

PROJECT MANUAL

STATE UNIVERSITY OF NEW YORK AT OSWEGO OSWEGO, NY

FUNNELLE HALL BATHROOM RENOVATION

100% CONSTRUCTION DOCUMENTS SUBMISSION

JDE NUMBER: 3190109999

DATE: 12/14/2018

VOLUME 1 OF 1

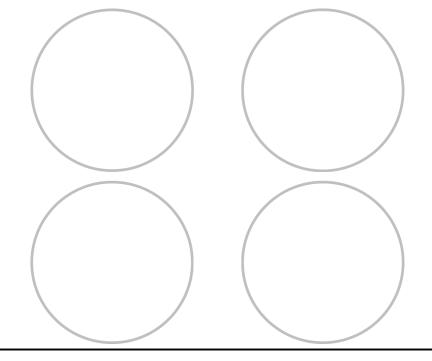
BELL & SPINA ARCHITECTS - PLANNERS PC

215 WYOMING STREET, #201

SYRACUSE, NY 13204

315-488-0377

Seals & Signatures



515 BROADWAY ALBANY, NY 12207-2964 518.257.3000

1 PENN PLAZA NEW YORK, NY 10119-0098 212.273.5000 800.992.2788

539 FRANKLIN STREET BUFFALO, NY 14202-1109 716.884.9780

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515 Broadway Albany, New York 12207-2964

T 518.257.3000 **F** 518.257.3100

NEW YORK OFFICE

One Penn Plaza, 52nd Fl. New York, New York 10119-0098

T 212.273.5000 **F** 212.273.5121

BUFFALO OFFICE

539 Franklin Street Buffalo, New York 14202-1109

T 716.884.9780 **F** 716.884.9787

www.dasny.org

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Construction Bidding Requirements

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BUFFALO OFFICE

539 Franklin Street Buffalo, New York 14202-1109

T 716.884.9780 **F** 716.884.9787

www.dasny.org

NOTICE TO BIDDERS

PLACE HOLDER

PROJECT SPECIFIC NOTICE TO BIDDERS

TO BE PROVIDED BY DASNY CONTRACTS UNIT

UPON APPROVAL FOR BIDDING

INFORMATION FOR BIDDERS

PLACE HOLDER

PROJECT SPECIFIC INFORMATION FOR BIDDERS

TO BE PROVIDED BY DASNY CONTRACTS UNIT

UPON APPROVAL FOR BIDDING

FORM OF BID

TO THE DORMITORY AUTHORITY OF THE STATE OF NEW YORK (Owner)

For
(Title of Project)
Pursuant to and in compliance with the Owner's Notice to Bidders dated and the Contract Documents relating hereto, the undersigned hereby offers to Provide all plant, labor, materials, supplies, equipment, Allowances, if applicable and other facilities and things necessary or proper for or incidental to the Work of:
(Contract Type or Trade)
as required by, and in strict accordance with applicable Contract Documents, including written changes thereto, and addenda issued by the Owner and sent to the undersigned or delivered to the bidder or available to the bidder prior to the opening of bids, whether received by the undersigned or not, for the total sum of:
(Written Dollar Amount)
(\$
(Figure Dollar Amount)
The above Written Dollar Amount is the undersigned's bid and no other number on any page submitted with this page 1 of the FORM OF BID can be the undersigned's bid under any circumstance.
The bid may be withdrawn at any time prior to the scheduled time for the opening of bids or any authorized postponement thereof.
If the Letter of Intent is sent or delivered to the undersigned within sixty (60) days after the date of opening of the bids, or any time thereafter before the bid is withdrawn, the undersigned shall, within fourteen (14) days after the date of such Letter of Intent, execute and deliver the Agreement in the form included in the Contract Documents.
The undersigned hereby designates as the undersigned's office to which the Letter of Intent may be sent or delivered:
Name:
Firm's Legal Name:
Street Address:
PO Box #:
City, State, Zip Code:
Email Address:

FORM OF BID

Non-collusive Bidding Certification

By submission of this bid, each bidder and each person signing on behalf of any bidder certifies, and, in the case of a joint bid, each party thereto certifies as to its own organization, under penalty of perjury, that to the best of its knowledge and belief:

- 1. The prices in the bid have been arrived at independently without collusion, consultation, communication or agreement, for the purpose of restricting competition, as to any matter relating to such prices with any other bidder or with any competitor;
- 2. Unless otherwise required by law, the prices which have been quoted in the bid have not been knowingly disclosed by the bidder and will not knowingly be disclosed by the bidder prior to opening, directly or indirectly, to any other bidder or to any competitor; and
- 3. No attempt has been made or will be made by the bidder to induce any other person, partnership, or corporation to submit or not to submit a bid for the purpose of restricting competition.

Date:
Firm's Legal Name:
Street Address:
City, State, Zip Code:
By:
(Signature of Officer)
Title:
Officer Name:
(Print)
Phone Number:
Fax Number:
E-Mail Address:
Taxpayer ID or Social Security Number

Submit Bid to:
DASNY
Attn: CONTRACTS UNIT – BID ENCLOSED
515 Broadway
Albany, New York 12207

2005 PROCUREMENT LOBBYING LAW - CERTIFICATION

The bidder shall submit this form at time of bid.

Th	e bidder	must check all ap	pplicable boxes.	
A.	Bidder	affirmation relati	ng to procedures g	overning permissible contacts
	1.	. The bidder:	affirms	does not affirm
		Authority's pro		ate and agrees hereinafter to comply with the Dormitory o permissible contacts for this procurement as required by d § 139–k (6) (b).
В.			dings of non-resp nent Lobbying Lav	consibility and prior contract terminations or withholdings
	1.		-	s defined in State Finance Law § 139-j and § 139-k made and bidder was not responsible?
		☐ No		☐ Yes
	2.	information requ	uired by State Fina	finding(s) the intentional provision of false or incomplete ance Law § 139-j and § 139-k, and/or the failure to comply ance Law § 139-j (3) relating to permissible contacts?
		☐ No		☐ Yes
	3.	If yes, provide of pages, if necessary		ach finding of non-responsibility below. (Attach additional
Go	vernmer	ntal Entity:		
Da	te of Fin	nding:		
Ba	sis of Fi	nding:		

2005 PROCUREMENT LOBBYING LAW - CERTIFICATION

4.	terminated or withhel provision of false or i	d a procurement contract wincomplete information require	te Finance Law § 139-j and § 139-k/ith the Bidder due to the intentional red by such Laws and/or the failure to aw § 139-k(3) relating to permissible
	contacts?	_	
	☐ No	Yes	
5.	If yes, provide details b	pelow. (Attach additional page	es, if necessary).
Governme	ental Entity:		
Date of To	ermination or Withholdin	g of Contract:	
Basis of T	Cermination or Withholdir	ng of Contract:	
C. Certif	fication		
felony une 210.45, ar 18 U.S.C.	der Penal Law Section 2 nd may also be punishable Section 1001; and states	10.40 or a misdemeanor under by a fine of up to \$10,000 or	misleading information may constitute a er Penal Law Section 210.35 or Section r imprisonment of up to five years under to the Dormitory Authority with respect ccurate.
	(Officer's Signature)		(Date)
Firms Leg	gal Name:		
Print Offic	cer's Name:		

CODE of BUSINESS ETHICS - CERTIFICATION

The bidder shall submit this form at time of bid.

A. Ethics Programs

- 1. The Dormitory Authority of the State of New York (the "Authority"), a public-benefit corporation, expects the highest degree of ethical business conduct by its employees and the many contractors, consultants and vendors with whom it interacts on behalf of its clients, bondholders and the people of the State of New York. The Authority, by mandate of its Board of Directors, administers a comprehensive corporate integrity program to ensure that, as public officers, Authority employees at all levels perform their official duties consistent with the requirements of the *New York State Public Officers Law*; other applicable laws, rules, and regulations; and policies of the Authority.
- 2. The Authority encourages and supports a fair, open and honest business relationship with its contractors, consultants and vendors based on quality, service and cost. Moreover, the Authority believes that a "level playing field" in the marketplace can only be achieved through adherence to ethical business practices by all participants involved in the process.
- 3. To promote a working relationship with the Authority based on ethical business practices, contractors, consultants and vendors are expected to:
 - a. furnish all goods, materials and services to the Authority as contractually required and specified;
 - b. submit complete and accurate reports to the Authority and its representatives as required;
 - c. not seek, solicit, demand or accept any information, verbal or written, from the Authority or its representatives that provides an unfair advantage over a competitor;
 - d. not engage in any activity or course of conduct that restricts open and fair competition on Authority-related projects and transactions;
 - e. not engage in any course of conduct with Authority employees or representatives that constitutes a conflict of interest or creates the appearance of a conflict of interest;
 - f. not offer any unlawful gifts or gratuities to Authority employees or representatives, or engage in bribery or other criminal activity; and
 - g. report to the Authority any activity by an Authority employee or contractor, consultant or vendor of the Authority that is inconsistent with the Authority's *Code of Business Ethics*.
- 4. The Authority encourages its contractors, consultants and vendors to advance and support ethical business conduct and practices among their respective directors, officers and employees, preferably through the adoption of corporate ethics awareness training programs and written codes of conduct. In addition to considering technical competence and financial stability, the Authority will consider the corporate integrity of all contractors, consultants and vendors prior to the awarding of contracts or issuing of purchase orders.

B. Conduct of Authority Employees

Authority employees are expected to conduct business with contractors, consultants and vendors in a fair, consistent and professional manner. The Authority's Code of Business Ethics and Employee Conduct entitled *Serving Responsibly*, and other Authority policies and procedures, guide the manner in which Authority employees are required to interact with contractors, consultants and vendors. Additionally, the New York State Public Officers Law sets forth legal parameters within which Authority employees must perform their official duties with respect to, among other things, conflicts of interest and the acceptance of gifts.

CODE of BUSINESS ETHICS - CERTIFICATION

C. Limits on Gifts to Authority Employees

- 1. Pursuant to Section 73(5) of the Public Officers Law, no person shall offer any gift having more than a nominal value to an Authority employee under circumstances in which it:
 - a. could be reasonably inferred the gift was intended to influence the employee in the performance of his or her official duties;, or
 - b. could reasonably be expected to influence the employee in the performance of his or her official duties:, or
 - c. was intended as a reward for any official action on the part of the employee.
- 2. A gift is anything more than nominal in value, in any form, given to an Authority employee. Gifts include, but are not limited to, money, service, loan, travel, lodging, meals, refreshments, entertainment, discount, forbearance or promise. Any firm or its agents, either doing business or seeking to do business with the Authority (contractors, consultants, vendors, etc.), is prohibited from directly or indirectly offering or giving any gifts, even gifts of nominal value, to Authority employees as such gifts are deemed to be *per se* improper.
- 3. As is stated in the *Prohibited Interests* section of the Construction and Consultant Contract documents, violations of these gift provisions may be grounds for immediate contract termination and/or referral for civil action or criminal prosecution.

D. Employing Relatives of Authority Employees

Although contractors, consultants and vendors may employ relatives of Authority employees, the Authority must be made aware of such circumstances as soon as possible, preferably in writing, to ensure a conflict of interest situation does not arise. The Authority reserves the right to request that contractors, consultants and vendors modify the work assignment of an Authority employee's relative where a conflict of interest, or the appearance thereof, is deemed to exist. Please be advised that Authority employees are required to disclose information regarding the hiring of relatives by contractors, consultants and vendors and recuse themselves from matters that may present a conflict of interest. For purposes of this document, the term "relatives" refers to spouses, domestic partners, parents, children, sisters, brothers, sisters-in-law, brothers-in-law, parents-in-law, sons/daughters-in-law, stepparents, stepchildren, aunts, uncles, nieces, nephews, first cousins, grandparents by blood relationship or by marriage, or persons residing in the same household.

E. Hiring Former Authority Employees

Contractors, consultants and vendors may hire former Authority employees. However, as a general rule, former employees of the Authority may neither appear nor practice before the Authority, nor receive compensation for services rendered on a matter before the Authority, for a period of *two years* following their separation from Authority service. In addition, former Authority employees are subject to a "lifetime bar" from appearing before the Authority or receiving compensation for services regarding any transaction in which they personally participated or which was under their active consideration during their tenure with the Authority. Violations will be referred to the New York State Commission on Public Integrity for appropriate action.

CODE of BUSINESS ETHICS - CERTIFICATION

F. Questions

Questions relating to these guidelines should be directed to the responsible Authority Project Manager or Program Director, Director of Procurement, the Authority's Ethics Officer or Director of Internal Affairs. To contact any of these individuals please call: (518) 257-3000.

When in doubt, please seek guidance.

G. Certification

I have read the foregoing and agree to comply with the Authority's Code of Business Ethics.	I further
acknowledge that failure to comply shall justify contract termination by the Authority and may	y result ir
the rejection of bids or proposals for future work with the Authority.	

(Officer's Signature)	(Date)	
Firm's Legal Name:		
Print Officer's Name		_
Title		

COMPLIANCE WITH LAWS - CERTIFICATION

The bidder shall submit this form at time of bid.

The bidder agrees that, except in any instance in which the bidder has obtained identical certifications from proposed Subcontractors for specific time periods, such bidder shall obtain identical certifications from proposed Subcontractors prior to the award of subcontracts exceeding Ten Thousand Dollars (\$10,000), and that such bidder shall retain such certifications in the files of such bidder.

A. Non Segregated Facilities

The bidder certifies that such bidder does not, nor shall not, maintain or provide for the employees of such bidder any segregated facilities at any establishments, and that the bidder does not, nor shall not, permit the employees of such bidder to perform the services of such employees at any location under the control of such bidder where segregated facilities are maintained. The bidder agrees that a breach of this certification is a violation of the nondiscrimination clauses of the Contract.

B. Non-discrimination in Employment in Northern Ireland

The bidder stipulates that it, and any individual or legal entity in which the bidder holds a ten percent (10%) or greater ownership interest, and any such entity that holds such an interest in the bidder, either:

- 1. has no business operations in Northern Ireland; or
- 2. shall take all lawful steps in good faith to conduct any business operations it has or in which it has such an interest in Northern Ireland in accordance with the MacBride Fair Employment Principles as set forth in Chapter 807 of the Laws of 1992 and shall permit any independent monitoring of its compliance with said Principles.

C. Federal Equal Employment Opportunity Act

The bidder attests to its compliance with the Federal Equal Employment Opportunity Act of 1972 (P.L. 92-261), as amended.

D. Commitment to Opportunity Programs

The bidder agrees to be bound in accordance with NYS Executive Law Article 15-A, and in conformance with Regulations promulgated by the Division of Minority and Women's Business Development of the NYS Department of Economic Development. A list of NYS certified M/WBEs may be obtained from the ESDC directory of certified businesses located at www.nylovesmwbe.ny.gov.

E. Transfer of Offset Credits

The bidder acknowledges notice that the Dormitory Authority may assign or otherwise transfer offset credits created by this contract to third parties located in New York State.

COMPLIANCE WITH LAWS - CERTIFICATION

F. Certification

The bidder acknowledges that intentional submission of false or misleading information may constitute a felony under Penal Law Section 210.40 or a misdemeanor under Penal Law Section 210.35 or Section 210.45, and may also be punishable by a fine of up to \$10,000 or imprisonment of up to five years under 18 U.S.C. Section 1001; and states that all information provided to the Dormitory Authority is complete, true and accurate.

(Officer's Signature)	(Date)
Firms Legal Name:	
Print Officer's Name:	
Title:	

BID BOND

KNOW ALL PERSONS BY THESE PRESENTS, that we:
as Principal
(Legal Title of the Bidder)
and as Surety
(Legal Title of the Surety)
are hereby held and firmly bound unto the Dormitory Authority - State of New York in the penal sum of:
(Amount)
or in the full and just sum of the difference between the total bid of the Principal and the total bid of the bidder submitting the next lowest bid, whichever sum shall be higher, for the payment of which, well an truly to be made, we hereby jointly and severally bind ourselves, our heirs, executors, administrators successors and assigns.
Signed this day of 20
Whereas the Principal has submitted to the Dormitory Authority - State of New York a certain bid, mad a part hereof, to enter into a Contract in writing for the:
(Title of Project)

NOW, THEREFORE the conditions of this obligation is such that::

- A. This obligation shall be void:
 - 1. If said bid shall be rejected or in the alternate.
 - 2. If said bid shall be accepted and the Principal shall execute and deliver the Agreement in the form attached hereto (properly completed; in accordance with said bid) and shall furnish bonds for the faithful performance of said Contract by the Principal, and for the payment of persons performing labor or furnishing materials in connection therewith, and shall in all other respects perform the Contract created by the acceptance of said bid.

Otherwise the same shall remain in force and effect; it being expressly understood and agreed that the liability of the Surety for any and all claims hereunder shall, in no event, exceed the penal amount of this obligation as herein stated.

- B. The penal sum of this Bond is in addition to any other Bond furnished by the Contractor and in no way shall be impaired or affected by any other Bond.
- C. The Surety, for value received, hereby stipulates and agrees that the obligations of said Surety and said Surety's Bond in no way shall be impaired or affected by any extension of time within which the Owner may accept such bid; and said Surety does hereby waive notice of any such extension.

BID BOND

IN WITNESS WHEREOF:

the parties hereto have executed this Bond the day and year first above written.

IN THE PRESENCE OF:	
(Principal)	(Surety)
(Signature)	(Signature)
(Title)	(Title)
(Address)	(Address)
(City, State, Zip Code)	(City, State, Zip Code)
(Phone Number & FAX Number)	(Phone Number & FAX Number)
(Email Address)	(Email Address)



Request for Taxpayer Identification Number and Certification

Go to www.irs.gov/FormW9 for instructions and the latest information.

Give Form to the requester. Do not send to the IRS.

interna	Revenue Service	Go to www.irs.gov/Formivg for instructions and the lates	t illiorillation.		
	1 Name (as show	n on your income tax return). Name is required on this line; do not leave this line blank.			
	2 Business name/	disregarded entity name, if different from above			
Print or type. Specific Instructions on page 3.	following seven Individual/sol	3 Check appropriate box for federal tax classification of the person whose name is entered on line 1. Check only one of the following seven boxes. Individual/sole proprietor or C Corporation S Corporation Partnership Trust/estate			
e.	single-memb	er LLC		Exempt payee code (if any)	
뜢볒	Limited liability company. Enter the tax classification (C=C corporation, S=S corporation, P=Partnership) ▶				
Print or type. c Instructions	Note: Check the appropriate box in the line above for the tax classification of the single-member owner. Do not check LLC if the LLC is classified as a single-member LLC that is disregarded from the owner unless the owner of the LLC is another LLC that is not disregarded from the owner for U.S. federal tax purposes. Otherwise, a single-member LLC that			Exemption from FATCA reporting code (if any)	
_ ≝	l	d from the owner should check the appropriate box for the tax classification of its owner.		(Applies to account maintained subside the U.S.)	
bec		nstructions) >	Poguostor's name a	(Applies to accounts maintained outside the U.S.)	
5 Address (number, street, and apt. or suite no.) See instructions. Requester's name and address (optional)			nu address (optional)		
0,	6 City, state, and 2	ZIP code			
	7 List account nun	nber(s) here (optional)			
Par	Taxpa	yer Identification Number (TIN)			
backu reside entitie TIN, la	Enter your TIN in the appropriate box. The TIN provided must match the name given on line 1 to avoid backup withholding. For individuals, this is generally your social security number (SSN). However, for a resident alien, sole proprietor, or disregarded entity, see the instructions for Part I, later. For other entities, it is your employer identification number (EIN). If you do not have a number, see <i>How to get a TIN</i> , later.				
Note: If the account is in more than one name, see the instructions for line 1. Also see What Name and Number To Give the Requester for guidelines on whose number to enter.			-		
Par	Certif	ication			
Under	penalties of perju	ury, I certify that:			
 The number shown on this form is my correct taxpayer identification number (or I am waiting for a number to be issued to me); and I am not subject to backup withholding because: (a) I am exempt from backup withholding, or (b) I have not been notified by the Internal Revenue Service (IRS) that I am subject to backup withholding as a result of a failure to report all interest or dividends, or (c) the IRS has notified me that I am no longer subject to backup withholding; and 					
3. I am a U.S. citizen or other U.S. person (defined below); and					
4. The	4. The FATCA code(s) entered on this form (if any) indicating that I am exempt from FATCA reporting is correct.				
you ha	Certification instructions. You must cross out item 2 above if you have been notified by the IRS that you are currently subject to backup withholding because you have failed to report all interest and dividends on your tax return. For real estate transactions, item 2 does not apply. For mortgage interest paid, acquisition or abandonment of secured property, cancellation of debt, contributions to an individual retirement arrangement (IRA), and generally, payments other than interest and dividends, you are not required to sign the certification, but you must provide your correct TIN. See the instructions for Part II, later.				
Sign Here			Date ►		
	<u> </u>	1			

General Instructions

Section references are to the Internal Revenue Code unless otherwise noted

Future developments. For the latest information about developments related to Form W-9 and its instructions, such as legislation enacted after they were published, go to www.irs.gov/FormW9.

Purpose of Form

An individual or entity (Form W-9 requester) who is required to file an information return with the IRS must obtain your correct taxpayer identification number (TIN) which may be your social security number (SSN), individual taxpayer identification number (ITIN), adoption taxpayer identification number (ATIN), or employer identification number (EIN), to report on an information return the amount paid to you, or other amount reportable on an information return. Examples of information returns include, but are not limited to, the following.

Form 1099-INT (interest earned or paid)

- Form 1099-DIV (dividends, including those from stocks or mutual funds)
- Form 1099-MISC (various types of income, prizes, awards, or gross proceeds)
- Form 1099-B (stock or mutual fund sales and certain other transactions by brokers)
- Form 1099-S (proceeds from real estate transactions)
- Form 1099-K (merchant card and third party network transactions)
- Form 1098 (home mortgage interest), 1098-E (student loan interest), 1098-T (tuition)
- Form 1099-C (canceled debt)
- Form 1099-A (acquisition or abandonment of secured property)

Use Form W-9 only if you are a U.S. person (including a resident alien), to provide your correct TIN.

If you do not return Form W-9 to the requester with a TIN, you might be subject to backup withholding. See What is backup withholding, later.

By signing the filled-out form, you:

- 1. Certify that the TIN you are giving is correct (or you are waiting for a number to be issued).
 - 2. Certify that you are not subject to backup withholding, or
- 3. Claim exemption from backup withholding if you are a U.S. exempt payee. If applicable, you are also certifying that as a U.S. person, your allocable share of any partnership income from a U.S. trade or business is not subject to the withholding tax on foreign partners' share of effectively connected income, and
- 4. Certify that FATCA code(s) entered on this form (if any) indicating that you are exempt from the FATCA reporting, is correct. See *What is FATCA reporting*, later, for further information.

Note: If you are a U.S. person and a requester gives you a form other than Form W-9 to request your TIN, you must use the requester's form if it is substantially similar to this Form W-9.

Definition of a U.S. person. For federal tax purposes, you are considered a U.S. person if you are:

- An individual who is a U.S. citizen or U.S. resident alien;
- A partnership, corporation, company, or association created or organized in the United States or under the laws of the United States;
- · An estate (other than a foreign estate); or
- A domestic trust (as defined in Regulations section 301.7701-7).

Special rules for partnerships. Partnerships that conduct a trade or business in the United States are generally required to pay a withholding tax under section 1446 on any foreign partners' share of effectively connected taxable income from such business. Further, in certain cases where a Form W-9 has not been received, the rules under section 1446 require a partnership to presume that a partner is a foreign person, and pay the section 1446 withholding tax. Therefore, if you are a U.S. person that is a partner in a partnership conducting a trade or business in the United States, provide Form W-9 to the partnership to establish your U.S. status and avoid section 1446 withholding on your share of partnership income.

In the cases below, the following person must give Form W-9 to the partnership for purposes of establishing its U.S. status and avoiding withholding on its allocable share of net income from the partnership conducting a trade or business in the United States.

- In the case of a disregarded entity with a U.S. owner, the U.S. owner of the disregarded entity and not the entity;
- In the case of a grantor trust with a U.S. grantor or other U.S. owner, generally, the U.S. grantor or other U.S. owner of the grantor trust and not the trust; and
- In the case of a U.S. trust (other than a grantor trust), the U.S. trust (other than a grantor trust) and not the beneficiaries of the trust.

Foreign person. If you are a foreign person or the U.S. branch of a foreign bank that has elected to be treated as a U.S. person, do not use Form W-9. Instead, use the appropriate Form W-8 or Form 8233 (see Pub. 515, Withholding of Tax on Nonresident Aliens and Foreign Entities).

Nonresident alien who becomes a resident alien. Generally, only a nonresident alien individual may use the terms of a tax treaty to reduce or eliminate U.S. tax on certain types of income. However, most tax treaties contain a provision known as a "saving clause." Exceptions specified in the saving clause may permit an exemption from tax to continue for certain types of income even after the payee has otherwise become a U.S. resident alien for tax purposes.

If you are a U.S. resident alien who is relying on an exception contained in the saving clause of a tax treaty to claim an exemption from U.S. tax on certain types of income, you must attach a statement to Form W-9 that specifies the following five items.

- 1. The treaty country. Generally, this must be the same treaty under which you claimed exemption from tax as a nonresident alien.
 - 2. The treaty article addressing the income.
- 3. The article number (or location) in the tax treaty that contains the saving clause and its exceptions.
- 4. The type and amount of income that qualifies for the exemption from tax.
- 5. Sufficient facts to justify the exemption from tax under the terms of the treaty article.

Example. Article 20 of the U.S.-China income tax treaty allows an exemption from tax for scholarship income received by a Chinese student temporarily present in the United States. Under U.S. law, this student will become a resident alien for tax purposes if his or her stay in the United States exceeds 5 calendar years. However, paragraph 2 of the first Protocol to the U.S.-China treaty (dated April 30, 1984) allows the provisions of Article 20 to continue to apply even after the Chinese student becomes a resident alien of the United States. A Chinese student who qualifies for this exception (under paragraph 2 of the first protocol) and is relying on this exception to claim an exemption from tax on his or her scholarship or fellowship income would attach to Form W-9 a statement that includes the information described above to support that exemption.

If you are a nonresident alien or a foreign entity, give the requester the appropriate completed Form W-8 or Form 8233.

Backup Withholding

What is backup withholding? Persons making certain payments to you must under certain conditions withhold and pay to the IRS 28% of such payments. This is called "backup withholding." Payments that may be subject to backup withholding include interest, tax-exempt interest, dividends, broker and barter exchange transactions, rents, royalties, nonemployee pay, payments made in settlement of payment card and third party network transactions, and certain payments from fishing boat operators. Real estate transactions are not subject to backup withholding.

You will not be subject to backup withholding on payments you receive if you give the requester your correct TIN, make the proper certifications, and report all your taxable interest and dividends on your tax return.

Payments you receive will be subject to backup withholding if:

- 1. You do not furnish your TIN to the requester,
- 2. You do not certify your TIN when required (see the instructions for Part II for details),
 - 3. The IRS tells the requester that you furnished an incorrect TIN,
- 4. The IRS tells you that you are subject to backup withholding because you did not report all your interest and dividends on your tax return (for reportable interest and dividends only), or
- 5. You do not certify to the requester that you are not subject to backup withholding under 4 above (for reportable interest and dividend accounts opened after 1983 only).

Certain payees and payments are exempt from backup withholding. See *Exempt payee code*, later, and the separate Instructions for the Requester of Form W-9 for more information.

Also see Special rules for partnerships, earlier.

What is FATCA Reporting?

The Foreign Account Tax Compliance Act (FATCA) requires a participating foreign financial institution to report all United States account holders that are specified United States persons. Certain payees are exempt from FATCA reporting. See *Exemption from FATCA reporting code*, later, and the Instructions for the Requester of Form W-9 for more information.

Updating Your Information

You must provide updated information to any person to whom you claimed to be an exempt payee if you are no longer an exempt payee and anticipate receiving reportable payments in the future from this person. For example, you may need to provide updated information if you are a C corporation that elects to be an S corporation, or if you no longer are tax exempt. In addition, you must furnish a new Form W-9 if the name or TIN changes for the account; for example, if the grantor of a grantor trust dies.

Penalties

Failure to furnish TIN. If you fail to furnish your correct TIN to a requester, you are subject to a penalty of \$50 for each such failure unless your failure is due to reasonable cause and not to willful neglect.

Civil penalty for false information with respect to withholding. If you make a false statement with no reasonable basis that results in no backup withholding, you are subject to a \$500 penalty.

Criminal penalty for falsifying information. Willfully falsifying certifications or affirmations may subject you to criminal penalties including fines and/or imprisonment.

Misuse of TINs. If the requester discloses or uses TINs in violation of federal law, the requester may be subject to civil and criminal penalties.

Specific Instructions

Line 1

You must enter one of the following on this line; **do not** leave this line blank. The name should match the name on your tax return.

If this Form W-9 is for a joint account (other than an account maintained by a foreign financial institution (FFI)), list first, and then circle, the name of the person or entity whose number you entered in Part I of Form W-9. If you are providing Form W-9 to an FFI to document a joint account, each holder of the account that is a U.S. person must provide a Form W-9.

a. **Individual.** Generally, enter the name shown on your tax return. If you have changed your last name without informing the Social Security Administration (SSA) of the name change, enter your first name, the last name as shown on your social security card, and your new last name.

Note: ITIN applicant: Enter your individual name as it was entered on your Form W-7 application, line 1a. This should also be the same as the name you entered on the Form 1040/1040A/1040EZ you filed with your application.

- b. **Sole proprietor or single-member LLC.** Enter your individual name as shown on your 1040/1040A/1040EZ on line 1. You may enter your business, trade, or "doing business as" (DBA) name on line 2.
- c. Partnership, LLC that is not a single-member LLC, C corporation, or S corporation. Enter the entity's name as shown on the entity's tax return on line 1 and any business, trade, or DBA name on line 2.
- d. Other entities. Enter your name as shown on required U.S. federal tax documents on line 1. This name should match the name shown on the charter or other legal document creating the entity. You may enter any business, trade, or DBA name on line 2.
- e. **Disregarded entity.** For U.S. federal tax purposes, an entity that is disregarded as an entity separate from its owner is treated as a "disregarded entity." See Regulations section 301.7701-2(c)(2)(iii). Enter the owner's name on line 1. The name of the entity entered on line 1 should never be a disregarded entity. The name on line 1 should be the name shown on the income tax return on which the income should be reported. For example, if a foreign LLC that is treated as a disregarded entity for U.S. federal tax purposes has a single owner that is a U.S. person, the U.S. owner's name is required to be provided on line 1. If the direct owner of the entity is also a disregarded entity, enter the first owner that is not disregarded for federal tax purposes. Enter the disregarded entity's name on line 2, "Business name/disregarded entity name." If the owner of the disregarded entity is a foreign person, the owner must complete an appropriate Form W-8 instead of a Form W-9. This is the case even if the foreign person has a U.S. TIN.

Line 2

If you have a business name, trade name, DBA name, or disregarded entity name, you may enter it on line 2.

Line 3

Check the appropriate box on line 3 for the U.S. federal tax classification of the person whose name is entered on line 1. Check only one box on line 3.

IF the entity/person on line 1 is a(n)	THEN check the box for
Corporation	Corporation
 Individual Sole proprietorship, or Single-member limited liability company (LLC) owned by an individual and disregarded for U.S. federal tax purposes. 	Individual/sole proprietor or single- member LLC
 LLC treated as a partnership for U.S. federal tax purposes, LLC that has filed Form 8832 or 2553 to be taxed as a corporation, or LLC that is disregarded as an entity separate from its owner but the owner is another LLC that is not disregarded for U.S. federal tax purposes. 	Limited liability company and enter the appropriate tax classification. (P= Partnership; C= C corporation; or S= S corporation)
Partnership	Partnership
Trust/estate	Trust/estate

Line 4, Exemptions

If you are exempt from backup withholding and/or FATCA reporting, enter in the appropriate space on line 4 any code(s) that may apply to you.

Exempt payee code.

- Generally, individuals (including sole proprietors) are not exempt from backup withholding.
- Except as provided below, corporations are exempt from backup withholding for certain payments, including interest and dividends.
- Corporations are not exempt from backup withholding for payments made in settlement of payment card or third party network transactions.
- Corporations are not exempt from backup withholding with respect to attorneys' fees or gross proceeds paid to attorneys, and corporations that provide medical or health care services are not exempt with respect to payments reportable on Form 1099-MISC.

The following codes identify payees that are exempt from backup withholding. Enter the appropriate code in the space in line 4.

- 1—An organization exempt from tax under section 501(a), any IRA, or a custodial account under section 403(b)(7) if the account satisfies the requirements of section 401(f)(2)
- 2—The United States or any of its agencies or instrumentalities
- 3—A state, the District of Columbia, a U.S. commonwealth or possession, or any of their political subdivisions or instrumentalities
- 4—A foreign government or any of its political subdivisions, agencies, or instrumentalities
- 5—A corporation
- 6—A dealer in securities or commodities required to register in the United States, the District of Columbia, or a U.S. commonwealth or possession
- 7—A futures commission merchant registered with the Commodity Futures Trading Commission
- 8-A real estate investment trust
- 9—An entity registered at all times during the tax year under the Investment Company Act of 1940
- 10—A common trust fund operated by a bank under section 584(a)
- 11—A financial institution
- 12—A middleman known in the investment community as a nominee or custodian
- 13—A trust exempt from tax under section 664 or described in section 4947

The following chart shows types of payments that may be exempt from backup withholding. The chart applies to the exempt payees listed above, 1 through 13.

IF the payment is for	THEN the payment is exempt for
Interest and dividend payments	All exempt payees except for 7
Broker transactions	Exempt payees 1 through 4 and 6 through 11 and all C corporations. S corporations must not enter an exempt payee code because they are exempt only for sales of noncovered securities acquired prior to 2012.
Barter exchange transactions and patronage dividends	Exempt payees 1 through 4
Payments over \$600 required to be reported and direct sales over \$5,0001	Generally, exempt payees 1 through 5 ²
Payments made in settlement of payment card or third party network transactions	Exempt payees 1 through 4

¹ See Form 1099-MISC, Miscellaneous Income, and its instructions.

Exemption from FATCA reporting code. The following codes identify payees that are exempt from reporting under FATCA. These codes apply to persons submitting this form for accounts maintained outside of the United States by certain foreign financial institutions. Therefore, if you are only submitting this form for an account you hold in the United States, you may leave this field blank. Consult with the person requesting this form if you are uncertain if the financial institution is subject to these requirements. A requester may indicate that a code is not required by providing you with a Form W-9 with "Not Applicable" (or any similar indication) written or printed on the line for a FATCA exemption code.

A—An organization exempt from tax under section 501(a) or any individual retirement plan as defined in section 7701(a)(37)

B—The United States or any of its agencies or instrumentalities

C—A state, the District of Columbia, a U.S. commonwealth or possession, or any of their political subdivisions or instrumentalities

D—A corporation the stock of which is regularly traded on one or more established securities markets, as described in Regulations section 1.1472-1(c)(1)(i)

E—A corporation that is a member of the same expanded affiliated group as a corporation described in Regulations section 1.1472-1(c)(1)(i)

F—A dealer in securities, commodities, or derivative financial instruments (including notional principal contracts, futures, forwards, and options) that is registered as such under the laws of the United States or any state

G—A real estate investment trust

H—A regulated investment company as defined in section 851 or an entity registered at all times during the tax year under the Investment Company Act of 1940

I—A common trust fund as defined in section 584(a) J—

A bank as defined in section 581

K—A broker

L—A trust exempt from tax under section 664 or described in section 4947(a)(1)

M—A tax exempt trust under a section 403(b) plan or section 457(g) plan

Note: You may wish to consult with the financial institution requesting this form to determine whether the FATCA code and/or exempt payee code should be completed.

Line 5

Enter your address (number, street, and apartment or suite number). This is where the requester of this Form W-9 will mail your information returns. If this address differs from the one the requester already has on file, write NEW at the top. If a new address is provided, there is still a chance the old address will be used until the payor changes your address in their records.

Line 6

Enter your city, state, and ZIP code.

Part I. Taxpayer Identification Number (TIN)

Enter your TIN in the appropriate box. If you are a resident alien and you do not have and are not eligible to get an SSN, your TIN is your IRS individual taxpayer identification number (ITIN). Enter it in the social security number box. If you do not have an ITIN, see *How to get a TIN*

If you are a sole proprietor and you have an EIN, you may enter either your SSN or EIN.

If you are a single-member LLC that is disregarded as an entity separate from its owner, enter the owner's SSN (or EIN, if the owner has one). Do not enter the disregarded entity's EIN. If the LLC is classified as a corporation or partnership, enter the entity's EIN.

Note: See *What Name and Number To Give the Requester,* later, for further clarification of name and TIN combinations.

How to get a TIN. If you do not have a TIN, apply for one immediately. To apply for an SSN, get Form SS-5, Application for a Social Security Card, from your local SSA office or get this form online at www.SSA.gov. You may also get this form by calling 1-800-772-1213. Use Form W-7, Application for IRS Individual Taxpayer Identification Number, to apply for an ITIN, or Form SS-4, Application for Employer Identification Number, to apply for an EIN. You can apply for an EIN online by accessing the IRS website at www.irs.gov/Businesses and clicking on Employer Identification Number (EIN) under Starting a Business. Go to www.irs.gov/Forms to view, download, or print Form W-7 and/or Form SS-4. Or, you can go to www.irs.gov/OrderForms to place an order and have Form W-7 and/or SS-4 mailed to you within 10 business days.

If you are asked to complete Form W-9 but do not have a TIN, apply for a TIN and write "Applied For" in the space for the TIN, sign and date the form, and give it to the requester. For interest and dividend payments, and certain payments made with respect to readily tradable instruments, generally you will have 60 days to get a TIN and give it to the requester before you are subject to backup withholding on payments. The 60-day rule does not apply to other types of payments. You will be subject to backup withholding on all such payments until you provide your TIN to the requester.

Note: Entering "Applied For" means that you have already applied for a TIN or that you intend to apply for one soon.

Caution: A disregarded U.S. entity that has a foreign owner must use the appropriate Form W-8.

Part II. Certification

To establish to the withholding agent that you are a U.S. person, or resident alien, sign Form W-9. You may be requested to sign by the withholding agent even if item 1, 4, or 5 below indicates otherwise.

For a joint account, only the person whose TIN is shown in Part I should sign (when required). In the case of a disregarded entity, the person identified on line 1 must sign. Exempt payees, see *Exempt payee code*, earlier.

Signature requirements. Complete the certification as indicated in items 1 through 5 below.

² However, the following payments made to a corporation and reportable on Form 1099-MISC are not exempt from backup withholding: medical and health care payments, attorneys' fees, gross proceeds paid to an attorney reportable under section 6045(f), and payments for services paid by a federal executive agency.

- 1. Interest, dividend, and barter exchange accounts opened before 1984 and broker accounts considered active during 1983. You must give your correct TIN, but you do not have to sign the certification.
- 2. Interest, dividend, broker, and barter exchange accounts opened after 1983 and broker accounts considered inactive during 1983. You must sign the certification or backup withholding will apply. If you are subject to backup withholding and you are merely providing your correct TIN to the requester, you must cross out item 2 in the certification before signing the form.
- **3. Real estate transactions.** You must sign the certification. You may cross out item 2 of the certification.
- **4. Other payments.** You must give your correct TIN, but you do not have to sign the certification unless you have been notified that you have previously given an incorrect TIN. "Other payments" include payments made in the course of the requester's trade or business for rents, royalties, goods (other than bills for merchandise), medical and health care services (including payments to corporations), payments to a nonemployee for services, payments made in settlement of payment card and third party network transactions, payments to certain fishing boat crew members and fishermen, and gross proceeds paid to attorneys (including payments to corporations).
- 5. Mortgage interest paid by you, acquisition or abandonment of secured property, cancellation of debt, qualified tuition program payments (under section 529), ABLE accounts (under section 529A), IRA, Coverdell ESA, Archer MSA or HSA contributions or distributions, and pension distributions. You must give your correct TIN, but you do not have to sign the certification.

What Name and Number To Give the Requester

For this type of account:	Give name and SSN of:
1. Individual	The individual
Two or more individuals (joint account) other than an account maintained by an FFI	The actual owner of the account or, if combined funds, the first individual on the account ¹
Two or more U.S. persons (joint account maintained by an FFI)	Each holder of the account
Custodial account of a minor (Uniform Gift to Minors Act)	The minor ²
5. a. The usual revocable savings trust (grantor is also trustee)	The grantor-trustee ¹
b. So-called trust account that is not a legal or valid trust under state law	The actual owner ¹
Sole proprietorship or disregarded entity owned by an individual	The owner ³
7. Grantor trust filing under Optional Form 1099 Filing Method 1 (see Regulations section 1.671-4(b)(2)(i) (A))	The grantor*
For this type of account:	Give name and EIN of:
Disregarded entity not owned by an individual	The owner
9. A valid trust, estate, or pension trust	Legal entity ⁴
10. Corporation or LLC electing corporate status on Form 8832 or Form 2553	The corporation
Association, club, religious, charitable, educational, or other tax- exempt organization	The organization
12. Partnership or multi-member LLC	The partnership
13. A broker or registered nominee	The broker or nominee

For this type of account:	Give name and EIN of:
14. Account with the Department of Agriculture in the name of a public entity (such as a state or local government, school district, or prison) that receives agricultural program payments	The public entity
15. Grantor trust filing under the Form 1041 Filing Method or the Optional Form 1099 Filing Method 2 (see Regulations section 1.671-4(b)(2)(i)(B))	The trust

¹ List first and circle the name of the person whose number you furnish. If only one person on a joint account has an SSN, that person's number must be furnished.

- ³ You must show your individual name and you may also enter your business or DBA name on the "Business name/disregarded entity" name line. You may use either your SSN or EIN (if you have one), but the IRS encourages you to use your SSN.
- ⁴ List first and circle the name of the trust, estate, or pension trust. (Do not furnish the TIN of the personal representative or trustee unless the legal entity itself is not designated in the account title.) Also see *Special rules for partnerships*, earlier.

*Note: The grantor also must provide a Form W-9 to trustee of trust.

Note: If no name is circled when more than one name is listed, the number will be considered to be that of the first name listed.

Secure Your Tax Records From Identity Theft

Identity theft occurs when someone uses your personal information such as your name, SSN, or other identifying information, without your permission, to commit fraud or other crimes. An identity thief may use your SSN to get a job or may file a tax return using your SSN to receive a refund.

To reduce your risk:

- · Protect your SSN,
- Ensure your employer is protecting your SSN, and
- Be careful when choosing a tax preparer.

If your tax records are affected by identity theft and you receive a notice from the IRS, respond right away to the name and phone number printed on the IRS notice or letter.

If your tax records are not currently affected by identity theft but you think you are at risk due to a lost or stolen purse or wallet, questionable credit card activity or credit report, contact the IRS Identity Theft Hotline at 1-800-908-4490 or submit Form 14039.

For more information, see Pub. 5027, Identity Theft Information for Taxpayers.

Victims of identity theft who are experiencing economic harm or a systemic problem, or are seeking help in resolving tax problems that have not been resolved through normal channels, may be eligible for Taxpayer Advocate Service (TAS) assistance. You can reach TAS by calling the TAS toll-free case intake line at 1-877-777-4778 or TTY/TDD 1-800-829-4059.

Protect yourself from suspicious emails or phishing schemes. Phishing is the creation and use of email and websites designed to mimic legitimate business emails and websites. The most common act is sending an email to a user falsely claiming to be an established legitimate enterprise in an attempt to scam the user into surrendering private information that will be used for identity theft.

² Circle the minor's name and furnish the minor's SSN.

The IRS does not initiate contacts with taxpayers via emails. Also, the IRS does not request personal detailed information through email or ask taxpayers for the PIN numbers, passwords, or similar secret access information for their credit card, bank, or other financial accounts.

If you receive an unsolicited email claiming to be from the IRS, forward this message to <code>phishing@irs.gov</code>. You may also report misuse of the IRS name, logo, or other IRS property to the Treasury Inspector General for Tax Administration (TIGTA) at 1-800-366-4484. You can forward suspicious emails to the Federal Trade Commission at <code>spam@uce.gov</code> or report them at <code>www.ftc.gov/complaint</code>. You can contact the FTC at <code>www.ftc.gov/idtheft</code> or 877-IDTHEFT (877-438-4338). If you have been the victim of identity theft, see <code>www.ldentityTheft.gov</code> and Pub. 5027.

Visit www.irs.gov/ldentityTheft to learn more about identity theft and how to reduce your risk.

Privacy Act Notice

Section 6109 of the Internal Revenue Code requires you to provide your correct TIN to persons (including federal agencies) who are required to file information returns with the IRS to report interest, dividends, or certain other income paid to you; mortgage interest you paid; the acquisition or abandonment of secured property; the cancellation of debt; or contributions you made to an IRA, Archer MSA, or HSA. The person collecting this form uses the information on the form to file information returns with the IRS, reporting the above information. Routine uses of this information include giving it to the Department of Justice for civil and criminal litigation and to cities, states, the District of Columbia, and U.S. commonwealths and possessions for use in administering their laws. The information also may be disclosed to other countries under a treaty, to federal and state agencies to enforce civil and criminal laws, or to federal law enforcement and intelligence agencies to combat terrorism. You must provide your TIN whether or not you are required to file a tax return. Under section 3406, payers must generally withhold a percentage of taxable interest, dividend, and certain other payments to a payee who does not give a TIN to the payer. Certain penalties may also apply for providing false or fraudulent information.

Page 6

BID BOND

ACKNOWLEDGEMENT OF CONTRACTOR EXECUTING BID BOND IF A CORPORATION

STATE OF	
COUNTY OF	
On the day of	in the year 20, before me personally came
to me known, who, being by me of	uly sworn, did depose and say that he/she resides at:
that he/she is the	(street, city, state, zip code) of
the corporation described in and thereto by authority of the Board	which executed the foregoing instrument; and that he/she signed his/her name of Directors of said corporation.
Notary Public	
	EDGEMENT OF CONTRACTOR EXECUTING BID BOND RSHIP, LIMITED LIABILITY COMPANY OR INDIVIDUAL
STATE OF	
COUNTY OF	
State, personally appeared on the basis of satisfactory evi instrument and acknowledged to	in the year 20, before me, the undersigned, a Notary Public in and for said personally known or proved to medence to be the individual(s) whose name(s) is (are) subscribed to the within me that he/she/they executed the same in his/her/their capacity(ies), and that by instrument, the individual(s), or the person upon behalf of which the individual(s)
Notary Public	
	ACKNOWLEDGEMENT OF SURETY
STATE OF	
COUNTY OF	
	in the year 20, before me personally came uly sworn, did depose and say that he/she resides at:
	(street, city, state, zip code)
that he/she is thethe corporation described in and thereto by authority of the Board	which executed the foregoing instrument; and that he/she signed his/her name of Directors of said corporation.
Notary Public	



Construction Contract Forms

CORPORATE HEADQUARTERS

515 Broadway Albany, New York 12207-2964

T 518.257.3000 **F** 518.257.3100

NEW YORK OFFICE

One Penn Plaza, 52nd Fl. New York, New York 10119-0098

T 212.273.5000 F 212.273.5121

BUFFALO OFFICE

539 Franklin Street Buffalo, New York 14202-1109

T 716.884.9780 **F** 716.884.9787

www.dasny.org



UPSTATE: 515 Broadway * Albany, NY 12207-2964 * Phone: (518) 257-3706 Fax: (518) 257-3100

DOWNSTATE: One Penn Plaza, 52nd Floor * New York, NY * 10119-0098 * Phone: (212) 273-5038 Fax: (212) 273-5121

UTILIZATION PLAN

	ORIO	GINAL Submission	REVISED Submission	on 🗌	
A .	PRIME INFORMATION: CONTRACTOR CONSULTANT VENDOR				
	Name: Address: Contact Person: E-Mail Address:		City: State: Telephone Number:	-	
	PROJECT INFORMATI	ON: Project Number	: Work Authorization	# (if applicable)	
	Contract / Bid Number:	Contract / Bid Ar	nount: \$		
	MBE Goal %	\$ WBE Go	oal % \$		
1.	Facility Name: Building(s): Address: City: County: Work Description: Schedule of proposed su	Zip: ubcontract work:			
	Trade/Service	Amount	Trade/Service	Amount	
		\$		\$	
		\$		\$	
		\$		\$	
		\$		\$	
		\$		\$	
		\$		\$	
2.	Description of Equipme	ent, Materials or Suj	pplies	Estimated Amount \$ \$ \$ \$ \$ \$ \$	

UTILIZATION PLAN

B. List <u>ALL</u> subcontractors and suppliers you plan to utilize during the performance of this contract:

*** NOTE: A completed Scope Verification Form AAP 10.0 (06/10) must accompany this Utilization Plan for each M/WBE and SDVOB <u>subcontractor</u> listed. A blank form is included in the Contract Documents. Incomplete or non-submittal of the form(s) will delay approval of the Utilization Plan.

•	Firm Name:		Value of Proposed Award: \$
	Address:	7.	Fed ID No.
	City: State:	Zip:	Estimated Start Date:
	Contact Person:		Telephone:
	Email Address:		Type of Firm: MBE WBE SDVOB
	Work Description:		OTHER
•	Firm Name:		Value of Proposed Award: \$
	Address:		Fed ID No.
	City: State:	Zip:	Estimated Start Date:
	Contact Person:	-	Telephone:
	Email Address:		Type of Firm: MBE WBE SDVOB
	Work Description:		OTHER
	Firm Name:		Value of Proposed Award: \$
	Address:		Fed ID No.
	City: State:	Zip:	Estimated Start Date:
	Contact Person:	r·	Telephone:
	Email Address:		Type of Firm: MBE WBE SDVOB
	Work Description:		OTHER
	Work Description.		
•	Firm Name:		Value of Proposed Award: \$
	Address:		Fed ID No.
	City: State:	Zip:	Estimated Start Date:
	Contact Person:		Telephone:
	Email Address:		Type of Firm: MBE WBE SDVOB
	Work Description:		OTHER
•	Firm Name:		Value of Proposed Award: \$
	Address:		Fed ID No.
	City: State:	Zip:	Estimated Start Date:
	Contact Person:	-	Telephone:
	Email Address:		Type of Firm: MBE WBE SDVOB
	Work Description:		OTHER

UTILIZATION PLAN

(subcontractor/supplier continuation page)

 Firm Name: Address: City: State: Contact Person: Email Address: Work Description: 	Zip:	Value of Proposed Award: \$ Fed ID No. Estimated Start Date: Telephone: Type of Firm: MBE WBE SDVOB OTHER
■ Firm Name: Address: City: State: Contact Person: Email Address: Work Description:	Zip:	Value of Proposed Award: \$ Fed ID No. Estimated Start Date: Telephone: Type of Firm: MBE WBE SDVOB OTHER
Firm Name: Address: City: State: Contact Person: Email Address: Work Description:	Zip:	Value of Proposed Award: \$ Fed ID No. Estimated Start Date: Telephone: Type of Firm: MBE WBE SDVOB OTHER
 Firm Name: Address: City: State: Contact Person: Email Address: Work Description: 	Zip:	Value of Proposed Award: \$ Fed ID No. Estimated Start Date: Telephone: Type of Firm: MBE WBE SDVOB OTHER
 Firm Name: Address: City: State: Contact Person: Email Address: Work Description: 	Zip:	Value of Proposed Award: \$ Fed ID No. Estimated Start Date: Telephone: Type of Firm: MBE WBE SDVOB OTHER
 Firm Name: Address: City: State: Contact Person: Email Address: Work Description: 	Zip:	Value of Proposed Award: \$ Fed ID No. Estimated Start Date: Telephone: Type of Firm: MBE WBE SDVOB OTHER

UTILIZATION PLAN

(subcontractor/supplier continuation page)

■ Firm Name:		Value of Proposed Award: \$
Address:	7in:	Fed ID No. Estimated Start Date:
City: State: Contact Person:	Zip:	Telephone:
Email Address:		Type of Firm: MBE WBE SDVOB
Work Description:		OTHER
1		
Firm Name:		Value of Proposed Award: \$
Address:		Fed ID No.
City: State:	Zip:	Estimated Start Date:
Contact Person:		Telephone:
Email Address:		Type of Firm: MBE WBE SDVOB
Work Description:		☐ OTHER
■ Firm Name:		Value of Proposed Award: \$
Address:		Fed ID No.
City: State:	Zip:	Estimated Start Date:
Contact Person:	•	Telephone:
Email Address:		Type of Firm: \square MBE \square WBE \square SDVOB
Work Description:		☐ OTHER
■ Firm Name:		Value of Proposed Award: \$
Address:		Fed ID No.
City: State:	Zip:	Estimated Start Date:
Contact Person:		Telephone:
Email Address:		Type of Firm: MBE WBE SDVOB
Work Description:		☐ OTHER
■ Firm Name:		Value of Proposed Award: \$
Address:		Fed ID No.
City: State:	Zip:	Estimated Start Date:
Contact Person:	_	Telephone:
Email Address:		Type of Firm: \square MBE \square WBE \square SDVOB
Work Description:		☐ OTHER
Type Name of Principal or Office	cer	Type Title of Principal or Officer
		
Signature of Principal or Officer	r	Date

UTILIZATION PLAN

C. REQUEST FOR WAIVER

TOTAL WAIVER	PARTIAL W	AIVER	N/A – GOALS AR	E MET
MBE Waiver (%) Red	quested	WBE Waive	er (%) Requested	_

NOTE: On Professional Service Term and Construction JOC Contracts, the overall goal percentages are applied to the entire contract dollar value. Therefore, if a waiver is requested for an individual work order, it is your responsibility to make up the shortfall on future work orders in order to maintain the overall M/WBE goal percentage for the contract. In addition, your firm should maintain a record of the M/WBE goal attainment for the overall contract which may be requested by the Owner's Opportunity Programs Group at any given time. Failure to do so may jeopardize the award of future work orders.

1. Provide a statement of justification to support the request for a waiver of the goal requirements established by the Contract Documents.

2. "Good Faith Effort" Guidelines

The following guidelines must be used for the preparation of ALL "good faith effort" documentation. The responses to the information in the Guidelines should be given in an item-by-item format following the numerical sequence as presented and accompany the Utilization Plan.

IF YOU FAIL TO ADEQUATELY DOCUMENT AND RESPOND TO EACH ITEM ON THE GOOD FAITH EFFORT GUIDELINES, THE REQUEST FOR WAIVER WILL BE DEEMED NON-RESPONSIVE, INCOMPLETE AND WILL BE REJECTED.

If you need assistance, please contact the Opportunity Programs Group at (518) 257-3706 (Upstate) or (212) 273-5038 (Downstate).

GOOD FAITH EFFORT GUIDELINES

- 1. Attach a copy of the completed Utilization Plan in accordance with M/WBE goals established in the Contract Documents.
- 2. Submit a written request for a referral list of M/WBE's certified by Empire State Development by trade or service from the Opportunity Programs Group for subcontracting and procurement opportunities.
- 3. Contact all the Empire State Development certified M/WBEs posted in the list of interested subcontractors and suppliers posted on the DASNY's website:

 http://www.dasnv.org/construc/bidops/03C2.php
- 4. Provide a record of advertisements placed in general circulation, trade and minority and women oriented publications. Include the name of publications and dates of advertisements.
- 5. Submit documentation that clearly demonstrates that you contacted all the M/WBEs identified through the outreach activities outlined above to determine their capacity to perform the applicable scope of work.
- 6. Provide a record of <u>ALL</u> written solicitations made to New York State certified minority and women-owned business enterprises obtained from the directory of certified businesses and/or the outreach efforts specified above. Include dates and copies of solicitation made.
- 7. Provide a record of <u>ALL</u> responses received from New York State certified minority and women-owned business enterprises to any such advertisements and solicitations made. Include dates and copies of any written responses.
- 8. Provide a list of any pre-bid, pre-award, or other meetings attended with New York State certified minority or women owned businesses.
- 9. List the efforts undertaken to subdivide portions of the work into smaller components in order to increase New York State certified minority and women-owned business enterprise participation.
- 10. Did your firm solicit any New York State certified minority and women-owned business enterprises located outside the region where the scope of work is to be performed? If so, what actions were taken to contact and assess the financial ability of those firms to participate?
- 11. Provide a description of all relevant contract documents, plans or specifications, or documents describing the scope of work which was made available to New York State certified minority and women-owned business enterprises for the purposes of soliciting their bids. Include the dates and manner in which these documents were made available.
- 12. Were the same subcontract terms and conditions offered to New York State certified minority and women-owned business enterprises as those offered in the ordinary course of business and to other subcontractors?
- 13. Did your firm engage in direct in person or telephone negotiations with NYS certified M/WBE firms where quotes originally submitted were deemed as too high?
- 14. Has your firm made payments for work performed by New York State certified minority and women-owned business enterprises in a timely fashion for past work so as to facilitate continued performance by the certified businesses?
- 15. List any special considerations and/or concerns, which are preventing adequate New York State certified minority and women-owned business enterprises to participate.

UTILIZATION PLAN

D. PERMANENT EMPLOYEE DISTRIBUTION PRIME INFORMATION: CONTRACTOR CONSULTANT VENDOR Name: Address: City: State: Zip: Contact Person: Telephone Number: Fax Number: E-Mail Address: DISTRIBUTION OF PERMANENT EMPLOYEES |-----FEMALE EMPLOYEES-----| |-----MALE EMPLOYEES-----| **ENTER POSITION NATIVE NATIVE** WHITE BLACK AMERICAN HISPANIC ASIAN OR JOB TITLE WHITE BLACK AMERICAN HISPANIC ASIAN EXECUTIVE AND OWNER: For position titles such as President, Partner, Owner, Treasurer, Secretary, etc. PROFESSIONAL: For position titles of individuals possessing a License to practice their profession TECHNICAL AND MANAGEMENT: For position titles except Executive and Owner, Professional, and Clerical & Support CLERICAL AND SUPPORT: Type Name of Principal or Officer Type Title of Principal or Officer Signature of Principal or Officer Date

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UTILIZATION PLAN

E. STANDARD EQUAL EMPLOYMENT OPPORTUNITY POLICY STATEMENT

PRIME INFORMATION: CONTRACTOR 🔲	CONSULTANT	VENDOR	
Name: Address: Contact Person: E-Mail Address:	City: State: Telephone Number:	Zip: Fax Number:	
PROJECT INFORMATION: Facility Name: Building (s): Address: City: County: Zip: Work Description:	¢		
Project Number: Contract Amount:	\$		
The following is a statement of's commitment in the workforce at the above referenced project:	nt to provide participa	ation by minority perso	ns and women
will ensure and maintain a working environshall specifically ensure that all foremen, superintecarry out our commitment to maintain such a wor	endents and other sup		
will establish and maintain a current list of a sources and minority and community organization maintain a record of the sources and organizations	ns when employment		
will maintain a file of the names and addres individual, recruitment source or community orga such referred individual. If the individual was no	nization and of what	action was taken with r	
will promptly notify the DASNY when the usagreement has not referred to us a minority person the work or when it has other information that the obligations.	n or woman sent by us	s to such a union for em	ployment in
will disseminate this equal employment opp provide all subcontractors with a copy, discussing copy of our equal employment policy shall be pos	it with them prior to	commencing work at th	
Type Name of Principal or Officer	Type Title of	Principal or Officer	-
Signature of Principal or Officer	Date		_

F. MWBE COMPLIANCE STATEMENT

The following MWBE program goal	g is a statement ofls and objectives:	's commitment to comply with DASNY's				
	will ensure that MWBE subcontrexperienced and qualified to perfect to perfect the control of the	ractors and vendors on the project are form the required work.				
	will ensure that MWBE sub commercially useful function.	econtractors and vendors on the project perform a				
		nes, addresses and telephone numbers of each MWBE cted to perform on the project, the date of contact and				
		cipation of MWBE subcontractors and vendors in excess IY's MWBE program guidelines.				
	will notify and obtain written ap Plan.	oproval from DASNY for any changes in this Utilization				
Type Name of Princip	pal or Officer	Type Title of Principal or Officer				
Signature of Principal	l or Officer	Date				
Subscribed and sworr	n to before me in the State of this day of					
County of	this day of					
Notary Public						
ID No.:						
My Commission Exp	ires:					

G. DASNY REVIEW AND APPROVAL

DASNY Opportunity Programs Group	DASNY Project Manager
Date	Date
Signature	Signature
Print Name	Print Name



DORMITORY AUTHORITY - STATE OF NEW YORK Office of Opportunity Programs

UPSTATE: 515 Broadway * Albany, NY 12207-2964 * Phone: (518) 257-3706 Fax: (518) 257-3100

DOWNSTATE: One Penn Plaza, 52nd Floor * New York, NY * 10119-0098 * Phone: (212) 273-5038 Fax: (212) 273-5121

SCOPE VERIFICATION FORM

This form must be submitted with the Utilization Plan for each MWBE subcontractor listed on the Utilization Plan and each Service-Disabled Veteran Owned Business (SDVOB). Failure to submit will delay acceptance of the Utilization Plan and award of the Contract.

A. PROJECT INFORMATION	
Facility:	Project No:
Contract/Bid No:	Work Authorization (if applicable):
B. PRIME CONTRACTOR	C. M/WBE SUBCONTRACTOR MBE WBE
COMPANY:	COMPANY:
CONTACT:	CONTACT:
TELEPHONE:	TELEPHONE:
E-MAIL:	E-MAIL:
D. SDVOB SUBCONTRACTOR	
COMPANY:	
CONTACT:	
TELEPHONE:	
E-MAIL:	
	-

E. MWBE SUBCONTRACTOR SCOPE OF SERVICES

In the box below, provide a detailed scope of services to be performed by the proposed M/WBE Subcontractor listed above.

CSI Number (Must be 6 Digits)	DESCRIPTION OF WORK	CONTRACT AMOUNT

AAP 10.0 (12/15)



DORMITORY AUTHORITY - STATE OF NEW YORK Office of Opportunity Programs

UPSTATE: 515 Broadway * Albany, NY 12207-2964 * Phone: (518) 257-3706 Fax: (518) 257-3100

DOWNSTATE: One Penn Plaza, 52nd Floor * New York, NY * 10119-0098 * Phone: (212) 273-5038 Fax: (212) 273-5121

F. SDVOB SUBCONTRACTOR SCOPE OF SERVICES

In the box below, provide a detailed scope of services to be performed by the proposed SDVOB Subcontractor listed above.

CSI Number (Must be 6 Digits)	DESCRIPTION OF WORK	CONTRACT AMOUNT

The official schedule of values for the above scope of services must be submitted along with the applicable subcontract agreement within 30 days of contract award. Failure to do so <u>may delay</u> future payment requisitions.

Contractor will notify and obtain written approval from DASNY for any changes in this Scope Verification Form.

Contractor and M/WBE Subcontractor certify that M/WBE Subcontractor will perform the above scope of work and will not subcontract its work, in whole or in part, to a non-M/WBE entity.

Contractor and SDVOB Subcontractor certify that SDVOB Subcontractor will perform the above scope of work and will not subcontract its work, in whole or in part, to a non-SDVOB entity.

CONTRACTOR	M/WBE SUBCONTRACTOR
Print Name of Principal or Officer	Print Title of Principal or Officer
Signature of Principal or Officer	Signature of Principal or Officer
Date	 Date

AAP 10.0 (12/15) 2 of 3



DORMITORY AUTHORITY - STATE OF NEW YORK Office of Opportunity Programs

UPSTATE: 515 Broadway * Albany, NY 12207-2964 * Phone: (518) 257-3706 Fax: (518) 257-3100

DOWNSTATE: One Penn Plaza, 52nd Floor * New York, NY * 10119-0098 * Phone: (212) 273-5038 Fax: (212) 273-5121

SDVOB SUBCONTRACTOR	
Print Name of Principal or Officer	_
Signature of Principal or Officer	_
 Date	-

AAP 10.0 (12/15) 3 of 3

"Appendix A"

DORMITORY AUTHORITY – STATE OF NEW YORK Monthly/Quarterly WORK FORCE UTILIZATION REPORT

Executive Order No. 162, issued by Governor Andrew Cuomo on January 9, 2017, requires Prime Contractors and included Subcontractors awarded State contracts after June 1, 2017 to submit a completed Monthly Workforce Utilization Report for contracts with a total contract value of One-Hundred Thousand 00/100 Dollars (\$100,000) or more for real property renovations and construction. Contracts for labor, services, equipment, materials or any combination of the foregoing with a total value of Twenty-Five Thousand 00/100 Dollars (\$25,000.00) or more are required to submit a completed Quarterly Workforce Utilization Report. The Prime Contractor is responsible for collecting reports from each of its included Subcontractors performing work on the contract, ensuring that the Subcontractor submits the report as required. Solely for the purposes of this reporting requirement, "Subcontractors" shall include any entity engaged in a contract with a Prime Contractor to provide services directly to or on behalf of the Prime Contractor on a State contract. Solely for the purposes of this reporting requirement, "Subcontractors" shall not include any entity providing exclusively goods and transportation directly to or on behalf of the Prime Contractor on a state contract.

All Monthly/Quarterly Workforce Utilization Reports are to be submitted within 10 days of the end of each month/quarter. Instructions for Submitting the Report and Frequently Asked Questions are posted on the DASNY website at https://www.dasny.org/tools-forms/forms, and may be accessed by clicking on MWSBE. The completed reports are to be submitted to DASNY's Opportunity Programs Group by emailing the Excel workbook files to EO162Reporting@dasny.org. Hard copies of the reports will not be accepted.

If you have any questions or require assistance in completing the Report, please contact Kim Kreski at KKRESKI@DASNY.org, (518) 257-3706 (Upstate projects) or Cher Parker at Cparker@DASNY.org, (212) 273-5038 (Downstate projects).



515 Broadway • Albany, New York 12207-2964			quisition Date:/_ quisition Amount: \$			
PRIME CONTRACTOR / CONSULTANT / VENDOR INFO	ORMATION				1	
NAME:	PROJECT#		СО	NTRACT#	WORK AUTH# (if	applicable):
ADDRESS:			INS	TITUTION:	-	
CITY, STATE ZIP: CONTACT PERSON:	FEDERAL ID#		WC	RK DESCRIPTION:		
(person completing form)	TELEPHONE# EMAIL:		l WC	IN DESCRIPTION.		
Please check here if you were granted a Total Waiver of the M/WBE Goals by receipt of letter dated: / /				are a Professional Service unt is under \$50,000	Consultant & the origin	al contract or Term
Please check here if you are a Construction Contractor and the original cont under \$100,000.		under \$2		are a Commodity Vendor 8	the original purchase of	order/contract amount is
SUBCONTRACTOR/SUBCONSULTANT and SUPPLIER PAYMENT INFORMATION * ALL M/WBE and SDVOB Firm * Non-M/WBE Firms with a			ver \$10,000 mu	st be listed.		
Please check here if <u>no</u> subcontractors or suppliers are being utilized on this contract	FEDERAL TAX ID NUMBER		FICATION oth categories)	AMOUNT TO BE PAID OUT OF THE PROCEEDS OF THIS REQUISITION	TOTAL AMOUNT OF ALL PAYMENTS MADE PRIOR TO THIS REQUISITION	TOTAL VALUE OF SUBCONTRACT/PO'S ISSUED
COMPANY INFORMATION	ID NOMBER	(00/00/110/110		REGUISITION	REGUISITION	133020
Name: Address:		☐ MBE ☐ WBE ☐ Non-M/WBE	□Subcontracto		\$	\$
Work Description:		SDVOB	Supplier			
Name:		☐ MBE				
Address:		☐ WBE ☐ Non-M/WBE	☐Subcontracto		\$	\$
Work Description:		SDVOB	Supplier			
Name:		☐ MBE				
Address:		☐ WBE☐ Non-M/WBE	☐Subcontracto☐Subconsultar		\$	\$
Work Description:		SDVOB	Supplier			
Name:		☐ MBE				
Address:		☐ WBE☐ Non-M/WBE	☐Subcontracto☐Subconsultar	1.5	\$	\$
Work Description:		SDVOB	Supplier			



PRIME CONTRACTOR / CONSULTANT / VENDOR INFORMATION									
NAME:	DD0 1507"		201	TD 4 CT//	WORK ALITH# (if a	naliaahla):			
	PROJECT#		CON	IRACI#	RACT# WORK AUTH# (if applicable):				
SUBCONTRACTOR/SUBCONSULTANT * ALL M/WBE Firms must be listed. * ALL M/WBE Firms must be listed. * Non-M/WBE Firms with a "Total Value of Subcontract/PO" over \$10,000 must be listed.									
COMPANY INFORMATION	FEDERAL TAX ID NUMBER	CLASSI	FICATION oth categories)	AMOUNT TO BE PAID OUT OF THE PROCEEDS OF THIS REQUISITION	TOTAL AMOUNT OF ALL PAYMENTS MADE PRIOR TO THIS REQUISITION	TOTAL VALUE OF SUBCONTRACT/PO'S ISSUED			
Name: Address: Work Description:		☐ MBE ☐ WBE ☐ Non-M/WBE ☐ SDVOB	□Subcontractor □Subconsultant □ Supplier	\$	\$	\$			
Name: Address: Work Description:		☐ MBE ☐ WBE ☐ Non-M/WBE ☐ SDVOB	□Subcontractor □Subconsultant □ Supplier	\$	\$	\$			
Name: Address: Work Description:		☐ MBE ☐ WBE ☐ Non-M/WBE ☐ SDVOB	□Subcontractor □Subconsultant □ Supplier	\$	\$	\$			
Name: Address: Work Description:		☐ MBE ☐ WBE ☐ Non-M/WBE ☐ SDVOB	□Subcontractor □Subconsultant □ Supplier	\$	\$	\$			
Name: Address: Work Description:		☐ MBE ☐ WBE ☐ Non-M/WBE ☐ SDVOB	□Subcontractor □Subconsultant □ Supplier	\$	\$	\$			
Name: Address: Work Description:		☐ MBE ☐ WBE ☐ Non-M/WBE ☐ SDVOB	□Subcontractor □Subconsultant □ Supplier	\$	\$	\$			

DASNY COMPLIANCE REPORT

Name:	☐ MBE				
Address:	☐ WBE	E □Subcor -M/WBE □Subcor		\$ \$;
Work Description:	□SDV	/OB ☐ Supplie	er		

PRIME CONTRACTOR / CONSULTANT / VENDOR INFORMATION							
NAME:							
	PROJECT#		CC	NTRACT#	WORK AUTH# (if a	pplicable):	
SUBCONTRACTOR/SUBCONSULTANT * ALL M/	WBE Firms mus	t be listed.					
	VBE Firms with	a "Total Value	of Subcontrac	ct/PO" over \$10,000 mu	st be listed.		
COMPANY INFORMATION	FEDERAL TAX ID NUMBER		FICATION oth categories	AMOUNT TO BE PAID OUT OF THE PROCEEDS OF THIS REQUISITION	TOTAL AMOUNT OF ALL PAYMENTS MADE PRIOR TO THIS REQUISITION	TOTAL VALUE OF SUBCONTRACT/PO'S ISSUED	
Name: Address: Work Description:		☐ MBE ☐ WBE ☐ Non-M/WBE ☐ SDVOB	□Subcontract □Subconsulta □ Supplier	1 4	\$	\$	
Name: Address: Work Description:		☐ MBE ☐ WBE ☐ Non-M/WBE ☐ SDVOB	□Subcontract □Subconsulta □ Supplier		\$	\$	
Name:		☐ MBE					
Address:		☐ WBE	□Subcontract		\$	\$	
Work Description:		SDVOB	Supplier				
Name: Address:		☐ MBE ☐ WBE ☐ Non-M/WBE	□Subcontract	· S	\$	\$	
Work Description:		SDVOB	Supplier	iiit			

DORMITORY AUTHORITY STATE OF NEW YORK

D	A	S	N	Y
DORMIT	ORY AUTH	ORITY ST	ATE OF NE	WYORK

Name: Address: Work Description:	☐ MBE ☐ WBE ☐ Non-M/WBE ☐ SDVOB	□Subcontractor □Subconsultant □ Supplier	\$ \$	\$
Name: Address: Work Description:	☐ MBE ☐ WBE ☐ Non-M/WBE ☐ SDVOB	□Subcontractor □Subconsultant □ Supplier	\$ \$	\$
Name: Address: Work Description:	☐ MBE ☐ WBE ☐ Non-M/WBE ☐ SDVOB	□Subcontractor □Subconsultant □ Supplier	\$ \$	\$



Compliance Report Instructions

This report is required with the submittal of <u>each</u> payment requisition. Payment <u>will not</u> be processed without a <u>completed</u> report with an <u>original</u> signature.

PRIME CONTRACTOR/CONSULTANT /VENDOR INFORMATION	Please provide all of the Prime and Project information as requested.
	If you are not reporting any sub/supplier payments, please check the appropriate box.
SUBCONTRACTOR/SUBCONSULTANT	All of the M/WBE and SDVOB sub/supplier information requested must be provided.
and SUPPLIER PAYMENT INFORMATION	ALL M/WBE and SDVOB Firms must be listed.
	Non-M/WBE Firms with a "Total Value of Subcontract/PO" over \$10,000 must be listed.
	ABOVE FIRMS MUST BE REPORTED EVEN IF THEY ARE NOT RECEIVING A PAYMENT THIS MONTH.
	** Only firms that have NYS Certification by the Empire State Development Corporation can be counted towards the M/WBE goal achievement for this contract.

**Please follow the instructions below carefully.

AMOUNT TO BE PAID OUT OF THE PROCEEDS OF THIS REQUISITION	Indicate the amount TO BE PAID to each sub/supplier from the money you will receive from this requisition. If no payment will be made, enter \$0 *This is not the amount that you "intend" to pay over the life of the contract.
TOTAL AMOUNT OF ALL PAYMENTS MADE PRIOR TO THIS REQUISITION	Indicate the amount that has <u>ACTUALLY</u> been paid to date. Note: DO NOT include the amount to be paid out of the proceeds of this requisition. *M/WBE amounts will be verified by DASNY's Office of Opportunity Programs through the receipt of copies of canceled checks. You may attach (please staple!) check copies to the report for expediency.
TOTAL VALUE OF ALL SUBCONTRACT/PO's ISSUED	Indicate the total value to date of ALL subcontract agreements issued by your company to the subcontractors/suppliers for this contract. This should be inclusive of any change orders issued to the original contract. -or- Indicate the total amount of ALL purchase orders issued by your company to the subcontractors/suppliers for this contract.



COMPLIANCE CERTIFICATION*

MWBE participation on the contract is true and	d accurate; (ii) the MWBE subcontractor	s and vendors listed in this report have performed a
commercially useful function on the project and ha	ve not, other than as allowed in the approve	ed Utilization Plan, subcontracted their assigned scope of
work to a non-MWBE entity; and (iii) it is in compl	liance with the approved Utilization Plan for	the contract.
Type Name of Principal or Officer	Type Title of Principal or Officer	
Signature of Principal or Officer	Date	<u> </u>
Subscribed and sworn to before me in the State of _ County ofthis day of		
County ofthis day of	, 20	
Notary Public		
ID No.:		
My Commission Expires:		

*False statements, information or data submitted on or with application for payment, may result in one or more of the following actions: Termination of Contract for cause; disapproval of future bids, contracts, or subcontracts; Withholding of final payments on the contract; and Civil and/or criminal prosecution.



DASNY REVIEW

DASNY's review of this report does not relieve the Contractor of its obligation to provide a true and accurate report and strictly comply with its approved Utilization Plan and Article 20 of the Contract General Conditions

DASNY Project Manager						
Date						
Signature						
Print Name						

Instructions for New York State Vendor Responsibility Questionnaires

Although it is recommended that vendors complete their questionnaires online using the New York State VendRep System, the four (4) questionnaires found on the VendRep System are also available in paper format.

The questionnaires are intended to elicit information based on vendor type (For-Profit or Not-for-Profit) and activity (Construction or Non-Construction). Each vendor should select the questionnaire that most closely reflects its business characteristics or as directed by an agency's solicitation instructions. The available vendor questionnaires are:

- For-Profit
- For-Profit Construction

- Not-for-Profit
- Not-for-Profit Construction

Business Entities may print the PDF version of a questionnaire form and complete it manually or may select the MS Word version and complete the questionnaire on a computer. Completing the questionnaire in MS Word allows the questionnaire to be saved on the user's computer and updated in the event that the vendor's information changes.

The person(s) completing the vendor responsibility questionnaire must be knowledgeable about the vendor's business and operations. The certification at the end of each questionnaire must be completed by an owner or officer of the Business Entity and must be notarized to be complete.

Business Entities must answer every question contained in the selected questionnaire. Most questions require "Yes" or "No" answers and request additional information where necessary. Each response must provide all relevant information which can be obtained within the limits of the law. However, information regarding a determination or finding made in error which was subsequently corrected or overturned, and/or was withdrawn by the issuing government entity, is not required. For paper submissions, responses that require additional information must include an attachment containing this information.

If the submitting Business Entity is a Joint Venture, one questionnaire must be submitted for the Joint Venture plus each Business Entity comprising the Joint Venture must also submit separate questionnaires.

¹ If the Business Entity uses a Social Security Number (SSN) as its identification number, providing the SSN on the questionnaire is optional. Individuals and Sole Proprietors may use an SSN but are encouraged to obtain and use an Employer Identification Number.

Definitions List

Administrative Proceeding

Any government entity proceeding in which a determination of the legal rights, duties or privileges of named parties thereto is required by law to be made only on a record and after an opportunity to be heard. Such a proceeding may be solely comprised of an exchange of written materials, which can include, but is not limited to, testimony recorded electronically, transcriptions, letters, documents, etc.

Affiliate

For-Profit:

SEE ASSOCIATED ENTITY

Not-For-Profit:

Any business entity (not-for-profit or for-profit) which is entitled to exercise the membership rights of participation in the election of board members, participation and service on the committees of the not-for-profit and approval of changes to a business entity's governing documents, and any company or other legal entity which controls or is controlled by the not-for-profit business entity.

Construction:

- a. Any business entity in which the submitting Business Entity holds 5% or greater ownership interest; and/or
- b. Any business entity or organized group of principal owners or officers holding 5% or greater ownership interest of the submitting business entity; and/or
- c. Any business entity which is owned
 - i. 5% or more by the same entity or group described in (b) or
 - ii. by an individual holding 5% or greater ownership in the submitting business entity and/or
- d. Any business entity in which the submitting Business Entity directs or has a right to direct such entity's daily operations, regardless of percentage of ownership interest.

Associated Entity

Generally, any entity that the Reporting Entity controls or is controlled by, including:

- a. Owner: Any business entity or organized group of principal owners or officers holding 50% or greater ownership interest in the Reporting Entity (i.e., holding company, parent company).
- b. Controlling entity: Any business entity which directs or has a right to direct the Reporting Entity's operations, regardless of percentage of ownership interest (i.e., headquarters).
- c. Controlled entity: Any business entity in which the Reporting Entity holds 50% or greater ownership interest, or the Reporting Entity directs or has a right to direct operations, regardless of percentage of ownership interest (i.e., subsidiaries, units under the Reporting Entity).

Note: "Associated Entity" does not include "sibling organizations" (i.e., entities owned or controlled by a parent company that owns or controls the Reporting Entity), unless such sibling entity has a direct relationship with or impact on the Reporting Entity.

Business Entity

Includes a Legal Business Entity, a Reporting Entity or an Associated Entity as defined herein.

Business Entity Leaders

An officer, general partner, managing partner, manager of an LLC, and/or director.

Business Entity Officials

Individuals serving in an executive capacity, as staff and/or corporate officers, who have decision-making authority and responsibility for the oversight of a business entity; includes individuals who perform the functions of chief executive officer (CEO), chief operating officer (COO), chief financial officer (CFO), and/or chairman of the board, or their equivalents. (Equivalent titles may include, but are not limited to, President, Executive Vice President, Treasurer, Secretary, Managing Trustee)

Instructions:

Corporations: Identify the Business Entity Officials.

Partnerships: Identify the Senior Managing Partners, and any other partners with powers equivalent to Business Entity Officials.

Limited Liability Companies (LLC): Identify the Executive Managing Directors/Members, Senior Managing Directors/Members, and any other members/managers with powers equivalent to Business Entity Officials.

Sole Proprietors: Identify the individual who is the sole owner and manager of the business entity, or other persons, including staff, with powers equivalent to Business Entity Officials.

Unincorporated Associations: Identify the Executive Committee Members, including President, Vice President, Secretary and Treasurer, Executive or Managing Trustees, or other persons, including staff, with powers equivalent to Business Entity Officials.

Certificate of Good Standing

Certificate issued by the Business Entity's controlling jurisdiction indicating that the Business Entity is current with the filing requirements of the jurisdiction, issued within one year of the date of certification of the Vendor Responsibility Questionnaire.

Charities Registration Number

Number issued by the New York State Attorney General's Charities Bureau to qualified not-for-profit charitable organizations.

CIK Code

The Central Index Key (CIK) is a designation number established for each entity which has filed disclosures with the Securities and Exchange Commission (SEC). It is used on the SEC's computer systems to identify corporations and individual people who have filed disclosure with the SEC.

Citation, Summons, Notice, Violation Order

A notice to appear in court or at an administrative hearing or administrative proceeding, usually issued by a State or Local Government enforcement agency. Includes court issued writs, police issued orders, administrative orders or writs to appear at a certain time and place to do something demanded in the writ, or to defend against the citation, or to show cause for not doing so.

Claim

A written, formal demand for money due, for property, for damages or for enforcement of a right, e.g., a fine or penalty sought by a Government Entity.

Construction

Contracts for work involving general contracting, building new structures and remodeling existing structures, demolition, concrete, paving and masonry, excavation, heating, ventilation and air conditioning, painting, plumbing, electrical work, roofing, asbestos abatement, lead abatement, and remediation and abatement of hazardous materials or hazardous waste. Construction activity also includes grant and other activities in which a not-for-profit entity contracts with the State for construction services (e.g., the building of permanent and transitional housing, and day care facilities). Includes all construction activities whether provided directly or through the use of subcontractors.

Corporation – For-Profit

Entity organized for the purpose of making profit, created under the laws of a State or United States federal government. Ownership may consist of publicly traded or privately held shares of stock.

Corporation – Not-For-Profit

A corporation formed for purposes other than financial gain, pursuant to and in accordance with a state's Not-For-Profit Corporation Law.

DBA - Doing Business As

An assumed name a business entity uses for doing business, in lieu of using the legal business name or owner's personal name. The entity must have filed a "Business Certificate," otherwise known as a Certificate of Conducting Business Under an Assumed Name, or DBA, in the county clerk's office of the county in which the business entity is located, or in the case of corporate entities with the Department of State.

Debarred

The exclusion of an individual or business entity from participating in the government procurement process for specified period of time.

Disadvantaged Business Enterprise (DBE)

A United States federal designation through a program run by the U.S. Department of Transportation. A for-profit small business concern that is at least 51% owned by one or more individuals who are both socially and economically disadvantaged, or in the case of a corporation, in which 51% of the stock is owned by one or more such individuals. State Agencies designate a business entity as a DBE based upon the federal standards.

Disqualification

Any action taken by a government entity which prevents or precludes a business entity from receiving an award for a particular contract or from being placed on a prequalification list. A business entity may be disqualified for a number of reasons, including but not limited to determinations of non-responsibility or lack of required experience.

DUNS - Data Universal Numbering System

A unique 9-digit number provided by Dun & Bradstreet (D&B), a commercial information company. The DUNS Number is site-specific and division-specific. Therefore, each physical location of an entity may have its own DUNS Number. Further, each separate division or branch of an entity may have its own, unique DUNS Number.

EIN - Employer Identification Number

Federal Employer Identification Number used for federal income tax reporting. Although this number may be the Social Security Number of an individual operating a business as a sole proprietor, vendors are encouraged to obtain an EIN for business purposes.

Federal

Any department, division, board, commission or bureau of any federal department designated by the United States federal government.

Financial Statements

Presentation of financial data including balance sheets, income statements, and statements of cash flow, or any supporting statement(s) intended to communicate a business entity's financial position at a point in time and its results of operations for a period then ended.

Formal Unsatisfactory Performance Assessment

A written (including electronic), unsatisfactory performance assessment or evaluation issued by a government entity, after providing due process to a business entity. May include unsatisfactory past performance assessments determined under audit and/or required by law, rule, regulation, policy or procedure.

Former Name

Any previous name by which Legal Business Entity has done business as, inside or outside the State of New York.

General Partnership

An association of two or more persons to carry on as co-owners of a business.

Good Faith Effort(s)

An effort to achieve a Minority-Owned Business Enterprise, Women-Owned Business Enterprise (M/WBE) or Disadvantaged Business Enterprise (DBE) goal, federal requirement or New York State requirement, which, by its scope, intensity and appropriateness to the objective, can reasonably be expected to fulfill the program requirements.

The code of Federal Regulations 49 C.F.R. Part 26 sets forth the standards to determine whether a contractor has made good faith efforts to reach a DBE goal. Appendix A to Part 26 provides the following guidance for a bidder: "First, the bidder can meet the goal, documenting commitments for participation by DBE firms sufficient for this purpose. Second, even if it doesn't meet the goal, the bidder can document adequate good faith efforts. This means that the bidder must show that it took all necessary and reasonable steps to achieve a DBE goal or other requirement of this part which, by their scope, intensity, and appropriateness to the objective, could reasonably be expected to obtain sufficient DBE participation, even if they were not fully successful."

Article 15-A of the Executive Law of the State of New York sets forth the standards for the M/WBE Program. These standards are to be used to determine whether a contractor has made "active and conscientious efforts to employ and to utilize minority group members and women at all levels and in all segments of its work force on state contracts, and the contractor will document these efforts."

Government Audits

Financial, compliance and/or performance audits completed for or by a government entity.

Government Contract

A contract entered into by a United States federal, state or local government entity.

Government Contracting Process

Bidding, evaluation, award and administration of a government contract.

Government Entity

Any United States federal, state or local government-created bureau, agency, department, division, board, commission, public authority or public benefit corporation.

Investigation

An inquiry has been or is being made by any prosecutorial, investigative or regulatory agency concerning an individual or business entity or the activities and/or the business practices thereof.

Joint Venture

When two or more persons or business entities join together for a specific business undertaking in which profits, losses and control are shared. Usually an enterprise with limited scope and duration but with shared liability and responsibility for debts or losses. Joint ventures normally terminate when the contract or project for which the entities have joined is completed. The Joint Venture may be established as a separate legal entity with its own federal Employer Identification Number (EIN).

Judgment

A court decision or judgment that settles the rights of the parties and disposes of all issues in controversy, except for award of costs and enforcement of the judgment. A judgment rendered by a lower court is deemed to be a final judgment, even if such judgment is subject to appeal.

Key Employee

Any officer, managing director or managing trustee, executive director, and persons or entities that manage and/or control the daily operations of the Business Entity, and any person having responsibilities or powers similar to those of officers, managing directors, or managing trustees, including the chief management and administrative officials of the Business Entity (such as executive director or chancellor), but does not include the heads of separate departments or smaller units within the business entity.

A chief financial officer and the officer in charge of administration or program operations are both Key Employees if they have the authority to control the Business Entity's activities, its finances or both. The "heads of separate departments" reference applies to persons such as the head of the radiology department or coronary care unit of a hospital, or the head of the English department at a college. These persons are managers within their specific areas but not for the business entity as a whole and therefore, are not Key Employees.

Legal Business Entity

A Business Entity registered with the Internal Revenue Service and assigned a federal Employer Identification Number. (Note: Individuals and Sole Proprietors may use a Social Security Number but are encouraged to obtain and use an Employer Identification Number.)

Legal Business Entity includes for-profit and not-for-profit entities, and may take the form of:

- a Corporation, Partnership (including General, Limited or Limited Liability Partnership), Limited Liability
 Company, Sole Proprietor, Unincorporated Association, or any other business organization, in the case of forprofit entities, or
- b. a Not-for-Profit Corporation, Foundation, Partnership, Limited Liability Company, Unincorporated Association, or any other business organization, in the case of not-for-profit entities.

Legal Business Entity Name

The name of the entity as set forth in the Legal Business Entity's creation documents.

- a. For Corporations, the name as set forth in the Certificate of Incorporation.
- b. For General Partnerships, the name as set forth in the Certificate of Assumed Name.
- c. For Limited Partnerships, the name as set forth in the Certificate of Limited Partnership.
- d. For Limited Liability Partnerships, the name as set forth in the Certificate of Registration.
- e. For Limited Liability Companies, the name as set forth in the Articles of Organization.

For purposes of this questionnaire, a Sole Proprietor or an individual seeking to do business as him/herself may use his/her name anywhere it asks for the name of the Legal Business Entity Name.

Liens

A form of security interest against property or property interest to secure the payment of a debt, judgment, or taxes, including, but not limited to, judgment liens, mechanics' liens, tax liens, attorneys' liens, New York State of Department of Environmental Conservation liens, but shall not include purchase credit liens, Uniform Commercial Code filings, or mortgages.

Liquidated Damages

Compensation that contracting parties have agreed should be paid to one party for any loss or damage arising from breach of the agreement by the other party.

LLC - Limited Liability Company

A Limited Liability Company (LLC) is a type of business structure that offers limited liability for the debts and obligations of the business entity to the owners. An LLC provides management flexibility and the income and losses are passed through the owners of the entity, like a partnership. It must be formed pursuant to and in accordance with the Limited Liability laws of the state. The designation "LLC" must follow and be a part of the business entity's legal name.

LLP - Limited Liability Partnership

A Limited Liability Partnership is a partnership with no limited partners, where each partner is a professional by law and qualified to render a professional service, and is engaged in the practice of such profession. The business entity is registered as an LLP with the New York State Department of State, or a partnership with no limited partners registered or otherwise created under the laws of another jurisdiction. The designation "LLP" must follow and be a part of the business entity's legal name.

LP - Limited Partnership

A Limited Partnership is a type of partnership which has two types of partners; general and limited. A LP has at least one general partner and one or more limited partners. The general partner acts in the same capacity as in a general partnership such as management control, right to use property of the partnership, shared profits and joint/several liability. The limited partner has limited liability, is not involved in the day-to-day activity of the partnership and has no management control. The designation "LP" must follow and be a part of the business entity's legal name.

Material Disallowance

Expenditures which have occurred in a contract or grant which an auditor has determined were not allowed under the guidelines established by the agency, the terms of the contract or grant, or by statute, in an amount that would be material in relation to the total value of the contract or grant.

Minority Community-Based Organization (MCBO)

A not-for-profit, local human service organization having its origins in the geographic area that it serves. Generally, the governing bodies and personnel of community-based organizations reflect the racial, ethnic and cultural makeup of the community being served. These types of organizations are characterized by majority representation of Native Americans, Asian-Americans, African-Americans and/or Hispanic-Americans, in both policy formulation and decision-making regarding management, service delivery and staffing reflective of the geographic area it serves.

Minority-Owned Business Enterprise (MBE)

A business enterprise which is at least 51% owned, operated or controlled by United States citizens or permanent resident aliens who are minority group members (as listed under Article 15-A of the New York State Executive Law).

A business entity must be certified by the New York State Division of Minority and Women-Owned Business Development as a Minority-Owned Business Enterprise in order to qualify for this status.

New York State Small Business (SB)

A business which is a resident of New York State, independently owned and operated, not dominant in its field and which employs one hundred or fewer people.

New York State Vendor ID

The NYS Vendor ID is a ten-character identifier issued by New York State when the vendor is registered on the Vendor File.

Non-Responsibility Finding

A determination by a government entity that a business entity does not have the requisite financial or organizational capacity, and/or legal authority, and/or integrity, and/or acceptable performance on previous government contracts to perform on a government contract.

Not-For-Profit

A business entity organized for the purpose of social, religious, charitable, educational, athletic, literary, and political or other such activities, which is registered with either:

- a. the New York State Department of State as a Not-for-Profit Corporation in accordance with Article 13 of the Not-for-Profit Corporation Law; and/or
- b. the New York State Attorney General Charities Bureau;

or, is exempt from taxation under Section 501 of the Internal Revenue Code.

Not-For-Profit Corporation

A corporation formed for purposes other than financial gain, pursuant to and in accordance with a state's Not-For-Profit Corporation Law.

Official(s)

Individual who serves in an executive capacity with decision-making authority and responsibility for the oversight of a Legal Business Entity, a Reporting Entity or an Associated Entity; includes individuals who perform the functions of chief executive officer (CEO), chief operating officer (COO), chief financial officer (CFO), and/or chairman of the board, or their equivalents.

Equivalent titles may include, but are not limited to the following:

- a. Corporations: The chief executive officer (CEO), chief operating officer (COO), chief financial officer (CFO), and/or chairman of the board
- b. Partnerships: The Senior Managing Partners
- c. Limited Liability Companies (LLC): The Executive Managing Directors/Members, Senior Managing Directors/Members
- d. Sole Proprietors: The individual who is the sole owner and manager of the business entity
- e. Unincorporated Associations: The Executive Committee Members, including President, Vice President, Secretary and Treasurer, Executive or Managing Trustees

Organizational Chart

A diagram which illustrates the relationship and management structure of the Reporting Entity to the Legal Business Entity and other Associated Entities as herein defined

Organizational Unit

An established portion of a Legal Business Entity which is within and operating under the authority of the Legal Business Entity, with a designated manager or management team responsible for the operation thereof. For example, a department, division, branch or chapter directly or primarily responsible for fulfilling the terms of the contract. (See Reporting Entity)

OSHA Violation

Serious

A violation designated as "serious" by the Occupational Safety and Health Administration (OSHA). Generally, where there is substantial probability that death or serious physical harm could result and that the employer knew or should have known of the hazard.

Willful

A violation designated as "willful" by the Occupational Safety and Health Administration (OSHA). Generally, a violation that the employer knowingly commits or commits with plain indifference to the law. The employer either knows that what he or she is doing constitutes a violation, or is aware that a hazardous condition exists and makes no reasonable effort to eliminate it.

PC – Professional Service Corporation

A Professional Service Corporation (PC) is organized by one or more individuals authorized to provide a professional service for the purpose of making a profit and for the purpose of rendering such professional service as licensed thereto. Shares may only be issued to those licensed individuals as are authorized to practice their professional service in this state and who have engaged in such profession or will be engaged in the practice of such profession of the PC within 30 days of the issuance of the shares. The designation "PC" must follow and be a part of the business entity's legal name.

PLLC – Professional Service Limited Liability Company

A Professional Service Limited Liability Company (PLLC) is a limited liability company organized for the purpose of providing professional services. Members may only consist of those licensed individuals as are authorized to practice their professional service in this state, and who have engaged in such profession, or will be engaged in the practice of such profession. The designation "PLLC" must follow and be a part of the business entity's legal name.

Primary Place of Business

The location where the direction and management of the Reporting Entity takes place.

Principal Owner

Any person holding 10% or more of the voting stock of a publicly traded corporation, or 25% or more of a privately held corporation. For construction business entities, any person whose ownership interest is 5% or more.

Principal Place of Business

The location of the primary control, direction and management of the Legal Business Entity.

Registered to do business in New York State

A business entity is registered to do business in New York State, when it has met the statutory filing requirements of filing for authority to do business in New York State, usually by filing with the New York Department of State.

Reporting Entity

The Reporting Entity may be either the entire Legal Business Entity or a portion of the Legal Business Entity, which does or anticipates doing business with the State of New York. If it is not the entire Legal Business Entity, the portion must be an established organizational unit within and operating under the authority of the Legal Business Entity, with a designated manager or management team responsible for the operation thereof. The established organizational unit must have the same Employer Identification Number as the Legal Business Entity. The organizational unit must also be part of the Legal Business Entity, with primary responsibility for fulfilling the terms of the anticipated contract. Examples of a Reporting Entity include, but are not limited to, a department, division or branch.

Sanction

(Sanction or sanctioned) Any fine, penalty, judgment, injunction, violation, debarment, suspension or revocation.

Shared Space

Space is considered to be shared when any part of the space utilized by the submitting Business Entity, at any of its sites, is also utilized on a regular or intermittent basis for any purpose by any other entity, and where there is no lease or sublease in effect between the submitting Business Entity and any other entity that is sharing space with the submitting Business Entity.

Sole Proprietor

A business entity owned and operated by one individual, although there may be employees. All business decisions are made by the sole owner.

State Contracting Entity

Any New York State government-created entity with the authority to enter into a contract. This includes any New York State created agency, department, division, board, commission or bureau, including public authorities and public benefit corporations.

State Government Entity

Any state government-created agency, department, division, board, commission or bureau of any state, including public authorities and public corporations.

Statutory Affirmative Action Requirements

The statutory inclusion of language in government procurement contracts that

- a. requires a business entity to affirmatively act to ensure and promote equal opportunity employment on government contracts,
- b. prohibits a business-entity from discrimination in employment, and
- c. provides for termination of such contracts for a business entity's failure to comply with such terms.

Suspension

(Suspension or suspended) Action taken by a government entity to temporarily restrict the business entity's right to provide new or continuing contractual obligations.

Terminated for Cause

The exercise of a government entity's right to completely or partially terminate a contract due to the business entity's failure to perform its contractual obligations or for the business entity's failure to comply with statutory and/or regulatory responsibilities.

TIN – Taxpayer Identification Number

Taxpayer Identification Number used for federal income tax reporting. This number may be the federal Employer Identification Number (EIN) or the Social Security Number (SSN) of an individual operating a business as a sole proprietor. (Note: Individuals and Sole Proprietors may use a Social Security Number but are encouraged to obtain and use an Employer Identification Number.)

Trade Name

Any name used by a person to identify a business or vocation of such person. A person shall include an individual (natural person), firm, partnership, corporation, union, association or other business entity capable of suing and being sued in a court of law. This also includes any trade, franchise or licensee names.

Unincorporated Association

This is a type of business entity that may be created contractually. The contractual relationship is between the members of the association, all of whom have agreed to join together for a particular purpose. These types of business entities include, but are not limited to, unions, historical societies, professional membership associations, and recreational societies.

Women-Owned Business Enterprise (WBE)

A business enterprise which is at least 51% owned, operated or controlled by U.S. citizens or permanent resident aliens who are women. A business entity must be certified by the New York State Division of Minority and Women-Owned Business Development as a Women-Owned Business Enterprise in order to qualify for this status.

NEW YORK STATE VENDOR RESPONSIBILITY QUESTIONNAIRE FOR-PROFIT CONSTRUCTION (CCA-2)

You have selected the For-Profit Construction questionnaire, commonly known as the "CCA-2," which may be printed and completed in this format or, for your convenience, may be completed online using the New York State VendRep System.

COMPLETION & CERTIFICATION

The person(s) completing the questionnaire must be knowledgeable about the vendor's business and operations. An owner or official must certify the questionnaire and the signature must be notarized.

NEW YORK STATE VENDOR IDENTIFICATION NUMBER (VENDOR ID)

The <u>Vendor ID</u> is a ten-digit identifier issued by New York State when the vendor is registered on the Statewide Vendor File. This number must now be included on the questionnaire. If the business entity has not obtained a <u>Vendor ID</u>, contact the OSC Help Desk at <u>ciohelpdesk@osc.state.ny.us</u> or call 866-370-4672.

DEFINITIONS

All underlined terms are defined in the "New York State Vendor Responsibility Definitions List," found at http://www.osc.state.ny.us/vendrep/documents/questionnaire/definitions.pdf. These terms may not have their ordinary, common or traditional meanings. Each vendor is strongly encouraged to read the respective definitions for any and all underlined terms. By submitting this questionnaire, the vendor agrees to be bound by the terms as defined in the "New York State Vendor Responsibility Definitions List" existing at the time of certification.

RESPONSES

Every question must be answered. Each response must provide all relevant information which can be obtained within the limits of the law. However, information regarding a determination or finding made in error which was subsequently corrected or overturned, and/or was withdrawn by the issuing government entity, is not required. Individuals and <u>Sole Proprietors</u> may use a Social Security Number but are encouraged to obtain and use a federal Employer Identification Number (EIN).

BUSINESS ENTITY INFORMATION								
<u>Legal Business Name</u>			EIN	EIN				
Address of the Pr	rincinal Pl	ace of Rusiness	_(street, city, state, zip c	ode)	New York State Vendor Idea	New York State Vendor Identification Number		
Address of the 11	тистрат т	ace of Business	_(street, etty, state, zip e	ouc)	New Tork State Vendor Idea	uncano	<u>ii ivuiiibei</u>	
					Telephone	Telephone Fax		
					ext.			
					Website			
Authorized Conta	act for this	s Questionnaire						
Name					Telephone	Fax		
					ext.			
Title					Email			
			pplicable, list any other where filed and the statu		ume, Former Name, Other Identit	y, or <u>EIN</u>	<u>I</u> used in	
Type	Name	- County v	viiere med and the state	EIN	State or County where filed		Status	
71								
	1			l			1	
I. BUSINESS C								
			priate box and provide a	additional inforr	nation:			
a) <u>Corp</u>	oration (i	ncluding <u>PC</u>)	Date of Incorporation					
, — —	ted Liabil C or <u>PLLC</u>	ity Company	Date Organized					
		ity Partnership	Date of Registration					
d) Limi	ted Partne	rship	Date Established					
e) 🗌 <u>Gene</u>	ral Partne	<u>rship</u>	Date Established		County (if formed in NYS)			
f) Sole Proprietor How many years in business?			L					
g) Other Date Established								
If Other, explain:								
1.1 Was the Business Entity formed in New York State?					☐ No			
If "No," indicate	jurisdictio	on where the Bu	siness Entity was forme	ed:				
United 3	States	State						
Other		Country						

I. BUSINESS CHARACTERISTICS							
1.2 Is the <u>Legal Busi</u>	ness Entity public	y traded?		☐ Yes ☐ No			
If "Yes," provide the C	CIK code or Ticker	Symbol:		•			
	1.3 Is the <u>Business Entity</u> currently <u>registered to do business in New York State</u> ? Note: Select "Not Required" if the Business Entity is a Sole Proprietor or General Partnership Not Required						
If "No," explain why t	he <u>Business Entity</u>	is not required to be registered	to do business in New York State	2:			
			mitting <u>Business Entity</u> is a <u>Joint</u> tity comprising the <u>Joint Venture</u> .	Yes No			
maintain an offic	e in New York Sta		Tork State, does the <u>Business Enti</u>	ty Yes No			
If "Yes," provide the a	ddress and telepho	ne number for one office located	l in New York State.				
	Business Enterprise, or New York State Small Business, or federally certified Disadvantaged Business						
☐ New York St. ☐ New York St. ☐ New York St.	If "Yes," check all that apply: New York State certified Minority-Owned Business Enterprise (MBE) New York State certified Women-Owned Business Enterprise (WBE) New York State Small Business Federally certified Disadvantaged Business Enterprise (DBE)						
1.7 Identify each person or business entity that is, or has been within the past five (5) years, <u>Principal Owner</u> of 5.0% or more of the firm's shares; a Business Entity Official; or one of the five largest shareholders, if applicable. (Attach additional pages if necessary.) <u>Joint Ventures</u> : Provide information for all firms involved.							
Name (For each person, include middle initial) Title Percentage of ownership (Enter 0%, if not applicable)		Employment status with the firm					
				Current Former			
				Current Former			
				Current Former			
				Current Former			

II. AFFILIATE and JOINT VENTURE RELATIONSHIPS								
2.0	Are there any other construction-related firms in which, now or in the past five years, the submitting Business Entity or any of the individuals or business entities listed in question 1.7 either owned or owns 5.0% or more of the shares of, or was or is one of the five largest shareholders or a director, officer, partner or proprietor of said other firm? (Attach additional pages if necessary.)							
Firm	/Company Name	Firm/Company EIN (If available)		Firm/Company's Primary Business Activity				
Firm	/Company Address							
Expl	ain relationship with the firm and indica	te percent of ownership	p, if applicable (enter N	//A, if not applicable):				
Are has i	there any shareholders, directors, officers n common with this firm?	s, owners, partners or p	proprietors that the subr	mitting Business Entity	Yes No			
Indiv	vidual's Name (Include middle initial)		Position/Title with Fin	rm/Company				
2.1	Does the <u>Business Entity</u> have any <u>cons</u> 2.0 above? (Attach additional pages if		tes not identified in the	response to question	Yes No			
Affil	iate Name	Affiliate EIN (If avail	able)	Affiliate's Primary Business Activity				
Affil	iate Address							
Explain relationship with the affiliate and indicate percent of ownership, if applicable (enter N/A, if not applicable):								
	there any shareholders, directors, officers n common with this affiliate?	s, owners, partners or p	proprietors that the subr	mitting Business Entity	Yes No			
Indiv	Individual's Name (Include middle initial) Position/Title with Firm/Company							
2.2	Has the <u>Business Entity</u> participated in years? (Attach additional pages if necessity)		ed Joint Ventures within	n the past three (3)	Yes No			
Joint	oint Venture Name Joint Venture EIN (If available) Identify parties to the Joint Venture							

III.	CONTRACT HISTORY						
3.0	Has the Business Entity completed any construction contracts?	☐ Yes ☐ No					
Cons	If "Yes," list the ten most recent <u>construction</u> contracts the <u>Business Entity</u> has completed using Attachment A – Completed Construction Contracts, found at <u>www.osc.state.ny.us/vendrep/documents/questionnaire/ac3294s.doc</u> . If less than ten, include most recent subcontracts on projects up to that number.						
3.1	Does the <u>Business Entity</u> currently have uncompleted <u>construction</u> contracts?	☐ Yes ☐ No					
<u>wwn</u>	If "Yes," list all current uncompleted construction contracts by using Attachment B – Uncompleted Construction Contracts, found at www.osc.state.ny.us/vendrep/documents/questionnaire/ac3295s.doc . Note: Ongoing projects must be included.						
	INTEGRITY – CONTRACT BIDDING in the past five (5) years, has the Business Entity, an affiliate, or any predecessor company or entity:						
4.0	Been <u>suspended</u> or <u>debarred</u> from any <u>government contracting process</u> or been <u>disqualified</u> on any government procurement?	Yes No					
4.1	Been subject to a denial or revocation of a government prequalification?	☐ Yes ☐ No					
4.2	Had any bid rejected by a government entity for lack of qualifications, responsibility or because of the submission of an informal, non-responsive or incomplete bid?	Yes No					
4.3	Had a proposed subcontract rejected by a government entity for lack of qualifications, responsibility or because of the submission of an informal, non-responsive or incomplete bid?	☐ Yes ☐ No					
4.4	Had a low bid rejected on a <u>government contract</u> for failure to make <u>good faith efforts</u> on any <u>Minority-Owned Business Enterprise</u> , <u>Women-Owned Business Enterprise</u> or <u>Disadvantaged Business Enterprise</u> goal or <u>statutory affirmative action requirements</u> on a previously held contract?	Yes No					
4.5	Agreed to a voluntary exclusion from bidding/contracting with a government entity?	Yes No					
4.6	Initiated a request to withdraw a bid submitted to a government entity or made any claim of an error on a bid submitted to a government entity?	Yes No					
For each "Yes," provide an explanation of the issue(s), the <u>Business Entity</u> involved, the relationship to the submitting <u>Business</u> <u>Entity</u> , the <u>government entity</u> involved, project(s), relevant dates, any remedial or corrective action(s) taken and the current status of the issue(s). Provide answer(s) below or attach additional sheets with numbered responses.							
1 7 1 1	NITECRITY CONTRACT AWARD						
V. INTEGRITY – CONTRACT AWARD Within the past five (5) years, has the Business Entity, an affiliate, or any predecessor company or entity:							
5.0	Defaulted on or been <u>suspended</u> , cancelled or <u>terminated for cause</u> on any contract?	☐ Yes ☐ No					
5.1	Been subject to an <u>administrative proceeding</u> or civil action seeking specific performance or restitution (except any disputed work proceeding) in connection with any <u>government contract</u> ?	Yes No					
5.2	Entered into a formal monitoring agreement, consent decree or stipulation settlement as specified by, or agreed to with, any government entity?	Yes No					
5.3	Had its surety called upon to complete any contract whether government or private sector?	☐ Yes ☐ No					
5.4	Forfeited all or part of a standby letter of credit in connection with any government contract?	☐ Yes ☐ No					

NYS VENDOR ID: 000000000 AC 3292-S (Rev. 9/13)

NEW YORK STATE VENDOR RESPONSIBILITY QUESTIONNAIRE **FOR-PROFIT CONSTRUCTION (CCA-2)**

V. INTEGRITY - CONTRACT AWARD Within the past five (5) years, has the Business Entity, an affiliate, or any predecessor company or entity: For each "Yes," provide an explanation of the issue(s), the <u>Business Entity</u> involved, the relationship to the submitting <u>Business</u> Entity, the government entity/owners involved, project(s), contract number(s), relevant dates, any remedial or corrective action(s) taken and the current status of the issue(s). Provide answer(s) below or attach additional sheets with numbered responses. VI. CERTIFICATIONS/LICENSES Within the past five (5) years, has the Business Entity, an affiliate, or any predecessor company or entity: Had a revocation or <u>suspension</u> of any business or professional permit and/or license? ☐ Yes ☐ No □ No ☐ Yes 6.1 Had a denial, decertification, revocation or forfeiture of New York State certification of Minority-Owned Business Enterprise, Women-Owned Business Enterprise or a federal certification of Disadvantaged Business Enterprise status, for other than a change of ownership? For each "Yes," provide an explanation of the issue(s), the <u>Business Entity</u> involved, the relationship to the submitting <u>Business</u> Entity, the government entity involved, relevant dates, any remedial or corrective action(s) taken and the current status of the issue(s). *Provide answer(s) below or attach additional sheets with numbered responses.* VII. LEGAL PROCEEDINGS/GOVERNMENT INVESTIGATIONS Within the past five (5) years, has the Business Entity, an affiliate, or any predecessor company or entity: Yes No Been the subject of a criminal investigation, whether open or closed, or an indictment for any businessrelated conduct constituting a crime under local, state or federal law? 7.1 Been the subject of: (i.) An indictment, grant of immunity, judgment or conviction (including entering into a plea bargain) ☐ Yes ☐ No for conduct constituting a crime; or (ii.) Any criminal investigation, felony indictment or conviction concerning the formation of, or any

business association with, an allegedly false or fraudulent Minority-Owned Business Enterprise,

Women-Owned Business Enterprise, or a Disadvantaged Business Enterprise?

Had a government entity find a willful prevailing wage or supplemental payment violation?

Had a New York State Labor Law violation deemed willful?

Received any OSHA citation, which resulted in a final determination classified as serious or willful?

Entered into a consent order with the New York State Department of Environmental Conservation, or a

federal, state or local government enforcement determination involving a violation of federal, state or local

7.2

7.3

7.4

environmental laws?

☐ Yes ☐ No

☐ Yes ☐ No

☐ Yes ☐ No

Yes

Yes

□ No

□ No

NEW YORK STATE VENDOR RESPONSIBILITY QUESTIONNAIRE FOR-PROFIT CONSTRUCTION (CCA-2)

VII. LEGAL PROCEEDINGS/GOVERNMENT INVESTIGATIONS	
Within the past five (5) years, has the Business Entity, an affiliate, or any predecessor company or entity:	
7.6 Other than previously disclosed, been the subject of any <u>citations</u> , notices or violation orders; a pending administrative hearing, proceeding or determination of a violation of:	☐ Yes ☐ No
• <u>Federal</u> , state or local health laws, rules or regulations;	
• Federal, state or local environmental laws, rules or regulations;	
• Unemployment insurance or workers compensation coverage or <u>claim</u> requirements;	
 Any labor law or regulation, which was deemed willful; 	
 Employee Retirement Income Security Act (ERISA); 	
• Federal, state or local human rights laws;	
• Federal, state or local security laws?	
For each "Yes," provide an explanation of the issue(s), the <u>Business Entity</u> involved, the relationship to the submitted the government entity involved, relevant dates, any remedial or corrective action(s) taken and the current step Provide answer(s) below or attach additional sheets with numbered responses. Note: Information regarding a determination or finding made in error, which was subsequently corrected or overtwithdrawn by the issuing government entity, is not required.	atus of the issue(s).
VIII. LEADERSHIP INTEGRITY If the Business Entity is a Joint Venture Entity, answer "N/A - Not Applicable" to questions in this section. Within the past five (5) years has any individual previously identified or any individual currently or formerly had to sign, execute or approve bids, proposals, contracts or supporting documentation on behalf of the Business Engovernment entity been:	
8.0 <u>Sanctioned</u> relative to any business or professional permit and/or license?	☐ Yes ☐ No ☐ N/A
8.1 <u>Suspended</u> , <u>debarred</u> or <u>disqualified</u> from any <u>government contracting process</u> ?	☐ Yes ☐ No ☐ N/A
8.2 The subject of a criminal <u>investigation</u> , whether open or closed, or an indictment for any business-related	☐ Yes ☐ No
conduct constituting a crime under local, state or <u>federal</u> law?	□ N/A
8.3 Charged with a misdemeanor or felony, indicted, granted immunity, convicted of a crime or subject to a judgment for:(i.) Any business-related activity, including but not limited to fraud, coercion, extortion, bribe or bribe-	
8.3 Charged with a misdemeanor or felony, indicted, granted immunity, convicted of a crime or subject to a judgment for:	N/A Yes No
8.3 Charged with a misdemeanor or felony, indicted, granted immunity, convicted of a crime or subject to a judgment for: (i.) Any business-related activity, including but not limited to fraud, coercion, extortion, bribe or bribe-receiving, giving or accepting unlawful gratuities, immigration or tax fraud, racketeering, mail fraud,	N/A Yes No

NEW YORK STATE VENDOR RESPONSIBILITY QUESTIONNAIRE FOR-PROFIT CONSTRUCTION (CCA-2)

IX. FINANCIAL AND ORGANIZATION	IX. FINANCIAL AND ORGANIZATIONAL CAPACITY					
9.0 Within the past five (5) years, has the performance assessment(s) from any §			ormal unsatisfactory	Yes No		
government entity involved, relevant dates,	If "Yes," provide an explanation of the issue(s), the <u>Business Entity</u> involved, the relationship to the submitting <u>Business Entity</u> , the <u>government entity</u> involved, relevant dates, any remedial or corrective action(s) taken and the current status of the issue(s). Provide answer below or attach additional sheets with numbered responses.					
9.1 Within the past five (5) years, has the over \$25,000?	Business Entity or any	affiliate had any liquida	ated damages assessed	Yes No		
If "Yes," provide an explanation of the issurrelevant dates, the contracting party involve attach additional sheets with numbered response.	ed, the amount assessed					
9.2 Within the past five (5) years, has the over \$25,000 filed against the Busines than 90 days? (<i>Note: Including but n</i>	ss Entity which remain u	undischarged or were u	nsatisfied for more	Yes No		
If "Yes," provide an explanation of the issue(s), the <u>Business Entity</u> involved, the relationship to the submitting <u>Business Entity</u> , relevant dates, the Lien holder or Claimants' name(s), the amount of the <u>lien(s)</u> and the current status of the issue(s). Provide answer below or attach additional sheets with numbered responses.						
9.3 In the last seven (7) years, has the <u>Bus</u> bankruptcy proceedings, whether or no				Yes No		
If "Yes," provide the <u>Business Entity</u> involve court name and the docket number. Indicate answer below or attach additional sheets with	e the current status of th	he proceedings as "Init				
9.4 What is the <u>Business Entity's</u> Bonding	g Capacity?					
a. Single Project		b. Aggregate (All Projects)				
9.5 List <u>Business Entity's</u> Gross Sales for Fiscal Years:	the previous three (3)					
1st Year (Indicate year)	2nd Year (Indicate ye	ear)	3rd Year (Indicate year)		
Gross Sales	Gross Sales		Gross Sales			
9.6 List <u>Business Entity's</u> Average Backle (Estimated total value of uncompleted	•	•				
1st Year (Indicate year)	2nd Year (Indicate y	ear)	3rd Year (Indicate year)		
Amount	Amount		Amount			
9.7 Attach <u>Business Entity's</u> most recent a Information, found at <u>www.osc.state.r</u> (<i>This information must be attached.</i>)				ment C – Financial		

NEW YORK STATE VENDOR RESPONSIBILITY QUESTIONNAIRE FOR-PROFIT CONSTRUCTION (CCA-2)

X. FREEDOM OF INFORMATION LAW (FOIL)					
10.0 Indicate whether any informatic Freedom of Information Law (I	on provided herein is believed to be exempt from disclosure under the FOIL).	Yes No			
· ·	ner such information is exempt from FOIL will be made at the time of any OIL. Attach additional pages if necessary.				
If "Yes," indicate the question number	er(s) and explain the basis for the claim.				

NEW YORK STATE VENDOR RESPONSIBILITY QUESTIONNAIRE FOR-PROFIT CONSTRUCTION (CCA-2)

Certification

The undersigned: (1) recognizes that this questionnaire is submitted for the express purpose of assisting New York State government entities (including the Office of the State Comptroller (OSC)) in making responsibility determinations regarding award or approval of a contract or subcontract and that such government entities will rely on information disclosed in the questionnaire in making responsibility determinations; (2) acknowledges that the New York State government entities and OSC may, in their discretion, by means which they may choose, verify the truth and accuracy of all statements made herein; and (3) acknowledges that intentional submission of false or misleading information may result in criminal penalties under State and/or Federal Law, as well as a finding of non-responsibility, contract suspension or contract termination.

The undersigned certifies that he/she:

- is knowledgeable about the submitting Business Entity's business and operations;
- has read and understands all of the questions contained in the questionnaire;
- has not altered the content of the questionnaire in any manner;
- has reviewed and/or supplied full and complete responses to each question;
- to the best of his/her knowledge, information and belief, confirms that the Business Entity's responses are true, accurate and complete, including all attachments, if applicable;
- understands that New York State government entities will rely on the information disclosed in the questionnaire when entering into a contract with the Business Entity; and
- is under an obligation to update the information provided herein to include any material changes to the
 Business Entity's responses at the time of bid/proposal submission through the contract award
 notification, and may be required to update the information at the request of the New York State
 government entities or OSC prior to the award and/or approval of a contract, or during the term of the
 contract.

Signature of Owner/Official				
Title				
Name of Business				
Address				
City, State, Zip				
Sworn to before me this	day of		_, 20;	
		_ Notary Public		

ATTACHMENT A – COMPLETED CONSTRUCTION CONTRACTS

Ques	estion 3.0: List the ten most recent construction contracts the Business Entity has completed. If less than ten, include most recent subcontracts on projects up to that number:							
1.	Agency/Owner				Award Date	Amount		Date Completed
	Contact Person		Telephone No.	Designer Architect an	nd /or Design Engine	er		
	Contract No.	Prime or Sub	Joint Venture (JV) N	Name, if applicable			EIN	of JV, if applicable
2.	Agency/Owner		,	Award Date Amount				Date Completed
	Contact Person		Telephone No.	Telephone No. Designer Architect and /or Design Engineer			·	
	Contract No.	Prime or Sub	Joint Venture (JV) N	Joint Venture (JV) Name, if applicable				
3.	Agency/Owner		,	Award Date Amount				Date Completed
	Contact Person		Telephone No.	Designer Architect ar	tect and /or Design Engineer			
	Contract No.	Prime or Sub	Joint Venture (JV) N	Name, if applicable			EIN	of JV, if applicable
4.	Agency/Owner	1			Award Date	Amount		Date Completed
	Contact Person		Telephone No.	Designer Architect ar	nd /or Design Engine	er		
	Contract No.	Prime or Sub	Joint Venture (JV) N	Name, if applicable			EIN	of JV, if applicable
5.	Agency/Owner	1	,		Award Date	Amount		Date Completed
	Contact Person		Telephone No.	Designer Architect ar	nd /or Design Engine	er	<u> </u>	
	Contract No.	Prime or Sub	Joint Venture (JV) N	Joint Venture (JV) Name, if applicable				of JV, if applicable

ATTACHMENT A – COMPLETED CONSTRUCTION CONTRACTS

Quest	tion 3.0: List the ten most number:	recent construction cont	racts the Business Entit	y has completed. If less	than ten, include m	ost recent subcontra	ects on j	projects up to that	
6.	Agency/Owner				Award Date	Amount]	Date Completed	
	Contact Person		Telephone No.	Designer Architect an	tect and /or Design Engineer				
	Contract No.	Prime or Sub	Joint Venture (JV) N	Name, if applicable			EIN of JV, if applicable		
7.	Agency/Owner				Award Date	Amount		Date Completed	
	Contact Person		Telephone No.	Telephone No. Designer Architect and /or Design Engineer					
	Contract No.	Prime or Sub	Joint Venture (JV) N	Joint Venture (JV) Name, if applicable				of JV, if applicable	
8.	Agency/Owner			Award Date Amount				Date Completed	
	Contact Person		Telephone No.	Designer Architect an	ct and /or Design Engineer				
	Contract No.	Prime or Sub	Joint Venture (JV) N	Name, if applicable			EIN	of JV, if applicable	
9.	Agency/Owner				Award Date	Amount		Date Completed	
	Contact Person		Telephone No.	Designer Architect an	nd /or Design Enginee	er			
	Contract No.	Prime or Sub	Joint Venture (JV) N	Name, if applicable			EIN	of JV, if applicable	
10.	Agency/Owner				Award Date	Amount		Date Completed	
	Contact Person		Telephone No.	Designer Architect an	nd /or Design Enginee	er			
	Contract No.	Prime or Sub	Joint Venture (JV) N	int Venture (JV) Name, if applicable				of JV, if applicable	

ATTACHMENT B – UNCOMPLETED CONSTRUCTION CONTRACTS

Ques	tion 3.1: List all current u	ncompleted construction co	ontracts:							
1.	Agency/Owner						Award Date		Completion Date	
	Contact Person Telephone				Designer Architect and /or	Design Engineer				
	Contract No.	Prime or Sub	Joint Venture (JV) Name	e, if applicable			EI	N of JV, if applicable	
				Total C	Contract Amount	Amount Sublet to other	ers	Uncomp	leted Amount	
2.	Agency/Owner			Award Date					Completion Date	
	Contact Person		Telephone No.	Telephone No. Designer Architect and /or Design Engineer						
	Contract No.	Prime or Sub	Joint Venture (JV) Name, if applicable					EI	N of JV, if applicable	
				Total C	Contract Amount	Amount Sublet to other	ut Sublet to others Uncomp		mpleted Amount	
3.	Agency/Owner						Award Date		Completion Date	
	Contact Person		Telephone No.	Telephone No. Designer Architect and /or Design Engineer						
	Contract No.	Prime or Sub	Joint Venture (J	JV) Name	e, if applicable			EI	N of JV, if applicable	
				Total C	Contract Amount	Amount Sublet to other	ers	Uncomp	leted Amount	
4.	Agency/Owner						Award Date		Completion Date	
	Contact Person		Telephone No.		Designer Architect and /or	Design Engineer				
	Contract No.	Prime or Sub	Joint Venture (JV) Name	e, if applicable			EI	N of JV, if applicable	
				Total C	Contract Amount	Amount Sublet to other	ers	Uncompleted Amount		

ATTACHMENT B – UNCOMPLETED CONSTRUCTION CONTRACTS

Ques	tion 3.1: List all current u	ncompleted construction co	ontracts:							
5.	Agency/Owner						Award Date		Completion Date	
	Contact Person		Telephone No.		Designer Architect and /or	Design Engineer				
	Contract No.	Prime or Sub	Joint Venture (.	int Venture (JV) Name, if applicable				EI	N of JV, if applicable	
				Total C	Contract Amount	Amount Sublet to other	ers	Uncomp	leted Amount	
6.	Agency/Owner			Award Date					Completion Date	
	Contact Person		Telephone No.	Telephone No. Designer Architect and /or Design Engineer						
	Contract No.	Prime or Sub	Joint Venture (JV) Name, if applicable					EI	N of JV, if applicable	
			Total Contract Amount Amount Suble			Amount Sublet to other	Sublet to others Uncome		mpleted Amount	
7.	Agency/Owner						Award Date		Completion Date	
	Contact Person		Telephone No.	Telephone No. Designer Architect and /or Design Engineer						
	Contract No.	Prime or Sub	Joint Venture (.	JV) Name	e, if applicable			EI	N of JV, if applicable	
				Total C	Contract Amount	Amount Sublet to other	ers	Uncomp	leted Amount	
8.	Agency/Owner						Award Date		Completion Date	
	Contact Person		Telephone No.		Designer Architect and /or	Design Engineer				
	Contract No.	Prime or Sub	Joint Venture (.	JV) Name	e, if applicable			EI	N of JV, if applicable	
				Total C	Contract Amount	Amount Sublet to other	ers	Uncomp	leted Amount	

ATTACHMENT B – UNCOMPLETED CONSTRUCTION CONTRACTS

Ques	tion 3.1: List all curren	nt uncompleted construct	tion contracts:						
9.	Agency/Owner						Award Date		Completion Date
	Contact Person Telephone No				Designer Architect and /or I	Design Engineer			
	Contract No. Prime or Sub Joint Venture			JV) Nam	e, if applicable			EII	N of JV, if applicable
		Contract Amount	Amount Sublet to others Unc		Uncompl	ompleted Amount			
10.	Agency/Owner						Award Date		Completion Date
	Contact Person		Telephone No.		Designer Architect and /or I	Design Engineer			
	Contract No.	Prime or Sub	Joint Venture (J	JV) Nam	e, if applicable			EI	N of JV, if applicable
				Total C	Contract Amount	Amount Sublet to oth	ers	Uncompl	leted Amount
					Grand	l Total All Uncomplet	ed Contracts	\$0.00	

Grand Total All Uncompleted Contracts	\$0.00
orana romana encompressa constacts	40100

		NYS Vendor	ID:			
		As of Da	ite:			
	ASSETS					
<u>Current Assets</u>						
1. Cash			\$	-		
2. Accounts receivable - less allowance for doubtful accounts	\$	-			•	
Retainers included in accounts receivable	\$	-	•			
Claims included in accounts receivable not yet approved or in litigation	\$	-				
Total Accounts Receivable			\$	-	-	
3. Notes receivable - due within one year			\$	-	_	
4. Inventory - materials			\$	-	_	
5. Contract costs in excess of billings on uncompleted contracts			\$	-	_	
6. Accrued income receivable					-	
Interest	\$	-				
Other (list)	\$	-	•			
	\$	-	•			
Total Accrued Income Receivable			\$	-		
7. Deposits					-	
Bid and Plan	\$	-				
Other (list)	\$	-	•			
	\$	-	•			
Total Deposits			\$	-		
8. Prepaid Expenses					-	
Income Taxes	\$	-				
Insurance	\$	-	•			
Other (list)	\$	-	•			
	\$	-	-			
Total Prepaid Expenses			\$	-		
9. Other Current Assets					-	
Other (list)	\$	-				
	\$	-				
Total Other Current Assets	-		\$	-		
10. Total Current Assets			•		\$	-
11. Investments						
Listed securities-present market value	\$					
Unlisted securities-present value	\$	=	=			
Total Investments	-				\$	_

	NYS Vendor ID:		
12. Fixed Assets			
Land	\$ -		
Building and improvements	\$ -		
Leasehold improvements	\$ -		
Machinery and equipment	\$ -		
Automotive equipment	\$ -		
Office furniture and fixtures	\$ -		
Other (list)	\$ -		
	\$ -		
Total	 \$	-	
Less: Accumulated depreciation	\$		
Total Fixed Assets - Net		\$	-
13. Other Assets			
Loans receivable			
Officers	\$ <u>-</u>		
Employees	\$ -		
Shareholders	\$ <u>-</u>		
Cash surrender value of officers' life insurance	\$ -		
Organization expense – net of amortization	\$ -		
Notes receivable - due after one year	\$ <u>-</u>		
Other (list)	\$ -		
	\$ -		
Total Other Assets	 	\$	-
14. TOTAL ASSETS		<u> </u>	

NYS Vendor ID:	
----------------	--

LIABILITIES **Current Liabilities** 15. Accounts payable 16 a. Loans from shareholders - due within one year 16 b. Other Loans - due within one year 17. Notes payable - due within one year 18. Mortgage payable - due within one year 19. Other payables - due within one year Other (list) Total Other Payables - due within one year 20. Billings in excess of costs and estimated earnings 21. Accrued expenses payable Salaries and wages Payroll taxes Employees' benefits Insurance Other Total Accrued Expenses Payable 22. Dividends payable 23. Income taxes payable State Federal Other Total Income Taxes Payable 24. Total current liabilities 25. Deferred income taxes payable State Federal Other Total Deferred Income Taxes 26. Long Term Liabilities Loans from shareholders - due after one year Other Loans - due within one year Principle Interest Notes payable - due after one year Mortgage - due after one year Other payables - due after one year Other (list) Total Long Term Liabilities

	NYS	vendor ID:		
27. Other Liabilities				
Other (list)	\$	-		
	\$	<u>-</u>		
Total Other Liabilities		\$	<u>-</u>	
28. TOTAL LIABILITIES			\$	-
	NET WORTH			
29. Net Worth (if proprietorship or partnership)			\$	-
30. Stockholders' Equity				
Common stock issued and outstanding	\$	-		
Preferred stock issued and outstanding	\$			
Retained earnings	\$	-		
Total	\$	-		
Less: Treasury stock	\$	-		
31. TOTAL STOCKHOLDERS' EQUITY			\$	-
32. TOTAL LIABILITIES AND STOCKHOLDERS'	EQUITY		\$	-

DASNY VENDOR QUESTIONNAIRE

Tit	tle o	f Project:		Project No:	9999			
A.	Ins	structions						
 The Contractor shall submit this form within three (3) days after low bidder notification. The Design Professional shall submit this form as part of the Request for Proposal. Provide information consistent with, and as stated, in the NYS Vendor Responsibility Questionnaire submitted at time of bid, o Request for Proposal. Respond to and answer all questions. Attach additional pages if more space is needed. Sign and have notarized the CERTIFICATION (on page 5). Indicate, by placing an asterisk by the question, whether any information provided herein is believed to be exempt from discletthe Freedom of Information Law (FOIL). Note: A determination of whether such information is exempt from FOIL will be a time of any request for disclosure under FOIL. 								
B.	Ge	neral Information						
	1.	Firm Name		TIN				
	2.	Firm Address						
	3.	Officer's Name	Title	Phone No				
	4.	Owner or Lessee and Address of all	premises to be used to provide services to the Proj	ect				
		a. Name	Address					
		b. Name	Address					
		c. Name	Address					
		d. Name	Address					
		e. Name	Address					

C. Financial Information

DASNY VENDOR QUESTIONNAIRE

1	TT 71	. 1.	•	C /1	~ ,		1	· ·	1 , , ,	. 1 1	41	1., ,	, 1		•		
	W/ha	n providing (CONIDC	ot the	tirm's	racant	anniial	tingnois	l statement	includ	a tha ai	uditar's	ronort and	accompany	าเทกป	CONTRACE	it anv.
1.	VV IIC	n movianie i	CODICS	o u	1111111	LCCCIII	ammai	HHIAHUIA	н манениен	. IIICIUU	c uic ai	uuiwi s	s i cionit and	accommany	1112	OULIIOLOS.	n anv.

2.	Identify below any other person or entity guaranteeing the performance of, or otherwise providing financial assistance to the firm and
	describe the form of assistance and list the name and federal tax identification number (TIN) of each person or entity

FORM OF ASSISTANCE	INDIVIDUAL	COMPANY NAME	TIN	ADDRESS

D. Ownership, Management and Affiliation Information:

The following terms shall apply to all questions in Section D:

"Affiliate" shall mean any person or entity which is directly or indirectly controlled by the person or entity to which the question relates, or any person or entity which directly or indirectly controls such person or entity. For purposes of this definition, control means the power to direct the management of the firm, person or other entity, whether through ownership of shares, the right to designate the Board of Directors, contract or otherwise.

"Predecessor Company or Entity" shall mean any entity in which any person or entity, identified in the NYS Vendor Responsibility Questionnaire, has an ownership or other interest.

"Principal" shall mean any person who is or has been, within the past five years, either an owner of five percent (5%) or more of the firm's shares, one of the firm's five largest shareholders or a director, officer, partner or proprietor of the firm.

1. Within the past five years has the firm, any affiliate of the firm, any predecessor company or entity, or any principal of the firm, been the subject of any of the following, (describe in detail the circumstances of each affirmative answer):

	A suspension or debarment by a local government entity?		YES
b.	A rejection of a low bid on a local or federal government contract for failure to meet statutory affirmative action	or minorit	ty/womer
	business enterprise requirements?	☐ NO	YES
c.	Any dissolution by government proclamation?	☐ NO	YES
d.	A denial of application for a professional or trade license?	☐ NO	YES

DASNY VENDOR QUESTIONNAIRE

Identify in questions 2, 3 and 4 below, each individual who participates in policy making, financial decisions, or the firm's operations in relation to the Project.

<u> </u>	T : - 4	C'	1- : -1-	41 1 111.1	-1	. 1	F 00/		(1 4 C'	
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<i>-</i> .	List any	111111111	1 *** 111011	uic illui viuu	ui owiis oi	inds ownica	J.0 /0 OI	IIIOIC WILLIIII	mic past mive	y Carb.

INDIVIDUAL	FIRM NAME	FIRM ADDRESS	TIN	% OWNED

3. Identify any affiliate of the individual or firm identified in question 2.

INDIVIDUAL	AFFILIATE	AFFILIATE ADDRESS	TIN

4. For any individual, firm or affiliate identified above, (a) list and describe all judgments, liens or claims over \$25,000 filed against the individual, firm or affiliate and state remaining undischarged or unsatisfied amounts for more than 90 days; and (b) describe and state all liquidated damages amounts assessed. Also list any litigation currently pending against the individual, firm or affiliate if the judgment sought relates to the type of work to be performed for the Project, or could have a material adverse financial impact on the individual, firm or affiliate.

INDIVIDUAL, FIRM OR AFFILIATE	LIEN OR CLAIM AMOUNT	LIQUIDATED DAMAGES AMOUNT

5. Within the past five years has any individual, firm or affiliate identified above been the subject of any of the following (describe in detail the circumstances of each affirmative answer):

a. A judgment of conviction for any business-related conduct constituting a crime under state or federal law?

□ NO □ YES

A criminal investigation or indictment for any business-related conduct constituting a crime under state or federal law?

NO

A grant of immunity for any business-related conduct constituting a crime under state or federal law?

d. A federal, state or local suspension or debarment?

DASNY VENDOR QUESTIONNAIRE

e.	A rejection of any bid for lack of qualifications, responsibility or submission of an informal, non-responsive or inco	mplete bi	d?
		□ NO	☐ YES
f.	A rejection of any subcontract for lack of qualifications, responsibility or submission of any informal, non-responsibility	isive or in	complete
	bid?	☐ NO	YES
g.	A denial or revocation of pre-qualification?	☐ NO	☐ YES
ĥ.	A voluntary exclusion from bidding or contracting agreement?	☐ NO	☐ YES
i.	Any administrative proceeding or civil action seeking specific performance or restitution in connection with any pu	blic work	s contract
	except any disputed work proceeding?	☐ NO	YES
j.	An OSHA Citation and Notification of Penalty containing a violation classified as serious?	☐ NO	YES
k.	An OSHA Citation and Notification of Penalty containing a violation classified as willful?	☐ NO	YES
1.	A prevailing wage or supplement payment violation?	\square NO	YES
m.	A state Labor Law violation deemed willful?	☐ NO	YES
n.	Any other federal, state or local citations, Notices, violation orders, pending administrative hearings or proceedings	s, or deter	minations
	of a violation of any labor law or regulation?	☐ NO	YES
o.	Any criminal investigation, felony indictment or conviction concerning information of, or any business association	with, any	allegedly
	false or fraudulent women's, minority or disadvantaged business enterprise?	☐ NO	YES
p.	Any denial, decertification, revocation or forfeiture of women's business enterprise, minority business enterpris	e or disad	lvantaged
	business enterprise status?	☐ NO	YES
q.	Rejection of a low bid on a local, state or federal contract for failure to meet statutory affirmative action or minori	ty/women	business
	enterprise requirements?	☐ NO	YES YES
r.	A consent order with the NYS Department of Environmental Conservation, or a federal, state or local govern	nment enf	
	determination involving a violation of the federal or state environmental laws?	NO	. YES
s.	Any bankruptcy proceeding?	☐ NO	☐ YES
t.	Any suspension or revocation of any business or professional license or dissolution by governmental proclamation?	_	YES
u.	Any citations, Notices, violation orders, pending administrative hearings or proceedings or determinations for violation		
	i. Federal, state or local health laws, rules or regulations?	☐ NO	YES YES
	ii. Unemployment insurance or workers compensation coverage or claim requirements?	☐ NO	YES YES
	iii. ERISA (Employee Retirement Income Security Act)?	☐ NO	YES YES
	iv. Federal, state or local human rights laws?	☐ NO	YES YES
	v. Federal or state security laws?	□ NO	YES
	vi. Tax laws?	☐ NO	YES YES
v.	Denial of application for a professional or trade license?	☐ NO	YES YES
w.	1 J	☐ NO	YES
х.		/	lar entity,
	whether appointed by a court, by an administrative body, or pursuant to an agreement with a public agency or author		
		\square NO	☐ YES

DASNY VENDOR QUESTIONNAIRE

6.	Within the past five years, has the firm, affiliate, predecessor company or entity, principal, or manager or individual who participates in policy making, financial decisions, or the firm's operations in relation to the Project (describe in detail the circumstances of each affirmative answer):
	 a. Filed or submitted to any government agency, employee or representative any document that the person knew to contain a false statement or false information? b. Falsified any business record? c. Given or offered to give money or any thing of value or any benefit to any labor official or public servant with intent to influence that person's official acts, duties or decisions as a labor official or public servant? d. Given or offered to give money or any thing of value or any benefit to any official or employee of a business with intent to induce that person or employee to engage in unethical or illegal business practices? e. Agreed with any person to submit a proposal, price or bid below prevailing market rate? f. Been sued or paid a settlement of claim related to the performance of professional services?
E. Cei	rtification
State of which is mislead 210.45,	dersigned recognizes that the DASNY Vendor Questionnaire is submitted for the express purpose of inducing the Dormitory Authority - f New York to award a contract or approve a subcontract; acknowledges that the Dormitory Authority may in its discretion, by means it may choose, determine the truth and accuracy of all statements made herein; acknowledges that intentional submission of false or ling information may constitute a felony under Penal Law Section 210.40 or a misdemeanor under Penal Law Section 210.35 or Section and may also be punishable by a fine of up to \$10,000 or imprisonment of up to five years under 18 U.S.C. Section 1001; and states that ormation provided herein and any attached pages is true, accurate and complete.
Officer	's Signature:
Officer	's Name:
Title: _	
	to before me this day of, 20
3	

ACORB.	CERTIFICAT	E OF INSURANCE	DATE (MM/DD/YY)
	(DORMITORY A	UTHORITY SAMPLE)	
	PRODUCER	THIS CERTIFICATE IS ISSUED AS A	A MATTER OF INFORMATION ONLY AND
	Your Agent or Broker	NOT AMEND, EXTEND OR ALTER TH	TIFICATE HOLDER. THIS CERTIFICATE DOES E COVERAGE AFFORDED BY THE POLICIES BELOW.
		COMPANIES A	FFORDING COVERAGE
	INSURED	COMPANY	
		A Your Insurance Company	
		COMPANY	
		B Your Insurance Company	
	Your Name	COMPANY	
		C Your Insurance Company	
		COMPANY	
		D Your Insurance Company	
		COMPANY	
		E Your Insurance Company	
	COVERAGES		

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED, NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

CO LTR	TYPE OF INSURANCE	POLICY NUMBER	POLICY EFFECTIVE DATE (MM/DD/YY)	POLICY EXPIRATION DATE (MM/DD/YY)	LIMITS	
	GENERAL LIABILITY				GENERAL AGGREGATE	\$2,000,000
	X COMMERCIAL GENERAL				PRODUCTS-COMP/OP AGG	\$2,000,000
	LIABILITY					
	□□ CLAIMS MADE X OCCUR	XYZ - 123	04/01/XX	04/01/XY	PERSONAL & ADV INJURY	\$2,000,000
A	□ OWNER'S & CONT PROT				EACH OCCURRENCE	\$2,000,000
	X Include Independent Consultants				FIRE DAMAGE (Any one fire)	\$ 50,000
		•			MED EXP (Any one person)	\$ 5,000
	AUTOMOBILE LIABILITY					
	X ANY AUTO				COMBINED SINGLE LIMIT	\$1,000,000
	X ALL OWNED AUTOS					
В	X SCHEDULED AUTOS	ABC-345	04/01/XX	04/01/XY	BODILY INJURY (Per Person)	
	X HIRED AUTOS					
	X NON-OWNED AUTOS				BODILY INJURY (Per accident)	
	X GARAGE LIABILITY					
					PROPERTY DAMAGE	
	EXCESS LIABILITY				EACH OCCURRENCE	AS NEEDED
	X UMBRELLA FORM	LLL-555	04/01/XX	04/01/XY	AGGREGATE	
C	□ OTHER THAN UMBRELLA FORM					
			A		PAGE AND POLYMAN AND	
D	EMPLOYERS' LIABILITY	WCP-678	04/01/XX	04/01/XY	DISEASE - POLICY LIMIT	\$ 1,000,000
					DISEASE - EACH EMPLOYEE	\$ 1,000,000
_	OTHER					** ***
E	Asbestos Abatement Liability	AAL - 111	04/01/XX	04/01/XY	IF REQUIRED	\$2,000,000
	Builder's Risk	BR-111	04/01/XX	04/01/XX	IF REQUIRED	Contract Value

DESCRIPTION OF OPERATIONS/LOCATIONS/VEHICLES/SPECIAL ITEMS

DASNY CONTRACT NO:

PROJECT NAME:

FACILITY:

The following are Additional Insureds under General Liability as respects this project:

CERTIFICATE HOLDER	CANCELLATION
Dormitory AuthorityState of New York 515 Broadway Albany, NY 12207 Attn: Procurement Unit	SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELED BEFORE THE EXPIRATION DATE THEREOF, THE ISSUING COMPANY MAIL 30 DAYS WRITTEN NOTICE TO THE CERTIFICATE holder NAMED TO THE LEFT
	AUTHORIZED REPRESENTATIVE Your Agent/Broker Representative
ACORD 25-S (7/90)	© ACORD CORPORATION 1990



FACILITY

PROJECT NAME

CONTRACTOR

DA#

CORPORATE HEADQUARTERS

515 Broadway Albany, New York 12207-2964

T 518.257.3000 **F** 518.257.3100

NEW YORK OFFICE

One Penn Plaza, 52nd Fl. New York, New York 10119-0098

T 212.273.5000 F 212.273.5121

BUFFALO OFFICE

539 Franklin Street Buffalo, New York 14202-1109

T 716.884.9780 **F** 716.884.9787

www.dasny.org

CONTRACT FORMS FOR CONSTRUCTION **AGREEMENT**

	number, in strict accordance with the Contract Documents (defined in the General Conditions), of which a listing of technical Specifications and Drawings is attached hereto and in strict accordance with Addenda issued by the Owner pursuant to the Contract, and Provide all other obligations imposed on such Contractor by the Contract.
В.	The Contractor agrees to Provide the Work of the Contract Documents necessary or proper for, or incidental to the Work of the Contract, for the total sum of Dollars (), which sum shall be deemed to be in full consideration for the performance by the Contractor of all the duties and obligations
C.	of such Contractor under the Contract. The Contractor shall commence the Work of the Contract Documents at the time to be specified in the Notice to Proceed, issued by the Owner, and shall achieve Substantial Completion no later than the The Contractor shall pay to the Owner as liquidated damages the sum of () for each and every day that the Contractor fails to achieve Substantial Completion of the Work.
INI	to achieve Substantial Completion of the Work.
INI	to achieve Substantial Completion of the Work. WITNESS WHEREOF, the parties hereto have executed this Agreement as of the day and year
	t above written.
	t above written.
	t above written.

^{*}If a corporation, signer must be President, Vice-President or other authorized officer. If a Limited Liability Company (LLC), signer must be a member or manager. If a Limited Liability Partnership (LLP), signer must be a partner. If a Limited Partnership, signer must be an authorized partner. If a general partnership, signer must be a partner. If a sole proprietorship, signer must be the owner.

$\begin{array}{c} \text{CONTRACT FORMS FOR CONSTRUCTION} \\ \text{AGREEMENT} \end{array}$

ACKNOWLEDGEMENT OF DORMITORY AUTHORITY OFFICER EXECUTING AGREEMENT

STATE OF _		
COUNTY OF	7	_
Cirelli, Jr., D.l Schenectady, 1	B.A., P.E., CMQ/OE to me known, New York, that he is the Director, lecuted the above instrument; and that	in the year 2018, before me personally came Louis R. who, being by me duly sworn, did depose and say that he resides at Procurement of Dormitory Authority, the corporation described in at the signed his name thereto by order of the Board of Directors of
Notary Public		
		CONTRACTOR EXECUTING AGREEMENT A CORPORATION
STATE OF		_
COUNTY OF	7	
On the da to me known,	ay of in the year 2 who, being by me duly sworn, did d	20, before me personally came, epose and say that he/she resides at:
that ha/aha ia f	(stree	t, city, state, zip code)
corporation de authority of th	escribed in and which executed the forms and of Directors of said corporates.	f, the pregoing instrument; and that he/she signed his/her name thereto by tion.
Notary Public		
		CONTRACTOR EXECUTING AGREEMENT ED LIABILITY COMPANY OR INDIVIDUAL
STATE OF _		<u></u>
COUNTY OF	7	_
and acknowled	Illy appeared	20, before me, the undersigned, a Notary Public in and for said, personally known or proved to me ridual(s) whose name(s) is (are) subscribed to the within instrument ed the same in his/her/their capacity(ies), and that by his/her/their r the person upon behalf of which the individual(s) acted, executed
Notary Public		

$\begin{array}{c} \text{CONTRACT FORMS FOR CONSTRUCTION} \\ \text{AGREEMENT} \end{array}$

Iran Divestment Certification

By:	
("DASNY") and ("Contractor") for the Project, DASNY Project Number 3. This certification is part of the Contract and is subscribed by and affirmed by the person entering into the Contract as true under the penalties of perjury. Contractor Name By:	signing on behalf of any other party certifies, and in the case of a joint bid or partnership each party thereto certifies as to its own organization, under penalty of perjury, that to th best of its knowledge and belief that each person is not on the list created pursuant to
Number 3. This certification is part of the Contract and is subscribed by and affirmed by the person entering into the Contract as true under the penalties of perjury. Contractor Name By:	("DASNY") and ("Contractor") for the
entering into the Contract as true under the penalties of perjury. Contractor Name By:	Number
By:	· · · · · · · · · · · · · · · · · · ·
	Contractor Name
Print Name:	By:
	Print Name:

CONTRACT FORMS FOR CONSTRUCTION AGREEMENT

SPECIFICATIONS AND DRAWINGS LISTING

Following is a list of technical Specifications and Drawings, which are a part of the Contract Documents placed for bid. Addenda issued by the Owner may not be listed but remain a part of the Contract Documents. In addition to the documents listed below, and Addenda issued by the Owner, the Contract Documents include those documents in the definition of Contract Documents in Article 1 of the General Conditions which are included in the Project manual.



CONTRACT FORMS FOR CONSTRUCTION AGREEMENT

Extended Warranty Service Maintenance

D. In the event the Form of Bid includes an Alternate for an extended warranty service maintenance agreement, and the Owner's Letter of Intent accepts that Alternate, funds for said Alternate shall be encumbered upon the execution of said agreement. If the extended warranty service maintenance agreement is not signed concurrent with this Contract, the warranty service provider, by execution of this Agreement, agrees that the warranty service provider shall execute the extended warranty service agreement which is included with the Contract Documents for the amounts stated in the accepted Alternate.

List the warranty service provider associated with the bid and the annual cost of the contract.

		Annual Cost
Legal Name of Firm	<u> </u>	
		1st Year
Street Address		2 nd Year
		3 rd Year_
City, State, Zip Code		4 th Year
		1000
* Warranty Service Provider Signature	Date	5 th Year
Title	— V	
Tiuc		

^{*}If a corporation, signer must be President, Vice-President or other authorized officer.

If a Limited Liability Company (LLC), signer must be a member or manager.

If a Limited Liability Partnership (LLP), signer must be a partner.

If a Limited Partnership, signer must be an authorized partner.

If a general partnership, signer must be a partner.

If a sole proprietorship, signer must be the owner.

CONTRACT FORMS FOR CONSTRUCTION AGREEMENT

ACKNOWLEDGEMENT OF WARRANTY SERVICE PROVIDER IF A CORPORATION

STATE OF		
COUNTY OF		
me known, who, being by	me duly sworn, did depos	e and say that he/she resides at:
	(street,	city, state, zip code)
that he/she is the	of	the
corporation described in ar authority of the Board of Γ		, the egoing instrument; and that he/she signed his/her name thereto by on.
Notary Public		
		OF WARRANTY SERVICE PROVIDER LIABILITY COMPANY OR INDIVIDUAL
STATE OF	· · · · · · · · · · · · · · · · · · ·	
COUNTY OF		
State, personally appeared on the basis of satisfactory and acknowledged to me	evidence to be the individent he/she/they executed	, before me, the undersigned, a Notary Public in and for said, personally known or proved to me lual(s) whose name(s) is (are) subscribed to the within instrument the same in his/her/their capacity(ies), and that by his/her/their he person upon behalf of which the individual(s) acted, executed
Notary Public		



PAYMENT BOND

KNOW ALL PERSONS BY THESE PRESENTS, that we:

		as Principal,
	(Legal title of the Contractor)	_
	(Street, City, State, Zip Code)	
and		asSurety,
	(Legal title of the Surety)	
	(Street, City, State, Zip Code)	
Oblige	d and firmly bound unto the Dormitory Authority, 515 Broadway, Albany, New e, hereinafter called the Owner, for the use and benefit of the claimants as hereinbount of:	
	Dollars	
	()	
WHE	REAS, CONTRACTOR, has by written Agreement dated	
entered	d into a Contract with the Owner for:	
	(Title of Project)	

in accordance with the Contract Documents and any changes thereto, which are made a part hereof, and are hereinafter referred to as the Contract.

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION is such that if the Principal shall promptly make payment to all claimants as hereinafter defined, for all labor and material used or reasonably required for use in the performance of the Contract, then this obligation shall be void; otherwise such obligation shall remain in full force and effect, subject, however, to the following conditions:

- A. A claimant is defined as one having a direct contract with the Principal or with a Subcontractor of the Principal for labor, material, or both, used or reasonably required for use in the performance of the Contract, labor and material being construed to include that part of water, gas, power, light, heat, oil, gasoline, telephone service or rental of equipment directly applicable to the Contract.
- B. The above named Principal and Surety hereby jointly and severally agree with the Owner that every claimant as herein defined, who has not been paid in full before the expiration of a period of ninety (90) days after the date on which the last of such claimant's work or labor was done or performed, or materials were furnished by such claimant, may sue on this Payment Bond for the use of such claimant, prosecute the suit to final judgment for such sum or sums as may be justly due claimant, and have execution thereon. The Owner shall not be liable for the payment of any costs or expenses of any such suit.
- C. No suit or action shall be commenced hereunder by any claimant:

PAYMENT BOND

- 1. Unless claimant, other than one having a direct contract with the Principal, shall have given written notice to the Principal above named, within one hundred twenty (120) days after such claimant did or performed the last of the work or labor, or furnished the last of the materials for which said claim is made, stating with substantial accuracy the amount claimed and the name of the party to whom the materials were furnished, or for whom the work or labor was done or performed. Such notice shall be served by mailing the same by registered mail or certified mail, postage prepaid, in an envelope addressed to the Principal at any place where the Principal maintains an office or regularly conducts the Principal's business, or at Principal's residence or served on Principal in any manner in which legal process may be served in the State of New York.
- 2. Except as provided in section 220-g of the New York State Labor Law, after the expiration of one (1) year following the date on which the public improvement has been Completed and Accepted by the Owner; however, if any limitation embodied in this Payment Bond is prohibited by any law controlling the construction hereof such limitation shall be deemed to be amended so as to be equal to the minimum period of limitation permitted by such law.
- 3. Other than in a New York State court of competent jurisdiction in and for the county in which the Contract, or any part thereof, was to be performed, or in the United States District Court for the district in which the Contract, or any part thereof, was to be performed, and not elsewhere.
- D. The penal sum of this Payment Bond is in addition to any other bond furnished by the Contractor and in no way shall be impaired or affected by any other bond.
- E. The amount of this Payment Bond shall be reduced by and to the extent of any payment or payments made in good faith hereunder.

Signed thisday of20	
IN THE PRESENCE OF:	
(Principal)	(Surety)
(Signature)	(Signature)
(Title)	(Title)
(Street Address)	(Street Address)
(City, State, Zip Code)	(City, State, Zip Code)
(Phone Number & FAX Number)	(Phone Number & FAX Number)
(Email Address)	(Email Address)

PAYMENT BOND

ACKNOWLEDGEMENT OF CONTRACTOR EXECUTING PAYMENT BOND IF A CORPORATION

STATE OF	
COUNTY OF	
On the day of in the to me known, who, being by me duly sworn,	year 20, before me personally came did depose and say that he/she resides at:
	(street, city, state, zip code)
corporation described in and which executed authority of the Board of Directors of said co	of, the the foregoing instrument; and that he/she signed his/her name thereto by orporation.
Notary Public	
	OF CONTRACTOR EXECUTING PAYMENT BOND MITED LIABILITY COMPANY OR INDIVIDUAL
STATE OF	
COUNTY OF	
State, personally appeared on the basis of satisfactory evidence to be the and acknowledged to me that he/she/they ex	year 20, before me, the undersigned, a Notary Public in and for said, personally known or proved to me individual(s) whose name(s) is (are) subscribed to the within instrument executed the same in his/her/their capacity(ies), and that by his/her/their l(s), or the person upon behalf of which the individual(s) acted, executed
Notary Public	
ACKN	IOWLEDGEMENT OF SURETY
STATE OF	
COUNTY OF	
On the day of in the to me known, who, being by me duly sworn,	year 20, before me personally came did depose and say that he/she resides at:
	(street, city, state, zip code)
that he/she is thecorporation described in and which executed authority of the Board of Directors of said co	of, the the foregoing instrument; and that he/she signed his/her name thereto by orporation.
Notary Public	



PERFORMANCE BOND

KNOW ALL PERSONS BY THESE PRESENTS, that we:

	as Principal,
(Legal title of the Contractor)	
(Street, City, State, Zip Code)	
and	as Surety,
(Legal title of the Surety)	
(Street, City, State, Zip Code)	
are held and firmly bound unto the Dormitory Authority, 515 Broadway, Albany, New Obligee, hereinafter called the Owner, in the amount of:	York 12207, as
Dollars (W. W. D. H. A. A. D. H. A. D.	
(Written Dollar Amount)	
()	
(Figure Dollar Amount)	
for the payment whereof Contractor and Surety bind themselves, their heirs, executors successors and assigns, jointly and severally, firmly by these presents.	s, administrators,
WHEREAS, CONTRACTOR, has by written agreement dated	
entered into a Contract with the Owner for:	
(Title of Project)	

in accordance with the Contract Documents and any changes thereto, which are made a part hereof, and are hereinafter referred to as the Contract.

- A. If the Contractor well and fully performs the Contract, the Surety and the Contractor shall have no obligation under this Performance Bond, except to participate in conferences as provided in paragraph B1.
- B. If there is no Owner Default, the Surety's obligation under this Performance Bond shall arise after:
 - 1. The Owner has notified the Contractor and Surety that the Owner is considering a Contractor Default; and
 - 2. The Owner has declared a Contractor Default.

PERFORMANCE BOND

- C. When the Owner has satisfied the conditions of paragraph B, the Surety shall, at the Owner's option, and at the Surety's expense take one the following actions within twenty (20) days after written notice is sent by the Owner to the Surety declaring a Contractor Default:
 - 1. Arrange for the Contractor, with consent of the Owner, to perform and complete the Contract.
 - 2. Undertake to perform and complete the Contract itself, through its agents or through independent contractors.
 - 3. Obtain bids or negotiated proposals from qualified contractors acceptable to the Owner for a contract for performance and completion of the Contract, arrange for a contract to be prepared for execution by the Owner and the contractor selected with the Owner's concurrence, to be secured with performance and payment bonds executed by a qualified surety equivalent to the Payment Bond and Performance Bond issued on the Contract, with a contract price between the Owner and contractor equal to the Balance of the Contract Price, and pay to the Owner the amount of damages as described in paragraph E in excess of the Balance of the Contract Price incurred by the Owner resulting from the Contractor Default.
 - 4. Tender to the Owner the amount of this Performance Bond.
- D. If the Surety does not proceed within the time prescribed in paragraph C, the Surety shall be deemed to be in default on this Performance Bond, and the Owner shall be entitled to enforce any remedy available to the Owner.
- E. After the Owner has declared a Contractor Default, and when the Surety acts under paragraph C1, C2, or C3 above, then the responsibilities of the Surety to the Owner shall not be greater than those of the Contract under the Contract, and the responsibilities of the Owner to the Surety shall not be greater than those of the Owner under the Contract. When the Surety acts under paragraph C1, C2 or C3 above, the Owner will agree to pay the Balance of the Contract Price to the Surety in accordance with and subject to the terms of the Contract or to a contractor selected to perform and complete the Contract in accordance with and subject to the terms of the contract between the Owner and contractor. When the Surety acts under paragraph C1 or C2 above, the Surety's obligation to perform and complete the Contract is not limited by the amount of this Performance Bond and the Balance of the Contract Price. When the Surety acts under paragraph C1, C2 or C3 above or fails to act under paragraph C, the Surety, in addition to its other obligations, is obligated without duplication for:
 - 1. Additional legal, Design Professional, Consultant and delay costs resulting from the Contractor Default, or resulting from the actions or failure to act of the Surety under paragraph C.
 - 2. Liquidated damages, or if no liquidated damages are specified in the Contract, actual damages for loss of beneficial use of the Work caused by delayed performance or non-performance of the Contractor.
- F. The Surety shall not be liable to the Owner or others for obligations of the Contractor that are unrelated to the Contract, and the Balance of the Contract Price shall not be reduced or set off on account of any such unrelated obligations. No right of action shall accrue on this Performance Bond to any person or entity other than the Owner or its successors or assigns.
- G. This Performance Bond and the Surety's obligations shall be in no way impaired or affected by any extension of time, modification, omission, addition, or change in or to the Contract or the Work to be performed thereunder, or by the payment thereunder before the time required therein, or by any waiver of any provision or condition precedent or subsequent thereof, or by settlement or compromise of any claim or dispute related there to, or by assignment, subcontract or other transfer of the Work or any part thereof, or of any monies due or to become due thereunder; and the Surety hereby waives notice of any

PERFORMANCE BOND

and all such extensions, modifications, omissions, additions, changes, payments, waivers, assignments, subcontracts and transfers.

- H. Any and all things done and omitted to be done by and in relation to assignees, subcontractors, and other transferees shall have the same effect as to the Surety as though done or omitted to be done by or in relation to the Principal.
- I. The obligations of the Surety under this Performance Bond shall be in no way impaired or affected by any winding up, insolvency, bankruptcy, or reorganization of the Principal or by any other rearrangement of the Principal for the benefit of creditors.
- J. The Owner's acceptance of this Performance Bond shall in no way, for any purpose, limit or be claimed to limit the liability of the Principal under the Contract, but such liability shall remain in all respects to the same extent as is provided for in the Contract.
- K. Notice to the Surety and the Contractor shall be mailed or delivered to the address shown on the signature page. Notice to the Owner shall be mailed or delivered to the address shown in the preamble.

L. Definitions:

- 1. **Balance of the Contract Price** The total amount payable by the Owner to the Contractor under the Contract after all proper adjustments (increases and reductions) allowed by the Contract have been made, including, but not limited to, allowance to the Contractor of any amounts received or to be received by the Owner in settlement of insurance or other claims for damages to which the Contractor is entitled, reduced by all valid and proper payments made to or on behalf of the Contractor under the Contract.
- 2. *Contract* The agreement between the Owner and the Contractor identified on the signature page, including all Contract Documents as defined in the General Conditions of the Contract and all changes, modifications, amendments, additions, and alterations thereto after the date of this Performance Bond.
- 3. *Contractor Default* Failure of the Contractor, which has neither been remedied nor waived, to perform or otherwise to comply with the terms of the Contract.
- 4. *Owner Default* Failure of the Owner, which has neither been remedied nor waived, to pay the Contractor as required by the Contract or to perform and complete or comply with the other material terms thereof.
- M. The penal sum of this Performance Bond is in addition to any other bond furnished by the Contractor and in no way shall be impaired or affected by any other bond.

PERFORMANCE BOND

N. Any suit under this Performance Bon the date on which Final Payment is ma		stituted before the expiration of two (2) years from s Contract.
Signed as of thisday of	20	
IN THE PRESENCE OF:		
(Principal)		(Surety)
(Signature)		(Signature)
(Title)		(Title)
(Address)		(Address)
(City, State, Zip Code)		(City, State, Zip Code)
(Phone Number & FAX Number)		(Phone Number & FAX Number)
(Email Address)		(Email Address)

ACKNOWLEDGEMENT OF CONTRACTOR EXECUTING PERFORMANCE BOND IF A CORPORATION

STATE OF
COUNTY OF
On the day of in the year 20, before me personally came to me known, who, being by me duly sworn, did depose and say that he/she resides at:
(street, city, state, zip code)
that he/she is the of
Notary Public
ACKNOWLEDGEMENT OF CONTRACTOR EXECUTING PERFORMANCE BOND IF A PARTNERSHIP, LIMITED LIABILITY COMPANY OR INDIVIDUAL
STATE OF
COUNTY OF
On the day of in the year 20, before me, the undersigned, a Notary Public in and for sa State, personally appeared, personally known or proved to so on the basis of satisfactory evidence to be the individual(s) whose name(s) is (are) subscribed to the within instrume and acknowledged to me that he/she/they executed the same in his/her/their capacity(ies), and that by his/her/th signature(s) on the instrument, the individual(s), or the person upon behalf of which the individual(s) acted, execut the instrument.
Notary Public
ACKNOWLEDGEMENT OF SURETY
STATE OF
COUNTY OF
On the day of in the year 20, before me personally came to me known, who, being by me duly sworn, did depose and say that he/she resides at:
(street, city, state, zip code)
that he/she is the of, to corporation described in and which executed the foregoing instrument; and that he/she signed his/her name thereto authority of the Board of Directors of said corporation.
Notary Public



Construction General Conditions

CORPORATE HEADQUARTERS

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NEW YORK OFFICE

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ARTICLE 1 -- DEFINITIONS

Section 1.01 - Definitions

The following terms as used in the Contract Documents shall be defined as follows:

Addendum or Addenda – Additional provisions of the Contract Documents issued in writing prior to the receipt of bids.

Application for Payment – A Contractor's written billing request, on a form:

- A. prepared by the Owner from the Schedule of Values approved by the Owner;
- B. completed by the Contractor;
- C. adjusted by the Owner; and
- D. signed by the Contractor,

requesting partial or full payment for partial or full performance of the Contract.

Beneficial Occupancy – The stage in the performance of the Work prior to Substantial Completion when a designated portion of the Work is sufficiently complete in accordance with the Contract Documents so the Owner or Client can occupy or utilize such portion of the Work for its intended use, evidenced by the Notice of Beneficial Occupancy executed by the Owner.

Change Order – Written notice, in a standard Owner's form, to the Contractor, signed by the Contractor and executed by the Owner, changing the Contract Documents in accordance with General Conditions Article 7 - Changes in the Work, or a Forced Change Order.

Claim - A demand by the Contractor seeking, as a matter of right, adjustment or interpretation of Contract terms, payment of money, an extension of time, or other relief with respect to the terms of the Contract. The term Claim also includes other disputes and matters in question between the Owner and Contractor arising out of or relating to the Contract.

Client - The entity for whom the Dormitory Authority is performing services, including subsidiaries, agents, related corporations, or fiduciaries of the entity.

Completion and Acceptance - The stage in the performance of the Work when all Work required to be performed by the Contract, except any Work that may be required in the future by:

- A. any warranty or guarantee in the Contract Documents;
- B. General Conditions Article 6 Subcontracts, Sections 6.01 E through I;
- C. General Conditions Article 14 Protection of Persons and Property; or
- D. General Conditions Article 15 Insurance and Bonds.

is complete in accordance with the Contract Documents, evidenced by the Notice of Completion and Acceptance executed by the Owner.

Contract Amendment – A written instrument, signed by an authorized officer of the Dormitory Authority and an authorized officer of Contractor, amending, modifying, changing, or supplementing the Contract.

Construction Manager - A natural person, partnership, limited liability company, corporation, or other legal entity regularly engaged in management of construction projects, and so designated by the Owner.

Consultant - A natural person, partnership, limited liability company, corporation, or other legal entity providing architectural, engineering, construction management, testing, inspection, commissioning, or other professional services, and so designated by the Owner.

Contract - The agreement between the Owner and the Contractor consisting of the Contract Documents.

Contract Documents - The Notice to Bidders, Information for Bidders, Form of Bid, Agreement, Payment Bond, Performance Bond, General Conditions, General Requirements, Drawings, Specifications, Addenda, Change Orders, Contract Amendments, and all provisions of law deemed to be included in the Contract.

Contractor - A natural person, partnership, limited liability company, corporation, or other legal entity with whom the Owner enters in to the Contract to perform the Work.

Design Professional - A natural person, partnership, limited liability company, corporation, or other legal entity providing architectural or engineering professional services, and so designated by the Owner.

Disputed Work Directive - Written directive, in a standard Owner's form, from and executed by the Owner to the Contractor directing the Contractor to proceed with the Work described in the Disputed Work Directive in accordance with General Conditions Article 10 – Claims and Disputes.

Dormitory Authority - Dormitory Authority of the State of New York, a public benefit corporation established by the laws of the State of New York with its principal office located at 515 Broadway, Albany, New York, 12207-2964.

Extra Work - Any work in addition to the Work initially required to be performed by the Contractor pursuant to the Contract Documents.

Facility – the operating unit of the Client where the Site is located.

False Claim – Any Claim which is, either in whole or part, false or fraudulent.

False Representation – This action takes place when a person has knowledge of the value of the work and materials supplied, performed, or proposed (the "Information") constituting the Claim, Change Order, or Application for Payment and either:

- A. acts in deliberate ignorance of the truth or falsity of the Information or
- B. acts in reckless disregard of the truth or falsity of the Information.

Forced Change Order –Written notice, in a standard Owner's form, to the Contractor, without the Contractor's signature and executed by the Owner, changing the Contract Documents in accordance with General Conditions Article 7 – Changes in the Work.

Furnish - To deliver to the Site ready for installation.

Hazardous Material – any substance (gas, liquid, or solid) or agent (biological, chemical, radiological, physical, or having two or more of the preceding characteristics) which has the potential to cause harm to humans, animals, or the environment, either by itself or through interaction with other factors, including but not limited to heavy metals, volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), pesticides, herbicides, dioxins, biological wastes, carcinogens, asbestos or any substance containing asbestos, polychlorinated biphenyls, lead, urea formaldehyde, explosives, radionuclides, radioactive materials, chemicals known or suspected to cause cancer or reproductive toxicity, pollutants, effluents, contaminants, emissions, infectious wastes, any petroleum or petroleum-derived waste or product or related materials, and any item defined as a hazardous, special, or toxic material, substance, or waste under any Hazardous Material Law, including, but not limited to, the NYS Environmental Conservation Law and Title 6 of the New York Code of Rules and Regulations.

Hazardous Material Laws – collectively, any present federal, state or local law, including all valid amendments, relating to public health, safety, or the environment, including without limitation, the Resource Conservation and Recovery Act ("RCRA"), 42 U.S.C. §6901 et seq.; the Comprehensive Environmental Response, Compensation, and Liability Act ("CERCLA"), 42 U.S.C. §9601 et seq., as amended by the Superfund Amendments and Reauthorization Act of 1986 ("SARA"); the Clean Air Act, 42 U.S.C. §7401 et seq.; the Hazardous Materials Transportation Act, 49 U.S.C. §5101 et seq.; the Clean Water Act, 33 U.S.C. §1215 et seq.; the Toxic Substances Control Act, 15 U.S.C. §2601 et seq.; the Safe Drinking Water Act, 42 U.S.C. §300f et seq.; the Federal Insecticide, Fungicide and Rodenticide Act, 7 U.S.C. §136 et seq.; the Emergency Planning and Community Right-to-Know Act, 42 U.S.C. §11001 et seq.; the Occupational Safety and Health Act of 1970, 29 U.S.C. §651 et seq.; the Atomic Energy Act, 42 U.S.C. §2201 et seq.; the NYS Environmental Conservation Law; the NYS Labor Law; the NYS Public Health Law; and the amendments, regulations, orders, decrees, permits, licenses or deed restrictions now or hereafter enacted or promulgated under any such statute.

Install - To unload at the delivery point at the Site and perform every operation necessary to establish secure mounting and correct operation at the proper location.

Letter of Intent - Written notice, signed by the Owner, to the Contractor, which accepts the Contractor's Form of Bid and transmits the Agreement, Payment Bond, Performance Bond, and other documents to the Contractor for execution.

Means and Methods of Construction - Labor, materials, temporary structures, tools, plant, and construction equipment, and the manner and time of their use, necessary to accomplish the result intended by the Contract Documents.

Notice of Beneficial Occupancy – Written notice, in a standard Owner's form, to the Contractor, executed by the Owner and delivered to the Contractor prior to Substantial Completion, that certain Work of the Contract Documents, identified in such Notice of Beneficial Occupancy, satisfies the criteria for Beneficial Occupancy and will be occupied or utilized by the Owner or Client.

Notice of Completion and Acceptance – Written notice, in a standard Owner's form, to the Contractor, executed by the Owner, that the Work required to be performed by the General Requirements, Drawings, Specifications, Addenda, and Change Orders, except any Work required by any warranty or guarantee in the Contract Documents, satisfies the criteria for Completion and Acceptance.

Notice of Physical Completion- Written notice, in a standard Owner's form, to the Contractor, executed by the Owner, that the Work of the Contract Documents satisfies the criteria for Physical Completion.

Notice of Substantial Completion - Written notice, in a standard Owner's form, to the Contractor, executed by the Owner, that the Work of the Contract Documents satisfies the criteria for Substantial Completion and constitutes the start of the guarantee period.

Notice to Proceed -

- A. Written notice, signed by the Owner, to the Contractor, that acknowledges receipt by the Owner of the signed Agreement, Payment Bond, and Performance Bond from the Contractor and directs the Contractor to start performance of the Work; or
- B. Written notice, in a standard Owner's form, to the Contractor, executed by the Owner, directing the Contractor to proceed with the change in the Work described therein in accordance with General Conditions Article 7 Changes in the Work. A Notice to Proceed cannot change the Contract amount or the date to achieve Substantial Completion. A Notice to Proceed can change only the General Requirements, the Drawings, or the Specifications.

NYS - New York State

Other Contractor(s) – The one or more natural persons, partnerships, limited liability companies, corporations, or other legal entities who have entered in to a contract with the Owner to perform work (including services) at or near the Site, identified in the Contract Documents or in writing by the Owner, including, but not limited to, contractors, Construction Managers, Consultants, and Design Professionals. Other Contractors does not include the Contractor.

Owner - Dormitory Authority of the State of New York.

Owner's Representative - A natural person, partnership, limited liability company, corporation, or other legal entity so designated by the Owner to act on behalf of the Owner. See General Conditions Section 2.03 for limitations and further provisions on the Owner's Representative.

Physical Completion – The stage in the performance of the Work when all Work to be performed at the Site, except any Work that may be required in the future by any warranty or guarantee in the Contract Documents, is complete in accordance with the Contract Documents, evidenced by the Notice of Physical Completion executed by the Owner.

Project - The work at or near the Site(s) carried out pursuant to the Contract and one or more other contracts.

Project Management Program – The software program used by the Owner to manage, monitor, and oversee performance of the Contract.

Provide - To Furnish and Install the Work complete in place and ready for its intended use.

Schedule of Values – a form provided by the Owner, completed by the Contractor, and submitted to the Owner for review and written approval; the completed, approved form establishes a minimum level of allocation of the Contract amount among the items of Work to formulate the Contractor's billing requests.

Site - The area(s) within the Contract limit, as indicated by the Contract Documents.

Stop Work Order - Written notice, signed by the Owner, to the Contractor, to cease or hold Work of the Contract Documents.

Subcontract - An agreement between the Contractor and Subcontractor for Work on the Site.

Subcontractor - A natural person, partnership, limited liability company, corporation, or other legal entity under contract with the Contractor, or under contract with any Subcontractor, to perform any portion of the Work, or to provide any labor, material, equipment, or service at the Site.

Substantial Completion – The stage in the performance of the Work when all Work is sufficiently complete in accordance with the Contract Documents so the Owner or Client can occupy or utilize the Work for its intended use, evidenced only by the Notice of Substantial Completion executed by the Owner. Issuance of a temporary certificate of occupancy or a temporary approval for occupancy does not establish Substantial Completion.

Work - All obligations explicitly and implicitly imposed upon the Contractor by the Contract Documents.

ARTICLE 2 -- CONTRACT DOCUMENTS

Section 2.01 - Captions

The table of contents, titles, captions, headings, running headlines, and marginal notes contained herein and in the Contract Documents are solely to facilitate reference to various provisions of the Contract Documents and in no way affect the interpretation of the provisions to which they refer.

Section 2.02 – Electronic Data Transfer

- A. Electronic data includes, but is not limited to, all digital versions of any Contract Document, all digital files produced by mechanical, facsimile, electronic, magnetic, digital or other programs, programming notes or instructions, activity listings of electronic mail receipts or transmittals, output resulting from the use of any software program, including but not limited to, word processing documents, spreadsheets, database files, charts, graphs, drawings, specifications, outlines, electronic mail, personal digital assistant messages, instant messages messages, PDF files, PRF files, batch files, ASCII files, DWG files and any other type of files now or hereafter allowed by Owner.
- B. The Owner reserves the right to implement an electronic payment program for payments due the Contractor. Prior to implementation, the Owner, in writing, shall notify the Contractor one hundred twenty (120) calendar days prior to the effective date of the electronic payment program. Commencing on or after the electronic payment effective date, all payments, due the Contractor, shall only be rendered electronically, unless payment by paper check is authorized in writing by the Owner. Commencing on or after the electronic payment effective date, the Contractor, further acknowledges and agrees that the Owner may withhold payments, if the Contractor has not complied with the Owner's policies and procedures relating to the electronic payment program in effect at such time, unless payment by paper check is authorized in writing by the Owner.
- C. Electronic data produced in connection with the Contract is proprietary information of the Owner and to be treated as confidential and not to be disclosed to, or shared with others outside the limits of the Contract without the express written consent of the Owner. The Owner makes no warranty, express or implied, as to the accuracy of the information transferred.
- D. The Contractor shall pay, on behalf of the Owner, any loss which the Owner becomes legally liable to pay as a result of a claim by any person or entity against the Contractor or Owner, which results directly from an act, error, or omission of the Contractor in the provision of electronic data in respect to the Contract.

Section 2.03 - Owner

- A. The Contract constitutes the entire agreement and understanding between the Contractor and the Owner with respect to the Project and supersedes all prior agreements, arrangements and understandings, and all trade custom and trade usage, and the construction of any provision of the Contract shall not be affected by the wording of any other agreement, whether between the Contractor and the Owner or involving other parties. The Contract may not be amended, modified, supplemented, or changed in any way except in accordance with General Conditions Article 7 Changes in the Work or a Contract Amendment. The legal relationship between the Owner and the Contractor shall be governed solely by the Contract and no rights shall arise on any other basis, including but not limited to, oral agreement, partial performance, estoppel, conduct of the parties, course of conduct or any other course of dealing involving the Project or any other project. The meaning and intent of the Contract Documents shall be interpreted solely by the Owner.
- B. The Owner shall give all orders and directions contemplated under the Contract relative to the execution of the Work. The Owner shall determine the amount, quality, and acceptability of the Work and shall decide all questions which may arise in relation to said Work. The Owner's estimates and decisions shall be final except as otherwise expressly provided herein.
- C. The Owner may, at its sole and exclusive discretion, waive certain provisions of the Contract Documents. Such waiver shall only be done by written instrument signed by a duly authorized officer of the Owner, and any such waiver shall apply solely in accordance with its terms and shall not act as a waiver of any provision of the Contract Documents, or estoppel against the enforcement thereof, in connection with any subsequent or separate event involving the Project or other projects.
- D. Any differences or conflicts concerning performance which may arise between the Contractor and Other Contractors performing work for the Owner shall be analyzed and resolved by the Owner as warranted by the circumstances. The Owner's exercise of discretion in this regard shall be sole and exclusive and its decision concerning such differences and conflicts shall be final and binding.
- E. The Owner may act through an Owner's Representative designated as such in writing by the Owner. Unless otherwise designated by the Owner, the Owner's Representative is the Owner's employee assigned to the Project as the project manager. Unless otherwise stated in writing by the Owner, the Owner's Representative is not an authorized officer of the Owner, does not have authority to approve a Labor Rate Worksheet on behalf of the Owner, does not have authority to waive the requirement for a narrative and fragnet schedule of General Conditions Section 7.01 C. 4, does not have authority to waive any provision of the Contract Documents and does not act for the Owner for General Conditions Article 15 – Insurance and Bonds. Unless otherwise stated in writing by the Owner and notwithstanding the other provisions of this paragraph, the Owner's Representative does have authority to issue a direction to attend a meeting in accordance with General Conditions Section 4.04, a Notice to Proceed in accordance with General Conditions Section 7.01 and a Disputed Work Directive in accordance with General Conditions Section 10.01. The Owner may change the Owner's Representative and the scope of her, his or its duties by written notice to the Contractor in accordance with General Conditions Section 2.04. The Owner's Representative's signature by itself on a Change Order is not execution of a Change Order by the Owner. See General Conditions Section 7.01 A. 5 for the requirements for execution of a Change Order by Owner.

Section 2.04 - Notice and Service Thereof

- A. Any notice to the Contractor from the Owner relative to any part of the Contract shall be in writing and service considered complete when said notice is sent or delivered in person to the Contractor or its authorized representative, at the street address, postal address or email address given by the Contractor in the Form of Bid. The Contractor may change any of these addresses by written notice to the Owner's Procurement Unit, 515 Broadway, Albany, New York 12207 2964; such change shall not be effective until Contractor receives from the Owner's Procurement Unit a written acknowledgement that the change has been received.
- B. Any notice from the Contractor to the Owner required by any part of the Contract shall be in writing and shall be sent or delivered to the Owner's Representative at the street address, postal address or email address for the Owner's Representative given in the Notice to Bidders. The Owner may change the Owner's Representative or any of these addresses by written notice to the Contractor. If any part of the Contract shall require the Contractor to provide notice to any other employee or unit of the Owner, the notice to such employee or unit is in addition to, and does not replace, the notice to the Owner's Representative. Notice to the Owner may be delivered by certified mail, overnight delivery by a nationally recognized courier or, if an email address is provided, email. The Owner's Representative will endeavor to provide a written acknowledgment of receipt of the notice but any failure to provide such written acknowledgment shall not be a breach of the Contract, shall not in any way alter the Contractor's obligation to provide timely notice and shall not in any way alter any of the other obligations of the Contractor under the Contract.
- C. For all notices from the Contractor to the Owner required by any part of the Contract, the Contractor shall have the burden of proving the Owner's receipt of the notice.

Section 2.05 - Nomenclature

Materials, equipment, or other Work not defined or specified in the Contract but described in words that have a generally accepted technical or trade meaning shall be interpreted as having said meaning in connection with the Contract.

Section 2.06 - Invalid Provisions

If any term or provision of the Contract Documents or the application thereof to any natural person, partnership, limited liability company, corporation or other legal entity or circumstance shall, to any extent, be determined to be invalid or unenforceable, the remainder of the Contract Documents, or the application of such terms or provisions to natural persons, partnerships, limited liability companies, corporations or other legal entities or circumstances other than those to which it is held invalid or unenforceable, shall not be affected thereby and each term or provision of the Contract Documents shall be valid and be enforced to the fullest extent permitted by law. It is the intent of the Owner and the Contractor that all provisions of the Contract shall be construed to be valid under applicable law and shall be enforced to the maximum extent possible.

Section 2.07 – Interpretation of Contract Documents

A. Should any provision in the Contract Documents be in conflict or inconsistent with the General Conditions or supplements thereto, the General Conditions or supplements thereto shall govern.

- B. Figured dimensions shall take precedence over scaled dimensions. Larger scale Drawings shall take precedence over smaller scale Drawings. Latest Addenda shall take precedence over previous Addenda and earlier dated Drawings and Specifications.
- C. Should a conflict occur in or between or among any parts of the Contract Documents that are entitled to equal preference, the better quality or greater quantity of material or more onerous provision in the Owner's judgment shall govern, regardless of cost, unless the Owner directs otherwise in writing. In each conflict, the Owner, in its sole and exclusive discretion, shall determine whether the quality, quantity or onerous provision method will be used to resolve the conflict.
- D. Drawings and Specifications are complementary. Anything shown on the Drawings and not mentioned in the Specifications, or mentioned in the Specifications and not shown on the Drawings, shall have the same effect as if shown or mentioned in both.
- E. The term "materials" includes "supplies".
- F. Words of the masculine gender shall be deemed and construed to include correlative words of the feminine and neuter genders. Unless the context shall otherwise indicate, words importing the singular number shall include the plural number and vice versa.

Section 2.08 - Copies of Contract Documents

The Owner may furnish to the Contractor up to three (3) paper copies and one electronic (PDF) copy of the Contract Documents without charge. Additional sets may be furnished at the costs of reproduction and mailing.

ARTICLE 3 -- SITE CONDITIONS

Section 3.01 - Subsurface or Site Conditions Found Different

- A. The Contractor acknowledges that the Contract amount set forth in its bid includes such provisions which the Contractor deems sufficient for all subsurface or site conditions the Contractor could reasonably anticipate encountering as indicated in the Contract Documents, or borings, reports, rock cores, foundation investigation reports, topographical maps, or other information available to the Contractor or from the Contractor's inspection and examination of the Site prior to submission of bids.
- B. The Owner assumes no responsibility for the correctness of any boring or other subsurface information and makes no representation whatsoever regarding subsurface conditions and test borings, reports, rock cores, foundation investigation and topographical maps which may be made available to the Contractor.
- C. Should the Contractor encounter subsurface or site conditions at the Site materially differing from those shown on or described in or indicated in the Contract Documents, the Contractor shall immediately give written notice to the Owner of such conditions and shall not disturb said conditions until authorized to do so by the Owner in writing.
- D. Subsurface or site conditions found materially differing from those that could have been reasonably anticipated may be cause for change to the Contract amount and time of completion. This determination will be made at the sole and exclusive discretion of the Owner.

Section 3.02 - Verifying Dimensions and Conditions

- A. The Contractor shall take all measurements at the Site and shall verify all dimensions and conditions at the Site before proceeding with the Work. If said dimensions or conditions are found to conflict with the Contract Documents, the Contractor immediately shall refer said conflict to the Owner in writing. The Contractor shall comply with any revised Contract Documents.
- B. During the performance of the Work, the Contractor shall verify all field measurements prior to fabrication of building components or equipment, and proceed with the fabrication to meet field conditions.
- C. The Contractor shall review all Contract Documents to determine exact location of all Work and verify spatial relationships of all the Work. Any question concerning said location or spatial relationships shall be submitted in a manner approved by the Owner.
- D. Special locations for equipment, pipelines, ductwork, and other such items of the Work, where not dimensioned on plans, shall be coordinated with affected Other Contractors.
- E. The Contractor shall be responsible for the proper fitting of the Work in place.

Section 3.03 - Surveys

Unless otherwise expressly provided in the Contract Documents, the Owner shall furnish the Contractor all surveys of the property necessary for the Work, but the Contractor shall lay out the Work.

ARTICLE 4 -- CONTRACTOR

Section 4.01 - Representations of Contractor

The Contractor represents and warrants:

- A. That it is financially solvent and is experienced in and competent to perform the Work, and has the staff, workers, equipment, subcontractors, and suppliers to complete the Work within the time specified for the Contract amount.
- B. That it is familiar with all federal, state, and local laws, codes, ordinances, orders, rules, and regulations which may affect the Work, the Contractor, or the Project.
- C. That all temporary and permanent Work required by the Contract Documents can be satisfactorily constructed, and that said construction will not injure any person or damage any property.
- D. That it has carefully examined the Contract Documents and the Site, and from the Contractor's own investigations is satisfied as to the nature and materials likely to be encountered, the character of equipment and other facilities needed for the performance of the Work, the general and local conditions, and all other materials or items which may affect the Work.
- E. That it is satisfied that the Work can be performed and completed as required in the Contract Documents, and warrants that it has not been influenced by any oral statement or promise of the Owner or the Design Professional.

- F. That to the best of Contractor's knowledge, there are no pending or threatened suits, proceedings, judgments, rulings, or orders by or before any court or any governmental agency or arbitrator that could reasonably be expected to affect materially and adversely:
 - 1. the financial condition or operations of the Contractor;
 - 2. the ability of the Contractor to perform its obligations hereunder; or
 - 3. the legality, validity, or enforceability of this Contract.
- G. That Contractor is a duly organized and validly existing entity of the type described in the recital clauses of the Agreement and is in good standing under the laws of the jurisdiction of its formation; it has the legal right, power, and authority and is qualified to conduct its business and to execute and deliver this Contract and perform its obligations under this Contract; and all regulatory authorizations have been obtained and will be maintained, as necessary, for it to perform legally its obligations under this Contract.
- H. That executing and performing this Contract are within Contractor's powers; that executing and performing this Contract has been duly authorized by all necessary action on the Contractor's part; and that such actions do not and will not violate any provision of law or any rule, regulation, order, writ, judgment, decree, or other determination presently in effect applicable to Contractor or its governing documents.
- I. That this Contract constitutes the Contractor's legal, valid, and binding obligation, enforceable against it in accordance with this Contract's terms, subject to applicable bankruptcy, insolvency, reorganization, and other laws affecting creditors' rights generally, and general equitable principles, to the discretion of the court before which proceedings to obtain the same may be pending.
- J. That Contractor is in good standing with any union with craft labor on the Site for part or all the Work of this Contract or the work of the Project.
- K. That Contractor is experienced in the methods of design, engineering, installation, management, and construction contemplated for the Work of this Contract and for contracts of this nature, scope magnitude and quality and that the Contractor understands the complexity involved in this type of Contract and the necessity to coordinate its Work with appropriate governmental agencies, the Owner, and the Other Contractors.
- L. That Contractor is fully informed as to all existing conditions and limitations, including local workforce/labor working arrangements and the continuous, regular, and uninterrupted operations of the Facility.
- M. That Contractor has had the opportunity to consult with or has consulted with legal counsel of its choice before entering in to this Contract.
- N. That any breach of any of the representations and warranties of this General Conditions Section 4.01, any failure of the Contractor to familiarize itself with the Contract Documents, the Facility, the Site or the Project or any lack of knowledge on the part of the Contractor of any existing or foreseeable condition or conditions at the Site reasonably inferred from the Contract Documents which create difficulties or hindrances in the execution of the Work shall constitute a conclusive and binding determination by the Contractor that resolving any adverse impact of such breach, failure or lack of knowledge does not constitute Extra Work and a waiver by the Contractor of all Claims for additional

compensation or damages or time to achieve Substantial Completion as a result of the breach, failure or lack of knowledge.

Section 4.02 - Errors or Discrepancies

The Contractor shall examine the Contract Documents thoroughly before commencing the Work and report any errors or discrepancies to the Owner, in writing, within fifteen (15) calendar days of discovery. The Owner shall not be responsible for costs, damages or delays due to the Contractor's failure to comply with the requirements of this General Conditions Section 4.02.

Section 4.03 - Coordinated Composite Drawings

- A. The Contractor shall prepare coordinated composite drawings clearly showing how the Work of the Contractor is to be performed in relation to the work of Other Contractors, prepare scaled drawings and sections in the same digital software program, version, and operating system as the original Contract Drawings or in an operating system approved by the Owner.
- B. If, and only if, required by the Information for Bidders for the Contract, the Contractor shall run a conflicts and coordination check utilizing the Project Drawings within a three-dimensional software program of the Contractor's choice to limit the number of physical conflicts that may occur during construction. Failure to run such a conflicts and coordination check or to resolve conflicts and coordination issues identified as a result of such a check prior to the initiation of the Work on Site shall constitute a:
 - 1. conclusive and binding determination by the Contractor that resolution of the conflicts does not involve Extra Work; and
 - 2. waiver by the Contractor of all Claims for additional compensation, damages, or time to achieve Substantial Completion as a result of the existence of physical conflicts.

Section 4.04 - Meetings

The Contractor shall attend all meetings required by the Contract Documents and all meetings when directed to attend by the Owner. The Contractor shall be represented at all meetings by the on-Site superintendent described in General Conditions Section 4.05 A who shall attend the meetings in person unless the Owner in writing prior to the meeting directs otherwise. If the Owner directs, the Contractor shall be represented either by the project management personnel of General Conditions 4.05 B or by an authorized officer of Contractor; in each case, the project management personnel or the authorized officer shall attend the meetings in person. The Owner, in its sole and exclusive discretion, shall determine the time, date, location, and purpose of the meeting. The purpose of a meeting includes, but is not limited to, Project progress, submittal status, Change Orders, site logistics, coordination, inspections, testing, safety reviews, or anything which the Owner determines is useful for administration or performance of the Contract or the Project.

Section 4.05 - Supervision by Contractor

A. The Contractor shall provide full-time competent supervision for the duration of the Contract. During the course of on-Site Work, the Contractor shall provide a full-time on-Site superintendent who shall have full authority to act for the Contractor at all times. The superintendent shall read, write, and speak English fluently, as well as communicate with the Contractor's workers and the workers of all Subcontractors.

- B. The Contractor shall also provide competent project management personnel in addition and superior to the full-time on-Site superintendent who shall also have full authority to act for the Contractor at all times except such project management personnel cannot modify or rescind any action of the full-time on-Site superintendent directed to the Owner without the Owner's written consent.
- C. If at any time the supervisory staff is not satisfactory to the Owner, the Contractor shall, if directed in writing by the Owner, immediately replace such supervisory staff with other staff satisfactory to the Owner at no additional cost to the Owner.
- D. The Contractor shall remove from the Work any employee of the Contractor or of any Subcontractor when so directed in writing by the Owner.

Section 4.06 – Project Scheduling

- A. The Contractor shall provide a project scheduler, experienced in critical path method (CPM) scheduling. The scheduler's experience and credentials shall be submitted in writing to the Owner for review and acceptance prior to proceeding with scheduling of the Work. The Owner may withdraw its acceptance of the project scheduler at any time thereafter for failure to perform in accordance with the Contract. The Contractor shall provide a replacement scheduler and submit the replacement's experience and credentials in writing to the Owner for review and acceptance as soon as possible. The replacement scheduler shall be at no additional cost to the Owner.
- B. Using the software required by the Owner, the Contractor shall prepare, maintain, and revise the Project CPM schedule to plan and monitor the progress of all Project operations, in accordance with the Contract Documents. See the General Requirements for further details.
- C. Construction activities shall be interrelated on a single Project CPM schedule that represents the entire Project, including the entire Contract duration from Notice to Proceed to Substantial Completion and through Completion and Acceptance. The Contractor shall utilize the critical path method of network calculation to generate the Project CPM schedule and shall utilize the time-scaled precedence diagram method to show the Project CPM Schedule. The Project CPM Schedule shall utilize calendar days for the time scale. The Contractor shall ensure all logic constraints are identified between the Work of the Contract, the work of Other Contractors and Owner's work prior to approval of the Project CPM schedule. See the General Requirements for further details.
- D. The Owner may reject any proposed Project CPM schedule, any proposed updated Project CPM schedule or any proposed recovery Project CPM schedule if the Owner, in its sole and exclusive discretion, finds the proposed Project CPM schedule, proposed updated Project CPM schedule or proposed recovery Project CPM schedule defective for any reason, including but not limited to:
 - 1. Defective logic;
 - 2. Excessive use of constraints;
 - 3. Activity durations that are inconsistent with actual or available workforce; or
 - 4. The appearance of an effort to manipulate the schedule so that responsibility for an adverse impact is associated with a natural person or entity other than the natural person or entity responsible for the adverse impact.

- E. If a proposed Project CPM schedule, proposed updated Project CPM schedule or proposed recovery Project CPM schedule is rejected by the Owner, the Owner will notify the Contractor in writing of the rejection and the reason or reasons for the rejection. Contractor shall submit a new proposed Project CPM schedule, proposed updated Project CPM schedule or proposed recovery Project CPM schedule with the defect or defects corrected at no cost to the Owner within two weeks of the Owner's written rejection.
- F. Review comments made by the Owner on the proposed Project CPM schedule, any proposed updated Project CPM schedule or any proposed recovery Project CPM schedule shall not relieve the Contractor from compliance with requirements of the Contract Documents. The Contractor shall be responsible for scheduling, sequencing, and performing the Work to comply with the requirements of the Contract Documents.
- G. The Contractor expressly understands and agrees that no additional compensation shall be paid for any alterations to Contractor's planned construction sequence to accommodate the Project CPM schedule requirements, any updated Project CPM schedule or any recovery Project CPM schedule pursuant to the Contract. Failure to include any element of work required for the performance of the Work shall not excuse the Contractor from completing all the Work required within the applicable completion date of each phase in the Contract Documents regardless of the Owner's approval of the Project CPM schedule, any updated Project CPM schedule or any recovery Project CPM schedule.
- H. The Owner may withhold payments if the Contractor fails to provide an acceptable project scheduler, replacement project scheduler, Project CPM schedule, updated Project CPM schedule, recovery Project CPM schedule or other schedule information or reports in accordance with requirements of the Contract.

Section 4.07 - Worker Identification and Site Access Control

- A. All employees of the Contractor and every Subcontractor shall comply with all site access control and security procedures prescribed by the Owner which may include, but are not limited to, the wearing of Owner issued identification badges, ingress and egress through controlled entry and exit points, and use of card readers or other electronic identity verification devices. Contractor cannot authorize any one to enter the Site, except Contractor's and Subcontractor's employees and persons delivering materials or equipment to Contractor or a Subcontractor, without the prior written consent of the Owner.
- B. All employees of the Contractor and every Subcontractor, prior to entering the Site for the first time, shall obtain an identification badge if issued by the Owner and produce to the Owner a valid form of government-issued photo identification and furnish other background information, including but not limited to the following:

Full Name
Last four (4) digits of Social Security Number
Home Address (#/Street/Apt./City/Zip)
Contractor/Subcontractor Name
Job Classification
Union Local Affiliation, if any

The Owner recognizes that certain information requested above constitutes personal information and will take all reasonable steps to ensure the security and confidentiality of this information as required by law.

C. All employees of the Contractor and every Subcontractor shall visibly display on their person, while entering and on the Site, an identification badge if issued by the Owner. In the event said identification badge has not been issued by the Owner, all employees of the Contractor and every Subcontractor shall produce a valid form of government-issued photo identification promptly upon request of the Owner. Failure to display such identification or to produce such identification in the manner as prescribed by the Owner may result in the employee's non-admittance to or immediate removal from the Site. The Owner will send written confirmation to the Contractor confirming the action taken, if requested by the Contractor.

Section 4.08 - Related Work

- A. The Contractor should examine the Contract Documents for Work of its Contract and any related work of other contracts, to ascertain the relationship of its Work to any related work of other contracts.
- B. The Owner may contract with a Design Professional, Construction Manager, or other Consultants to provide services to the Owner. The services enumerated in consultant contracts are for the benefit of the Owner who may choose to utilize any or all of said services. The Contractor has no privity of contract with the Design Professional, Construction Manager, or any other Consultant which contracts with the Owner and should not assume that all of the services enumerated in said contracts will be provided.
- C. The Contractor shall adhere to all of the requirements specified or communicated by the Design Professional in performing delegated design work required by the Contract Documents.

Section 4.09 – Coordination with Separate Contracts

- A. The Owner may award other contracts for work which may proceed simultaneously with the execution of the Work. The Contractor shall coordinate the Contractor's operations with those of Other Contractors as directed by the Owner. Cooperation shall be required in the arrangements for access, the storage of material, and in the detailed execution of the Work.
- B. The Contractor shall take those steps reasonably necessary to keep itself informed of the progress and workmanship of Other Contractors and any subcontractors of Other Contractors and shall notify the Owner in writing immediately of lack of progress or defective workmanship on the part of Other Contractors or any subcontractors of Other Contractors, where said delay or defective workmanship may interfere with the Contractor's operations.
- C. Failure of a Contractor to keep so informed and failure to give written notice of lack of progress or defective workmanship by Other Contractors or any subcontractors of Other Contractors shall be construed as acceptance by the Contractor of said progress and workmanship as being satisfactory for proper coordination with the Work.
- D. Where the Contractor shall perform Work in close proximity to work of Other Contractors or any subcontractors of Other Contractors, or where there is evidence that Work of the Contractor may interfere with work of Other Contractors or any subcontractors of Other Contractors, the Contractor shall assist in arranging space conditions to make satisfactory adjustment for the performance of the Work. If the Contractor performs Work in a manner that causes interference with the work of Other

- Contractors or any subcontractors of Other Contractors, the Contractor shall make changes necessary to correct the condition at no additional cost to the Owner.
- E. The Contractor shall render any assistance which the Owner may require with respect to any claim or action in any way relating to the Work including, without limitation, review of claims, preparation of technical reports and participation in negotiations, without any additional compensation therefor.

Section 4.10 - Cooperation with Other Contractors

- A. During the performance of the Work, Other Contractors may be engaged in performing work. The Contractor shall coordinate the Contractor's Work with the work of said Other Contractors in such a manner as the Owner may direct.
- B. If the Owner determines that the Contractor is failing to coordinate the Work with the work of Other Contractors as the Owner has directed:
 - 1. The Owner shall have the right to withhold any payments due under the Contract until the Contractor complies with the Owner's direction; and
 - 2. The Contractor shall assume the defense and pay on behalf of the Owner any and all claims or judgments or damages and any costs to which the Owner may be subjected or which the Owner may suffer or incur by reason of the Contractor's failure to promptly comply with the Owner's directions, including, but not limited to attorney's fees, expert fees, and costs. Notwithstanding the foregoing, the Owner retains the right to select its own counsel for such defense, the cost of which is to be paid by the Contractor.
- C. If the Contractor notifies the Owner, in writing, that an Other Contractor on the Site is failing to coordinate its work with the Work, the Owner shall investigate the charge. If the Owner finds it to be true, the Owner shall promptly issue such directions to the Other Contractor with respect thereto as the situation may require. The Owner shall not be liable for any damages suffered by the Contractor by reason of the Other Contractor's failure to promptly comply with the directions so issued by the Owner, or by reason of an Other Contractor's default in performance.
- D. Should the Contractor sustain any damage through any act or omission of any Other Contractor having a contract with the Owner or through any act or omission of any subcontractor of said Other Contractor, the Contractor shall have no Claim against the Owner for said damage.
- E. Should any Other Contractor having or which shall have a contract with the Owner sustain damage through any act or omission of the Contractor or through any act or omission of a Subcontractor, the Contractor shall reimburse said Other Contractor for all said damages and shall indemnify and hold the Owner harmless from all such claims by said Other Contractor, including, but not limited to attorney's fees, expert fees, and costs. Notwithstanding the foregoing, the Owner retains the right to select its own counsel for such defense, the cost of which is to be paid by the Contractor. The Owner's right to indemnification hereunder shall in no way be diminished, waived, or discharged, by its recourse to assessment of liquidated damages as provided in the Contract Documents, or by the exercise of any other remedy provided by the Contract or law.
- F. The Owner cannot guarantee the responsibility, efficiency, unimpeded operations, or performance of any contractor. The Contractor acknowledges these conditions and shall bear the risk of all delays including, but not limited to, delays caused by the presence or operations of Other Contractors and

subcontractors of Other Contractors and delays attendant upon any Project CPM schedule approved by the Owner and the Owner shall not incur any liability by reason of any delay.

ARTICLE 5 -- MATERIALS AND LABOR

Section 5.01 - Contractor's Obligations

- A. The Contractor shall, comply with all the terms of the Contract Documents and complete all the Work in a good worker like manner, within the time specified in the Contract and to the satisfaction of the Owner.
- B. The Contractor shall provide and pay for all labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, permits, insurance, temporary structures and other facilities and services necessary for the proper execution and completion of the Work, whether temporary or permanent, and whether incorporated or to be incorporated in the Work or not incorporated in the Work.
- C. The Contractor shall enforce strict discipline and good order among the Contractor's employees and other persons carrying out the Work. The Contractor shall not permit employment of unfit persons or persons not skilled in tasks assigned to them.
- D. Any labor, materials or means whose employment, or utilization during the course of the Contract may tend to or in any way cause or result in strike, work stoppages, delays, suspension of Work or similar troubles by workers employed by the Contractor, its Subcontractors or material suppliers, or by any of the trades working in or about the Site, or by Other Contractors, their subcontractors or material suppliers pursuant to other contracts shall not be allowed. Any violation by the Contractor of this requirement may in the sole judgment of the Owner be considered a default by the Contractor under the Contract and a basis for the Owner to take action against the Contractor as set forth in General Conditions Article 11 Termination or Suspension or such other action as the Owner may deem proper.
- E. The Contractor and each Subcontractor shall comply with all applicable local, state, and federal laws, rules and regulations and all applicable construction standards issued by the Joint Commission and other accrediting agencies and organizations.
- F. The Contractor and each Subcontractor shall comply with all applicable Hazardous Material Laws. The Contractor shall provide the Owner the Safety Data Sheets for any Hazardous Materials or hazardous substances brought on the Site by the Contractor or a Subcontractor at least fifteen (15) calendar days prior to the delivery of such materials to the Site. Contractor shall identify to Owner at least fifteen (15) calendar days in advance the quantities of all "Chemicals of Interest" listed under the Chemical Facility Anti-Terrorism Standards of the Homeland Security Appropriations Act of 2007 that will be brought onto the Site.
- G. Contractor shall provide the necessary information and training to its employees on each Hazardous Material and hazardous substance to which they may be exposed on the Site and shall cause each of its Subcontractors to provide the necessary information and training to the Subcontractor's employees on each Hazardous Material and hazardous substance to which they may be exposed on the Site. Upon request of the Owner, Contractor shall provide the Owner with proof, satisfactory to the Owner, that Contractor's employees and all Subcontractors' employees have received the necessary information and training.

- H. Contractor shall not transport, store or use, and shall prohibit Subcontractors from transporting, storing or using, any construction materials or equipment (whether or not totally enclosed) containing Hazardous Materials including, but not limited to, asbestos, polychlorinated biphenyls, benzene, lead or urea formaldehyde in connection with this Contract; provided, however, Contractor and Subcontractors may transport, store and use the following substances: lead, natural gas, gasoline, diesel fuel, fuel oil(s), gravel(s), lube oil(s), grease(s), sealant(s), combustible gases, form oil(s), solvent(s), adhesives, paints, coatings, and all other materials that are used or consumed in or during construction or testing of the Work and its constituent systems and components in quantities reasonably necessary to perform the Work, if transported, stored and used in accordance with applicable laws including, but not limited to, those laws related to the implementation and utilization of spill containment, transport systems and storage vessels and facilities.
- I. Any Hazardous Materials and hazardous substances brought to or stored on or at the Site shall require specific, prior written authorization from Owner and, as a condition to such authorization, Contractor shall provide Owner with the Material Safety Data Sheet covering any Hazardous Material or hazardous substance furnished under or otherwise associated with the Work (including the construction equipment). Contractor shall maintain on the Site, at all times, complete records, and inventories, including Safety Data Sheets, of Hazardous Materials and hazardous substances described in this General Conditions Section 5.01 that are being used by it or its Subcontractors, or any persons for whose actions on the Site Contractor is responsible.

Section 5.02 - Means and Methods of Construction

- A. Unless otherwise provided in the Contract Documents, the Contractor shall choose the Means and Methods of Construction subject to the Owner's right to reject, at any time, the Means and Methods of Construction proposed by the Contractor, which in the opinion of the Owner:
 - 1. Will constitute or create a hazard to the Work or to persons or property;
 - 2. Will not produce finished Work in accordance with the terms of the Contract;
 - 3. Will be detrimental to the overall progress of the Project; or
 - 4. Will have an adverse impact on the operations of the Client.
- B. The Owner's failure to exercise its right to reject the Contractor's Means and Methods of Construction shall not relieve the Contractor of its obligation to complete the Work; the Owner's exercise of its right to reject the Contractor's Means and Methods of Construction shall not create a Contractor's or Subcontractor's cause of action for damages against the Owner.

Section 5.03 - Contractor's Title to Materials

- A. No materials for the Work shall be purchased by the Contractor or by any Subcontractor subject to any chattel mortgage or under a conditional sale or other agreement by which an interest is retained by any other party. The Contractor warrants that the Contractor has full, good, and clear title to all materials used by the Contractor in the Work, or resold to the Owner pursuant to the Contract Documents free from all liens, claims or encumbrances.
- B. For all materials and equipment to be stored at a location other than the Site prior to execution of an agreement with the Owner for materials stored off-site pursuant to General Conditions Section 8.01 G,

the Contractor shall provide the Owner with written notice of the location, security, environmental protections and the materials or equipment to be stored at that location at least fifteen (15) calendar days before such storage begins. Such notice does not obligate the Owner to pay for such stored material or equipment. Payment for stored material or equipment can be made only when the requirements for such payment in General Conditions Article 8 - Payment and elsewhere in the Contract have been met.

C. All materials, equipment and articles which become the property of the Owner shall be new unless specifically stated otherwise.

Section 5.04 - Comparable Products ("Or Equal" Clause)

- A. Whenever a material, article or piece of equipment is identified on the Drawings or in the Specifications by reference to manufacturers' or vendors' names, trade names, catalogue number, or make, said identification is intended to establish a standard. Any material, article or equipment of other manufacturers and vendors which performs satisfactorily the duties imposed by the design intent may be considered equally acceptable provided that, in the opinion of the Design Professional, the material, article, or equipment so proposed is of equal quality, substance and function and the Contractor shall not Provide, Furnish or Install any said proposed material, article, or equipment without the prior written approval of the Design Professional. The burden of proof and all costs related thereto concerning the "or equal" nature of the substitute item, whether approved or disapproved, shall be borne by the Contractor.
- B. Any costs savings to an approved comparable product realized by the Contractor shall be shared equally between the Owner (50%) and Contractor (50%).
- C. Where the Design Professional, pursuant to the provisions of this General Conditions Section 5.04, approves in writing a product proposed by the Contractor and said proposed product requires a revision of the Work covered by this Contract, or the work covered by other contracts, all changes in the work of all contracts, revision or redesign, and all new Drawings and details required therefore shall be provided by the Contractor at its cost and shall be subject to the approval of the Design Professional.
- D. No substitution which may result in a delay to the Project will be permitted without the prior written approval of the Owner.

Section 5.05 - Quality, Quantity and Labeling

- A. The Contractor shall Furnish materials and equipment of the quality and quantity specified in the Contract.
- B. When materials are specified to conform to any standard, the materials delivered to the Site shall bear manufacturer's labels stating that the materials meet said standards. Contractor's quality control plan required by paragraph D of this General Conditions Section 5.05 shall include measures undertaken by the Contractor to prevent the use of materials with counterfeit labels or other counterfeit indications of meeting a standard.
- C. The above requirements shall not restrict or affect the Owner's right to test materials as provided in the Contract.
- D. The Contractor shall develop and implement quality control plans to assure itself and the Owner that all Work performed by the Contractor and its Subcontractors complies fully with all Contract

requirements, and shall submit the plans to the Owner as required by the Contract. See the Submittals Section of the General Requirements for further details. The Contractor's quality control plans shall be independent of any testing or inspection performed by or on behalf of the Owner.

Section 5.06 - Tax Exemption

- A. The Owner is exempt from payment of federal, state, and local taxes; sales and compensating use taxes of the State of New York and of cities and counties on all materials and supplies incorporated in to the completed Work. These taxes are not to be included in bids. This exception does not apply to tools, machinery, equipment or other property leased by or to the Contractor or a Subcontractor, or to supplies and materials which, even though they are consumed, are not incorporated in to the completed Work, and the Contractor and Subcontractors shall be responsible for and pay any and all applicable taxes, including sales and compensating use taxes, on said leased tools, machinery, equipment or other property and upon all said unincorporated supplies and materials.
- B. The Contractor and Subcontractors shall obtain any and all necessary certificates or other documentation from the appropriate governmental agency or agencies, and use said certificates or other documentation as required by law, rule, or regulation.

ARTICLE 6 -- SUBCONTRACTS

Section 6.01 - Subcontracting

- A. The Contractor may utilize the services of Subcontractors, subject to the limits prescribed in the Information for Bidders Section 7.0 Approval of Subcontractors/Subcontract Limits. Exceeding stated limits, without prior written approval by the Owner, may be cause for Contract termination.
- B. The Contractor shall submit to the Owner the name of each proposed Subcontractor as required by the Contract. The Owner reserves the right to disapprove any proposed Subcontractor and such disapproval shall not result in any additional cost to the Owner. If requested by the Owner, the Contractor shall provide copies of any and all Subcontracts and purchase order agreements related to the Work. The Contractor shall require each Subcontractor to provide the Owner, upon the Owner's request, with a copy of each of the Subcontractor's subcontracts and purchase order agreements related to the Work.
- C. The Contractor's use of Subcontractors shall not diminish the Contractor's obligation to complete the Work. The Contractor shall control and coordinate the Work of Subcontractors and be fully responsible for the acts and omissions of Subcontractors, and of persons either directly or indirectly employed by Subcontractors. The Contractor shall be responsible for all guarantees and warranties provided by Subcontractors.
- D. The Contractor shall be responsible for requiring each Subcontractor, to extent of the Work to be performed by such Subcontractor, to be bound to the Contractor by all the terms, conditions, and requirements of the Contract Documents, and to assume towards the Contractor all the obligations and responsibilities which the Contractor, by the Contract Documents, assumes toward the Owner. The Contractor shall cause each Subcontractor to receive and review the provisions of the Contract Documents applicable to the Subcontractor, including but not limited to a copy of the Payment Bond for this Contract. Upon request of the Owner, the Contractor shall provide written proof satisfactory to the Owner that each Subcontractor has received and reviewed the provisions of the Contract Documents applicable to such Subcontractor, including but not limited to, a copy of the Payment Bond for this Contract.

- E. The Contractor shall ensure that each Subcontractor's duties to procure insurance for, and to defend, indemnify and hold harmless the Owner and Client, are, to the fullest extent permitted by law, at least the same as the Contractor's duties to procure insurance for, and to defend, indemnify and hold harmless the Owner and Client.
- F. To the fullest extent permitted by law and independent of any duty to indemnify and hold harmless, the Contractor shall require each Subcontractor, to the fullest extent permitted by law, to defend the Owner and Client against claims by third persons for wrongful death, bodily injuries and property damage, direct or consequential, loss or damage of any kind whatsoever arising out of or alleged to arise out of or as a result of or in connection with the performance of the Work, whether actually caused by or resulting from the performance of the Work, or out of or in connection with the Subcontractor's operations or presence at, or in the vicinity of, the Site.
- G. To the fullest extent permitted by law, the Contractor shall require each Subcontractor, to the fullest extent permitted by law, to indemnify and hold harmless the Owner and Client against claims by third persons for wrongful death, bodily injuries and property damage, direct or consequential, loss or damage of any kind whatsoever arising out of or alleged to arise out of or as a result of or in connection with the performance of the Work, whether actually caused by or resulting from the performance of the Work, or out of or in connection with the Subcontractor's operations or presence at, or in the vicinity of, the Site.
- H. The Contractor shall require each Subcontractor, in addition to the Subcontractor's other obligations, to pay the costs of the Owner and Client, including but not limited to, attorneys' and consultants' fees, expenses and court costs, to commence and prosecute a court action against the Subcontractor to enforce one or more of the Subcontractor's obligations under General Conditions Section 6.01 E, F or G or against an insurance company to obtain coverage under an insurance policy which the Subcontractor represented would provide coverage to the Owner or Client.
- I. Nothing contained in the Contract or any subcontract shall create any contractual relationship between any Subcontractor and the Owner except the requirements in General Conditions Sections 15.03 and 15.04 for each Subcontractor to procure insurance policies on which the Owner or the Owner and Client are insureds, the obligations of each Subcontractor pursuant to General Conditions Section 6.01 E, F and G to defend, indemnify and hold harmless, to the fullest extent permitted by law, the Owner and Client against claims by third persons for wrongful death, bodily injuries and property damage, direct or consequential, loss or damage of any kind whatsoever and the obligation of each Subcontractor pursuant to General Conditions Section 6.01 H.
- J. In selecting a Subcontractor, the Contractor shall consider whether the proposed Subcontractor appears on any list of entities debarred or suspended from doing business with a government entity, including the current list of companies or individuals that have been declared ineligible to receive Federal contracts published by the System for Award Management. The Contractor shall not Subcontract with any entity on the <u>List of Employers Ineligible To Bid On Or Be Awarded Any Public Contract</u>, published by the NYS Department of Labor Bureau of Public Work. The Contractor shall not Subcontract with any entity on the debarment list published by the NYS Workers' Compensation Board pursuant to Section 141-b of the NYS Workers' Compensation Law.
- K. Prior to or after award of the Contract, if requested by the Owner, the Contractor shall require a Subcontractor to submit a NYS Vendor Responsibility Questionnaire For Profit Construction (CCA-2) and a Dormitory Authority DASNY Vendor Questionnaire. If requested by the Owner, the Contractor shall require a Subcontractor to update a NYS Vendor Responsibility Questionnaire For Profit

Construction (CCA-2) and a Dormitory Authority DASNY Vendor Questionnaire previously submitted to the Owner.

- L. The Contractor shall submit a NYS Vendor Responsibility Questionnaire For Profit Construction (CCA-2) and a Dormitory Authority DASNY Vendor Questionnaire to the Owner for each Subcontractor proposed for the Work with a subcontract value of two million dollars (\$2,000,000) or greater. Refer to General Conditions Article 19 Executive Order No. 125.
- M. After execution of the Contract, the Owner will provide to the Contractor copies of the Owner's Code of Business Ethics Certification form. The Contractor is required to have each Subcontractor, at all tiers, complete the form prior to the Subcontractor beginning work. The completed forms are to be filed by the Contractor with the Owner. A failure to comply with this requirement may result in the Subcontractor(s) being removed from the Project Site.

ARTICLE 7 -- CHANGES IN THE WORK

Section 7.01 - Changes

- A. Without invalidating the Contract, the Owner, in writing, may order changes in the Work by altering, adding to, or deducting from the Work of the Contract.
 - 1. No change in the Work is effective unless the Owner executes and delivers a Change Order to the Contractor. No payment for a change in the Work is due the Contractor unless and until a Change Order is executed and delivered by the Owner to the Contractor and the Contractor has performed the change in the Work. No alteration to the standard language of the Owner's Change Order form shall be accepted. If the Contractor requests an adjustment to the Substantial Completion date for a change in the Work and the Owner agrees, an increase or decrease to the duration, in calendar days, shall be included in the Change Order.
 - 2. Notwithstanding subparagraph 1, the Owner, at its discretion, may execute and deliver to the Contractor a Notice to Proceed directing the Contractor to proceed immediately and diligently with the change in the Work described in the Notice to Proceed. The Owner, upon execution and delivery of the Notice to Proceed to the Contractor, is obligated to adjust the Contract for the change in the Work described in the Notice to Proceed; the extent of the adjustment(s) will be determined using the method of General Conditions Section 7.01 B specified in the Notice to Proceed, this General Conditions Article and negotiations with the Contractor; the adjustment(s) will be stated in the Change Order to be executed and delivered by the Owner to the Contractor. The Contractor, upon receipt of the Notice to Proceed, is obligated to proceed immediately and diligently with the change in the Work described in the Notice to Proceed while the adjustment(s) are determined. The Notice to Proceed shall be processed through the Project Management Program prior to execution and delivery by the Owner to the Contractor. No alteration to the standard language of the Owner's Notice to Proceed form shall be accepted. No payment for the change in the Work is due the Contractor until the Change Order is executed and delivered by the Owner to the Contractor and the Contractor has performed the change in the Work. The Owner determines the duration between execution and delivery of the Notice to Proceed and execution and delivery of the Change Order.
 - 3. Contractor's failure to proceed immediately and diligently with any Notice to Proceed or Change Order executed and delivered by the Owner to the Contractor, unless the Owner in writing directs otherwise, shall be a material breach of the Contract.

- 4. If, after the Owner has executed and delivered a Notice to Proceed to the Contractor for a change in the Work, the Owner and the Contractor cannot agree on the adjustment(s) to the Contract for the change in the Work described in such Notice to Proceed, the Owner shall execute and deliver a Forced Change Order to the Contractor in an amount and with such other provisions that the Owner considers to be fair and reasonable for the change in the Work described in such Notice to Proceed and Forced Change Order. If the Contractor does not accept the Forced Change Order, the Contractor shall strictly comply with the requirements of General Conditions Section 7.01 D.
- 5. No Change Order is executed by the Owner unless and until the Change Order is processed through the Project Management Program and:
 - a. For a Change Order for an amount less than \$5,000, the regional project manager, the chief project manager, or the director construction, for the Project signs the Change Order;
 - b. For a Change Order for an amount of \$5,000 to \$150,000, the director construction administration, the chief project controls, or the senior managing director construction signs the Change Order; and
 - c. For a Change Order for more than \$150,000, the managing director construction or other authorized officer of Owner signs the Change Order;
 - d. Notwithstanding the preceding provisions of this subparagraph, a Change Order which modifies the date for Substantial Completion and has a monetary amount less than \$5,000 shall be executed as a Change Order of \$5,000 to \$150,000.
 - e. No Change Order delivered to the Contractor is valid unless the Change Order has been executed in accordance with this subparagraph. The Owner, by written notice to the Contractor, may add or delete employees from the list of employees authorized to sign for the Owner a category of Change Orders and may limit an employee's authorization to sign a Change Order to part of a category. Notwithstanding any other provision of the Contract, the written notice adding an employee to the list of employees authorized to sign for the Owner a category of Change Orders and the written notice limiting an employee's authorization to part of a category may be put on one or more Change Orders for the Contract.
- B. The Contract amount may be increased or decreased only by a Change Order and the amount of the adjustment is determined by one or more of the following methods, as determined by the Owner:
 - 1. By applying the applicable unit price or prices contained in the Contract Documents, or negotiated pursuant to the provisions of this General Conditions Article. Unit prices are limited to the quantities specified in the Contract Documents or prior Change Order. Unit prices for quantities greater than specified in the Contract Documents or prior Change Order may, in the Owner's sole and exclusive discretion, be subject to negotiations between the Owner and Contractor.
 - 2. By estimating the fair and reasonable cost of the change in the Work or deleted Work.
 - 3. By determining the actual cost of the change in the Work and considering the following:
 - a. Labor, including all wages and required wage supplements, paid to employees below the rank of superintendent directly employed at the Site for the change in the Work. Minimum wages are the prevailing rate of wages defined by the NYS Department of Labor. Actual wages in excess, paid by the Contractor, may be considered by the Owner.

- b. Premiums or taxes paid by the Contractor for worker's compensation insurance, unemployment insurance, FICA tax and other payroll taxes as required by law, net of actual and anticipated refunds and rebates.
- c. Materials associated with the change in the Work.
- d. Equipment, excluding hand tools, which in the judgment of the Owner, would have been or will be employed in the Work. The Owner may employ the use of rental rates it deems most appropriate from the information in the "Equipment Watch Retail Rental and Equipment Watch Cost Recovery" databases. In no case will the equipment rental cost exceed the purchase price of the equipment. Self-owned equipment is defined to include equipment rented from Contractor-controlled or affiliated companies. It is the duty of the Contractor to utilize either rented or self-owned equipment that is of a nature and size appropriate for the Work to be performed. The Owner reserves the right to determine reasonable and appropriate equipment sizing, and at the Owner's discretion, it may adjust the costs allowed to reflect a smaller or less elaborate piece of equipment more suitable for performance of the change in the Work. The Owner, in its sole and exclusive discretion, will determine if equipment is rented from a company controlled by or affiliated with the Contractor.
- e. To determine the daily and hourly rate of self-owned equipment, the monthly rate shall be divided by twenty-two (22) to establish a daily rate; or by one hundred and seventy-six (176) to establish the hourly rate. The operating cost listed in the "Equipment Watch Retail Rental and Equipment Watch Cost Recovery" databases would be added to this rate to establish the billable rate.
- C. For each change in the Work, the Contractor shall submit to the Owner, within the time period provided by the Owner, the following information:
 - 1. A detailed proposal of labor, material, and equipment costs for the change in the Work. The Contractor and Subcontractors shall use the Owner's Contractor and Subcontractor Change Order Proposal Forms, which are available directly from the Owner or from the Dormitory Authority's website http://www.dasny.org.
 - 2. The Contractor's and Subcontractor's proposals shall provide a notarized statement as follows:
 - "I hereby certify that the value for the labor, material and equipment that comprise the proposal, represents the value of said work, material and equipment for the work performed or to be performed, pursuant to the Contract between the undersigned and the Dormitory Authority and that no overhead or profit is included in the proposal for a change to the Work performed by any Subcontractor or for any major equipment or material supplier that is a subsidiary or an affiliate of this firm."
 - 3. Signed and notarized Labor Rate Worksheet to determine hourly rates for each classification of worker associated with the change in the Work. The Contractor shall use the Owner's Labor Rate Worksheets, which are available directly from the Owner or from the Dormitory Authority's website http://www.dasny.org. Only hourly rates for each classification of worker approved by the Owner can be used to determine the adjustment of the Contract amount for a Change Order. Only an authorized officer of Owner or authorized employee of Owner's Project Controls Unit can approve Labor Rate Worksheets.

- 4. Narrative and fragnet schedule, which describes the impact on the Project CPM schedule in calendar days associated with the change in the Work if the Contractor requests a change in the date to achieve Substantial Completion. Owner, in its sole and exclusive discretion, may waive, in writing, this requirement for requests to change the date to achieve Substantial Completion made prior to the Owner's approval of the initial Project CPM schedule. Owner's waiver of this requirement can be made only by an authorized officer of Owner or authorized employee of Owner's Project Controls Unit. If the Contractor does not submit a narrative and fragnet schedule, the Contractor acknowledges that the Change Order does not require a change in the date to achieve Substantial Completion.
- 5. The Contractor agrees to provide, at the Owner's request, any additional documentation to further verify labor, material, equipment, and any other cost sought for a change in the Work.
- 6. The Contractor agrees to provide, at the Owner's request, written justification for a change in the Work.
- D. Each Contractor's written change proposal shall be reviewed by the Owner consistent with the requirements of the Contract.
 - 1. Owner and Contractor shall negotiate in good faith to agree on the adjustment(s) to the Contract for each change in the Work. The Owner is not required to respond to any change proposal submitted by the Contractor until the Contractor submits a change proposal that complies with the Contract Documents. Negotiations under this General Conditions Article shall not impact the Project schedule. The Contractor's proposal for a change in the Work is approved and accepted by the Owner only by the Owner's execution and delivery of a Change Order to the Contractor. See General Conditions Section 7.01 A. 5 for the requirements of execution and delivery.
 - 2. If the Owner has executed and delivered a Notice to Proceed to the Contractor for a change in the Work and the Owner and the Contractor cannot agree on the adjustment(s) to the Contract for the change in the Work described in such Notice to Proceed, the Owner shall execute and deliver a Forced Change Order to the Contractor in an amount and with such other provisions that the Owner considers to be fair and reasonable for the change in the Work described in such Notice to Proceed and Forced Change Order. If the Contractor does not accept the Forced Change Order, the Contractor shall file a notice of Claim in strict accordance with General Conditions Section 10.03 and comply strictly with all requirements of General Conditions Sections 10.03, 10.05 and 10.06. The Contractor's failure to comply with any or all of General Conditions Sections 10.03, 10.05 and 10.06 shall be deemed to be:
 - a. a conclusive and binding determination on the part of the Contractor to accept the Forced Change Order as final, binding and conclusive on the Contractor; and
 - b. a waiver by the Contractor of all Claims for additional compensation or damages as a result of the Forced Change Order.
- E. Any information representing the value of the Work performed, materials supplied and equipment utilized contained in the Contractor's and Subcontractor's proposals that constitutes False Representation may subject the Contractor or Subcontractor to criminal charges, including NYS Penal Law Sections 175.35 (Offering a False Instrument for Filing) and 210.40 (False Statement) and/or Title 18 U.S.C. Sections 1001 (Fraudulent and False Statements) and/or termination of the Contract for cause and civil prosecution under Article XIII of the NYS State Finance Law the New York False Claims Act.

- F. The compensation specified in the Change Order executed by the Owner and delivered to the Contractor includes full compensation for the changes in the Work covered thereby, and the Contractor waives all rights to any other compensation, damages, or expenses for the changes in the Work described therein.
- G. The Contractor shall furnish satisfactory bills, certified payrolls, vouchers, and other cost documentation covering all items of cost and when requested by the Owner shall give the Owner access to all accounts and records relating thereto, including records of Subcontractors and material suppliers.
- H. At Substantial Completion, the Owner may address increased Project-specific bonding, liability insurance and builder's risk insurance costs which may have resulted from changes in the Work. The Contractor shall provide satisfactory proof of and paid invoices, including cancelled checks or bank statements showing payment, for such increased costs. The Owner will not pay overhead and profit on any increased costs for bonding, liability insurance or builder's risk insurance.
- I. General Conditions Section 10.01 applies when the Owner determines that a decision, response, direction, action, omission, or condition does not require performance of Extra Work.

Section 7.02 - Overhead and Profit

A. See Example A for changes in the Work performed directly by the Contractor, whether a base cost is arrived at by estimated cost or actual cost method; add to base cost a sum equal to twenty percent. See Exceptions - Paragraphs "D" and "E".

Example A:

Contractor base cost	\$1,000
20% overhead and profit	<u>200</u>
Total	\$1,200

B. See Example B for changes in the Work performed by a Subcontractor under contract with the Contractor, where estimated or actual cost is Ten Thousand Dollars (\$10,000.00) or less; add to the base cost a sum equal to twenty percent of cost, for the benefit of the Subcontractor. For the benefit of the Contractor; add an additional sum equal to ten percent of the Subcontractor's base cost.

Example B:

Subcontractor base cost	\$1,000
20% Subcontractor overhead and profit	<u>200</u>
Subcontractor Total	\$1,200
10% Contractor overhead and profit on base cost	<u>100</u>
Total	\$1,300

C. See Example C for changes in the Work performed by a Subcontractor, under contract with the Contractor, which exceeds a base cost of Ten Thousand Dollars (\$10,000) in estimated or actual cost; add to the base cost a sum equal to twenty percent of cost for the benefit of the Subcontractor. For the benefit of the Contractor; add an additional sum equal to ten percent of the first Ten Thousand Dollars (\$10,000) of the Subcontractor's base cost, plus five percent of the next Ninety Thousand Dollars (\$90,000) of the Subcontractor's base cost, plus three percent of any sum in excess of One Hundred Thousand Dollars (\$100,000) of the Subcontractor's base cost.

Example C:

Subcontractor base cost	\$200,000
20% Subcontractor overhead and profit	40,000
Subcontractor Total	\$240,000
10% Contractor overhead and profit on first \$10,000 base cost	1,000
5% on next \$90,000 base cost	4,500
3% on base cost over \$100,000	<u>3,000</u>
Total	\$248,500

D. See Example D for overhead and profit on major equipment such as: switchgear, transformers, air handling units, boilers, etc. For extra equipment purchases by the Contractor or Subcontractors which exceeds a base cost of Ten Thousand dollars (\$10,000) in estimated or actual cost; add to the base cost for the benefit of the Contractor a sum equal to ten percent of the first Ten Thousand dollars (\$10,000) of the vendor's base cost plus five percent of the next Ninety Thousand dollars (\$90,000) of the vendor's base cost, plus three percent of any sum in excess of One Hundred Thousand dollars (\$100,000) of the vendor's base cost. If the equipment is supplied by the Subcontractor, the Contractor is entitled to a maximum of ten (10) percent of the first Ten Thousand dollars (\$10,000) of the base cost.

Example D:

Vendor base cost	\$200,000
10% Contractor or Subcontractor overhead and profit on first \$10,000 base cost	1,000
5% on next \$90,000 base cost	4,500
3% on base cost over \$100,000	3,000
Contractor or Subcontractor Total	\$208,500
10% Contractor overhead and profit on first \$10,000 base cost when equipment	
is supplied by the Subcontractor, no other mark-up allowed	<u>1,000</u>
Total	\$209,500

E. See Example E for overhead and profit on a material only Change Order. For increased material purchases by the Contractor or Subcontractors which exceed a base cost of Ten Thousand dollars (\$10,000) in estimated or actual costs; add to the base cost for the benefit of the Contractor a sum equal to ten percent of the first Ten Thousand dollars (\$10,000) of the supplier's cost plus five percent of the next Ninety Thousand dollars (\$90,000) of the supplier's cost, plus three percent of any sum in excess of One Hundred Thousand dollars (\$100,000) of the supplier's cost. If the material is supplied by the Subcontractor, the Contractor is entitled to a maximum of ten (10) percent of the first Ten Thousand dollars (\$10,000) of the base cost.

Example E:

Example E.	
Material cost (net difference between original contract and revised)	\$200,000
10% Contractor or Subcontractor overhead and profit on first \$10,000 base cost	1,000
5% on next \$90,000 base cost	4,500
3% on base cost over \$100,000	3,000
Contractor or Subcontractor Total	\$208,500
10% Contractor overhead and profit on first \$10,000 base cost when material	
is supplied by the Subcontractor, no other mark-up allowed	<u>1,000</u>
Total	\$209,500

- F. Other than the overhead and profit described in General Conditions Section 7.02A, no further overhead and profit will be allowed for changes to the Work performed by a Subcontractor under Subcontract with the Contactor or for major equipment or material supplier determined to be an affiliate of or controlled by the Contractor. An affiliate is considered any firm or entity in which the Contractor or any individual listed on the Contractor's NYS Vendor Responsibility Questionnaire either owns 5% or more of the shares of, or is one of the five largest shareholders, a director, officer, member, partner or proprietor of said Subcontractor, major equipment or material supplier; a controlled firm is any firm or entity which, in the opinion of the Owner, is controlled by the Contractor or any individual listed on the Contractor's NYS Vendor Responsibility Questionnaire.
 - 1. The Owner, in its sole and exclusive discretion, will determine if a firm or entity is an affiliate of or controlled by the Contractor.
- G. No overhead and profit shall be paid for changes in the Work performed by a Subcontractor not under Subcontract with the Contractor. No overhead and profit shall be paid on the premium portion of overtime pay. Where the changes in the Work involve both an increase and a reduction in similar or related Work, the overhead and profit allowance shall be applied only to the cost of the increase that exceeds the cost of the reduction.

Section 7.03 - Deduct Change Order

The amount of credit to be allowed by the Contractor to the Owner for a deletion or change which results in a decrease in the Contract amount shall be as determined by the Owner. The credit shall include the overhead and profit allocable to the deleted or changed Work unless the Owner, in its sole and exclusive discretion, determines otherwise.

ARTICLE 8 -- PAYMENT

Section 8.01 - Provision for Payment

A. The Contractor shall complete and submit to the Owner for review and written approval, the detailed Schedule of Values prior to the Contractor's first billing request. It is understood, and the Contractor acknowledges, that the Schedule of Values is an administrative tool to illustrate a format and minimum level of detail required for billing requests, and shall not be considered as delineating the Contractor's scope of Work. The Owner may require the Contractor to revise its Schedule of Values at no cost to the Owner and to provide a greater level of detail. Further, the Owner reserves the right to accept only those cost distributions which, in the Owner's opinion, are reasonable, equitably balanced and correspond to the estimated quantities in or for the Contract Documents. Owner's approval of the Schedule of Values can be provided only by an authorized officer of Owner or authorized employee of Owner's Project Controls Unit.

The Contractor, at its own expense, shall take all actions necessary to fully comply with the requirements of the Statewide Utilization Management Plan ("SUMP") of the NYS Contract System. Contractor shall require all Subcontractors to comply with the requirements of SUMP and the NYS Contract System. These requirements include, but are not limited to, the Contractor's timely payment to all Subcontractors and timely input in to the NYS Contract System of information, including but not limited to, information regarding Subcontractor payments and compliance with Contract requirements, including but not limited to Contract requirements for participation of Minority and Women Owned Business Enterprises in the performance of the Contract.

- B. The Owner shall not approve any billing request until:
 - 1. the Contractor is in full compliance with SUMP and the NYS Contract System; and
 - 2. the Owner approves the Schedule of Values in writing.
- C. To request a partial or full payment for partial or full performance of the Contract, Contractor shall obtain from the Owner a Contractor's billing request. The Contractor shall complete the billing request by entering in each line item thereof the percentage of completion of that item as of the end of the preceding business month and deliver the completed billing request to the Owner. The Owner shall review the billing request and make any changes which the Owner, in its sole and exclusive discretion, determines to be necessary so that the percentage of completion for each line item in the billing request accurately reflects the Contractor's performance of the Contract as of the end of the preceding business month. The Owner then delivers the Owner's adjusted version of the billing request to the Contractor for execution by the Contractor of the certifications of the Contractor required for partial or full payment for partial or full performance of the Contract. The Contractor delivers the executed billing request to the Owner. Any partial payment request under the Contract, unless the Owner in writing signed by an authorized officer permits more frequent requests.
- D. The Owner may make a partial payment to the Contractor for partial performance of the Contract on the basis of an Application for Payment for the Work performed during the preceding business month. The Owner shall retain five percent (5%) of the amount of each said Application for Payment. The Owner may make full payment to the Contractor for full performance of the Contract on the basis of an Application for Payment. Each Application for Payment shall be accompanied by all documentation required by law, including but not limited to, certified payrolls and all documentation required by the Owner, including but not limited to documentation to establish compliance with NYS Labor Law and NYS Lien Law. The Owner may require any documentation the Owner determines is necessary or useful to establish that the Contractor's performance of the Work complies with the requirements of the Contract and applicable law.
- E. Any partial payment made shall not be construed as a waiver of the right of the Owner to require the fulfillment of all the terms of the Contract. No payment, either partial or full, by the Owner to the Contractor shall waive or excuse any failure by the Contractor to comply fully with the Contract Documents. No payment will be made for Work not performed.
- F. In preparing the Contractor's billing request, material delivered to the Site and properly stored and secured at the Site and material approved to be stored off-site under such conditions as the Owner shall prescribe in accordance with paragraph G of this General Conditions Section 8.01, may be taken in to consideration. All costs related to the storage of materials are the sole responsibility of the Contractor.
- G. The Owner will provide an agreement for materials stored off-site and specific forms that the Contractor shall complete, execute, and submit with any billing request for such material. Required information includes, but is not limited to: a general description of the material; a detailed list of the materials; a pre-approved storage area; segregation and identification of the material; insurance covering full value against all risks of loss or damage, with non-cancellation provision; immediate replacement agreement in event of loss or damage; agreement to pay the expense of all inspections of the material; ownership provisions; delivery guarantee; project completion statement; bill of sale, releases of liens, and inventory. The Owner, in its sole and exclusive discretion, may require the Contractor to certify in the agreement for materials stored off-site that the materials comply with one or more requirements of the

Contract or to provide documentary proof acceptable to the Owner that the materials comply with one or more requirements of the Contract.

- H. All monthly billing requests submitted by the Contractor shall only be in the form and manner approved by the Owner. The Contractor shall furnish such affidavits, vouchers, receipts, and other documentation as to delivery and payment for materials, payment of Subcontractors, and payment of prevailing rate of wage and supplements required by NYS Labor Law as the Owner requires to substantiate each and every billing request. Contractor shall furnish any other documentation required by Owner to establish compliance with one or more requirements of the Contract or any statute or regulation, including but not limited to the certification required by General Conditions Section 16.02 and proof of compliance with NYS Labor Law Section 220-h (See General Conditions Section 16.03 H).
- I. All payments received by the Contractor under or in connection with the Contract are trust funds under Article 3-A of the NYS Lien Law and shall be applied by the Contractor in accordance with such law.

Section 8.02 - Substantial Completion and Reduction of Retainage

- A. After the Owner has determined Substantial Completion of the Work, as evidenced by the executed Notice of Substantial Completion, the Owner shall pay to the Contractor the balance due the Contractor pursuant to the Contract less:
 - 1. Two (2) times the value of any remaining items of Work to be completed or corrected as determined in accordance with paragraph B. of this General Conditions Section 8.02.
 - 2. An amount necessary to satisfy any and all claims, liens, or judgments by the Owner or third parties against the Contractor.
- B. After the Owner has determined Substantial Completion of the Work, as evidenced by the executed Notice of Substantial Completion, the Contractor shall submit to the Owner, for Owner's written approval, a detailed estimate of the value of the known remaining items of Work as set forth by the Owner and a schedule for achieving Physical Completion and Completion and Acceptance of the Work. The Owner shall review that estimate and schedule and:
 - 1. Direct the Contractor to revise and resubmit the estimate, the schedule or both; or
 - 2. Approve the estimate and schedule.

The Owner, at its discretion, may value the items of Work to be completed or corrected assuming such items will be completed or corrected by an entity other than the Contractor and may include the cost of obtaining regulatory or other third-party approval of one or more items of Work.

- C. As the remaining items of Work are completed and accepted by the Owner, the Owner shall pay the appropriate amount pursuant to a duly completed and submitted Application for Payment.
- D. The list of remaining Work items may be expanded to include additional items of corrective or completion Work until Completion and Acceptance by the Owner. Appropriate payments may be withheld to cover the value of these items pursuant to this General Conditions Section 8.02.
- E. The Contractor may request from the Owner a reduction of retainage when a phase of the Work is accepted by the Owner but Owner is not obligated to grant such request.

- F. The Application for Payment for the first payment of reduction of retainage shall be accompanied by:
 - 1. A release by the Contractor to the Owner of all Claims by and all liability to the Contractor for all items in connection with the Work and for every act and neglect of the Owner and others relating to or arising out of the Work; or
 - 2. A release by the Contractor to the Owner of all Claims by and all liability to the Contractor for all items in connection with the Work and for every act and neglect of the Owner and others relating to or arising out of the Work, excepting and reserving to the Contractor those Claims specified by the Contractor in the release. Owner's acceptance of a release containing Claims specified by and reserved to the Contractor does not waive any rights of the Owner arising under the Contract or any other source with respect to such Claims.

The requirement of a release may be waived only in writing and only by the Owner's Office of Counsel. No payment, final or otherwise, shall operate to release the Contractor or the Contractor's sureties from any obligations under this Contract or the Performance or Payment bonds.

Section 8.03 - Release and Consent of Surety

Notwithstanding any other provision of the Contract Documents to the contrary, reduction of retainage and/or the final Application for Payment shall not become due until the Contractor submits to the Owner a General Release from the Contractor and, if the Owner requests, a Consent of Surety to said payment in form and content acceptable to the Owner. No payment, final or otherwise, shall operate to release the Contractor or the Contractor's sureties from any obligations under this Contract or the Performance or Payment bonds.

Section 8.04 - Liens

- A. Upon the Owner's receipt of a notice of public improvement lien, all, or a portion, of the amounts due in the current and subsequent payments due the Contractor shall be withheld until a sum which shall be one and one-half (1 1/2) times the amount stated to be due in the notice of public improvement lien shall have been withheld from payments due the Contractor. This sum shall be withheld until the lien is discharged. The Contractor shall promptly discharge any notice of public improvement lien by filing a bond pursuant to NYS Lien Law Section 21, subdivision 5. If any Subcontractor should file a notice of lien against the property upon which the Project is located, such lien is void and Contractor, at its expense shall obtain and file an order of the Supreme Court of the State of New York cancelling such lien. If Contractor shall fail to obtain such order or if Contractor shall file a notice of lien against the property upon which the Project is located, the Owner may obtain an order of the Supreme Court of the State of New York cancelling such lien and deduct the attorney's fees and other costs incurred in obtaining and filing such order from any amount due the Contractor.
- B. Upon receipt of any other lien, levy, notice to withhold, restraining notice, court or administrative order or any other instrument allowed by law and directing the Owner to withhold payments due Contractor, the Owner will withhold the sum which Owner determines is necessary to withhold to comply with the applicable law. This sum shall be withheld until the instrument is, in the Owner's sole and exclusive discretion, appropriately satisfied or discharged.

Section 8.05 - Withholding of Payments

A. The Owner may withhold from the Contractor any part of any payment as may, in the judgment of the Owner, be necessary:

- 1. To ensure payment of just claims of any natural person or entity supplying labor, materials, or equipment for the Work.
- 2. To protect the Owner from loss due to defective Work not remedied.
- 3. To protect the Owner, Client, or any Consultant from loss due to failure to defend, loss due to injury to persons or damage to the Work or property of Other Contractors, Subcontractors or others caused by the act or neglect of the Contractor or Subcontractors.
- 4. To ensure payment of fines and penalties, that may be imposed on the Contractor pursuant to the provisions of the Contract.
- 5. To ensure payment of fines, penalties, or damages that may be imposed on the Contractor pursuant to General Conditions Article 20 Opportunity Programs.
- 6. To protect and make whole the Owner from a Contractor's non-compliance to the requirements set forth in General Conditions Article 14 Protection of Persons and Property and Article 15 Insurance and Bonds.
- 7. To protect the Owner and Client from damage caused or claimed to have been caused directly or indirectly by the failure of the Contractor to perform the Work of the Contract in strict accordance with the Contract Documents.
- B. The Owner shall have the right to apply any such amounts so withheld in such a manner as the Owner may deem proper to satisfy said claims, fines, and penalties, or to secure said protection. Said application of the money shall be deemed payments for the account of the Contractor.

Section 8.06 - Late Payment

Timeliness of payment and any interest to be paid to the Contractor for late payment is governed by Section 2880 of the NYS Public Authorities Law. Timely payment by the Contractor to the Subcontractor is governed by Section 139-f of the NYS State Finance Law which requires payment by the Contractor to the Subcontractor within seven (7) calendar days of receipt of payment from the Owner.

Section 8.07 – False Representations/Information

- A. False Representations, information, or data submitted on or with Applications for Payment may result in one or more of the following actions:
 - 1. Termination of the Contract for cause;
 - 2. Disapproval of future bids or contracts or subcontracts;
 - 3. Withholding of final payment on the Contract; and
 - 4. Civil and/or criminal prosecution (See General Conditions Sections 7.01 E and 10.03 F).
- B. The provisions of this General Conditions Section 8.07 are solely for the benefit of the Owner, and any action or non-action hereunder by the Owner shall not give rise to any liability on the part of the Owner.

ARTICLE 9 -- TIME OF COMPLETION

Section 9.01 - Substantial Completion

- A. The Contractor shall commence performance of the Work at the time stated in the Notice to Proceed and the Contractor shall achieve Substantial Completion no later than the date for Substantial Completion specified in the Contract. Notwithstanding anything to the contrary, a schedule submitted by the Contractor showing Substantial Completion earlier than that specified in the Contract shall not entitle the Contractor to any additional cost in the event the earlier date is not realized.
- B. It is hereby understood and mutually agreed, by and between the Contractor and the Owner, that Substantial Completion of the Work on or before the date for Substantial Completion specified in the Contract, is an essential condition of the Contract.
- C. The Contractor agrees that the Work shall be prosecuted regularly, diligently, and cooperatively with Other Contractors at such rate of progress as shall ensure Substantial Completion thereof within the time specified. It is expressly understood and agreed, by and between the Contractor and the Owner, that the time to achieve Substantial Completion allowed herein is reasonable.
- D. It is further agreed that time is of the essence for each and every portion of the Work. In any instance in which additional time is allowed for Substantial Completion of the Work, the new date of Substantial Completion established by said extension shall be of the essence. The Contractor shall not be charged with liquidated damages or any excess cost of the Owner or Client if the Owner determines in its sole and exclusive discretion that the Contractor is without fault and that the delay in Substantial Completion of the Work is due:
 - 1. To any preference, priority or allocation order duly issued by the Government of the United States or the State of New York.
 - 2. To an unforeseeable cause beyond the control and without the fault of, or negligence of the Contractor, and approved by the Owner, including, but not limited to, acts of God or of public enemy, acts of the Owner, fires, epidemics, quarantine, restrictions, strikes, freight embargoes and unusually severe weather.
 - 3. To any delays of Subcontractors or suppliers occasioned by any of the causes specified in Subsections 1 and 2 of this paragraph provided the Contractor shall, within fifteen (15) calendar days from the beginning of any such delay, notify the Owner in writing of the causes of the delay. Notice shall be delivered to the Owner as specified in General Conditions Section 10.03 C.
- E. The date of Substantial Completion may be modified only by a Change Order.
- F. If the Contractor shall neglect, fail, or refuse to achieve Substantial Completion by the date specified, or any proper extension thereof granted by the Owner, the Contractor agrees to pay to the Owner for loss of beneficial use of the Work of the Contract an amount specified in the Contract, not as a penalty, but as liquidated damages, for each and every calendar day thereafter that the Contractor does not achieve Substantial Completion.
- G. If the Contractor shall abandon performance of the Work before achieving Substantial Completion, the Contractor agrees to pay to the Owner for loss of beneficial use of the Work of the Contract an amount specified in the Contract, not as a penalty, but as liquidated damages, for each and every calendar day

after both the date of abandonment and the date specified for Substantial Completion that the Work has not achieved Substantial Completion. The obligation of the Contractor to pay liquidated damages as provided in this paragraph shall survive the termination of the Contract pursuant to General Conditions Section 11.01.

- H. If the Owner terminates the Contract before the Contractor achieves Substantial Completion, the Contractor agrees to pay to the Owner for loss of beneficial use of the Work of the Contract an amount specified in the Contract, not as a penalty, but as liquidated damages, for each and every calendar day after both the date of termination of the Contract and the date specified for Substantial Completion that the Work has not achieved Substantial Completion. The obligation of the Contractor to pay liquidated damages as provided in this paragraph shall survive the termination of the Contract pursuant to General Conditions Section 11.01.
- I. Said amount of liquidated damages is agreed upon by and between the Contractor and the Owner because of the impracticability and extreme difficulty of fixing and ascertaining the actual damages which the Owner would sustain for loss of beneficial use of the Work of the Contract in the event of delay in Substantial Completion, abandonment of the Work by the Contractor or termination of the Contract pursuant to General Conditions Section 11.01, and said amount is agreed to be the amount of damages sustained by the Owner and said amount may be retained from time to time by the Owner.
- J. The foregoing liquidated damages are intended to compensate the Owner only for the loss of beneficial use of the Work of the Contract. In addition, the Contractor shall be liable to the Owner and the Client, to the fullest extent permitted by law, for whatever actual damages (other than actual loss of beneficial use) the Owner or Client may incur as a result of any actions or inactions of the Contractor or its Subcontractors including, without limitation, interest expense and carrying costs, liabilities to Other Contractors working on the Project or other third parties, job extension costs, and other losses incurred by the Owner or Client. The provisions of this paragraph are for the exclusive use of the Owner and Client, and shall not accrue to Other Contractors or other third parties.
- K. The Owner will issue the Notice of Substantial Completion after the Owner, in its sole and exclusive discretion, has determined that Substantial Completion of the Work has occurred.

Section 9.02 – Physical Completion and Completion and Acceptance

- A. After the Owner has issued the Notice of Substantial Completion, the Contractor shall comply with General Conditions Section 8.02 B. Compliance with General Conditions Section 8.02 B is a condition precedent to the payment described in General Conditions Section 8.02 A. Once the Owner approves the detailed estimate of the value of the known remaining items of Work and the schedule for achieving Physical Completion and Completion and Acceptance, the Contractor shall achieve Physical Completion and Completion and Acceptance no later than the dates for each in the approved schedule. The Owner and Contractor agree that achieving Physical Completion and Completion and Acceptance no later than the dates for each in the approved schedule is an essential condition of the Contract and that time is of the essence.
- B. The Contractor agrees that after achieving Substantial Completion, Contractor shall continue to prosecute the remaining items of Work regularly, diligently, and cooperatively with Other Contractors. Contractor further agrees that once the schedule for achieving Physical Completion and Completion and Acceptance is approved, the Contractor shall prosecute the remaining items of Work regularly, diligently, and cooperatively with Other Contractors at such a rate of progress as shall ensure the achieving of Physical Completion and Completion and Acceptance by the dates for each in the approved schedule.

- C. The list of remaining Work items may be expanded to include additional items of corrective or completion Work until Completion and Acceptance by the Owner. Appropriate payments may be withheld to cover the value of these items pursuant to General Conditions Section 8.02.
- D. The Owner will issue the Notice of Physical Completion after the Owner, in its sole and exclusive discretion, has determined that Physical Completion of the Work has occurred.
- E. The Owner will issue the Notice of Completion and Acceptance after the Owner, in its sole and exclusive discretion, has determined that Completion and Acceptance of the Work has occurred. Completion and Acceptance follows or may be concurrent with Physical Completion.

ARTICLE 10 -- CLAIMS AND DISPUTES

Section 10.01 - Claim for Extra Work

- A. If the Contractor claims that:
 - 1. a decision of, or direction or response to the Contractor by, the Owner, Consultant, or Owner Representative;
 - 2. a condition; or
 - 3. any action or omission of the Owner

is contrary to the terms and provisions of the Contract and will require the Contractor to perform Extra Work, Contractor shall file a written notice of Claim in strict accordance with General Conditions Section 10.03. No Claim for Extra Work shall be allowed unless the Contractor files a written notice of Claim that complies strictly with the requirements of General Conditions Sections 10.01 and 10.03. The notice of Claim shall identify the decision, direction, response, action, omission, or condition from which the Claim arises. The Contractor shall also strictly comply with all other requirements of General Conditions Sections 10.01 and 10.03.

- B. If the Owner determines the decision, response, direction, action, omission, or condition does not require the performance of Extra Work, the Owner shall issue a Disputed Work Directive. The Contractor, upon receipt of the Disputed Work Directive shall immediately and diligently proceed with the Work described in the Disputed Work Directive in accordance with all instructions of the Owner. Contractor's failure to proceed immediately and diligently with any Disputed Work Directive issued by the Owner, unless the Owner in writing directs otherwise, shall be a material breach of the Contract. Contractor's performance of the Work described in and pursuant to the Disputed Work Directive shall not be a waiver of the Contractor's Claim for Extra Work provided the Contractor strictly complies with all requirements of General Conditions Sections 10.01 and 10.03. The Owner may issue a Disputed Work Directive for a decision, response, direction, action, omission, or condition before the Contractor files a notice of Claim arising from such decision, response, direction, action, omission, or condition; if the Owner does so, the Contractor shall still file a notice of Claim in strict compliance with General Conditions Section 10.03 and shall strictly comply with all requirements of General Conditions Sections 10.01 and 10.03.
- C. The Contractor's failure to comply strictly with any or all parts of General Conditions Sections 10.01 and 10.03 shall be deemed to be:

- 1. a conclusive and binding determination on the part of the Contractor that the decision, response, direction, action, omission, or condition does not involve Extra Work; and
- 2. a waiver by the Contractor of all Claims for additional compensation or damages as a result of the decision, response, direction, action, omission, or condition.

Section 10.02 - Claim for Additional Cost

- A. If the Contractor wishes to make a Claim for an increase in the cost to perform the Work, including but not limited to a Claim alleging breach of the Contract by Owner, the Contractor shall file a written notice of Claim strictly in accordance with General Conditions Section 10.03. The notice of Claim shall identify the condition or event from which the Claim arises. No Claim for an increase in the cost to perform the Work of the Contract shall be allowed unless the Contractor files a notice of Claim that complies strictly with the requirements of General Conditions Section 10.02 and 10.03. Contractor shall also strictly comply with all other requirements of General Conditions Sections 10.02 and 10.03. The Owner shall determine the validity of the Contractor's contention. Pending the decision of the Owner, the Contractor shall proceed with the diligent and prompt performance of the Work. Denial of additional costs shall not entitle the Contractor to additional time to achieve Substantial Completion. Nothing in this paragraph waives any of Owner's rights under the Contract.
- B. The Contractor's failure to comply strictly with any or all parts of General Conditions Sections 10.02 and 10.03 shall be deemed to be:
 - 1. a conclusive and binding determination on the part of the Contractor that the event or condition does not increase the cost to perform the Work of the Contract; and
 - 2. a waiver by the Contractor of all Claims for additional compensation or damages as a result of the event or condition.

Section 10.03 - Notice of Claim and Substantiation

- A. A written notice of Claim shall be delivered concurrently to the Owner's Representative and Project Controls Unit by the Contractor within fifteen (15) calendar days after occurrence of the event, decision, direction, response, action, or omission giving rise to such Claim or within fifteen (15) calendar days after the Contractor first recognizes the condition giving rise to the Claim, whichever is earlier. The burden of proving the Owner's receipt of the notice of Claim shall be the Contractor's responsibility.
- B. Within ninety (90) calendar days of the initial notice of Claim, the Contractor shall substantiate the Claim in writing and document the nature of the Claim and provide supporting cost data and documentation, Contractor's original cost estimate, Project CPM schedule demonstrating alleged impact of and correlation to the Claim subject matter and a Contractor affidavit stating the following:
 - "I hereby certify that the value assigned the work, labor, material and equipment that comprise the Claim, represents the actual value of said work, labor, material and equipment pursuant to the Contract between the undersigned and the Dormitory Authority."
 - 1. The Contractor shall provide, every thirty (30) calendar days thereafter for as long as such damages are incurred, written, verified statements of the details and the amounts of such damages, together with documentary evidence of such damages.

- 2. Contractor shall identify the final written, verified statement for each Claim submitted pursuant to this paragraph.
- 3. Each written, verified statement shall be delivered as set forth in paragraph C of this General Conditions Section 10.03.
- C. The Contractor shall provide the Owner's Representative one (1) paper copy of the documented Claim and mail two (2) paper copies of the documented Claim to:

Dormitory Authority Project Controls Unit 515 Broadway Albany, NY 12207-2964

- D. The Owner, at any time after the Contractor files a notice of Claim, may request additional documentation to determine the validity of the Contractor's contention and the Contractor shall submit such additional documentation within the time period specified by the Owner in the Owner's request for additional documentation. The Owner, at any time after the Contractor files a notice of Claim, may request an electronic copy of the documented Claim and the Contractor shall submit such a copy within ten calendar days.
- E. The value of any Claim, if allowed, shall be determined by the methods described in General Conditions Article 7 Changes in the Work. No Claim shall be allowed unless and until a Change Order allowing the Claim is executed and delivered by the Owner to the Contractor; payment of an allowed Claim may be made only through an Application for Payment.
- F. Any information representing the actual value of the labor performed, equipment utilized and material Furnished contained in the Claim that constitutes False Representation may subject the Contractor or Subcontractor to criminal charges, including NYS Penal Law Sections 175.35 (Offering a False Instrument for Filing) and 210.40 (False Statement) and/or Title 18 U.S.C. Sections 1001 (Fraudulent and False Statements) and/or termination of the Contract for cause and civil prosecution under Article XIII of the NYS State Finance Law the New York False Claims Act.

Section 10.04 - No Damages for Delay

- A. No Claims for increased costs, charges, expenses, or damages of any kind shall be made by the Contractor against the Owner for any delays or hindrances from any cause whatsoever; provided that the Owner, in the Owner's sole and exclusive discretion, may compensate the Contractor for any said delays or hindrances by extending the date for achieving Substantial Completion specified in the Contract. No payment for increased cost, charge, expense, or damage of any kind shall act as a waiver of the Owner's right, in its sole and exclusive discretion, to compensate the Contractor for any delays or hindrances from any cause whatsoever solely by extending the date for achieving Substantial Completion specified in the Contract.
- B. If the Contractor claims that a delay or hindrance entitles the Contractor to additional time to achieve Substantial Completion, the Contractor shall submit a written request to the Owner for such additional time within fifteen (15) calendar days of the event or condition giving rise to the request. The written request shall identify the event or condition causing the alleged delay or hindrance giving rise to the request and show that the Contractor is not responsible for the delay or hindrance or for any concurrent delay. The Contractor shall submit with the request an updated Project CPM schedule that shows the impact of the event or condition on the Project CPM schedule. The request and updated Project CPM

schedule shall be submitted to the Owner in accordance with General Conditions Section 10.03 C. The Owner may request additional documentation to decide the Contractor's request and the Contractor shall submit such additional documentation within the time period specified by Owner in the Owner's request for additional documentation. Failure of the Owner to respond in writing to a written request for additional time within thirty (30) calendar days shall be deemed a denial of the request unless the Owner extends the period to respond to the written request for additional time by written notice to the Contractor. While the Owner is considering the Contractor's request, the Contractor shall proceed with the diligent and prompt performance of the Work. Denial of additional time shall not entitle the Contractor to additional costs.

- C. The Contractor's failure to comply strictly with any or all parts of General Conditions Sections 10.03 and 10.04 shall be deemed to be:
 - a conclusive and binding determination on the part of the Contractor that the event or condition causing the alleged delay or hindrance does not require additional time to achieve Substantial Completion; and
 - 2. a waiver by the Contractor of all Claims for additional time to achieve Substantial Completion as a result of the event or condition causing alleged delay or hindrance.

Section 10.05 - Continuance of the Work

Unless the Owner, in writing, permits otherwise, the Contractor shall proceed diligently and promptly with the performance of the Work while the Owner considers a notice of Claim filed pursuant to:

- A. General Conditions Sections 7.01D and 10.03;
- B. General Conditions Sections 10.01 and 10.03; or
- C. General Conditions Sections 10.02 and 10.03;

or while the Owner considers a request for additional time to achieve Substantial Completion filed pursuant to General Conditions Sections 10.03 and 10.04 or while the Owner considers any other Claim.

Section 10.06 - Resolution of Claim

- A. Any resolution or determination by the Owner of a Claim or a request for additional time to achieve Substantial Completion shall be final, binding and conclusive on the Contractor unless within fifteen (15) calendar days after receiving notice of the Owner's resolution, the Contractor files a written notice with the Owner that the Contractor reserves the Contractor's rights under the Contract in connection with the matters covered by said resolution or determination. The written notice shall be filed in strict accordance with General Conditions Sections 10.03 C and 10.06. The Contractor's failure to comply strictly with these requirements shall be deemed to be a waiver by the Contractor of all Claims for additional compensation or damages included in the Claim and the request for additional time to achieve Substantial Completion.
- B. After any resolution or determination by the Owner of a Claim or a request for additional time to achieve Substantial Completion, the Contractor shall proceed diligently and promptly with the performance of the Work whether the Contractor files a written notice with the Owner that the Contractor reserves the Contractor's rights under the Contract in connection with the matters covered

- by said resolution or determination or the Contractor does not file such a written notice. Nothing in this paragraph waives any of the Owner's rights under the Contract.
- C. Contractor shall file no action or proceeding in a court challenging any resolution or determination by the Owner of a Claim or a request for additional time to achieve Substantial Completion unless the Contractor shall have strictly complied with all the requirements relating to the giving of notice and of information with respect to such Claim or request for additional time to achieve Substantial Completion in this General Conditions Article 10. Nothing in this paragraph waives any of Owner's rights under the Contract.
- D. Contractor shall file no action or proceeding in court challenging any resolution or determination by the Owner of a Claim or a request for additional time to achieve Substantial Completion until Contractor has achieved Physical Completion of the Work. Contractor agrees that any court action or proceeding challenging any resolution or determination by the Owner of a Claim or a request for additional time to achieve Substantial Completion filed before Contractor has achieved Physical Completion of the Work is premature. Nothing in this paragraph waives any of Owner's rights under the Contract. The Owner, in its sole and exclusive discretion, may modify this paragraph by a Contract Amendment.
- E. At its sole and exclusive discretion, the Owner may resolve any Claim or a request for additional time to achieve Substantial Completion without waiving its rights under the Contract.

ARTICLE 11 – TERMINATION OR SUSPENSION

Section 11.01 – Termination for Cause

- A. In the event that any provision of the Contract is violated by the Contractor or by any Subcontractor, the Owner may serve written notice upon the Contractor and upon the Contractor's surety, if any, of the Owner's intention to declare a Contractor Default (defined in the Performance Bond) and terminate the Contract. Such notice shall contain the reasons for the intention to declare a Contractor Default and terminate the Contract. The Contractor will be allowed an opportunity to show why the Owner should not declare a Contractor Default and why the Contractor's Contract should not be terminated for cause. If the violation shall not cease or arrangements satisfactory to the Owner are not made, the Owner, in writing, may declare a Contractor Default and the Contract shall terminate upon the date specified by the Owner in the declaration of Contractor Default. The Owner shall send the Contractor and the Contractor's surety, if any, written notice of and a copy of the declaration of Contractor Default and termination of the Contract. In the event of a declaration of Contractor Default and termination of the Contract, the Owner has the remedies set forth in the Performance Bond, the Contract, and all remedies at law or in equity.
- B. In the event of any such termination, the Owner may take over the Work and prosecute the Contract to completion and take possession of and may utilize such materials, appliances, and equipment on the Site and necessary or useful in completing the Work. The Contractor and Contractor's surety shall be liable to the Owner for all costs incurred by the Owner.
- C. In the event the termination for cause is determined to be improper, the termination shall be deemed a termination pursuant to General Conditions Section 11.02 Termination for Convenience of Owner.

Section 11.02 - Termination for Convenience of Owner

A. The Owner, at any time, may terminate the Contract in whole or in part. Any such termination shall be effected by delivering to the Contractor a written notice of termination specifying the extent to which

performance of Work under the Contract is terminated and the date upon which the termination becomes effective. Upon receipt of the notice of termination, the Contractor shall act promptly to minimize the expenses resulting from the termination.

- B. The Owner shall pay the Contractor for Work of the Contract performed by the Contractor and accepted by the Owner for the period extending from the end of the period covered by the last approved Application for Payment up to the effective date of the termination, an amount determined in accordance with General Conditions Article 7 Changes in the Work. In no event shall the Contractor be entitled to compensation in excess of the total consideration of the Contract. In no event shall Contractor be entitled to overhead or profit on the Work not performed.
- C. In the event of such termination the Owner may take over the Work and prosecute the Contract to completion and may take possession of and may utilize such materials, appliances, and equipment on the Site and necessary or useful in completing the Work.

Section 11.03 - Owner's Right to do Work

The Owner at any time may notify the Contractor that the Owner will have the Work of the Contract or any part thereof, performed by others, without terminating the Contract and without prejudice to any other right the Owner may have. The Owner may recover any and all costs related to such Work and deduct the value of such Work from the Contract amount.

Section 11.04 - Suspension of Work

- A. The Owner may order the Contractor in writing to suspend, delay or interrupt performance of all or any part of the Work for a reasonable period of time as the Owner may determine. The order shall contain the reason or reasons for issuance which may include, but is not limited to, latent field conditions, substantial program revisions, acquisition of rights of way or real property, financial crisis, labor disputes, civil unrest, expired insurance, court order or acts of God.
- B. Upon receipt of a suspension order, the Contractor shall, as soon as practicable, cease performance of the Work as ordered and take immediate affirmative measures to protect such Work from loss or damage.
- C. The Contractor specifically agrees that such suspension, interruption, or delay of the performance of the Work shall not increase the cost of performance of the Work. However, to the extent that the suspension of the Work is through no fault of the Contractor, the Owner may consider requests for compensation provided that the justification is submitted in accordance with General Conditions Article 10 Claims and Disputes.
- D. The date of Substantial Completion of the Work may be extended by Change Order to compensate the Contractor for the time lost by the suspension, interruption, or delay.
- E. The Owner may terminate the suspension, interruption, or delay of the performance of the Work by a written direction to the Contractor or may invoke any other provision of General Conditions Article 11 Termination or Suspension.

Section 11.05 - Stop Work

A. Should the Contractor fail to comply with the terms of the Contract, including but not limited to the insurance requirements of the Contract, the Owner, at any time, by written order to the Contractor, can

require the Contractor to stop all, or any part, of the Work called for by the Contract. The order shall be specifically identified as a Stop Work Order. Upon receipt of the order, the Contractor shall immediately comply with its terms and take reasonable steps to protect the Work covered by the order during the period of work stoppage. The Owner, at its option shall either:

- Cancel the Stop Work Order after the Contractor has successfully remedied the cause of the Stop Work Order.
- 2. Invoke any other provision of General Conditions Article 11 Termination or Suspension.
- B. The Contractor shall not be entitled to an increase in time or costs as a result of the Stop Work Order.

ARTICLE 12 -- BENEFICIAL OCCUPANCY

Section 12.01 - Occupancy Prior to Substantial Completion

- A. If, before Substantial Completion, the Owner desires Beneficial Occupancy of any part of the Work, the Owner shall have the right to do so, and the Contractor shall in no way interfere with or object to Beneficial Occupancy. Payment for operational costs of Project systems for the part of the Work subject to Beneficial Occupancy from the time of Beneficial Occupancy to Substantial Completion shall be borne by the Owner, unless otherwise specified by the Contract.
- B. Said Beneficial Occupancy (1) shall not constitute acceptance of space, systems, materials, or elements of the Work and (2) shall not affect the obligations of the Contractor for Work which is not in accordance with the requirements of the Contract or other obligations of the Contractor under the Contract.

The Contractor shall continue the performance of the Work in a manner that shall not unreasonably interfere with said use, occupancy, and operation by the Owner.

ARTICLE 13 -- INSPECTION AND ACCEPTANCE

Section 13.01 - Access to the Work

The Owner shall at all times have access to the Work and the Contractor shall provide proper facilities for access. If the Contractor schedules or performs any Work on a day or at a time which results in a Dormitory Authority employee assigned to the Project receiving overtime compensation or an additional charge to the Dormitory Authority from an Other Contractor for such Work, the Dormitory Authority, in its sole and exclusive discretion, may deduct such overtime compensation and such additional charge from moneys due the Contractor. If the Contractor intends to schedule any Work, including but not limited to any testing or inspection, outside the regular operating hours for the Project, the Contractor must provide the Owner and any Other Contractor involved in such Work at least fifteen (15) calendar days written notice of the scheduled date for such Work. The Owner, in its sole and exclusive discretion, may reduce the required number of days of notice for one or more occasions by written notice to the Contractor and to any involved Other Contractors.

Section 13.02 - Notice for Testing and Inspection

If the Contract Documents, the Owner's instructions, laws, rules, ordinances, or regulations require that any Work be inspected or tested, the Contractor shall give the Owner a minimum of five (5) calendar days,

unless otherwise specified, written notice of readiness of the Work for inspection or testing and the date fixed for said inspection or testing.

Section 13.03 - Reexamination of Work

Reexamination of any part of the Work may be ordered by the Owner, and if so ordered the Work shall be uncovered by the Contractor. If said Work is found to be in accordance with the Contract, the Owner shall pay the cost of reexamination. If said Work is not found to be in accordance with the Contract, the Contractor shall pay the cost of reexamination and replacement.

Section 13.04 - Inspection of Work

All Work, all materials whether incorporated in the Work or not incorporated in the Work, all processes of manufacture, and all methods of construction shall be, at all times and places, subject to the inspection of the Owner, and the Owner shall be the final judge of the quality and suitability of the Work, materials, processes of manufacture, and methods of construction for the purposes for which said Work, materials, processes of manufacture, and methods of construction are used. Any Work not approved by the Owner shall be reconstructed, made good, replaced, or corrected immediately by the Contractor including all work of Other Contractors destroyed or damaged by said removal or replacement. Rejected material shall be removed immediately from the Site. Acceptance of material and workmanship by the Owner shall not relieve the Contractor from the Contractor's obligation to replace all Work that is not in full compliance with the Contract.

Section 13.05 - Defective or Damaged Work

If, in the opinion of the Owner, it is undesirable to replace any defective or damaged materials or to reconstruct or correct any portion of the Work damaged or not performed in accordance with the Contract Documents, the Contract amount shall be reduced by an amount, which in the judgment of the Owner, shall be deemed equitable.

Section 13.06 – Testing of Work

All materials and equipment used in the Work shall be subject to testing in accordance with accepted standards to establish conformance with the Contract Documents and suitability for intended use or as directed by the Owner. Any Work covered or concealed without the approval or consent of the Owner, shall be uncovered for examination. No testing by the Owner or by a testing laboratory on behalf of the Owner relieves the Contractor of the responsibility to maintain quality control of materials, equipment, and installation to conform to the requirements of the Contract Documents. The Owner may order additional testing for any test results below specified minimums, above specified maximums or otherwise unacceptable. Additional cost for testing, professional services and any other expenses related to the additional testing shall be at the Contractor's expense. The Owner may deduct such costs from moneys due the Contractor.

Section 13.07 - Final Completion

No previous inspection shall relieve the Contractor of the obligation to perform the Work in accordance with the Contract. No payment, either partial or full, by the Owner to the Contractor shall excuse any failure by the Contractor to comply fully with the Contract Documents. The Contractor shall remedy all defects and deficiencies at the Contractor's expense, paying the cost of any damage to other Work, the work of Other Contractors and the property of the Owner or Client. No Work is completed and accepted until

the Owner issues the Notice of Completion and Acceptance. Completion and Acceptance is limited to the Work described in the Notice of Completion and Acceptance.

Section 13.08 - Guarantee

The Contractor shall, in all respects, guarantee the Work to the Owner and be responsible for all material, equipment, and workmanship of the Work. The Contractor shall forthwith repair, replace or remedy in a manner approved by the Owner, at the Contractor's expense, any material, equipment, workmanship, or other part of the Work found by the Owner to be defective or otherwise faulty and not in compliance with the Contract Documents, which defect or fault appears during the minimum period of one (1) year, or such longer period as may be prescribed by the Contract, from the date of Substantial Completion determined by the Owner. For items of Work performed after the date of Substantial Completion, the minimum period of one (1) year in the preceding sentence shall begin with the date of Physical Completion. The Contractor shall also pay for any damage to the Work, any damage to the work of Other Contractors and any damage to the property of the Owner or Client resulting from said defect or fault.

ARTICLE 14 -- PROTECTION OF PERSONS AND PROPERTY

Section 14.01 – Site Safety and Protection

- A. The Contractor and each Subcontractor shall comply with all applicable rules, regulations, codes, and bulletins of the New York State Department of Labor and to the standards imposed under the Federal Occupational Safety and Health Act of 1970, as amended. The Contractor and each Subcontractor shall comply with all Client safety requirements. The Contractor and each Subcontractor shall comply with all City of New York safety requirements for Projects within the City of New York constructed in accordance with the Building Code of the City of New York.
- B. The Contractor and each Subcontractor, and only the Contractor and each Subcontractor, shall be responsible for the initiation, maintenance and supervision of safety precautions and programs in connection with the Work and the Contractor shall require each Subcontractor to initiate, maintain and supervise its own safety precautions and programs for any portion of the Work for which the Subcontractor is responsible and to generate safety reports for days when safety inspections occur. The Contractor shall prepare and submit to the Owner a written safety plan for the Site showing how all safety requirements of applicable law and the Contract will be implemented for the duration of the Contract. The Contractor shall designate a responsible person at the Site whose duties shall include maintaining site safety pursuant to OSHA and any other applicable requirement, conducting weekly tool box meetings with its workers, implementing the Site safety plan and providing the Owner with a copy of such meeting minutes.
- C. The Owner shall provide the Contractor with copies of the Owner's safety orientation booklet. The Contractor shall provide a copy to each of its workers and to each worker of its Subcontractors prior to each worker starting Work. The Contractor shall maintain documentation that each worker received a copy of the Owner's safety orientation booklet prior to the worker starting Work.
- D. The Contractor and each Subcontractor shall, at all times: (1) guard the Owner's property from damage or loss in connection with the Work; (2) guard and protect the Contractor's Work and adjacent property; (3) replace or make good any said loss or damage unless said loss or damage is caused directly by the Owner; and (4) guard the lives and health of all persons on and in the vicinity of the Site.
- E. The Contractor and each Subcontractor shall protect all adjoining property and shall repair or replace any said property damaged or destroyed during the progress of the Work.

F. The Contractor is responsible for ensuring that each Subcontractor executes the Subcontractor's obligations in this General Conditions Section 14.01.

Section 14.02 - Protection of Work

- A. The Contractor shall be responsible for the safety, efficiency and adequacy of the Contractor's Work, plant, appliances, and methods, and for any damage which may result from the failure or the improper construction, maintenance, or operation of such Work, plant, appliances, and methods.
- B. The Contractor shall have full responsibility to protect and maintain all materials on and off site in proper condition and forthwith repair, replace and make good any damage thereto until Physical Completion. The Contractor shall maintain an inventory of all materials for the Project that are delivered to the Site or approved for off-site storage facilities pursuant to General Conditions Section 8.01 G. All tools, spare parts, extra materials, attic stock and similar items delivered by the Contractor after Physical Completion shall be in proper condition and Contractor shall forthwith repair, replace, and make good any damage thereto until the later of Completion and Acceptance or the expiration of one year from delivery.
- C. The Contractor shall immediately report any loss, theft, burglary, vandalism, or damage of materials or installed work to the Owner by phone and email as soon as it is discovered. If vandalism, theft, or burglary is suspected as the cause of the loss, the Contractor shall notify Site security personnel and the municipal police, protect the place of the loss until released from protection by the Owner, and insure that no potential evidence relating to the loss is removed from the place of the loss.
- D. Any insurance claim alleging damage to the Work shall be submitted to the Owner pursuant to General Conditions Section 10.03.
- E. A claim for damage to the Work shall include the following in addition to the requirements of General Conditions Section 10.03:
 - 1. A copy of a police report (if applicable).
 - 2. A complete inventory of damages or lost items including:
 - a. Description of each item.
 - b. Purchase date and proof of delivery of each item.
 - c. Supplier from whom purchased.
 - d. Serial number (if applicable).
 - e. Price of each item.
 - 3. The name, address and telephone number of the person who controlled the lost or damaged items immediately before the loss or damage.
 - 4. The name, address and telephone number of the person who discovered the loss or damage.
 - 5. A written description of how the loss or damage occurred.

F. The Owner may deny any claim from the Contractor under this General Conditions Section 14.02 if all items required by this General Conditions Section 14.02 are not provided or are not satisfactory to the Owner.

Section 14.03 - Protection of Lives and Health

- A. The Contractor and each Subcontractor shall be responsible for the safe performance of the Work and their Means and Methods of Construction and for any injury or loss that shall occur from a failure to meet such responsibility.
- B. The Contractor shall, within twenty-four (24) hours, notify the Owner and each Subcontractor shall, within twenty-four (24) hours, notify the Contractor of any incident, accident, illness, or injury that occurred on the Project Site. The Contractor shall follow-up and provide the Owner with a copy of Form C-2, Employers Report of Injury/Illness within twenty-four (24) hours of any incident, accident, illness, or injury, a copy of the recorded OSHA Log and any and all reports and statements pertaining to such incident, accident, illness, or injury.
- C. The Contractor and each Subcontractor shall maintain a record of all cases of death, illness or injury requiring medical attention, hospitalization, or causing loss of time from work, arising out of and in the course of performance of Work of the Contract.
- D. The Contractor and each Subcontractor shall preserve and safeguard the area of any incident, accident, illness, or injury where the person required emergency medical treatment. The Contractor shall secure the area and not allow any material object or property to be altered, changed, moved, or removed from the area and post a person at the area to protect it. Safeguarding and protecting the area shall only be abandoned by the Contractor upon release by the Owner. The Contractor shall provide the Owner, within twenty-four (24) hours, a list of witnesses which includes the full name, home address, occupation and telephone number of each person and all maintenance records, tool box meeting records and daily reports reflecting the work performed on the day of the incident. The Contractor shall provide, within twenty-four (24) hours of learning of the actual or potential existence of any other witnesses, the Owner with updated information which includes the full name, home address, occupation, and telephone number of each additional witness.
- E. If, in the performance of the Work, a harmful hazard is created for which appliances or methods of elimination have been approved by regulatory authorities, the Contractor shall install, maintain, and operate said appliances or methods.
- F. The Contractor and each Subcontractor shall provide, within five (5) calendar days, written notice to each of its liability insurers (primary, excess and umbrella) of any such incident, accident, illness, injury, or death on the Project Site on behalf of itself, the Owner, the Client, and the Construction Manager. The Contractor and each Subcontractor shall provide to the Owner, the Client and the Construction Manager, a copy of such notice at the time such notice is given to each insurer as well as confirmation of receipt of such notice by each insurer.
- G. The Contractor is responsible for ensuring that each Subcontractor executes the Subcontractor's obligations in this General Conditions Section 14.03.
- H. Failure of the Contractor to comply with provisions of this General Conditions Section 14.03 shall be deemed a material breach of Contract and the Owner may impose a payment penalty on the Contractor for any act of non-compliance. The payment penalty shall not exceed one twentieth (1/20) of the

contract price or a maximum of One Thousand Dollars (\$1,000) for each time the Contractor fails to perform or to provide the information, reports, forms, etc. required in this General Conditions Section 14.03. This payment penalty is not exclusive; the Owner may avail itself of any other contractual remedy available.

Section 14.04 - Risks Assumed by the Contractor

The Contractor agrees that each duty set forth in this General Conditions Section 14.04 is separate, distinct, and independent from the other duties in this General Conditions Section 14.04.

- A. To the fullest extent permitted by law, the Contractor solely assumes the following distinct and several risks whether said risks arise from acts or omissions, whether supervisory or otherwise, of the Owner, of the Client, of any Subcontractor, of third persons or from any other cause, including unforeseen obstacles and difficulties which may be encountered in the performance of the Work, whether said risks are within or beyond the control of the Contractor and whether said risks involve any legal duty, primary or otherwise, imposed upon the Owner or Client, regardless of the presence or absence of culpable conduct on the part of the Contractor, excepting only risks which arise from faulty designs as shown by the Drawings and Specifications or from the percentage of negligence attributed to the Owner, the Client or the Construction Manager or the Owner's, Client's or Construction Manager's members, officers, representatives or employees that caused the loss, damage or injuries hereinafter set forth:
 - 1. To the fullest extent permitted by law, the risk of loss or damage, including direct or indirect damage or loss, of whatever nature to the Work or to any plant, equipment, tools, materials or property furnished, used, installed or received by the Owner, the Construction Manager, the Contractor or any Subcontractor, materialman or worker performing services or furnishing materials for the Work regardless of the presence or absence of any culpable conduct on the part of the Contractor, excepting only risks which arise from the percentage of negligence attributed to the Owner, Client or Construction Manager or the Owner's, Client's or Construction Manager's members, officers, representatives or employees that caused the loss or damage. The Contractor shall bear said risk of loss or damage until Physical Completion or until completion or removal of said plant, equipment, tools, materials or property from the Site and the vicinity thereof, whichever event occurs last. In the event of said loss or damage, the Contractor immediately shall repair, replace, or make good any said loss or damage.
 - 2. To the fullest extent permitted by law, the risk of claims, just or unjust, by third persons against the Contractor, the Owner, the Client, or the Construction Manager on account of wrongful death, bodily injuries and property damage, direct or consequential, loss or damage of any kind whatsoever arising out of or alleged to arise out of or as a result of or in connection with the performance of the Work by the Contractor or any Subcontractor, whether actually caused by or resulting from the performance of the Work, or out of or in connection with the operations of the Contractor or any Subcontractor or presence at or in the vicinity of the Site of the Contractor or any Subcontractor, regardless of the presence or absence of any culpable conduct on the part of the Contractor. The Contractor shall bear the risk for all deaths, injuries, damages or losses sustained or alleged to have been sustained prior to Physical Completion of the Work excepting only the percentage of negligence attributed to the Owner, Client or Construction Manager or the Owner's, Client's or Construction Manager's members, officers, representatives or employees that caused the deaths, losses, damages or injuries, regardless of the presence or absence of any culpable conduct on the part of the Contractor. The Contractor shall bear the risk for all deaths, injuries, damages, or losses sustained or alleged to have been sustained after Physical Completion resulting from the Contractor's negligence or alleged negligence.

- 3. To the fullest extent permitted by law, the Contractor assumes entire responsibility and liability for any and all damage or injury of any kind or nature whatsoever, including death resulting therefrom, to all persons, whether employees of the Contractor or otherwise, and to all property, arising out of or alleged to arise out of or as a result of or in connection with the performance of the Work by the Contractor or any Subcontractor, whether actually caused by or resulting from the performance of the Work, or out of or in connection with the Contractor's or any Subcontractor's operations or presence at or in the vicinity of the Site, regardless of the presence or absence of any culpable conduct on the part of the Contractor. If any person shall make said claim for any damage or injury, including death resulting therefrom, or any alleged breach of any statutory duty or obligation on the part of the Owner, the Client, Construction Manager, or any of the servants and employees of the Owner, Client or Construction Manager, the Contractor shall indemnify and hold harmless the Owner, the Client, the Construction Manager, and any of such servants and employees, for any and all loss, damage or injury that the Owner, the Client Construction Manager, or any such servants and employees, may sustain as the result of any claim, provided however, the Contractor shall not be obligated to indemnify and hold harmless the Owner, the Client Construction Manager, and any such servants and employees for their own negligence, if any. In the event that any negligence is attributed to the Owner, Client, Construction Manager or any such servants or employees, then that particular entity or person shall be indemnified and held harmless for all of its liability minus the percentage of negligence attributed to that particular entity or person.
- 4. Notwithstanding any contrary provision of the Contract, and to the fullest extent permitted by law, the Contractor shall, within ten (10) calendar days of notice from the Owner, Client or Construction Manager, assume the obligation to defend and represent the Owner, the Client, the Construction Manager, and any of the servants and employees of the Owner, Client or Construction Manager, with counsel selected by the Owner, in all claims by third parties arising out of or alleged to arise out of or as a result of or in any way associated with the duties, obligations or requirements of the Contractor or any Subcontractor pursuant to the Contract, or the presence of the Contractor or any Subcontractor on the Site. This obligation to defend applies immediately and is separate and independent of and distinct from the enforceability of any obligation of Contractor or any Subcontractor to indemnify or hold harmless the Owner, the Client, the Construction Manager and the servants or employees of the Owner, Client, and Construction Manager. The Contractor's obligation to defend includes, but is not limited to, payment of any legal fees associated with defending the Owner, the Client, the Construction Manager and any such servants and employees, all costs of investigation, expert evaluation, and any other costs. If the Contractor fails to so defend and represent the Owner, the Client, the Construction Manager, or any such servants and employees with counsel selected by the Owner, the Owner may proceed to defend and represent itself, the Client, the Construction Manager and any such servant and employee with counsel selected by Owner. Contractor shall make payment of the selected counsel's fees and expenses and all other defense costs incurred by Owner immediately upon receipt of Owner's demand.
- B. The Contractor's obligations under this General Conditions Article shall not be deemed waived, limited or discharged by the enumeration or procurement of any insurance for liability for damages. The Contractor shall notify its insurance carrier within twenty-four (24) hours after receiving a written notice of loss or damage or claim from the Owner, the Client, or the Construction Manager. The Contractor shall make a claim to its insurer specifically under the provisions of the contractual liability coverage and any other coverage afforded the Owner, the Client or Construction Manager including those of being a named insured or an additional insured where applicable.
- C. Neither Completion and Acceptance of the Work nor making any payment shall release the Contractor from the Contractor's obligations under this General Conditions Article. The enumeration elsewhere in the Contract of particular risks assumed by the Contractor or of particular claims for which the

Contractor is responsible shall not be deemed to limit the effect of the provisions of this General Conditions Article or to imply that the Contractor assumes or is responsible for only risks or claims of the type enumerated; and neither the enumeration in this General Conditions Article nor the enumeration elsewhere in the Contract of particular risks assumed by the Contractor or particular claims for which the Contractor is responsible shall be deemed to limit the risks which the Contractor would assume or the claims for which the Contractor would be responsible in the absence of said enumerations.

D. Notwithstanding any provision of the Contract to the contrary, and to the fullest extent permitted by law, if the Contractor does not fulfill one or more of Contractor's obligations under General Conditions Articles 14 and 15 to defend, indemnify, hold harmless, and procure insurance for the Owner, Client and Construction Manager, and the Owner, Client or Construction Manager commences a court action to enforce one or more of the Contractor's obligations to defend, indemnify, hold harmless and procure insurance for the Owner, Client and Construction Manager, the Contractor, in addition to its other obligations, shall pay the costs of the Owner, Client and Construction Manager to bring and prosecute the court action, including but not limited to attorney and consultant fees, expenses and court fees. If the Owner, Client, or Construction Manager commences a court action against an insurance company to obtain coverage under an insurance policy which the Contractor represented would provide coverage to the Owner, Client or Construction Manager, the Contractor, in addition to its other obligations, shall pay the costs of the Owner, Client, and Construction Manager to bring and prosecute the court action, including but not limited to attorney and consultant fees, expenses, and court fees.

ARTICLE 15--INSURANCE AND BONDS

Section 15.01 - General Provisions

- A. The Contractor and Subcontractors shall not violate, or permit to be violated, any term or condition of their insurance policies, and shall at all times satisfy the safety requirements of the Owner and of the insurance companies issuing such policies.
- B. The Contractor and Subcontractors shall maintain in force all insurance required to be procured by them under this Contract until issuance of the Notice of Physical Completion by the Owner except where this Contract requires an insurance policy to be maintained for a period beyond issuance of the Notice of Physical Completion in which case the Contractor and Subcontractors shall maintain such insurance policy in force for the specified period beyond issuance of the Notice of Physical Completion.
- C. All insurance required to be procured and maintained by the Contractor and Subcontractors under this Contract shall be procured from insurance companies licensed to do business in the State of New York by the NYS Department of Financial Services and rated at least A- by A.M. Best and Company, or meet such other requirements as are acceptable to the Owner in its sole and exclusive discretion.
- D. All insurance policies required to be procured and maintained by the Contractor and Subcontractors under this Contract shall include a provision or endorsement that the policy shall not be canceled, materially changed, or not renewed without at least thirty (30) calendar days written notice to the Owner except for non-payment in which case notice to the Owner shall be provided as required by law.
- E. All insurance policies required to be procured and maintained by the Contractor and Subcontractors under this Contract shall include a provision or endorsement that at least thirty (30) calendar days prior to the expiration of the policy, evidence from the carrier of renewal or replacement of the policy by the

- carrier, with terms and limits no less favorable than the expiring policy, or written notice from the carrier that the policy will not be renewed or replaced by the carrier, shall be delivered to the Owner.
- F. All insurance policies required to be procured and maintained by the Contractor and Subcontractors under this Contract shall be written on an occurrence basis except where this Contract explicitly allows otherwise.
- G. All insurance policies required to be procured and maintained by the Contractor and Subcontractors under this Contract shall include a provision or endorsement that the Owner and the Client shall not be responsible for any claim expenses and loss payments within the deductible or the self-insured retention and that the Contractor or Subcontractor shall be solely responsible for all claim expenses and loss payments within the deductible or self-insured retention. At any time this Contract requires the Contractor or any Subcontractor to maintain an insurance policy, the Owner may require the Contractor or subcontractor to provide proof, acceptable to the Owner in its sole discretion, that the Contractor or Subcontractor has assets or security sufficient to satisfy all deductible or self-insured obligations under such insurance policy for which the Contractor or Subcontractor may be liable under the claims pending or reasonably possible against the Contractor or Subcontractor at the time the Owner requires the proof. A failure of the Contractor or Subcontractor to provide such proof is a failure of the Contractor or Subcontractor to maintain the insurance required by the Contract or to provide the Owner with evidence of valid and in-force insurance coverage required by the Contract for purposes of General Conditions Section 15.05.
- H. All insurance policies required to be procured and maintained by the Contractor and Subcontractors under this Contract shall include a provision or endorsement that there shall be no right of subrogation against the Owner, Client, or Construction Manager. If any of the Contractor's policies or any of the policies of any Subcontractor prohibit such a waiver of subrogation, the Contractor or Subcontractor shall secure the necessary permission to grant this waiver of subrogation. Any and all such permission shall be confirmed by a manuscript endorsement to the relevant insurance policy or policies and a certified copy of the endorsement shall be provided to the Owner and Construction Manager.
- I. Each liability and protective liability insurance policy required to be procured and maintained by the Contractor and Subcontractors under this Contract shall include a provision or endorsement that the coverage afforded the Owner, Client and Construction Manager under such policy shall be primary and non-contributory and that such policy shall be primary to any other insurance policy maintained by the Owner, by the Client or by the Construction Manager. Any other insurance policy maintained by the Owner, by the Client or by the Construction Manager shall be in excess of and shall not contribute with the Contractor's or Subcontractor's insurance policy, regardless of the "other insurance" clause contained in the Owner's, Client's or Construction Manager's own policy of insurance or the Contractor's or Subcontractor's insurance policies.
- J. Any other Contract Document, including but not limited to the Information for Bidders, but excluding Change Orders, may require any of the Contractor and Subcontractors to provide at its or their expense any other form or limit of insurance necessary to secure the interests of the Owner or Client.
- K. Notwithstanding any other provision of the Contract, the Owner, in a Change Order or Contract Amendment, may require the Contractor and any or all Subcontractors to provide, at the expense of the Owner, any other form or limit of insurance in addition to the insurance requirements of the original Contract necessary to secure the interests of the Owner, Client, or Construction Manager.
- L. Neither the procurement nor the maintenance of any type of insurance by the Owner, the Client, the Contractor or the Construction Manager shall in any way be construed or deemed to limit, discharge,

waive or release the Contractor or any Subcontractor from any of the obligations or risks accepted by the Contractor and Subcontractors or to be a limitation on the nature or extent of said obligations and risks or to be a limitation of any obligation to defend, indemnify, hold harmless and procure insurance for the Owner, Client and Construction Manager.

- M. All provisions of General Conditions Article 14 Protection of Persons and Property and General Conditions Article 15 Insurance and Bonds are to the fullest extent permitted by law. One purpose of this Contract is to allocate, to the fullest extent permitted by law, all risk of loss to the Contractor, each Subcontractor, and the insurers of each. Each insurance company from which Owner or Client has directly purchased an insurance policy is a third-party beneficiary of the Contractor's and each Subcontractor's obligations to procure insurance.
- N. Contractor is responsible for ensuring that each Subcontractor obtains and maintains in the required amount each type of insurance policy required by this Contract and that such insurance policy provides the Owner, Client and Construction Manager with the coverage required by this Contract.
- O. Contractor agrees and acknowledges that, because the Contractor (and not the Owner or Client) is responsible for performance of the duties and obligations set forth in this Contract for completion of the Project, the Contractor, through the use of insurance, intends to allocate all losses to such insurance to protect itself and the Owner and Client.

Section 15.02 - Submission of Insurance

- A. Owner will not execute the Contract unless the Contractor shall submit to the Owner or the Owner's designee proof of insurance in such forms as requested and deemed acceptable by the Owner, indicating the Project, and showing evidence of all insurance required under the Contract. Upon the Owner's request, the Contractor shall provide a copy of each insurance policy required by the Contract certified by the insurance carrier as a true and complete copy. The Owner may request such a certified copy of a policy at any time and may make such requests as often as the Owner, in its sole and exclusive discretion, deems necessary. Each request may be for a certified copy of one or more policies. In addition, the Contractor shall provide copies of certificates of insurance to the Construction Manager, if applicable. Certificates of insurance, notwithstanding anything to the contrary contained on the Certificate of Insurance, when submitted to the Owner, constitute a warranty by the Contractor and its insurance agent or broker, that the insurance coverage described is in effect for the policy term shown.
- B. The Contractor shall submit insurance certificates (Accord 25 and 855, or equivalent as determined by the Owner), copies of declaration pages, schedules of forms and endorsements, copies of all named insured endorsements, all endorsements of the policy granting coverage to the Owner, Client, and Construction Manager, and such other documents requested by the Owner as proof of insurance for the Contractor. All insurance submittals must be approved by the Owner prior to the Contractor's commencement of Work.
- C. Upon the Owner's request, the Contractor shall submit to the Owner or Owner's designee proof of insurance for one or more Subcontractors, in such forms as requested and deemed acceptable by the Owner, indicating the Project, and showing evidence of all insurance required under the Contract. Upon the Owner's request, the Contractor shall provide a copy of each insurance policy of the Subcontractor or Subcontractors required by the Contract and certified by the insurance carrier as a true and complete copy. The Owner may request such a certified copy of a policy at any time and may make such requests as often as the Owner, in its sole and exclusive discretion, deems necessary. Each request may be for a certified copy of one or more policies for one or more Subcontractors. In addition, the Contractor shall provide copies of certificates of insurance to the Construction Manager, if applicable. Certificates

- of insurance of the Subcontractors, notwithstanding anything to the contrary contained on the Certificate of Insurance, when submitted to the Owner by the Contractor, constitute a warranty by the Contractor, the Subcontractor and the Subcontractor's insurance agent or broker, that the insurance coverage described is in effect for the policy term shown.
- D. Upon request of the Owner made any time after bids are opened, the Contractor shall submit insurance certificates (Accord 25 and 855, or equivalent as determined by the Owner), copies of declaration pages, schedules of forms and endorsements, copies of all named insured endorsements, all endorsements of the policy granting coverage to the Owner, Client, and Construction Manager, and such other documents requested by the Owner as proof of insurance for a Subcontractor. Owner may request proof of insurance for one or more Subcontractors at the same or at different times and may request proof of insurance for a particular Subcontractor as often as Owner, in its sole and exclusive discretion, determines is necessary.

Section 15.03 - Insurance Provided by Contractor

- A. Prior to award of the Contract, the Contractor shall procure, at its sole cost and expense, and shall maintain in force at all times required by this Contract all of the insurance required under this Contract. Each Subcontractor shall procure, at its sole cost and expense, prior to the Contractor submitting to the Owner the name of such Subcontractor and prior to such Subcontractor commencing performance of any of the Work, and each Subcontractor shall maintain in force at all times required by this Contract all of the insurance required under this Contract. The insurance that the Contractor and each Subcontractor shall procure and maintain under this Contract includes, but is not limited to, the following:
 - 1. Workers' Compensation (including occupational disease) and Employer's Liability insurance. Full New York State Workers' Compensation and Employer's Liability coverage shall be provided and evidenced by one of the following certificates (**Acord certificates are not acceptable**):
 - a. C-105.2 (September '15, or most current version) Certificate of NYS Workers' Compensation Insurance Coverage. The insurance carrier shall provide a completed form as evidence of inforce coverage.
 - U-26.3 (or any replacement) NYS Insurance Fund Certificate of Workers' Compensation Coverage. The NYS Insurance Fund shall provide a completed form as evidence of in-force coverage.
 - c. GSI-105.2(2/02 or most current version) Certificate of Participation in Workers' Compensation Group Board-approved self-insurance. The NYS Workers' Compensation Board's Self Insurance Office or the Contractor's Group Self Insurance Administrator shall provide a completed form.
 - d. SI-12 (5/09 or most current version) Affidavit Certifying That Compensation Has Been Secured. The NYS Workers' Compensation Board's Self Insurance Office or the Contractor's Self Insurance Administrator shall provide a completed form.
 - 2. Disability Benefits insurance. Full New York State Disability Benefits coverage for the benefit of such employees as are required to be covered by the New York State Disability Benefits Law shall be provided and evidenced by one of the following certificates:

- a. DB-120.1 (September 15, or most current version) Certificate Of Insurance Coverage Under the NYS Disability Benefits Law.
- b. DB-155 (9/16) Compliance with Disability Benefits Law. The NYS Workers' Compensation Board's Self Insurance Office shall provide a completed form.
- c. CE 200 Certificate of Attestation of Exemption. (Note: this form will only be accepted as evidence of an exemption from providing Disability Benefits insurance as required by law. The Dormitory Authority will not accept this as an exemption from providing Worker's Compensation Insurance.) The Certificate may be obtained from the NYS Workers Compensation Board's website at http://www.wcb.state.ny.us. The CE 200 cannot be used for multiple projects; therefore, a new form shall have to be completed prior to award of any subsequent contract.
- 3. Commercial General Liability (CGL) insurance. The CGL insurance policy shall cover the liability of the Contractor or Subcontractor for bodily injury, property damage, and personal/advertising injury arising from performance of the Work or operations or presence at or in the vicinity of the Site of the Contract. The policy shall utilize ISO form CG 00 01 12 07 or a form providing equivalent coverage. The limits under such policy shall not be less than the following: the limit for each occurrence shall be at least \$2,000,000; the general aggregate limit shall be at least \$2,000,000; the personal and advertising injury limit shall be at least \$1,000,000; and the Products Completed Operations limit shall be at least \$2,000,000. The limits may be provided through a combination of primary and umbrella and/or excess liability policies. Coverage shall provide and encompass at least the following:
 - a. If the Contractor or Subcontractor proposes the use of a policy other than the ISO form CG 00 01 12 07, the Contractor or Subcontractor shall provide the proposed policy to the Owner which, in its sole and exclusive discretion, will determine whether the proposed policy provides equivalent coverage. The Contractor or Subcontractor shall pay Owner any attorney fees and other costs incurred by Owner in determining whether the proposed policy provides equivalent coverage. Owner will select the attorney providing advice on the proposed policy.
 - b. ISO Endorsement Forms CG 20 10 11/85 and CG 20 37 10 01, or their equivalents, specifically naming as additional insureds the Dormitory Authority and Client and if applicable, the Construction Manager and other entities specified on the sample certificate of insurance provided by the Owner in the bidding documents and for form CG 20 37 10 01 or its equivalent, specifically listing the Project location.
 - c. If the Contractor or Subcontractor proposes the use of an endorsement or endorsements other than the ISO Endorsement Forms CG 20 10 11/85 and CG 20 37 10 01, the Contractor or Subcontractor shall provide the proposed endorsement(s) to the Owner which, in its sole and exclusive discretion, will determine whether the proposed endorsements provide equivalent coverage. Contractor and Subcontractor shall pay Owner any attorney fees and other costs incurred by Owner in determining whether the proposed endorsements provide equivalent coverage. Owner will select the attorney providing advice on the proposed endorsements.
 - d. Additional insured status for Owner, Client and Construction Manager shall apply during the Products/Completed Operations phase as well as during the course of performance of the Work.
 - e. The policy provisions required by General Conditions Section 15.01.

- f. Excavation, Collapse and Underground Hazards.
- g. Independent contractors/subcontractors.
- h. Blanket Written Contractual Liability covering all indemnity agreements, including all indemnity obligations contained in the Contract, and covering tort liability of another assumed in a contract.
- i. Products and completed operations coverage for a term no less than three years commencing upon issuance by the Owner of the Notice of Physical Completion.
- j. Premises liability.
- k. Defense and/or indemnification obligations, including obligations assumed under this Contract.
- 1. Cross liability for additional insureds.
- m. Contractor and Subcontractor means and methods.
- n. Liability resulting from Section 240 or Section 241 of the NYS Labor Law.
- o. ISO Endorsement CG 25 03 11 85 or its equivalent applying the policy's general aggregate limit separately to the Project.
- p. The maximum deductible or self-insured retention shall be \$50,000.
- q. No endorsement or provision in the policy shall exclude coverage for Owner, Client, or Construction Manager for any liability when the injured party is an employee of Contractor or any Subcontractor.
- r. No endorsement or provision in the policy shall require privity of contract between the Owner and Subcontractor or between the Client and the Contractor or Subcontractor or between the Construction Manager and the Contractor or Subcontractor in order for the Owner, the Client, or the Construction Manager to have coverage as an insured on such insurance policy.
- s. If the Contractor or Subcontractor must provide a Railroad Protective Liability insurance policy, the CGL exclusion for work within fifty (50) feet of railroad property must be deleted.
- t. No endorsement or provision in the policy shall have a height limitation or exclusion.
- u. No endorsement or provision in the policy shall have a classification exclusion as respects work performed for the Owner, Client, and Construction Manager.
- v. Owner, Client, and Construction Manager shall be covered for any and all liability arising out of acts or omissions of Contractor and any Subcontractor.
- 4. Commercial Automobile Liability insurance. The Commercial Automobile Liability insurance policy shall cover liability arising out of the use of any motor vehicle in connection with the Contract, including owned, leased, hired and non-owned vehicles bearing or, under the circumstances under which they are being used, required by the laws of NYS to bear, license plates. The policy shall have a combined single limit for bodily injury and property damage of at least

\$1,000,000. The limit may be provided through a combination of primary and umbrella and/or excess liability policies. If the Contract involves the removal of hazardous waste or otherwise transporting Hazardous Materials, pollution liability coverage for covered autos shall be provided by endorsement CA 99 48 03 06 or CA 00 12 03 06 and the Motor Carrier Act Endorsement (MCS90) shall be attached to the policy.

- 5. Umbrella and/or Excess Liability insurance. When the limits of the CGL, Commercial Auto Liability or Employers' Liability policies procured are insufficient to meet the limits specified in the preceding paragraphs, Commercial Umbrella or Excess Liability policies shall be procured and maintained provided, however, that the total amount of insurance coverage is at least equal to the requirements specified in the preceding paragraphs. The Commercial Umbrella or Excess Liability policies shall follow the same form as the CGL, Commercial Automobile Liability and Employers Liability insurance policies required in the preceding paragraphs. The Umbrella and/or Excess Liability policies shall be primary to any other insurance maintained by the Owner or Client or Construction Manager or any other additional insured. Any other insurance maintained by the Owner, the Client, the Construction Manager, or any other additional insured shall be in excess of and shall not contribute with the Contractor's or Subcontractor's Umbrella or Excess Liability insurance policies, regardless of the "other insurance" clause contained in the Owner's or Client's or Construction Manager's or other additional insured's own policy of insurance or the Contractor's or Subcontractor's insurance policies.
- 6. The Contractor shall secure, pay for, and maintain property insurance necessary for protection against the loss of owned, borrowed or rented capital equipment and tools, including any tools owned by employees, and any tools or equipment, staging towers, and forms owned, borrowed, or rented by the Contractor. The requirement to secure and maintain such insurance is solely for the benefit of the Contractor. Failure of the Contractor to secure such insurance or to maintain adequate levels of coverage shall not render the Owner, Client and, if applicable, the Construction Manager and other entities specified as additional insureds on the sample certificate of insurance provided by the Owner in the bidding documents or their agents and employees responsible for any losses; and the Owner, Client and, if applicable, the Construction Manager and other entities specified as additional insureds on the sample certificate of insurance provided by the Owner in the bidding documents and their agents and employees shall have no such liability.
- B. Notwithstanding any other provision of the Contract to the contrary and to the fullest extent permitted by law, Contractor shall be liable for all costs and fees, including counsel fees, incurred by or on behalf of the Owner, the Client or the Construction Manager in any action brought by or against the Owner, Client or Construction Manager concerning insurance coverage owed to Owner, Client or Construction Manager by any insurer for which Contractor or any Subcontractor represented that the Owner, Client and Construction Manager would be an insured or would benefit in any way if a claim was brought against Owner, Client and Construction Manager.

Section 15.04 - Other Insurance Provided by Contractor

The Contractor and each Subcontractor shall also procure and maintain as required by General Conditions Sections 15.01 B and 15.03 A the following insurance:

A. United States Longshore and Harbor Workers' Compensation Act and Jones Act: When, to perform the Work, the Contractor or any Subcontractor is engaged in activities on or near a shoreline or on or near the navigable waterways of the United States or when any part of the Work is connected to water related activities, the Workers' Compensation policy referenced above of the Contractor and any such

Subcontractor shall be endorsed to provide Jones Act and United States Longshore and Harbor Workers' Act coverage.

- B. Contractor's Pollution Liability insurance: When the Work includes abatement, removal, repair, replacement, enclosure, encapsulation or disposal of any pollutants, which include but are not limited to, petroleum, petroleum products, mold, asbestos, lead or any other Hazardous Material, the Contractor or any Subcontractor performing Work involving any of the pollutants, shall procure and maintain in full force and effect pollution legal liability insurance with limits of at least \$2,000,000 providing coverage for bodily injury and property damage, including loss of use of damaged property or of property that has not been physically injured and coverage that encompasses at least the following:
 - 1. Endorsement specifically naming as additional insureds: Dormitory Authority, the Client, and if applicable, the Construction Manager and other entities specified on the sample certificate of insurance provided by the Owner in the bidding documents.
 - 2. The policy provisions required by General Conditions Section 15.01.
 - 3. A maximum deductible or self-insured retention of \$50,000.
 - 4. Coverage for actual, alleged or threatened emission, discharge, dispersal, seepage, release or escape of pollutants, including any loss, cost or expense incurred as a result of any cleanup of pollutants or in the investigation, settlement or defense of any claim, suit or proceedings against the Owner, Client or Construction Manager arising from the Work.
 - 5. Coverage shall be provided until three years after the Owner issues the Certificate of Physical Completion.
- C. Railroad Protective Liability insurance: If any Work of the Contract is to be performed on or within fifty (50) feet of a railroad property or railroad right of way or will require entrance upon railroad property or right of way or will require assignment of a railroad employee, the Contractor shall provide and maintain a Railroad Protective Liability policy with the policy limits required by the owner(s) of the railroad. For purposes of this paragraph, a subway is a railroad. The policy form shall be ISO-RIMA or an equivalent form approved by the owner(s) of the railroad. The railroad owner(s) shall be the named insured on the policy and the definition of "physical damage to property" shall mean direct and accidental loss of or damage to all property of any named insured and all property in any named insured's care, custody, or control. If the Contractor shall provide a Railroad Protective Liability insurance policy, the Contractor and any Subcontractor performing on or within fifty (50) feet of railroad property or railroad right of way or entering railroad property or right of way or requiring assignment of a railroad employee shall have their CGL insurance policy endorsed to delete the exclusion of coverage for Work within fifty (50) feet of railroad property.
- D. Professional Liability insurance: Each of the Contractor and any Subcontractor performing any Work which involves delegation of design shall procure and maintain Error and Omissions Liability Insurance for the delegated design Work with a minimum insurance limit of not less than two (2) million dollars issued to and covering damage for liability imposed on the Contractor or Subcontractor by this Contract or law arising out of any negligent act, error, or omission in the rendering of or failure to render professional services required by this Contract. This insurance may be issued on a claims-made policy form and shall be maintained for no less than three (3) years after issuance by the Owner of the Notice of Physical Completion. The policy, at the sole expense of the Contractor or Subcontractor, shall have extended Discovery Clause coverage of at least three (3) years after issuance by the Owner of the Notice

- of Physical Completion if the policy is cancelled or not renewed. The maximum deductible or self-insured retention is \$100,000.
- E. Marine Protection & Indemnity insurance and Hull & Machinery insurance: Each of the Contractor and any Subcontractor performing any Work on navigable water or connected to water-related activities or with marine operations, shall procure and maintain Marine Protection & Indemnity insurance and Hull & Machinery insurance. Hull & Machinery coverage shall be provided for the total value of the watercraft and equipment used in the Work on navigable water or connected to water-related activities or with marine operations. The Contractor shall obtain a Marine Protection & Indemnity Liability insurance policy for all navigable water, water-related or marine activities or operations under the Contract with a minimum limit of \$2,000,000. The Owner, the Client and, if applicable, the Construction Manager and other entities specified on the sample certificate of insurance provided by the Owner in the bidding documents shall be additional insureds on the Marine Protection & Indemnity Liability insurance policy. The Marine Protection & Indemnity Liability insurance policy shall provide coverage that encompasses at least the following:
 - 1. The policy provisions required by General Conditions Section 15.01.
 - 2. A maximum deductible or self-insured retention of \$50,000.
 - 3. Coverage shall be provided until the Owner issues the Certificate of Physical Completion.
 - 4. Endorsement specifically naming as additional insureds: Dormitory Authority, the Client, and if applicable, the Construction Manager and other entities specified on the sample certificate of insurance provided by the Owner in the bidding documents.

Section 15.05 - Stop Work Order - Insurance

- A. All insurance certificates are valid for one (1) year from the date the certificate is signed/stamped, or until policy expiration, whichever is earlier. The Contractor shall be responsible to submit updated insurance certificates thirty (30) calendar days prior to any insurance certificate expiration date.
- B. Failure of the Contractor or any Subcontractor to maintain the insurance required by the Contract or to provide the Owner with evidence of valid and in-force insurance coverage required by the Contract shall result in a Stop Work Order pursuant to General Conditions Article 11 Termination or Suspension and/or withholding of payment to the Contractor.
- C. At any time that the coverage provisions and limits on the policies required herein do not meet the provisions and limits set forth above, the Contractor or Subcontractor shall immediately cease Work on the Project. The Contractor or Subcontractor shall not resume Work on the Project until authorized to do so by the Owner.
- D. Any delay or time lost as a result of the Contractor or Subcontractor not having proper insurance required by this General Conditions Article or not providing the Owner with evidence of valid and in force insurance required by the Contract shall not give rise to a delay Claim or any other Claim against the Owner. Further, the Contractor may be liable to other contractors for costs incurred by reason of the Contractor's or Subcontractor's failure to provide insurance.

Section 15.06 – Builder's Risk

- A. The Owner will provide Builder's Risk insurance for all projects, except for those projects listed in paragraph B of this General Conditions Section 15.06.
 - 1. The Owner shall, except as otherwise specified, at all times beginning with the Notice to Proceed and until Substantial Completion, procure and maintain, at the Owner's sole cost and expense, "All Risk" Builder's Risk insurance. The Contractor and Subcontractors will be covered for the Work of the Contract, except losses up to and including the deductible shall be borne by the Contractor. The Owner shall, at the Owner's sole discretion, have the power to adjust and to settle with the insurer any loss or claim under the Builder's Risk insurance. Reimbursement for loss, if any, shall be made payable to the Owner. The deductible is stated in the Information for Bidders.
 - 2. Coverage shall include sub limits for property in transit and for property in storage on and off the Site. Specific higher limits for transit or for storage may be available as circumstances may require upon written request by the Contractor or any Subcontractor to the Owner at least 30 calendar days before such higher limit would take effect if the request is granted. Owner in its sole and exclusive discretion may grant or deny the request for a higher limit for transit or storage. If the Owner denies the request, the Contractor or Subcontractor shall have no Claim against the Owner for any cost or damage. If the Owner grants the request, the Owner may condition the grant upon the Contractor or Subcontractor paying the additional cost for the higher limit for transit or storage.
 - 3. No coverage shall be provided to the Contractor or any Subcontractor under any property insurance policy of the Owner or Client which only covers completed, occupied structures.
- B. The Contractor shall procure and maintain, at its sole cost and expense, Builder's Risk insurance for all OMH, OPWDD, OASAS, NYCHA, and HTFC-GOSR projects, or when otherwise specified, as provided below.
 - 1. The Contractor shall maintain until the date of Physical Completion, an All Risk Builder's Risk Completed Value Form insurance policy, with coverage for at least the value of the Work of the Contract except for excavation work, planting and seeding, and Work buried in the ground other than wiring and walking tunnels, but including debris removal costs and architect, engineering and other costs to evaluate damage and provide any design or other services necessary to correct or minimize damage in the event of damage to the Work covered by the policy or such higher amount of coverage as required by the Owner in this Contract. Debris removal costs shall include demolition as may be necessary by the operation of any law, ordinance, or regulation. The policy shall cover property of the Owner or Client when in the Contractor's care, custody, or control. The policy shall name as insureds the Owner, Client and Contractor and shall include such soft costs coverage for the Owner and Client as specified in this Contract. The extended coverage endorsement may include a loss deductible of \$10,000 or less. The Contractor shall bear all losses up to and including the deductible provision.
 - 2. Coverage shall also include sub limits for equipment, material, and other property in transit or in storage on or off the Site. Specific higher limits of coverage for property in transit or storage, at Contractor's expense, may be required by the Owner due to circumstances of the Project.

- 3. Each Builder's Risk insurance policy shall include the following endorsement:
 - "It is made a condition of this insurance that until the Owner issues the Notice of Physical Completion to the Contractor, occupancy of the premises shall not require consent of the insurer, nor shall such occupancy be the basis for a rate adjustment."
- 4. Builder's Risk insurance policy shall name the Dormitory Authority and the Contractor Loss Payees in order of precedence, as their interests may appear and shall run until the date of Physical Completion. Policies expiring on a fixed date before Physical Completion shall be renewed not less than thirty (30) calendar days before such expiration date. Such policy shall not be changed by endorsement without the knowledge and consent of the Owner and in particular, shall provide that no notice of cancellation by the insurer shall be effective until sixty (60) calendar days after such notice is received by the Owner. If the policy is issued by a mutual insurance company, the policy shall provide that the Owner and the Client shall not be liable for any premium or assessment under the policy; the Contractor shall be responsible for all premiums and assessments.
- 5. The Owner may withhold the Contractor's payment for Work which is required to be insured until original binder or policies for the Builder's Risk insurance are provided to the Owner pursuant to General Conditions Section 15.06.

Section 15.07 - Bonds Provided by Contractor

- A. The Contractor shall provide the Performance Bond in an amount at least equal to 100% of the Contract sum as security for the faithful performance of the Contract. The Contractor shall also provide the Payment Bond in an amount at least equal to 100% of the Contract sum for the payment of all persons performing labor or providing materials in connection with the Work of the Contract. The Contractor shall execute the Performance Bond form and the Payment Bond form included in the Contract Documents.
- B. If at any time the Owner, in its sole and exclusive discretion, shall become dissatisfied with any surety or sureties upon the Performance Bond or the Payment Bond, or if for any other reason said bonds shall cease to be adequate security to the Owner, the Contractor shall, within five (5) calendar days after written notice from the Owner to do so, substitute an acceptable bond or bonds in such form and sum and signed by such other surety or sureties as may be satisfactory to the Owner. The Contractor shall pay the premiums on said bond or bonds. No further payments shall be deemed due nor shall be made until the new surety or sureties shall have furnished an acceptable bond or bonds to the Owner.
- C. The surety company, on all bonds, shall be authorized to do business in the State of New York by the NYS Department of Financial Services and rated at least A- by A.M. Best and Company, or meet such other requirements as are acceptable to the Owner in its sole and exclusive discretion.

ARTICLE 16 -- GENERAL PROVISIONS of the CONTRACT

Section 16.01 - General Law Provisions

A. This Contract and its enforcement, and any controversy arising out of or relating to the making or performance of this Contract, shall be governed by and construed in accordance with the law of the State of New York, without regard to the New York principles of conflicts-of law and except where the United States supremacy clause requires otherwise.

- B. Each and every provision of law and clause required by law to be inserted in the Contract shall be deemed to be inserted therein and the Contract shall read and shall be enforced as though so included therein.
- C. The Contractor shall comply fully with all applicable laws, rules, and regulations, and as applicable, Building Code of New York State or Building Code of the City of New York.
- D. The Contractor agrees that the Contract shall be deemed executory to the extent of moneys available from either: (1) the proceeds of bonds issued by the Dormitory Authority for the Contract, (2) moneys made available by the Client to the Owner for the Contract, (3) other moneys made available to the Owner from whatever source specifically for the Contract and no liability shall be incurred by the Owner beyond moneys available therefore.
- E. The relationship created by the Contract between the Owner and the Contractor is one of an independent contractor and it is no way to be construed as creating an agency relationship between the Owner and the Contractor nor is it to be construed as, in any way or under any circumstances, creating or appointing the Contractor as an agent of the Owner for any purpose whatsoever.
- F. The Client is an intended third-party beneficiary of the Contract for the purposes of recovering any damages incurred by the Client and caused by the Contractor.
- G. The Contractor shall not assign the Contract in whole or in part without prior written consent of the Owner. Any attempt to assign the Contract in whole or in part without prior written consent of the Owner is null and void. As a condition to consent to the assignment, the Owner shall require each proposed assignee to establish, to the satisfaction of the Owner in its sole and exclusive discretion, that the assignee is responsible and, if applicable, has the experience to perform the Work. If the Owner consents to an assignment and if the Contractor assigns all or part of any moneys due or to become due under the Contract, the instrument of assignment shall contain a clause substantially to the effect that the Contractor and assignee agree that the assignee's right in and to any moneys due or to become due to the Contractor shall be subject to all prior claims for services rendered or materials supplied in connection with the performance of the Work. The Owner reserves the right to assign this Contract in whole or in part without the consent of the Contractor.
- H. Nothing in the Contract shall create or shall give to third parties any claim or right of action against the Owner, the State of New York, the Client, and the Construction Manager, or any institution at which the Work is being carried out beyond such as may legally exist irrespective of the Contract.
- I. The Owner is exempt from the terms of fair trade agreements for sales to the Contract.
- J. Inasmuch as the Contractor can be compensated adequately by money damages for any breach of the Contract which might be committed by the Owner, the Contractor agrees that no default, act or omission of the Owner shall constitute a material breach of the Contract entitling the Contractor to cancel or rescind the Contract or to suspend or abandon performance of the Contract; and the Contractor hereby waives any and all rights and remedies to which the Contractor might otherwise be or become entitled to because of any wrongful act or omission of the Owner saving only the Contractor's right to money damages.
- K. No action or proceeding shall lie or shall be maintained by the Contractor, nor anyone claiming under or through the Contractor, against the Owner upon any Claim arising out of or based upon the Contract, relating to the giving of notices or information.

- L. No action or proceeding shall lie in favor of or shall be maintained by the Contractor against the Owner unless such action shall be commenced within one year after the earliest following event:
 - 1. The date the Owner executes the Notice of Physical Completion.
 - 2. Receipt, by the Owner, of the Contractor's final Application for Payment, if no Notice of Physical Completion is issued.
 - 3. The date of termination if the Owner terminates the Contract.
- M. The Owner and Contractor agree to submit to the exclusive jurisdiction of the Commercial Division, New York Supreme Court, which shall hear any dispute, Claim or controversy arising in connection with or relating to this Contract, including, but not limited to the validity, breach, enforcement, or termination thereof.
- N. No action or proceeding shall be brought against the Owner in any location other than Albany County unless the Owner specifically consents, in writing, to a change of venue.
- O. If the Contractor obtains a judgment against the Owner in any action or proceeding, the Contractor agrees to accept no more than three percent (3%) interest, per annum, on the amount of the judgment.

Section 16.02 - Diesel Emissions Reduction

- A. The Contractor shall certify that heavy duty vehicles, as defined in the NYS Environmental Conservation Law (ECL) Section 19-0323 and Title 6 of the New York Codes Rules and Regulations, Part 248 (6 NYCRR 248), will comply with the rules, regulations and provisions pursuant to ECL Section 19-0323, and 6 NYCRR 248, which requires the use of Best Available Retrofit Technology and Ultra Low Sulfur Diesel to the extent required by law unless specifically waived by the NYS Department of Environmental Conservation (DEC). Qualification for a waiver will be the responsibility of the Contractor.
- B. Annually, as required by DEC, but no later than March 1st, the Contractor shall complete and submit directly to the Owner, via electronic mail, the Regulated Entity Vehicle Inventory Form and Regulated Entity and the Contractors Annual Report Form, found on the DEC website http://www.dec.state.ny.gov for vehicles used on the Project for the preceding calendar year.
- C. The Contractor shall certify to the Owner, and submit with each Application for Payment, the Contractor and Subcontractor Certifications form, which states that the Contractor agrees to comply with the provisions of General Conditions Section 16.02.

Section 16.03 – State and Federal Labor Law Provisions

- A. All applicable provisions of NYS Labor Law shall be carried out in the performance of the Work.
- B. The Contractor specifically agrees, as required by NYS Labor Law, Sections 220 and 220-d as amended, that:
 - 1. No worker, in the employ of the Contractor, any Subcontractor or any other person doing or contracting to do the whole or any part of the Work contemplated by the Contract shall be permitted or required to work more than eight (8) hours in any one (1) calendar day and more than five (5) days in any one week, except in the extraordinary emergencies set forth in NYS Labor Law.

- 2. The wages paid for a legal day's work shall be not less than the prevailing rate of wages as defined by NYS Labor Law. Each laborer, worker or mechanic employed by the Contractor, any Subcontractor or any other person doing or contracting to do the whole or any part of the Work contemplated by the Contract shall be paid not less than the prevailing rate of wages as defined by NYS Labor Law and shall be provided not less than the supplements as required by NYS Labor Law.
- The minimum hourly rate of wage to be paid and supplements provided shall be not less than that required by the NYS Labor Law and as shall be designated by the Commissioner of Labor of the State of New York.
- 4. The Contractor and all Subcontractors shall post in a prominent and accessible place on the Site, a legible statement of all minimum wage rates and supplements to be paid or provided for the various classes of workers engaged in the performance of the Work and all deductions, if any, required by law to be made from unpaid wages actually earned by any worker so engaged.
- 5. The Contractor and all Subcontractors shall provide each worker a written notice of the prevailing wage rate for each of the worker's particular job classifications on each pay stub and, as required by the NYS Labor Law, written notice that includes the telephone number and address for the Department of Labor and a notice informing all workers of their right to contact the Department of Labor if a worker is not receiving the proper prevailing rate of wages and/or supplements for a worker's particular job classification.
- 6. The Contractor shall be responsible for obtaining prevailing wage rate updates directly from the NYS Department of Labor, either by accessing its website http://www.labor.state.ny.us or a written request to the Bureau of Public Works.
- C. The minimum wage rates, if any, specified for apprentices shall apply only to persons working with the tools of the trade which such persons are learning under the direct supervision of journeyman mechanics as an individual registered in an apprenticeship program which is duly registered with the Commissioner of Labor of the State of New York in conformity with the NYS Labor Law. Except as otherwise required by law, the number of apprentices in each trade or occupation employed by the Contractor or any Subcontractor shall not exceed the number permitted by the applicable standards of the NYS Department of Labor, or, in the absence of such standards, the number permitted under the usual practice prevailing between the unions and the employers' association of the respective trades or occupations.
- D. All workers of the Contractor and all Subcontractors shall be paid in accordance with the provisions of the NYS Labor Law. The Contractor and all Subcontractors shall submit to the Owner original copies of the Contractor and Subcontractor Certifications form and Certified Payroll forms in accordance with payment procedures and otherwise upon request. The Contractor and all Subcontractors shall prepare and keep original payrolls or transcripts thereof in compliance with NYS Labor Law Section 220, subdivision 3-a, and shall file transcripts of such payrolls with the Owner as required by NYS Labor Law Section 220, subdivision 3-a. Filing the transcripts of such payrolls with the Owner as required by NYS Labor Law Section 220, subdivision 3-a is a condition precedent to payment of any sums due and owing Contractor or any Subcontractor for Work performed upon the Project.
- E. The Contractor agrees that, in case of underpayment of wages to any worker engaged in the Work by the Contractor or any Subcontractor, the Owner shall withhold from the Contractor out of payments due an amount sufficient to pay such worker the difference between the wages required to be paid under

the Contract and the wages actually paid such worker for the total number of hours worked, and that the Owner may disburse such amount so withheld by the Owner for and on account of the Contractor to the worker to whom such amount is due. The Contractor further agrees that the amount to be withheld pursuant to this paragraph may be in addition to the amounts and percentages to be retained by the Owner pursuant to other provisions of the Contract.

- F. Pursuant to subdivision 3 of Section 220 and Section 220-d of the NYS Labor Law the Contract shall be forfeited and no sum paid for any Work done thereunder upon a Contractor's or Subcontractor's second conviction for willfully paying or providing less than:
 - 1. The stipulated wage scale or supplement as established by the fiscal officer.
 - 2. The stipulated minimum hourly wage scale and supplements as designated by the Commissioner of Labor of the State of New York.
- G. If the project is Federally funded in part or whole and therefore subject to the requirements of the Davis Bacon Act, the U.S. Department of Labor's government-wide implementation of the Act, or to Federal program legislation, the Contractor shall pay the higher of either NYS Department of Labor prevailing wage rates or wages established for the locality of the project by the U.S. Department of Labor.
- H. The Contractor specifically agrees that all workers engaged on the Site, whether employees of the Contractor, Subcontractor, or other person performing or contracting to do any part of the Work, shall be certified, prior to performing any Work, as having successfully completed the OSHA 10-hour construction safety and health course as required by NYS Labor Law Section 220-h.

Section 16.04 - Nondiscrimination

- A. To the extent required by Article 15 of the NYS Executive Law (also known as the Human Rights Law) and all other NYS and United States statutory and constitutional non-discrimination provisions, the Contractor shall not discriminate against any employee or applicant for employment because of race, creed, color, sex (including gender identity or expression), national origin, sexual orientation, military status, age, disability, predisposing genetic characteristics, marital status or domestic violence status.
- B. If the Contractor is directed to do so by the Owner, the Contractor shall request each employment agency, labor union or authorized representative of workers with which the Contractor has a collective bargaining agreement or other agreement or understanding, to furnish a written statement that such employment agency, labor union or representative will not discriminate on the basis of race, creed, color, sex, national origin, age, disability or marital status, and that such union or representative will affirmatively cooperate in the implementation of the Contractor's obligations under Articles 15 and 15A of the NYS Executive Law.
- C. The Contractor shall state, in all solicitations or advertisements for employees, that in the performance of the Contract, all qualified applicants will be afforded equal employment opportunities without discrimination because of race, creed, color, national origin, sex, age, disability, or marital status.
- D. The Contractor shall include the provisions of paragraphs A, B, and C of this General Conditions Section 16.04 in every Subcontract and purchase order in such a manner that such provisions will be binding upon each Subcontractor and vendor as to the operations for the Contract to be performed within the State of New York.
- E. Pursuant to NYS Labor Law, Section 220-e, the Contractor specifically agrees:

- 1. That in the hiring of employees for the performance of Work under the Contract or any subcontract hereunder, or for the manufacture, sale or distribution of materials, equipment or supplies hereunder, but limited to operations performed within the territorial limits of the State of New York, no Contractor, Subcontractor, nor any person acting on behalf of such Contractor or Subcontractor, shall by reason of race, creed, color, disability, sex or national origin discriminate against any citizen of the State of New York who is qualified and available to perform the Work to which the employment relates.
- 2. That no Contractor, Subcontractor, nor any person on behalf of such Contractor or Subcontractor shall, in any manner, discriminate against or intimidate any employee hired for the performance of Work under the Contract on account of race, creed, color, disability, sex, or national origin.
- 3. That there may be deducted from the amount payable to the Contractor, by the Owner under the Contract, a penalty of fifty dollars (\$50.00) for each person for each calendar day during which such person was discriminated against or intimidated in violation of the terms of the Contract.
- 4. That the Contract may be canceled or terminated by the Owner and all moneys due or to become due hereunder may be forfeited for a second or any subsequent violation of the terms or conditions of this Section 16.04 E of the Contract.

Section 16.05 - Domestic Steel

The Dormitory Authority is required to comply with all provisions of Title 4 of Article 9 of the NYS Public Authorities Law, including NYS Public Authorities Law Section 2603-a, and in accordance therewith, if the amount of the Contract exceeds \$100,000, the Owner requires that all structural steel, reinforcing steel or other major steel items to be incorporated in to the Work of the Contract be produced or made in whole or substantial part in the United States, its territories, or possessions. The Owner, in its discretion, may grant waivers of this requirement in accordance with NYS Public Authorities Law Section 2603-a. Contractor must request a waiver in writing and obtain a written waiver of this requirement from Owner before using in performance of the Contract any steel not produced or made in whole or substantial part in the United States, its territories, or possessions.

Section 16.06 - Failure to Comply with Article 16

The Owner will not be responsible for any Claim arising from compliance with this General Conditions Article 16.

ARTICLE 17—RECORDS/AUDITS/INVESTIGATIONS/ETHICS

Section 17.01 – Preparation of Records/Owner's Right to Inspect Records and to Audit

The Contractor shall, concurrently with performance of the Contract, prepare substantiating records regarding performance of the Contract, including records of Subcontractors and material suppliers. General Conditions Section 17.03 describes the records and other data to be maintained by Contractor, Subcontractors, and material suppliers. The Contractor shall maintain and keep, for a period of at least six (6) years after the date of payment of the final Application for Payment, all records and other data relating to the Work, including records of Subcontractors and material suppliers. Upon seven (7) calendar days' written notice, the Contractor shall make its records (including records of Subcontractors and material suppliers) available during normal business hours to the Owner or its authorized representative(s). Owner

and its authorized representative(s) shall be entitled to inspect, examine, review and copy the Contractor's records (including records of Subcontractors and material suppliers) at the Owner's reasonable expense, within adequate workspace at the Contractor's facilities. The Owner shall also have the right to have Owner or its authorized representative audit all records and other data of the Contractor, Subcontractors and material suppliers relating to the Work.

Section 17.02- False Statements/Information/Disclosure

Failure to comply with General Conditions Section 17.01, providing False Representations, false statements or inaccurate information submitted in accordance with Contract Documents, including but not limited to, an Application for Payment, a Claim or a Change Order, or False Representations, false statements, or inaccurate information submitted to the Owner, or a determination that the Contractor participated in the kick-back of wages may result in one or more of the following actions:

- A. Termination of the Contract for cause, pursuant to General Conditions Section 11.01.
- B. Rejection of future bids or disapproval of a contract or subcontract.
- C. Withholding of payments.
- D. Criminal prosecution.
- E. Civil prosecution under Article XIII of the NYS State Finance Law the New York False Claims Act.
- F. Rejection of a Claim or Change Order.
- G. Deduction of the Owner's cost of an audit from the Contract amount.

Section 17.03 - Owner's Right to Conduct Investigations

- A. The Contractor agrees to cooperate fully and faithfully with any investigation, audit or inquiry conducted by the Owner.
- B. The Contractor shall grant the Owner the right to examine all books, records, files, accounts, computer records, documents, and correspondence, including electronically-stored information, in the possession or control of the Contractor, its subsidiaries and affiliated companies and any other company directly or indirectly controlled by the Contractor, relating to the Contract. These shall include, but not be limited to: Subcontracts; bid files; payroll and personnel records; cancelled checks; correspondence; memoranda; daily reports of Work completed that day; schedules; reports; audits; vendor qualification records; original estimate files; Change Order/Contract Amendment estimate files; detailed worksheets; Subcontractor, consultant and supplier proposals for both successful and unsuccessful bids; backcharge logs; any records detailing cash, trade, or volume discounts earned; insurance proceeds, rebates or dividends received; payroll and personnel records; tax returns; and the supporting documentation for the aforesaid books and records.
- C. At the Owner's request, said materials shall be provided in a computer readable format, where available. At the request of the Owner, the Contractor shall execute such documents, if any, as are necessary to give the Owner access to Contract-related books, documents, or records, which are, in whole or part, under control of the Contractor but not currently in the Contractor's physical possession. The Contractor shall not enter in to any agreement with a Subcontractor, consultant, or supplier, in

connection with the Contract, that does not contain a right to audit clause in favor of the Owner. The Contractor shall assist the Owner in obtaining access to past and present Subcontractor, consultant, and supplier amendment/change order files (including detailed documentation covering negotiated settlements), accounts, computer records, documents, correspondence, and any other books and records in the possession of Subcontractors, consultants and suppliers pertaining to the Contract, and, if appropriate, enforce the right-to-audit provisions of such agreements.

- D. The Contractor shall assist the Owner in obtaining access to, interviews with, and information from all former and current persons employed and/or retained by the Contractor, for purposes of the Contract.
- E. The Contractor shall require each Subcontractor to include in all agreements that the Subcontractor may hereinafter enter in to with any and all Subcontractors, consultants, and suppliers, in connection with the Contract, a right-to-audit clause in favor of the Owner conferring rights and powers of the type outlined in this General Conditions Section 17.03. The Contractor shall not enter in to any Subcontract with a Subcontractor in connection with the Contract that does not contain such a provision. The Contractor shall not make any payments to a Subcontractor, consultant, or supplier from whom the Contractor has failed to obtain and supply to the Owner complete, accurate, and truthful information in compliance with a request from the Owner to the Contractor.
- F. Any violation of the provisions of this General Conditions Article 17 shall justify termination of this Contract and may result in the Owner's rejection of the Contractor's bids or proposals for future contracts and the deduction of the Owner's cost of an audit from the Contract amount.

Section 17.04 - Disclosure of Criminal Investigation

- A. The Contractor shall immediately notify the Owner in the event that any owner, partner, director, officer or employee of the Contractor, or its affiliated companies as identified in the NYS Vendor Responsibility Questionnaire For Profit Construction (CCA-2), are subpoenaed or questioned in connection with any business-related criminal investigation, whether or not the owner, partner, director, officer or employee is, or is believed to be, the subject or target of such investigation, or is notified or otherwise learns that any owner, partner, director, officer or employee of the Contractor or its affiliated companies is under investigation for an alleged business-related violation of criminal law, or in the event that any premises or records of the Contractor are searched pursuant to a search warrant seeking evidence of a crime or crimes, unless otherwise precluded by law enforcement authorities.
- B. The Contractor shall immediately notify the Owner in the event that any owner, partner, director, officer or employee of the Contractor or its affiliated companies as identified in the NYS Vendor Responsibility Questionnaire For Profit Construction (CCA-2), the firm itself, or one of its affiliated companies is indicted or charged in an accusatory instrument for any business-related violation of local, state or federal criminal law, unless otherwise precluded by law enforcement authorities.
- C. In the event that any owner, partner, director, officer, or employee of the Contractor is indicted or charged in an accusatory instrument for any business-related violation of local, state, or federal criminal law relating to this Contract or any other Dormitory Authority contract, the Owner may require the Contractor to remove said owner, partner, director, officer, or employee from any direct involvement in the affairs of the Contractor as it relates to this Contract and all other Dormitory Authority contracts until the criminal matter is resolved. In the event that any owner, partner, director, officer, or employee of the Contractor is convicted of a business-related violation of local, state, or federal criminal law, the Owner may require the Contractor to permanently remove said individual from any direct involvement in the affairs of this Contract and all other Dormitory Authority contracts.

- D. In the event that the Contractor or any owner, partner, director, officer, or employee of the Contractor is convicted of a business-related violation of local, state, or federal criminal law, the Owner may schedule a hearing with the Contractor to determine the Contractor's responsibility to continue work under this Contract and other Dormitory Authority contracts. Following this hearing, the Owner may, at its sole discretion, take one or more of the following actions:
 - 1. Terminate this Contract.
 - 2. Require the Contractor, at its own expense, to hire an independent private-sector inspector general to monitor its activities, institute procedures and conduct internal inquiries, in a manner prescribed by the Owner.
 - 3. Increase retainage to an amount not to exceed ten percent (10%).
 - 4. Take any other remedial action deemed appropriate.

Section 17.05 - Anti-Riot Provisions

- A. The Contractor agrees that no part of the Contract funds shall be used to make payments, give assistance, or supply services, in any form, to any individual convicted in any federal, state, or local court of competent jurisdiction for inciting, promoting, or carrying on a riot, or engaging in any group activity resulting in material damage to property or injury to persons found to be in violation of federal, state or local laws designed to protect persons or property.
- B. The Contractor and each Subcontractor shall notify their employees of all rules and regulations adopted pursuant to Article 129-A of the NYS Education Law. The Contractor shall post notices containing the text of the aforementioned rules and regulations at the Site.

Section 17.06 - Ethical Conduct

- A. Officers and employees of the Owner are bound by Sections 73, 73-a and 74 of the NYS Public Officers Law. In addition, no officer, employee, architect, attorney, engineer, inspector, or consultant of or for the Owner authorized on behalf of the Owner to exercise any legislative, executive, administrative, supervisory, or other similar functions in connection with the Contract or the Work, shall become personally interested, directly or indirectly, in the Contract, material supply contract, subcontract, insurance contract, or any other contract pertaining to the Work.
- B. Section 73(5) of the NYS Public Officers Law expressly prohibits the Contractor, or its agents, from directly or indirectly offering or giving any gift having more than nominal value to an employee of the Owner under circumstances in which it could be reasonably inferred the gift was intended to influence the employee in the performance of their official duties or was intended as a reward for the employee's official action.
 - 1. In addition to the prohibition of Section 73(5) of the NYS Public Officers Law, the Dormitory Authority has a "zero tolerance" policy with respect to the solicitation, acceptance, or receipt of gifts from disqualified sources. Therefore, the Contractor and its agents shall refrain from offering or giving anything of value to an employee of the Owner. Employees of the Owner may not solicit any gift, gratuity, stipend, or thing of value from the Contractor or its agents. Violations of these gift provisions may be grounds for immediate Contract termination and/or referral for civil action or criminal prosecution.

- C. To promote a working relationship with the Owner based on ethical business practices, the Contractor is expected to:
 - 1. Furnish all goods, materials and services to the Owner as contractually required and specified.
 - 2. Submit complete and accurate reports to the Owner and its representatives as required.
 - 3. Not seek, solicit, demand or accept any information, verbal or written, from the Owner or its representatives that provides an unfair advantage over a competitor.
 - 4. Not engage in any activity or course of conduct that restricts open and fair competition on Owner-related projects and transactions.
 - 5. Not engage in any course of conduct with Owner employees or its representatives that constitutes a conflict of interest, in fact or in appearance.
 - 6. Not offer or give any unlawful gifts or gratuities, or engage in bribery or other criminal activity.
- D. The Owner encourages the Contractor to advance and support ethical business conduct and practices among its directors, officers, and employees, preferably through the adoption of corporate ethics awareness training programs and written codes of conduct.
- E. Although the Contractor may employ relatives of Owner employees, the Owner shall be made aware of such circumstances as soon as possible, preferably in writing, to ensure a conflict of interest situation does not arise. The Owner reserves the right to request that the Contractor modify the work assignment of a relative of an Owner employee where a conflict of interest, or the appearance thereof, is deemed to exist.
- F. The Contractor may hire former employees of the Owner. However, as a general rule, former employees of the Owner may neither appear nor practice before the Owner, nor receive compensation for services rendered on a matter before the Owner, for a period of two years following their separation from service with the Owner. In addition, former employees of the Owner are subject to a "lifetime bar" from appearing before the Owner or receiving compensation for services regarding any transaction in which they personally participated or which was under their active consideration during their tenure with the Owner.
- G. The Contractor agrees to notify the Owner's Office of Internal Affairs at 518-257-3193 of any activity by an employee of the Owner that is inconsistent with the contents of this General Conditions Section 17.06.
- H. Any violation of this General Conditions Section 17.06 shall justify termination of this Contract and may result in Owner's rejection of the Contractor's bids or proposals for future agreements.

Section 17.07 – Continuing Integrity

A. Contractor shall at all times during the Contract term remain responsible. Contractor agrees, if requested by the President of Owner or his or her designee, to present evidence of its continuing legal authority to do business in New York State, integrity, experience, ability, prior performance, and organizational and financial capacity.

- B. The President of Owner or his or her designee, in his or her sole discretion, reserves the right to suspend any or all activities under this Contract, at any time, when he or she discovers information that calls in to question the responsibility of Contractor. In the event of such suspension, Contractor will be given written notice outlining the particulars of such suspension. Upon issuance of such notice, Contractor shall comply with the terms of the suspension order. Contract activity may resume at such time as the President of Owner or his or her designee issues a written notice authorizing a resumption of performance under the Contract.
- C. Notwithstanding any other provision of this Contract, upon written notice to Contractor, and a reasonable opportunity to be heard with the appropriate Owner officials or staff, the Contract may be terminated by the President of Owner or his or her designee at Contractor's expense where Contractor is determined by the President of Owner or his or her designee to be non-responsible. In such event, the President of Owner or his or her designee may complete the contractual requirements in any manner he or she may deem advisable and pursue available legal or equitable remedies for the breach.

Section 17.08 – Iran Divestment

- A. By entering in to this Contract, Contractor certifies, under the penalties of perjury, that Contractor is not on the list created pursuant to paragraph (b) of subdivision 3 of Section 165-a of the NYS State Finance Law. Contractor further certifies that Contractor will not utilize on this Contract any subcontractor that is identified on the list created pursuant to paragraph (b) of subdivision 3 of Section 165-a of the NYS State Finance Law.
- B. During this Contract, should Owner receive information that a person (as defined in NYS State Finance Law §165-a) is in violation of the above-referenced certifications, Owner will review such information and offer the person an opportunity to respond. If the person fails to demonstrate that it has ceased its engagement in the investment activity which is in violation of the Act within 90 days after the determination of such violation, then Owner shall take such action as may be appropriate and provided for by law, rule, or contract, including, but not limited to, seeking compliance, recovering damages, or declaring the Contractor in default.

ARTICLE 18 -- 2005 PROCUREMENT LOBBYING LAW

Section 18.01 - Procurement Lobbying Law

Bidders shall affirm their understanding of and agree to comply with NYS State Finance Law § 139-j (3) and § 139-j (6) (b), certify their compliance with NYS State Finance Law § 139-k (5), disclose prior non-responsibility determinations under NYS State Finance Law § 139-j, and shall certify that the information they provide with respect to NYS State Finance Law § 139-j and § 139-k is complete, true, and accurate. Contractor hereby reaffirms its understanding of an agreement to comply with NYS State Finance Law § 139-j (3) and § 139-j (6) (b), re-certifies its compliance with NYS State Finance Law § 139-k (5) and recertifies that the information it provided with respect to NYS State Finance Law § 139-j and § 139-k is complete, true, and accurate.

Section 18.02 - Contractor's Certifications

For any contract \$15,000 or more each Contractor shall submit, with its bid, on the form provided herewith, the 2005 Procurement Lobbying Law – Certification, pursuant to NYS State Finance Law § 139-j and § 139-k. The information contained in the 2005 Procurement Lobbying Law – Certification, pursuant to NYS State Finance Law § 139-j and § 139-k will serve as an informational resource to aid the Owner in making an award determination.

Section 18.03 - Termination Provisions

The Owner reserves the right to terminate this Contract in the event it is found that the certification filed by the Contractor in accordance with NYS State Finance Law § 139-j and § 139-k, as such may be amended or modified, was intentionally false or intentionally incomplete. Upon such finding, the Owner may exercise its right pursuant to General Conditions Section 11.01 – Termination for Cause.

ARTICLE 19 -- EXECUTIVE ORDER No. 125

Section 19.01 - Determination of Contractor Responsibility

In order to assist the Owner in determining the responsibility and reliability of the lowest bidder for the Contract and to effectuate the directives of Executive Order No. 125, dated May 22, 1989, (9 NYCRR §4.125) the Council of Contracting Agencies has adopted procedures to collect and exchange relevant information among contracting agencies.

Section 19.02 – NYS Vendor Responsibility Questionnaire

- A. For any Contract valued at \$10,000 or more, the NYS Vendor Responsibility Questionnaire For Profit Construction (CCA-2) for the Contractor or for any Subcontractor shall be submitted as requested by the Owner. Owner may request an updated NYS Vendor Responsibility Questionnaire For Profit Construction (CCA-2) for the Contractor or for any Subcontractor as often as the Owner, in its sole and exclusive discretion, deems necessary to carry out the Owner's duties and responsibilities under this Contract.
- B. The information contained in the NYS Vendor Responsibility Questionnaire For Profit Construction (CCA-2) will serve as an informational resource to aid the Owner in making an award determination and in making other determinations for this Contract.

ARTICLE 20 -- OPPORTUNITY PROGRAMS

Section 20.01 - General Provisions

- A. The Dormitory Authority is required to implement the provisions of NYS Executive Law Article 15-A and Parts 140 through 145 of Title 5 of the NYCRR for all State contracts (as defined in such statute and regulations) with a value:
 - 1. in excess of \$25,000 for labor, services, equipment, materials, or any combination of the foregoing; or
 - 2. in excess of \$100,000 for real property renovations and construction.
- B. The Contractor agrees, in addition to any other nondiscrimination provision of the Contract and at no additional cost to the Owner, to fully comply and cooperate with the Owner in the implementation of NYS Executive Law ARTICLE 15-A, PARTICIPATION BY MINORITY GROUP MEMBERS AND WOMEN WITH RESPECT TO STATE CONTRACTS, and the regulations promulgated thereunder. These requirements include: equal employment opportunities for minority group members and women (EEO), and contracting opportunities for NYS certified minority and women-owned business

enterprises (MWBEs). The Contractor's demonstration of good faith efforts pursuant to 5 NYCRR § 142.8 shall be a part of these requirements. These provisions shall be deemed supplementary to, and not in lieu of the nondiscrimination provisions required by NYS Executive Law Article 15 (the Human Rights Law) and other applicable federal, state and local laws.

C. Failure to comply with all requirements in this General Conditions Article 20 may result in a finding of non-responsiveness, non-responsibility, breach of contract or any combination of the foregoing leading to the assessment of liquidated damages pursuant to General Conditions Section 20.06 and other remedies available to the Owner pursuant to the Contract and applicable law.

Section 20.02 – Equal Employment Opportunity (EEO)

A. The provisions of NYS Executive Law Article 15-A, and the rules and regulations promulgated thereunder pertaining to equal employment opportunities for minority group members and women shall apply to the Contract.

B. The Contractor shall:

- 1. Undertake or continue, and ensure each Subcontractor shall undertake or continue, existing EEO programs to ensure that minority group members and women are afforded equal employment opportunities without discrimination because of race, creed, color, national origin, sex, age, disability, or marital status. For these purposes, EEO shall apply in the areas of recruitment, employment, job assignment, promotion, upgrading, demotion, transfer, layoff, or termination and rates of pay or other forms of compensation.
- 2. Submit an EEO policy statement to the Owner within seventy-two (72) hours after the date of the Letter of Intent to award the Contract.
- 3. Adopt a model EEO policy statement and require each Subcontractor to adopt a model EEO policy statement if the Contractor or Subcontractor does not have an existing EEO policy statement, and if the Owner requires the Contractor or Subcontractor to adopt a model EEO policy statement.
- 4. Have a Contractor's EEO policy statement that shall include the following language:
 - a. The Contractor will not discriminate against any employee or applicant for employment because of race, creed, color, national origin, sex, age, disability, or marital status, will undertake or continue existing EEO programs to ensure that minority group members and women are afforded equal employment opportunities without discrimination, and shall make and document its conscientious and active efforts to employ and utilize minority group members and women in its work force.
 - b. The Contractor shall state in all solicitations or advertisements for employees that, in the performance of the Contract, all qualified applicants will be afforded equal employment opportunities without discrimination because of race, creed, color, national origin, sex, age, disability, or marital status.
 - c. The Contractor shall request each employment agency, labor union, or authorized representative of workers with which it has a collective bargaining or other agreement or understanding, to furnish a written statement that such employment agency, labor union, or representative will not discriminate on the basis of race, creed, color, national origin, sex age,

disability or marital status and that such union or representative will affirmatively cooperate in the implementation of the Contractor's obligations herein.

- 5. The Contractor shall include the provisions of paragraphs a. through c. of this General Conditions Section 20.02 B. 4. and Subdivision E of this General Conditions Section 20.02, which provides for relevant provisions of the Human Rights Law, in every Subcontract in such a manner that the requirements of these provisions will be binding upon each Subcontractor as to Work in connection with the Contract.
- C. To ensure compliance with this General Conditions Section 20.02, the Contractor shall submit a staffing plan, on a form provided by Owner, to document the composition of the proposed workforce to be utilized in the performance of the Contract by the specified categories listed, including ethnic background, gender, and Federal occupational categories. The Contractor shall complete the staffing plan form and submit it when directed by Owner.
- D. To ensure continuous compliance with General Conditions Section 20.02:
 - 1. The Contractor shall submit a Workforce Utilization Report, and shall require each Subcontractor to submit a Workforce Utilization Report, in such form as shall be required by the Owner on a monthly basis during the term of the Contract.
 - 2. Separate forms shall be completed by the Contractor and each Subcontractor.
 - 3. Pursuant to Executive Order 162 (9 NYCRR 8.162) dated January 9, 2017, the Contractor and each Subcontractor are also required to report the gross wages paid to each of their employees for the Work performed by such employees on the Contract on a monthly basis.
- E. The Contractor shall comply with the provisions of the NYS Human Rights Law, and all other State and Federal statutory and constitutional non-discrimination provisions. The Contractor and each Subcontractor shall not discriminate against any employee or applicant for employment because of race, creed (religion), color, sex, national origin, sexual orientation, military status, age, disability, predisposing genetic characteristic, marital status, or domestic violence victim status, and shall also follow the requirements of the NYS Human Rights Law with regard to non-discrimination on the basis of prior criminal conviction and prior arrest.

Section 20.03 – Opportunities for Minority and Women-Owned Business Enterprises (MWBE)

- A. The Owner has established goals for the participation in this Contract of NYS certified minority-owned business enterprises ("MBE") and NYS certified women-owned business enterprises ("WBE" and collectively with MBEs, "MWBE"). The goals (collectively, MWBE Contract Goals) are set forth in the Information for Bidders Section 8.0 Opportunity Programs Requirements.
- B. The Contractor represents and warrants that, as a condition for award of the Contract, the Contractor has submitted a Statewide Utilization Management Plan ("SUMP") via the NYS Contract System (NYSCS) which lists all proposed Subcontractors including an identification of the NYS certified MWBE subcontractors and suppliers the Contractor intends to use to perform the Work of the Contract and to achieve the MWBE Contract Goals established in the Contract Documents. In addition, or alternatively, Contractor may have submitted a request for a waiver. Prior to award of the Contract, the Owner approved Contractor's plan to achieve the MWBE Contract Goals established in the Contract Documents (MWBE Utilization Plan) to the extent the Owner did not approve Contractor's request for

- a waiver of part or all of the MWBE Contract Goals. Owner approval of the MWBE Utilization Plan approves a Subcontractor only for the purpose of the MWBE Utilization Plan.
- C. Contractor agrees to adhere to the MWBE Utilization Plan in the performance of the Contract. Contractor shall not change the Utilization Plan without the prior written approval of the Owner. Contractor further agrees that failure to adhere to the MWBE Utilization Plan shall constitute a material breach of the Contract and upon such breach, the Owner shall be entitled to any remedy provided in the Contract or by law, including but not limited to a finding that the Contractor is non-responsible.
- D. The Contractor understands that only sums paid to MWBEs for the performance of a commercially useful function, as that term is defined in 5 NYCRR § 140.1 may be applied towards the achievement of the applicable MWBE Contract Goal. The portion of a subcontract with an MWBE serving as a supplier that shall be deemed to represent the commercially useful function performed by the MWBE shall be 60% of the total value of the subcontract. The portion of a subcontract with an MWBE serving as a broker that shall be deemed to represent the commercially useful function performed by the MWBE shall be the monetary value for fees, or the markup percentage, charged by the MWBE. The Owner will audit the Contractor's efforts to achieve the MWBE Contract Goals through the NYSCS.

Section 20.04 - Good Faith Efforts

- A. The Contractor shall document good faith efforts pursuant to 5 NYCRR § 142.5 to provide meaningful participation by MWBEs as Subcontractors (which includes material suppliers, other vendors, and others; see definition of Subcontractor in General Conditions Article 1 Definitions) in the performance of the Contract, to comply with the requirements of the Contract and to enable the Owner to determine compliance with the provisions of this General Conditions Article 20. Guidelines for documentation of good faith efforts are at http://www.dasny.org/tools-forms/forms under MWSBE.
- B. If the Contractor fails to adequately document good faith efforts, it may result in a finding of non-compliance.

Section 20.05 - Waivers

- A. If the Contractor, after making good faith efforts satisfactory to the Owner, is unable to achieve the MWBE Contract Goals, the Contractor may submit a request for a waiver through the NYSCS, or a non-electronic method provided by the Owner. The request for a waiver must be supported by evidence of the good faith efforts by the Contractor to achieve the maximum feasible MWBE participation towards the applicable MWBE Contract Goals. If the documentation included with the waiver request is complete, the Owner shall evaluate the request and issue a written notice of acceptance or denial within twenty (20) business days of receipt.
- B. If the Owner, upon review of the SUMP, the MWBE Utilization Plan, the NYSCS and any other relevant information, determines that the Contractor is failing or refusing to comply with the MWBE Contract Goals and no waiver has been issued in regard to such non-compliance, the Owner may issue a notice of deficiency to the Contractor. The Contractor shall respond to the notice to deficiency within seven (7) business days of receipt. Such response may include a request for partial or total waiver of MWBE Contract Goals.

Section 20.06 – Damages - MWBE Participation

A. If the Owner determines that the Contractor is not in compliance with the requirements of this General Conditions Article 20 and the Contractor refuses to comply with the requirements of this General

Conditions Article 20, or if the Contractor is found to have willfully and intentionally failed to comply with the MWBE Contract Goals, then: (1) the Contractor shall be obligated to pay the Owner liquidated damages; or (2) the Contractor shall be obligated to pay the Owner other appropriate damages; or (3) the Owner shall receive one or more other appropriate remedies, unless the Owner elects to pursue its remedies under NYS Executive Law Section 316. If the Owner declines to pursue its remedies under NYS Executive Law Section 316, the Owner may elect to pursue one or more of liquidated damages, other appropriate damages, and one or more other appropriate remedies.

- B. If the Owner decides to assess liquidated damages, the Contractor shall be obligated to pay to the Owner liquidated damages in an amount equal to the difference between all sums identified for payment to MWBEs if the Contractor had achieved the MWBE Contract Goals and all sums actually paid to MWBEs for performance of Work under the Contract. If such liquidated damages have not been withheld by the Owner, the Contractor shall pay such liquidated damages to the Owner within sixty (60) days after they are assessed. provided, however, that if the Contractor has filed a complaint with the Director of the Division of Minority and Women's Business Development pursuant to 5 NYCRR §142.2, liquidated damages shall be payable only in the event of a determination adverse to the Contractor following the complaint process. The liquidated damages are intended to compensate the Owner only for the Owner's damage if the Owner determines that the Contractor is not in compliance with the requirements of General Conditions Sections 20.03, 20.04 and 20.05 and the Contractor refuses to comply with the requirements of General Conditions Sections 20.03, 20.04 and 20.05, or if the Contractor is found to have willfully and intentionally failed to comply with the MWBE Contract Goals. In addition, the Contractor shall be liable to the Owner to the fullest extent permitted by law for:
 - 1. whatever other appropriate damages the Owner may incur; or
 - 2. any other appropriate remedy to which the Owner may be entitled as a result of the Contractor's refusal to comply with the requirements of this General Conditions Article 20 outside the requirements of General Conditions Sections 20.03, 20.04, 20.05 and the MWBE Contract Goals.

Other appropriate damages include, but are not limited to, the expenses for personnel, supplies and overhead incurred by the Owner to administer and enforce the requirements of this General Conditions Article 20 other than the requirements of General Conditions Sections 20.03, 20.04, 20.05 and the MWBE Contract Goals.

Section 20.07 – Reporting to Owner

The Contractor shall complete the reports and submit as indicated to establish and update EEO requirements during the life of the Contract. Reports not submitted at such time shall be cause for the Owner to delay payment to the Contractor. The listed reports are a requirement of the Contract and copies are included in the Contract Documents and template forms are also available on the Dormitory Authority's web site at, http://www.dasny.org/tools-forms/forms, under MWSBE.

ARTICLE 21- SERVICE-DISABLED VETERAN OWNED BUSINESSES

Section 21.01 – General Provisions

Article 17-B of the NYS Executive Law provides for more meaningful participation in public procurement by certified Service-Disabled Veteran – Owned Businesses (SDVOB), thereby further integrating such businesses in to New York State's economy. The Dormitory Authority recognizes the need to promote the employment of service-disabled veterans and to ensure that certified SDVOBs have opportunities for maximum feasible participation in the performance of Dormitory Authority contracts.

Section 21.02 – Contract with Goals

- A. If the Information for Bidders established an overall goal for SDVOB participation in this Contract and Contractor submitted an SDVOB Utilization Plan that was accepted by the Dormitory Authority, Contractor shall follow the accepted SDVOB Utilization Plan. Contractor, by award of the Contract, certified that Contractor shall follow the submitted and accepted SDVOB Utilization Plan for the performance of SDVOBs on the Contract.
- B. Contractor shall not change the accepted SDVOB Utilization Plan without the prior written consent of the Dormitory Authority. Any modifications or changes to the accepted SDVOB Utilization Plan after award of the Contract to the Contractor shall be reported to the Dormitory Authority on a revised SDVOB Utilization Plan. As part of a revised SDVOB Utilization Plan, the Contractor may request a partial or total waiver of the goal for SDVOB participation but such request must be made prior to submission of the Application for Payment for the final payment on the Contract. Contractor shall make and shall document good faith efforts to provide meaningful participation by SDVOBs as subcontractors or suppliers in the performance of the Contract. The revised SDVOB Utilization Plan is not effective unless and until it is accepted by the Dormitory Authority. If the revised SDVOB Utilization Plan is not accepted by the Dormitory Authority, the Dormitory Authority shall issue a notice of deficiency and the Contractor shall proceed as set forth in paragraph D of this General Conditions Section 21.02
- C. Contractor shall report to the Dormitory Authority Monthly SDVOB Contractor Compliance during the Contract documenting the preceding month's progress towards implementing the accepted SDVOB Utilization Plan and achieving the SDVOB goals for the Contract. This information shall be submitted to the Dormitory Authority in the manner and at the times directed by the Dormitory Authority.
- D. If the Dormitory Authority, upon review of the SDVOB Utilization Plan and the Monthly SDVOB Contractor Compliance reports determines that the Contractor is failing or refusing to comply with the Contract SDVOB goals and no waiver has been issued with respect to such non-compliance, the Dormitory Authority may issue a notice of deficiency to the Contractor. The Contractor shall respond to the notice of deficiency within seven (7) business days of receipt. Such response may include a request for partial or total waiver of the Contract SDVOB goals.
- E. Contractor shall make and shall document its good faith efforts to utilize SDVOBs in the performance of the Contract. Evidence of required good faith efforts includes but is not limited to:
 - 1. Copies of solicitations to SDVOBs and any responses thereto;
 - 2. Explanation of the specific reason(s) each SDVOB responding to a Contractor's solicitation was not selected;
 - 3. Dates of any pre-bid, pre-award or other meetings attended by Contractor, if any, scheduled by the Dormitory Authority with certified SDVOBs which the Dormitory Authority determined were capable of fulfilling the SDVOB goals in the Contract;
 - 4. Information describing the specific steps undertaken to reasonably structure the scope of subcontracts and material orders for the purpose of subcontracting with, or obtaining materials from, SDVOBs;
 - 5. Other information relevant to the waiver request.

F. Contractor's failure to use SDVOBs in accordance with the accepted SDVOB Utilization Plan or any accepted revised SDVOB Utilization Plan shall be a material breach of the Contract and upon such breach, the Dormitory Authority shall be entitled to any remedy provided in the Contract, by law or regulation or at law or in equity, including but not limited to a finding the Contractor is non-responsible. If the Dormitory Authority finds the Contractor willfully and intentionally fails to comply with the Contract SDVOB goals, the Contractor shall pay damages to the Dormitory Authority as set forth in 9 NYCRR § 252.2(s).

Section 21.03 – Contract with No Goals

If the Information for Bidders does not establish an overall goal for SDVOB participation in this Contract, Contractors are still strongly encouraged and expected to consider SDVOBs in the fulfillment of the requirements of the Contract in recognition of the service and sacrifices made by service-disabled veterans and in recognition of their economic activity in doing business in New York State. The Contractor is encouraged to make good faith efforts to promote and assist in the participation of SDVOBs in performance of the Contract as Subcontractors.



Appendices

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SECTION 00 31 26 - EXISTING INFORMATION PROVIDED TO BIDDERS

PART 1 - HAZARDOUS MATERIAL INFORMATION

1.01 EXISTING HAZARDOUS MATERIAL INFORMATION

A. This Document with its referenced attachments is part of the Procurement and Contracting Requirements for Project. They provide Owner's information for Bidders' convenience and are intended to supplement rather than serve in lieu of Bidders' own investigations. They are made available for Bidders' convenience and information but are not a warranty of existing conditions.

1.02 ASBESTOS CONTAINING MATERIALS

A. A Limited Hazardous Materials Survey (Asbestos, PCB's, Mold, Misc.) was completed by Atlantic Testing Laboratories, Limited (ATL) on 14 August 2018 and is appended for reference. In summary, asbestos containing materials are anticipated to be disturbed by the work of this project.

1.03 PCB (POLYCHLORINATE BIPHENYL) CONTAINING MATERIALS

A. A Limited Hazardous Materials Survey (Asbestos, PCB's, Mold, Misc.) was completed by Atlantic Testing Laboratories, Limited (ATL) on 14 August 2018 and is appended for reference. In summary, PCB containing materials are anticipated to be disturbed by the work of this project.

1.04 LEAD PAINTED SURFACES

A. A Limited Hazardous Materials Survey (Asbestos, PCB's, Mold, Misc.) was completed by Atlantic Testing Laboratories, Limited (ATL) on 14 August 2018 and is appended for reference. In summary, surfaces containing lead paint are anticipated to be disturbed by the work of this project.

PART 2 - Not used

PART 3 - Not used

END OF SECTION 00 31 26



Construction General Requirements

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SECTION 01 12 00 - CONTRACT SUMMARY OF WORK

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. The Contract Documents, including but not limited to, the Drawings and Individual Specification Sections, apply to this Section.

1.02 SUMMARY

- A. Section includes a summary of <u>each-the</u> Contract for the Project, including responsibilities for coordination and temporary facilities and controls.
- B. Specific requirements for the work of the each- Contract are also indicated in individual Specification Sections and on Drawings for each Contract.
- C. Related Sections:
 - 1. Section 01 31 00 Project Management and Coordination.
 - 2. Section 01 32 00 Construction Progress Documentation.
 - 3. Section 01 50 00 Temporary Facilities and Controls.

1.03 CONTRACTOR'S PROJECT MANAGER

A. Contractor and each Sub-contractor shall identify a project manager who shall be responsible for coordination between and among the Contractor each and all contractors and subcontractors for the Project and the Owner.

1.04 COORDINATION ACTIVITIES

- A. Coordination activities of Contractor's project manager include, but are not limited to, the following:
 - 1. Provide overall coordination of the Work.
 - 2. Coordinate use of access shared with other subcontractors to workspaces and workspaces shared with other subcontractors.
 - Coordinate product selections for compatibility with either product selected under this Contract and <u>under other sub</u>contracts for the Project. Identify to Owner and Design Professional incompatibilities between products selected under this Contract and <u>products selected under other contracts</u> for the Project.
 - 4. Provide overall coordination of temporary facilities and controls.
 - 5. Coordinate, schedule, and approve interruptions of permanent and temporary utilities, including those necessary to make connections for temporary services.
 - 6. Coordinate construction and operations of the Work with work performed by each subcontractor other separate Contract for the Project and the Owner's construction forces.
 - 7. Prepare Coordinated Composite Drawings, in collaboration with each <u>other sub</u>contractor for the Project, to coordinate the work <u>of the contracts</u> for the Project.

- 8. Coordinate sequencing and scheduling of the Work. Include the following:
 - a. Initial Coordination Meeting: At earliest possible date, the Owner will arrange and conduct a meeting with the Call-contractors for the Project for sequencing and coordinating the work of the Project.
- 9. Provide quality assurance and quality control services specified in Section 01 40 00 Quality and Code Requirements.
- 10. Coordinate sequence of activities to accommodate tests and inspections, and coordinate schedule of tests and inspections.
- 11. Provide information necessary to adjust, move, or relocate existing utility structures affected by construction.
- 12. Provide progress cleaning of all Contract work areas and coordinate progress cleaning of areas or pieces of equipment where more than one subcontractor has worked.
- 13. Coordinate cutting and patching.
- 14. Coordinate protection of the Work.
- 15. Coordinate firestopping.
- 16. Coordinate completion of punch list items.
- 17. Coordinate preparation of As-built drawings and specifications.
- 18. Print and submit all required project turnover documents.
- 19. Coordinate preparation of operation and maintenance manuals.
- B. Responsibilities of project manager for construction contract includes coordination for temporary facilities and controls, include, but are not limited to, the following:
 - 1. Provide common-use field office for use by all personnel engaged in construction activities.
 - 2. Provide telephone service for common-use facilities.

1.05 GENERAL REQUIREMENTS OF THE CONTRACT

- A. Extent of Contract: Requirements indicated on drawings and in specification sections determine which Contract includes a specific element of the Work of the Contract.
 - 1. The work described in this section for <u>each_the Ceontractor</u> shall be complete systems and assemblies, including products, components, accessories, and installation required by the respective contract documents.
 - 2. Trenches and other excavation for the work of each the contract. shall be the work of such contract.
 - 3. Blocking, backing panels, sleeves, and metal fabrication supports. for the work of each contract shall be the work of such Contract.
 - 4. Furnishing of access panels for the work. of each contract shall be the work of such Contract. Installation of access panels located in the substrate of ceilings, walls and floors. shall be the work of the construction contract.
 - 5. Equipment pads_for the work of each contract shall be the work of such contract.
 - 6. Roof-mounted equipment curbs. for the work of each contract shall be the work of the construction contract.
 - 7. Painting for the work of each contract shall be the work of such contract.
 - 8. <u>All Cutting and Patching.</u>: Each contract shall perform its own cutting and patching.
 - 9. Firestopping for the work. of each contract shall be provided by such contract.
- B. Redundant with Section 13200Substitutions: The Each contractor's project manager shall cooperate with all all other subcontractor's project managers involved to coordinate approved substitutions with remainder of the work of the Project.

- C. Temporary Facilities and Controls: In addition to specific responsibilities for temporary facilities and controls indicated in this Section and in Section 01 50 00 Temporary Facilities and Controls, Contractor is responsible for the following:
 - 1. Installation, operation, maintenance, and removal of each temporary facility necessary for its own normal construction activity, and costs and use charges associated with each facility, except as otherwise provided for in this Section 01 12 00.
 - 2. Plug-in electric power cords and extension cords, supplementary plug-in task lighting, and special lighting necessary exclusively for its own activities.
 - 3. Its own field office complete with necessary furniture, utilities, and telephone service.
 - 4. Its own storage and fabrication sheds.
 - 5. Temporary enclosures for its own construction activities.
 - 6. Staging and scaffolding for its own construction activities.
 - 7. General hoisting facilities for its own construction activities.
 - 8. Waste disposal facilities, including collection and legal disposal of its own hazardous, dangerous, unsanitary, or other harmful waste materials.
 - 9. Progress cleaning of work areas affected by its operations on a daily basis.
 - 10. Secure lockup of its own tools, materials, and equipment.
 - 11. Construction aids and miscellaneous services and facilities necessary exclusively for its own construction activities.

1.06 [GENERAL] CONSTRUCTION [CONTRACT] [WORK]

- A. Work in the [General] Construction [Contract] [Work] includes, but is not limited to, the following:
 - 1. Remaining work not identified as work under other contracts.
 - 2. Site preparation, including clearing, building demolition and relocations, and earthwork.
 - 3. Site improvements, including roadways, parking lots, pedestrian paving, site development furnishings and equipment, and landscaping.
 - 4. Site water supply and distribution.
 - 5. Site sanitary sewerage.
 - 6. Site storm drainage.
 - Site fuel distribution.
 - 8. Tunnels for site utilities.
 - 9.2. Selective demolition.
 - 10. Foundations, including footings, foundation walls[, and piles].
 - 44.3. Slabs-on-grade, including earthwork, subdrainage systems, and insulation.
 - 12. Below-grade building construction, including excavation, backfill, and thermal and moisture protection.
 - 43.4. Superstructure, including floor and roof construction [and] [sprayed fire-resistive materials] [and] [board fire protection].
 - 44. Exterior closure, including walls, [parapets,] doors, windows [, and louvers].
 - 45.5. Roofing, including coverings, flashings froof specialties fand [glazed openings].
 - 46.6. Interior construction, including partitions, doors, interior glazed openings, and fittings.
 - 47.7. Fire-protection specialties.
 - 18. Stairs, including railings and finishes.
 - 49.8. Interior finishes [finish carpentry] [architectural woodwork] and built-in casework.
 - Conveying systems, including [elevators] [wheelchair lifts] [escalators] [and] [cranes].
 - 0. Equipment, including the following:
 - . Stage equipment.
 - . Projection screens.
 - Loading dock equipment.
 - Waste compactors.

- . Foodservice equipment.
- Residential appliances.
- . Laboratory fume hoods.
- Furnishings, including [casework] [window treatments] [floor grilles and mats] [and] [seating] <Insert type of furnishing>.
- Special construction, including the following:
 - . Pre-engineered structures.
 - Special-purpose rooms.
 - . Radiation protection.
- P.B. Temporary facilities and controls in the [General] Construction Contract include, but are not limited to, the following:
 - 1. Temporary facilities and controls that are not otherwise specifically assigned to other contracts.
 - Sediment and erosion control.
 - 3. Unpiped sewers and drainage, including drainage ditches, dry wells, stabilization ponds, and containers.
 - 4. Stormwater control.
 - 5-2. Unpiped temporary toilet fixtures, wash facilities, and drinking water facilities, including disposable supplies.
 - 6.3. Temporary enclosure for building exterior.
 - 7. Temporary roads and paved areas.
 - 8. Dewatering facilities and drains.
 - 9. Excavation support and protection for the Work of the contract.
 - 40.4. Project identification and temporary signs.
 - 44.5. General waste disposal facilities.
 - 12. Pest control.
 - 13. Temporary stairs.
 - 44.6. Temporary fire-protection facilities.
 - 45.7. Barricades, warning signs, and lights.
 - 16.8. Site enclosure fence.
 - 47.9. Covered walkways.
 - 48.10. Security enclosure and lockup.
 - 49.11. Environmental protection.
 - 20.12. Restoration of Owner's existing facilities used as temporary facilities.
 - 21.13. Temporary heating, cooling, and ventilation for [General] Construction Contract Work before weathertight enclosure of building is complete.
 - Temporary heating, cooling, and ventilation after permanent enclosure of building is complete.

4.081.07 PLUMBING [CONTRACT] [WORK]

- A. Work in the Plumbing [Contract] [Work] includes, but is not limited to, the following:
 - 1. Site special plumbing systems.
 - 2.1. Plumbing fixtures.
 - 3.2. Domestic water distribution.
 - 4.3. Sanitary waste.
 - 5. Storm water drainage.
 - 6. Special plumbing systems, including the following:

- . Compressed air.
- . Deionized water.
- . Distilled water.
- . Fuel oil.
- . Natural gas.
- . Medical gas.
- . Vacuum.
- . Acid waste.
- Pools and fountains.
- 16.4. Fire protection systems.
- 17. Special fire suppression systems, including the following:
 - . Foam fire-extinguishing systems.
 - . Clean-agent extinguishing systems.
- 20.5. Plumbing connections to equipment furnished by all other contracts.
- B. Temporary facilities and controls in the Plumbing Contract include, but are not limited to, the following:
 - 1. Piped sewerage and drainage.
 - 2. Piped gas service.
 - 3. Piped water service.
 - 4. Piped temporary toilet fixtures, wash facilities, and drinking water facilities.
 - 5.4. Temporary standpipe for Fire Department use.
 - 6.5. Plumbing connections to existing systems and temporary facilities and controls furnished by other contracts.
 - 7.6. Temporary heating, cooling, and ventilation for Plumbing Contract Work before weathertight enclosure of building is complete.

1.091.08 HVAC [CONTRACT] [WORK]

- A. Work in the HVAC-[Contract] [Work] includes, but is not limited to, the following:
 - 1. Site steam distribution.
 - 2. Site hydronic distribution.
 - 3.1. Energy supply, including [oil] [gas] [steam] [hot- and chilled-water] supply systems.
 - 4.2. HVAC systems and equipment.
 - 5.3. HVAC instrumentation and controls.
 - 6.4. HVAC testing, adjusting, and balancing.
 - 7.5. Building automation system.
 - 8.6. Mechanical connections to equipment furnished by all other contracts.
- B. Temporary facilities and controls in the HVAC Contract include, but are not limited to, the following:
 - 1. Temporary heating, cooling, and ventilation for HVAC Contract Work. before weathertight enclosure of building are complete.

1.101.09 ELECTRICAL [CONTRACT] [WORK]

A. Work in the Electrical [Contract] [Work] includes, but is not limited to, the following:

- 1. Site electrical distribution.
- 2. Site lighting.
- 3. Site communications and security.
- 4.1. Electrical service and distribution.
- 5.2. Exterior and linterior lighting and light pole bases.
- 6.3. Communication and security new data fiber optic cable.
- 7.4. Upgrade fFire alarm and detection systems.
- 8. Special electrical systems, including the following:
 - . Uninterruptible power supply systems.
 - . Packaged engine generator systems.
 - . Battery power systems.
 - . Cathodic protection.
 - . Electromagnetic shielding systems.
 - . Lightning protection systems.
 - . Unit power conditioners.
 - . Power generation systems.
- 47.5. Electrical connections to equipment furnished by all other contracts.
- B. Temporary facilities and controls in the Electrical Work Contract include, but are not limited to, the following:
 - 1. Electric power service and distribution.
 - 2. Lighting, including site lighting.
 - 3. Fire alarm and detection systems.
 - 4. Electrical connections to existing systems and temporary facilities and controls furnished by other contracts.
 - Temporary heating, cooling, and ventilation for Electrical Contract Work before weathertight enclosure of building is complete.

3.00 <INSERT NAME OF CONTRACT>

- . Work in the <Insert name> Contract includes, but is not limited to, the following:
 - 0. < Insert descriptions of the Work>.
- . Temporary facilities and controls in the <Insert name> Contract include, but are not limited to, the following:
 - 0. < Insert requirements for temporary facilities and controls>.

PART 9 - PART 2 - PRODUCTS (Not Used)

PART 10 - PART 3 - EXECUTION (Not Used)

END OF SECTION 01 12 00

SECTION 012300 - ALTERNATES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The Contract Documents, including but not limited to, the Drawings and Individual Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for alternates.

1.3 DEFINITIONS

- A. Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in the Bidding Documents that may be added to or deducted from the base bid amount if the Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.
 - 1. Alternates described in this Section are part of the Work only if enumerated in the Contract.
 - 2. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate alternate into the Work. No other adjustments are made to the Contract Sum.

1.4 PROCEDURES

- A. Coordination: Modify or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.
 - 1. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate.
- B. Notification: Immediately following award of the Contract, notify each party involved, in writing, of the status of each alternate. Indicate if alternates have been accepted, rejected, or deferred for later consideration. Include a complete description of negotiated modifications to alternates.
- C. Execute accepted alternates under the same conditions as other Work of the Contract.
- D. Schedule: A schedule of alternates is included at the end of this Section. Specification Sections referenced in schedule contain requirements for materials necessary to achieve the work described under each alternate.

ALTERNATES 012300 - 1

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF ALTERNATES

- A. Alternate No. Insert number: Group Study RoomsInsert title of alternate.
 - 1. Base Bid: Configure four (4) Storage Rooms on each floor at floors 2-9 (South Wing Storage -00, Storage -01 & North Wing Storage -16, Storage -17) — Insert brief description of base bid requirement [as indicated on Sheet A-105 Enlarged 2nd-9th Floor Plans South & A-107, Enlarged 2nd-9th Floor plans North Insert title of sheet [and] [as specified in Division Insert Division number Section "Insert Section Title"].
 - 2. Alternate #1: Alternate #1 converts one of the storage rooms in each wing on floors 2-9 into a Group Study Room. (See Drawing A-113 and related electrical and HVAC drawings). Rooms are generally to have the following: infrastructure and provisions for a future monitor by the campus, corridor wall of fire rated aluminum storefront, suspended acoustical ceilings, floor and wall finishes, lighting, power, and ventilation.

END OF SECTION 012300

ALTERNATES 012300 - 2

SECTION 01 29 00 - PAYMENT PROCEDURES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. The Contract Documents, including but not limited to, the Drawings and Individual Specification Sections, Schedule of Values, Contractor Pencil Copy and Application for Payment, apply to this Section.

1.02 SUMMARY

A. This Section specifies administrative and procedural requirements necessary to prepare and process Applications for Payment.

B. Related Sections:

- 1. General Conditions, Article 8 Payment, for requirements governing provisions for payment.
- 2. General Conditions, Article 20 Opportunity Programs, for requirements governing minority participation.
- 3. Section 01 77 00 Contract Closeout Requirements, for administrative contract closeout requirements.
- 4. Section 01 81 13 Sustainable Design Requirements, for administrative requirements governing submittal of cost breakdown information required for LEED documentation.

1.03 DEFINITIONS

- A. Schedule of Values: A form in the Contract Documents, which establishes minimum level of payment detail to formulate an initial Application for Payment.
- B. Contractor's Pencil Copy: A form provided by the Owner, which estimates a billing request from the Contractor. When approved by the Owner, formulates the Application for Payment.
- C. Application for Payment: A form provided by the Owner, which provides certification by the Contractor for payment.

1.04 SCHEDULE OF VALUES

- A. Coordination: Coordinate preparation of the Schedule of Values with the Owner.
- B. The Contractor shall allocate portions of the Contract Sum to labor, material and major equipment costs to various portions of the Work as indicated on the form.
 - Submit the Schedule of Values to the Owner, for approval at earliest possible date after award of the Contract.
 - 2. The Owner shall not approve any billing request until the Schedule of Values is approved.

- C. Format and Content: Use model form provided in Contract Documents as a guide to establish line items for the Schedule of Values.
 - 1. Arrange the Schedule of Values with separate columns to indicate the following for each item listed:
 - a. Dollar value of the following, as a percentage of the Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent.
 - 1) Labor.
 - 2) Materials.
 - Major Equipment.
 - 2. Provide a breakdown of Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Provide multiple line items for principal subcontract amounts in excess of five percent of Contract Sum.
 - a. Include separate line items under Contractor and principal subcontracts for LEED documentation, if applicable and other project closeout requirements in an amount totaling five percent of the Contract Sum and subcontract amount.
 - 3. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
 - 4. Allowances: If applicable, provide a separate line item in the schedule of values for each allowance.
 - 5. Each item in the Schedule of Values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item, except Lump Sum and Quantity of Work Allowances.
 - 6. Schedule of Values Updating: The Owner may require the Contractor to revise its Schedule of Values. Further, the Owner reserves the right to accept only those cost distributions which, in the Owner's opinion, are reasonable, equitably balanced and correspond to estimated quantities in Contract Documents.

1.05 MONTHLY APPLICATIONS FOR PAYMENT

- A. Each Application for Payment shall be consistent with previous applications and payments as approved by the Owner and paid for by the Owner.
 - 1. Initial Application for Payment, the Owner shall not approve any billing request until the Schedule of Values and Construction Schedule is approved.
 - 2. Payment for allowance items and stored materials involve additional requirements.
 - 3. Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.
- B. Payment Application Times: Billing request may be submitted to the Owner once each month.
 - 1. Submit Contractor's Pencil Copy billing request seven days prior to due date for review by the Owner.
- C. Payment Forms: All forms and documents required for payment shall be provided by the Owner. Template forms and documents may also be available on the Dormitory Authority's web site www.dasny.org.

- D. Preliminary Procedure: The Contractor may request from the Owner a Contractor's Pencil Copy form. Where indicated on the form, the Contractor shall enter a billing request, either dollar amount or percentage complete for each item number requesting payment.
 - 1. If applicable, the Contractor shall obtain from the Owner, an Allowance Notice to Proceed for Allowance items and an Agreement for Materials Stored Off-Site prior to billing.
 - 2. Submit Contractor's Pencil Copy billing request to the Owner for approval.
 - 3. The Contractor shall provide updated documentation to the Owner in accordance with General Conditions, Article 20 Opportunity Programs.
- E. Procedure: Upon the Owner's approval of the Contractor's Pencil Copy billing request, payment documents will be provided to the Contractor. The Contractor shall complete each document and submit two copies of all documents with original signature & notary where indicated on forms, the following:
 - Application for Payment.
 - 2. Compliance Report.
 - 3. Contractor and Subcontractor Certifications Form
 - 4. Contractor's Certified Payroll Form.
 - 5. Allowance Allocation Form, if applicable
- F. Payroll Forms: The Contractor and all Sub-contractors to the Contractor shall submit original copies of the Contractor and Subcontractor Certifications Form and Contractor's Certified Payroll Form.
- G. Transmittal: Sign and notarize where indicated on each document, submit two original copies to Owner.
 - 1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about payment.
- H. Stored Materials: The Owner will provide an Agreement for Materials Stored Off-Site and specific forms that the Contractor must complete and submit to the Owner, including but not limited to:
 - 1. Include in the Contractor's Pencil Copy billing request amounts applied for materials or equipment purchased or fabricated and stored, but not yet installed.
 - 2. Differentiate between items stored on-site and items stored off-site.
 - 3. Provide certificate of insurance, evidence of transfer of title to the Owner, and consent of surety to payment, for stored materials.
 - 4. Provide supporting documentation that verifies amount requested, such as paid invoices. Match amount requested with amounts indicated on documentation; do not include overhead and profit on stored materials.
 - 5. Provide summary documentation for stored materials indicating the following:
 - a. Materials previously stored and included in previous Applications for Payment.
 - b. Work completed for this Application utilizing previously stored materials.
 - c. Additional materials stored with this Application.
 - d. Total materials remaining stored, including materials with this Application.
- I. Payment: Timely payment by the Owner to the Contractor is governed by Section 2880 of the Public Authorities Law.

J. Liens: Upon receipt of a lien, the Owner shall deduct a sum of one and one-half (1 ½) times the amount stated to be due in the notice of lien from the application for payment. Upon official receipt of discharge of lien, the Owner shall provide payment as stated above.

1.06 APPLICATION FOR PAYMENT AT SUBSTANTIAL COMPLETION

- A. Preliminary Procedure: After issuance of the executed Notice of Substantial Completion, submit a Contractor's Pencil Copy billing request showing 100 percent completion for portion of the Work claimed as complete at Substantial Completion.
 - 1. Submit Contractor's Pencil Copy billing request to the Owner for approval.
 - 2. The Contractor shall provide final documentation to the Owner in accordance with General Conditions, Article 20 Opportunity Programs.
- B. Reduction of Retainage: The Contractor may request a reduction of retainage upon Substantial Completion of the Work or when a phase of Work is accepted by the Owner.
 - The Contractor submits to the Owner a written request to have retainage reduced and provides a cost estimate and schedule to complete all remaining Work items indicated on the executed Notice of Substantial Completion.
 - 2. The Owner shall deduct from the sum two times the value of remaining items of Work to be completed or corrected.
 - 3. The Owner will provide the Contractor with General Release and Consent of Surety forms based on the amount of reduction. The Contractor shall complete each document and submit three copies of each document with original signature & notary where indicated on forms.
 - 4. The Owner shall hold payment until receipt of completed General Release and Consent of Surety forms.
- C. Procedures: Upon the Owner approval of Contractor's Pencil Copy billing request, payment documents will be provided to the Contractor. The Contractor shall complete each document and submit two copies of all documents with original signature & notary where indicated on forms, the following:
 - 1. Application for Payment.
 - 2. Compliance Report.
 - 3. Contractor and Subcontractor Certifications Form
 - 4. Contractor's Certified Payroll Form.
- D. Payroll Forms: The Contractor and all Sub-contractors to the Contractor shall submit original copies of the Contractor and Subcontractor Certifications Form and Contractor's Certified Payroll Form.
- E. Transmittal: Sign and notarize where indicated on each document, submit two original copies to Owner.
- F. Payment: Timely payment by the Owner to the Contractor is governed by Section 2880 of the Public Authorities Law.
- G. Liens: Upon receipt of a lien, the Owner shall deduct a sum of one and one-half (1 ½) times the amount stated to be due in the notice of lien from the application for payment. Upon official receipt of discharge of lien, the Owner shall provide payment as stated above.

1.07 FINAL APPLICATION FOR PAYMENT (same as contract closeout documents)

- A. Contract Compliance: The Contractor shall comply with the Requirements of General Conditions, Section 10.08 Limitations on Actions.
- B. Preliminary Procedure: All Work and Extra Work of the Contract and all requirements of Section 01 77 00 Contract Closeout Requirements must be complete and approved prior to commencement of final Application for Payment.
 - 1. The Contractor shall request and submit to the Owner a final Contractor's Pencil Copy that will formulate the final Application for Payment.
 - 2. The Contractor shall provide outstanding documentation to the Owner in accordance with General Conditions, Article 20 Opportunity Programs.
- C. Procedures: Upon the Owner approval of Contractor's Pencil Copy billing request, final Application for Payment and Contract closeout documents will be provided to the Contractor. The Contractor shall complete each document and submit two copies of all documents with original signature & notary, where indicated on the forms, the following:
 - 1. Final Application for Payment including remaining Retainage.
 - 2. Final Compliance Report.
 - 3. Contractor and Subcontractor Certifications Form
 - 4. Contractor's Certified Payroll Form.
 - 5. Release Form -- Final Payment to Contractor.
 - 6. Consent of Surety -- Final Payment to Contractor, with power of attorney.
- D. Payroll Forms: The Contractor and all Sub-contractors to the Contractor shall submit original copies of the Contractor and Subcontractor Certifications Form and Contractor's Certified Payroll Form.
- E. Transmittal: Sign and notarize where indicated on each document, submit two original copies to the Owner.
- F. Final Payment: Timely payment by the Owner to the Contractor is governed by Section 2880 of the Public Authorities Law.
- G. Liens: Upon receipt of a lien, the Owner shall deduct a sum of one and one-half (1 ½) times the amount stated to be due in the notice of lien from the final application for payment. Upon official receipt of discharge of lien, the Owner shall provide final payment as stated above.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 29 00



SCHEDULE OF VALUES

Date:	12/14/2018
Contract No:	
CR No:	
Trade:	
	Contract No:

CSI	DESCRIPTION	UM	QTY	LABOR	MATERIAL	SCHEDULED VALUE
010000	Bonds	LS				
010000	Insurance	LS				
011000	Mockups	LS				
013100	Project Meetings	MO				
013100	Supervision	MO				
013300	Submittals	LS				
013200	Schedule	LS				
017419	Daily Clean-Up	MO				
017419	Final Clean-Up	MO				
017419	Project Closeout	LS				
019113	Sustainable Commissioning Requirements	LS				
020860	Lead Safe Work Practices	LS				
028200	Asbestos Abatement	LS				
030130	Strengthening Cast-In-Place Concrete	LS				
062000	Finished Carpentry	LS				
75110	Built-Up Roof Repair	LS				
078400	Firestopping	LS				
081000	Hollow Metal Work	LS				
082000	Wood Doors	LS				
087000	Door Hardware	LS				
092500	Gypsum Wall Board	LS				
093200	Unglazed Porcelain Mosaic Tile	LS				
093350	Porcelain Tile	LS				
095400	Ceiling Suspension System	LS				
099000	Painting	LS				
108000	Toilet Accessories	LS				
0						
0						
0						
0						
0						
0						

Total: \$ - \$ - \$

SECTION 01 31 00 - PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. The Contract Documents, including but not limited to, the Drawings and individual Specification Sections and Contract Manager, apply to this Section.

1.02 SUMMARY

- A. Section includes administrative provisions for coordinating construction operations on the Project including, but not limited to, the following:
 - 1. General project coordination procedures.
 - 2. Administrative and supervisory personnel.
 - 3. Coordination drawings.
 - 4. Requests for Information (RFIs).
 - 5. Contract Manager software site.
 - 6. Project meetings.
- B. Each contractor shall participate in coordination requirements. Refer to Section 01 12 00 Contract Summary of Work for certain areas of responsibility that are assigned to a specific contractor.

C. Related Sections:

- 1. Section 01 12 00 Contract Summary of Work, for a description of the division of work among separate contracts and responsibility for coordination activities not in this Section.
- 2. Section 01 32 00 Project Scheduling and Progress Documentation, for preparing and submitting Contractor's construction schedule.
- 3. Section 01 77 00 Contract Closeout Requirements, for coordinating closeout of the Contract.
- 4. Section 01 91 13 General Commissioning Requirements, for coordinating the Work with Owner's commissioning authority.

1.03 DEFINITIONS

A. RFI: Request from the Owner, Design Professional, or Contractor seeking information from each other during construction.

1.04 COORDINATION

A. Coordination for Single Contract Project: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations included in different Sections that depend on each other for proper installation, connection, and operation.

- 1. The Contractor shall utilize the bid milestone schedule included in the Contract Documents to prepare a CPM schedule in accordance with Section 01 32 00 Project Scheduling and Progress Documentation. The Contractor shall submit the proposed CPM schedule to the Owner within 45 days of the Notice to Proceed.
- 2. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
- 3. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
- 4. Make adequate provisions to accommodate items scheduled for later installation.
- B. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and activities of other contractors to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
 - 1. Coordination of the Owner's P6 Project Management CPM schedule.
 - 2. Coordination of the commissioning process and activities.
 - 3. Preparation of the schedule of values.
 - 4. Entering dates each required submission item listed on the Contractor's Submission Schedule will be submitted, coordinated with the CPM Schedule.
 - 5. Installation and removal of temporary facilities and controls.
 - 6. Delivery and processing of submittals.
 - 7. Progress meetings.
 - 8. Preinstallation conferences.
 - 9. Project closeout activities.
 - 10. Startup and adjustment of systems.
- C. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.

1.05 COORDINATED COMPOSITE DRAWINGS

- A. Coordinated Composite Drawings, General: Prepare coordinated composite drawings in accordance with requirements in individual Sections, where installation is not completely shown on Shop Drawings, where limited space availability necessitates coordination, or if coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity.
 - 1. Content: Project-specific information, drawn accurately to a scale large enough to indicate and resolve conflicts. Do not base coordinated composite drawings on standard printed data. Include the following information, as applicable:
 - a. Use applicable Drawings as a basis for preparation of coordinated composite drawings. Prepare sections, elevations, and details as needed to describe relationship of various systems and components.
 - b. Coordinate the addition of trade-specific information to the coordinated composite drawings by multiple contractors in a sequence that best provides for coordination of the information and resolution of conflicts between installed components before submitting for review.
 - c. Indicate functional and spatial relationships of components of architectural, structural, mechanical, and electrical systems.
 - d. Indicate space requirements for routine maintenance and for anticipated replacement of components during the life of the installation.

- e. Show location and size of access doors required for access to concealed dampers, valves, and other controls, including space required opening the access door.
- f. Indicate required installation sequences.
- g. Indicate dimensions shown on the Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternate sketches to the Design Professional indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.
- B. Coordinated Composite Drawing Organization: Organize drawings as follows:
 - 1. Floor Plans and Reflected Ceiling Plans: Show architectural and structural elements, and mechanical, plumbing, fire protection, fire alarm, and electrical Work. Show locations of visible ceiling-mounted devices relative to acoustical ceiling grid. Supplement plan drawings with section drawings where required to adequately represent the Work.
 - 2. Plenum Space: Indicate subframing for support of ceiling and wall systems, mechanical and electrical equipment, and related Work. Locate components within ceiling plenum to accommodate layout of light fixtures indicated on the Drawings. Indicate areas of conflict between light fixtures and other components.
 - 3. Mechanical Rooms: Provide coordinated composite drawings for mechanical rooms showing plans and elevations of mechanical, plumbing, fire protection, fire alarm, and electrical equipment.
 - 4. Structural Penetrations: Indicate penetrations and openings required for all disciplines.
 - 5. Mechanical and Plumbing Work: Show the following:
 - a. Sizes and bottom elevations of ductwork, piping, and conduit runs, including insulation, bracing, flanges, and support systems.
 - b. Dimensions of major components, such as dampers, valves, diffusers, access doors, cleanouts and electrical distribution equipment.
 - c. Fire-rated enclosures around ductwork.
 - 6. Electrical Work: Show the following:
 - a. Runs of vertical and horizontal conduit 1-1/4 inch diameter and larger.
 - b. Light fixture, exit light, emergency battery pack, smoke detector, and other fire alarm locations.
 - c. Panel board, switch board, switchgear, transformer, busway, generator, and motor control center locations.
 - d. Location of pull boxes and junction boxes dimensioned from column center lines.
 - 7. Fire Protection System: Show the following:
 - Locations of standpipes, mains piping, branch lines, pipe drops, and sprinkler heads.
 - 8. Review: The Design Professional will review coordinated composite drawings to confirm that the Work is being coordinated, but not for the details of the coordination, which are the Contractor's responsibility. If the Design Professional determines that the coordinated composite drawings are not being prepared in sufficient scope or detail, or are otherwise deficient, the Design Professional will so inform the Contractor, who shall make changes as directed and resubmit.
- C. Coordination Digital Data Files: Prepare coordination digital data files in accordance with the following requirements:

1. File Preparation Format: The Contractor shall coordinate with the Design Professional and use the same digital data software program, version, and operating system as the original Drawings.

1.06 KEY PERSONNEL

A. Key Personnel Names: Within 15 days after receipt of the Notice to Proceed, submit a list of key personnel assignments with resume and job qualifications, including project manager, project scheduler, commissioning agent, superintendent and other personnel in attendance at the Project site. Identify individuals and their duties and responsibilities; list addresses and telephone numbers, including home, office, and cellular telephone numbers, and email addresses. Provide names, addresses, and telephone numbers of individuals assigned as standbys in the absence of individuals assigned to the Project.

1.07 REQUESTS FOR INFORMATION (RFIs)

- A. General: Immediately on discovery of the need for additional information or interpretation of the Contract Documents, the Contractor shall prepare and submit an RFI in the form specified.
 - 1. Coordinate and submit RFIs in a prompt manner so as to avoid delays in the Contractor's work or work of subcontractors.
- B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:
 - 1. Project name.
 - 2. Project number.
 - Date.
 - 4. Name of Contractor.
 - 5. Name of Design Professional.
 - 6. RFI number, numbered sequentially.
 - RFI subject.
 - 8. Specification Section number and title and related paragraphs, as appropriate.
 - 9. Drawing number and detail references, as appropriate.
 - 10. Field dimensions and conditions, as appropriate.
 - 11. Contractor's suggested resolution. If Contractor's solution(s) impacts the date of Substantial Completion or the Contract Sum, Contractor shall state impact in the RFI.
 - 12. Contractor's signature.
 - 13. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.
 - a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.
- C. RFI Forms: The Owner's Contract Manager-generated form with substantially the same content as indicated above.
- D. Design Professional's Action: The Design Professional will review each RFI, determine action required, and respond. Allow a reasonable amount of working days for the Design Professional's response for each RFI. RFIs received by the Design Professional after 1:00 p.m. will be considered as received the following working day.

- 1. The following RFIs will be returned without action:
 - a. Requests for approval of submittals.
 - b. Requests for approval of substitutions.
 - c. Requests for coordination information already indicated in the Contract Documents.
 - d. Requests for adjustments in the date for Substantial Completion or the Contract Sum.
 - e. Requests for interpretation of the Design Professional's actions on submittals.
 - f. Incomplete RFIs or inaccurately prepared RFIs.
- 2. The Design Professional's action may include a request for additional information, in which case the Design Professional's time for response will date from time of receipt of additional information.
- 3. The Design Professional's action on RFIs that may result in a change to the date of Substantial Completion or the Contract Sum may be eligible for the Contractor to submit a Claim in accordance with procedures in General Conditions, Article 10 Claims and Disputes.
 - a. If the Contractor believes the RFI response warrants change in the date of Substantial Completion or the Contract Sum, notify the Owner in writing within fifteen (15) days of receipt of the RFI response.
- E. On receipt of the Design Professional's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify the Owner and Design Professional within five days if the Contractor disagrees with response.
- F. RFI Log: Coordinate and cooperate with the Owner to prepare, update and maintain the use of the Contract Manager RFI log. The RFI log will include not less than the following:
 - 1. Project name.
 - 2. Name and address of Contractor.
 - 3. Name and address of Design Professional.
 - 4. RFI number including RFIs that were dropped and not submitted.
 - 5. RFI description.
 - Date the RFI was submitted.
 - 7. Date Design Professional's response was received.
 - 8. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.
 - 9. Identification of related Field Order, Work Change Directive, and Proposal Request, as appropriate.

1.08 CONTRACT MANAGER SOFTWARE SITE

- A. Coordinate and cooperate with the Owner for managing project communication and documentation until Contract Closeout. The Contract Manager software site may include, but is not limited to, the following functions:
 - 1. Project directory.
 - 2. Project correspondence.
 - 3. Meeting minutes.
 - 4. Contract modifications forms and logs.
 - 5. RFI forms and logs.
 - 6. Task and issue management.

- 7. Submittals forms and logs.
- 8. Payment application forms.
- 9. Online document collaboration.
- 10. Reminder and tracking functions.
- 11. Archiving functions.

1.09 PROJECT MEETINGS

- A. General: The Owner and/or Design Professional will schedule and conduct meetings at the Project site, unless otherwise indicated.
 - 1. Attendees: The Owner and/or Design Professional will inform participants and others involved, and individuals whose presence is required, of date and time of each meeting.
 - 2. Agenda: The Owner and/or Design Professional will prepare the meeting agenda through the use of the Owner's Contract Manager software and distribute the agenda to all invited attendees.
 - 3. Minutes: The Owner and/or Design Professional will record significant discussions and agreements achieved in Contract Manager and distribute the meeting minutes to everyone concerned.
- B. Construction Kick-off Meeting: The Owner will schedule and conduct a construction kick-off meeting before starting construction, at a time convenient to the Owner and Design Professional, upon issuance of the Notice to Proceed.
 - 1. The meeting shall review responsibilities and personnel assignments.
 - 2. Attendees: The Owner, Owner's Commissioning Authority, Design Professional, and their consultants; the Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the meeting shall be familiar with the Project and authorized to make binding decisions on matters relating to the Work.
 - 3. Agenda: The meeting agenda will include items of significance that could affect progress, including the following:
 - a. Tentative construction schedule.
 - b. Phasing.
 - c. Critical work sequencing and long-lead items.
 - d. Designation of key personnel and their duties.
 - e. Lines of communications.
 - f. Procedures for processing field decisions and Change Orders.
 - g. Procedures for RFIs.
 - h. Procedures for testing and inspecting.
 - i. Procedures for processing Applications for Payment.
 - j. Distribution of the Contract Documents.
 - k. Submittal procedures.
 - I. Sustainable design requirements.
 - m. Preparation of As-builts and turnover documents.
 - n. Use of the premises.
 - o. Work restrictions.
 - p. Working hours.
 - q. Owner's occupancy requirements.
 - r. Responsibility for temporary facilities and controls.
 - s. Procedures for moisture and mold control.
 - t. Procedures for disruptions and shutdowns.
 - u. Construction waste management and recycling.
 - v. Parking availability.

- w. Office, work, and storage areas.
- x. Equipment deliveries and priorities.
- y. First aid.
- z. Security.
- aa. Progress cleaning.
- bb. Safetv.
- 4. Minutes: The Owner and/or Design Professional will use Contract Manager to record and distribute meeting minutes.
- C. Progress Meetings: The Owner will conduct progress meetings at regular intervals.
 - 1. Coordinate dates of meetings with preparation of payment requests.
 - Attendees: The Owner's Commissioning Authority, and Design Professional, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meeting shall be familiar with the Project and authorized to make binding decisions on matters relating to the Work.
 - 3. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of the Project.
 - a. The Project Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to the Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
 - 1) Review schedule for next scheduled progress meeting period.
 - b. Review present and future needs of each entity present, including the following:
 - 1) Interface requirements.
 - 2) Sequence of operations.
 - 3) Status of submittals.
 - 4) Deliveries.
 - 5) Off-site fabrication.
 - 6) Access.
 - 7) Site utilization.
 - 8) Temporary facilities and controls.
 - 9) Progress cleaning.
 - 10) Quality and work standards.
 - 11) Status of correction of deficient items.
 - 12) Field observations.
 - 13) Status of RFIs.
 - 14) Status of proposal requests.
 - 15) Pending changes.
 - 16) Status of Change Orders.
 - 17) Pending claims and disputes.
 - 18) Documentation of information for payment requests.
 - 4. Minutes: The Owner and/or Design Professional entity responsible for conducting the meeting will use Contract Manager to record and distribute the meeting minutes to each party present and to parties requiring information.

- a. Schedule Updating: Coordinate with the Owner to revise the Project Schedule after each progress meeting where revisions to the schedule have been made or recognized. The Owner will issue revised schedule concurrently with the report of each meeting.
- D. Preinstallation Meetings: The Owner may conduct preinstallation meetings at the Project site before each construction activity that requires coordination with other construction and major assemblies of the Work requiring tight control and coordination.
 - Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow shall attend the meeting. The Owner to advise the Contractor, Design Professional and Owner's Commissioning Authority of scheduled meeting dates.
 - 2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:
 - Contract Documents.
 - b. Options.
 - c. Related RFIs.
 - d. Related Change Orders.
 - e. Purchases.
 - f. Deliveries.
 - g. Submittals.
 - h. Review of mockups.
 - i. Possible conflicts.
 - j. Compatibility problems.
 - k. Time schedules.
 - I. Weather limitations.
 - m. Manufacturer's written recommendations.
 - n. Warranty requirements.
 - o. Compatibility of materials.
 - p. Acceptability of substrates.
 - g. Temporary facilities and controls.
 - r. Space and access limitations.
 - s. Regulations of authorities having jurisdiction.
 - t. Testing and inspecting requirements.
 - u. Installation procedures.
 - v. Coordination with other work.
 - w. Required performance results.
 - x. Protection of adjacent work.
 - y. Protection of construction and personnel.
 - 3. The Owner and/or Design Professional will use Contract Manager to record significant meeting discussions, agreements, and disagreements, including required corrective measures and actions.
 - 4. Reporting: The Owner and/or Design Professional will distribute minutes of the meeting to each party present and to other parties requiring information.
 - 5. Do not proceed with installation if the meeting cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the meeting at earliest feasible date.
- E. Project Closeout Conference: The Owner may schedule and conduct a Project closeout conference, at a time convenient to the Owner and Design Professional, but no later than sixty (60) days prior to the scheduled inspection date for Substantial Completion.

- 1. The Owner will conduct the conference to review requirements and responsibilities related to the Project closeout.
- 2. Attendees: The Owner, Owner's Commissioning Authority, Design Professional, and their consultants; the Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the meeting. Participants at the meeting shall be familiar with the Project and authorized to make binding decisions on matters relating to the Work.
- 3. Agenda: Discuss items of significance that could affect or delay the Project closeout, including the following:
 - a. Submission of turnover documents.
 - b. Procedures required prior to inspection for Substantial Completion and for final inspection for acceptance.
 - c. Requirements for demonstration and training.
 - d. Preparation of Contractor's punch list.
 - e. Procedures for processing Applications for Payment at Substantial Completion and for final payment.
 - f. Coordination of separate contracts.
 - g. Owner's partial occupancy requirements.
 - h. Installation of Owner's furniture, fixtures, and equipment.
 - i. Responsibility for removing temporary facilities and controls.
- 4. Minutes: The Owner and/or Design Professional conducting meeting will use Contract Manager to record and distribute meeting minutes.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 31 00

SECTION 01 32 00 - PROJECT SCHEDULING AND PROGRESS DOCUMENTATION - CONSTRUCTION MANAGER AT RISK

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. The Contract Documents, including but not limited to, the Drawings and individual Specification Sections and Bid Milestone Schedule, apply to this Section.

1.02 SUMMARY

- A. This is a Construction Manager at Risk (CMR) contract therefore the CMR is responsible for the scheduling and documentation requirements outlined in this Section 01 32 00. The terms "contractor" and CMR are interchangeable in this Section 01 32 00.
- B. Section includes administrative and procedural requirements to plan, schedule and document the progress of construction during the performance of the Work, including the following:
 - 1. Critical Path Method (CPM) schedule and reports.
 - 2. Material location reports.
 - 3. Field condition reports.`
 - 4. Special reports.

C. Related Sections:

- 1. Section 01 12 00 Contract Summary of Work, for preparing a combined CPM Schedule.
- 2. Section 01 33 00 Submittal Procedure, for submitting schedules and reports.
- 3. Section 01 40 00 Quality and Code Requirements, for submitting a schedule of tests and inspections.

1.03 <u>DEFINITIONS</u>

- A. Project: Work at the Site carried out pursuant to one or more Contracts.
- B. Activity: A discrete part of the Contract that can be identified for planning, scheduling, monitoring, and controlling the Project. Activities included in a CPM schedule consume time and resources.
 - 1. Critical Activity: An activity on the critical path that has no total float.
 - 2. Predecessor Activity: An activity that precedes another activity in the network.
 - 3. Successor Activity: An activity that follows another activity in the network.
- C. Bid Milestone Schedule: Interim milestones, included in the Contract Documents, which the Contractor utilizes to formulate the Baseline Schedule.
- D. Baseline Schedule: Initial schedule, prepared by the Contractor, to complete the Work of the Contract in accordance with the Contract duration and starting point to which schedule updates are compared.

- E. CPM: Critical Path Method is a scheduling method used to plan and schedule construction projects where activities are arranged based on activity relationships creating a time scaled network diagram.
- F. PDM: Precedence Diagram Method follows the standard CPM calculations and allows for special logic relationships creating an interdependent relationship throughout the network.
- G. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no total float.
- H. Data Date: The date when the status of the CPM schedule is determined, showing the calendar start date for the update period.
- I. Float: The measure of leeway in starting and completing an activity.
 - 1. Float time is not for the exclusive use or benefit of either the Owner or Contractor, but is a jointly owned, expiring Project resource available to both parties as needed to meet schedule milestones and Substantial Completion date.
 - 2. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the successor activity.
 - 3. Total float is the measure of leeway in starting or completing an activity without adversely affecting the planned Substantial Completion date.

1.04 <u>INFORMATIONAL SUBMITTALS</u>

- A. Format for Submittals: Submit required submittals in both electronic (PDF) file format and as electronic backup file in native software format.
- B. CPM Schedule: Schedule, of size required to display entire schedule for entire construction period.
 - 1. Submit a working electronic copy of schedule, using software indicated, and labeled to comply with requirements for submittals. Include type of schedule (baseline or updated) and date on label.
- C. CPM Reports: Concurrent with CPM schedule, submit each of the following reports. Format for each activity in reports shall contain; activity ID number, activity description, original duration, remaining duration, actual duration, early and late start and finish dates and total float in calendar days.
 - 1. Activity Report: List of all activities sorted by early or actual start date in each phase, area and level following the physical divisions of the Work.
 - 2. Short Term Activity Report: Lists all activities occurring from the update data date in a two month forward and one month back window.
 - 3. Logic Report: List of preceding and succeeding activities for all activities, sorted in ascending order by early or actual start date. Include activity ID number and float path(s).
 - 4. Total Float Report: Provide a cumulative list of total float from each update period with comments associated to any and all variances.
 - 5. Procurement Report: List all procurement activities sorted in order of the item being procured.
 - 6. Narrative Report: The project scheduler shall describe the nature of the submission, interpretation of calculations, issues affecting progress and a milestone analysis comparing progress against the baseline and update schedules.

- D. Material Location Reports: Submit at monthly intervals.
- E. Field Condition Reports: Submit at time of discovery of differing conditions.
- F. Special Reports: Submit at time of unusual event.
- G. Qualification Data: For project scheduler.

1.05 QUALITY ASSURANCE

- A. Project Scheduler Qualifications: An experienced specialist in CPM scheduling and reporting, with capability of producing CPM reports and diagrams within timeframes requested by the Owner. The project scheduler shall have or be able to obtain certification as a Planning and Scheduling Professional (PSP) or have a minimum of five years of demonstrated experience scheduling large capital projects.
- B. Prescheduling Conference: The Owner may conduct conference at the Project site to comply with requirements in Section 01 31 00 Project Management and Coordination. Review methods and procedures related to the Baseline Schedule and the CPM schedule, including, but not limited to, the following:
 - 1. Review software limitations and content and format for reports.
 - 2. Verify availability of qualified personnel needed to develop and update schedule.
 - 3. Discuss coordination, including phasing, work stages, area separations, interim milestones and Beneficial Occupancy.
 - 4. Review delivery dates for Owner-furnished products.
 - 5. Review schedule for work of Owner's separate contracts.
 - 6. Review time required for review of submittals and resubmittals.
 - 7. Review requirements for tests and inspections by independent testing and inspecting agencies.
 - 8. Review time required for completion and startup procedures.
 - 9. Review and finalize list of construction activities to be included in schedule.
 - 10. Review submittal requirements and procedures.
 - 11. Review procedures for updating schedule.

1.06 COORDINATION

- A. Coordinate preparation and processing of CPM schedules and reports with the performance of the Work and with CPM scheduling and reporting of separate Contractors.
 - 1. Coordinate new Baseline Schedules and CPM schedule updates with separate Contractor's when additional Contracts are executed during the entire duration of the Project.
- B. Coordinate CPM schedule with the Contractor's Submission Schedule, progress reports, and other required schedules and reports.
 - 1. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

PART 2 - PRODUCTS

2.01 CRITICAL PATH METHOD SCHEDULE, GENERAL

- A. Bid Milestone Schedule: The Owner shall provide a Bid Milestone Schedule, which is attached to this section as a template for the Baseline Schedule. Nothing in the Bid Milestone Schedule, Baseline Schedule or CPM schedule shall preclude the Contractor from advancing the Work of the Contract.
 - 1. Include milestones indicated in the Contract Documents in Baseline Schedule, including, but not limited to, the Notice to Proceed, interim milestones, Substantial Completion, and Contract close-out.
 - 2. Substantial Completion date shall not be changed by submission of a schedule that shows an early completion date, unless approved by the Owner.
 - 3. No time for weather will be apportioned for foreseeable occurrences in a specific regional area. The Contractor shall be responsible to determine reasonable averages and make allowances in the performance of the Work.
- B. Activities: Treat each numbered activity as a consumable resource for each principal element of the Work. Comply with the following:
 - 1. Activity Duration: Define activities so no activity is longer than 15 days, unless specifically allowed by the Owner.
 - 2. Procurement Activities: Include procurement process activities for long lead items and major items, requiring a cycle of more than 60 days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.
 - 3. Submittal Review Time: Include review and resubmittal times indicated in Section 01 33 00 Submittal Procedures in schedule. Coordinate submittal review times in the CPM schedule with dates entered in the Contractor's Submission Schedule.
 - 4. Startup and Testing Time: Include not less than 15 days for startup and testing.
 - 5. Substantial Completion: Indicate completion on the date established for Substantial Completion, and allow time for the Owner's administrative procedures necessary to execute the Notice of Substantial Completion (NOSC).
 - 6. Incomplete Work items and Contract Closeout: Include not more than 60 days for incomplete Work items and Contract Closeout Requirements.
- C. Constraints: Include constraints and work restrictions indicated in the Contract Documents, or approved by the Owner prior to use and show how date constraints affect the sequence of the Work.
 - Construction Areas: Identify each major area of construction for each major portion of the Work. Indicate where each construction activity within a major area must be sequenced or integrated with other construction activities.
- D. Upcoming Work Summary: Prepare summary report indicating activities scheduled to occur or commence prior to submittal of next schedule update. Summarize the following issues:
 - 1. Unresolved issues.
 - Unanswered RFIs.
 - 3. Rejected or unreturned submittals.
 - 4. Notations on returned submittals.

- E. Recovery CPM Schedule: When periodic update indicates the Work is 15 or more calendar days behind the current approved CPM schedule, submit a separate recovery CPM schedule indicating means by which the Contractor intends to regain compliance with the CPM schedule. Indicate changes to working hours, working days, crew sizes, and equipment required achieving compliance, and dating by which recovery will be accomplished, subject to Owner's approval.
- F. Computer Scheduling Software: Prepare CPM schedules using current version of a program that has been developed specifically to manage CPM schedules and interface with the Owner's electronic file of the Bid Milestone Schedule.
 - 1. Utilize Primavera P6 or P3 Primavera Project Planner operating system.

2.02 CRITICAL PATH METHOD SCHEDULE (CPM SCHEDULE)

- A. Baseline Schedule: Prepare schedule using a time-scaled PDM network diagram representing the Work of the Contract. Total float time shall be equal to or greater than zero in the Baseline Schedule.
 - 1. Submit Baseline Schedule within 15 days of the date established for the Notice to Proceed. Outline significant construction activities for the first 90 days of construction. Include skeleton diagram for the remainder of the Work based on indicated activities.
 - 2. Develop network diagram in sufficient time to submit Baseline Schedule so it can be accepted for use no later than 30 days after date established for the Notice to Proceed.
 - a. Failure to include any work item required for the performance of the Work shall not excuse the Contractor from completing the Work of the Contract within applicable completion dates, regardless of the Owner's approval of the schedule.
- B. CPM Schedule: Prepare contemporaneous schedules using a time-scaled PDM network for sequencing the Work and showing the progress of the Work.
 - 1. Establish procedures for monitoring and updating the CPM schedule and for reporting progress. Coordinate procedures with the progress meeting and payment request date.
 - 2. Coordinate the Work occurring concurrently through the integration of other Contractors Baseline Schedules into the CPM schedule.
 - 3. Conduct educational workshops to train and inform the Contractor's key Project personnel, including subcontractors' personnel, in proper methods of providing data and using CPM schedule information.
 - 4. Use "one workday" as the unit of time for individual activities. Indicate nonworking days and holidays incorporated into the schedule in order to correlate with Contract durations.
- C. CPM Schedule Preparation: Prepare a list of all activities required to complete the Work of the Contract. At minimum, each individual specification section, including General Requirement sections, as indicated in the Project Manual, shall be listed as an activity.
 - 1. Activities ID: Provide a unique identifier to each activity. No activity ID shall be recycled or reused.
 - 2. Activities: Indicate the estimated time duration, sequence requirements, and relationship of each activity in relation to other activities. Include estimated time frames for the following activities:
 - a. Preparation and processing of submittals.
 - b. Mobilization and demobilization.
 - c. Purchase of materials.

- d. Delivery.
- e. Fabrication.
- f. Utility interruptions.
- g. Installation.
- h. Work by Owner that may affect or be affected by the Contractor's activities.
- i. Testing and commissioning.
- j. Incomplete Work items and Contract closeout.
- 3. Actual Activity Dates: Once an activity has been assigned an actual date of occurrence, the status of that activity shall not change. Any change to actual dates must be accompanied with supporting data and approved by the Owner. No actual start date shall occur ahead of the data date.
- 4. Critical Path Activities: Identify critical path activities, including those for interim completion dates. Scheduled start and completion dates shall be consistent with the Bid Milestone Schedule dates.
- 5. Processing: Process data to produce output data status on a computer-drawn, PDM network. Revise data, reorganize activity sequences, and reproduce as often as necessary to produce the CPM schedule within the limitations of the Contract duration.
- 6. Calculations: The schedule network shall be calculated allowing activities to retain their original logic. Progress override shall not be used when calculating the network status.
- 7. Logic: Leads and lags will not be used when the creation of an activity will perform the same function. Lag durations contained in the schedule shall not have negative value. Lead and lag durations shall not exceed the durations of the activity they are assigned.
 - a. There shall be only two open ended activities; (1) Notice to Proceed, with no predecessor logic, and (2) Final Payment, with no successor logic. All intermediate activity logic shall be connected.
 - b. Out of sequence activities that have progressed before all preceding logic will be allowed only on a case by case basis, as approved by the Owner. The Contractor shall propose logic corrections to eliminate all out of sequence progress and correct out of sequence progress that continues for more than two update cycles by logic revisions, as approved by the Owner.
- 8. Float: The Owner shall reject the schedule and schedule updates for the use of float suppression techniques such as preferential sequencing, special lead lags logic constraints, zero total or zero free float constraints, extended activity times, or imposing constraint dates other than what is required by the Contract.
 - a. The use of resource leveling used for the purpose of artificially adjusting activity durations to consume float and influence the critical path is prohibited.
 - b. A schedule showing work completing in less time than the Contract duration and accepted by the Owner, will be considered to have float.
 - c. Any float generated during the performance of the Work, due to efficiencies of the Owner or any Contractor is not for sole use of the party generating the float.
 - d. Negative float will not be a basis for requesting time extensions and will not be construed as a means of acceleration or schedule extension.
- Format: Follow the applicable individual specification sections of the Work as the bases for the content of the CPM schedule. Organize the CPM schedule to provide the necessary detail for each area, level, quadrant and section as needed in the performance of the Work.
- D. Changes in the Work: For each proposed change and concurrent with its submission, prepare a time-impact analysis using a network fragment to demonstrate the effect of the proposed change on the overall CPM schedule.

- E. Schedule Updating: Concurrent with making revisions to schedule, prepare tabulated reports showing the following:
 - 1. Identification of activities that have changed, including the reason each adjustment was necessary.
 - 2. Changes in early and late finish dates.
 - 3. Changes in activity durations in workdays.
 - 4. Changes in the critical path.
 - 5. Changes in total float or slack time.
 - 6. Changes in the duration for Substantial Completion.

2.03 REPORTS

- A. Material Location Reports: At monthly intervals, prepare and submit a comprehensive list of materials delivered to and stored at Project site. List shall be cumulative, showing materials previously reported plus items recently delivered. Include with list a statement of progress on and delivery dates for materials or items of equipment fabricated or stored away from Project site.
- B. Field Condition Reports: Immediately on discovery of a difference between field conditions and the Contract Documents, prepare and submit a detailed report. Submit with a Request for Information. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

2.04 SPECIAL REPORTS

- A. General: Submit special reports directly to Owner within one day of an occurrence. Distribute copies of report to parties affected by the occurrence.
- B. Reporting Unusual Events: When an event of an unusual and significant nature occurs at Project site, whether or not related directly to the Work, prepare and submit a special report. List chain of events, persons participating, and response by Contractor's personnel, evaluation of results or effects, and similar pertinent information. Advise the Owner in advance when these events are known or predictable.

PART 3 - EXECUTION

3.01 CPM SCHEDULE

- A. Project Scheduler: Engage a consultant or person skilled in construction planning and scheduling to provide planning, scheduling, evaluation, and reporting services using CPM scheduling.
 - 1. In-House Option: The Owner may waive the requirement to retain a consultant if Contractor employs skilled personnel with experience in CPM scheduling and reporting techniques. Submit qualifications.
 - 2. Meetings: Project scheduler shall attend all meetings related to the Project progress, alleged delays, and time impact.

- B. CPM Schedule and CPM Reports Updating: Prior to each scheduled progress meeting, update schedule to reflect actual construction progress and activities. Issue schedule and reports one week before each regularly scheduled progress meeting.
 - 1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the CPM reports of each such meeting. As a minimum, schedule update submissions shall occur monthly and within 30 days of the schedule Data Date.
 - 2. Include CPM reports with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
 - 3. As the Work progresses, indicate final remaining duration for each activity.
- C. Distribution: Submit one electronic copy, in format specified, to the Owner and distribute copies of approved schedule and reports to the Owner, Design Professional, separate contractors, testing and inspecting agencies, and other parties identified by the Owner with a need-to-know schedule responsibility.
 - 1. Post copies in Project meeting rooms and temporary field offices.
 - When revisions are made, distribute updated schedules and reports to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

END OF SECTION 01 32 00

SECTION 01 33 00 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. The Contract Documents, including but not limited to, the Drawings and individual Specification Sections and Contractor's Submission Schedule, apply to this Section.

1.02 SUMMARY

A. Section includes requirements for the submittal schedule and administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.

B. Related Sections:

- 1. Section 01 32 00 Construction Progress Documentation, for submitting schedules and reports, includes Contractor's construction schedule.
- 2. Section 01 77 00 Contract Closeout Requirements, for documents required to closeout
- 3. Section 01 78 23 Operation and Maintenance Manuals, for submitting operation and maintenance manuals.

1.03 DEFINITIONS

- A. Action Submittals: Written and graphic information and physical samples that require the Design Professional's responsive action. Action submittals are those submittals indicated in individual specification sections as action submittals.
- B. Informational Submittals: Written and graphic information and physical samples that do not require the Design Professional's responsive action. Submittals may be rejected for not complying with requirements. Informational submittals are those submittals indicated in individual specification sections as informational submittals.
- C. Portable Document Format (PDF): An open standard file format licensed by Adobe Systems used for representing documents in a device-independent and display resolution-independent fixed-layout document format.
- D. Required Submittal List Utility application: Interacts with and to be used with the Owner's Contract Manager system. The Design Professional uses the utility to itemize the list of submission items needed to be submitted by the Contractor in order to insure the design intent will be satisfied and inclusive of all Project turnover documents and/or Contract Closeout Requirements.
- E. Contractor's Submission Schedule: The itemized list of project submission requirements printed as a report from Contract Manager. The Contractor enters the date each item needs to be submitted in order to meet the CPM schedule and returns this document to the Owner.

1.04 ACTION SUBMITTALS

- A. Submittal Schedule: The Contractor's Submission Schedule is attached to this section, prepared by the Design Professional. The Contractor is to coordinate and cooperate with the Owner and Design Professional to arrange in chronological order by dates required by the construction schedule. Coordinate time required for review, ordering, manufacturing, fabrication, and delivery to establish dates. Coordinate additional time required for making corrections or modifications to submittals noted by the Design Professional and additional time for handling and reviewing submittals required by those corrections.
 - 1. Coordinate the Contractor's Submission Schedule with list of subcontracts, the schedule of values, and coordinated CPM schedule.
 - 2. Initial Submittal: Submit in accordance with start-up CPM schedule. Include submittals required during the first 60 days of construction. List those submittals required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.
 - 3. Final Submittal: Submit concurrently in accordance with the complete CPM schedule.
 - a. Coordinate with the Owner and Design Professional revised Contractor's Submission Schedule to reflect changes in current status and timing for submittals.
- B. Format for Submittals: Submit required submittals in electronic (PDF) file format.

1.05 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

- A. Design Professional's Digital Data Files: Electronic copies of CAD Drawings of the Contract Drawings will not be provided by the Design Professional for the Contractor's use in preparing submittals.
- B. Coordination: Coordinate preparation and processing of submittals with the performance of the Work.
 - 1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
 - 2. Commissioning Authority will review submittals applicable to systems being commissioned for compliance with commissioning needs, concurrent with the Design Professional review and approval.
 - 3. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
 - 4. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
 - 5. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
 - a. Submit Operation and Maintenance Manuals concurrent with action submittal.
 - b. The Owner or Design Professional reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- C. Processing Time: Allow time for submittal review, including time for re-submittals, as follows. Time for review shall commence on the Design Professional's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including re-submittals.

- 1. Initial Review: Allow 15 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. The Design Professional will advise the Contractor when a submittal being processed must be delayed for coordination.
- 2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
- 3. Re-submittal Review: Allow 15 days for review of each re-submittal.
- 4. Sequential Review: Where sequential review of submittals by the Design Professional's consultants, the Owner, or other parties is indicated, allow 21 days for initial review of each submittal.
- D. Identification and Information: Place a permanent label or title block on each paper copy submittal item for identification.
 - 1. Indicate name of firm or entity that prepared each submittal on label or title block.
 - 2. Provide a space approximately 6 by 8 incheson label or beside title block to record Contractor's review and approval markings and action taken by the Design Professional.
 - 3. Include the following information for processing and recording action taken:
 - a. Project name.
 - b. Date.
 - c. Name of Design Professional.
 - d. Name of Construction Manager (if applicable).
 - e. Name of Contractor.
 - Name of subcontractor.
 - g. Name of supplier.
 - h. Name of manufacturer.
 - i. Submittal number including revision identifier.
 - 1) Submittal number shall be the submittal item number and Submittal Package number designated in the Contractor's Submission Schedule.
 - j. Drawing number and detail references, as appropriate.
 - k. Location(s) where product is to be installed, as appropriate.
 - Other necessary identification.
- E. Identification and Information: Identify and incorporate information in each electronic submittal file as follows:
 - 1. Assemble complete submittal package into a single indexed file with links enabling navigation to each item.
 - 2. Name file with submittal number or other unique identifier, including revision identifier.
 - 3. Provide means for insertion to permanently record the Contractor's review and approval markings and action taken by the Design Professional.
 - 4. Include the following information on an inserted cover sheet:
 - a. Project name.
 - b. Date.
 - c. Name and address of Design Professional.
 - d. Name of Construction Manager (if applicable).
 - e. Name of Contractor.
 - f. Name of firm or entity that prepared submittal.
 - g. Name of subcontractor.
 - h. Name of supplier.
 - i. Name of manufacturer.
 - j. Number and title of appropriate Specification Section.
 - k. Drawing number and detail references, as appropriate.

- I. Location(s) where product is to be installed, as appropriate.
- m. Related physical samples submitted directly.
- n. Other necessary identification.
- 5. Include the following information as keywords in the electronic file metadata:
 - a. Project name.
 - b. Number and title of appropriate Specification Section.
 - c. Manufacturer name.
 - d. Product name.
- F. Options: Identify options requiring selection by the Design Professional.
- G. Deviations: Identify deviations from the Contract Documents on submittals.
- H. Additional Copies: Unless the Design Professional observes noncompliance with provisions in the Contract Documents, initial submittal may serve as final submittal.
- I. Transmittal: Assemble each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. The Design Professional will return submittals, without review, received from sources other than the Contractor.
 - 1. Transmittal Form: Use the Contractor's office form.
 - 2. Transmittal Form: Provide locations on form for the following information:
 - a. Project name.
 - b. Date.
 - c. Destination (To:).
 - d. Source (From:).
 - e. Names of subcontractor, manufacturer, and supplier.
 - f. Category and type of submittal.
 - g. Submittal purpose and description.
 - h. Specification Section number and title.
 - i. Indication of full or partial submittal.
 - j. Drawing number and detail references, as appropriate.
 - k. Transmittal numbered consecutively.
 - I. Submittal and transmittal distribution record.
 - m. Remarks.
 - n. Signature of transmitter.
 - On an attached separate sheet, prepared on the Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by the Design Professional on previous submittals, and deviations from requirements in the Contract Documents, including minor variations and limitations. Include same identification information as related submittal.
- J. Re-submittals: Make re-submittals in same form and format.
 - 1. Note date and content of previous submittal.
 - 2. Note date and content of revision in label or title block and clearly indicate extent of revision.
 - 3. Resubmit submittals until they are marked with approval notation from the Design Professional's action stamp.

- K. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, and installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.
- L. Use for Construction: Use only final submittals that are marked with approval notation from the Design Professional's action stamp.

PART 2 - PRODUCTS

2.01 SUBMITTAL PROCEDURES

- A. General Submittal Procedure Requirements: Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.
 - 1. Submit electronic submittals via email as electronic (PDF) files, to the Design Professional. If applicable, the Design Professional will forward submittals to the Commissioning Authority for systems being commissioned. The Owner may request paper copies of certain submittals for onsite coordination.
 - a. The Design Professional, through the Owner, will return annotated file. Annotate and retain one copy of file as an electronic Project turnover document file.
 - b. The Commissioning Authority through the Design Professional will return annotated file.
 - 2. Operation and Maintenance Manual Submittals: Submit concurrent with the Action Submittal, as related in individual Specification Sections.
 - 3. Closeout Submittals: Comply with requirements specified in Section 01 77 00 Contract Closeout Requirements and as listed in the Contractor's Submission Schedule.
 - 4. Permits, Certificates and Certifications Submittals: Provide a statement that includes signature of entity responsible for preparing certification. Permits, Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.
- B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
 - 1. If information must be specially prepared for submittal because standard published data are not suitable for use, submit as Shop Drawings, not as Product Data.
 - 2. Mark each copy of each submittal to show which products and options are applicable.
 - 3. Include the following information, as applicable:
 - a. Submittal Package number and Submittal Item number.
 - b. Manufacturer's catalog cuts.
 - c. Manufacturer's product specifications.
 - d. Standard color charts.
 - e. Statement of compliance with specified referenced standards.
 - f. Testing by recognized testing agency.
 - g. Application of testing agency labels and seals.
 - h. Notation of coordination requirements.
 - i. Availability and delivery time information.
 - 4. For equipment, include the following in addition to the above, as applicable:

- a. Wiring diagrams showing factory-installed wiring.
- b. Printed performance curves.
- c. Operational range diagrams.
- d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.
- 5. Submit Product Data concurrent with Samples.
- 6. Submit Product Data in electronic (PDF) file format.
- C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.
 - 1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
 - a. Submittal Package number and Submittal Item number.
 - b. Identification of products.
 - c. Schedules.
 - d. Compliance with specified standards.
 - e. Notation of coordination requirements.
 - f. Notation of dimensions established by field measurement.
 - g. Relationship and attachment to adjoining construction clearly indicated.
 - h. Seal and signature of professional engineer if specified.
 - 2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inchesbut no larger than 30 by 42 inches.
- D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.
 - 1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
 - 2. Identification: Attach label on unexposed side of Samples that includes the following:
 - a. Submittal Package number and Submittal Item number.
 - b. Generic description of Sample.
 - c. Product name and name of manufacturer.
 - d. Sample source.
 - e. Number and title of applicable Specification Section.
 - 3. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
 - a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
 - b. Samples not incorporated into the Work, or otherwise designated as the Owner's property, are the property of the Contractor.
 - 4. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.

- a. Number of Samples: For turnover purpose, submit six full sets of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. The Design Professional, through the Owner, will return submittal with options selected.
- 5. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.
 - a. Number of Samples: Submit six sets of Samples. The Design Professional, through the Owner, will retain two Sample sets; remainder will be returned. Mark up and retain one returned Sample set as a turnover sample.
 - 1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
 - 2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least six sets of paired units that show approximate limits of variations.
- E. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:
 - 1. Name, address, and telephone number of entity performing subcontract or supplying products.
 - 2. Number and title of related Specification Section(s) covered by subcontract.
 - 3. Drawing number and detail references, as appropriate, covered by subcontract.
 - 4. Submit subcontract list in PDF electronic file, to the Owner.
- F. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of architects and owners, and other information specified.
- G. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification and Procedure Qualification Record on American Welding Society (AWS) forms. Include names of firms and personnel certified.
- H. OSHA Certificates: Upon the Owner's request, submit certificates of the OSHA 10-hour Construction Safety and Health Course S1537-A, for all laborers, workers and mechanics working on site.
- I. Installer Certificates: Upon the Owner's request, submit written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.
- J. Manufacturer Certificates: Upon the Owner's request, submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.

- K. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
- L. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.
- M. Field Test Reports: Submit reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.

PART 3 - EXECUTION

3.01 CONTRACTOR'S REVIEW

- A. Action and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to the Design Professional.
- B. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of the Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

3.02 DESIGN PROFESSIONAL'S ACTION

- A. General: The Design Professional will not review submittals that do not bear the Contractor's approval stamp and will return them without action.
- B. Action Submittals: The Design Professional will review each submittal, make marks to indicate corrections or modifications required, and return it through the Owner. The Design Professional will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action.
- C. Informational Submittals: The Design Professional will review each submittal and will return it if it does not comply with requirements.
- D. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from the Design Professional.
- E. Incomplete submittals are not acceptable, will be considered nonresponsive, and will be returned without review.
- F. Submittals not required by the Contract Documents may not be reviewed and may be discarded.
- G. On projects that have commissioning, the Commissioning Authority will receive copies of the submittals through the Design Professional and will provide comments on the submittals via the Design Professional.

3.03 CONTRACTOR'S SUBMITTAL SCHEDULE

A. The Contractor's Submission Schedule: The Contractor's Submission Schedule, prepared by the Design Professional is attached following the end of this section. The Contractor shall provide the dates each item needs to be submitted to the Owner no later than 30 days after approval of CPM schedule. The schedule shall include the date of all shop drawings, samples, materials that shall be submitted and the date approval is required. The Contractor shall adhere to the submittal processing time as describe in paragraph 1.5 above when developing the submittal schedule. The Contractor is to coordinate and cooperate with the Owner and Design Professional to complete scheduling in accordance with the approved CPM schedule.

END OF SECTION 01 33 00

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	018113	Additional LEED Submittals														
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	018113	LEED Documentation Submittals		╁			H		Н	\vdash		-		\vdash	+	
	018113	Low Emitting Materials														
	020860	Valid Waste Transporter Permit														
	020860	Verification That Designated Disposal Site is Authorized														
	020860	Employee Training & Certification Docs														
	020860	Logs,Haz Wase Determination, Manifest, Trip Tickets														
	020860	Certificates					Н		Н	\vdash	+	4		\vdash	-	
	028200	Pre-Work Asbestos Submittals (Section 1.03, A)	+	-			Н		H	H	-			\vdash	-	
	028200	Project Close-out Asbestos Submittals (Section 1.03, A)		 			H		H	H	+	┪		\vdash		
	028400	Pre-Work PCB Submittals (Section 1.03, A)		H			H		H	H	+	ᅥ		\forall		
-	028400	Project Close-out PCB Submittals Section 1.03, C)					П		П	+	+ 1	寸		\Box		
	028500	Pre-Work Mold Submittals (Section 1.02, A)														
	028500	Project Close-out Mold Submittals (Section 1.02, B)														
	028700	Before Start of Universal Waste and Fluorescent Lamps Work Submittals Section 1.2, A)														

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	030130	Quality Control (Section 1.05, B, 1, a, b, c, d)									$\perp \perp$					
	030130	Employees Training Certification (Section 1.05, 2, A)									$\perp \perp$					
	030130	Post Lead Related Activity (Section 1.05, 3, a, b, c, d, e)									Ш					
	030130	Certificates (Section 1.05, 4)									$\perp \perp$					
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	033000	Product Data (Section 1.03, A)									$\perp \perp$					
		Design Mixtures (Section 1.03, B)		Ш							$\downarrow \downarrow$			$oldsymbol{\downarrow}$		
		Shop Drawings (Section 1.03, C)									$\perp \perp$					
	033000	Concrete Mix Design Test Reports (Section 1.03, D)									$\perp \perp$					
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		Product Data (Section, 1.02, B, 1)									$\perp \perp$					
		Prep Instructions (Section, 1.02, B, 2)										_				
	033460	Manufacturers Information (Section, 1.02, B, 3)									$\perp \perp$					
	033460	LEED Compliance (Section, 1.02, B, 4)									$\perp \perp$					
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		Product Data (Section 1.03, A)									$\bot \bot$					
		Samples (Section 1.03, B)									$\perp \perp$					
	042000	Certificates (Section1.03, C)										+				
	055000	Product Data (Section 1.03, A)														
	055000	Shop Drawings (Section 1.03, B)														
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	061000	Product Data (Section 1.02, A)									T					
	061000	LEED Compliance (Section 1.02, B, 1)		H			H		\dashv	1	† †	十		\dagger	+	
		. , , , , , , , , , , , , , , , , , , ,		H			H		\dashv	1	† †	十		\dagger	+	
	062000	Samples (Section 1.03, A, 1, a ,b, c)	1	H			H		\dashv		† †	\dashv		\dagger	+	
		Shop Drawings (Section 1.03, B, 1&2)		П			П				† †	十		\dagger	\dagger	
	062000	LEED Compliance (Section 1.03, C, 1)									11			T		
	062000	Quartz Warranty (Section 1.06, A,1)														
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	072000	Product Data (Section 1.02, A)		П					1	1	† †	十		\dagger	\top	
		Samples (Section 1.02, B)		П			П			1	† †	1		\dagger	+	
		LEED Compliance (Section 1.02, C, 1)		П			П				† †	1		\dagger	\top	
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	075110	Product Data for all Roofing Products (Section 1.03, A)		П			П				† †	1		\dagger	+	
		Shp Drawings st 1/4" Scale (Section 1.03, B)		H			П				† †	1		\dagger	\dagger	
		Certificates (Section 1.03, C, a, b, c, d, e)		П					1	1	† †	丁		\dagger	\top	
		Certificates (Section 1.03, C, 2)		П			П				† †	十		\dagger	\dagger	
		Railing Submittals (Section 1.03, D)					П				††	十		\dagger	\dagger	
		·		\sqcap			H		\dashv		††	十		\dagger		
	078400	Product Data (Section 1.05, A)	1	\sqcap			H		\top		††	十		\dagger	\dagger	
		Design Listings (Section 1.05, B)							\top		††	十		十	\top	

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	078400	Installation Instructions (Section 1.05, C)														
	078400	Third Party Testing (Section 1.05, D) (if applicable)														
	078400	MSDS Sheets (Section 1.05, E)														
	078400	Qualification Data (Section 1.05, F)														
	078400	Quality Control Manual (Section 1.05, G)								Щ						
	078400	Firestop Schedule (Section 1.05, H)		Ш											_	
	078400	Firestop Application Log (Section 1.05, I)		Щ			<u> </u>		Щ		\bot	Ш				
	078400	Contractor Qualifications (Section 1.06, B)		Щ			<u> </u>		Ш	\square		Ш				
	078400	Mockups (Section 1.06, L) (to be located on-site)		\vdash							\perp	\vdash			_	
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-	079000	Samples (Section 1.03, A, 1&2)		lacksquare							_	\blacksquare				-
_	079000	Product Data (Section 1.03, B, 1&2)		\vdash												
	079000	LEED Compliance (Section 1.03, C, 1) Certificates and Guarantees (Section 1.06, A, B, C)		H								\vdash				
	079000	Certificates and Guarantees (Section 1.06, A, B, C)		lacksquare								+				
	081000	Shop Drawings (Section 1.03, A)		Н												+
	081000	Certification (Section 1.03, B)		\mathbf{H}							-	\vdash				
		Manufacturers Catalog (Section 1.03, C)		Н												
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	082000	Shop Drawings (Section 1.03, A)														
	082000	Certification (Section 1.03, B)														
	082000	Manufacturer's Catalog (Section 1.03, C)														
	082000	Samples (Section 1.03, D)														
	082000	Manufacturer's Guarantee (Section 1.03, E)														
	082000	LEED Compliance (Section 1.03, F)														
	082000	LEED Compliance Composite Wood (Section 1.03, G)														
	082000	Warranty (Section 1.07, A)														
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		Shop Drawings (section 1.03, A)		Ш					\square		\perp	Ш				1
-	083050	Manufacturers Catalog (Section 1.03, C)		\vdash			_		\square	\sqcup	_	\vdash		\square	\perp	
	004400	Chan Drawings (Casties 4.04 A. 400)		\vdash			-		H	$\vdash \vdash$	+	H		H	-	
	084123	Shop Drawings (Section 1.04, A, 1&2)		\vdash					H	$\vdash \vdash$		\vdash		\vdash		
	084123 084123	Product Data (Section 1.04, B, 1) Hardware Schedule (Section 1.04, C)		\vdash			\vdash		H	$\vdash \vdash$	-	\vdash		$\vdash \vdash$	-	
	084123	Samples (Section 1.04, D, 1, 2, 3)		H					H	$\vdash \vdash$	+	Н		\vdash		+
	084123	Qualification Data (Section 1.04, E)		\vdash					H	\vdash	\dashv	Н		\vdash	\dashv	+
	084123	Sample Warranties(Section 1.04, F)		H					H	\vdash	+	Н				
	084123	Maintenance Data (Section 1.04, G)		\Box					\Box		\dashv	Н				†
	084123	Maintenance Color Chart (Section 1.04, H)		П							-	П				†
	084123	Warranty (Section 1.07, A)		П					П	\Box	_	П			1	
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	087000	Hardware Schedule (Section 1.03, A, 1, 2, 3, 5)										П				
	087000	UL Label Certification (Section 1.03, B)														
	087000	Maintenance Materials (Section 1.03, C)														

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	088000 088000 088000 088000	Product Data (Section 1.04, A) Glass Samples (Section 1.04, B) Glazing Accessory Samples (Section 1.04, C) Manufacturer's Guarantee (Section 1.04, D)														
	088000	Shop Drawings (Section 1.04, E)		H					\vdash		++	-				
	088000	Qualification Data (Section 1.04, F, 1&2)		H					\vdash		+	-				
	088000	Manufacturer's Warranty (Section 1.04, G) (see 1.07)		${ m H}$					${ m H}$	\dashv	++	\dashv		H	+	
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	092310	Product Data (Section 1.03, A)		Н							+					
	092310	MSDS Sheets (Section 1.03, B)		Ħ							11					
	092500	Product Data (Section 1.06, A)									\top					
	092500	MSDS Sheets (Section 1.06, B)														
	092500	Manufacturer's Standard Warranty (Section 1.06, C)														
	092500	Samples (Section 1.06, D)									$\perp \perp$					
	092500	LEED Compliance (Section 1.06, E)		Ш												
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	093100	Product Data (Section 1.03, A)		Н					\vdash		++	4				
	093100	Samples (Section 1.03, B)		Н							++					
	093100	Maintenance Guide (Section 1.03, C)		\blacksquare					\vdash		++					
	093100 093100	LEED Submittal Req's. (Section 1.03, D, 1, 2, 3, 4,) LEED Credit Submittals (Section 1.03, E, a & b)		H					\vdash		++	-				
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	093200	Product Data (Section 1.03, A)		\mathbf{H}							++					
	093200	Samples (Section 1.03, B)		\mathbf{H}							++	_				
-	093200	Extra Stock (Section, 1.03, C)									+					
	093200	Maintenance Guide (Section 1.03, D)														
	093200	LEED Submittal Req's. (Section 1.03, E, A, B, C, D)		Ħ							\top					
	093200	LEED Credit Submittals (Section 1.03, F, 1, 2)														
	093350	Product Data (Section 1.03, A)														
	093350	Samples (Section 1.03, B)									$\perp I$			$oxed{\Box}$		
	093350	Extra Stock (Section, 1.03, C)		Ш					Щ		$\bot \bot$					
	093350	Maintenance Guide (Section 1.03, D)		Щ		1			Щ		$\bot \bot$					
	093350	LEED Submittal Req's. (Section 1.03, E, 1, 2, 3, 4)		Ш			<u> </u>		\sqcup		++	_				
	093350	LEED Credit Submittals (Section 1.03, F, a, b)		\vdash		1			\sqcup		++	_				
	005000	Deadust Date (Scaling 4.05, A)		+		1			\vdash		++	\dashv			_	<u> </u>
	095000	Product Data (Section 1.05, A)		H		1			\dashv	-	++	\dashv		$\vdash \vdash$	+	
	095000 095000	LEED Information (Section 1.05, A, a)		H					\vdash	-	++	\dashv			+	
	095000	Samples (Section 1.05, B) Shop Drawings (Section 1.05, C)		H					\dashv	-	++	\dashv		H	-	
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	095400	Product Data (Section 1.06, A)		H		1			\vdash	+	++	\dashv		H	+	
	090400	Toduct Data (Occitor 1.00, A)														

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-	095400	Samples (Section 1.06, B)														
	095400	Shop Drawings (Section 1.06, C)									_					
	095400	Warranty (Section 1.08, A)									-					
	096500	Product Data (Section 1.02, A)							\vdash	-	+			\vdash		
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	096800	Product data (Section 1.03, A)														
	096800	Samples (Section 1.02, B)														
	096800	Warranty (Section 1.03, C)														
	096800	Installation Instructions (Section (1.03, D)														
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	099000	Product Data (Section 1.03, A)														
	099000	LEED Compliance (Section 1.03, B) Samples (Section 1.03, C)														
	099000	Attic Stock (Section 1.03, D)														
		Paint Quality Verification (Section 1.03, E)														
		Sustainable Design Submittals (Section 1.03, F, 1, 2)														
	104000	Product Data (Section 1.03, A)														
	104000	Samples (Section 1.03, B)														
	104000	Shop Drawings (Section 1.03, C)														
	104000	NEMA Certificate (Section 1.03, D)														
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		Product Data (Section 1.03, A)									_					
	104416	Manufacturer's Install Instructions (Section 1.03, B)		\vdash		-					+	Н		$\vdash \vdash$	_	
	240040	Chan Drawings														
	210010 210502	Shop Drawings Pipe and Fittings Data	+	H		-			\vdash	\dashv	+	Н		${\mathbb H}$	+	
	210502	Valves										Н				
-	210553	Pipe Identification														
	210553	Valve Identification		T						\dashv	+	H		\forall	\dashv	
	210553	Signs									1	П		$ \uparrow $		
	211000	Backflow Prevention Devices										П		H		
	211200	Alarm Check Valve														
	211200	Alarm Devices														
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	211313	Sprinkler Equipment		Ш								Ц		Ш		
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	220010	Shop Drawings	1													

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	220502	Pipe and Fittings									Ш					
	220523	Valves									Ш					
	220553	Piping Identification									$\perp \perp$					
	220553	Valve Identification									$\perp \perp$					
	220553	Signs														
	220580	Pumps and all accessories		Ш					_	_	\sqcup	_			_	
	220700	Pipe Insulation		Ш							\coprod				\downarrow	
		Domestic Water Balancing Report		Ш							\sqcup	_			\downarrow	
	223000	Plumbing Equipment		Ш												
	224200	Plumbing Fixtures														
											\sqcup					
		Shop Drawings									\sqcup					
	260515	Fire Stopping Products									$\perp \perp$					
	260519	Wires and Cable Assemblys														
	260523	Cables									$\perp \perp$					
		Shop Drawings														
	260526	Grounding Electrodes and Connections								_	++	_			-	
		Bonding Devices									$\perp \perp$					
	260526	Ground Enhancement Material														
		Exothermic Connections and Molds		Ш												
		Mechanical Connections									$\perp \perp$					
		Steel and Nonmetallic Slotted Support Systems														
		Raceways and Boxes									$\perp \perp$					
	260533	Electrical System Identification									$\perp \perp$					
	260923	Lighting Controls									$\perp \perp$					
	262416	Panelboards and Accessories									$\perp \perp$					
	262726	Wiring Devices														
	262819	Switches and Circuit Breakers														
	263600	Transfer Switches and Accessories														
	265119	LED Interior Lighting									\prod					
-	284620	Addressable Fire Alarm System and Accessories									11					
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SECTION 01 40 00 - QUALITY AND CODE REQUIREMENTS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. The Contract Documents, including but not limited to, the Drawings and Individual Specification Sections and New York State (NYS) Statement of Special Inspections and Tests, apply to this Section.

1.02 SUMMARY

- Section includes administrative and procedural requirements for quality assurance and quality control.
- B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve the Contractor of responsibility for compliance with the Contract Document requirements.
 - 1. Specific quality assurance and quality control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
 - 2. Specified tests, inspections, and related actions do not limit the Contractor's other quality assurance and quality control procedures that facilitate compliance with the Contract Document requirements.
 - 3. Requirements for the Contractor to provide quality assurance and quality control services required by the Owner or authorities having jurisdiction are not limited by provisions of this Section.

C. Related Sections:

- Section 01 32 00 Construction Progress Documentation, for developing a schedule of required tests and inspections.
- 2. Individual Specification Sections, for specific inspections and tests requirements.

1.03 <u>DEFINITIONS</u>

- A. Quality Assurance Services: Activities, actions, and procedures performed during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.
- B. Quality Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements.
- C. Mockups: Full size physical assemblies that are constructed on-site. Mockups are constructed to verify selections made under sample submittals; to demonstrate aesthetic effects and, where indicated, qualities of materials and execution; to review coordination, testing, or operation; to show interface between dissimilar materials; and to demonstrate compliance with specified installation tolerances. Mockups are not Samples. Approved mockups establish the standard by which the Work will be judged.

- D. Product Testing: Tests and inspections that are performed by a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.
- E. Field Quality Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.
- F. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.
- G. Installer/Applicator/Erector: The Contractor or another entity engaged by the Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.
- H. Experienced: When used with an entity or individual, "experienced" means having successfully completed a minimum of five previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

1.04 <u>ACTION SUBMITTALS</u>

- A. Shop Drawings: For mockups, provide plans, sections, and elevations, indicating materials and size of mockup construction.
 - 1. Indicate manufacturer and model number of individual components.
 - 2. Provide axonometric drawings for conditions difficult to illustrate in two dimensions.

1.05 INFORMATIONAL SUBMITTALS

- A. Contractor's Quality Control Plan: For quality assurance and quality control activities and responsibilities.
- B. Contractor's Quality Control Manager Qualifications: For supervisory personnel.
- C. Testing Agency Qualifications: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.
- D. Schedule of Tests and Inspections: Prepare in tabular form and include the following:
 - 1. Specification Section number and title.
 - 2. Entity responsible for performing tests and inspections.
 - Description of test and inspection.
 - 4. Identification of applicable standards.
 - 5. Identification of test and inspection methods.
 - 6. Number of tests and inspections required.
 - 7. Time schedule or time span for tests and inspections.
 - 8. Requirements for obtaining samples.
 - 9. Unique characteristics of each quality control service.

1.06 CONTRACTOR'S QUALITY CONTROL PLAN

- A. Quality Control Plan, General: Submit quality control plan within 10 days of Notice to Proceed, and not less than five days prior to preconstruction conference. Submit in format acceptable to the Owner. Identify personnel, procedures, controls, instructions, tests, records, and forms to be used to carry out Contractor's quality assurance and quality control responsibilities. Coordinate with Contractor's construction schedule.
- B. Quality Control Personnel Qualifications: Engage qualified full-time personnel trained and experienced in managing and executing quality assurance and quality control procedures similar in nature and extent to those required for Project.
 - 1. Project quality control manager may also serve as Project superintendent.
- C. Submittal Procedure: Describe procedures for ensuring compliance with requirements through review and management of submittal process. Indicate qualifications of personnel responsible for submittal review.
- D. Testing and Inspection: Include in quality control plan a comprehensive schedule of the Work requiring tests or inspections, including the following:
 - 1. The Contractor-performed tests and inspections including subcontractor-performed tests and inspections. Include required tests and inspections and the Contractor-elected tests and inspections.
 - 2. Special inspections required by authorities having jurisdiction and indicated on the "NYS or NYC Statement of Special Inspections and Tests."
- E. Continuous Inspection of Workmanship: Describe process for continuous inspection during construction to identify and correct deficiencies in workmanship in addition to testing and inspection specified. Indicate types of corrective actions to be required to bring work into compliance with standards of workmanship established by Contract requirements and approved mockups.
- F. Monitoring and Documentation: Maintain testing and inspection reports including log of approved and rejected results. Include work the Owner has indicated as nonconforming or defective. Indicate corrective actions taken to bring nonconforming work into compliance with requirements. Comply with requirements of authorities having jurisdiction.

1.07 REPORTS AND DOCUMENTS

- A. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following:
 - 1. Date of issue.
 - 2. Proiect title and number.
 - 3. Name, address, and telephone number of testing agency.
 - 4. Dates and locations of samples and tests or inspections.
 - 5. Names of individuals making tests and inspections.
 - 6. Description of the Work and test and inspection method.
 - 7. Identification of product and Specification Section.
 - 8. Complete test or inspection data.
 - 9. Test and inspection results and an interpretation of test results.
 - 10. Record of temperature and weather conditions at time of sample taking and testing and inspecting.

- 11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
- 12. Name and signature of laboratory inspector.
- 13. Recommendations on retesting and reinspecting.
- B. Manufacturer's Technical Representative's Field Reports: Prepare written information documenting manufacturer's technical representative's tests and inspections specified in other Sections. Include the following:
 - 1. Name, address, and telephone number of technical representative making report.
 - 2. Statement on condition of substrates and their acceptability for installation of product.
 - 3. Statement that products at Project site comply with requirements.
 - 4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
 - 5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
 - 6. Statement whether conditions, products, and installation will affect warranty.
 - 7. Other required items indicated in individual Specification Sections.
- C. Factory-Authorized Service Representative's Reports: Prepare written information documenting manufacturer's factory-authorized service representative's tests and inspections specified in other Sections. Include the following:
 - Name, address, and telephone number of factory-authorized service representative making report.
 - 2. Statement that equipment complies with requirements.
 - 3. Results of operational and other tests and a statement of whether observed performance complies with requirements.
 - 4. Statement whether conditions, products, and installation will affect warranty.
 - 5. Other required items indicated in individual Specification Sections.

1.08 PERMITS, LICENSES, AND CERTIFICATES:

- A. The Contractor shall obtain, maintain and pay for all applications, permits, filings, and licenses necessary for the execution of the Work and for the use of such Work when completed as required by any and all authorities having jurisdiction. The Contractor shall comply with and give notices required by laws, ordinances, rules, regulations and lawful orders of authorities having jurisdiction bearing on performance of the Work.
- B. The Contractor shall promptly assist the Owner in securing all approvals from authorities having jurisdiction. Without limitation, the Contractor shall assist the Owner in making application for Project approval, variances or other approvals, Letters of Completion, Temporary Certificates of Occupancy, and Certificates of Occupancy, including completion of all necessary applications and supporting documentation.
- C. The Contractor shall comply with all regulations governing conduct, access to the premises, operation of equipment and systems and conduct while in or near the premises and shall perform the Work in such a manner as not to unreasonably interrupt or interfere with the conduct of business of the Institution.
- D. For the Owner's records, submit copies of permits, licenses, certifications, inspection reports, material certificates/affidavits, approvals, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

- E. Dormitory Authority Permits: Prior to commencement of the Work, the Dormitory Authority shall provide the Contractor, at no costs, a Construction Permit for performance of the Work and post a copy at the Project site.
 - 1. The Contractor shall secure and pay for all other work permits, applications, filings, and approvals that are associated with the Work of the Contract and pay all other permits, fees, licenses and inspections necessary for the proper execution and completion of the Contract as required by all other applicable authorities having jurisdiction.
 - 2. Contractor shall, at no additional costs to the Owner, provide for inspection of all electrical Work of the Contract and provide a certificate of compliance from an independent electrical inspection agency acceptable to the Owner.

1.09 QUALITY ASSURANCE

- A. General: Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.
- B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- D. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.
- E. Specialists: Certain Specification Sections require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.
- F. Testing Agency Qualifications: An independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 329, and with additional qualifications specified in individual Sections; and where required by authorities having jurisdiction, that is acceptable to authorities.
- G. Manufacturer's Technical Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- H. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- I. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:
 - 1. Build mockups in location and of size indicated or, if not indicated, as directed by the Owner.

- Notify the Owner seven days in advance of dates and times when mockups will be constructed.
- 3. Employ supervisory personnel who will oversee mockup construction. Employ workers that will be employed during the construction at the Project.
- 4. Demonstrate the proposed range of aesthetic effects and workmanship.
- 5. Obtain the Owner's approval of mockups before starting work, fabrication, or construction.
 - a. Allow seven days for initial review and each re-review of each mockup.
- 6. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
- 7. Demolish and remove mockups when directed by the Owner.

1.10 QUALITY CONTROL

- A. Owner Responsibilities: Where quality control services are indicated as the Owner's responsibility, the Owner will engage a qualified testing agency to perform these services.
 - 1. The Owner will furnish the Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
- B. Contractor Responsibilities: Tests and inspections not explicitly assigned to the Owner are the Contractor's responsibility. Perform additional quality control activities required to verify that the Work complies with requirements, whether specified or not.
 - 1. Unless otherwise indicated, provide quality control services specified and those required by authorities having jurisdiction. Perform quality control services required of the Contractor by authorities having jurisdiction, whether specified or not.
 - 2. Where services are indicated as the Contractor's responsibility, engage a qualified testing agency to perform these quality control services.
 - a. Contractor shall not employ same entity engaged by the Owner, unless agreed to in writing by the Owner.
 - 3. Notify testing agencies at least 24 hours in advance of time (excluding weekends and holidays) when Work that requires testing or inspecting will be performed.
 - 4. Where quality control services are indicated as the Contractor's responsibility, submit a written report, in duplicate, of each quality control service.
 - 5. Testing and inspecting requested by the Contractor and not required by the Contract Documents are the Contractor's responsibility.
 - 6. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.
- C. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Section 01 33 00 Submittal Procedures.
- D. Manufacturer's Technical Services: Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in preinstallation conferences, examination of substrates and

conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.

E. Retesting/Reinspecting:

- 1. Regardless of whether original tests or inspections were the Contractor's responsibility, provide quality control services, including retesting and re-inspecting, for construction that replaced Work that failed to comply with the Contract Documents.
- Costs for retesting and re-inspecting construction that replaces or is necessitated by work
 that failed to comply with the Contract Documents, or costs attributable to the
 Contractor's lack of coordination in properly scheduling the Work requiring testing and
 inspection will be charged to Contractor and the Contract Sum will be adjusted by
 Change Order.
- F. Testing Agency Responsibilities: Cooperate with the Owner and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
 - 1. Notify the Owner and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
 - 2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
 - 3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
 - 4. Submit a written report, in duplicate, of each test, inspection, and similar quality control service through Contractor.
 - 5. Does not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
 - 6. Do not perform any duties of the Contractor.
- G. Associated Services: The Contractor shall cooperate with agencies performing required tests, inspections, and similar quality control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. The Contractor shall provide the following:
 - 1. Access to the Work, including equipment required to access the Work.
 - 2. Incidental labor and facilities necessary to facilitate tests and inspections.
 - 3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
 - 4. Facilities for storage and field curing of test samples.
 - 5. Delivery of samples to testing agencies.
 - 6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
 - 7. Security and protection for samples and for testing and inspecting equipment at Project site.
- H. Coordination: Coordinate sequence of activities to accommodate required quality assurance and quality control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.
 - 1. Schedule times for tests, inspections, obtaining samples, and similar activities.
- I. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality control services required by the Contract Documents. Coordinate and submit concurrently with Contractor's construction schedule. Update as the Work progresses.

1. Distribution: Distribute schedule to the Owner, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

1.11 NYS SPECIAL INSPECTIONS AND TESTS

- A. Special Inspections and Tests: The Owner will engage a qualified testing agency to conduct special inspections and tests required by authorities having jurisdiction as the responsibility of the Owner, as indicated in the NYS Statement of Special Inspections and Tests, attached to this Section, and as follows:
 - 1. Notifying Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
 - 2. Submitting a written report of each test, inspection, and similar quality control service to the Owner with copy to the Contractor and to authorities having jurisdiction. Frequency of reporting shall be determined in consultation with the Owner.
 - 3. Submitting a final report of special tests and inspections at Substantial Completion, this includes a list of unresolved deficiencies.
 - 4. Interpreting tests and inspections and stating in each report whether tested and inspected work complies with or deviates from the Contract Documents or code requirements.
 - 5. Retesting and re-inspecting corrected work.
- B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve a Contractor of responsibility for compliance with the Contract Document requirements.
 - 1. Specified tests, inspections, and related actions do not limit Contractor's quality control procedures that facilitate compliance with the Contract Document requirements.
 - 2. Inspections and tests performed by the testing agency shall in no way relieve the Contractor of the responsibility to construct in accordance with the Contract Documents.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.01 TEST AND INSPECTION LOG

- A. Prepare a record of tests and inspections. Include the following:
 - 1. Date test or inspection was conducted.
 - 2. Description of the Work tested or inspected.
 - 3. Date test or inspection results were transmitted to the Design Professional.
 - 4. Identification of testing agency or special inspector conducting test or inspection.
- B. Maintain log at Project site. Post changes and modifications as they occur. Provide access to test and inspection log for the Owner's reference during normal working hours.

3.02 REPAIR AND PROTECTION

A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.

- B. Protect construction exposed by or for quality control service activities.
- C. Repair and protection are the Contractor's responsibility, regardless of the assignment of responsibility for quality control services.

END OF SECTION 01 40 00

SECTION 01 45 33 - SPECIAL INSPECTIONS AND STRUCTURAL TESTING

PART 1 GENERAL

1.01 **GENERAL REQUIREMENTS**

A. Special Inspections and Structural Testing shall be in accordance with Chapter 17 of the New York State Uniform Code (NYSUC).

1.02 **DEFINITIONS**

- A. Registered Design Professional: Licensed Professional Engineer or Registered Architect whose seal appears in the Construction Drawings. Unless noted otherwise, references to the Registered Design Professional in this section refer to the Structural Engineer for building design.
- B. RDP for Geotechnical Engineering: Licensed Professional Engineer whose seal appears on the Geotechnical Investigation. The RDP for Geotechnical Engineering shall perform or oversee Agent 2 services as indicated in the Schedule of Special Inspections. If a Geotechnical Investigation was not performed or if the RDP for Geotechnical Engineering is not retained to perform Agent 2 services, a licensed Geotechnical Engineer shall be retained to perform these duties.
- C. Code Enforcement Official: Officer or other designated authority charged with administration and enforcement of the NYSUC. For projects under jurisdiction of New York State agencies such as the Department of Education (SED), State University Construction Fund (SUCF), Office of General Services (OGS), and Dormitory Authority (DASNY), the Code Enforcement Official is an official from agency having jurisdiction.
- D. Special Inspector (SI): Professional Engineer licensed in the State of New York [or other state], acting on behalf of the Owner, that implements the Special Inspection Program for the project.
- E. Testing/Inspecting Agency: Agent retained by Special Inspector or Owner and coordinated by Special Inspector to perform some inspection services on behalf of Special Inspector.
- F. Testing/Inspecting Agency (Agent 1): Professional Engineer licensed in the State of New York [or other state] that is qualified to perform structural inspections. The Special Inspector shall have a minimum of three years of experience performing inspections for similar projects.
- G. Testing/Inspecting Agency (Agent 2): Professional Geotechnical Engineer licensed in the state of New York [or other state], that is qualified to perform inspections for preparation of building subgrades and foundations.
- H. Testing/Inspecting Agency (Agents 3 or 4): Agency or firm qualified to inspect certain structural elements and perform field and laboratory tests to determine the characteristics and quality of building materials and workmanship.
- I. Statement of Special Inspections: Documents prepared by the Registered Design Professional and filed with and approved by the Code Enforcement Official as a condition of obtaining a building permit. The Statement of Special Inspections is represented by this specification and includes the Schedule of Special Inspections.

- J. Schedule of Special Inspections: An itemized list of inspections, verifications, and tests (including frequency) required for the project and individuals, agencies, or firms who will be retained to perform these services. The Schedule of Special Inspections is located in at the end of this specification.
- K. Inspect and Inspection: Visual observation of materials, equipment, or construction work as defined in the Statement of Special Inspections, to determine that the work is in substantial conformance with the requirements of the Contract Documents.
- L. Continuous Special Inspection: Full-time observation of work by the Special Inspector or Testing Agency while the work is being performed.
- M. Periodic Special Inspections: Part-time or intermittent observation of work by the Special Inspector or Testing Agency for work that has been or is being performed and at completion of work.

1.03 **QUALIFICATIONS**

- A. Special Inspector and Testing/Inspecting Agency shall be accepted by the Registered Design Professional (RDP) and the Code Enforcement Official.
- B. Special Inspections shall be performed by agents who have relevant experience for each category of inspections indicated in the drawings.
- C. Minimum qualifications of inspection agents are indicated in the drawings.

1.04 **SUBMITTALS**

- A. Special Inspector and Testing/Inspecting Agency shall submit to the Registered Design Professional and Code Enforcement Official for review, a copy of their qualifications including names and qualifications of each inspector and technician who will be performing inspections or tests.
- B. Special Inspector and Testing/Inspecting Agency shall disclose past or current business relationship or potential conflict of interest with Contractor or Subcontractors whose work will be inspected or tested.

1.05 **PAYMENT**

- A. Owner will engage and pay for services of Special Inspector and Testing/Inspecting Agency.
- B. If materials requiring Special Inspections are fabricated in a plant not within 200 miles of project site, Contractor shall be responsible for travel expenses of Special Inspector or Testing/Inspecting Agency.
- C. Contractor shall be responsible for cost of retesting or reinspection of work failing to comply with requirements of Contract Documents.

1.06 OWNER RESPONSIBILITIES

A. Owner will provide Special Inspector with complete set of Contract Documents sealed by the Registered Design Professional and approved by the Code Enforcement Official.

1.07 **CONTRACTOR RESPONSIBILITIES**

- A. Contractor shall cooperate with Special Inspector and his agents so Special Inspections and testing may be performed without hindrance.
- B. As indicated in the Schedule of Special Inspections, Contractor shall notify Special Inspector or Testing/Inspecting Agency at least 48 hours in advance of a required inspection or test.
- C. Contractor shall provide incidental labor and facilities to provide access to work to be inspected or tested, to obtain and handle samples at site or at source of products to be tested, to facilitate tests and inspections, and for storing and curing of test samples.
- D. If Special Inspections or testing require the use of Contractor's scaffolding to access work areas, Contractor shall provide competent person to perform daily evaluation of scaffolding to verify it is safe to use. Contractor shall notify Special Inspector and Testing Agent of this review before each use. Contractor is responsible for safe assembly and stability of scaffolding.
- E. Contractor shall keep latest set of Construction Drawings, field sketches, accepted shop drawings, and specifications at project site for field use by Inspectors and Testing Technicians.
- F. Contractor shall perform remedial work if required and sign nonconformance reports stating remedial work has been completed. Contractor shall submit signed reports to Special Inspector as work proceeds.
- G. The Special Inspection program shall not relieve Contractor of obligation to perform work in accordance with requirements of Contract Documents or from implementing an effective Quality Control program.
- H. Contractor shall be solely responsible for construction site safety.

1.08 **SPECIAL INSPECTOR RESPONSIBILITIES**

- A. Special Inspector shall hold a Special Inspections preconstruction meeting at least 7 days prior to initial planned date for start of construction. Attendees shall include Contractors, Owner's Representative, Testing Agency, Special Inspector, and Registered Design Professionals for Structural Engineering and for Architecture. Discussions shall include the following:
 - 1. Review of specifications and Schedule of Special Inspections for work requiring Special Inspections.
 - 2. Responsibilities of Contractors, Owner, Testing Agency, Special Inspector, and Registered Design Professional.
 - 3. Notification and reporting procedures.
- B. Special Inspector shall record and distribute minutes from the Special Inspection Preconstruction meeting.
- C. Special Inspector shall review inspection and material testing reports and coordinate the services of the Testing/Inspecting Agencies as follows:

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- Verify inspections have been performed in accordance with the Schedule of Special Inspections.
- 2. Verify reports are being distributed to the Contractor, Owner, Architect, Code Enforcement Official, and Registered Design Professional (RDP) for Structural Engineering.
- 3. Verify discrepancies have been recorded and are being tracked.
- D. Special Inspector shall make site visits to inspect work as designated in the Statement of Special Inspections. Discrepancies will be brought to the attention of the Contractor and RDP.
- E. Special Inspector shall keep records of inspections and tests.
- F. Special Inspector shall review Certificates of Compliance for conformance with the standards specified in the Contract Documents. Discrepancies will be brought to the attention of the Contractor and RDP.
- G. Special Inspector shall submit a final report of Special Inspections in accordance with Section 3.4 of this specification.

1.09 **LIMITS ON AUTHORITY**

- A. Special Inspector or Testing/Inspecting Agency shall not release, revoke, alter, or enlarge on requirements of Contract Documents.
- B. Special Inspector or Testing/Inspecting Agency shall not have control over Contractor's means and methods of construction.
- Special Inspector or Testing/Inspecting Agency shall not be responsible for construction site safety.
- D. Special Inspector or Testing/Inspecting Agency shall not have authority to stop work.

PART 2 INSPECTIONS AND TESTING

2.01 STRUCTURAL STEEL

- A. Special Inspector shall perform the following:
 - Verify Fabricator maintains detailed fabrication and Quality Control procedures:
 - a. Review procedures for completeness and adequacy relative to code requirements.
 - b. If Fabricator is designated as AISC-Certified Fabricator, Special Inspection for shop-fabricated members and assemblies is not required.
 - c. If Fabricator is not designated as AISC-Certified Fabricator, Contractor shall reimburse Owner via execution of credit change order for cost of Special Inspections and testing in Fabricator's shop.
 - Review manufacturer's Certificates of Compliance for high-strength bolts and weld filler material.
 - 3. Review certified mill test reports.
 - 4. Inspect steel frame joint details for compliance with approved Construction Documents.

- B. Testing Agency shall perform the following:
 - 1. Material verification of high-strength bolts, nuts, and washers, including review of identification markings and manufacturer's Certificate of Compliance.
 - a. Test high-strength bolt assemblies in a tension measuring device to verify material conformance prior to installation. Assemble bolt, nut, and washer on a loose plate and tension by tightening nut to develop required tension in Table 7.1 of "Specification for Structural Joints Using High Strength Bolts."
 - 2. Verification that copies of accepted field welding procedure specifications are available on site for reference by erector's welders.
 - 3. Verification that erector's welder's qualifications are current and appropriate for joint type, welding position, and welding process to be used.
 - 4. Verification that joint fit-up for partial and complete penetration groove welds are in compliance with AWS tolerances as follows:
 - a. Visually inspect 50 percent of joints scheduled for partial and complete penetration groove welds.
 - b. Visually inspect 50 percent of column splices scheduled for partial and complete penetration groove welds.
 - Visually inspect 100 percent of tension member splices, column splices, and moment connections that are part of the lateral force resisting system.
 - 5. Inspect high-strength bolting.
 - a. Joints designated as snug tight require only visual inspection.
 - b. Joints designated as fully tensioned or slip critical require visual inspection during installation.
 - Checking after installation using calibrated wrenches will not be permitted.
 - 6. Material verification of structural steel and metal deck, including review of identification markings.
 - 7. Perform pull-out tests on adhesive, expansion, and sleeve anchors.
 - 8. Material verification of weld filler materials, including review of identification markings.
 - 9. Inspect welding of structural steel.
 - a. Visually inspect welds according to AWS.
 - b. Schedule inspection of field welding in timely manner utilizing vertical access means and methods utilized by Contractor to perform the welding
 - c. Ultrasonic inspection (UT) according to ASTM E 587 is required for partial and complete penetration field groove welds as follows:
 - 1) UT inspect 50 percent of joints scheduled for partial and complete penetration groove welds.
 - 2) UT inspect 50 percent of column splices scheduled for partial and complete penetration groove welds.

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- 3) UT inspect 100 percent of tension member splices, column splices, and moment connections that are part of lateral force resisting system.
- 4) UT inspect 50 percent or minimum of six of the joints scheduled for partial or complete penetration groove welds completed by each welder. Increase inspection percentage to 100 percent for each welder with more than one rejected weld.
- d. Magnetic particle inspection according to ASTM E 709 is required for Fabricators not certified by AISC Quality Certification Program for 10 percent of shop fillet welds.
- e. Magnetic particle inspection according to ASTM E 709 is required for 10 percent of field fillet welds.
- f. UT inspect according to ASTM E 587 is required for 10 percent of shop partial or complete penetration welds and 100 percent of shop partial or complete penetration groove welds in tension members.
- g. Inspect shear connectors in accordance with AWS D1.1, Section 7. Observe bend tests performed by Contractor. Refer to Section 053000, Part 3 for bend test requirements.
- h. Inspect every shear connector by striking once with 10-pound hammer. Direction of hammer swing shall be parallel with member containing connector. Inspection by striking with hammer does not replace bend tests in accordance with AWS.
- 10. Inspect condition of erected materials.
 - a. Visually inspect erected steel for damage.
 - b. Visually inspect connections and framing to verify compliance with Contract Documents and accepted shop drawings.
- 11. Inspect column plumbness and splices:
 - a. Inspect erected columns for plumbness within tolerances specified in Section 051200, Part 3: Execution.
 - b. Inspect columns for fit up within tolerances specified in AISC *Manual of Steel Construction*, Specification Section M4.
- 12. Additional testing shall be performed as follows if required.
 - a. Testing Agency shall perform additional tests of connections and framing members field modified by Contractor to correct errors in shop drawings, fabrication, or erection.
 - b. Testing and reporting of field modifications shall be in accordance with this section, Special Inspections, and have the following additional requirements:
 - 1) Magnetic particle inspection according to ASTM E 709 is required for 100 percent of fillet welds.
 - 2) Ultrasonic inspection according to ASTM E 587 is required for 100 percent of full-penetration welds.
 - 3) Perform pull-out tests on 100 percent of each type of adhesive, expansion, or sleeve anchor used by applying a load equal to 125 percent of allowable pull-out strength listed in manufacturer's literature.

c. Contractor shall reimburse Owner for cost of additional tests performed.

PART 3 DOCUMENTATION

3.01 RECORDS AND REPORTS

- A. Prepare detailed reports of each test or inspection. Include the following general information:
 - 1. Project name and number.
 - 2. Date of test or inspection.
 - 3. Name of Testing Agency or Inspecting Agency.
 - 4. Name of technician or inspector.
 - 5. Weather conditions.
 - 6. Locations and elevations of specific areas tested or inspected referenced to grid lines.
 - 7. Description of test or inspection.
 - 8. Reference to applicable ASTM standard.
 - 9. Summary of observations, results, and recommendations.
 - 10. Description of areas or materials requiring retesting or reinspection.
- B. Reports for each drilled pile or pier shall contain the following information:
 - 1. Elevation of bottom and top.
 - 2. Centerline location at top.
 - 3. Variation of shaft from plumb.
 - 4. Elevation of top and bottom of casings left in place.
 - 5. Volume of grout or concrete in each pile or pier.
 - 6. Condition of bearing strata and verification of review by RDP for Geotechnical Engineering.
 - 7. Water seepage.
 - 8. Unusual conditions.
 - 9. Delays in placement of grout or concrete, and location of construction joints in shafts.
 - 10. Dates of starting excavation or drilling, completion of excavation or drilling, inspections, and placement of concrete.
 - 11. Number of blows for every foot penetration and rate of penetration under last five blows of hammer.
 - 12. Kind and size of hammer used in driving.
- C. Concrete compressive strength test reports shall contain the following information:
 - 1. Name of Contractor and concrete supplier.
 - 2. Name of concrete testing service.
 - 3. Name of technician making and testing specimens.
 - 4. Truck number and delivery ticket number.
 - 5. Date and location within structure of concrete placement.
 - 6. Concrete type, class, mix proportions of materials, and design compressive strength at 28 days.
 - 7. Slump, air content, unit weight, and concrete temperature.
 - 8. Total time period between batching and completing placement for each truck.
 - 9. Compressive strength and type of break for tests.

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- D. Field reports for concrete inspection shall contain general information noted above plus ambient temperature and cylinder numbers.
- E. Test reports for masonry materials shall include proportions, composition, and compressive strength.

3.02 **COMMUNICATION**

- A. Testing/Inspecting Agency shall immediately notify Contractor, Special Inspector, and Registered Design Professional by telephone, fax, or e-mail of test results failing to comply with requirements of Contract Documents.
- B. Special Inspector shall immediately notify Contractor of work found to be in nonconformance with Contract Documents during inspections. If nonconforming work is not corrected while Special Inspector is on-site, Special Inspector shall notify Registered Design Professional within 24 hours (one business day) and issue an inspection report noting the non-conformance.
- C. Special Inspector and each Testing/Inspecting Agent shall use a log to record and track non-conforming work during construction. Non-Conformance log shall include the following information:
 - 1. Description of non-conformance.
 - 2. Date of non-conformance.
 - 3. Description of RDP response if received.
 - 4. Status of nonconformance: 'Open' or 'Closed.'

Updated log shall be attached to each inspection report. Special Inspector or Testing/Inspecting Agent may use Non-Conformance Log form provided at end of this section or other similar form.

D. If non-conforming work is not corrected at time of substantial completion of structure or other appropriate time, Special Inspector shall notify Code Enforcement Official.

3.03 **DISTRIBUTION OF REPORTS**

- A. Testing/Inspecting Agency shall submit reports to Special Inspector and Registered Design Professional within 7 days of inspection or test. Legible handwritten reports may be submitted if final typed copies are not available.
- B. Special Inspector shall distribute reports to the Contractor, Owner, Architect, Code Enforcement Official, and RDP for Structural Engineering within 7 days of inspections. Legible handwritten reports may be submitted if final typed copies are not available.
- C. If requested by the Code Enforcement Official, Special Inspector shall submit interim reports that include inspections and tests performed since beginning of construction or since previous interim report. Interim reports shall be addressed to the Code Enforcement Official with copies sent to the Registered Design Professionals (Structural Engineer and Architect) and Contractor. Interim reports shall be signed by Agent performing inspections.

3.04 FINAL REPORT OF SPECIAL INSPECTIONS

A. At completion of work, each Testing/Inspecting Agency shall submit Agent's Final Report

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- of Special Inspections to Special Inspector stating work was completed in substantial conformance with Contract Documents and appropriate inspections and tests were performed. Testing/Inspecting Agency may use Agent's Final Report of Special Inspections form provided at end of this section or other similar form.
- B. At completion of work, Special Inspector shall compile a Final Report of Special Inspections including each Agent's Final Report of Special Inspections. The Final Report of Special Inspections shall state required inspections have been performed and itemize nonconforming work not corrected or resolved as required by the NYSUC. Interim reports from all Agents will not be included unless specifically requested by the Owner or Code Enforcement Official. The Final Report shall be stamped by a New York State Professional Engineer.
- C. Special Inspector may use Final Report of Special Inspections form provided at end of this section or other similar form based on CASE Form 102-2001.
- Special Inspector shall submit Final Report of Special Inspections to Registered Design Professional and Code Enforcement Official prior to issuance of a Certificate of Use and Occupancy.

AGENT X NON-CONFORMANCE LOG

PROJECT:
PROJECT NUMBER:

(See Note Status Verification Contractor (See Note Received Date Reinspectio n Required ဢ Date of RDP Response Received Summary of Non-Conformance Inspection Report Reference/Date Special Conformance (See Note 1) Item No. Non-NC 3 NC 6 NC 1 $^{\circ}$ 4 2 9 9 9

1. New items are in bold. For each non-conformance item above, the General Contractor or Subcontractor must sign and submit the Contractor Verification statement located in the RDP Response Report.

2. Non-conformance items remain "OPEN" until the Contractor Verification have been received. When the signed verifications have been received by the RDP, the item will be "CLOSED".

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Testing/Inspection Agent's Final Report of Special Inspections

Project Name:	Inspection Agent:
Location:	
Owner:	_Special Inspector:
Owner Address:	Structural RDP:
Ryan Biggs Clark Davis Project No.:	_
project and designated for this Agent in the	f, the Special Inspections and testing required for this Statement of Special Inspections (which includes of Special Inspections) have been performed and esolved except for the following:
Comments:	
[Attach continuation sheets if required to comple	ete description of uncorrected discrepancies.]
Respectfully submitted, Agent of the Special Inspector [TITLE]	
(Type or print name)	
Signature Date	
Address	
	Design Professional Seal or Certification
City, State, Zip	

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Final Report of Special Inspections

Project Name	Special Inspector
l ocation:	Special Inspector:Special Inspector Project No.:
Owner:	Architect of Record:
Owner Address:	Structural RDP:
Ryan Biggs Clark Davis Project No.:	
indicated in the Statement of Special Ins	dge, and belief, Special Inspections required for this project, as spections, (which includes Specification Section 01 45 33 and the een performed and discovered discrepancies have been reported
Comments:	
[Attach continuation sheets if require	d to complete description of uncorrected discrepancies.]
part of this Final Report. Upon reque	nal Report form a basis for and are to be considered an integral st, the interim Testing and Special Inspection reports can be ecial Inspections are attached and are also a part of this Final
Respectfully submitted, Special Inspector [TITLE]	
(Type or print name)	
Signature Date	Professional Seal
	Professional Seaf

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Contractor's Statement of Responsibility

Project Name:	Con	tractor:		
Location:	Con	ontractor:ontractor Project No.:		
Owner:	Arcr	nitect of Record:		
Owner Address:	Stru	ctural RDP:		
Ryan Biggs Clark Da	vis Project No.:			
As the Contractor resumble understand the special of Special Inspection Inspections). I verify the	s (which includes Specification S	, I reviewed and d-force-resisting systems listed in the Statement ection 01 45 33 and the Schedule of Special		
and the distribut Control will be a Code Enforcema Each person example.	ion of reports have been reviewed exercised to obtain conformance wient Official.	th the Construction Documents approved by the on in the organization have been identified. Their		
Comments [Attach co	ontinuation sheets if required]:			
Respectfully submitted	i,			
(Type or print name)				
Signature	Date			
Address				
City, State, Zip				

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SCHEDULE OF SPECIAL INSPECTIONS FOR BUILDING STRUCTURES

INSPECTION AGENTS			
1. SPECIAL INSPECTOR, P.E.			
2. GEOTECHNICAL ENGINEERING/INSPECTOR			
3. TESTING/INSPECTING AGENCY			
4. TESTING/INSPECTING AGENCY			

THE OWNER OR THE OWNER'S REPRESENTATIVE SHALL RETAIN A SPECIAL INSPECTOR WHO WILL PERFORM INSPECTIONS AND TESTING AND/OR OVERSEE THE WORK OF AN INSPECTION AND TESTING AGENCY. THE SPECIAL INSPECTOR SHALL BE A PROFESSIONAL ENGINEER EXPERIENCED IN THE DESIGN OF BUILDINGS AND REGISTERED IN THE STATE OF NEW YORK.

THE CONTRACTOR OR SUBCONTRACTOR PERFORMING THE WORK CANNOT RETAIN THE SPECIAL INSPECTOR. ANY CONFLICT OF INTEREST MUST BE DISCLOSED TO THE CODE ENFORCEMENT OFFICIAL PRIOR TO COMMENCING CONSTRUCTION.

THE NAMES AND QUALIFICATIONS OF AGENTS MUST BE SUBMITTED TO THE CODE ENFORCEMENT OFFICIAL AND REGISTERED DESIGN PROFESSIONAL PRIOR TO COMMENCING CONSTRUCTION. THE QUALIFICATIONS OF ALL PERSONNEL PERFORMING INSPECTION AND TESING ACTIVITIES ARE SUBJECT TO APPROVAL BY THE CODE ENFORCEMENT OFFICIAL. MINIMUM QUALIFICATIONS OF THE TESTING AGENTS ARE INDICATED IN THE SCHEDULE.

KE'	KEY OF MINIMUM QUALIFICATIONS OF INSPECTION AGENTS (MQIA)				
PE	NEW YORK STATE REGISTERED PROFESSIONAL ENGINEER				
RDP	NEW YORK STATE REGISTERED DESIGN PROFESSIONAL ENGINEER				
EIT	ENGINEER IN TRAINING SUPERVISED BY A PE – INTERN ENGINEER				
ACI-CCI	AMERICAN CONCRETE INSTITUTE CERTIFIED CONCRETE CONSTRUCTION INSPECTOR				
ACI-CFTT	AMERICAN CONCRETE INSTITUTE CERTIFIED CONCRETE FIELD TESTING TECHNICIAN – GRADE 1				
ICC-RCSI	ICC REINFORCED CONCRETE SPECIAL INSPECTOR				
ICC-RCC	ICC REINFORCED CONCRETE CERTIFICATION				
ICC-SMC	ICC STRUCTURAL MASONRY CERTIFICATION				
ICC-SSWC	ICC STRUCTURAL STEEL AND WELDING CERTIFICATION				
AWS-CWI	AMERICAN WELDING SOCIETY CERTIFIED WELDING INSPECTOR				
ICC-SAFC	ICC SPRAY-APPLIED FIREPROOFING CERTIFICATION				
ASNT	AMERICAN SOCIETY OF NON-DESTRUCTIVE TESTING – LEVEL II OR III				
ICC-PCC	ICC PRESTRESSED CONCRETE CERTIFICATION				
100 1 00	100 FRED REGEL OF CHARLES				

	CATEGORY	MINIMUM QUALIFICATIONS OF INSPECTION AGENTS (MQIA)
A.	REINFORCED CONCRETE	 CURRENT ICC REINFORCED CONCRETE SPECIAL INSPECTOR OR ACI CONCRETE CONSTRUCTION INSPECTOR CONCRETE FIELD TESTING CAN BE BY AN ACI CONCRETE FIELD TESTING TECHNICAL WITH GRADE 1 CERTIFICATION INTERN ENGINEER WITH RELEVANT EXPERIENCE NEW YORK STATE REGISTERED DESIGN PROFESSIONAL ENGINEER (RDP) WITH RELEVANT EXPERIENCE
B.	WELDING	 CURRENT AWS CERTIFIED WELDING INSPECTOR CURRENT ICC STRUCTURAL STEEL AND WELDING CERTIFICATE PLUS ONE YEAR OF RELEVANT EXPERIENCE CURRENT LEVEL II CERTIFICATION FROM THE AMERICAN SOCIETY FOR NON-DESTRUCTIVE TESTING (NDT) CURRENT LEVEL III PROVIDED PREVIOUSLY CERTIFIED AS NDT LEVEL II
C.	HIGH-STRENGTH BOLTING AND STEEL FRAME INSPECTION	CURRENT ICC STRUCTURAL STEEL AND WELDING CERTIFICATE PLUS ONE YEAR OF RELEVANT EXPERIENCE INTERN ENGINEER WITH RELEVANT EXPERIENCE RDP WITH RELEVANT EXPERIENCE
D.	SPRAYED FIRE-RESISTANT MATERIALS	CURRENT ICC SPRAY-APPLIED FIREPROOFING CERTIFICATION AND ONE YEAR OF RELEVANT EXPERIENCE INTERN ENGINEER WITH RELEVANT EXPERIENCE RDP WITH RELEVANT EXPERIENCE
E.	SMOKE CONTROL	EXPERTISE IN FIRE PROTECTION ENGINEERING, MECHANICAL ENGINEERING, AND CERTIFIED AS AN AIR BALANCER THE RDP RESPONSIBLE FOR DESIGN
F.	GENERAL	 QUALIFIED PERSON WITH ONE YEAR OF RELEVANT EXPERIENCE INTERN ENGINEER WITH RELEVANT EXPERIENCE RDP WITH RELEVANT EXPERIENCE

STEEL CONSTRUCTION: SPECIAL INSPECTION IS REQUIRED. (TABLE 1705.2.1)							
TYPE	AGENT NO.	MQIA	CONT.	PERIODIC	REFERENCED STANDARD	CODE	
MATERIAL VERIFICATION OF STRUCTURAL STEEL AND METAL DECK:							
A. IDENTIFICATION MARKINGS TO CONFORM TO ASTM STANDARDS SPECIFIED IN THE APPROVED CONSTRUCTION DOCUMENTS.	1 OR 3	E.1-E.3		X 100%			
B. MANUFACTURER'S CERTIFIED MILL TEST REPORTS REQUIRED.	1			X 100%			
MINIMUM INSPECTIONS PRIOR TO WELDING	3	D.1, D.2, M.1	Х		AISC 360 TABLE N5.4-1		
MINIMUM INSPECTIONS DURING WELDING	3	D.1, D.2, M.1	Х		AISC 360 TABLE N5.4-2		
MINIMUM INSPECTIONS AFTER WELDING	3	D.1, D.2, M.1		X 100%	AISC 360 TABLE N5.4-3		
UT SHALL BE PERFORMED ON CJP GROOVE WELDS SUBJECTS TO TRANSVERSELY APPLIED TENSION LOADING IN BUTT-T, AND CORNER JOINTS	3	D.1, D.2, M.1			AISC 360 N5.5b		
A. FOR RISK CATEGORY III OR IV STRUCTURES				X 100%			
B. FOR RISK CATEGORY II STRUCTURES				X 10%			
MAGNETIC PARTICLE SHALL BE PERFORMED ON FILLET WELDS				X 10%			
MINIMUM INSPECTIONS PRIOR TO HIGH- STRENGTH BOLTING (EXCEPT FOR SNUG-	3	E.1, M.1	Х		AISC 360 TABLE N5.6-1		

TIGHT JOINTS).						
MINIMUM INSPECTIONS DURING HIGH- STRENGTH BOLTING (EXCEPT FOR SNUG- TIGHT JOINTS).	3	E.1, M.1			AISC 360 TABLE N5.6-2	
A. TURN-OF-NUT WITH MATCH MARKING, DIRECT- TENSION- INDICATOR METHOD, TWIST- OFF-TYPE TENSION CONTROL BOLT METHOD				X 100%		
B. CALIBRATED WRENCH METHOD, TURN-OF-NUT METHOD WITHOUT MATCHMAKING.			X			
MINIMUM INSPECTION AFTER HIGH-STRENGTH BOLTING	3	E.1, M.1		X	AISC 360 TABLE N5.6-3	
MINIMUM INSPECTIONS FOR SNUG-TIGHT HIGH- STRENGTH BOLTING – 100% VISUAL.	3	E.1, M.1		X		
INSPECT FABRICATED OR ERECTED STEEL AS APPROPRIATE TO VERIFY COMPLIANCE WITH THE CONSTRUCTION DRAWINGS. INSPECT BRACES, STIFFENERS, MEMBER LOCATIONS, AND JOINT DETAILS.	1 OR 3	E.1, E.2, E.3, M.1		X	AISC 360 N5.7	
VERIFY COLUMN PLUMBNESS AND SPLICES	3	E.1		X 100%		
PERFORM PULL-OUT TESTS ON DRILLED-IN, ADHESIVE, EXPANSION, AND SLEEVE ANCHORS: A. TEST 10% OF	3	E.1		X 100%	ACI 318 17.8.2	
EACH ANCHOR TYPE (MINIMUM OF						

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	2) BY APPLYING A LOAD EQUAL TO 125% ALLOWABLE PULL-OUT STRENGTH.				
B.	TEST 100% OF ANCHORS BY PULLING WITH A CLAW HAMMER USING THE WEIGHT OF ONE MAN.				
C.	ADHESIVE ANCHORS INSTALLED IN HORIZONTALLY OR UPWARDLY INCLINED ORIENTATIONS TO RESIST SUSTAINED TENSION LOADS.		X	ACI 318 17.8.2.4	

END OF SECTION 01 45 33 - SPECIAL INSPECTIONS & STRUCTURAL TESTING (11/18)

SECTION 01 50 00 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. The Contract Documents, including but not limited to, the Drawings and Individual Specification Sections, apply to this Section.

1.02 **SUMMARY**

A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.

B. Related Sections:

1. Section 01 12 00 – Contract Summary of Work, for work restrictions and limitations on utility interruptions.

1.03 USE CHARGES

- A. General: Installation, removal, and use charges for temporary facilities shall be included in the Contract Sum. Allow other entities to use temporary services and facilities without cost, including, but not limited to, the Owner, the Design Professionals, occupants of the Project, testing agencies, and authorities having jurisdiction.
- B. Water and Sewer Service from Existing System: Water from the Owner's existing water system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.
- C. Electric Power Service from Existing System: Electric power from the Owner's existing system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.

1.04 INFORMATIONAL SUBMITTALS

- A. Site Plan: Show temporary facilities, utility hookups, staging areas, and parking areas for construction personnel.
- B. Moisture-Protection Plan: Describe procedures and controls for protecting materials and construction from water absorption and damage; including delivery, handling, and storage provisions for materials subject to water absorption or water damage, discarding water-damaged materials, protocols for mitigating water intrusion into completed Work, and replacing water damaged Work.
 - 1. Indicate sequencing of work that requires water, such as coring and describe plans for dealing with water from these operations. Show procedures for verifying that wet construction has dried sufficiently to permit installation of finish materials.

- C. Dust-Control and HVAC-Control Plan: Submit coordination drawing and narrative that indicates the dust-control and HVAC-control measures proposed for use, proposed locations, and proposed time frame for their operation. Identify further options if proposed measures are later determined to be inadequate. Include the following:
 - 1. Locations of dust-control partitions at each phase of the work.
 - 2. HVAC system isolation schematic drawing.
 - 3. Location of proposed air filtration system discharge.
 - 4. Other dust-control measures.
 - 5. Waste management plan.

1.05 **QUALITY ASSURANCE**

- A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations and requirements of authority having jurisdiction for temporary electric service. Install service to comply with NFPA 70.
- B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.
- C. Accessible Temporary Egress: Comply with applicable provisions in ADA-ABA Accessibility Guidelines and ANSI A117.1.

1.06 PROJECT CONDITIONS

A. Temporary Use of Permanent Facilities: Engage installer of each permanent service to assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before the Owner's acceptance, regardless of previously assigned responsibilities. Temporary use of permanent facilities during construction may be allowed at the sole discretion of the Owner.

PART 2 - PRODUCTS

2.01 <u>MATERIALS</u>Retain or delete paragraphs A through F below appropriate to project conditions regarding security fencing or dust control partitions. Determine option in paragraph A.

- A. Portable Chain-Link Fencing: Minimum 0.148-inch thick, galvanized steel, chain-link fabric fencing; minimum 8 feet high with galvanized steel pipe posts; minimum 2-3/8-inch OD line posts and 2-7/8-inch OD corner and pull posts, with 1-5/8-inch OD top and bottom rails. Provide galvanized steel bases for supporting posts.
- B. Polyethylene Sheet: Reinforced, fire-resistive sheet, 10 mils minimum thickness, with flame-spread rating of 15 or less per ASTM E 84.
- C. Dust Control Adhesive-Surface Walk-off Mats: Provide mats minimum 36 by 60 inches.

2.02 TEMPORARY FACILITIES .

- A. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.
 - 1. Store combustible materials apart from building.

2.03 EQUIPMENT

A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.

PART 3 - EXECUTION

3.01 INSTALLATION, GENERAL

- A. Locate facilities where they will serve the Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.
- B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.02 TEMPORARY UTILITY INSTALLATION

- A. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.
 - B. Heating and Cooling: Provide temporary heating and cooling required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.
 - C. Isolation of Work Areas in Occupied Facilities: Prevent dust, fumes, and odors from entering occupied areas and areas not under construction.
 - 1. Prior to commencing work, isolate the HVAC system in area where work is to be performed in accordance with approved coordination drawings.
 - a. Disconnect supply and return ductwork in work area from HVAC systems servicing occupied areas.
 - b. Maintain negative air pressure within work area using HEPA-equipped air filtration units, starting with commencement of temporary partition construction, and continuing until removal of temporary partitions is complete.
 - 2. Maintain dust partitions during the Work. Use vacuum collection attachments on dust-producing equipment. Isolate limited work within occupied areas using portable dust containment devices.
 - 3. Perform daily construction cleanup and final cleanup using approved, HEPA-filter-equipped vacuum equipment.

- D. Ventilation and Humidity Control: Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.
 - 1. Provide dehumidification systems to maintain the facilities between [XX] and [XX] RH when required to reduce substrate moisture levels to level required to allow installation or application of finishes.
- E. Electric Power Service: Connect to the Owner's existing electric power service. Maintain equipment in a condition acceptable to the Owner. Obtain all required permits.
 - Connect temporary service to the Owner's existing power source, as directed by the Owner.
- F. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.
 - 1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.
- G. Telephone Service: Provide temporary telephone service in Owner's-use facilities for use by all construction personnel. Install two telephone lines for each field office.
 - 1. Provide additional telephone lines for the following:
 - 2. At each telephone, post a list of important telephone numbers.
 - a. Police and fire departments.
 - b. Ambulance service.
 - c. Contractor's home office.
 - d. Design Professional's office.
 - e. Testing Consultant's offices.
 - f. Owner's office.
 - g. Principal subcontractors' field and home offices.
 - 3. Provide superintendent with cellular telephone for use when away from field office.

3.03 SUPPORT FACILITIES INSTALLATION

- A. General: Comply with the following:
 - 1. Provide construction for temporary offices, shops, and sheds located within construction area or within 30 feet of building lines that is noncombustible according to ASTM E 136. Comply with NFPA 241.
 - 2. Maintain support facilities until Substantial Completion inspection date is scheduled. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to the Owner.
- B. Traffic Controls: Comply with requirements of authorities having jurisdiction.

- 1. Protect existing site improvements to remain including curbs, pavement, and utilities.
- 2. Maintain access for fire-fighting equipment and access to fire hydrants.
- C. Parking: Provide temporary parking areas for construction personnel.
 - 1. Remove snow and ice as required to minimize accumulations.
- D. Project Signs: Provide Project signs as indicated. Unauthorized signs are not permitted.
 - Identification Signs: Provide Project identification signs as specified in the Contract Documents.
 - 2. Temporary Signs: Provide other signs as required to inform public and individuals seeking entrance to the Project.
 - a. Provide temporary, directional signs for construction personnel and visitors.
 - 3. Maintain and touchup signs so they are legible at all times.
- E. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction.
- F. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.
 - 1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilitie
- G. Existing Elevator Use: Use of the Owner's existing elevators will be permitted, provided elevators are cleaned and maintained in a condition acceptable to the Owner. At Substantial Completion, restore elevators to condition existing before initial use, including replacing worn cables, guide shoes, and similar items of limited life.
 - 1. Do not load elevators beyond their rated weight capacity.
 - 2. Provide protective coverings, barriers, devices, signs, or other procedures to protect elevator car and entrance doors and frame. If, despite such protection, elevators become damaged, engage elevator Installer to restore damaged work so no evidence remains of correction work. Return items that cannot be refinished in field to the shop, make required repairs and refinish entire unit, or provide new units as required.
- H. Existing Stair Usage: Use of the Owner's existing stairs will be permitted, provided stairs are cleaned and maintained in a condition acceptable to the Owner. At Substantial Completion, restore stairs to condition existing before initial use.
 - 1. Provide protective coverings, barriers, devices, signs, or other procedures to protect stairs and to maintain means of egress. If stairs become damaged, restore damaged areas so no evidence remains of correction work.

3.04 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.

- B. Tree and Plant Protection: Install temporary fencing outside the drip line of trees to protect vegetation from damage from construction operations. Protect tree root systems from damage.
- C. Site Enclosure Fence: Before construction operations begin furnish and install site enclosure fence in a manner that will prevent people and animals from easily entering site except by entrance gates.
 - 1. Extent of Fence: As required to enclose entire Project site or portion determined sufficient to accommodate construction operations.
 - 2. Maintain security by limiting number of keys and restricting distribution to authorized personnel. Furnish one set of keys to the Owner.
- D. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.
- E. Temporary Egress: Maintain temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction.
- F. Covered Walkway: Erect protective, covered walkway for passage of individuals through or adjacent to Project site. Coordinate with entrance gates, other facilities, and obstructions. Comply with regulations of authorities having jurisdiction.
 - 1. Construct covered walkways using scaffold or shoring framing.
 - 2. Provide overhead decking, protective enclosure walls, handrails, barricades, warning signs, exit signs, lights, safe and well-drained walkways, and similar provisions for protection and safe passage.
 - 3. Paint and maintain appearance of walkway for duration of the Work.
- G. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.
 - 1. Where heating or cooling is needed and permanent enclosure is not complete, insulate temporary enclosures.
- H. Temporary Partitions: Provide floor-to-ceiling dustproof partitions to limit dust and dirt migration and to separate areas occupied by the Owner from fumes and noise.
 - 1. Construct dustproof partitions with fire rated gypsum wallboard with joints taped on occupied side, and fire-retardant plywood on construction operations side.
 - 2. Where fire-resistance-rated temporary partitions are required by authorities having jurisdiction, construct partitions according to the rated assemblies.
 - 3. Insulate partitions to control noise transmission to occupied areas.
 - 4. Seal joints and perimeter. Equip partitions with gasketed dustproof doors and security locks where openings are required.
 - 5. Protect air-handling equipment.
 - 6. Provide walk-off mats at each entrance through temporary partition.
- I. Fire Safety During Construction: Comply with all requirements identified herein as well as the more stringent requirements of the applicable codes (New York State Building and Fire Codes or New York City Building and Fire Codes).

- 1. No smoking: Smoking shall be prohibited throughout the project/construction site. "No Smoking" signs shall be conspicuously posted at all entrances and throughout the site.
- 2. The Contractor shall designate a Fire Prevention Program Superintendent/ Fire Safety Manager who shall be responsible for all fire safety efforts until completion and acceptance of the Work described in the Contract Documents that include but are not limited to the following:
 - a. Prefire Plans. Develop in cooperation with the local Fire Chief and Fire Code Official. Any changes affecting the utilization of information contained in the plan shall result in notification to the local Fire Chief and Fire Code Official.
 - b. Training. Job site personnel shall be trained in fire safety practices and procedures and the proper use of fire protection equipment, including hand-held fire extinguishers, hose lines, fire alarm and sprinkler systems.
 - c. Fire Protection Devices. Fire protection and detection equipment shall be maintained and serviced.
 - d. Hot Work Operations. Welding, cutting, open torches, torch-applied roof system activities, and other hot work operations shall be conducted under a permit system. A fire watch and fire extinguishers shall be provided.
 - e. Impairment of Fire Protection Systems. Coordinate planned, emergency or accidental impairments of fire protection systems to include tagging of impaired systems and notification of Fire Department, Alarm Company, Building Owner/Operator, and Contractors.
 - f. Temporary Covering of Fire Protection Devices. Coverings placed on or over fire protection devices for protection from damage shall be immediately removed upon the completion of the Work in the room or area in which the devices are installed.
- 3. Provide readily accessible telephone service for fire calls at a location or locations approved by the Owner.
 - a. The Contractor shall pay all costs thereof until completion and acceptance of the Work or as otherwise directed by the Owner.
 - b. Provide/post the street address of the construction site and the emergency telephone number of the Fire Department adjacent to the telephone.

3.05 MOISTURE AND MOLD CONTROL

- A. Contractor's Moisture-Protection Plan: Avoid trapping water in finished work. Document visible signs of mold that may appear during construction.
 - 1. Control moisture and humidity inside building by maintaining effective dry-in conditions.
 - 2. Use permanent HVAC or temporary systems to control humidity.
 - 3. Comply with manufacturer's written instructions for temperature, relative humidity, and exposure to water limits.
 - a. Hygroscopic materials that may support mold growth, including wood and gypsumbased products, that become wet during the course of construction and remain wet for 48 hours are considered defective.
 - b. Measure moisture content of materials that have been exposed to moisture during construction operations or after installation. Record daily readings over a forty-eight hour period. Identify materials containing moisture levels higher than allowed. Report findings in writing to the Design Professional.
 - c. Remove materials that can not be completely restored to their manufactured moisture level within 48 hours.

3.06 OPERATION, TERMINATION, AND REMOVAL

- A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.
- B. Maintenance: Maintain facilities in good operating condition until removal.
 - 1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.
- C. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.
- D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
 - 1. Materials and facilities that constitute temporary facilities are property of the Contractor. The Owner reserves right to take possession of the Project identification signs.
 - 2. Remove temporary roads and paved areas not intended for or acceptable for integration into permanent construction. Where area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at temporary entrances, as required by authorities having jurisdiction.
 - 3. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Section 01 77 00 Contract Closeout Requirements.

END OF SECTION 01 50 00

SECTION 01 60 00 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. The Contract Documents, including but not limited to, the Drawings and Individual Specification Sections and Contractor's Submittal Schedule, apply to this section.

1.02 SUMMARY

- A. Section includes administrative and procedural requirements for selection of products for use in the Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.
- B. Related Sections:
 - 1. Section 01 23 00 Alternates, for products selected under an alternate.
 - 2. Section 01 33 00 Submittal Procedure, for product submittals.

1.03 DEFINITIONS

- A. Products: Items obtained for incorporating into the Work of the Contract and purchased new for the Project. The term "product" includes the terms "material," "equipment," and "system."
 - 1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature that is current as of date of the Contract Documents.
 - 2. New Products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.
 - 3. Comparable Product: Product that is demonstrated and approved through submittal process to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.
- B. Procurement Exemption Approval Product Specification: A specification in which a specific manufacturer's product is named including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes as a single source or sole source provider.

1.04 <u>ACTION SUBMITTALS</u>

- A. Comparable Product Requests: Submit request for consideration of each comparable product. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
 - 1. Include data to indicate compliance with the requirements specified in "Comparable Products" from Article 5, Section 5.04 of the General Conditions.

- 2. Design Professional's Action: If necessary, the Design Professional will request additional information or documentation for evaluation within one week of receipt of a comparable product request. The Design Professional will notify the Contractor through the Owner of approval or rejection of proposed comparable product request within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.
 - a. Form of Approval: As specified in Section 01 33 00 Submittal Procedure.
 - b. Use product specified if the Design Professional does not issue a decision on use of a comparable product request within time allocated.
- B. Procurement Exemption Approval Product Specification Submittal: Comply with requirements in Section 01 33 00 Submittal Procedure. Show compliance with requirements.

1.05 QUALITY ASSURANCE

- A. Compatibility of Options: If the Contractor is given option of selecting between two or more products for use on the Project, select product compatible with products previously selected, even if previously selected products were also options.
 - 1. Each contractor is responsible for providing products and construction methods compatible with products and construction methods of other contractors.
 - 2. If a dispute arises between contractors over concurrently selectable but incompatible products, the Design Professional will determine which products shall be used.

1.06 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.
- B. Delivery and Handling:
 - 1. Schedule delivery to minimize long-term storage at the Project site and to prevent overcrowding of construction spaces.
 - 2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
 - 3. Deliver products to the Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
 - 4. Inspect products on delivery to determine compliance with the Contract Documents and to determine that products are undamaged and properly protected.

C. Storage:

- 1. Store products to allow for inspection and measurement of quantity or counting of units.
- 2. Store materials in a manner that will not endanger the Project structure.
- 3. Store products that are subject to damage by the elements under cover in a weather tight enclosure above ground, with ventilation adequate to prevent condensation.
- 4. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
- 5. Protect stored products from damage and liquids from freezing.

1.07 PRODUCT WARRANTIES

- A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve the Contractor of obligations under requirements of the Contract Documents.
 - 1. Manufacturer's Warranty: Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to the Owner.
 - 2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for the Owner.
- B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.
 - 1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
 - 2. Refer to individual specification sections for specific content requirements and particular requirements for submitting special warranties.
- C. Submittal Time: Comply with requirements in Section 01 33 00 Submittal Procedure.

PART 2 - PRODUCTS

2.01 PRODUCT SELECTION PROCEDURES

- A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and new at time of installation.
 - 1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
 - 2. The Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
 - 3. Where products are accompanied by the term "as selected," the Design Professional will make selection.
 - 4. Descriptive, performance, and reference standard requirements in the Specifications establish characteristics of products.
 - 5. Or Equal: For products specified by name and accompanied by the term "or equal," or "or approved equal," or "or approved," comply with requirements in "Comparable Products" Article to obtain approval for use of an unnamed product.
 - 6. Provide products that do not contain asbestos.

B. Product Selection Procedures:

- 1. Manufacturer/Source: Where Specifications include a procurement exemption approval and name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements. Comparable products or substitutions for the Contractor's convenience will not be considered.
- 2. Products: Where Specifications include a list of names of both available manufacturers and products, provide one of the products listed, or an unnamed product, that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product.
- 3. Manufacturers: Where Specifications include a list of available manufacturers, provide a product by one of the manufacturers listed, or a product by an unnamed manufacturer,

that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed manufacturer's product.

- C. Visual Matching Specification: Where Specifications require "match sample", provide a product that complies with requirements and matches sample. The Owner's decision will be final on whether a proposed product matches.
 - 1. If no product available within specified category matches and complies with other specified requirements, comply with requirements in "Comparable Products" Article for consideration of an unnamed manufacturer's product.
- D. Visual Selection Specification: Where Specifications include the phrase "as selected from manufacturer's full range", select a product that complies with requirements. The Design Professional will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

2.02 COMPARABLE PRODUCTS

- A. Conditions for Consideration: The Design Professional will consider the Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, the Design Professional may return requests without action, except to record noncompliance with these requirements:
 - 1. Action Submittal shall be provided in accordance with Submittal Procedures within 60 days after Notice to Proceed.
 - 2. Evidence that the proposed product does not require revisions to the Contract Documents that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.
 - 3. Detailed comparison of qualities of proposed product with those named in the Specifications, including attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
 - 4. Evidence that proposed product provides specified warranty.
 - 5. List of similar installations for completed projects with project names and addresses and names and addresses of design professionals and owners, if requested.
 - 6. Samples, if requested.
- B. Comparable Products Costs: Any costs savings to an approved Comparable Product identified and realized by the Contractor shall be shared equal between the Owner (50%) and Contractor (50%).

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 60 00

SECTION 01 73 29 - CUTTING AND PATCHING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. The Contract Documents, including but not limited to, the Drawings and Individual Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes procedural requirements for cutting and patching.
- B. Responsibility: Each Contractor is responsible for the cutting and patching to permit installation or performance of Work of their contract.
- C. Related Sections include the following:
 - Individual Specification Sections.

1.03 DEFINITIONS

- A. Cutting: Removal of in-place construction necessary to permit installation or performance of Work of the contract.
- B. Patching: Fitting and repair work required to restore surfaces to original conditions after installation of Work of the contract.

1.04 SUBMITTALS

- A. Cutting and Patching Proposal: Submit a proposal describing procedures at least 10 days before the time cutting and patching will be performed, requesting approval to proceed. Include the following information:
 - 1. Extent: At each occurrence, describe cutting and patching, show how they will be performed, and indicate why they cannot be avoided.
 - 2. Changes to In-Place Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building's appearance and other significant visual elements.
 - 3. Products: List products to be used and firms or entities that will perform the Work.
 - 4. Dates: Indicate when cutting and patching will be performed.
 - 5. Utility Services and Mechanical/Electrical Systems: List services/systems that cutting and patching procedures will disturb or affect. List services/systems that will be relocated and those that will be temporarily out of service. Indicate how long services/systems will be disrupted.
 - 6. Structural Elements: Where cutting and patching involve adding reinforcement to structural elements, submit details and engineering calculations showing integration of reinforcement with original structure.

7. Design Professional's Approval: Obtain approval of cutting and patching proposal before cutting and patching. Approval does not waive right to later require removal and replacement of unsatisfactory work.

1.05 QUALITY ASSURANCE

- A. Structural Elements: Do not cut and patch structural elements in a manner that could change their load-carrying capacity or load-deflection ratio.
- B. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that result in increased maintenance or decreased operational life or safety.
- C. Fire Rated Elements: Do not cut and patch fire rated elements (i.e. floors, walls, roofs, shafts, etc.) in a manner that results in reducing their capacity to perform as intended or that results in decreased fire rating.
- D. Miscellaneous Elements: Do not cut and patch miscellaneous elements or related components in a manner that could change their load-carrying capacity, which results in reducing their capacity to perform as intended, or that result in increased maintenance or decreased operational life or safety.
- E. Visual Requirements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that would, in Design Professional's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.
- F. Cutting and Patching Conference: Before proceeding, meet at Project site with parties involved in cutting and patching, including other trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

1.06 WARRANTY

A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during cutting and patching operations, by methods and with materials so as not to void existing warranties.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. General: Comply with requirements specified in other Sections.
- B. In-Place Materials: Use materials identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.
 - 1. If identical materials are unavailable or cannot be used, use materials that, when installed, will match the visual and functional performance of in-place materials, unless specified otherwise in other Sections.

C. Fire Rated Elements: Provide firestopping products/systems specified in system design listings by approved testing agencies that conform to the construction type, penetrating item, annular space requirements and fire rating involved in each separate assembly. Refer to applicable Individual Specification Sections.

PART 3 - EXECUTION

3.01 **EXAMINATION**

- A. Examine surfaces to be cut and patched and conditions under which cutting and patching are to be performed.
 - 1. Compatibility: Before patching, verify compatibility with and suitability of substrates, including compatibility with in-place finishes or primers.
 - 2. Proceed with installation only after unsafe or unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Temporary Support: Provide temporary support of Work to be cut.
- B. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.
- C. Adjoining Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.
- D. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting or patching to minimize interruption to occupied areas.

3.03 PERFORMANCE

- A. General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
 - 1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.
- B. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction.
 - 1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
 - 2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.

- 3. Concrete or Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
- 4. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
- 5. Proceed with patching after construction operations requiring cutting are complete.
- C. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other Work. Patch with durable seams that are as invisible as possible. Provide materials and comply with installation requirements specified in other Sections.
 - 1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate integrity of installation.
 - 2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
 - Clean piping, conduit, and similar features before applying paint or other finishing materials.
 - b. Restore damaged pipe covering to its original condition.
 - 3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
 - a. Where patching occurs in a painted surface, apply primer and intermediate paint coats over the patch and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.
 - 4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an evenplane surface of uniform appearance.
 - 5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition.
 - 6. Fire Rated Elements: Install firestopping systems to comply with applicable Individual Specification Sections and firestopping manufacturer's written installation instructions and published drawings for products and applications.
- D. Cleaning: Clean areas and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty, and similar materials.

END OF SECTION 01 73 29

NOTE: THIS SECTION IS A COMMON DOCUMENT ON A MULTI-CONTRACT PROJECT. SECTION 01 74 19 – CONSTRUCTION WASTE MANAGEMENT

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section includes requirements for Construction Waste Management (CWM), with criteria for recycling and/or salvaging demolition and construction waste generated during the project. A Construction Waste Management Plan shall be developed for approval by the Construction Manager and DASNY Project Manager. The Plan shall be implemented throughout the duration of the project, and shall be documented in accordance with the SUBMITTALS Article below.
 - CWM is included as part of the LEED building goals for the project, which are established in alignment with the DASNY Sustainability Policy for Construction, and the project goals of the Owner.

B. Responsible parties:

- Locations for removal bins or dumpsters shall be coordinated with DASNY's Project Manager.
- 2. Each contractor shall supply a CWM plan detailing the means and methods for recycling job site waste. Following the award of contract, the Contractors shall identify a single entity to act as the construction waste manager.
- 3. All Contractors will receive and sign-off on the CWM plan. They will be responsible for adherence to the plan through management of their work on-site and the waste generated under their contract.
 - a. Sign-off and adherence to the plan applies even when a separate bid package is established for the CWM.

C. Resources

NY CD Resource Center
 727 East Washington Street
 Syracuse, New York 13210
 Bgriffin@syracusecoe.org (315) 443-9747

Initiated with support from Empire State Development, The NY CD Resource Center supports and promotes the growth of C&D recycling and building materials reuse (BMR) in New York State through a variety of market-development and network-building activities. Key among these activities is the provision of C&D materials management training to New York contractors and haulers, many of whom want to increase recycling at construction sites but need help getting started. The program also offers on-site assistance at construction sites.

 ESD Recycling Market Information Database. http://appcenter.nylovesbiz.com/esdrecycling/.

1.02 PERFORMANCE REQUIREMENTS

A. Each Contract shall prepare and submit a CWM Plan to the Design Professional for approval. The CWM Plan shall outline the provisions to be implemented to salvage for reuse or to recycle demolition and construction waste generated during the project.

- 1. The end-of-project recycling rate when possible shall equal, at minimum, 75 percent for 2 LEED credits (by weight) of the total waste from construction, demolition, and land clearing activities.
 - a. Contractors are encouraged to achieve higher levels of diversion from landfill if possible, as this benefits long-term landfill management and the LEED rating system awards additional points if exemplary performance levels are reached.
- B. The approved CWM Plan shall be implemented throughout the duration of the project and documented in accordance with the SUBMITTALS Article below.
- C. The CWM Plan shall include, but not be limited to, the following components:
 - 1. Re-Used materials/equipment: Materials or equipment to be removed from the site or turned over to the State shall be documented.
 - a. Documentation shall include the materials turned over, weight or quantity of materials/equipment and a letter on company letterhead indicating the intended use of items.
 - Listing of Targeted Materials: Develop a list of the waste materials from the Project that will be targeted for reuse, salvage, or recycling. The following materials shall be accounted for (materials that will not be recycled shall be indicated as such):
 - a. Cardboard, paper, packaging
 - b. Acoustical Ceiling Tiles
 - c. Clean dimensional wood, palette wood
 - d. Beverage containers
 - e. Land clearing debris
 - f. Concrete
 - g. Stone
 - h. Concrete Masonry Units (CMU)
 - i. Asphalt
 - j. Metals from banding, stud trim, ductwork, piping, rebar, roofing, windows, other trim, steel, iron, galvanized sheet steel, stainless steel, aluminum, copper, zinc, lead, brass, and bronze
 - k. Gypsum board
 - Carpet and pad
 - m. Paint
 - Asphalt roofing shingles if applicable for any existing building demolition
 - o. Rigid Foam
 - p. Glass
 - q. Plastics
 - r. Woods
 - Sorting Method: Provide a description of the proposed means of sorting and transporting the recyclable materials (whether materials will be on-site sorted and then hauled to designated centers, or whether mixed materials will be collected by a waste hauler and removed from the site for off-site sorting).
 - 4. Recycling facilities: Provide the name of the recycling facilities(s) where materials will be sent for recycling, how it will be recycled, and the applicable fee(s).
 - 5. Landfill Information: Provide the name of the landfill(s) where trash will be disposed of and the applicable landfill tipping fee(s).

- 6. Additional Information: Include any additional information deemed relevant to describe the scope and intent of the CWM Plan to the Design Professional.
- 7. Subcontractor Requirements: Construction Waste Management and recycling requirements shall be incorporated into all Subcontractors' contracts.

1.03 SUBMITTALS

- A. Submittal Requirements:
 - 1. A copy of the CWM Plan, as defined in the PERFORMANCE REQUIREMENTS Article above.
 - 2. Contractors shall submit a monthly Waste Management submission.
 - This submission shall include waste receipts and a completed Waste Management Form. (a sample form is included at the end of this Section identified as Exhibit "A")
 - 3. Calculations and supporting documentation to demonstrate end-of-project recycling rates meeting the requirements of the CWM Plan. Note: These calculations and supporting documentation are required regardless of method of processing (on-site or off-site separations). Use these Solid Waste Conversion Factors only if tipping tickets are not available if the weight in each dumpster or container is not directly measured.

Solid Weight Conversion Factors				
Mixed Waste 350 lbs/cubic yard				
Wood	300 lbs/cubic yard			
Cardboard 100 lbs/cubic yard				
Gypsum Board	500 lbs/cubic yard			
Rubble	1,400 lbs/cubic yard			
Steel 1,000 lbs/cubic yard				

- b. Record and document the total weight (in tons) of all demolition and construction waste materials sent to the landfill, or recycled or salvaged. Monthly Waste Management Reporting Forms shall be used as the basis for determining the total amount of waste recycled or salvaged for the project. The monthly reporting forms shall specify:
 - The number of dumpsters or other containers of recycled or salvaged materials for that month.
 - 2) The volume (in cubic yards) of each dumpster or container of recycled or salvaged materials for that month.
 - 3) The type of recycled or salvaged material contained in each dumpster or container.
 - 4) The weight of the recycled or salvaged material in each dumpster or container. For materials not contained in the Solid Waste Conversion Factors above propose a conversion factor for review by the Design Professional.
 - 5) In addition, provide the name of the receiving facilities/companies that will be purchasing or accepting

- the recycled or salvaged materials. Receipts or other proof of facility reception of materials is required.
- 6) For materials separated for recycling off-site, establish a method for tracking the weight of the recycled material. The method shall be included in the CWM Plan for the Design Professional review and approval.
- c. In the case of off-site separation, ensure the transfer station used will provide tickets with required information on delivery weights (or volume with appropriate conversions), and proof of recycling rates for reporting.
- d. Calculate the end-of-project recycling rate percentage by dividing the recycled and salvaged waste (in tons) by the total waste generated (recycled, salvaged, and landfilled waste also in tons), and multiplying by 100.
- e. For materials turned over to others for reuse, provide documentation on company letterhead indicating the material(s), the quantity (either by weight or units), the date and the intended reuse of the product.

PART 3 EXECUTION

3.01 IMPLEMENTATION

The following implementations of the CWM Plan will be the responsibility of either the Contractor for the Construction Work or the CWM Contractor if that work is bid out under separate contract.

- A. Containers: Provide containers and the removal of all waste, non-returned surplus materials, and rubbish from the site in accordance with the Waste Management Plan. Oversee and document the results of the Plan. The Prime Contractors shall be responsible for collecting, sorting, and depositing in designated areas, their waste, non-returned surplus materials, and rubbish, as per the CWM Plan.
- B. Instruction: Provide on-site instruction of appropriate separation, handling and recycling, salvage, reuse and return methods to be used by all parties in appropriate stages of the Project.
- C. Separation of materials: Recycling and waste bin areas are to be kept neat and clean, and clearly marked.
 - On-site separation: Lay out a specific area(s) to facilitate separation of materials for potential recycling, salvage, reuse and return. Each potential material shall be collected and stored to avoid being mixed with other materials
 - 2. Off-site separation: Lay out an area for collection of mingled recyclable and waste materials, to be picked up and sorted off-site for recycling.

3.02 MEETINGS

- A. Conduct Construction Waste Management meetings. Meetings shall include Subcontractors affected by the CWM Plan. At a minimum, waste management goals and issues shall be discussed at the following meetings:
 - 1. Pre-bid meeting.
 - 2. Pre-construction meeting.
 - 3. Regular job-site meetings.

B. Any non-compliant practices in the field will be addressed at regular job-site meetings.

3.03 MONTHLY WASTE MANAGEMENT REPORTING FORMS

A. Monthly Waste Management Reporting Forms, as required in the SUBMITTALS Article above, shall be submitted to the Design Professional for review throughout the duration of the project.

END OF SECTION

(Project Name) (Exhibit "A") CONTRACTOR C&D WASTE MANAGEMENT FORM For Waste Generated On-Site					
Company:					
Contact:					
Phone:					

Material Description (Include packaging applicable)	waste	if Total Weight	% Reused on-	% Recycled off-site	% Sent to landfill	Material Recipient
			_			

Recycled Material: Material that would otherwise be destined for landfill but is diverted from the waste stream, reintroduced as material feedstock and reprocessed into new end products.

Reused Material: Materials that can be reused in their original form without any reprocessing.

SECTION 01 77 00 - CONTRACT CLOSEOUT REQUIREMENTS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. The Contract Documents, including but not limited to, the Drawings and Individual Specification Sections and Notice of Substantial Completion (NOSC) Form, apply to this section.

1.02 SUMMARY

- A. Section includes administrative requirements for preparation and submission of final Contract Closeout Documents, including, but not limited to, the following:
 - 1. Contract Closeout Meeting
 - 2. Notice of Substantial Completion (NOSC) Requirements
 - a. List of Incomplete Work Items
 - b. Contract Turnover Documents
 - 1) As-built Drawings
 - 2) As-built Specifications
 - 3) As-built Schedule
 - 4) Sustainable Documents
 - 5) Permits, Licenses and Certificates
 - 6) Hazardous Wastes Documents
 - 7) Commissioning Authority's Deficiency Log
 - c. General Guarantee
 - d. Operation and Maintenance Manuals
 - 3. Contract Closeout
 - 4. Final Cleaning

B. Related Sections:

- 1. General Conditions, Article 8 Payment
- 2. General Conditions, Article 13 Inspection and Acceptance
- 3. Section 01 40 00 Quality and Code Requirements
- 4. Section 01 78 23 Operation and Maintenance Manuals
- 5. Section 01 78 39 As-built Documents
- 6. Section 01 81 13 Sustainable Design Requirements

1.03 <u>CONTRACT CLOSEOUT Meeting</u>

A. Contract Closeout Meeting: The Owner will schedule and conduct a Contract closeout meeting, at a time convenient to the Owner and Design Professional, but no later than sixty (60) days prior to the scheduled inspection date for Substantial Completion.

- The Owner will conduct the meeting to review requirements and responsibilities related to Contract closeout.
- Attendees: Representatives of the Owner, testing agency, commissioning authority, Design Professional, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the meeting. Participants at the meeting shall be familiar with Project and authorized to make binding decisions on matters relating to the Work.
- 3. Agenda: Discuss items of significance that could affect or delay Contract closeout, including the following:
 - a. Status of Contract Turnover Documents.
 - b. Procedures required prior to inspection for Substantial Completion and for final inspection for acceptance.
 - c. Requirements for preparing sustainable documentation.
 - d. Requirements for submitting final operation and maintenance manual.
 - e. Requirements for Permits, Licenses and Certificates.
 - f. Preparation of Contractor's list of incomplete Work items.
 - g. Procedures for processing Application for Payment at Substantial Completion and final payment.
 - h. Submittal procedure.
 - i. Installation of the Owner's furniture, fixtures, and equipment.
 - j. Responsibility for removing temporary facilities and controls.
- 4. Minutes: The Owner or Design Professional will record and distribute meeting minutes.

1.04 NOTICE OF SUBSTANTIAL COMPLETION (NOSC)

- A. Substantial Completion: After the Work of the Contract is determined by the Owner, to be at Substantial Completion, the Contractor shall submit a written request to the Owner for a date of inspection. The date of Substantial Completion establishes the start of the guarantee period.
- B. Documentation: The Notice of Substantial Completion (NOSC) form shall be executed at the end of inspection documenting incomplete Work items and submission of documents in accordance with this section that includes but is not limited to:
 - a. Preparation of a list of Work to be completed and corrected, the value of Work items on the list, and completion date of each Work item.
 - b. Submittal of contract turnover documents.
 - c. Submittal of operation and maintenance manuals, testing, adjustment and balance records.
 - d. Delivery of tools, spare parts, extra materials, and similar items to location designated by the Owner. Label with manufacturer's name and model number where applicable.
 - e. Make final changeover of permanent locks and deliver keys to the Owner. Advise the Owner of changeover.
 - f. Termination and removal of temporary facilities from Project site, along with mockups, construction tools, and similar elements.
 - g. Completion of final cleaning requirements.
- C. SAMPLE FORM NOTICE OF SUBSTANTIAL COMPLETION

Vith exception of the		CONTRACTOR:		
		CONTRACT NO:		
	9999	CONTRACT VALUE:		
Conditions. This dat	e list of incomplete Work and status of ontract Documents as Substantial Co e also constitutes start of the guarantee	ompletion on (date)		
1. 2. 3. 4. 5. 6. NOTE: Attach addition:	LIST OF INCOMPLETE WORK		SCHEDULED	COMPLETION DATE
STATUS of CO	NTRACT TURNOVER DOCUMENTS:		PROVIDED YES	DUE Not DATE Applicable
 Sustainab Permits, 1 Hazard w Operation Spare pro Identify a 	As-built schedule transmitted to Owner le documentation submitted to Owner icenses and certificates submitted to Autho aste documentation approved by Owner and maintenance manual submitted to Ow ducts stock stored on site per Owner's dire my other Contract specific turnover docume my other Contract specific turnover docume ming	ner in final form ction ent		
Acknowledged by the Co	intractor (signature& title)	Email Addres	is .	Date
Recommended by the De	esign Professional (signature & title)	Email Addres	is .	Date
Recommended by the Pr	roject Manager (signature)			Date
Approved by the Director	r/Chief (signature)			Date
Distribution by PM: Contractor Dosign Professional Facility Representative	Distribution by PA: Code Compliance Unit Risk Management Procurement Contract File (original)			

1.05 LIST OF INCOMPLETE ITEMS

- A. Organization of List: Submit list of incomplete items in *EXCEL* spreadsheet electronic format. Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.
 - 1. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
 - 2. Include the following information at the top of each page:
 - a. Project name & number.
 - b. Date.
 - c. Name of Contractor & Contract number.
 - d. Page number.
- B. Reinspection: Submit a written request for reinspection. On receipt of request, the Owner will either proceed with inspection or notify the Contractor of unfulfilled requirements. After inspection, the Owner will notify the Contractor of items, either on the Contractor's list or additional items identified, that must be completed or corrected.
 - 1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
 - Results of completed inspection will form the basis to proceed with commencement of Contract Closeout Documents.

1.06 CONTRACT TURNOVER DOCUMENTS

- A. Procedure: Contract turnover documents shall be transmitted to the Owner or if stated to the Design Professional, fifteen (15) days prior to requesting inspection date for Substantial Completion.
- B. As-built Drawings: Transmit one paper copy set of marked-up As-built Drawings to the Design Professional, with copy of transmittal to Owner. Print each Drawing, whether or not changes and additional information were recorded.
- C. As-built Specifications: Transmit one paper copy set of marked-up as-built specifications, including addenda and contract modifications to the Design Professional, with copy of transmittal to Owner.
- D. As-built Schedule: Submit one electronic (PDF) copy, certified by the Contractor, of the schedule that reflects the exact manner in which the project was actually constructed, to the Owner.
- E. Sustainable Documentation: Submit one electronic (PDF) copy of product data, costs, invoices, material lists, manifest, certifications, etc to obtain project LEED certification. Refer to Individual Specification Section 01 81 13 Sustainable Design Requirements for record-keeping and submittals required for USGBC LEED prerequisites.
- F. Permits, Licenses and Certificates Documents: Submit one copy of original permits, licenses, certifications, inspection reports, material certificates/affidavits, approvals, and related documents required by authorities having jurisdiction to obtain Letter of Completion, Certificate of Occupancy, or Code Compliance Certificate. Coordinate and respond to requirements from

the Owner, or Municipality and all other authorities having jurisdiction for issuance of approval/documents required for the Owner use and occupancy.

- 1. Cooperate and help coordinate with agency testing materials as specified in Section 01 40 00 Quality and Code Requirements. Testing Agency is required to submit final report of special inspections.
- 2. The Contractor to provide one copy of original certification from agency or firm certifying the following and as required by Individual Specification Sections:
 - a. Sprinkler System NFPA Forms for;
 - 1) Contractor's Material and Test Certificate for Aboveground Piping
 - b. Fire Alarm System NFPA 72 Form for;
 - 1) Record of Completion
 - c. Electrical Certification Form from;
 - 1) Authority having jurisdiction
 - 2) Independent electrical inspection agency acceptable to the Owner
- G. Hazardous Waste Documents: Submit four (4) paper copies of documents to the Owner thirty (30) days prior to requesting inspection date for Substantial Completion. Refer to Individual Specification Sections for all requirements.
- H. Miscellaneous Record Submittals: Refer to Individual Specification Sections for miscellaneous record-keeping requirements and submittals in connection with various construction activities. Submit one electronic (PDF) copy of each submittal.
- I. Reports: Submit written report indicating items incorporated in Contract Documents concurrent with progress of the Work, including modifications, concealed conditions, field changes, product selections, and other notations incorporated.

1.07 GUARANTEE

A. General Guarantee: Comply with General Conditions, Article 13 – Inspection and Acceptance. The date established on the Notice of Substantial Completion form constitutes commencement of the Guarantee period.

1.08 OPERATION AND MAINTENANCE MANUALS

A. Final Manuals Submittal: Submit an electronic copy of a compiled set of complete Operation and Maintenance Manuals in final form as indicated in Section 01 78 23 – Operation and Maintenance Manuals, to the Owner fifteen (15) days prior to requesting date of inspection for Substantial Completion.

1.09 CONTRACT CLOSEOUT (same as final application for payment)

A. Contract Compliance: The Contractor shall comply with the requirements of General Conditions, Section 10.08 – Limitations on Actions.

- B. Preliminary Procedure: All Work and Extra Work of the Contract and requirements of this section must be complete and approved prior to commencement of Contract closeout.
 - 1. The Contractor shall request and submit to the Owner a final Contractor's Pencil Copy billing request that will formulate the final Application for Payment.
 - 2. The Contractor shall provide outstanding documentation to the Owner in accordance with General Conditions, Article 20 Opportunity Programs.
- C. Procedures: Upon the Owner's approval of the Contractor's Pencil Copy billing request, Contract closeout documents will be provided to the Contractor. The Contractor shall complete each document and submit all documents with original signature & notary as indicated on forms, the following:
 - 1. Final Application for Payment that includes remaining Retainage.
 - 2. Final Compliance Report.
 - 3. Contractor and Subcontractor Certifications Form.
 - 4. Contractor's Certified Payroll Form.
 - 5. Release Form -- Final Payment to Contractor.
 - 6. Consent of Surety -- Final Payment to Contractor, with power of attorney.
- D. Payroll Forms: The Contractor and all Sub-contractors to the Contractor shall submit original copies of the Contractor and Subcontractor Certifications Form and Contractor's Certified Payroll Form.

PART 2 - PRODUCTS

2.01 CLEANING MATERIALS

- A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.
 - 1. Use cleaning products that meet Green Seal GS-37, or if GS-37 is not applicable, use products that comply with allowable VOC levels.

PART 3 - EXECUTION

3.01 **DEMOBILIZATION**

- A. Deliver tools, spare parts, extra materials, and similar items to location designated by the Owner. Label with manufacturer's name and model number where applicable.
- B. Make final changeover of permanent locks and deliver keys to the Owner. Advise the Owner's personnel of changeover.
- C. Terminate and remove temporary facilities from the Project site, along with mockups, construction tools, and similar elements.

3.02 RECORDING AND MAINTENANCE

- A. Recording: Maintain one copy of each submittal during the construction period for contract turnover document purposes. Post changes and modifications to contract turnover documents as they occur; do not wait until the end of the Project.
- B. Maintenance of Turnover Documents and Samples: Store turnover documents and Samples in the field office apart from the Contract Documents used for construction. Contract turnover documents shall not be used for construction purposes. Maintain turnover documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to contract turnover documents for the Owner's reference during normal working hours during performance of Contract.

3.03 FINAL CLEANING

- A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.
- B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.
 - 1. Complete the following cleaning operations as applies to Work of the contract.
 - a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
 - b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
 - c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface
 - d. Remove tools, construction equipment, machinery, and surplus material from Project site.
 - e. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
 - f. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
 - g. Sweep concrete floors broom clean in unoccupied spaces.
 - h. Vacuum carpet and similar soft surfaces, removing debris and excess nap; shampoo if visible soil or stains remain. Replace if soil or stains remain after shampooing.
 - Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.
 - j. Remove labels that are not permanent.
 - k. Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.

- Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates.
- I. Wipe surfaces of mechanical and electrical equipment and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
- m. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.
- n. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
- o. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency. Replace burned-out bulbs, and those noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.
- p. Leave Project clean and ready for occupancy.
- C. Construction Waste Disposal: Comply with waste disposal requirements in all other applicable sections.

END OF SECTION 01 78 00

SECTION 01 78 23 - OPERATION AND MAINTENANCE MANUALS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. The Contract Documents, including but not limited to, the Drawings and Individual Specification Sections and Contractor's Submission Schedule, apply to this Section.

1.02 SUMMARY

- A. Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:
 - 1. Operation and maintenance manual for systems, subsystems, and equipment.
 - 2. Product maintenance data.
 - 3. Systems and equipment maintenance data.
- B. Related Sections:
 - 1. Section 01 33 00 Submittal Procedures
 - 2. Section 01 77 00 Contract Closeout Requirements
 - 3. Section 01 81 13 Sustainable Design Requirements
 - 4. Section 01 91 13 General Commissioning Requirements

1.03 <u>DEFINIT</u>IONS

- A. System: An organized collection of parts, equipment, or subsystems united by regular interaction.
- B. Subsystem: A portion of a system with characteristics similar to a system.

1.04 CLOSEOUT SUBMITTALS

- A. Required Manuals: see Section 01 77 00 Contract Closeout Requirements for additional requirements.
- B. Format: Submit operations and maintenance manuals in the following format:
 - 1. PDF electronic file. Assemble each manual into a composite electronically indexed file. Submit on digital media acceptable to the Design Professional.
 - Name each indexed document file in composite electronic index with applicable item name. Include a complete electronically linked operation and maintenance directory.
 - b. Enable inserted reviewer comments on draft submittals.

PART 2 - PRODUCTS

2.01 REQUIREMENTS FOR OPERATION, AND MAINTENANCE MANUALS

- A. Organization: Organize the manual into separate sections by CSI number based on the table of contents of the project manual, for each system and subsystem, and a separate section for each piece of equipment not part of a system. The manual shall contain the following materials, in the order listed:
 - 1. Title page.
 - Table of contents.
 - Manual contents:
 - a. Operation data.
 - b. Product maintenance data.
 - c. Systems and equipment data
- B. Title Page: Include the following information:
 - 1. Subject matter included in manual.
 - 2. Name and address of Project.
 - 3. Name and address of Owner.
 - Date of submittal.
 - 5. Name and contact information for Contractor.
 - 6. Name and contact information for Construction Manager.
 - 7. Name and contact information for Design Professional.
 - 8. Name and contact information for Commissioning Agent.
 - 9. Names and contact information for major consultants to the Design Professional that designed the systems contained in the manuals.
 - 10. Cross-reference to related systems in other operation and maintenance manuals.
- C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.
 - If operation or maintenance documentation requires more than one media volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.
- D. Manual Contents: Organize into sets of manageable size. Arrange contents by CSI Section number and then by system, subsystem, and equipment. .
- E. Manuals, Electronic Copy: Submit electronic (PDF) copy of the manual, to the Design Professional, concurrent with Action Submittal.

2.02 OPERATION DATA

- A. Content: In addition to requirements in this Section, include operation data required in individual Specification Section and the following information:
 - 1. System, subsystem, and equipment descriptions. Use designations for systems and equipment indicated on Contract Documents.
 - 2. Operating standards.

- 3. Operating procedures.
- 4. Operating logs.
- 5. Wiring diagrams.
- 6. Control diagrams.
- 7. Piped system diagrams.
- 8. Precautions against improper use.
- 9. License requirements including inspection and renewal dates.
- B. Descriptions: Include the following:
 - Product name and model number. Use designations for products indicated on Contract Documents.
 - 2. Manufacturer's name.
 - 3. Equipment identification with serial number of each component.
 - 4. Equipment function.
 - 5. Operating characteristics.
 - 6. Limiting conditions.
 - 7. Performance curves.
 - 8. Engineering data and tests.
 - 9. Complete nomenclature and number of replacement parts.
- C. Operating Procedures: Include the following, as applicable:
 - 1. Startup procedures.
 - 2. Equipment or system break-in procedures.
 - 3. Routine and normal operating instructions.
 - 4. Regulation and control procedures.
 - 5. Instructions on stopping.
 - 6. Normal shutdown instructions.
 - 7. Seasonal and weekend operating instructions.
 - 8. Required sequences for electric or electronic systems.
 - 9. Special operating instructions and procedures.
- D. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.
- E. Piped Systems: Diagram piping as installed, and identify color-coding where required for identification.

2.03 PRODUCT MAINTENANCE DATA

- A. Content: Organize data into a separate section, within the O & M Manual, for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.
- B. Source Information: List each product included in section identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.
- C. Product Information: Include the following, as applicable:
 - 1. Product name and model number.

- 2. Manufacturer's name.
- 3. Color, pattern, and texture.
- 4. Material and chemical composition.
- 5. Reordering information for specially manufactured products.
- D. Maintenance Procedures: Include manufacturer's written recommendations and the following:
 - 1. Inspection procedures.
 - 2. Types of cleaning agents to be used and methods of cleaning.
 - 3. List of cleaning agents and methods of cleaning detrimental to product.
 - 4. Schedule for routine cleaning and maintenance.
 - 5. Repair instructions.
- E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.
- F. Warranties and Guarantees: Include copies of warranties and guarantees lists of circumstances and conditions that would affect validity of warranties.
 - 1. Include procedures to follow and required notifications for warranty claims.

2.04 SYSTEMS AND EQUIPMENT MAINTENANCE DATA

- A. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.
- B. Source Information: List each system, subsystem, and piece of equipment included in a separate section within the O & M Manual identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.
- C. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:
 - 1. Standard maintenance instructions and bulletins.
 - 2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
 - 3. Identification and nomenclature of parts and components.
 - 4. List of items recommended to be stocked as spare parts.
- D. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:
 - 1. Test and inspection instructions.
 - 2. Troubleshooting guide.
 - 3. Precautions against improper maintenance.
 - 4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
 - 5. Aligning, adjusting, and checking instructions.
 - 6. Demonstration and training video recording, if available.

- E. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.
 - 1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
 - 2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.
- F. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.
- G. Warranties: Include copies of warranties and lists of circumstances and conditions that would affect validity of warranties.
 - 1. Include procedures to follow and required notifications for warranty claims.

PART 3 - EXECUTION

3.01 MANUAL PREPARATION

- A. Operation and Maintenance Documentation shall be provided for review, concurrent, with Action Submittal specified in Individual Specification Section.
 - Correct or modify the manual to comply with the Design Professional's and Commissioning Authority's comments. Submit copies of each corrected manual within 15 days of receipt of Design Professional's and Commissioning Authority's comments and prior to commencing demonstration and training.
- B. Product Maintenance Data: Assemble a complete set of maintenance data, in a separate section, within the O & M Manual, indicating care and maintenance of each product, material, and finish incorporated into the Work.
- C. Operation and Maintenance Data: Assemble a complete set of operation and maintenance data, in a separate section, within the O & M Manual, indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.
 - 1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
 - 2. Prepare a separate section within the O & M Manual, for each system and subsystem, in the form of an instructional manual for use by operating personnel.
- D. Manufacturers' Data: Where manual contain manufacturers' standard printed data; include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.
 - 1. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.

- E. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in As-built Drawings to ensure correct illustration of completed installation.
 - 1. Do not use original project record documents as part of operation and maintenance manuals.

END OF SECTION 01 78 23

SECTION 01 78 39 - AS BUILT DOCUMENTS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. The Contract Documents, including but not limited to, the Drawings and Individual Specification Sections, apply to this Section.

1.02 SUMMARY

- A. Section includes administrative and procedural requirements for As-built documents, including the following:
 - 1. As-built Drawings
 - 2. As-built Specifications
 - 3. As-built Schedule
 - 4. Record Product Data
 - 5. Miscellaneous record submittals

B. Related Sections:

- 1. Section 01 32 00 Construction Progress Documentation
- 2. Section 01 33 00 Submittal Procedure; Required Submittal List
- 3. Section 01 77 00 Contract Closeout Requirements
- 4. Section 01 78 23 Operation and Maintenance Manuals
- C. Administrative and procedural requirements for contract turnover documents, including, but not limited to the following, as provided in Individual Specifications Sections.
 - 1. Sustainable Documents
 - 2. Commissioning Documents
 - 3. Hazardous Waste Documents

1.03 CLOSEOUT SUBMITTALS

A. Required Documents: Section 01 77 00 – Contract Closeout Requirements, describes administrative requirements for submission, number and type of copies required for contract closeout requirements.

PART 2 - PRODUCTS

2.01 <u>AS-BUILT DRAWINGS</u>

A. As-built Drawings: Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings onsite. Review As-built Drawings and shop drawings monthly with the Owner, for approval.

- 1. Preparation: Daily mark As-built Drawings to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up As-built Drawings.
 - a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
 - b. Accurately record information in an acceptable drawing technique.
 - c. Record data as soon as possible after obtaining it.
 - d. Record and check the markup before enclosing concealed installations.
- 2. Content: Types of items requiring marking include, but are not limited to, the following:
 - a. Dimensional changes to Drawings.
 - b. Revisions to details shown on Drawings.
 - c. Depths of foundations below first floor.
 - d. Locations and depths of underground utilities.
 - e. Revisions to routing of piping and conduits.
 - f. Revisions to electrical circuitry.
 - g. Actual equipment locations.
 - h. Duct size and routing.
 - i. Locations of concealed internal utilities.
 - j. Changes made by Change Order.
 - k. Changes made by Bulletin.
 - I. Changes made following the Owner's written orders.
 - m. Details not on the original Contract Drawings.
 - n. Field records for variable and concealed conditions.
 - o. Record information on the Work that is shown only schematically.
- 3. Mark the Contract Drawings and Shop Drawings completely and accurately. Utilize personnel proficient at recording graphic information in production of marked-up as-built prints.
- 4. Mark as-built sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
- 5. Mark important additional information that was either shown schematically or omitted from original Drawings.
- 6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.

2.02 AS-BUILT SPECIFICATIONS

- A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.
 - 1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
 - 2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
 - 3. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.
 - 4. For each principal product, indicate whether record Product Data has been submitted in operation and maintenance manuals instead of submitted as record Product Data.
 - 5. Note related Change Orders, record Product Data, and turnover Drawings where applicable.

2.03 AS-BUILT SCHEDULE

- A. Final Schedule: Submit to the Owner a final schedule update. The As-built Schedule shall reflect the exact manner in which the project was actually constructed including actual start and finish dates, activities, sequences and logic.
 - 1. The Contractor shall certify the final schedule update as being a true reflection of the way the project was actually constructed.

2.04 RECORD PRODUCT DATA

- A. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.
 - 1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
 - 2. Include significant changes in the product delivered to the Project site and changes in manufacturer's written instructions for installation.
 - 3. Note related Change Orders, As-built Specifications, and As-built Drawings where applicable.

2.05 MISCELLANEOUS RECORD SUBMITTALS

- A. Assemble miscellaneous records required by Individual Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.
- B. Format: Submit miscellaneous record submittals.
 - 1. Include miscellaneous record submittals directory organized by specification section number and title, electronically linked to each item of miscellaneous record submittals.

PART 3 - EXECUTION

3.01 RECORDING AND MAINTENANCE

- A. Maintain Change Log: Maintain and submit written change log to the Owner, monthly for review indicating items incorporated in contract turnover documents concurrent with progress of the Work, including modifications, concealed conditions, field changes, product selections, and other notations incorporated.
- B. Recording: Maintain one copy of each submittal during the construction period for contract turnover document purposes. Post changes and modifications to contract turnover documents as they occur; do not wait until the end of the Project.
- C. Maintenance of Turnover Documents and Samples: Store turnover documents and Samples in the field office apart from the Contract Documents used for construction. Contract turnover documents are not to be used for construction purposes. Maintain turnover documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to contract turnover documents for the Owner's reference during normal working hours during performance of Contract.

END OF SECTION 01 78 39

SECTION 01 81 13 SUSTAINABLE DESIGN REQUIREMENTS

USGBC HAS REMOVED CREDIT NUMBERING IN LEED V4 AND IDENTIFIES PREREQUISITES AND CREDITS BY NAME ONLY. NUMBERING IS INCLUDED HEREIN FOR EASE OF USE IN PROJECT ADMINISTRATION.

THIS SECTION IS SPECIFIC TO LEED VERSION 4 PROJECTS IN NORTH AMERICA. SIGNIFICANT EDITING WILL BE REQUIRED FOR PROJECTS IN OTHER REGIONS.

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. Section includes general requirements and procedures for compliance with certain prerequisites and credits needed for Project to obtain "LEED Version 4 for Building Design and Construction" (LEED v4 BD+C) Silver, Gold, or Platinum certification based on USGBC's LEED v4 BD+C.
 - 1. Specific requirements for LEED are also included in other Sections.
 - Some LEED prerequisites and credits needed to obtain LEED certification depend on product selections and may not be specifically identified as LEED requirements. Compliance with requirements needed to obtain LEED prerequisites and credits may be used as one criterion to evaluate substitution requests and comparable product requests.
 - 3. A copy of the LEED Project checklist is attached at the end of this Section for information only.
 - Some LEED prerequisites and credits needed to obtain the indicated LEED certification depend on aspects of Project that are not part of the Work of the Contract.
 - 4. Definitions included in the "LEED Version 4 for Building Design and Construction" (LEED v4 BD+C) Reference Guide and online amendments apply to this Section.

B. Related Requirements:

- 1. Section 01 32 33, "Photographic Documentation."
- 2. Section 01 33 00, "Submittal Procedures."
- 3. Section 01 50 00, "Temporary Facilities and Controls" for temporary heating and cooling requirements.
- 4. Section 01 57 31, "Indoor Air Quality Management."
- 5. Section 01 74 19, "Construction Waste Management and Disposal."
- 6. Section 01 78 23, "Operation and Maintenance Data."

- 7. Section 01 78 39, "LEED Systems Manual."
- 8. Section 01 91 13, "General Commissioning Requirements."
- 9. Divisions 02 through 49 Sections for LEED requirements specific to the work of each of these Sections. Requirements may or may not include reference to LEED.

1.03 DEFINITIONS

- A. Bio-Based Materials: Materials that meet the Sustainable Agriculture Network's Sustainable Agriculture Standard. Bio-based raw materials shall be tested using ASTM D 6866 and be legally harvested, as defined by the exporting and receiving country.
- B. CDPH Standard Method v1.1: California Department of Public Health (CDPH) Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers, v. 1.1–2010, for the emissions testing and requirements of products and materials.
- C. Composite Wood and Agrifiber: Products made of wood particles and/or plant material pressed and bonded with adhesive or resin such as particleboard, medium density fiberboard (MDF), plywood, wheatboard, strawboard, panel substrates, and door cores.
- D. Corporate Sustainability Report: A third-party verified report that outlines the environmental impacts of extraction operations and activities associated with the manufacturer's product and the product's supply chain.
- E. Indoor Air Quality (IAQ) Management Plan: Plan developed by the Contractor to provide a healthy indoor environment for workers and building occupants during construction. Plan must meet or exceed the recommendations of the Sheet Metal and Air Conditioning Contractors National Association (SMACNA) "IAQ Guidelines for Occupied Buildings Under Construction."
- F. Leadership Extraction Practices: Products that meet at least one of the responsible extraction criteria, which include: extended producer responsibility; bio-based materials; FSC wood products; materials reuse; recycled content; and other USGBC approved programs.
- G. Material Cost: The dollar value of materials being provided to the site, after Contractor markups, including transportation costs, taxes, fees, and shop labor, but excluding field equipment and field labor costs.
- H. Materials Reuse: Reuse includes salvaged, refurbished, or reused products.
- I. Multi-Attribute Optimization: Third party certified products that demonstrate impact reduction below industry average in at least three of the following six categories: global warming potential; stratospheric ozone depletion; acidification; eutrophication; tropospheric ozone creation; nonrenewable resource depletion.
- J. Recycled Content: Recycled content is the sum of postconsumer recycled content plus one-half the preconsumer recycled content, based on cost.

- 1. "Postconsumer" material is defined as waste material generated by households or by commercial, industrial, and institutional facilities in their role as end users of the product, which can no longer be used for its intended purpose.
- 2. "Preconsumer" material is defined as material diverted from the waste stream during the manufacturing process. Excluded is reutilization of materials, such as rework, regrind, or scrap, generated in a process and capable of being reclaimed within the same process that generated it.
- K. Volatile Organic Compounds (VOC) Emissions Test: Refer to CDPH Standard Method v1.1 definition.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Work of this project includes completed building and application for LEED certification. Work is not complete until Owner has accepted USGBC's final review of LEED certification.
 - 1. Provide documentation required by LEED and LEED review.
- B. Provide materials and procedures necessary to obtain LEED prerequisites and credits required in this Section. Other Sections may specify requirements that contribute to LEED prerequisites and credits. Refer to other sections for additional materials and procedures necessary to obtain LEED prerequisites and credits.
- C. Respond to questions and requests for additional information from Architect and the USGBC regarding LEED credits until the USGBC has made its determination on the project's LEED certification application.
- D. LEED Online Submittals: Upload LEED documentation submittal data directly to USGBC project "LEED Online" website. Complete online forms at least monthly and as necessary to document LEED credits for submittals required in this Section.
- E. LEED Conference: Schedule and conduct a conference at a time convenient to Owner and Architect within 21 days prior to commencement of the work. Advise Architect, Owner's Commissioning Authority, and Owner's Project Manager of scheduled meeting dates.
 - 1. Attendees: Authorized representatives of Owner, Owner's Commissioning Authority, Owner's Project Manager, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
 - 2. Agenda: LEED goals for the project, Contractor's action plans, and discussion of targeted LEED Prerequisites and Credits.
 - 3. Minutes: Record and distribute minutes to attendees and other entities with responsibilities for obtaining LEED Credits.

1.05 ACTION SUBMITTALS

- A. General: Submit additional LEED submittals required by other Specification Sections.
 - 1. Submit each LEED submittal simultaneously with applicable product submittal.

B. LEED Documentation Submittals:

- 1. General, Sustainable Materials Attributes Form: Project submittals must be accompanied by a completed Sustainable Materials Attributes Form. Submittal packages must also include highlighted documentation supporting the sustainability claims made on the Sustainable Materials Attributes Form.
 - a. Provide location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material.
- 2. EAp3, Building-Level Energy Metering: Product data for meters, sensors, and data collection system used to provide continuous metering of building energy-consumption performance.
- 3. MRp2/MRc5, Construction and Demolition Waste Management: Comply with submittal requirements of Section 01 74 19 "Construction Waste Management and Disposal."
- 4. EQp2/EQc3/EQc4, Indoor Air Quality: Comply with submittal requirements of Section 01 57 31, "Indoor Air Quality Management."
- 5. EQc2, Low-Emitting Materials: Product data, indicating VOC content and emissions testing documents showing compliance with requirements for low-emitting materials, for the following materials:
 - a. Paints and coatings.
 - b. Adhesives and sealants.
 - c. Flooring.
 - d. Products containing composite wood or agrifiber products or wood glues.
 - e. Ceilings, walls, thermal, and acoustic insulation.
 - f. Exterior applied materials.
 - g. Furniture.

1.06 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For LEED coordinator.
- B. Project Materials Cost Data: Provide statement indicating total cost and shop labor for materials used for Project. Costs exclude site labor, overhead, and profit. Include breakout of costs for the following categories of items:
 - 1. Wood construction materials.
 - 2. Furniture.
 - 3. Passive plumbing materials.
 - 4. Passive mechanical (HVAC) materials.
 - 5. Passive electrical materials.
 - 6. Earthwork and exterior improvements, hard costs.
- C. LEED Action Plan Components: Provide preliminary submittals within **30** days of date established for **commencement of the Work** indicating how the following requirements will be met:

- 1. MRp2/MRc5, Waste management plan, complying with Section 01 74 19 "Construction Waste Management and Disposal."
- 2. EQp2/EQ3/EQ4, Indoor air quality plan, complying with Section 01 57 31, "Indoor Air Quality Management."
- D. LEED Progress Reports: Concurrent with each Application for Payment, submit reports comparing actual construction and purchasing activities with LEED action plans for the following:
 - 1. MRp2/MRc5, Waste reduction progress reports complying with Section 01 74 19 "Construction Waste Management and Disposal."
 - 2. EQc2, Low emitting materials.
 - a. Low Emitting Materials Tracking Sheet monitoring the project's progress towards targeted LEED Indoor Environmental Quality Credits. Tracking Sheet to be presented at construction meetings.
 - 3. EQc3, Indoor air quality, during construction, complying with Section 01 57 31, "Indoor Air Quality Management."
 - 4. EQc4, Indoor air quality assessment, complying with Section 01 57 31, "Indoor Air Quality Management."

1.07 OUALITY ASSURANCE

A. LEED Coordinator: Engage an experienced LEED-Accredited Professional to coordinate LEED requirements. LEED coordinator may also serve as waste management coordinator.

PART 2 - PRODUCTS

2.01 MATERIALS, GENERAL

- A. Provide products and procedures necessary to obtain LEED credits required in this Section. Although other Sections may specify some requirements that contribute to LEED credits, the Contractor shall determine additional materials and procedures necessary to obtain LEED credits indicated. Contractor to determine a combination of credit options best suited for achieving credits required.
 - 1. Exclusions: Special equipment, such as elevators, escalators, process equipment, and fire suppression systems, is excluded from the credit calculations. Also excluded are products purchased for temporary use on the project, like formwork for concrete.

2.02 LOW-EMITTING MATERIALS

A. EQc2, Low-Emitting Materials, General Emissions Requirements: Products must demonstrate they have been tested and determined compliant in accordance with California Department of Public Health, (CDHP), Standard Method v1.1-2010, using the applicable exposure scenario. Manufacturer's documentation demonstrating compliance must state the range of total VOCs (tVOC) after 14 days measured as specified in the CDPH Standard Method v1.1 as follows:

- 1. 0.5 mg/m3 or less,
- 2. between 0.5 and 5.0 mg/m3 or,
- 3. 0.50 mg/m3 or more.
- B. EQc2, Low-Emitting Materials, Paints and Coatings: For field applications **that are inside the weatherproofing system**, use paints and coatings that comply with the limits for VOC content when calculated according to the California Air Resources Board (CARB) 2007, Suggested Control Measure (SCM) for Architectural Coatings, or the South Coast Air Quality Management District (SCAQMD) Rule 1113, effective June 3, 2011.

Product Type:	Allowable VOC Content (g/L):
Bond Breaker	350
Clear wood finishes - Varnish	275
Clear wood finishes – Sanding Sealer	275
Clear wood finishes - Lacquer	275
Colorant – Architectural Coatings, excluding IM	50
coatings	
Colorant – Solvent Based IM	600
Colorant - Waterborne IM	50
Concrete – Curing compounds	100
Concrete – Curing compounds for roadways & bridges	350
Concrete surface retarder	50
Driveway Sealer	50
Dry-fog coatings	50
Faux finishing coatings - Clear topcoat	100
Faux finishing coatings – Decorative Coatings	350
Faux finishing coatings - Glazes	350
Faux finishing coatings - Japan	350
Faux finishing coatings – Trowel applied coatings	50
Fire-proof coatings	150
Flats	50
Floor coatings	50
Form release compounds	100
Graphic arts (sign) coatings	150
Industrial maintenance coatings	100
Industrial maintenance coatings – High temperature IM	420
coatings	
Industrial maintenance coatings – Non-sacrificial anti- graffiti coatings	100
Industrial maintenance coatings – Zinc rich IM primers	100
Magnesite cement coatings	450
Mastic coatings	100
Metallic pigmented coatings	150
Multi-color coatings	250
Non-flat coatings	50
Pre-treatment wash primers	420
Primers, sealers and undercoaters	100
Reactive penetrating sealers	350

Recycled coatings	250
Roof coatings	50
Roof coatings, aluminum	100
Roof primers, bituminous	350
Rust preventative coatings	100
Stone consolidant	450
Sacrificial anti-graffiti coatings	50
Shellac- Clear	730
Shellac – Pigmented	550
Specialty primers	100
Stains	100
Stains, interior	250
Swimming pool coatings – repair	340
Swimming pool coatings – other	340
Traffic Coatings	100
Waterproofing sealers	100
Waterproofing concrete/masonry sealers	100
Wood preservatives	350
Low solids coatings	120

- C. EQc2, Low-Emitting Materials, Paints and Coatings: For field applications that are inside the weatherproofing system, 90 percent of paints and coatings shall comply with the requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- D. EQc2, Low-Emitting Materials, Adhesives and Sealants: For field applications[that are inside the weatherproofing system], use adhesives and sealants that comply with the limits for VOC content when calculated according to South Coast Air Quality Management District (SCAQMD) Rule #1168, requirements in effect on July 1, 2005, and rule amendment date January 7, 2005:

Architectural Applications:	Allowable VOC Content (g/L):
Indoor carpet adhesives	50
Carpet pad adhesives	50
Outdoor carpet adhesives	150
Wood flooring adhesives	100
Rubber floor adhesives	60
Subfloor adhesives	50
Ceramic tile adhesives	65
VCT and asphalt tile adhesives	50
Dry wall and panel adhesives	50
Cove base adhesives	50
Multipurpose construction adhesives	70
Structural glazing adhesives	100
Single ply roof membrane adhesives	250
Specialty Applications:	
PVC welding	510

490
325
250
550
350
80
250
100
150
140
850
250
30
50
50
30
80
250
760
300
250
450
420
250
775
500
760
750
250

- 1. Exception: The provisions of SCAQMD Rule 1168 do not apply to adhesives and sealants subject to state or federal consumer product VOC regulations.
- E. EQc2, Low-Emitting Materials, Adhesives and Sealants: For field applications that are inside the weatherproofing system, 90 percent of adhesives and sealants shall comply with the requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- F. EQc2, Low-Emitting Materials, Flooring: Flooring shall comply with the requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

- G. EQc2, Low-Emitting Materials, Composite Wood: Composite wood, agrifiber products, and adhesives shall be made using ultra-low-emitting formaldehyde (ULEF) resins as defined in the California Air Resources Board's "Airborne Toxic Control Measure to Reduce Formaldehyde Emissions from Composite Wood Products" or shall be made with no added formaldehyde.
- H. EQc2, Low-Emitting Materials, Ceilings, Walls, Thermal, and Acoustic Insulation: Ceilings, walls, and thermal insulation shall comply with the requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- I. EQc2, Low-Emitting Materials, Exterior Applied Materials: At least 90 percent of exterior applied materials, measured by volume, shall comply with the requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
 - 1. The following materials are prohibited and do not count toward total percentage compliance:
 - a. Hot-mopped asphalt for roofing.
 - b. Coal tar sealants for parking lots and other paved surfaces.
- J. EQc2, Low-Emitting Materials, Furniture: At least 90 percent of furniture, measured by cost, shall be tested in accordance with ANSI/BIFMA Standard Method M7.1-2011; comply with ANSI/BIFMA e3-2011 Furniture Sustainability Standard, Sections 7.6.1 and 7.6.2, using either the concentration modeling approach or the emissions factor approach; and model the test results using the open plan, private office, or seating scenario in ANSI/BIFMA M7.1, as appropriate.

K. Additional Low-Emitting Requirements:

- 1. If the applicable regulation requires subtraction of exempt compounds, any content of intentionally added exempt compounds larger than 1% weight by mass (total exempt compounds) must be disclosed.
- 2. If a product cannot reasonably be tested as specified above, testing of VOC content must comply with ASTM D2369-10; ISO 11890, part 1; ASTM D6886-03; or ISO 11890-2.
- 3. Methylene chloride and perchloroethylene may not be intentionally added in paints, coatings, adhesives, or sealants.

2.03 INDOOR WATER USE REDUCTION

- A. WEp2, Indoor Water Use Reduction, Appliances: Provide ENERGY STAR or performance equivalent appliances.
- B. WEp2/WEc2, Indoor Water Use Reduction, Plumbing Fixtures: Do not exceed water flow requirements indicated in Division 22 PLUMBING.

PART 3 - EXECUTION

3.01 NONSMOKING BUILDING

- A. EQp2, Environmental Tobacco Smoke Control: Smoking is not permitted within the building or within 25 feet (8 m) of entrances, operable windows, or outdoor-air intakes.
 - 1. Refer to Section 01 57 31, "Indoor Air Quality Management."

3.02 CONSTRUCTION WASTE MANAGEMENT

A. MRp2 MRc5, Construction and Demolition Waste Management: Comply with Section 01 74 19 "Construction Waste Management and Disposal."

3.03 CONSTRUCTION INDOOR-AIR-QUALITY MANAGEMENT

A. EQc3/EQc4, Construction Indoor Air Quality Management Plan: Comply with Section 01 57 31, "Indoor Air Quality Management."

END OF SECTION 01 81 13



Funnelle Hall, SUNY Oswego **LEED Project Narrative** December 7, 2018

Our systematic review of the LEED Version 4 series of rating systems has led us to believe that SUNY Oswego will garner the most success by pursuing a multi-construction phase approach via the New Construction Rating System. Our description for how we arrived at this conclusion is below.

LEED for Schools, while typically for classroom style buildings, can be achieved for dormitories. However, when looking at the overall scope of work by phase, there were concerns with the acoustic requirements of this rating system being met. We were skeptical that this version could be certified even if completed at the end of the total project.

LEED for Operations and Maintenance has the greatest likelihood of certification compliance at each phase of the project. (example: Phase 1: LEED Certified O&M, Phase 2: Additional LEED Certified O&M). The issue with two certifications for one building is as follows: USGBC may require all registration and administration fees be paid for each certification causing undo cost to the Owner and the level of certification achieved may be sacrificed by splitting certifications into two phases. However, the project when reviewed holistically, does not comply with this rating system as there are significant changes to the building and its M/E/P/FP systems that would set it squarely in the New Construction rating system.

LEED for New Construction is the most suitable rating system for this project to achieve LEED Certification. The program when reviewed in full is a significant rehabilitation of the building as a whole. Completing one Certification versus two saves the client money on USGBC, Commissioning and consultant fees. Given the scopes of all phases of the project it makes sense that New Construction can be looked at most holistically from a design and construction standpoint, as well as LEED approach.

Our recommendation is to proceed with "LEED for New Construction Version 4" compliance path and our LEED Narrative for this approach is outlined below. The final page of this document outlines the approach anticipated for Phase One and Phase Two Project Teams. Per the enclosed, all Phase One Project Team members will be required to upload all data, spec sheets and findings associated with their scopes to the LEED Online Platform so that any and all future project members have all details required to complete the LEED Certification. Based on our assessment, DASNY's Requirement of LEED Silver is possible at Funnelle Hall.

LEED V4 New Construction Project Narrative

Phone

315.488.0377

Prerequisite: Integrative Project Planning and Design

Project Timeline: Phase 1 and Phase 2

Each Phase's project team will identify their project team members as well as role in the project, complete a design charrette. Each phase of the project should also identify the Owner's Project Requirements, Phase One Team will start this document with the intent that the Phase Two Project Team will complete the full document for final submission. Per DASNY's requirements, the project will be required to reach LEED Silver or better.



Location & Transportation

Credit: LEED for Neighborhood Development Location

Credit will not be pursued since site is not located within a LEED for Neighborhoods Development.

Credit: Sensitive Land Protection

Phase 1 Team

Phase 1 Team will pursue this credit as the building is a major renovation which occurs on an existing

building footprint. Support material will be loaded to LEED Online.

Credit: High Priority Site

Credit will not be pursued since site is not located within a defined high priority site location.

Credit: Surrounding Density and Diverse Uses

Phase 1 Team

Phase 1 Team will pursue this credit. Due to concentration of population and LEED-style amenities located on site, it is believed that we should be able to gain 2-5 points for this credit with additional review and assistance from Owner. Support material will be loaded to LEED Online by Phase 1 Team.

Credit: Access to Quality Transit

Phase 1 Team—If credit is not in compliance during Phase One, Phase Two Team to revisit

Phase 1 Team will discuss the feasibility of achieving one credit for Access to Quality Transit. A full team discussion is required to discuss all modes of transportation in addition to bus routes on site. At this time, we are just shy of the 40 required weekend bus trips, but there may be other modes of transportation we can include for this credit which could secure one point, potentially additional points. Owner and LEED Coordinator for Phase One should discuss all alternate modes of transportation on site to establish if this is a viable credit. If the credit cannot be met in Phase One, then Phase Two project teams should revisit the credit to see if additional alternative transit has been established by the time of project submission.

Credit: Bicycle Facilities

Phase 1 Team

Phase 1 Team will pursue this credit for the project. LEED Coordinator to confirm with Owner the number of bike rack storage and any additional storage that would be required to meet the credit. Given that this is a dormitory scenario we comply with the shower room requirements.

Further review this prerequisite for a Campus Approach Project

Credit: Reduced Parking Footprint

Phase 1 Team—If credit is not in compliance during Phase One, Phase Two Team to revisit.

Determine with the Owner over the timeline of all Funnelle Hall project (all phases) if existing or restructured parking could comply with this credit. We will need to determine the local code parking requirement and then assess if SUNY Oswego/parking close to the site is equal to, or less than, existing code requirements. There are two compliance paths for this credit, a 25% reduction from a baseline parking scenario, or if complies with scenario two which complies with sub-categories of the Density and Diverse Uses and/or Quality Transportation credits. Owner and LEED Coordinator for Phase One should discuss all alternate modes of transportation on site to establish if this is a viable credit. If the credit cannot be met in Phase One, then Phase Two project teams should revisit the credit to see if additional alternative transit has been established by the time of project submission.



Credit: Green Vehicles

Phase 1 Team—If credit is not in compliance during Phase One, Phase Two Team to revisit

Credit will likely not be pursued since current EV parking and preferred alternate fuel parking spaces to not appear to meet 2% of total parking. Team can review parking strategies with Owner further to confirm. If the credit cannot be met in Phase One, then Phase Two project teams should revisit the credit to see if additional alternative transit has been established by the time of project submission.

Further review this prerequisite for a Campus Approach Project

Sustainable Sites

Prerequisite: Construction Activity Pollution Prevention

Phase 1 Team and Phase Two Team

Both teams will have to comply with requirements of prerequisite to ensure construction related pollution is controlled at the site including soil erosion, water sedimentation, and airborne dust.

Credit: Site Assessment
Phase Two Team

Exterior site impacts are not relevant to Phase One scopes of work. Not currently part of any project scope but could be examined as Phase Two Scope. Any changes to the Project's Phase Two, or subsequent phases, should be further investigated by Phase Two Teams.

Further review this prerequisite for a Campus Approach Project

Credit: Site Development—Protect and Restore Habitat

Phase Two Team

Exterior site impacts are not relevant to Phase One scopes of work. Not currently part of any project scope but could be examined as Phase Two Scope. Look to restore native vegetation to the site as part of a larger campus initiative.

Further review this prerequisite for a Campus Approach Project

Credit: Open Space
Phase Two Team

Exterior site impacts are not relevant to Phase One scopes of work. Not currently part of any project scope but could be examined as Phase Two Scope. Any changes to the Project's Phase Two, or subsequent phases, should be further investigated by Phase Two Teams.

Further review this prerequisite for a Campus Approach Project

Credit: Rainwater Management

Phase Two Team

Exterior site impacts are not relevant to Phase One scopes of work. Not currently part of any project scope but could be examined as Phase Two Scope. Any changes to the Project's Phase Two, or subsequent phases, should be further investigated by Phase Two Teams.

Further review this prerequisite for a Campus Approach Project

Credit: Heat Island Reduction

Credit will not be pursued since envelope and site work is not currently within any project scope.



Credit: Light Pollution Reduction

Credit will not be pursued since site lighting is not a portion of scope of work.

Further review this prerequisite for a Campus Approach Project

Water Efficiency

Prerequisite: Outdoor Water Use Reduction

Phase One and Phase Two Teams

Will comply via Option One: No Irrigation Required

Further review this prerequisite for a Campus Approach Project

Prerequisite: Indoor Water Use Reduction

Phase One and Phase Two Teams

Phase One Team will comply with requirements of prerequisite for all dormitory restrooms utilizing water efficient toilets, urinal, shower heads and lavatories.

Phase Two Team to comply with any areas of work impacting building water use.

Phase One Team to upload all required documentation for utilization and final upload by the Phase Two Team.

Prerequisite: Building Level Water Metering

Phase One Team—Support as required from Phase Two Team

Phase One Team will design and install a permanent water meter to measure the total potable water use of the building and associated grounds. Water data must be compiled into monthly and annual summaries and shared with USGBC for five years.

Credit Outdoor Water Use Reduction

Phase One and Phase Two Teams

Will comply via Option One: No Irrigation Required

Further review this prerequisite for a Campus Approach Project

Credit Indoor Water Use Reduction

Phase One Team—Support as required from Phase Two Team

By way of installing water efficient fixtures in all dormitory bathrooms we will certainly see reduced water consumption in general. Project One Team needs to review the impact of water reducing fixtures and the total number of increased plumbing fixtures per the scope to determine the number of points available for this project.

Credit: Cooling Tower Water Use

Credit will not be pursued since cooling towers are not within any project scope.

Credit: Water Metering

Phase One Team—Support from Phase Two Team

Review with the Owner the addition of water meters to gage hot water distribution and restroom plumbing fixture use to show compliance with credit and provide additional water use reduction.



Energy & Atmosphere

Prerequisite: Fundamental Commissioning and Verification

Phase One and Phase Two

Both Phases will have to provide fundamental building systems commissioning to meet this prerequisite. It is recommended that the Commissioning Agent is hired to work with the design and construction teams on all phases of the project to ensure total project continuity of systems. The hired commissioning agent will work with the Owner to create the Owners Project Requirements for all phases of the Project. They will then develop the Basis of Design for commissioned components of the project, develop and implement the Commissioning Plan, review the construction documents to ensure commissioning requirements are met, develop the testing systems for commissioning and verify the test's execution. They will then provide a Commissioning Report to the Owner and document all findings and recommendations for improved system operation.

Prerequisite: Minimum Energy Performance

Phase One and Phase Two

Since this is a multi-phased project our team believes that pursuing Option 1: Energy Simulation makes the most sense for a phased construction approach. The Phase One MEP Team would build an energy model for Phase One scopes of work and later the Phase Two MEP Team would finalize model with the scopes of work relevant to their phase. The model and design strategies must demonstrate a 3% energy use reduction for a Major Renovation. This model will then be used to determine how many potential points can apply to the Minimum Energy Performance Credit.

Prerequisite: Building-Level Energy Metering

Phase One and Phase Two Teams

Install new or use existing building-level energy meters to provide building level date on total energy consumption. Commit to sharing monthly energy consumption data and electrical demand to USGBC for a minimum of 5 years.

Fundamental Refrigerant Management

Phase One and Phase Two

The specification of CFC-based refrigerants associated with new heating, cooling, ventilation and refrigeration systems will be prohibited by all Phase Project Teams.

Further review this prerequisite for a Campus Approach Project

Enhanced Commissioning

Phase One and Phase Two Project Teams

Due to the multi-phase nature of this project, multiple staff personnel that have the opportunity to maintain/service these systems and the need to make sure that all MEP components are seamlessly integrated across multiple design teams, it is advised that Enhanced Commissioning be pursued. This credit will ensure that the hired Commissioning Authority reviews contractor submittals, verify the inclusion of systems manual requirements in construction documents; inclusion of operator and occupant training requirements; verify inclusion of any systems manual updates and delivery; verification of seasonal testing; review building operation 10 months after substantial completion; develop an on-going commissioning plan. There are additional monitoring-based procedures that can be included to assess performance of energy and water-consuming systems for an additional point, that again, across multiple project teams may be beneficial to pursue.



Credit: Optimize Energy Performance
Phase One and Phase Two Project Teams

See narrative associated with Prerequisite for Minimum Energy Performance (pg.5).

Credit: Advanced Energy Metering

Project team does not intend to pursue this Credit due to additional equipment and on-going monitoring required by owner.

Credit: Demand Response

This credit is not being pursued as this building style should not load-shed due to its occupancy type.

Credit: Renewable Energy Production

This credit is not being pursued at this time as on-site renewable energy is not in any project scope.

Credit: Enhanced Refrigerant Management
Phase One and Phase Two Project Teams

The specification of CFC-based refrigerants associated with new heating, cooling, ventilation and refrigeration systems will be prohibited by all Phase Project Teams. Project teams will relay and calculate any additional ozone depleting/global warming potential refrigerants on the project to ensure we meet LEED Level compliance.

Further review this prerequisite for a Campus Approach Project

Credit: Green Power and Carbon Offsets

Phase Two Project Team

Discuss with the Project Owner the option to purchase renewable energy credits to offset either 50% or 100% of the Project's energy needs.

Materials and Resources

Prerequisite: Storage and Collection of Recyclables

Phase One Project Team

If the building does not already have dedicated trash/recycle rooms by floor, utilize one of the newly created storage spaces in the building core for the collection of recyclable materials such as paper, cardboard, glass, plastics and metals. Additionally, create proper storage space for the collection of hazardous materials such as batteries and e-waste. If Owner does not want to utilize these new storage rooms, Phase Two Project Team will be required to incorporate these spaces into other areas of the building.

Further review this prerequisite for a Campus Approach Project

Prerequisite: Construction and Demolition Waste Management Planning

Phase One and Phase Two Project Teams

Both Phase Project Teams must complete a holistic construction waste management plan to divert as much content as possible by way of recovering, reusing, and recycling materials.



Credit: Building Life-Cycle Impact Reduction
Phase One and Phase Two Project Teams

Both teams to assess and report the percentage of onsite materials being reused on the project inclusive of floors, roof decking, skin, framing, walls, etc. It is assumed that both teams would follow Compliance Path Three for this credit.

Credit: Building Product Disclosure and Optimization—Environmental Product Declarations

Project team does not intend to pursue this Credit due to phased LEED project team approach and the level of detail needed to track all material product information.

Credit: Building Product Disclosure and Optimization—Sourcing of Raw Materials

Project team does not intend to pursue this Credit due to phased LEED project team approach. It will be difficult to implement without total team compliance and raw material travel distances.

Credit: Building Product Disclosure and Optimization—Material Ingredients

Project team does not intend to pursue this Credit due to phased LEED project team approach and the level of detail needed to track all material product information.

Credit: Construction and Demolition Waste Management Planning

Phase One and Phase Two Project Teams

Both Phase Project Teams must complete a holistic construction waste management plan to divert as much non-hazardous materials content as possible by way of recovering, reusing, and recycling materials. The targeted goal is to find alternate waste streams for 50% of waste and three material streams by weight. Submit a final construction waste management report demonstrating waste reduction.

Further review this prerequisite for a Campus Approach Project

Indoor Environmental Quality

Prerequisite: Minimum Indoor Air Quality Performance

Phase One and Phase Two Project Teams

Comply with ASHRAE Standard 62.1-2010 ventilation requirements for mechanically ventilated spaces to determine minimum outdoor air intake flow for required ventilation. Additionally, install outdoor air-flow monitoring devices with alarm sensor to notify building operations of sub-standard operation.

Prerequisite: Environmental Tobacco Smoke Control

Phase One Team

Prohibit smoking both inside and outdoors of the building other than at designated smoking areas that are at least 25 feet from any building entries, air intakes and operable windows. No Smoking signage must be posted within 10 feet of all building entrances. LEED Coordinator and Owner will work together to create a non-smoking policy, a designated smoking area (if not a 100% smoke free campus) to be outlined on a Campus Map and photos of installed non-smoking signage.

Review this credit as a Campus Approach/Campus to be 100% Smoke Free



Credit: Enhanced Indoor Air Quality Strategies

Phase One and Phase Two Teams

Phase One Teams will need to design and install sufficient exhaust systems from any hazardous gas or chemical locations within the building.

Phase Two Teams will need to design and install permanent entryway systems which capture particulates entering the building at building entrances.

Both Phase One and Phase Two Teams will need to replace all air filtration media after completion of each project scope and before occupancy. Each Project Team will need to upload their required documentations.

Credit: Low-Emitting Material

Phase One and Phase Two Teams

Both Project Teams will target the strictest compliance of low-to-no VOC's on this project associated with the following materials: Interior Paints and Coating, Interior Adhesives and Sealants, Flooring and Composite Wood. Ideally all project teams will also follow strict low-to-no VOC compliance relating to Ceilings, Walls, Thermal and Acoustic Insulation. All parties will contribute to demonstrating compliance by using the USGBC low-emitting materials calculator and by loading of required product information.

Credit: Construction Indoor Air Quality Management Plan

Phase One and Phase Two Project Teams

Both teams shall create and then ensure compliance of appropriate indoor air quality management plans by construction teams during all phases on site. All required design teams shall integrate SMACNA Guidelines into all drawings and specifications. The onsite GC or CM will need to create an on-site Indoor Air Quality Plan where all site crews must be held accountable and compliant. Site teams must demonstrate their compliance of this plan through photographs and record of compliant filtration media. Additional compliance narratives are required for no-smoking policies and care of absorbent materials.

Credit: Indoor Air Quality Assessment

Phase One and Phase Two Project Teams

GC or CM for each phase will be required to complete, either before occupancy or during occupancy, a full building flush out to disperse off-gassed compounds and other contaminants for the sake of building occupant health. Each phase will require a Flush Out Report.

Credit: Thermal Comfort
Phase One Project Team

Given that the Phase One Project team is completing all mechanical unit upgrades, their design and investigation of compliance for this credit should be adequate for submission. Should impacts be made to this design for unknown/undeveloped scope associated with Phase Two, the Phase Two Team may need to update the design and proof of compliance. Phase One MEP team to submit all required documentation to demonstrate compliance.

Credit: Interior Lighting

Phase Two Project Team Possible Credit

Phase One Project Teams will create a lighting strategy that supports this credit but given the types of spaces being designed for in Phase One, these fixtures will not be a primary contributor to the credit. Phase Two project teams will need to assess their design strategy and implementation for this credit.



Credit: Daylight

Phase Two Project Team Possible Credit

Given that this is a major renovation and not new construction, the Phase Two Team should complete a quick schematic study to estimate if the building will meet daylighting goals. There are concerns about meeting this credit due to massing of other structures around the building and that the orientation of the building runs North/South which is not optimal for daylighting strategies.

Credit: Quality Views

Phase Two Project Team Possible Credit

Given that this is a major renovation and not new construction, the Phase Two Team should complete a quick schematic study to estimate if the building will meet criteria for Quality Views. Currently there is no scope to update the building's skin/glazing as part of the scope of work. Consideration must also be given to the massing of other structures around the building and if this impedes on views, as well as the final Phase Two scope of work list and how this may impact any views to Regularly Occupied Areas.

Credit: Acoustic Performance

Currently the scope of work for both phases of the project do not allow the project teams to address this credit.

Innovation

Credit: Innovation

Five Innovation points possible. Potential ideas to implement by Phase Two submission:

- 1. Dormitory level food waste composting
- 2. Sustainable Purchasing Programs (materials purchased, used and disposed of on-site)—lamps, supplies, furnishings, etc.
- 3. Furniture Donation to a ReStore or Hope for Us Housing establishment
- 4. Attempt to create a Zero Waste atmosphere on site
- 5. Green Building
- 6. Green Cleaning Program

Credit: LEED Accredited Professional

Lauren Staniec is a LEED AP and supply necessary documentation.

Regional Priority

SUNY Oswego's USGBC Regional Priorities are as follows:

- 1. Renewable Energy Production: Use renewable energy systems to offset building energy costs. (1-3 points available for up to 10% renewable energy created for the site.)
- 2. Surrounding Density and Diverse Uses: Renovated buildings where the building's main entrance is within a ½-mile (800-meter) walking distance of the main entrance of four to seven (1 point) or eight or more (2 points) existing and publicly available diverse uses.
- 3. Building Life-Cycle Impact Reduction: Option 3. building and material reuse (2–4 points)
 Reuse or salvage building materials from off site or on site as a percentage of the surface area, as listed in Table 1 as outlined in Oswego, New York regional priority credit guidelines. Include structural elements (e.g., floors, roof decking), enclosure materials (e.g., skin, framing) and permanently installed interior elements (e.g., walls, doors, floor coverings, ceiling systems). Exclude from the calculation window assemblies and any hazardous materials that are remediated as a part of the project. (2-4 additional points are available)



- 4. Rainwater Management—Investigate this strategy as part of a larger Campus Initiative
- 5. Heat Island Reduction—Review Phase Two scope of work and determine if building skin should be added to scope. Adding the building skin and glazing strategies to the Scope of Work would open the opportunity to access the previously mentioned Heat Island Reduction Credit as well as the associated Regional Priority Credit. It also creates a more holistic, energy efficient project. However, this decision needs to be discussed in conjunction with Phase One as the sizing of mechanical/ventilation strategies will be impacted.

See LEED V4 for New Construction on following page.



LEED v4 for BD+C: New Construction and Major Renovation

Project Checklist

Project Name:

SUNY Oswego, Funnelle Hall, Phase One + Two

Date: 6-Dec-18

5 0 Innovation

Y ? N

Integrative Process PHASE ONE & TWO

3	6	19	Location and Transportation	16
		16	Credit LEED for Neighborhood Development Location	16
1			Credit Sensitive Land Protection PHASE ONE	1
		2	Credit High Priority Site	2
2	3		Credit Surrounding Density and Diverse Uses PHASE ONE	5
	1		Credit Access to Quality Transit PHASE ONE OR TWO	5
	1		Credit Bicycle Facilities PHASE ONE OR TWO	1
	1		Credit Reduced Parking Footprint PHASE ONE OR TWO	1
		1	Crach Vahiolog	1

0	7	10	Susta	inable Sites	10
Υ			Prereq	Construction Activity Pollution Prevention PHASE 1 & 2	Required
	1	1	Credit	Site Assessment PHASE TWO	1
	2	2	Credit	Site Development - Protect or Restore Habitat PHASE TWO	2
	1	1	Credit	Open Space PHASE TWO	1
	3	3	Credit	Rainwater Management PHASE TWO	3
		2	Credit	Heat Island Reduction PHASE TWO	2
		1	Credit	Light Pollution Reduction	1

4	5	2	Water	Efficiency	11
Υ			Prereq	Outdoor Water Use Reduction PHASE 1 & 2	Required
Υ			Prereq	Indoor Water Use Reduction PHASE 1 & 2	Required
Υ			Prereq	Building-Level Water Metering PHASE 1 & 2	Required
2			Credit	Outdoor Water Use Reduction	2
2	4		Credit	Indoor Water Use Reduction PHASE ONE	6
		2	Credit	Cooling Tower Water Use	2
	1		Credit	Water Metering PHASE ONE	1

13	12	6	Energ	y and Atmosphere	33
Υ			Prereq	Fundamental Commissioning and Verification PHASE 1 & 2	Required
Υ			Prereq	Minimum Energy Performance PHASE 1 & 2	Required
Υ			Prereq	Building-Level Energy Metering PHASE 1 & 2	Required
Υ			Prereq	Fundamental Refrigerant Management PHASE 1 & 2	Required
3	1		Credit	Enhanced Commissioning Phase 1 & 2	6
9	9		Credit	Optimize Energy Performance	18
		1	Credit	Advanced Energy Metering	1
		2	Credit	Demand Response	2
		3	Credit	Renewable Energy Production	3
1			Credit	Enhanced Refrigerant Management PHASE 1 & 2	1
	2		Credit	Green Power and Carbon Offsets PHASE 2	2

4	2	6	Materi	ials and Resources	13
Υ			Prereq	Storage and Collection of Recyclables PHASE 1	Required
Υ			Prereq	Construction and Demolition Waste Management Planning PHASE 1 & 2	Required
3	2		Credit	Building Life-Cycle Impact Reduction Phase 1 & 2	5
		2	Credit	Building Product Disclosure and Optimization - Environmental Product Declarations	2
		2	Credit	Building Product Disclosure and Optimization - Sourcing of Raw Materials	2
		2	Credit	Building Product Disclosure and Optimization - Material Ingredients	2
1			Credit	Construction and Demolition Waste Management PHASE 1 & 2	2

5	5	3	Indoor	r Environmental Quality	16
Y			Prereq	Minimum Indoor Air Quality Performance PHASE 1 & 2	Required
Υ			Prereq	Environmental Tobacco Smoke Control PHASE 1 & 2	Required
		2	Credit	Enhanced Indoor Air Quality Strategies PHASE 1 & 2	2
2	1		Credit	Low-Emitting Materials PHASE 1 & 2	3
1			Credit	Construction Indoor Air Quality Management Plan PHASE 1 & 2	1
1			Credit	Indoor Air Quality Assessment PHASE 1 & 2	2
1			Credit	Thermal Comfort PHASE 1	1
	1		Credit	Interior Lighting PHASE 2	2
	2		Credit	Daylight PHASE 2	3
	1		Credit	Quality Views PHASE 2	1
		1	Credit	Acoustic Performance	1

1			Credit	LEED Accredited Professional PHASE ONE	1
0	3	0	Regio	onal Priority	4
	1		Credit	Regional Priority: Specific Credit Rainwater Management PHASE 2	1
	1		Credit	Regional Priority: Specific Credit Surrounding Density & Diverse Use PHASE 1	1
	1		Credit	Regional Priority: Specific Credit Building Life Cycle Impact PHASE 1	1
			Credit	Regional Priority: Specific Credit	1

30	45	46 TOTALS	Possible Points:	110

Certified: 40 to 49 points, Silver: 50 to 59 points, Gold: 60 to 79 points, Platinum: 80 to 110

Areas Highlighted within this document note items not defined in any current project scope, but elements that could be further investigated as a Campus Approach project and included in later project phases.

GENERAL REQUIREMENTS for CONSTRUCTION

SECTION 01 91 13 - GENERAL COMMISSIONING REQUIREMENTS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. The Contract Documents, including but not limited to, the Drawings and Individual Specification Sections and the Commissioning Plan, apply to this Section.

1.02 SUMMARY

- A. Section includes general, procedural, and administrative requirements that apply to implementation of commissioning.
- B. General Provisions for Commissioning:
 - Selected building systems and equipment to be commissioned are identified in Division 24.
 - 2. The commissioning process shall be directed by the Commissioning Authority, provided by the Owner.
 - 3. The responsible Contractor shall act as the Commissioning Agent, and shall be responsible for executing the commissioning process as directed by the Commissioning Authority, and as defined in Division 24.
 - 4. The commissioning process is defined in Division 24 and includes responsibilities for each Commissioning Team member including the Commissioning Agent.

C. Related Sections:

1. Specification Sections referenced in Division 24, Commissioning, apply to this Section.

D. References:

- Owner's Project Requirements (OPR), Basis of Design (BoD), and Design Intent (DI) documents.
- 2. Dormitory Authority State of New York: Building Commissioning Guidelines 2006 http://www.dasny.org/construc/build_comm_guide/index.php
- 3. ASHRAE Guideline 0-2005: The Commissioning Process
- ASHRAE Guideline 1.1-2007: HVAC & R Technical Requirements for the Commissioning Process.

1.03 DEFINITIONS

A. Basis of Design (BoD): A document prepared by the Design Professional that records how the designer has met the owner's project requirements. It includes the concepts, calculations, decisions, and product selections and how applicable regulatory requirements, standards, and guidelines have been met. The document includes descriptions and lists of individual items that support the design process.

GENERAL REQUIREMENTS for CONSTRUCTION

- B. Commissioning (Cx): A quality assurance process that documents specified systems and components are provided and tested to meet the Owner's needs and the design intent in accordance with the Contract Documents.
- C. Commissioning Agent (CA): The Contractor. For the purposes of commissioning the Contractor shall assume the role, tasks, and responsibilities of the Commissioning Agent. Note that per the Owner's Building Commissioning Guidelines, the Owner does not allow the Commissioning Authority and Commissioning Agent to be the same organization or person. The Commissioning Agent shall assign a representative with expertise and authority to act on its behalf to participate in the commissioning process.
- D. Commissioning Authority (CxA): The Professional, appointed by the Owner, to direct and coordinate the commissioning process.
- E. Commissioning Plan (Cx Plan): A document, prepared by the Commissioning Authority, defining the commissioning process including schedules, responsibilities, documentation requirements, and functional performance test requirements.
- F. Commissioning Team: Individuals and entities, as deemed appropriate by the CxA, appointed by the Owner and Contractor, having the authority to act on their behalf, explicitly organized to implement the commissioning process, through coordinated action and defined in the contract documents and the Commissioning Plan.
- G. Design Intent (DI): A document prepared by the Design Professional that summarizes design goals of the design phase.
- H. Owner's Project Requirements (OPR): A document prepared by the Design Professional that defines the functional requirements and the expectations for operation.
- I. Systems and Energy Management Manual: A composite document that expands the scope of the operation and maintenance manual by including additional information gathered by the commissioning process as required by the New York State Green Building Tax Credit, Section 638.8 (k)(2).

1.04 <u>COMMISSIONING TEAM</u>

A. The Commissioning Team shall consist of, but not be limited to, the Owner, Design Professional, Commissioning Authority, Commissioning Agent, suppliers, and specialists, in accordance with the Commissioning Plan.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 91 13

SECTION 02 08 60 - LEAD-SAFE WORK PRACTICES

PART 1 GENERAL

1.01 **DESCRIPTION**

A. Scope of Work

This Section describes the requirements of the Demolition without limiting the generality implied by the Specifications and Drawings. The work under this Section shall include, but is not limited to the following principal items:

- 1. Quality assurance requirements including personnel training.
- 2. Project monitoring and testing services for lead related work, including requirements for sampling and monitoring during lead related activities.
- 3. Requirements for transport and disposal of lead waste materials by legal and appropriate means.
- 4. All paint finishes are assumed to be lead containing material.

B. Related work specified elsewhere

Section 01 50 00 - Construction Facilities and Temporary Controls

1.02 **REFERENCES**

- A. United States Environmental Protection Agency (USEPA)
 - 1. 40 CFR Part 260 Hazardous Waste Management System: General
 - 2. 40 CFR Part 261 Identification and Listing of Hazardous Waste.
 - 3. 40 CFR Part 262 Standards Applicable to Generators of Hazardous Waste.
 - 4. 40 CFR Part 263 Standards Applicable to Transporter of Hazardous Waste.
 - 5. 40 CFR Part 264 Standards for Owners and Operators of Hazardous Waste Treatment Storage, and Disposal Facilities.
 - 6. 40 CFR Part 265 Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities.
 - 7. 40 CFR Part 266 Standards for the Management of Specific Hazardous Wastes and Specific Types of Hazardous Waste Management Facilities.
 - 8. 40 CFR Part 268 Land Disposal Restrictions.
 - 9. 40 CFR Part 270 EPA Administrated Permit Programs: The Hazardous Waste Permit Program.
 - 10. 40 CFR Part 745, Subpart L Lead-Based Paint Activities.
- B. United States Department of Transportation (DOT)
 - 1. 49 CFR 171 General Information, Regulations, and Definitions.
 - 2. 49 CFR 172 Hazardous Materials Table, Special Provisions, Hazardous Materials Communications, Emergency Response Information, and Training Requirements.
 - 3. 49 CFR 173 Shippers General Requirements for Shipments and Packaging.
 - 4. 49 CFR 174 Carriage by Rail.
 - 5. 49 CFR 175 Carriage by Aircraft.
 - 6. 49 CFR 176 Carriage by Vessel.
 - 7. 49 CFR 177 Carriage by Public Highway.
 - 8. 49 CFR 178 Specifications for Packaging.
 - 9. 49 CFR 179 Specifications for Tank Cars.
 - 10. 49 CFR 180 Continuing Qualification for Maintenance of Packaging.
- C. New York State Department of Environmental Conservation (DEC)

- 6 NYCRR 360 Solid Waste Management Facilities.
- 2. 6 NYCRR 364 Waste Transporter Permits.
- 3. 6 NYCRR 370 Hazardous Waste Management Systems: General.
- 4. 6 NYCRR 371 Identification and Listing of Hazardous Wastes.
- 5. 6 NYCRR 372 Hazardous Waste Manifest and Related Standards for Generators, Transporter and Facilities.
- 6. 6 NYCRR 373-1 Hazardous Waste Treatment, Storage and Disposal Facility Permitting Requirements.
- 7. 6 NYCRR 373-2 Final Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage and Disposal Facilities.
- 8. 6 NYCRR 373-3 Interim Status Standards for Owners and Operators of Hazardous Waste Facilities.
- 9. 6 NYCRR 376 Land Disposal Restrictions.
- D. Occupation Safety and Health Administration (OSHA)
 - 1. 29 CFR 1926.62 Construction Standard for Lead.

1.03 **DEFINITIONS**

A. "LBP": Lead-Based Paint.

1.04 SYSTEM DESCRIPTION

- A. Lead-Safe Work Practices: Lead-Safe Work Practices provide for disturbance of lead, including removal and disposal of: lead-based paint; lead containing dust; and lead contaminated soil in accordance with all applicable codes, regulations, standards, laws, and ordinances and provides general overview of anticipated requirements and conditions necessary to meet regulatory requirements and specific conditions of this Project. Failure to expressly refer to applicable code, regulation, standard, law and ordinance within Contract Documents does not imply that applicable regulatory requirements are not applicable to this Project.
 - 1. Lead Testing: A lead inspection has not been performed. It is assumed with the age of the existing painted guardrails that the paint is lead-based.

1.05 **SUBMITTALS**

- A. Comply with requirements of Section 01 30 00 Submittals and as modified below.
- B. Quality Control Submittals
 - 1. Submit following items to the Architect's office before beginning lead related activities at the project site:
 - Valid Waste Transporter Permit, issued by New York State Department of Environmental Conservation.
 - b. Written communication from designated treatment, storage or disposal facility that it:
 - Is authorized to receive and dispose of waste products generated by this Project;
 - 2) Has capacity to receive and dispose of waste products generated by this Project and:
 - 3) Will provide or assure that ultimate disposal method indicated on manifest for particular hazardous waste(s) will be followed.

- Instruction regarding requirements for distribution of waste manifest as completed at time of shipment.
- d. Emergency Contact List.
- 2. Submit following items during course of lead related activities at the project site:
 - a. Employee Training and Certification Documentation: Provide Owner with Valid Training and Certification documentation for new employees before employees beginning work.
- 3. Submit following items after completion of lead related activities at the project site:
 - a. Daily Logs
 - b. Sign In Sheets
 - c. Documentation of Hazardous Waste Determination, consisting of Toxify Characteristic Leachate Procedure sample analysis and documentation that identifies the material(s) sampled.
 - d. For waste that is known of determined to be hazardous, New York State Uniform Hazardous Waste Manifest or manifest as required by the state where the waste is disposed.
 - e. Trip Tickets for all other waste.
- 4. Certificates Submit certification that indicates compliance with requirements specified in Quality Control below.

1.06 **QUALITY ASSURANCE**

- A. Qualifications
 - 1. Contractor
 - a. Supervision: Provide full-time, on-site supervisor for project site.
 - b. Personnel Certification Requirements
 - 1) Lead Personnel: Received "Lead-Safe Work Practices" training approved by United States Department of Housing and Urban Development (HUD) within the last 12 months.
 - 2) Lead Supervisory Personnel: Maintain current USEPA certification as a lead-based paint abatement supervisor as per 40 CFR 763.
 - c. Personnel Training Requirements: In addition to the training requirements for USEPA certification, all supervisory or Lead-Safe Work Practice personnel, including any personnel entering lead activity areas shall have training as required by 29 CFR 1926.62.
 - 2. Owner's Sampling/Monitoring Firm: Independent of Contractor and possessing current USEPA certification to perform lead-based paint activities.
 - a. Personnel Certification
 - 1) Monitoring: Possess current USEPA certification, as per 40 CFR 745, subpart L, as either "Risk Assessor" or "Inspector."
 - 2) Final Inspection or Clearance Testing Possess current USEPA certifications, as per 40 CFR 745, subpart L, as either "Risk Assessor" or "Inspector."

- 3. Lead Analysis Laboratories:
 - a. Maintain current National Lead Laboratory Accreditation Program (NLLAP) accreditation.
 - b. Maintain current New York State Environmental Laboratory Approval Program (ELAP) accreditation in each method of analysis used.
 - c. Use most recent version of specified test method.
 - d. Analyze samples for waste characterization using:
 - Toxify Characteristic Leachate Procedure EPA Method 1311 and;
 - 2) Analysis by one of the following:
 - .01 Inductively Coupled Plasma-Atomic Emission Spectrometry EPA Method 6010;
 - .02 Inductively Coupled Plasma-Mass Spectrometry EPA Method 6020;
 - .03 Lead (Atomic Absorption, Direct Aspiration) EPA Method 7420 or;
 - .04 Lead) Atomic Absorption, Furnace Technique) EPA Method 7421.
 - e. Analyze air samples for total lead (if required) using one (1) of the following:
 - Lead by Flame Atomic Absorption Spectrophotometer NIOSH 7082:
 - 2) Lead by Graphite Furnace Atomic Absorption Spectrophotometer NIOSH 7105 or;
 - 3) Elements by Inductively Coupled Argon Plasma, Atomic Emission Spectroscopy NIOSH 7300.
 - f. Analyze wipe samples, paint chip samples and soil samples using one (1) of the following methods:
 - Inductively Coupled Plasma-Atomic Emission Spectrometry EPA Method 6010:
 - 2) Inductively Coupled Plasma-Mass Spectrometry EPA Method 6020
 - Lead (Atomic Absorption, Direct Aspiration) EPA Method 7420 or;
 - 4) Lead (Atomic Absorption, Furnace Technique) EPA Method 7421.

B. Regulatory Requirements

 Hazardous Waste Generator Status: Owner is "Conditionally Exempt Small Quantity Generator" as defined by 6 NYCRR 371 and 40 CFR 260. Schedule removal, on-site storage, and transport as required to maintain Owner's status as "Conditionally Exempt Small Quantity Generator."

1.07 **PROJECT/SITE CONDITIONS**

A. Emergency Contact List: Prepare emergency contact list providing means to contact applicable individuals and agencies in event of emergency at any time of day or night and

including at least the following individuals and agencies:

- Contractor Personnel
 - a. Project Manager
 - b. Project Supervisor
- 2. Sampling Organization
 - a. On Site Sampling Technician
- 3. Owner
- 4. Local Police Department
- 5. Local Fire Department
- 6. Local Hospital and Ambulance Service.
- B. Restrict access to all work areas. Immediately report any access by unauthorized individuals to Owner and Project Monitor.

1.08 **SEQUENCING AND SCHEDULING**

- A. Completion: Complete Lead related work in accordance with Construction Schedule requirements specified in Section 01006 Work Sequence with each phase considering distinct and separate for purpose of schedule and substantial completion.
 - 1. Substantial Completion of phase occurs when:
 - All components of phase have passed visual inspection by Supervisor;
 - b. Satisfactory clearance criteria are achieved for each portion of phase; and
 - c. All containment barriers have been removed; and
 - d. Areas are returned to the Owner.
 - If Contractor fails to achieve substantial completion within specified schedule requirements, all costs associated with extension of schedule, including (but not limited to) cost of Architect's time and expense, sampling costs, monitoring costs, direct costs incurred by Owner, and costs to accelerate sample analysis deducted from Final Payment.
- B. Restrictions on Working Hours: Schedule work only during regular working hours approved by Owner before beginning lead related work. Do not use overtime or multiple shifts with "overtime" defined as any time in excess of eight (8) hours in a single day, work on weekends, or work on holidays.
- C. Changes in Working Hours: Advise the Architect and Owner of any changes in hours or days when lead activities will be conducted at the project site at least twenty-four (24) hours before change. The Contractor retains all liability resulting from the Contractor failure to make required notification.

PART 2 PRODUCTS

2.01 **EQUIPMENT**

- A. Respirators: Provide respirators approved as acceptable for protection by the National Institute for Occupational Safety and Health (NIOSH) under provisions of 30 CFR Part 11.
 - 1. Supply and use respirators in accordance with 29 CFR 1910.134 and 29 CFR

1926.62.

- 2. Provide respirators, filters and ancillary supplies as required for employees and authorized visitors.
- 3. Account for hazards other than lead in respirator selection.
- B. Protective Clothing: Provide disposable protective clothing complying with requirements of 29 CFR 1926.62 that is disposed of after one (1) use for employees and authorized visitors.
- C. Lead Related Construction Facilities and Controls:
 - Polyethylene sheeting (plastic sheeting) 6 mil thickness, sized to minimize seams.
 - Tape and/or adhesive spray capable of sealing joints in adjacent polyethylene sheets and for attachment of polyethylene sheet to finished or unfinished surfaces of dissimilar materials and capable of adhering under both dry and wet conditions, including use of amended water;
 - 3. Polyethylene waste disposal bags 6 mil thickness with preprinted labels.
 - 4. HEPA filtered negative pressure equipment.
 - HEPA filtered vacuums.
 - 6. Water filtration, three (3) stages with final filtration to at least five (5) microns
 - 7. Barrier tape.
 - 8. Warning signs.
 - 9. Hygiene facilities as required by 29 CFR 1926.62 including showers, cleansing agents and disposable towels.
 - 10. Lead specific detergent similar to:
 - a. "Ledizolv Detergent" by LSV, Inc., New York, New York.
 - b. "Sentinel 805 EnviroWash" by Sentinel, Minneapolis, Minnesota.
- D. Testing Services Equipment
 - Wipe Testing
 - a. Disposable Wipes meeting the following criteria:
 - 1) Contains low background lead levels (less than 5 ug/wipe);
 - 2) Single thickness;
 - 3) Durable and does not tear easily;
 - 4) Does not contain aloe:
 - 5) Can be digested in laboratory;
 - 6) Shown to yield 80-120 percent recovery rates from samples spiked with leaded dust (not lead in solution);
 - 7) Remains moist during wipe sampling process (wipes containing alcohol that do not dry out may be used) and;
 - 8) Are acceptable to the laboratory performing the Analysis.
 - b. Acceptable products (subject to laboratory approval) include:
 - 1) Little Ones Baby Wash Cloths:
 - 2) Little Ones Baby Wipes Natural Formula;
 - 3) Little Ones Baby Wipes Lightly Scented;
 - 4) Pure and Gentle Baby Wipes;
 - 5) Fame Baby Wipes; and
 - 6) Wash'n Dri Wipes.
 - c. Non-sterilized non-powdered disposable gloves.

- d. Non-sterilized polyethylene centrifuge tubes (50 ml size) or equivalent hard-shell container that can be rinsed quantitatively in the laboratory.
- 2. Air Sampling Cassettes: Commercially available 37 mil cassettes, using mixed cellulose ester sample collection fibers with pore size of 0.8 micrometers. Use only new cassettes; reloaded cassettes are not acceptable.

PART 3 EXECUTION

3.01 **EXAMINATION**

A. Verification of Conditions (by Contractor): Examine conditions under which lead related work is to be performed and notify the Architect in writing of any conditions detrimental to the proper and timely work performance. Do not proceed with lead related work unit unsatisfactory conditions have been corrected in a manner acceptable to the Contractor.

3.02 **PREPARATION**

A. Protection

- 1. Provide personal protective equipment as required by 29 CFR 1926.62 at no cost to employees or authorized visitors.
- 2. Institute a respirator program in accordance with 29 CFR 1926.62 and 29 CFR 1910.134 (b), (d), (e) and (f).
- Use protective clothing and respirators whenever lead is being disturbed, abated, cleaned up, containerized or stored in vehicle or container used to transport waste to landfill.
- 4. Institute a medical surveillance program in accordance with 29 CFR 1926.62 for all employees performing or supervising lead handling work, entering the work containment area, or using a respirator.
- B. Before all other preparation activities, construct decontamination facilities adjacent to the lead work area, consisting of:
 - 1. Dirty area changing room.
 - 2. Shower room.
 - 3. Clean area changing room.
 - 4. Airlock at each entrance and between each room.
 - 5. Floors, walls, and ceilings sealed with two (2) layers of plastic sheeting.
 - 6. Provision for privacy while using the decontamination facilities.
- C. Exterior Work Preparation (Other Than Windows and Doors)
 - 1. Seal all openings to the building interior within twenty (20) feet of the lead work area -- except windows or doors that may be closed and locked -- with two (2) layers of plastic sheeting.
 - 2. Install a single layer of plastic sheeting on the ground extending ten (10) feet beyond the lead work area perimeter in all directions. Anchor or tape plastic sheeting to the building to avoid gaps between the sheeting and the building. Secure all plastic sheeting to prevent movement with wood studs or similar material.
 - 3. Install barrier tape and warning signs at a twenty (20) foot perimeter from the lead work area.
 - 4. Do not conduct lead activities if the wind speeds exceed 20 miles per hour.
 - 5. Stop lead activity and clean up area before rain begins; proceed with lead activities inside the building only.

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- 6. Move all movable objects twenty (20) feet from the lead work area.
- 7. Seal fixed objects and large objects that cannot be moved with a single layer of plastic sheeting.
- D. Interior Work Preparation.
 - 1. Level 1 Abatement (Dust removal and lead disturbance of no more than two (2) square feet of painted surface per room.):
 - a. A single layer of plastic sheeting on the floor extending five (5) feet beyond perimeter of treated area in all directions.
 - b. Install barrier tape and warning signs at all entrances to the room.
 - c. Room ventilation systems turned off and all room vents within five (5) feet of the treated surface sealed with plastic sheeting.
 - d. Move furniture and movable objects at least five (5) feet from the treated surfaces.
 - e. Seal fixed objects and large objects that cannot be moved out of the room with plastic sheeting.
 - f. Provide negative air pressure equipment where large supplies of fresh air are required to control exposure to other hazardous substances, such as solvent vapors.
 - 2. Level 2 Abatement (Lead disturbance of between two (2) and ten (10) square feet of painted surface per room, where all work in all rooms will be completed in one (1) day.):
 - a. Apply two (2) layers of plastic sheeting over the entire floor area.
 - b. Install an airlock at the entrance to the lead work area or the room.
 - c. Install barrier tape and warning signs at all entrances to the room.
 - d. Room ventilation systems turned off and all room vents within five (5) feet of the treated surface sealed with plastic sheeting.
 - d. Move furniture and movable objects at least five (5) feet from the treated surfaces.
 - e. Seal fixed objects and large objects that cannot be moved out of the room with plastic sheeting.
 - f. Provide negative air pressure equipment where large supplies of fresh air are required to control exposure to other hazardous substances, such as solvent vapors.
 - 3. Level 3 Abatement (Lead disturbance of between two (2) and ten (10) square feet of painted surface per room, where work in all rooms will be completed in not more than five (5) work days.):
 - a. Apply two (2) layers of plastic sheeting over the entire floor area.
 - b. Install airlock at the entrance to the lead work area or the room. The airlock is not required on doors between adjacent rooms within lead work area.
 - c. Post warning signs at entrances to the building.
 - d. Install barrier tape and warning signs at all room entrances.
 - e. Seal or lock any room entrances or lead work area not being used.
 - f. Turn off room ventilation systems and seal all vents with plastic sheeting.
 - g. Move furniture and movable objects from lead work area.
 - h. Seal fixed objects and large objects that cannot be moved with a single layer of plastic sheeting.
 - i. Provide negative air pressure equipment where large supplies of fresh air are required to control exposure to other hazardous substances, such as solvent vapors.

- 4. Level 4 Abatement (Lead disturbance of more than ten (10) square feet of painted surface per room):
 - a. Apply two (2) layers of plastic sheeting over the entire floor area.
 - b. Install airlock at the entrance to the lead work area or the room. The airlock is not required on doors between adjacent rooms within lead work area.
 - c. Post warning signs at entrances to the building.
 - d. Install barrier tape and warning signs at all room entrances.
 - e. Seal or lock any room entrances or lead work area not being used.
 - f. Turn off room ventilation systems and seal all vents with plastic sheeting.
 - g. Move furniture and movable objects from lead work area.
 - h. Seal fixed objects and large objects that cannot be moved with a single layer of plastic sheeting.
 - i. Provide negative air pressure equipment where large supplies of fresh air are required to control exposure to other hazardous substances, such as solvent vapors.
- E. Do not begin lead disturbance or removal until all preparation work, including installation of decontamination enclosure systems and any required engineering controls (ex. negative air pressure equipment, etc.) has been completed.

3.03 **LEAD WORK PROCEDURES**

- A. Exterior Lead Work Constraints: Do not proceed with lead activities if wind speeds are greater than twenty (20) miles per hour. Stop lead activities and proceed with cleanup activities before rain begins.
- B. Unacceptable Removal Methods:
 - 1. Open flame burring or torching (includes propane-fueled heat grids).
 - 2. Machine sanding or grinding without HEPA local vacuum exhaust tool.
 - 3. Hydroblasting or high-pressure wash.
 - 4. Abrasive blasting or sandblasting without HEPA vacuum exhaust tool.
 - 5. Heat Guns operating above 1,100 degrees F.
 - 6. Methylene chloride paint removal products.
 - 7. Dry scraping.
- C. Acceptable Removal Methods: [Since acceptable methods are not appropriate or acceptable for every item or location, refer to Drawings for approved removal methods for individual items and locations.]
 - 1. Component Removal
 - a. Mist all disturbed paint and dust and maintain in moist condition.
 - b. Entirely remove indicated components.
 - c. Wet scrape residual paint from adjacent unpainted surfaces. Do not damage adjacent surfaces.
 - d. Collect all paint chips, dust and debris and seal in 6 mil plastic bags.
 - e. Seal removed building components in 6 mil plastic sheeting or 6 mil plastic hags
 - 2. Heat Gun Removal (Operating at less than 1,100 degrees F.)
 - a. Provide fire extinguishers in lead work area, and ensure adequate electrical power is available.
 - b. Use in limited areas only.

c. Do not gouge or abrade substrate.

Wet Scraping

- a. Apply adequate water to moisten surface completely; avoid large amounts of water on the floor or ground.
- b. Do not moisten areas near electrical outlet circuits or switches.
- c. Use spray bottles or wet sponge attached to scraper.

Off Site Stripping

- a. Apply paint removers in accordance with manufacturer's recommendations.
- b. Test paint remover in inconspicuous location approved by the Architect to avoid damage to the substrate.
- Identify the building component to ensure reinstallation in the same location.
- d. Mist all paint and dust disturbed and maintain in moist condition.
- e. Remove components indicated on the Drawings in their entirety. Wet scrap residual paint from adjacent unpainted surfaces. Do not damage adjacent surfaces.
- f. Collect all paint chips, dust and debris and seal the same in 6 mil bags. Seal removed building components in plastic sheeting. Inform off site paint remover regarding presence of lead-based paint before shipping components
- g. Do no reinstall components until removal of residual paint and cleaning is complete and satisfactory clearance sampling achieved.

5. On Site Stripping.

- a. Apply paint removers in accordance with the manufacturer's recommendations.
- b. Test paint remover in inconspicuous location approved by the Architect to avoid damage to substrate.
- c. Do not damage adjacent surfaces.
- d. Collect all paint chips, dust and debris and seal in 6 mil plastic bags.

Work Stoppage Criteria During Lead Activities

- a. During lead related activities, stop work immediately if damaged containment barriers are discovered or if dust or paint chips are discovered outside of lead work area.
- b. Before resumption of lead activities, perform cleanup of areas adjacent to lead work area using HEPA vacuums or wet cleaning methods.

D. Clean Up Procedures

Building Exterior

- a. At the end of the day, whether or not lead related activities are complete, clean up and store all removed components, debris, and plastic sheeting drop cloths in lockable containers with solid floors, walls, and ceilings until transported off the site.
- b. HEPA vacuum and wash all plastic sheeting with lead specific detergent.
- c. Place all plastic sheeting used to cover ground and seal openings to the building interior in containers.

2. Building Interior

- Conduct ongoing cleaning during lead related activities, including regular removal of large and small debris.
- b. Clean up visible debris and components before leaving lead work site at the end of the work shift.
- c. Decontaminate all tools, equipment, and worker protection gear before removing them from contaminated areas.
- d. Wait at least one (1) hour after active lead removal or disturbance has ceased before final cleaning.
- e. Final cleaning includes HEPA vacuum, wet wash, and HEPA vacuum cycle as follows:
 - 1) HEPA vacuum all surfaces in the room (ceilings, walls, trim, and floors), starting with the ceiling and working down, moving toward the room entry door. Completely clean each room before beginning clean up in another room.
 - 2) Wash all surfaces with lead specific detergent, changing cleaning solution after completing cleaning in every room.
 - 3) Repeat HEPA vacuuming of all surfaces in room (ceilings, walls, trim and floors), starting with the ceiling and working down, moving toward the room entry door. Completely clean each room before beginning clean up in another room.
- f. After completing all disturbance, removal and cleaning activities, provide access to areas for Owner's monitoring firm to perform visual examination to ensure that all removal has been completed and all visible dust and debris have been removed. Correct all incomplete lead work before clearance sampling.
- E. Clearance Monitoring: After supervisor and monitor have performed visual inspection and provisionally determined that removal and cleaning have been properly completed, monitor begins clearance monitoring. Removal and cleaning are not properly completed until lead work area achieves satisfactory clearance sampling in accordance with this Section.

F. Removal of Work Area Containment

- 1. Do not remove remaining plastic sheeting, barriers, decontamination, facilities, negative pressure equipment and ancillary items until satisfactory clearance air monitoring results are achieved.
- 2. Notify the Architect immediately if any residual lead debris is identified during removal of plastic sheeting, barriers, decontamination facilities, negative pressure equipment and ancillary items, and clean up debris.
- 3. Clean all tape, glue, staples, etc. Used in lead work process.
- 4. Repair damage to walls, floors, ceilings, fixtures, or other items not scheduled for demolition or lead work to pre-lead work condition. Where finishes are damaged, refinish or repaint entire object or to nearest break in surface of walls, ceilings, soffits, etc.
- 5. Remove entire containment when partial occupancy by Owner is required before the Owner occupies the area or other prime contractors occupy space for additional construction as required by contract documents.
- 6. Paint or otherwise seal treated surfaces not scheduled for painting.

3.04 WASTE SEGREGATION AND CHARACTERIZATION

A. Segregate waste in the following categories:

- 1. Removed components (Considered construction and demolition debris for bidding purposes).
- 2. Paint chips, dust, and filters from HEPA vacuums (Considered hazardous waste for bidding purposes).
- 3. Respirator filter cartridges, rags, sponges, mops, scrapers, and other materials used for testing lead work, and clean up (Considered construction and demolition debris for bidding purposes).
- 4. Contaminated soil (Considered hazardous waste for bidding purposes).
- 5. Cleaned plastic sheeting and disposable work clothes (Considered construction and demolition debris for bidding purposes).
- B. Sample each container of waste to determine if it is characterized as hazardous waste, treating each sample as follows:
 - 1. Prepare using Toxicity Characteristic Leachate Procedure, EPA method 1311.
 - 2. Analyze for lead using EPA method 6010, 6020, 7420 or 7421.
 - 3. Analyze for any other hazardous characteristic introduced into the waste by lead procedures.
- C. Consider cleaned plastic sheeting and disposable work clothes not sufficiently cleaned as hazardous waste and dispose as hazardous waste at no additional cost to the Owner.
- D. Maintain each waste category above in separate hard walled lockable containers until waste characterization is complete. If waste mixed from different categories, dispose all mixed waste as hazardous waste at no additional cost to the Owner.

3.05 FIELD QUALITY CONTROL

- A. Inspection of Barriers: Provide inspection of all barriers at least twice daily by the Contractor's Supervisor and record inspections and observations in a daily project log.
- B. Repairs to Barriers and/or Enclosure Systems: Repair damage and defects in barriers and enclosure systems immediately upon discovery and prior to resumption of lead activities.
- C. Testing by Owner: The Owner reserves the right to obtain independent monitoring and sampling services to provide independent documentation regarding compliance with regulatory requirements. Where the Owner provides monitoring, sampling (or both), use the most stringent results from inspections, daily air sampling and clearance sampling.

D. Contractor Requirements:

- 1. Provide air sampling as required by 29 CFR 1926.62.
- 2. Provide sampling and analysis for waste characterization.
- 3. Provide access to lead work areas for Owner's Monitor/Sampling Technician to observe all lead related work and collect samples.
- 4. Provide adequate lighting, ladders, scaffolding, and similar items to enable Monitor/Sampling Technician to perform visual inspections of all surfaces within lead work areas.
- 5. Provide sufficient temporary electrical power to locations within lead work areas as required to supply high volume air sampling pumps for daily use.
- 6. Do not perform any monitoring functions with the Contractor's personnel or with firms wholly or partly owned by the Prime Contractor. Notify the Owner and Architect immediately of any conflict of interest between the Prime Contractor and any firm providing monitoring, sampling or laboratory analysis.

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- 7. The Prime Contractor retains complete and total responsibility for complying with the Contract Documents and all regulatory requirements.
- E. Area Air Sampling Procedures (if used): Comply with provisions of NIOSH 7082.
- F. Clearance Sampling Procedures:
 - Timing of Clearance Sampling -- Do not begin clearance sampling until:
 - a. All lead related work and cleaning work has ceased.
 - b. All personnel have left the lead work area.
 - c. A minimum of one (1) hour settling period has elapsed.
 - 2. Exterior Work Area Clearance:
 - a. Background Sampling:
 - 1) Determine required clearance sampling strategy.
 - Collect representative samples of the same number and king as required for clearance.
 - 3) Hold samples until after lead disturbance, removal, cleaning, clearance sampling and sample analysis is complete.
 - 4) If any sample results are above clearance criteria, analyze background samples for comparison with clearance sample results.
 - 5) Background sampling intended for informational purposes only.
 - b. Clearance Wipe Sampling:
 - Collect a minimum of one (1) sample from horizontal surfaces in the immediate area of lead work on each side of building where lead work occurs.
 - 2) Collect a minimum of one (1) window trough sample on each floor and each side of building where lead work occurs.
 - 3) If applicable, collect a minimum of one (1) additional window trough sample on the floor below lead work for each side of the building where lead work occurs.
 - 4) Refer to the U.S. Department of Housing and Urban Development Guidelines for evaluation of control of lead-based paint hazards in housing, Appendix 13.1: Wipe Sampling for Settled Lead-Contamination Dust for sampling requirements.
 - 5) Use the Lead Hazard Control Clearance Dust Sampling (Single Surface Sampling) Form 15.2, from the U.S. Department of Housing and Urban Development Guidelines For the Evaluation and Control of Lead-Based Paint Hazards in Housing to document the following:
 - .01 Sample locations.
 - .02 Surface area sampled.
 - .03 Project information.
 - .04 Chain of custody information.
 - .05 Signatures.
 - 6) Clearance Level: 400 ug/sq. Ft.
 - c. Clearance Soil Sampling:

- 1) Clearance wipe sampling consists of composite samples, consisting of two (2) to four (4) component samples.
- 2) Collect one (1) composite sample form each side of the building on which lead work occurs.
- 3) Refer to the U.S. Department of Housing and Urban Development Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing, Appendix 13.3: Soil Sampling Protocol for Housing for sample requirements.
- 4) Use the Lead Hazard Control Clearance Soil Sampling (Composite Sampling Only) Form 15.3, from the U.S. Department of Housing and Urban Development Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing to document the following:
 - .01 Sample locations.
 - .02 Surface area sampled.
 - .03 Project information.
 - .04 Chain of custody information.
 - .05 Signatures.
 - 5) Clearance Level: 400 ug/g.
- 3. Interior Work Area Clearance:
 - a. Background Sampling:
 - 1) Determine the required clearance sampling strategy.
 - 2) Collect representative samples of the same number and kind as required for clearance.
 - 3) Hold the samples until after the lead disturbance, removal, cleaning, clearance sampling and sample analysis is complete.
 - 4) If any of the sample results are above clearance criteria, analyze the background samples for comparison with clearance sample results.
 - 5) Background sampling intended only for informational purposes.
 - b. Clearance Wipe Sampling:
 - 1) Collect a minimum of two (2) dust samples from at least four (4) rooms. If lead work occurs in less than four (4) rooms, collect samples where no lead work occurred.
 - Collect one (1) floor sample in each room where lead work occurred.
 - 3) Collect one (1) interior window stool or window trough per room where lead work occurred, alternating between rooms.
 - 4) For 20% of rooms where lead work occurs, collect one (1) floor sample outside of the room in uncontaminated space, but within ten (10) feet of the airlock.
 - 5) For each room over 2,000 square feet, collect one (1) additional floor sample for every 2,000 square feet and collect one (1) floor sample outside of the room uncontaminated space, but within ten (10) feet of the airlock.
 - Refer to the U.S. Department of Housing and Urban Development Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing Appendix 13.1: Wipe Sampling for Settled Lead-Contaminated Dust for sampling requirements.
 - 7) Use Lead Hazard Control Clearance Dust Sampling (Single Surface Sampling) Form 15.2, from the U.S. Department of

Housing and Urban Development Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing to document the following:

- .01 Sample locations
- .02 Surface area sampled
- .03 Project information
- .04 Chain of custody information
- .05 Signatures
- 8) Satisfactory Clearance Levels:
 - .01 Bare and Carpeted Floors: 40 ug/sq. Ft.
 - .02 Interior Window Stools: 250 ug/ sq. Ft.
 - .03 Window Troughs: 400 ug/ sq. Ft.
- G. Failure of Clearance Sampling:
 - 1. Clearance criteria achieved when:
 - a. All scheduled lead removal is complete.
 - b. No dust or debris remains within the lead work area.
 - c. Clearance sample results are below clearance level or background whichever is greater.
 - 2. Re-clean any lead work area or other area not meeting the clearance criteria.
 - 3. Where clearance criteria are not met for soil, remove two (2) inches of soil from perimeter of twenty (20) feet around the building, or portion thereof, where lead was removed or wherever paint chips are found, whichever is greater.
 - 4. Sampling technician collects new samples in approximately the same location for each lead work area with samples not meeting clearance criteria.
 - 5. Repeat cleaning, sampling, monitoring, and analysis until satisfactory clearance criteria are achieved.
 - 6. Failure of clearance monitoring indicates lead activity has not been properly completed; the Prime Contractor shall perform additional cleaning at no additional cost to the Owner, including sampling and sample analysis during additional cleaning and clearance sampling. The Prime Contractor remains responsible for complying with all the specified progress schedules and completion dates.

3.06 PACKAGING, TRANSPORT ION AND WASTE DISPOSAL PROCEDURES

- A. Perform additional surveys as hazardous material disposal progresses to detect hazards resulting from hazardous material disposal activities.
- B. Use hazardous waste characterization performed in accordance with the "Waste Segregation and Characterization" above to document and confirm classification of waste. Prior to removing waste from the site, confirm in writing to the Owner:
 - 1. Results of waste characterization testing.
 - 2. Identification of waste documented to have waste classification identified in the "Waste Segregation and Characterization" above.
 - 3. Identification of waste characterization varying from the "Waste Segregation and Characterization" above.
- C. Packaging: Package, label, and mark all hazardous waste materials in accordance with

applicable requirements of 49 CFR 173, 178, and 179.

- D. Temporary On-site Storage and Protection: Provide storage on site of hazardous materials removed for service and scheduled for disposal complying with the requirements of 6 NYCRR 372.2(a)(8). Do not exceed 180 days storage on site.
- E. Hazardous Waste Determination: Provide analysis required by Treatment, Storage or Disposal facility to document hazardous waste determination.
- F. Hazardous Waste Manifests
 - 1. Maintain manifest from date of transport until date of disposal, destruction or recycling.
 - 2. Submit the fully executed manifests to the Owner within 60 days of date waste was accepted by initial transporter.
 - 3. Use the following type of manifest as acceptable:
 - a. If the waste is disposed of in New York State or if waste is disposed in a state not requiring use of specific manifest form, use the New York State Uniform Hazardous Waste Manifest.
 - b. If the wastes is disposed of in a state other than New York State and use of a specific manifest form is required, use the manifest required by the state where the waste is disposed in place of the New York State Uniform Hazardous Waste Manifest.
 - 4. Complete the manifest and deliver to the Owner for review and signature.
 - 5. Retain copies of manifest required to remain with hazardous waste shipment and deliver remaining copies to the Architect.
 - 6. Advise the Architect regarding required distribution of manifest, both verbally and in writing.
- G. Disposal: Transport hazardous waste to a treatment or disposal facility complying with the following requirements:
 - 1. Permitted, licensed or registered by the state to dispose of hazardous waste.
 - 2. Possesses interim status to dispose of hazardous waste.
 - 3. Authorized to manage hazardous waste under the Resource Conservation and Recovery Act (RCRA).
 - 4. Beneficially uses/re-uses or legitimately recycles/reclaims waste; or treats waste prior to beneficial use/reuse or legitimate recycling/reclamation.
- H. Construction and Demolition Debris: Dispose of material determined to be Construction and Demolition Debris as such in accordance with 6 NYCRR 360 and 364. Provide trip tickets or other documentation clearly identifying the amount of material removed from the site, transported to the disposal site and disposed of, including at least:
 - 1. Name, address and telephone number of waste generator.
 - Approximate quantity.
 - 3. Name and telephone number of disposal site operator.
 - 4. Name and physical site location of disposal site.
 - 5. Name, address and telephone number of transporter.

END OF SECTION 02 08 60 - LEAD-SAFE WORK PRACTICE.

SECTION 021100 - REMOVALS

PART 1 GENERAL

1.01 **DESCRIPTION**

A. Scope of Work

This Section describes the requirements of the Demolition without limiting the generality implied by the Specifications and Drawings. The work under this Section shall include, but is not limited to the following principal items:

- 1. Demolition, Cutting and Patching: As indicated and as necessary to install new work in alteration areas.
- 2. Salvage of Materials: For reuse in this project. All material or equipment indicated for return to Building Owner shall be assembled by the Contractor, together with four copies of completed and signed transmittal forms identifying the said material or equipment, and all turned over to Housing.
- 3. General Construction Work: Add, build, demolish, relocate, remove, patch and finish such walls, ceilings, partitions, structural materials, equipment, finish materials, etc., as indicated and as necessary to complete the General Construction work.
- 4. Heating Work: Shall be properly disconnected, terminated, demolished, altered, relocated, replaced, added to as indicated and required to complete the heating work. Furnish and install new heating equipment, piping, valves, controls, etc., as required (See Mechanical Specs & Drawings).
- 5. Plumbing Work: Shall be properly disconnected, terminated, demolished, altered, relocated, replaced, added to as indicated and required to complete the plumbing work. Furnish and install new fixtures, piping, valves, controls, etc., as required. (See Plumbing Specs & Drawings).
- 6. Electric Work: Shall be properly disconnected, terminated, demolished, altered, relocated, replaced, added to as indicated and required to complete the electric work. Furnish and install new fixtures, wiring, panels, switches, etc., as required (See Electrical Specs & Drawings).
- 7. All Contractors: Contractors are advised that painted wood and painted metal trim may contain lead. Reference OSHA 29 CFR 1926-62 AEmployee Construction Workers Exposed to Lead.@ Follow HUD guidelines for lead abatement as required to perform work. See HUD Guidelines, Appendix 7.3: Lead-Based Paint Abatement Specification Example.

1.02 **SECURITY AND ACCESS**

- A. The security and maintenance of adequate safe means of egress and ingress to existing building is of prime importance from the standpoint of maintaining safe access through construction operations at all times. The Contractor shall coordinate work with the Owner's site representative and all concerned.
- B. Entrances and exits shall remain accessible at all times. Plans for any prolonged (other than momentary) obstruction to pedestrian and/or vehicular access must be cleared with the Owner's Representative prior to implementation.

PART 2 PRODUCTS

2.01 **MATERIALS**

- A. For replacement of work removed, comply with Specifications for type of work to be done.
- B. Existing materials that are altered during construction activities but are designated to remain in place shall be replaced with like materials "Patch to Match" as part of the base bid Scope of Work (or as called for on the Plans). This includes locations outside the project area (adjacent rooms for example) where finishes or other materials are removed to install equipment for the project.

PART 3 EXECUTION

3.01 PROCEDURE AND TIMING

A. Procedure

The work shall be executed in an orderly and careful manner with due consideration for inhabitants and the public. Maintain enclosures at all openings to adjacent areas not being altered, at all times, with necessary signs, lights, bracing and guards for the protection of all personnel and existing facilities.

B. Timing

Coordinate work to facilitate scheduling of abandonment and to allow for the installation of temporary and permanent services as required. All work shall be scheduled in advance at a meeting with the Owner, Architect and Contractor to coordinate work schedules.

C. Cutting and Patching

The Contractor shall include as scope of his work all alterations intended for a complete project as required to:

- 1. Maintain fire safety and environmental systems throughout construction. Temporary facilities shall be installed as required during removals to accomplish same.
- 2. Make all parts fit properly.
- 3. Uncover work to provide for installation of ill-timed work.
- 4. Remove and replace defective work.
- 5. Remove and replace work not conforming to requirements of Contract Documents.
- 6. Install specified work in existing construction.
- 7. Do not endanger any work by cutting or altering work or any part of it.
- 8. Patch all pipe, conduit and duct wall penetrations. Use joint compound at GWB walls; at masonry walls use grout. [See Section 078400 **if included** Firestopping for penetrations through fire-rated walls, fire-rated partitions and fire-rated floors or smoke barriers.]
- D. The Contractor shall salvage all materials for reuse for work of their trades in a manner which prevents injury or damage to persons, adjoining properties and public rights-of-way in compliance with the Existing Building Code of New York State, Section 1301.4. The Contractor shall coordinate with the Owner all materials or equipment to be removed, relocated or reused. Contractor to deliver items designated to be turned over to Owner to

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Owners storage location. The Contractor shall determine the scope of work required to perform these tasks.

E. The Contractor shall remove and dispose of all materials that will not be reused. This includes all necessary work involved in elimination and hauling away materials intended for removal by the Specifications and Drawings. The work under this Section shall include all necessary labor and materials to repair existing demolished materials, except as specified or shown otherwise, shall become the property of the Contractor and shall be removed from the project site.

Electric lamps are to be recycled where local recycling options are available.

- F. Protect and safeguard from damage all existing structural systems, equipment and finishes that will remain. Contractor shall be responsible for any damage caused by his own forces or his subcontractors.
- G. Structural and other conditions will be verified with the Architect before proceeding with alteration work. Inspect structures prior to start of work and notify the Architect in writing, of any conditions detrimental to the execution of the work. Photograph existing damage which could be misconstrued as a damage resulting from the work of the Contract. State location and date of photograph and file with the Architect prior to starting work.

END OF SECTION 021100 - REMOVALS

SECTION 028200 - ASBESTOS REMOVAL

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. This asbestos abatement Project will consist of the removal and disposal of asbestos containing materials (ACM) and presumed asbestos containing materials (PACM) at The State University of New York at Oswego Funnelle Hall, located at 7060 New York State Route 104, Oswego, Oswego County, New York.
- B. The work shall include but not be limited to the removal of the following materials:

Floor/Level	Description of ACM Material	Approximate Quantity (SF/LF/Unit)
Basement Through Ninth Floors	Gray Mudded Pipe TSI Fittings	900 Linear Feet
Basement Through Ninth Floors	Cloth Jacket Associated with Gray Mudded TSI Pipe Fittings	950 Linear Feet
Second Through Eighth Floors	Gray with White 9- by 9-Inch Streaked Floor Tile and Associated Black Mastic	2,164 Square Feet
Ninth Floors	Adhesive Associated with HVAC Duct Insulation	60 Square Feet
Second Through Eighth Floors	White Cementitious Ceiling/Wall Board	320 Square Feet
Basement, 1st Floor, 6th Floor, and 8th Floor	Gray and Gold Duct Sealants	28 Square Feet
Basement	White Vibration Dampening Cloth	2 Square Feet
Basement	Gaskets Associated with Pumps	15 Square Feet
Basement and First Floor	White 1- by 1-foot Pitted Ceiling Tile	875 Square Feet
First Through Ninth Floors	Door Insulation	2,880 Square Feet
Basement	White Braided Electrical Wire Jacket	4 Square Feet

- C. The Contractor shall be aware of all conditions of the Project and is responsible for verifying quantities and locations of all Work to be performed. Failure to do so shall not relieve the Contractor of its obligation to furnish all labor and materials necessary to perform the Work.
- D. All Work shall be performed in strict accordance with the Project Documents and all governing codes, rules, and regulations. Where conflicts occur between the Project Documents and applicable codes, rules, and regulations, the more stringent shall apply.
- E. Working hours shall be as required and approved by the Owner. Asbestos abatement activities including, but not limited to, work area preparation, gross removal activities, cleaning activities, waste removal, etc. may need to be performed during 'off-hours' (including nights and weekends). In addition, multiple mobilizations may be required to perform the work identified in this project. The Contractor shall coordinate and schedule all Work with the facility and Owner's representative.

1.02 PERMITS AND COMPLIANCE

- The Contractor shall assume full responsibility and liability for compliance with all applicable A. Federal, State, and local laws, rules, and regulations pertaining to Work practices, protection of Workers, authorized visitors to the site, persons, and property adjacent to the Work.
- B. Perform asbestos related Work in accordance with New York State Industrial Code Rule 56 (herein referred to as Code Rule 56), 40 CFR 61, and 29 CFR 1926. Where more stringent requirements are specified, adhere to the more stringent requirements.
- C. The Contractor must maintain current licenses, permits and certifications pursuant to New York State Department of Labor and Department of Environmental Conservation for all Work related to this Project, including the removal, handling, transport, and disposal of asbestos containing materials.
- D. The Contractor must have and submit proof upon request that any persons employed by the Contractor to engage in or supervise Work on any asbestos Project have a valid NYS asbestos handling certificate pursuant to Code Rule 56.
- E. The Contractor shall comply fully with any Variance secured from regulatory agencies by the Owner in the performance of the Work. Any Variance applications previously submitted are included as an appendix of this specification.
- F. The Contractor shall be responsible for obtaining all other Variances as may be required for the Project or as requested by the Owner. Approval of the Owner is required prior to submission of a Variance application to any regulatory agency. Failure to obtain Owner approval may result in Owner not permitting variance to be used on the project.
- G. The Contractor shall be responsible for compliance with The New York State Uniform Fire Prevention and Building Code, or its successor during all Work at the site.
- H. Failure to adhere to the Project Documents shall constitute a breach of the Contract and the Owner shall have the right to and may terminate the Contract provided, however, the failure of the Owner to so terminate shall not relieve the Contractor from future compliance.

1.03 SUBMITTALS

- A. Pre-Work Submittals: Within 7 days prior to the pre-construction conference, the Contractor shall submit 3 copies of the documents listed below, with 1 copy going directly to the DASNY Code Compliance Unit for review and approval prior to the commencement of asbestos abatement activities:
 - Contractor license issued by New York State Department of Labor.
 - 2. A list of Projects performed within the past two (2) years including the dollar value of all Projects. Provide Project references to include Owner, consultant, and air monitoring firm's name, contact persons, address, and phone number.
 - Progress Schedule: 3.
 - Show the complete sequence of abatement activities and the sequencing of Work within each building or building section.
 - Show the dates for the beginning and completion of each major element of Work b. including substantial completion dates for each Work Area, building, or phase.
 - Project Notifications: As required by Federal and State regulatory agencies together 4. with proof of transmittal (i.e. certified mail return receipt).
 - Building Occupant Notification: As required by regulatory agencies. 5.
 - 6. Abatement Work Plan: Provide plans that clearly indicate the following:
 - All Work Areas/containments numbered sequentially.

- b. Locations and types of all decontamination enclosures.
- c. Entrances and exits to the Work Areas/containments.
- d. Type of abatement activity/technique for each Work Area/containment.
- e. Number and location of negative air units and exhaust. Also provide calculations for determining number of negative air pressure units.
- f. Location of water and electrical connections to building services.
- g. Waste transport routes through the building to the waste storage container.
- 7. Disposal Site/Landfill Permit from applicable regulatory agency.
- 8. NYS Department of Environmental Conservation Waste Transporter Permit.
- B. On-Site Submittals: Refer to Part 3.01.C & D for all submittals, documentation, and postings required to be maintained on-site during abatement activities.
- C. Project Close-out Submittals: Within 30 days of the completion of each abatement phase, the Contractor shall submit one hard copy of the documents listed below to DASNY Code Compliance and one copy to the environmental consultant for review and approval prior to Contractor's final payment. Once DASNY Code Compliance approves the close-out submittal, the Contractor shall provide three sets of the approved close-out documents (double-sided and bound) to DASNY Project Management, including one set to be distributed to the facility.
 - 1. All waste disposal shipment records and disposal logs(Original waste shipment records shall be sent to DASNY Code Compliance).
 - 2. OSHA compliance air monitoring records conducted during the Work.
 - 3. Daily progress log, including the entry/exit log.
 - 4. Provide the Contractor's Acknowledgement Statement (Appendix C) that lists all Workers used in the performance of the Project, including name and NYS DOL certification number. The Statement shall be notarized (Original notarized statement shall be sent to DASNY Code Compliance).
 - 5. Disposal Site/Landfill Permit from applicable regulatory agency.
 - 6. Project notifications, amended notifications, Variances.

1.04 PRE-CONSTRUCTION CONFERENCE

- A. Prior to start of preparatory Work under this Contract, the Contractor shall attend a preconstruction conference attended by Owner, Facility Personnel, and Environmental Consultant.
- B. Agenda for this conference shall include but not necessarily be limited to:
 - Contractor's scope of Work, Work plan, and schedule to include number of workers and shifts.
 - 2. Contractor's safety and health precautions including protective clothing and equipment and decontamination procedures.
 - 3. Environmental Consultant's duties, functions, and authority.
 - 4. Contractor's Work procedures including:
 - a. Methods of job site preparation and removal methods.
 - b. Respiratory protection.
 - c. Disposal procedures.
 - d. Cleanup procedures.
 - e. Fire exits and emergency procedures.
 - 5. Contractor's required pre-work and on-site submittals, documentation, and postings.
 - 6. Contractor's plan for twenty-four (24) hour Project security both for prevention of theft and for barring entry of unauthorized personnel into Work Areas.
 - 7. Temporary utilities.
 - 8. Handling of furniture and other moveable objects.
 - 9. Storage of removed asbestos containing materials.

- 10. Waste disposal requirements and procedures, including use of the Owner supplied waste shipment record.
- C. In conjunction with the conference the Contractor shall accompany the Owner and Environmental Consultant on a pre-construction walk-through documenting existing condition of finishes and furnishings, reviewing overall Work plan, location of fire exits, fire protection equipment, water supply and temporary electric tie-in.

1.05 APPLICABLE STANDARDS AND REGULATIONS

- A. The Contractor shall comply with the following codes and standards, except where more stringent requirements are shown or specified:
- B. Federal Regulations:
 - 1. 29 CFR 1910.1001, "Asbestos" (OSHA)
 - 2. 29 CFR 1910.1200, "Hazard Communication" (OSHA)
 - 3. 29 CFR 1910.134, "Respiratory Protection" (OSHA)
 - 4. 29 CFR 1910.145, "Specification for Accident Prevention Signs and Tags" (OSHA)
 - 5. 29 CFR 1926, "Construction Industry" (OSHA)
 - 6. 29 CFR 1926.1101, "Asbestos, Tremolite, Anthophyllite, and Actinolite" (OSHA)
 - 7. 29 CFR 1926.500 "Guardrails, Handrails and Covers" (OSHA)
 - 8. 40 CFR 61, Subpart A, "General Provisions" (EPA)
 - 9. 40 CFR 61, Subpart M, "National Emission Standard for Asbestos" (EPA)
 - 10. 49 CFR 171-172, Transportation Standards (DOT)
- C. New York State Regulations:
 - 1. 12 NYCRR, Part 56, "Asbestos", Industrial Code Rule 56 (DOL)
 - 2. 6 NYCRR, Parts 360, 364, Disposal and Transportation (DEC)
 - 3. 10 NYCRR, Part 73, "Asbestos Safety Program Requirements" (DOH)
 - 4. "New York State Uniform Fire Prevention and Building Code"
- D. Standards and Guidance Documents:
 - American National Standard Institute (ANSI) Z88.2-80, Practices for Respiratory Protection
 - 2. ANSI Z9.2-79, Fundamentals Governing the Design and Operation of Local Exhaust Systems
 - 3. EPA 560/585-024, Guidance for Controlling Asbestos Containing Materials in Buildings (Purple Book)
 - 4. EPA 530-SW-85-007, Asbestos Waste Management Guidance
 - 5. ASTM Standard E1368 "Standard Practice for Visual Inspection of Asbestos Abatement Projects"

1.06 NOTICES

- A. The Contractor shall provide notification of intent to commence asbestos abatement activities as indicated below.
 - 1. At least ten (10) Working days prior to beginning abatement activities, send written notification to:

U.S. Environmental Protection Agency
National Emissions Standards for Hazardous Air Pollutants (NESHAPS) Coordinator
26 Federal Plaza
New York, NY 10007

2. At least ten (10) days prior to beginning abatement activities send written notification to:

New York State Department of Labor
Division of Safety and Health, Asbestos Control Program.
State Office Campus
Building 12 - Room 161B
Albany, NY 12240

- B. The Contractor is required to send notifications to regulatory agencies via electronic, mail, or package delivery service that will provide proof of delivery and receipt.
- C. The Contractor shall be responsible for maintaining current project filings with regulatory agencies for the duration of the project.
- D. The Contractor shall post and/or provide Building Occupant Notification at least 10 days prior to beginning abatement activities as required by Code Rule 56.

1.07 PROJECT MONITORING AND AIR SAMPLING

- A. The Owner shall engage the services of an Environmental Consultant (the Consultant) who shall serve as the Owner's Representative in regard to the performance of the asbestos abatement Project and provide direction as required throughout the entire abatement Project period. The consultant and all subconsultants shall not have any contractual relationship with the Contractor for the duration of the asbestos project.
- B. The Contractor is required to ensure cooperation of its personnel with the Consultant for the air sampling and Project monitoring functions described in this section. The Contractor shall comply with all direction given by the Consultant during the course of the Project.
- C. The Consultant shall provide the following administrative services:
 - 1. Review and approve or disapprove all submittals, shop drawings, schedules, and samples.
 - 2. Assure that all notifications to governmental agencies by the Contractor are submitted in a timely manner and are correct in content.
- D. The Consultant shall staff the Project with a trained and certified person(s) to act on the Owner's behalf at the job site. This individual shall be designated as the Abatement Project Monitor (APM).
 - The APM shall be on-site at all times the Contractor is on-site. The Contractor shall not be permitted to conduct any Work unless the APM is on-site (except for inspection of barriers and negative air system during non-working days).
 - 2. The APM shall have the authority to direct the actions of the Contractor verbally and in writing to ensure compliance with the Project documents and all regulations. The APM shall have the authority to Stop Work when gross Work practice deficiencies or unsafe practices are observed, or when ambient fiber concentrations outside the removal area exceed .01 f/cc or background level.
 - a. Such Stop Work order shall be effective immediately and remain in effect until corrective measures have been taken and the situation has been corrected.
 - b. Standby time and air sample collection and analysis required to resolve the situation shall be at the Contractor's expense.
 - 3. The APM shall provide the following services:
 - a. Inspection of the Contractor's Work, practices, and procedures, including temporary protection requirements, for compliance with all regulations and Project specifications.
 - b. Provide abatement Project air sampling as required by applicable regulations (NYS, AHERA) and the Owner. Sampling will include, but not be limited to

- background, work area preparation, asbestos handling, final cleaning, and clearance air sampling.
- c. Verify daily that all Workers used in the performance of the Project are certified by the appropriate regulatory agency.
- d. Monitor the progress of the Contractor's Work, and report any deviations from the schedule to the Owner.
- e. Monitor, verify, and document all waste load-out operations including placement of generator and location labels on each waste container, as required by federal regulations.
- f. Verify that the Contractor is performing personal air monitoring daily, and that results are being returned and posted at the site as required.
- g. The APM shall maintain a log on site that documents all project related and Consultant and Contractor actions, activities, and occurrences.
- h. Verify landfill to be used for waste disposal with waste transporter(driver) and Contractor prior to waste trailer/dumpster leaving site. Confirm the waste transporter firm and landfill are listed on the regulatory notifications for the project and the waste transport vehicle license number is listed on the current NYS DEC Waste Transporter permit.
- 4. The following minimum inspections shall be conducted by the APM, accompanied by the Contractor's supervisor. Additional inspections shall be conducted as required by Project conditions and/or the Owner's direction. Progression from one phase of Work to the next by the Contractor is only permitted with the written approval of the APM.
 - a. Pre-Construction Inspection: The purpose of this inspection is to verify the existing conditions of the Work Areas and to document these conditions.
 - b. Pre-Commencement Inspection: The purpose of this inspection is to verify the integrity of each containment system prior to disturbance of any asbestos containing material. This inspection shall take place only after the Work Area is fully prepped for removal.
 - c. Work Inspections: The purpose of this inspection is to monitor the Work practices and procedures employed on the Project and to monitor the continued integrity of the containment system. Inspections within the removal areas shall be conducted by the APM during all preparation, removal, and cleaning activities at least twice every Work shift. Additional inspections shall be conducted as warranted.
 - d. Pre-Encapsulation Inspection: The purpose of this inspection is to ensure the complete removal of Asbestos Containing Material (ACM), from all surfaces in the Work Area prior to encapsulation.
 - e. Visual Clearance Inspection: The purpose of this inspection is to verify that: all materials in the scope of work have been properly removed; no visible asbestos debris/residue remains; no pools of liquid or condensation remains; and all required cleanings are complete. This inspection shall be conducted before final air clearance testing.
 - f. Post-Clearance Inspection: The purpose of this inspection is to ensure the complete removal of ACM, including debris, from the Work Area after satisfactory final clearance sampling and removal of all isolation and critical barriers and equipment from the Work Area.
 - g. Punch List Inspection: The purpose of this inspection is to verify the Contractor's certification that all Work has been completed as contracted and the existing condition of the area prior to its release to the Owner.
- E. The Consultant shall provide abatement Project air sampling and analysis as required by applicable regulations (New York State and/or AHERA). Sampling will include but is not limited to, background, work area preparation, asbestos handling, and final cleaning and clearance air sampling.

- 1. Unless otherwise required by applicable regulations, the Consultant shall have samples analyzed by Phase Contrast Microscopy (PCM). Results shall be available within 24 hours of completion of sampling.
- 2. Samples shall be collected as required by applicable regulations (New York State and/or AHERA) and these specifications. If Transmission Electron Microscopy (TEM) clearance air sampling is utilized by the owner, the clearance criteria and sampling protocols must be in compliance with AHERA. If PCM air sample analysis results exceed the satisfactory clearance criteria, then TEM analysis of the entire set of clearance air samples may be used, provided that a standard NIOSH/ELAP accepted laboratory analysis method is utilized that shall report each air sample result in fibers per cubic centimeter.
- 3. If the air sampling during any phase of the abatement project reveals airborne fiber levels at or above .01 fibers/cc or the established background level, whichever is greater, outside the regulated Work Area, Work shall stop immediately and corrective measures required by Code Rule 56 shall be initiated. Notify DASNY project personnel as well as all employers and occupants in adjacent areas. The Contractor shall bear the burden of any and all costs incurred by this delay.
- 4. The Environmental Consultant shall submit copies of all elevated air sampling results collected during abatement and all elevated final air clearance results to the Commissioner of Labor, as required by regulation.

1.08 CONTRACTOR AIR SAMPLING

- A. In addition to the requirements of OSHA 1926.1101, the Contractor shall be required to perform personal air monitoring every Work shift in each Work Area during which abatement activities occur in order to determine that appropriate respiratory protection is being worn and utilized.
- B. The Contractor shall conduct air sampling that is representative of both the 8-hour time weighted average and 30-minute short-term exposures to indicate compliance with the permissible exposure and excursion limits.
- C. The Contractor's laboratory analysis of air samples shall be conducted by an NYS DOH ELAP approved laboratory. The consultant shall not collect or analyze the Contractor's air samples.
- D. Results of personnel air sample analyses shall be available, verbally, within twenty-four (24) hours of sampling and shall be posted upon receipt. Written laboratory reports shall be delivered and posted at the Work site within five (5) days. Failure to comply with these requirements may result in all work being stopped until compliance is achieved.

1.09 PROJECT SUPERVISOR

- A. The Contractor shall designate a full-time Project Supervisor who shall meet the following qualifications:
 - 1. The Project Supervisor shall hold New York State certification as an Asbestos Supervisor.
 - 2. The Project Supervisor shall meet the requirements of a "Competent Person" as defined by OSHA 1926.1101 and shall have a minimum of one year experience as a supervisor.
 - 3. The Project Supervisor must be able to speak, read, and write English fluently, as well as communicate in the primary language of the Workers.
- B. If the Project Supervisor is not on-site at any time whatsoever, all Work shall be stopped. The Project Supervisor shall remain on-site until the Project is complete. The Contractor may not remove the Project Supervisor from the Project without the written consent of the Owner and

the Environmental Consultant; however the Project Supervisor shall be removed from the Project if so requested by the Owner.

- C. The Project Supervisor shall maintain the bound Daily Project Log and the entry/exit logs as required by New York State Department of Labor and section 2.03 of the specifications and the Waste Disposal Log (Appendix B) required by section 4.03 of the specifications.
- D. The Project Supervisor shall be responsible for the performance of the Work and shall represent the Contractor in all respects at the Project site. The Supervisor shall be the primary point of contact for the Asbestos Project Monitor.

1.10 MEDICAL REQUIREMENTS

- A. Before exposure to airborne asbestos fibers, provide Workers with a comprehensive medical examination as required by 29 CFR 1910.1001, and 29 CFR 1926.1101.
 - 1. This examination is not required if adequate records show the employee has been examined as required by 29 CFR 1910.1001, and 29 CFR 1926.1101 within the past year.
 - 2. The same medical examination shall be given on an annual basis to employees engaged in an occupation involving potential disturbance of asbestos fibers.

1.11 TRAINING

- A. As required by applicable regulations, prior to assignment to asbestos Work instruct each employee with regard to the hazards of asbestos, safety and health precautions, and the use and requirements of protective clothing and equipment.
- B. Establish a respirator program as required by ANSI Z88.2 and 29 CFR 1910.134, and 29 CFR 1926.1101. Provide respirator training and fit testing.

1.12 RESPIRATORY PROTECTION

- A. Select respirators from those approved by the National Institute for Occupational Safety and Health (NIOSH).
- B. Respirators shall be individually fit-tested to personnel under the direction of an Industrial Hygienist on a yearly basis. Fit-tested respirators shall be permanently marked to identify the individual fitted, and use shall be limited to that individual.
- C. Where fiber levels permit, and in compliance with regulatory requirements, Powered Air Purifying Respirators (PAPR) are the minimum allowable respiratory protection permitted to be utilized during gross removal operations of OSHA Class I or OSHA Class II friable ACM.
- D. No respirators shall be issued to personnel without such personnel participating in a respirator training program.
- E. High Efficiency Particulate Air (HEPA) respirator filters shall be approved by NIOSH and shall conform to the OSHA requirements in 29 CFR 1910.134 and 29 CFR 1926.1101.
- F. A storage area for respirators shall be provided by the Contractor in the clean room side of the personnel decontamination enclosure where they will be kept in a clean environment.
- G. The Contractor shall provide and make available a sufficient quantity of respirator filters so that filter changes can be made as necessary during the work day.

- H. Filters used with negative pressure air purifying respirators shall not be used any longer than one eight (8) hour work day. Any loose respirator filters found within the regulated area, must be disposed of as asbestos waste.
- I. Any authorized visitor, Worker, or supervisor found in the Work Area not wearing the required respiratory protection shall be removed from the Project site and not be permitted to return.
- J. The Contractor shall have at least two (2) Powered Air Purifying Respirators stored on site designated for authorized visitors use. Appropriate respirator filters for authorized visitors shall be made available by the Contractor.

1.13 DELIVERY AND STORAGE

- A. Deliver all materials to the job site in original packages with containers bearing manufacturer's name and label.
- B. Store all materials at the job site in a suitable and designated area.
 - Store materials subject to deterioration or damage away from wet or damp surfaces and under cover.
 - 2. Protect materials from unintended contamination and theft.
 - 3. Storage areas shall be kept clean and organized.
- C. Remove damaged or deteriorated materials from the job site. Materials contaminated with asbestos shall be disposed of as asbestos debris as herein specified. This includes unused Contractor supplies located in the regulated work area.

1.14 TEMPORARY UTILITIES

- A. Shut down and lock out all electrical power to the asbestos Work Areas, including lighting circuits. Any electrical power passing through the Work Areas that can't be shut down due to health and safety reasons, shall be protected as per the requirements of Industrial Code Rule 56 and shall not be utilized within the work area.
- B. Provide temporary 120-240 volt, single phase, three wire, 100 amp electric service with Ground Fault Circuit Interrupters (GFCI) for all electric requirements within the asbestos Work Area.
 - 1. Where available, obtain from Owner's existing system. Otherwise provide power from other sources (i.e. generator).
 - 2. Provide temporary wiring and "weatherproof" receptacles in sufficient quantity and location to serve all HEPA equipment and tools.
 - 3. Provide wiring and receptacles as required by the Environmental Consultant for project monitoring and air sampling equipment (pumps, fans, leaf blowers, etc.).
 - 4. All power to the Work Area shall be brought in from outside the area through GFCI's at the source.
- C. Provide temporary lighting with "weatherproof" fixtures for all Work Areas including decontamination chambers.
 - 1. The entire Work Area shall be kept illuminated at all times.
 - 2. Provide lighting as required by the Environmental Consultant for the purposes of performing required inspections.
- D. All temporary devices and wiring used in the Work Area shall be capable of decontamination procedures including HEPA vacuuming and wet-wiping.

E. Utilize domestic water service, if available, from Owner's existing system. Provide hot water heaters with sufficient capacity to meet Project demands.

PART 2 PRODUCTS

2.01 PROTECTIVE CLOTHING

- A. Provide personnel utilized during the Project with disposable protective whole body clothing, head coverings, gloves and foot coverings. Provide disposable plastic or rubber gloves to protect hands. Cloth gloves may be worn inside the plastic or rubber for comfort, but shall not be used alone. Make sleeves secure at the wrists and make foot coverings secure at the ankles by the use of tape, or provide disposable coverings with elastic wrists or tops.
- B. Provide sufficient quantities of protective clothing to assure a minimum of four (4) complete disposable outfits per day for each individual performing abatement Work.
- C. Eye protection and hard hats shall be provided and made available for all personnel entering any Work Area.
- D. Authorized visitors shall be provided with suitable protective clothing, headgear, eye protection, and footwear whenever they enter the Work Area.

2.02 SIGNS AND LABELS

- A. Provide warning signs and barrier tapes at all approaches to asbestos Work Areas. Locate signs at such distance that personnel may read the sign and take the necessary protective steps required before entering the area.
 - 1. Provide danger signs in vertical format conforming to 29 CFR 1926.1101, minimum 20" x 14" displaying the following legend.

DANGER
ASBESTOS
MAY CAUSE CANCER
CAUSES DAMAGE TO LUNGS
AUTHORIZED PERSONNEL ONLY
WEAR RESPIRATORY PROTECTION AND
PROTECTIVE CLOTHING IN THIS AREA

- 2. Provide 3" wide yellow barrier tape printed with black lettered, "DANGER ASBESTOS REMOVAL". Locate barrier tape across all corridors, entrances and access routes to asbestos Work Area. Install tape 3' to 4' AFF.
- B. Provide asbestos danger labels affixed to all asbestos materials, scrap, waste, debris and other products contaminated with asbestos.
 - 1. Provide asbestos danger labels of sufficient size to be clearly legible, displaying the following legend:

DANGER
CONTAINS ASBESTOS FIBERS
MAY CAUSE CANCER
CAUSES DAMAGE TO LUNGS
DO NOT BREATHE DUST
AVOID CREATING DUST

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 Provide the following asbestos labels, of sufficient size to be clearly legible, for display on waste containers (bags or drums) which will be used to transport asbestos contaminated material in accordance with United States Department of Transportation 49 CFR Parts 171 and 172: (Note: Include "RQ" for friable asbestos waste only.)

RQ, NA2212, (WASTE) ASBESTOS, 9, PGIII

 Generator identification information shall be affixed to each waste container or any packaging used to containerize asbestos waste indicating the following printed in indelible ink:

> Generator Name Facility Name Facility Address Date

2.03 DAILY PROJECT LOG & WORK AREA ENTRY/EXIT LOG

- A. Provide a bound Daily Project Log. The log shall contain on title page the Project name; name, address and phone number of Owner; name, address and phone number of Environmental Consultant; name, address and phone number of Abatement Contractor; emergency numbers including, but not limited to local Fire/Rescue department and all other New York State Department of Labor requirements.
- B. All entries into the log shall be made in non-washable, permanent ink and such pen shall be strung to or otherwise attached to the log to prevent removal from the log-in area. Under no circumstances shall pencil entries be permitted.
- C. All persons entering and exiting the Work Area shall sign the entry/exit log and include name, certification number, and time.
- D. The Project Supervisor shall document all Work performed daily and note all inspections required by Code Rule 56, i.e. testing and inspection of barriers and enclosures.

2.04 SCAFFOLDING AND LADDERS

- A. Provide all scaffolding and/or staging as necessary to accomplish the Work of this Contract. Scaffolding may be of suspension type or standing type such as metal tube and coupler, tubular welded frame, pole or outrigger type or cantilever type. The type, erection and use of all scaffolding and ladders shall comply with all applicable OSHA construction industry standards.
- B. Provide scaffolding and ladders as required by the Environmental Consultant for the purposes of performing required inspections.

2.05 SURFACTANT (AMENDED WATER)

A. Wet all asbestos-containing materials prior to removal with surfactant mixed and applied in accordance with manufacturer's printed instructions.

2.06 ENCAPSULANT

- A. Encapsulant shall be tinted or pigmented so that application when dry is readily discernible.
- B. The encapsulant solvent or vehicle shall not contain a volatile hydrocarbon.

2.07 WASTE DISPOSAL BAGS, DRUMS, AND CONTAINERS

- A. Provide 6 mil polyethylene disposal bags printed with asbestos caution labels. Bags shall also be imprinted with U.S. Department of Transportation required markings.
- B. Provide 30 or 55 gallon capacity fiber, plastic, or metal drums capable of being sealed air and water tight if asbestos waste has the potential to damage or puncture disposal bags. Affix asbestos caution labels on lids and at one-third points around drum circumference to assure ready identification.
- C. Containers and bags must be labeled accordance with 40 CFR Part 61 NESHAPS and Code Rule 56. When the bags/containers are moved to the holding area, lockable trailer, or lockable hardtop dumpster from the waste decontamination system washroom, each bag/container must also be appropriately labeled with the date moved in waterproof markings.
- D. Labeled ACM waste containers or bags shall not be used for non-ACM waste or trash. Any material placed in labeled containers or bags, whether turned inside out or not shall be handled and disposed of as ACM waste.

2.08 HEPA VACUUM EQUIPMENT

A. All vacuuming performed under this contract shall be performed with High Efficiency Particulate Air (HEPA) filter equipped industrial vacuums conforming to ANSI Z9.2.

2.09 POWER TOOLS

A. Any power tools used to drill, cut into, or otherwise disturb asbestos material shall be manufacturer equipped with HEPA filtered local exhaust ventilation.

2.10 FIRE RETARDANT PLASTIC SHEETING

- A. All polyethylene (plastic) sheeting used on the Project (including but not limited to sheeting used for critical and isolation barriers, fixed objects, walls, floors, ceilings, waste container) shall be at least 6 mil fire retardant sheeting.
- B. Decontamination enclosure systems shall utilize at least 6 mil opaque fire retardant plastic sheeting. At least 2 layers of 6 mil reinforced fire retardant plastic sheeting shall be used for the flooring.

PART 3 EXECUTION

3.01 GENERAL REQUIREMENTS

- A. Should visible emissions or water leaks be observed outside the Work Area, immediately stop Work and institute emergency procedures per Code Rule 56. Should there be elevated fiber levels outside the Work Area, immediately stop Work, institute emergency procedures per Code Rule 56, and notify all employers and occupants in adjacent areas. All costs incurred in decontaminating such non-Work Areas and the contents thereof shall be borne by the Contractor, at no additional cost to the Owner.
- B. Valid NYS DOL Asbestos Handler certification cards shall be on site prior to admittance of any Contractor's employees to the asbestos Work Area.

DORMITORY AUTHORITY OF THE STATE OF NEW YORK FUNNELLE HALL BATHROOM RENOVATIONS SUNY OSWEGO

SITEWORK - DIV. 2 ASBESTOS REMOVAL- SECTION 028200 PAGE -13-

- C. The following submittals, documentation, and postings shall be maintained on-site by the Contractor during abatement activities at a location approved by the Abatement Project Monitor:
 - 1. Valid Contractor handling license issued by New York State Department of Labor.
 - 2. NYS DOL Asbestos Handler certification cards for each person employed in the removal, handling, or disturbance of asbestos.
 - 3. Daily OSHA personal air monitoring results.
 - 4. NYS Department of Health ELAP certification for the laboratory that will be analyzing the OSHA personnel air samples.
 - 5. NYS Department of Environmental Conservation Waste Transporter Permit.
 - 6. Project documents (specifications and drawings.)
 - 7. Notifications, Variances, Approved Work Plan. Ensure that the most up-to-date notifications and Variances are on-site.
 - 8. Applicable regulations.
 - 9. Safety Data Sheets of supplies/chemicals used on the Project.
 - 10. Disposal Site/Landfill Permit from applicable regulatory agency.
 - 11. List of emergency telephone numbers.
 - 12. Magnahelic manometer semi-annual calibration certification.
 - 13. Waste Disposal Log.
 - 14. Daily Project Log.
 - 15. Entry/Exit Logs.
- D. The following documentation shall be maintained on-site by the Abatement Project Monitor during abatement activities:
 - 1. Valid Contractor handling license issued by New York State Department of Labor.
 - 2. Air Sample Log.
 - 3. Air sample results.
 - 4. Project Monitor Daily Log
 - 5. Asbestos Survey Report.
 - 6. A copy of ASTM Standard E1368 "Standard Practice for Visual Inspection of Asbestos Abatement Projects."
 - 7. Calibration chart for rotometer(s) used on-site.
- E. The Work Area must be vacated by building occupants prior to decontamination enclosure construction and Work Area preparation.
- F. All demolition necessary to access asbestos containing materials for removal must be conducted within negative pressure enclosures by licensed asbestos handlers. Demolition debris may be disposed of as construction and demolition debris provided the Abatement Project Monitor determines that it is not contaminated with asbestos and there has been no disturbance of ACM within the enclosure. If the demolition debris is determined to be contaminated or ACM has been disturbed, it must be disposed of as asbestos waste.

3.02 PERSONNEL DECONTAMINATION ENCLOSURE

- A. Provide personnel decontamination enclosure contiguous to the Work Area or as per Variance. The decontamination enclosure shall be attached to the Work Area and not located within it unless isolation barriers are installed. If the decontamination chamber is accessible to the public it shall be fully framed, sheathed, and lockable to prevent unauthorized entry.
- B. Access to the Work Area will be from the clean room through an air-lock to the shower and through an air lock to the equipment room. Each airlock shall be a minimum of three feet from door to door. Additional air locks shall be provided as required by Code Rule 56 for remote decontamination enclosures.

- C. The decontamination enclosure ceiling and walls shall be covered with one layer of opaque 6 mil fire retardant plastic sheeting. Two layers of reinforced fire retardant plastic sheeting shall be used to cover the floor.
- D. The entrance to the clean room shall have a lockable door with adequate small openings for Work Area make-up air. Provide suitable lockers for storage of Worker's street clothes. Storage for respirators along with replacement filters and disposable towels shall also be provided.
- E. Provide a temporary shower with individual hot and cold water supplies and faucets. Provide a sufficient supply of soap and shampoo. There shall be one shower for every six Workers. The shower room shall be constructed in such a way so that travel through the shower chamber shall be through the shower. The shower shall not be able to be bypassed.
- F. Shower water shall be drained, collected and filtered through a system with at least a 5.0 micron particle size collection capability containing a series of several filters with progressively smaller pore sizes to avoid rapid clogging of the system. The filtered waste water shall then be discharged in accordance with applicable codes and the contaminated filters disposed of as asbestos waste.
- G. The equipment room shall be used for the storage of tools and equipment. A walk-off pan filled with water shall be located in the Work Area outside the equipment room for Workers to clean foot coverings when leaving the Work Area. A labeled 6 mil plastic ACM waste bag for collection of contaminated clothing shall be located in this room.
- H. The personal decontamination enclosure shall be cleaned and disinfected minimally at the end of each Work shift and as otherwise directed by the Asbestos Project Monitor.

3.03 WASTE DECONTAMINATION ENCLOSURE

- A. Provide a waste decontamination enclosure contiguous to the Work area. The decontamination enclosure shall be attached to the Work Area and not located within it unless isolation barriers are installed. If the decontamination chamber is accessible to the public it shall be fully framed, sheathed, and lockable to prevent unauthorized entry.
- B. The waste decontamination enclosure system shall consist of a holding area, air lock and washroom. The airlock shall be a minimum of three feet from door to door. The entrance to the holding area shall have a lockable door.
- C. The decontamination enclosure ceiling and walls shall be covered with one layer of opaque 6 mil fire retardant plastic sheeting on walls and ceiling. Two layers of reinforced fire retardant plastic sheeting shall be used to cover the floor.
- D. Where there is only one egress from the Work Area, the holding area of the waste decontamination enclosure system may branch off from the personnel decontamination enclosure equipment room, which then serves as the waste wash room.
- E. The waste wash room water shall be drained, collected, and filtered through a system with at least a 5.0 micron particle size collection capability containing a series of several filters with progressively smaller pore sizes to avoid rapid clogging of the system. The filtered waste water shall then be discharged in accordance with applicable codes and the contaminated filters disposed of as asbestos waste.
- F. In small asbestos Projects where only one egress from the Work Area exists, the shower room may be used as a waste washroom. In this instance, the clean room shall not be used for

waste storage, but shall be used for waste transfer to carts, which shall immediately be removed from this enclosure.

3.04 WORK AREA ENTRY AND EXIT PROCEDURES

- A. Access to and from the asbestos Work Area is permitted only through the personnel decontamination enclosure unless otherwise stipulated in a Site Specific Variance.
- B. Workers shall sign the entry/exit log upon every entry and exit.
- C. The following procedures shall be followed when entering the Work Area:
 - 1. Before entering the Work Area, Workers shall proceed to the clean room, remove all street clothes, and don protective clothing, equipment, and respirators.
 - 2. Workers shall proceed from the clean room through the shower room and the equipment room and into the Work Area.
- D. The following procedures shall be followed when exiting the Work Area:
 - 1. Before leaving the Work Area, gross asbestos contamination will be removed by brushing, wet cleaning and/or HEPA vacuuming, followed by use of the walk-off pan.
 - 2. In the equipment room, Workers shall remove disposable clothing, but not respirators, and shall place clothing in plastic disposal bags for disposal as contaminated debris prior to entering the shower room. Reusable equipment shall be removed and stored in the equipment room (e,q, work boots).
 - 3. Workers shall shower thoroughly while wearing respirators, then wash respirator with soap and water prior to removal.
 - 4. Upon exiting the shower, Workers shall enter the clean room and don new disposable clothing if the Work shift is to continue or street clothes to exit area. Under no circumstances shall Workers enter public non-Work Areas in disposable protective clothing.
- E. If remote decontamination enclosures are permitted by Code Rule 56 or a Site Specific Variance, workers shall wear two disposable suits for all phases of Work. Workers exiting the work area shall HEPA vacuum the outer suit, enter the airlock, remove the outer suit and then place it back into the Work Area. A clean second suit shall be donned before exiting the airlock and proceeding to the decontamination enclosure or another work area via the designated pathway required by Code Rule 56.

3.05 WORK AREA PREPARATION

- A. Asbestos danger signs shall be posted at all approaches to the asbestos Work Area. Post all emergency exits as emergency exits only on the Work Area side, post with asbestos caution signs on the non-Work Area side. Provide all non-Work Area stairs and corridors accessible to the asbestos Work Area with warning tapes at the base of stairs and beginning of corridors. Warning tapes shall be in addition to caution signs.
- B. Shut down and lock out the building heating, ventilating, and air conditioning systems. Electrical systems and circuits shall also be shut down unless permitted to remain active per Code Rule 56 and appropriately protected and labeled. Existing lighting sources shall not be utilized. Provide temporary electric power and lighting as specified herein.
- C. All non-ACM surfaces and objects within the Work Area shall be pre-cleaned using HEPA vacuuming and/or wet-wiping methods. Dry sweeping and any other methods that raise dust shall be prohibited. ACM shall not be disturbed during pre-cleaning.

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- D. Movable objects within the Work Area shall be HEPA vacuumed and/or wet-wiped and removed from the Work Area.
- E. All non-movable equipment in the Work Area shall be completely covered with 2 layers of fire retardant plastic sheeting, at least 6 mil in thickness, and secured in place with duct tape and/or spray adhesive. Active Fire Protection System components in the Work Area shall not be covered with fire retardant plastic sheeting or any other obstruction.
- F. Provide enclosure of the asbestos Work Area necessary to isolate it from unsealed areas of the building in accordance with the approved asbestos Work plan and as specified herein.
- G. Provide critical barriers by sealing off all openings including but not limited to operable windows and skylights, doorways, diffusers, grills, electrical outlets and boxes, doors, floor drains, and any other penetrations to surfaces in the Work Area enclosure, using 2 layers of at least 6 mil fire retardant plastic sheeting.
- H. Provide isolation barriers by installing temporary framing and sheathing at openings larger than 32 square feet forming the limits of the asbestos Work Area. Sheathing thickness must be a minimum of 3/8 inch and all sheathing shall be caulked and the Work Area side sealed with two layers of 6 mil fire retardant plastic sheeting. Isolation barriers in stairwells and at work area egress locations shall not be covered with sheathing, only two layers of 6 mil fire retardant plastic sheeting.
- I. Isolation barriers shall be installed at all elevator openings in the Work Area. .Elevators running through the regulated abatement work area shall be shut down or isolated as per Code Rule 56. Elevator controls shall be modified so that elevators bypass the Work Area
- J. Provide two independent layers of 6 mil fire retardant plastic sheeting over all floor, wall, and ceiling surfaces. Isolation barriers shall also be covered with two independent layers (for a total of four layers). Sheeting shall be secured with duct tape. All joints in fire retardant plastic sheeting shall overlap 12" minimum. Carpeting left in place shall be covered with 3/8 inch plywood sheathing prior to plasticizing.
- K. Unless otherwise specified for removal, the Contractor shall either protect all fiberglass insulation on piping, ductwork, tanks, etc. in the Work Area using two layers of six mil fire retardant plastic sheeting or remove the insulation as asbestos containing waste. If the Contractor elects to remove the fiberglass insulation as asbestos-contaminated, he/she shall be responsible for reinsulation if reinsulation of removed insulations is part of the Contract or Project.
- L. Frame out emergency exits from Work Area. Provide double layer 6 mil fire retardant plastic sheeting and tape seal opening. Post as emergency exits only and tape utility knife to the Work Area side of each exit. Within the Work Area, mark the locations and directions of emergency exits throughout the Work Area using exit signs and/or duct tape.
- M. Remove all items attached to or in contact with ACM only after the Work Area enclosure is in place. HEPA vacuum and wet wipe with amended water all items prior to their removal from the Work Area and before the start of asbestos removal operations.
- N. Suspended ceiling tiles shall only be removed after Work Area preparation is complete. If possible, non-contaminated ceiling tiles shall be HEPA vacuumed and removed from the Work Area before asbestos removals begin. Contaminated ceiling tiles shall be disposed of as asbestos waste.

3.06 NEGATIVE AIR PRESSURE FILTRATION SYSTEM

- Provide a portable asbestos filtration system that develops a minimum pressure differential of A. negative 0.02 in. of water column within all full enclosure areas relative to adjacent unsealed areas and that provides a minimum of 4 air changes per hour in the Work Area during abatement and 6 air changes for non-friable flooring and/or mastic removal.
- B. Such filtration systems must be made operational after critical and isolation barriers are installed but before wall, floor, and ceilings are plasticized and shall be operated 24 hours per day during the entire Project until the final cleanup is completed and satisfactory results of the final air samples are received from the laboratory.
- C. The system shall include a series of pre-filters and filters to provide High Efficiency Particulate Air (HEPA) filtration of particles down to 0.3 microns at 100% efficiency and below 0.3 microns at 99.9% efficiency. Provide sufficient replacement filters to replace pre-filters every 2 hours, secondary pre-filters every 24 hours, and primary HEPA filters every 600 hours (25 continuous days) of operation. HEPA filter sides shall be marked with installation date during all new HEPA filter installations on project.
- A minimum of one additional filtration unit of at least the same capacity as the primary unit(s) D. shall be installed and fully functional to be used during primary unit (s) filter changing and in case of primary failure.
- At no time will the unit exhaust indoors, within 15 feet of a receptor, including but not limited to windows and doors, or adversely affect the air intake of the building. Exhaust ducting shall not exceed 25' in length, except as allowed by Industrial Code Rule 56. Provide construction fencing at ground level exhaust termination locations per Code Rule 56.
- F. Upon electric power failure or shut-down of any filtration unit, all abatement activities shall stop immediately and only resume after power is restored and all filtration units are fully operating. For shut-downs longer than one hour, all openings into the Work Area, including the decontamination enclosures, shall be sealed.
- G. For all OSHA Class I removal Work Areas, the Contractor shall provide a manometer to verify negative air pressure. Manometers shall be read twice daily and recorded within the Daily Project Log.
- There shall be at least a 4 hour settling period after the Work Area is fully prepared and the negative filtration units have been started to ensure integrity of the barriers.
- Once installed and operational, the Contractor's Supervisor shall conduct daily inspections of I. the Work Area to insure the airtight integrity of the enclosure and operation of the negative air system. Findings shall be recorded within the Daily Project Log. Inspections shall also be conducted on days when no abatement activities are in progress per Code Rule 56 (i.e. weekends).

3.07 REMOVAL OF ASBESTOS CONTAINING MATERIALS

- A. Asbestos-containing materials shall be removed in accordance with the Contract Documents and the approved Asbestos Work Plan. Only one type of ACM shall be abated at a time within a Work Area. Where there are multiple types of ACM requiring abatement, Code Rule 56 procedures for sequential abatement shall be followed.
- В. Sufficiently wet asbestos materials with a low pressure, airless fine spray of surfactant to ensure full penetration prior to material removal. Re-wet material that does not display evidence of saturation.

- C. One Worker shall continuously apply amended water while ACM is being removed.
- D. Perform cutting, drilling, abrading, or any penetration or disturbance of asbestos containing material in a manner to minimize the dispersal of asbestos fibers into the air. Use equipment and methods specifically designed to limit generation of airborne asbestos particles. All power operated tools used shall be provided with manufacturer HEPA equipped filtered local exhaust ventilation, as required by regulation.
- E. Upon removal of ACM from the substrate, the newly exposed surfaces shall be HEPA vacuumed and/or wet cleaned. Surfaces must be thoroughly cleaned using necessary methods and any required solvents to completely remove any adhesive, mastic, etc.
- F. All removed material shall be placed into 6 mil plastic disposal bags or other suitable container upon detachment from the substrate. Cleanup of accumulations of loose debris or waste shall be performed whenever there is enough accumulation to fill a single bag or container and minimally at the end of each workshift.
- G. Large components shall be wrapped in two layers of 6 mil fire retardant plastic sheeting. Sharp components likely to tear disposal bags shall be placed in fiber drums or boxes and then wrapped with sheeting.
- H. Power or pressure washers are not permitted for asbestos removal or clean-up procedures unless approved in a Site Specific Variance and allowed by owner.
- I. All open ends of pipe and duct insulation not scheduled for removal shall be encapsulated using lag cloth.
- All construction and demolition debris determined by the Environmental Consultant to be J. contaminated with asbestos shall be handled and disposed of as asbestos waste.
- K. The use of metal shovels, metal dust pans, etc. are not permitted inside the work area.

3.08 EQUIPMENT AND WASTE CONTAINER DECONTAMINATION AND REMOVAL PROCEDURES

- External surfaces of contaminated containers and equipment shall be cleaned by wet cleaning and/or HEPA vacuuming in the Work Area before moving such items into the waste decontamination enclosure system airlock by persons assigned to this duty. The persons in the Work Area shall not enter the airlock. No gross removal operations are permitted when waste transfer is in progress.
- B. The containers and equipment shall be removed from the airlock by persons stationed in the washroom during waste removal operations. The external surfaces of containers and equipment shall be cleaned a second time by wet cleaning.
- C. The cleaned containers of asbestos material and equipment are to be dried of any excessive pooled or beaded liquid, placed in uncontaminated 6 mil plastic bags or sheeting, as the item's physical characteristics demand, and sealed airtight.
- D. The clean recontainerized items shall be moved into the airlock that leads to the holding area. Workers in the washroom shall not enter this airlock.

- E. Containers and equipment shall be moved from the airlock and into the holding area by persons dressed in clean personal protective equipment, who have entered from the holding area.
- F. The cleaned containers of asbestos material and equipment shall be placed in water tight carts with doors or tops that shall be closed and secured. These carts shall be held in the holding area until transfer to the waste container. The carts shall be wet cleaned and/or HEPA vacuumed at least once each day.
- G. The exit from the decontamination enclosure system shall be secured to prevent unauthorized entry.
- H. Where the waste removal enclosure is part of the personnel decontamination enclosure, waste removal shall not occur during shift changes or when otherwise occupied. Precautions shall be taken to prevent short circuiting and cycling of air outward through the shower and clean room.

3.09 WORK AREA DECONTAMINATION, CLEANING, AND CLEARANCE PROCEDURES

A. Following completion of gross abatement and after all accumulations of asbestos waste materials have been containerized, the following decontamination procedures shall be followed unless modified by a Site Specific Variance.

B. First Cleaning:

- All bagged asbestos waste and unnecessary equipment shall be decontaminated and removed from the Work Area.
- 2. All surfaces in the Work Area shall be wet cleaned, except active fire protection system components that may be damaged by water. A wet-purpose shop vacuum may be used to pick up excess liquid, and may either be decontaminated prior to removal from the Work Area or disposed of as asbestos waste.
- 3. The Abatement Project Monitor (APM) shall conduct a visual inspection of the Work Area for cleanliness and completion of abatement.
- 4. The Contractor shall then apply a thin coat of encapsulant to all surfaces in the Work Area that were not the subject of removal. In no event shall encapsulant be applied to any surface that was the subject of removal prior to obtaining satisfactory air monitoring results. Encapsulants shall be pigmented or tinted to provide an indication for completeness of coverage. The APM shall determine adequacy of coverage.
- 5. After the encapsulant has been applied and the required waiting/settling / drying time has elapsed, the first layer of fire retardant plastic sheeting shall then be removed and bagged as asbestos waste.

C. Second Cleaning

- 1. All surfaces in the Work Area shall be HEPA vacuumed and then wet cleaned. Wet cleaning of active fire protection system components is not necessary if damage may occur.
- 2. The APM shall conduct a second visual inspection of the Work Area for cleanliness.
- 3. After the required waiting/settling/drying time has elapsed, the second layer of fire retardant plastic sheeting shall be removed and bagged as asbestos waste.

D. Third Cleaning

- All surfaces in the Work Area shall be HEPA vacuumed and then wet cleaned. Wet cleaning of active fire protection system components is not necessary if damage may occur.
- 2. After the required waiting/settling/drying time has elapsed, the APM shall conduct a third visual inspection of the Work Area for completeness of abatement and cleanliness.

- The APM shall document the results of the visual inspection in the Project Monitor Log and Contractor's Daily Project Log.
- 3. After satisfactory APM visual inspection, aggressive final clearance air sampling shall then be conducted by the Environmental Consultant provided no visible asbestos debris/residue; pools of liquid, or condensation remains. NOTE: TEM samples should be used vs. PCM if demolition or other dust-generating evolutions are taking place in adjacent areas, as evident from excessive loading.
- 4. Upon receipt of satisfactory final clearance air sampling results, the negative air pressure equipment can then be shut down, and the isolation and critical barriers removed and bagged as asbestos waste. Following this and satisfactory inspections by the project supervisor and the APM for cleanliness, the decontamination enclosures shall be removed.
- E. As a result of any visual inspection by the APM or should air sampling results indicate high fiber levels, the Contractor will reclean the affected areas at no additional expense to the Owner.

3.10 TENT ENCLOSURES

- A. Tent enclosures may only be used where specifically permitted by Code Rule 56 or a Site Specific Variance issued by the NYS Department of Labor.
- B. The Contractor shall restrict access to the immediate area where tent removal procedures are taking place using barrier tape and/or construction barriers. Caution signs shall be posted.
- C. Remote personnel decontamination enclosures shall be constructed. Configuration shall be as required by Project size and a washroom with attached airlock shall be constructed contiguous to the tent enclosure for small and large size tent enclosure work areas. For tent enclosures with gross abatement of friable materials, a contiguous decontamination system shall be constructed, maintained and utilized, except for minor size tent enclosure work areas where an adjacent decontamination room or area is permitted by Code Rule 56.
- D. The Work Area shall be precleaned. All objects and equipment that will remain in the restricted area during abatement shall be sealed with two layers of six mil polyethylene and tape.
- E. The tent shall be a single use barrier constructed with a rigid frame and at least two layers of six mil polyethylene unless one layer of six mil polyethylene is otherwise permitted by Code Rule 56. Tents with twenty (20) square feet or less of floor space or no gross removal of friable ACM shall be constructed of one (1) layer of six mil polyethylene and shall include walls, ceilings and a floor (except portions of walls, floors and ceilings that are the removal surface) with double folded seams. All seams shall be sealed airtight using duct tape and/or spray adhesive.
- F. The tent shall be constructed with at least one airlock for worker/waste egress.
- G. A manometer shall be used for all OSHA Class I abatement.
- H. Negative air shall be maintained at four (4) air changes per hour for non-friable and glovebag abatement tent enclosure work areas. Eight (8) air changes shall be maintained for friable gross removal tent enclosure work areas. In a Minor size abatement tent enclosure work area a HEPA vacuum may be used to maintain the required air changes.
- I. OSHA compliance air monitoring is required per section 1.09.

- J. ACM removal shall follow procedures defined in section 3.07.
- K. Waste material shall be placed in properly labeled 6 mil plastic bags or other appropriate containers. The outside of the bags or containers shall be wet wiped and/or HEPA vacuumed in the washroom and shall then be placed in a second bag/container before being transferred to the waste storage container. All transportation of waste bags and containers outside the Work Area shall be in watertight carts. These carts shall be held in the holding area until transfer to the waste container. The carts shall be wet cleaned and/or HEPA vacuumed at least once each day.
- Following completion of gross abatement and after all accumulations of asbestos waste materials have been containerized, the following decontamination procedures shall be followed.
 - All bagged asbestos waste and unnecessary equipment shall be decontaminated and removed from the Work Area.
 - 2. All surfaces in the Work Area shall be wet cleaned. A wet-purpose shop vacuum may be used to pick up excess liquid, and shall be decontaminated prior to removal from the Work Area.
 - 3. The Contractor shall then apply a thin coat of encapsulant to all non-removal surfaces covered with plastic in the Work Area. In no event shall encapsulant be applied to any surface that was the subject of removal prior to obtaining satisfactory air monitoring results. Encapsulants shall be pigmented or tinted to provide an indication for completeness of coverage. The APM shall determine adequacy of coverage.
 - 4. After the waiting/settling/drying time requirements have elapsed, the Asbestos Project Monitor shall conduct a visual inspection of the Work Area for cleanliness and completion of abatement. The APM shall document the results of the visual inspection in the Project Monitor Log and Contractor's Daily Project Log.
 - 5. After satisfactory APM visual inspection, aggressive final clearance air sampling shall then be conducted by the Environmental Consultant.
 - 6. Upon receipt of satisfactory final clearance air sampling results, the tent shall be collapsed into itself, placed in suitable disposal bags, and tranferred through the washroom to the waste storage container. Isolation and critical barriers shall then be removed and bagged as asbestos waste followed by satisfactory visual inspections by the project supervisor and the APM for cleanliness.

3.11 GLOVEBAG REMOVAL

- A. Glovebag removals may only be used as specifically permitted by Code Rule 56 or a Site Specific Variance issued by the NYS Department of Labor. Glovebags may only be used on pipe or duct insulation.
- B. In addition to conformance with applicable regulations and variances, glovebag removals are only permitted to be conducted within tent enclosures complying with these specifications.
- C. The Contractor shall restrict access to the immediate area where tent/glovebag removal procedures are taking place using barrier tape and/or construction barriers. Caution signs shall be posted.
- D. Remote personnel decontamination enclosures shall be constructed. Configuration shall be as required by Project size and a washroom with attached airlock shall be constructed contiguous to the tent enclosure.
- E. Glovebag removals shall utilize commercially available glovebags of at least six mil thickness. Use shall be in accordance with the manufacturer's instructions and the following minimum requirements:

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- 1. The sides of the glovebag shall be cut to fit the size pipe being removed. Tools shall be inserted into the attached tool pocket.
- 2. The glovebag shall be placed around the pipe and the open edges shall be folded and sealed with staples and duct tape. The glovebag shall also be sealed at the pipe to form a tight seal.
- 3. Openings shall be made in the glovebag for the wetting tube and HEPA vacuum hose. The opening shall be sealed to form a tight seal.
- 4. All glovebags shall be smoke tested by the Asbestos Project Monitor under negative pressure using the HEPA vacuum before removal operations commence. Glovebags that do not pass the smoke test shall be resealed and then retested.
- 5. After first wetting the materials to be removed, removal may commence. ACM shall be continuously wetted. After removal of the ACM, the piping shall be scrubbed or brushed so that no visible ACM remains. Open ends of pipe insulation shall be encapsulated.
- 6. After the piping is cleaned, the inside of the glovebag shall be washed down and the wetting tube removed. Using the HEPA vacuum, the glovebag shall be collapsed and then twisted and sealed with tape with the ACM at the bottom of the bag.
- 7. A disposal bag shall be placed around the glovebag that is then detached from the pipe. The disposal bag is then sealed and transferred through the washroom to the waste storage container.
- F. After glovebag removals are complete, tent decontamination procedures shall be followed.

3.12 REMOVALS OF EXTERIOR NON-FRIABLE ACM

- A. Except as modified by this section, removal of exterior non-friable ACM (i.e. roof flashings, built-up roofing, siding, caulking, glazing compound, transite, tars, sealers, coatings, and other NOB ACM) shall conform to all provisions of this specification.
- B. Unless Site Specific Variances have been otherwise obtained, removals shall be conducted in accordance with the provisions of Code Rule 56.
- C. The Work Area shall be the area from which ACM materials are being removed and shall extend 25 feet from the perimeter of the removal area.
- D. Non-certified Workers are not allowed in the Work Area until the Work Area is cleared by the Asbestos Project Monitor (APM).
- E. Remote personnel decontamination enclosures shall be constructed at a location in accordance with the approved Work Plan. Unless located outside the Work Area, decontamination enclosures are not permitted to be constructed on the roof. Decontamination enclosures shall be constructed as close to the regulated abatement work area as physically possible, but no greater than 50 feet from the building. It shall be cordoned off at a distance of 25 feet to separate it from public areas.
- F. All openings (including but not limited to operable windows, doors, hatches, vents, ducts, and grilles) one story above, one story below, and within 25 feet of the work area shall be sealed with two layers of six mil polyethylene. Alternately, a polyethylene drape may be used instead of sealing windows individually where permitted by Code Rule 56.
- G. The removal of the ACM may require the use of scrapers, solvents, mastic removal chemicals, or other methods/procedures to ensure complete removal.
- H. The Contractor is required to provide temporary protection of the building (i.e. roof, window openings, construction joints, etc.) at the end of each Work shift so as to maintain the building in a watertight condition.

- I. All asbestos waste generated shall be containerized in the work area, prior to transfer to waste storage trailer/dumpster. No waste shall remain in the work area at the end of each work shift. All waste shall be disposed of as RACM asbestos waste including projects where waste transfer procedures are modified by Site Specific Variance.
- J. Dumpsters used for waste storage shall be lined with two layers of six mil polyethylene and shall have a hard top. Where open-top dumpsters are permitted by ICR 56 or a Site Specific Variance, the top shall be closed with polyethylene flaps that are sealed at the end of each work shift.
- K. Personal protective equipment, including respirators, shall be utilized and worn during all removal operations until the Work Area is cleared by the APM.
- L. The Owner may, at his discretion, choose to conduct air sampling. If air samples collected during abatement indicate any airborne asbestos fiber concentration(s) at or above 0.01 f/cc, Work shall be stopped immediately and Work methods shall be altered to reduce the airborne asbestos fiber concentration(s).
- M. Following completion of gross abatement and after all accumulations of asbestos waste materials have been containerized, the following decontamination procedures shall be followed:
 - All surfaces in the Work Area shall be HEPA vacuumed and then wet cleaned.
 - 2. The APM shall conduct a visual inspection of the Work Area for cleanliness and completeness of abatement. The APM shall document the results of the visual inspection in the Project Monitor Log and Contractor's Daily Project Log.
 - 3. Upon satisfactory visual inspection results, the isolation and critical barriers shall be removed and bagged as asbestos waste. Following this, the decontamination enclosures shall be removed.

3.13 NON-FRIABLE FLOORING AND/OR MASTIC REMOVALS

- A. The following procedures may only be used for the removal of non-friable flooring and/or mastic materials using manual and chemical methods. These procedures shall not apply to beadblaster use or other abrasive abatement methods.
- B. The Contractor shall restrict access to the immediate Work Area where non-friable ACM removal procedures are taking place using barrier tape and/or construction barriers. Caution signs shall be posted.
- C. Remote personnel decontamination enclosures may be utilized and shall be constructed at a location in accordance with the approved Work Plan. A washroom with attached airlock shall be constructed contiguous to each Work area enclosure.
- D. The Work Area shall be prepared per section 3.05, except that ceilings, walls, and floors need not be fully plasticized However, a four-foot high single layer of 6-mil fire retardant plastic sheeting shall be installed as a splashguard at all walls adjoining mastic removal portions of the work area, to prevent damage to the existing walls.
- E. Negative air shall be maintained at six (6) air changes per hour.
- F. OSHA compliance air monitoring is required per section 1.09.
- G. ACM removal shall follow procedures defined in section 3.07.

- H. Waste material shall be placed in properly labeled 6 mil plastic bags or other appropriate containers. The outside of the bags or containers shall be wet wiped and/or HEPA vacuumed in the washroom and double-bagged before being passed into the airlock. The bags or containers shall then be transported to the waste storage container. All transportation of waste bags and containers outside the Work Area shall be in watertight carts.
- Following completion of gross abatement and after all accumulations of asbestos waste materials have been containerized, the following decontamination procedures shall be followed.
 - All bagged asbestos waste and unnecessary equipment shall be decontaminated and removed from the Work Area.
 - 2. All plastic sheeting splashguards shall be removed and containerized, followed by all surfaces in the Work Area being wet cleaned. A wet-purpose shop vacuum may be used to pick up excess liquid, and shall be decontaminated prior to removal from the Work Area.
 - 3. The Contractor shall then apply a thin coat of encapsulant to all non-removal surfaces in the Work Area. In no event shall encapsulant be applied to any surface that was the subject of removal prior to obtaining satisfactory air monitoring results. Encapsulants shall be pigmented or tinted to provide an indication for completeness of coverage. The APM shall determine adequacy of coverage.
 - 4. After the waiting/settliong/drying time requirements have elapsed, the Asbestos Project Monitor (APM) shall conduct a visual inspection of the Work Area for cleanliness and completion of abatement. The APM shall document the results of the visual inspection in the Project Monitor Log and Contractor's Daily Project Log.
 - 5. After satisfactory APM visual inspection, aggressive final clearance air sampling shall then be conducted by the Environmental Consultant.
 - 6. Upon receipt of satisfactory final clearance air sampling results, the isolation and critical barriers shall be removed and bagged as asbestos waste. Following this and satisfactory inspections by the project supervisor and the APM for cleanliness the decontamination enclosures shall be removed.

3.14 RESTORATION OF UTILITIES, FIRESTOPPING, AND FINISHES

- A. After final clearance, remove locks and restore electrical and HVAC systems. All temporary power shall be disconnected, power lockouts removed and power restored. All temporary plumbing shall be removed.
- B. Finishes damaged by asbestos abatement activities including, but not limited to, plaster/paint damage due to duct tape, staples, and spray adhesives, and floor tile lifted due to wet or humid conditions, shall be restored prior to final payment.
 - 1. Finishes unable to be restored shall be replaced under this Contract at the Contractor's expense.
 - 2. All foam and expandable foam products and materials used to seal Work Area openings shall be completely removed upon completion of abatement activities.
- C. All penetrations (including, but not limited to, pipes, ducts, etc.) through fire rated construction shall be firestopped using materials and systems tested in accordance with ASTM E814 on Projects where reinsulation is part of the required work.

PART 4 DISPOSAL OF ASBESTOS WASTE

4.01 TRANSPORTATION AND DISPOSAL SITE

A. The Contractor's Hauler and Disposal Site shall be approved by the Owner. All waste generated during the asbestos project shall be disposed of as RACM asbestos waste.

- B. The Contractor shall give twenty-four (24) hour notification prior to removing any waste from the site. Waste shall be removed from the site only during normal working hours unless otherwise specified. No waste may be taken from the site unless the Contractor and Environmental Consultant are present and the Environmental Consultant authorizes the release of the waste as described herein.
- C. All waste generated as part of the asbestos project shall be removed from the site within ten (10) calendar days after successful completion of all asbestos abatement work.
- D. Upon arrival at the Project Site, the Hauler must possess and present to the Environmental Consultant a valid New York State Department of Environmental Conservation Part 364 Asbestos Hauler's Permit. The Environmental Consultant may verify the authenticity of the hauler's permit with the proper authority and shall verify that the waste is being transported to the disposal site as listed on the DOL/EPA notifications.
- E. The Hauler, with the Contractor and the Environmental Consultant, shall inspect all material in the transport container prior to taking possession and signing the Asbestos Waste Shipment Records.

4.02 WASTE STORAGE CONTAINERS

- A. All waste containers shall be fully enclosed and lockable (i.e. enclosed dumpster, trailer, etc.). No open containers will be permitted on-site (i.e. open dumpster with canvas cover, etc.) unless specifically permitted by applicable regulation or a Site Specific Variance. When asbestos contaminated waste must be kept on the work site overnight or longer, it shall be double bagged and stored in accordance with Federal, State, and local laws.
- B. The Environmental Consultant shall verify that the waste storage container and/or truck tags (license plates) match that listed on the New York State Department of Environmental Conservation Part 364 permit. Any container not listed on the permit shall be removed from the site immediately.
- C. The container shall be plasticized and sealed with two (2) layers of 6 mil polyethylene. Once on site, it shall be kept locked at all times, except during load out. The waste container shall not be used for storage of equipment or contractor supplies.
- D. While on-site, the container shall be labeled with EPA Danger signage:

DANGER
CONTAINS ASBESTOS FIBERS
AVOID CREATING DUST
CANCER AND LUNG DISEASE HAZARD

- E. The New York State Department of Environmental Conservation Asbestos Hauler's Permit number shall be stenciled on both sides and back of the container.
- F. The container is not permitted to be loaded unless it is properly plasticized, has the appropriate danger signage affixed, and has the permit number appropriately stenciled on the container.
- G. Waste generated off-site is not permitted to be brought onto the Project site and loaded into the waste container.
- H. All asbestos waste removed from the project site shall be transported directly to the disposal site without any additional waste being added to the container during transport.

4.03 OWNER'S AND HAULER'S ASBESTOS WASTE SHIPMENT RECORDS

- A. An Asbestos Waste Shipment Record shall be provided by the Owner (Appendix A) and shall be utilized in conjunction with the Asbestos Hauler's Shipment Record.
- B. The Owner's Shipment Record and the Hauler's Shipment Record shall be completed by the Contractor and verified by the Environmental Consultant that all the information and amounts are accurate and the proper signatures are in place.
- C. The Shipment Records shall have the appropriate signatures of the Environmental Consultant, the Contractor, and the Hauler representatives prior to any waste being removed from the site.
- D. Copies of the completed Owner's Shipment Record and the Hauler's Shipment Record shall be retained by the Environmental Consultant and the Contractor and shall remain on site for inspection.
- E. Upon arrival at the Disposal Site, the Owner's Shipment Record and the Hauler's Shipment Record shall be signed by the Disposal Facility operator to certify receipt of ACM covered by the shipment record.
- F. The Disposal Facility operator shall return the original Owner's Shipment Record and the Hauler's Shipment Record to the Contractor.
- G. The Contractor shall forward copies of the Owner's Shipment Record and the Hauler's Shipment Record to the Environmental Consultant within 14 days of the waste container being removed from the site. Failure to do so may result in payment being withheld from the Contractor.
- H. The Contractor shall utilize the Waste Disposal Log provided by the Owner (Appendix B.) This log shall be maintained by the Project Supervisor and shall be kept on site at all times.
- I. All waste disposal shipment records and disposal logs shall be submitted by the Contractor to the Owner with the final close-out documentation.

SITEWORK - DIV. 2 ASBESTOS REMOVALS - SECTION 028200 PAGE -29-

APPENDIX A

ASBESTOS WASTE SHIPMENT RECORD

DORMITORY AUTHORITY OF THE STATE OF NEW YORK FUNNELLE HALL BATHROOM RENOVATIONS SUNY OSWEGO

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Asbestos Waste Shipment Record Dormitory Authority State of New York

Record No. A2001

	Albany, New York 12207-2964					
DASNY PROJECT NUMBER:						
DASNY Project Name:						
Generator Facility Name:						
Generator Facility Address: _						
		Phone Number:				
Contact Person	Phone #	# Asbestos License #				
Asbestos Consultant/Monitor F	irm Name and Address: _					
Contact Person	Phone #	Asbestos License #				
		: I hereby declare that the contents of this consignment are fully accordance with applicable governmental regulations.				
Type of Material:						
Type & Size of Container:						
Asbestos Abatement Contractor						
Date:						
Asbestos Consultant/Monitor	•					
Date:						
Transporter/Transfer Facility A	Acknowledgement of Recei	ipt of Material:				
Transporter #1 Company Name						
Name:		Signature:				
Date & Time of Departure		Transporter Permit (NYS DEC #)				
Tractor License #		Trailer License #				
Discrepancies Noted:						
Transfer Facility (if applicable)	Company Name:					
Name:		Signature:				
Date & Time of Departure		Permit (NYS DEC #)				
Discrepancies Noted:						
Transporter #2 (if applicable) C	• •					
Name:		Signature:				
Date & Time of Departure		Transporter Permit (NYS DEC #)				
Tractor License #		Trailer License #				
Discrepancies Noted:						
Disposal Facility Owner or Opediscrepancies noted above.	rator: I hereby certify rec	ceipt of the asbestos waste covered by this shipment record including				
-	ility:					
Date & Time of Arrival:						
Name:						

Disposal facility to return completed waste shipment record (white copy) to the Asbestos Abatement Contractor listed above.

White: Owner/DASNY Green: Disposal Facility Canary: Transporter Pink: Consultant Goldenrod: Contractor

DORMITORY AUTHORITY OF THE STATE OF NEW YORK FUNNELLE HALL BATHROOM RENOVATIONS SUNY OSWEGO

SITEWORK - DIV. 2 ASBESTOS REMOVALS - SECTION 028200 PAGE -31-

APPENDIX B

WASTE SHIPMENT RECORD LOG

SITEWORK - DIV. 2 ASBESTOS REMOVALS - SECTION 028200 PAGE -32-

DORMITORY AUTHORITY STATE OF NEW YORK WASTE SHIPMENT RECORD LOG

Facility:					Building:			-
Project:						Project Number:		
Asbestos Contr	actor:				Environmental Consultant:			
						DATES (Chain of Event		nts)
Load No.	Hauler	NYSDEC #	License Plate No.	Size of Container	Disposal Facility	Dptr from Site	Rec'd at Disposal Site	Shipment Record Returned

COMMENTS:

DORMITORY AUTHORITY OF THE STATE OF NEW YORK FUNNELLE HALL BATHROOM RENOVATIONS SUNY OSWEGO

SITEWORK - DIV. 2 ASBESTOS REMOVALS - SECTION PAGE -33-

APPENDIX C

CONTRACTOR'S ACKNOWLEGEMENT STATEMENT

CONTRACTOR'S ACKNOWLEDGEMENT STATEMENT

Re:	Abatement of Asbestos Containing Materials						
	(Project Title)						
	(Project Location)						
	(DASNY Project Number)						
handling certify th CFR 192 have rec asbestos	g, and disposal of asbestos containing that the employees: a) have received the containing as required by OSHA as the containing as required by OSHA.	employment in connection with the abatement, g materials at the referenced project, I hereby he medical examinations required by OSHA 29 cally for respirators used on the Project; and c) a 29 CFR 1926.1101 in the proper handling of ealth implications and risks involved, as well as pment to be used.					
Employe	ee Name	Asbestos Certificate Number					
Supervis	sor Signature	Printed Name					
(Notary	block here)						
Page	of	Title					

NON-LIQUID PCB MATERIAL REMOVAL- SECTION 028400

SECTION 028400 - NON-LIQUID PCB MATERIAL REMOVAL

PART 1 - GENERAL

1.01 SCOPE OF WORK

- A. This demolition, renovation or abatement Project will include the removal and disposal of non-liquid PCB materials (herein referred to as PCB materials) at The State University of New York at Oswego Funnelle Hall, located at 7060 New York State Route 104, Oswego, Oswego County, New York.
- B. The work shall include but not be limited to the removal of the following.

Building & Floor	Material Description				
Exterior	Tan Brick/Stone Interface Caulk				
Exterior – East	Light Red Marble/Column Interface Caulk				
and West Sides					

- C. The Contractor shall be aware of all conditions of the Project and is responsible for verifying quantities and locations of all Work to be performed. Failure to do so shall not relieve the Contractor of its obligation to furnish all labor and materials necessary to perform the Work.
- D. All Work shall be performed in strict accordance with the Project Documents and all governing codes, rules, and regulations. Where conflicts occur between the Project Documents and applicable codes, rules, and regulations, the more stringent shall apply.
- E. Working hours shall be as required and approved by the Owner. PCB material removal activities including, but not limited to, work area preparation, gross removal activities, cleaning activities, waste removal, etc. may need to be performed during 'off-hours' (including nights and weekends). In addition, multiple mobilizations may be required to perform the work identified in this project. The Contractor shall coordinate and schedule all Work with the facility and Owner's representative.

1.02 PERMITS AND COMPLIANCE

- A. The Contractor shall assume full responsibility and liability for compliance with all applicable Federal, State, and local laws, rules, and regulations pertaining to Work practices, protection of Workers, authorized visitors to the site, persons, and property adjacent to the Work.
- B. Perform PCB related Work in accordance with DEC Hazardous Waste Regulations (6 NYCRR 370-374, i.e. Hazardous Waste Rules), 40 CFR 761, and 29 CFR 1926, as specified herein. Where more stringent requirements are specified, adhere to the more stringent requirements.
- C. The Contractor must maintain current licenses or registrations pursuant to DEC and EPA regulations for all Work related to this Project, including the removal, handling, transport, and disposal of hazardous and industrial waste.
- D. The Contractor shall be prepared to obtain an EPA ID number if so directed by the Owner.
- E. Failure to adhere to the Project Documents shall constitute a breach of the Contract and the Owner shall have the right to and may terminate the Contract provided, however, the failure of the Owner to so terminate shall not relieve the Contractor from future compliance.

1.03 SUBMITTALS

- A. Pre-Work Submittals: Within 7 days prior to the pre-construction conference, the Contractor shall submit 3 copies of the documents listed below, with 1 copy going directly to the DASNY Code Compliance Unit for review and approval prior to the commencement of PCB abatement activities:
 - 1. Progress Schedule:
 - Show the complete sequence of abatement activities and the sequencing of Work within each building or building section.
 - Show the dates for the beginning and completion of each major element of Work b. including substantial completion dates for each Work Area, building, or phase.
 - Abatement Work Plan: Provide plans that clearly indicate the following: 2.
 - All Work Areas/containments numbered sequentially.
 - Entrances and exits to the Work Areas/containments. b.
 - Type of abatement activity/technique for each Work Area/containment.
 - Proposed location and construction of storage facilities and field office.
 - Disposal Site/Landfill Permit from applicable regulatory agency.
 - Letter identifying the presence of PCB bulk product waste, with Acknowledgement by the landfill. See section 4.01.A
 - NYS Department of Environmental Conservation Waste Transporter Permit. 5.
- B. On-Site Submittals: Refer to Part 3.01.B for all submittals, documentation, and postings required to be maintained on-site during abatement activities.
- Project Close-out Submittals: Within 30 days after project completion, the Contractor shall C. submit 1 copy of the closeout-out submittals listed below to DASNY Code Compliance and 1 copy to the environmental consultant for review and approval prior to the Contractors final payment. Once DASNY Code Compliance approves the close-out submittal, the contractor shall provide three approved sets of the documents (double-sided and bound) to DASNY Project Management. DASNY Project Management shall provide the Facility with one copy of the approved closeout submittals.
 - Copy of all waste disposal manifests and disposal logs. Original waste manifests shall be sent to DASNY Code Compliance with the closeout submittals.
 - Daily progress log.
 - Copy of Contractor's Acknowledgment Statement Forms. Original notarized statement shall be sent to DASNY Code Compliance with the closeout submittals.
 - 4. Disposal Site/Landfill Permit from applicable regulatory agency.
 - Copy of PCB notification with acknowledgement from the disposal facility/landfill, if 5. applicable.

1.04 PRE-CONSTRUCTION CONFERENCE

- Prior to start of preparatory Work under this Contract, the Contractor shall attend a pre-A. construction conference attended by Owner, Facility Personnel, and Environmental Consultant.
- B. Agenda for this conference shall include but not necessarily be limited to:
 - Contractor's scope of Work, Work plan, and schedule to include number of workers and
 - 2. Contractor's safety and health precautions including protective clothing and equipment and decontamination procedures.
 - 3. Environmental Consultant's duties, functions, and authority.
 - Contractor's Work procedures including: 4.

- Methods of job site preparation and removal methods.
- Disposal procedures. b.
- Cleanup procedures. C.
- Fire exits and emergency procedures.
- Contractor's required pre-work and on-site submittals, documentation, and postings. 5.
- Contractor's plan for twenty-four (24) hour Project security both for prevention of theft and for barring entry of unauthorized personnel into Work Areas.
- 7. Temporary utilities.
- 8. Handling of furniture and other moveable objects.
- 9. Storage of removed PCB materials.
- 10. Waste disposal requirements and procedures.
- In conjunction with the conference the Contractor shall accompany the Owner and C. Environmental Consultant on a pre-construction walk-through documenting existing condition of finishes and furnishings, reviewing overall Work plan, location of fire exits, fire protection equipment, water supply and temporary electric tie-in.

1.05 APPLICABLE STANDARDS AND REGULATIONS

- A. The Contractor shall comply with the following codes and standards, except where more stringent requirements are shown or specified:
- B. Federal Regulations:
 - 29 CFR 1910.1200, "Hazard Communication" (OSHA)
 - 29 CFR 1910.134, "Respiratory Protection" (OSHA)
 - 29 CFR 1910.145, "Specification for Accident Prevention Signs and Tags" (OSHA) 3.
 - 29 CFR 1926. "Construction Industry" (OSHA)
 - 29 CFR 1926.500 "Guardrails, Handrails and Covers" (OSHA)
 - 40 CFR 761, "PART 761—POLYCHLORINATED BIPHENYLS (PCBs)" (EPA) 6.
 - 49 CFR 171-173, Transportation Standards (DOT)
- C. New York State Regulations:
 - 6 NYCRR, Parts 360, 364, Disposal and Transportation (DEC)
 - 6 NYCRR, Parts 370-373, "Hazardous Waste Management System"
- Standards and Guidance Documents:
 - American National Standard Institute (ANSI) Z88.2-80, Practices for Respiratory Protection

1.06 PROJECT MONITORING

- A. The Owner shall engage the services of an Environmental Consultant (the Consultant) who shall serve as the Owner's Representative in regard to the performance of the PCB abatement Project and provide direction as required throughout the entire abatement Project period.
- B. The Contractor is required to ensure cooperation of its personnel with the Consultant for the sampling and Project monitoring functions described in this section. The Contractor shall comply with all direction given by the Consultant during the course of the Project.
- C. The Consultant shall provide the following administrative services:
 - Review and approve or disapprove all submittals, shop drawings, schedules, and samples.
 - 2. Assure that all notifications to governmental agencies or landfills by the Contractor are submitted in a timely manner and are correct in content.

3.

- Review and approve the Contractor's compliance testing laboratory.
- The Consultant shall staff the Project with a trained and certified person(s) to act on the D. Owner's behalf at the job site. This individual shall be designated as the Abatement Project
 - The APM shall be on-site at all times the Contractor is on-site. The Contractor shall not be permitted to conduct any Work unless the APM is on-site (except for inspection and planning purposes during non-working days).
 - 2. The APM shall have the authority to direct the actions of the Contractor verbally and in writing to ensure compliance with the Project documents and all regulations. The APM shall have the authority to Stop Work when gross Work practice deficiencies or unsafe practices are observed.
 - Such Stop Work order shall be effective immediately and remain in effect until corrective measures have been taken and the situation has been corrected.
 - Standby time required to resolve the situation shall be at the Contractor's b.
 - The APM shall provide the following services: 3.
 - Inspection of the Contractor's Work, practices, and procedures, including temporary protection requirements, for compliance with all regulations and Project specifications.
 - Monitor the progress of the Contractor's Work, and report any deviations from the b. schedule to the Owner.
 - Monitor, verify, and document all waste load-out operations. C.
 - The APM shall maintain a log on site that documents all project related and d. Consultant and Contractor actions, activities, and occurrences.
 - The APM shall take air, swipe, wipe, or bulk samples upon the Owner's request.
 - The following inspections shall be conducted by the APM. Additional inspections shall 4. be conducted as required by Project conditions. Progression from one phase of Work to the next by the Contractor is only permitted with the written approval of the APM.
 - Pre-Construction Inspection: The purpose of this inspection is to verify the existing conditions of the Work Areas and to document these conditions.
 - Pre-Commencement Inspection: This inspection shall take place only after the b. Work Area is fully prepped for removal.
 - Work Inspections: The purpose of this inspection is to monitor the Work C. practices and procedures employed on the Project and to monitor the continued integrity of the containment system. Inspections within the removal areas shall be conducted by the APM during all preparation, removal, and cleaning activities at least twice every Work shift. Additional inspections shall be conducted as warranted.
 - d. Visual Clearance Inspection: The purpose of this inspection is to verify that: all materials in the scope of work have been properly removed; no visible PCB material debris/residue remains.
 - Punch List Inspection: The purpose of this inspection is to verify the Contractor's e. certification that all Work has been completed as contracted and the existing condition of the area prior to its release to the Owner.
 - The Owner may, at his discretion, choose to conduct air sampling. If air samples 5. collected during abatement indicate any airborne PCB concentration(s) above the OSHA PEL of 0.5 mg/m3 or EPA recommended thresholds, work shall be stopped immediately and Work methods shall be altered to reduce the airborne PCB concentration(s).

1.07 PROJECT SUPERVISOR

- The Contractor shall designate a full-time Project Supervisor who shall meet the following A. qualifications:
 - The Project Supervisor shall be trained in PCB removal and hazardous waste 1. management in NYS, via a 40-hour HAZWOPER/Supervisor training course.
 - The Project Supervisor shall have a minimum of one year experience as a supervisor.
 - The Project Supervisor must be able to read and write English fluently, as well as 3. communicate in the primary language of the Workers.
- B. If the Project Supervisor is not on-site at any time whatsoever, all Work shall be stopped. The Project Supervisor shall remain on-site until the Project is complete. The Project Supervisor cannot be removed from the Project without the written consent of the Owner and the Environmental Consultant. The Project Supervisor shall be removed from the Project if so requested by the Owner.
- C. The Project Supervisor shall maintain a bound Daily Project Log that includes the Waste Disposal Log required by section 4.03 of the specifications.
- The Project Supervisor shall be responsible for the performance of the Work and shall D. represent the Contractor in all respects at the Project site. The Supervisor shall be the primary point of contact for the APM.

1.08 TRAINING

- As required by applicable regulations, prior to assignment to PCB Work instruct each Α. employee with regard to the hazards of PCB, safety and health precautions, and the use and requirements of protective clothing and equipment.
- Employees managing Hazardous Waste as described in Section 3.03 must also meet the B. Personnel training requirements in section 6 NYCRR 373-3.2.

1.09 RESPIRATORY PROTECTION

- A. Establish a respirator program as required by ANSI Z88.2 and 29 CFR 1910.134. Provide respirator training.
- Select respirators from those approved by the Mine Safety and Health Administration (MSHA). and the National Institute for Occupational Safety and Health (NIOSH), Department of Health and Human Services. High Efficiency Particulate Air (HEPA) respirator filters shall be approved by NIOSH and shall conform to the OSHA requirements in 29 CFR 1910.134.
- C. Respirators shall be individually fit-tested to personnel under the direction of an Industrial Hygienist on a yearly basis. Fit-tested respirators shall be permanently marked to identify the individual fitted, and use shall be limited to that individual.
- D. The Contractor shall provide and make available a sufficient quantity of respirator filters so that filter changes can be made as necessary during the work day.
- E. Any authorized visitor, Worker, or supervisor found in the Work Area not wearing the required respiratory protection shall be removed from the Project site and not be permitted to return.

1.10 DELIVERY AND STORAGE

A. Deliver all materials to the job site in original packages with containers bearing manufacturer's name and label.

- B. Store all materials at the job site in a suitable and designated area.
 - Store materials subject to deterioration or damage away from wet or damp surfaces and under cover.
 - Protect materials from unintended contamination and theft.
 - Storage areas shall be kept clean and organized. 3.
- C. Remove damaged or deteriorated materials from the job site. Materials contaminated with PCB shall be disposed of as PCB material as specified herein.

1.11 <u>TEMPORARY UTILITIES</u>

- Where available, obtain power from Owner's existing system. Otherwise provide power from Α. other sources (i.e. generator).
 - Provide temporary wiring and "weatherproof" receptacles in sufficient quantity and location to serve all HEPA equipment and tools.
 - Provide wiring and receptacles as required by the Environmental Consultant for air 2. sampling equipment.
- B. Provide temporary lighting for all Work Areas.
 - The entire Work Area shall be kept illuminated at all times.
 - Provide lighting as required by the Environmental Consultant for the purposes of 2. performing required inspections.
- C. Utilize domestic water service, if available, from Owner's existing system.

PART 2 - PRODUCTS

2.01 PROTECTIVE CLOTHING

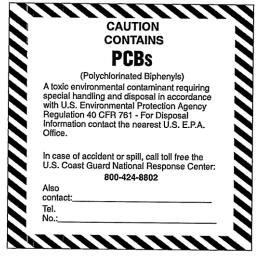
- Provide personnel utilized during the Project with disposable protective whole body clothing. Α. head coverings, and foot coverings. Provide disposable plastic or rubber gloves, suitable to prevent PCB skin contact, to protect hands.
- Provide sufficient quantities of protective clothing to assure a minimum of four (4) complete B. disposable outfits per day for each individual performing abatement Work.
- Eye protection and hard hats shall be provided and made available for all personnel entering C. any Work Area.
- D. Authorized visitors shall be provided with suitable protective clothing, headgear, eye protection, and footwear whenever they enter the Work Area.

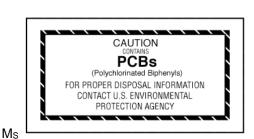
2.02 SIGNS AND LABELS, CONTAINERS

- A. Provide warning signs and barrier tapes at all approaches to PCB Work Areas. Locate signs at such distance that personnel may read the sign and take the necessary protective steps required before entering the area.
- Provide the appropriate "Large PCB Marking" or "Small PCB Marking" (M_L or M_S per 40 CFR B. 761) as shown below, of sufficient size to be clearly legible, for display on waste containers (bags, boxes, rolloffs or drums) which will be used to contain or transport PCB contaminated

NON-LIQUID PCB MATERIAL REMOVAL- SECTION 028400

material, in accordance with 40 CFR 761. In addition, U.S. Department of Transportation (DOT) 49 CFR Parts 171 and 172 requires the name and UN number of the material to be on the bags or drums, and, if shipped in bulk (rolloffs, Gaylord boxes, etc) the bulk container must also be labeled: Polychlorinated biphenyl, solid mixture UN 3432.





 M_L

C. The PCB materials are also NYS Hazardous Waste, and must have a label stating the following on each container:

HAZARDOUS WASTE--Federal Law Prohibits Improper Disposal. If found, contact the nearest police or public safety authority, or the U.S. Environmental Protection Agency.

Generator's Name and Address	
Generator's EPA Identification Number_	
Manifest Tracking Number	

- D. Provide 6 mil plastic disposal bags with PCB caution labels.
 - The "Small PCB Label" (M_S per 40 CFR 761) may be used as shown above. Bags shall also be labeled with U.S. DOT required markings per 49 CFR 172, Polychlorinated biphenyl, solid mixture UN 3432.
 - Labeled PCB waste containers or bags shall not be used for non-PCB waste or trash.
 Any material placed in labeled containers or bags, whether turned inside out or not shall be handled and disposed of as PCB waste.

2.03 DAILY PROJECT LOG

- A. Provide a Daily Project Log. The log shall contain on title page the Project name, name, address and phone number of Owner; name, address and phone number of Environmental Consultant; name, address and phone number of Abatement Contractor; emergency numbers including, but not limited to local Fire/Rescue department.
- B. All entries into the log shall be made in non-washable, permanent ink and such pen shall be strung to or otherwise attached to the log to prevent removal from the log-in area. Under no circumstances shall pencil entries be permitted.
- C. The Project Supervisor shall document all Work performed daily and note all inspections.

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2.04 SCAFFOLDING AND LADDERS

- Provide all scaffolding and/or staging as necessary to accomplish the Work of this Contract. Scaffolding may be of suspension type or standing type such as metal tube and coupler, tubular welded frame, pole or outrigger type or cantilever type. The type, erection and use of all scaffolding and ladders shall comply with all applicable OSHA construction industry standards.
- B. Provide scaffolding and ladders as required by the Environmental Consultant for the purposes of performing required inspections.

2.05 SHIPPING CONTAINERS AND PACKAGING

Provide packaging in accordance with 49 CFR 173 Packaging Group 9, such as 30 or 55 gallon capacity fiber, plastic, or metal drums, Gaylord Boxes or other Intermediate Bulk Containers (IBCs), or non-siftable bulk containers, capable of being sealed air and water tight if PCB waste has the potential to damage or puncture disposal bags. Affix PCB caution labels on lids of drums, and opposite sides of drums or bulk containers, as well as the ends of bulk containers.

2.06 EQUIPMENT AND MATERIALS

- All dry vacuuming performed under this contract shall be performed with High Efficiency Particulate Air (HEPA) filter equipped industrial vacuums conforming to ANSI Z9.2.
- Any power tools used to drill, cut into, or otherwise disturb PCB material shall be manufacturer B. equipped with HEPA filtered local exhaust ventilation.
- C. All polyethylene (plastic) sheeting used on the Project (including but not limited to sheeting used for critical and isolation barriers, fixed objects, walls, floors, ceilings, waste container) shall be at least 6 mil fire retardant sheeting.

PART 3 - EXECUTION

3.01 GENERAL REQUIREMENTS

- A. Should visible PCB debris be observed outside the Work Area, immediately stop Work notify the Owner; institute emergency procedures as directed. All costs incurred in decontaminating such non-Work Areas and the contents thereof shall be borne by the Contractor, at no additional cost to the Owner.
- B. The following submittals, documentation, and postings shall be maintained on-site by the Contractor during abatement activities at a location approved by the Abatement Project Monitor:
 - NYS Department of Environmental Conservation Waste Transporter Permit.
 - Project documents (specifications and drawings.)
 - 3. Applicable regulations.
 - Material Safety Data Sheets of supplies/chemicals used on the Project. 4.
 - Approved Abatement Work Plan. 5.
 - List of emergency telephone numbers. 6.
 - Waste Disposal Log. 7.
 - Daily Project Log. 8.

- NON-LIQUID PCB MATERIAL REMOVAL- SECTION 028400 PAGE -9-
- C. The following documentation shall be maintained on-site by the Abatement Project Monitor during abatement activities:
 - Project Monitor Daily Log. 1.
 - PCB Survey Report. 2.

3.02 WORK AREA PREPARATION

- A. PCB caution signs shall be posted at all approaches to the PCB Work Area. Post all emergency exits as emergency exits only on the Work Area side, post with PCB caution signs on the non-Work Area side. Provide all non-Work Area stairs and corridors accessible to the PCB Work Area with warning tapes at the base of stairs and beginning of corridors. Warning tapes shall be in addition to caution signs.
- B. Access to areas of work shall be regulated to prevent unauthorized visitors.
- C. Personal/Equipment Decontamination Room or Area. An existing room or area that is adjacent to the work area shall be used for the decontamination of personnel and equipment. The room or area shall be covered by an impermeable dropcloth on the floor or horizontal working surface. The room or area must be of sufficient size to accommodate cleaning of equipment and removing personal protective equipment. Work clothing must be cleaned with a HEPA vacuum before it is removed. All equipment and surfaces of waste containers must be cleaned prior to removing them from the decontamination room or area. All personnel must enter and exit the PCB work area through the decontamination room or area.
- C. Work Area Preparation For Exterior Removal:
 - 1. All ground surfaces exterior to the work area shall have a laver of 6 mil fire retardant plastic sheeting, attached to the building face and laid down on the surface below the exterior abatement work area, at least 10 feet wide or to the furthest point of gravity fall for dislodged debris by methods used, whichever is further. For work at the second story and above, extend 6 mil fire retardant plastic sheeting as necessary. For work above third story, by sidewalk, street, or property boundary, scaffolding sides shall be covered in 6-mil fire retardant plastic sheeting.
 - 2. All operable windows within the work area and 25 ft. from all sides of the work area shall be closed.
 - 3. In the work area, isolate all HVAC equipment intakes by temporarily shutting down units during removals and installing plastic sheeting over the opening.
- Work Area Preparation For Interior Removal: D.
 - Isolate all HVAC equipment, including installing plastic sheeting on all air returns and exhausts. Turn off all HVAC systems serving work area when feasible.
 - All floor areas adjacent to the work area shall have a layer of 6 mil fire retardant plastic sheeting, attached to the interior wall and laid down on the surfaces below the abatement work area, at least 5 feet wide or to the furthest point of gravity fall for dislodged debris by methods used, whichever is further.
 - All movable objects shall be removed from the immediate work area. All non-movable objects shall be covered with one layer of 6 mil fire retardant plastic sheeting and sealed at the edges.
 - All operable windows within the work area shall be closed.
 - Temporary dust barriers consisting of a minimum of 6-mil fire-retardant plastic sheeting shall be at installed at hallways, corridors, doorways, and other openings to the work area not used for passage during removals) to establish work area containment enclosure.
 - A 6-mil fire retardant plastic sheeting overlapping curtained doorway shall be installed at the entrance to the work area.

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7. For all work areas with use of electromechanical tools for PCB removals, HEPA filtered negative air ventilation units must be installed in work area and operate continuously during removal operations to establish negative pressure. A minimum of 4 air changes per hour must be maintained within work area during removals and cleanings until work area clearance is obtained from the APM.

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3.03 REMOVAL OF PCB MATERIALS - GENERAL

- PCB-containing materials shall be removed in accordance with the Contract Documents and the approved PCB Work Plan.
- B. Non-PCB items remaining such as windows, doors, masonry, and all other building construction and components from which PCB materials are removed shall be decontaminated by physical or chemical means (such as stripper) such that no visible residue remains. The removal of the PCB materials may require the use of scrapers, solvents, mastic removal chemicals, or other methods/procedures to ensure complete removal.
- C. Use tools that generate the least amount of dust and will still complete the PCB caulk removal. See current EPA regulations and recommendations regarding tools and protective measures to be used for PCB caulk removals.
- Grinding electromechanical tools (e.g. angle grinders, masonry groove cutters, circular saws, D. and slot mills, etc.) are not allowed to be used for exterior open-air PCB caulk removals.
- E. For exterior removals, take appropriate precautions (e.g. install windscreens) to prevent dust and debris from migrating due to windy conditions.
- F. Remove accessible caulk that could be disturbed before cutting building components, such as window frames.
- G. All removed PCB material shall be placed into 6 mil plastic disposal bags or other suitable container upon detachment from the substrate. Large components with PCB material or PCB residue shall be wrapped in one layer of 6 mil plastic sheeting. Sharp components likely to tear disposal bags shall be placed in fiber drums or boxes and then wrapped with sheeting.
- H. Power or pressure washers are not permitted for PCB removal or clean-up procedures
- All construction and demolition debris determined by the Environmental Consultant to be contaminated with PCB shall be handled and disposed of as PCB waste. If non-porous (e.g. metal) removed components previously in contact with non-liquid PCBs are to be cleaned and decontaminated prior to disposal as non-PCB waste, the requirements of 40 CFR 761 Subpart D shall be met, including cleaning to Visual Standard No. 2, Near-White Blast Cleaned Surface Finish of the National Association of Corrosion Engineers (NACE). The project monitor shall verify compliance with Standard No. 2, by visually inspecting all cleaned removed components. The Contractor shall note that a near-white metal blast cleaned surface, when viewed without magnification, shall be free of all visible oil, grease, dust, dirt, mill scale, rust, coating, oxides, corrosion products, and other foreign matter.
- All PCB waste must be located at or near the point of generation, under the control of the Project Supervisor. Up to 55 gallons may be stored at the point of generation for an indefinite period, but any more than 55 gallons must be moved within 3 days to a Container storage area (CSA) as specified in 6 NYCRR Section 372.2 "Standards Applicable to Generators of Hazardous Waste", or off site. Waste may be stored at the CSA for 90 days, during which labeling, inspections, and other requirements must be met as described in 6 NYCRR Section 372.2, Section 373-3.1(d) and Subpart 373-3.
- K. The CSA and personnel managing it must also meet the following requirements of 6 NYCRR 373:
 - 1. Preparedness and Prevention provisions of Section 373-3.3

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- Secondary containment requirements of 373-2.9(f)(1)
- Personnel training in section 373-3.2
- Contingency plans and emergency procedures in section 373-3.4 subparagraph 376.1(a)(1)(v)
- The containers must be dated when placed in storage, and accumulation times must be observed
- 6. The total amount of hazardous waste stored in the storage area at one time is 13,200 lb.
- A label or sign stating "Hazardous Waste" must identify all areas and containers used to accumulate hazardous waste
- Closure of the CSA. If an EPA ID number and CSA were created specifically for the PCB L. removal work, once the removal work is complete the Contractor shall immediately close out the CSA, notify the DEC/EPA that the hazardous waste activity has concluded, and that the storage area is to be closed per 373-3.7(b) and (e).
- M. The Contractor is required to provide temporary protection of the building (i.e. roof, window openings, construction joints, etc.) at the end of each Work shift so as to maintain the building in a watertight condition.
- N. Personal protective equipment, including respirators, shall be utilized and worn during all removal operations until the Work Area is cleared by the APM.
- O. Following completion of gross abatement and after all accumulations of PCB waste materials have been containerized, the decontamination procedures in Section 3.04 shall be followed.
- Ρ. Finishes damaged by PCB abatement activities shall be restored prior to final payment. Finishes unable to be restored shall be replaced under this Contract.
- Dry sweeping and any other methods that raise dust shall be prohibited. Q.

3.04 EQUIPMENT AND AREA DECONTAMINATION

- A. When removal of PCB materials is completed, the decontamination process shall consist of vacuuming (with a HEPA filter), wet wiping/mopping and a repeated vacuuming (with a HEPA filter) of the entire work area. All surfaces in and around the work area must be free of dust generated during the work.
- Decontaminate all tools and equipment before removal from the work area. B.
- C. If dust or debris has migrated to areas of the building other than the immediate work area, those areas shall be incorporated into the work area and thoroughly decontaminated to ensure all visible dust generated by the activity is eliminated.
- D. Uncontaminated dust barriers and other protective sheeting shall be placed in disposable construction bags and disposed of as normal trash.
- E. Visually inspect the area for any remaining dust or debris. Vacuum (with HEPA filter) and wet wipe until space is clean. Dispose of vacuum contents as PCB waste.
- F. Upon completion of decontamination and removing temporary dust barriers, a final inspection shall be performed by the Contractor and Abatement Project Monitor. As a result of any visual inspection by the Abatement Project Monitor, the Contractor will clean or reclean the affected areas at no additional expense to the Owner.

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PART 4 - DISPOSAL OF PCB WASTE

4.01 TRANSPORTATION AND DISPOSAL SITE

- Α. The Contractor's Hauler and Disposal Site shall be approved by the Owner. For any permitted out-of-state landfill not specifically authorized for disposal of PCBs, written notice must be provided 15 days prior to the first shipment of the same waste stream that the waste may contain PCBs greater than 50ppm, in accordance with 40 CFR 761.62. The letter shall be acknowledged via a disposal facility representative's signature, printed name and title. If the facility is permitted to accept PCB waste, no letter is required. Note: For disposal within New York State, facilities must be specifically permitted to accept PCB waste.
- B. The Contractor shall give twenty-four (24) hour notification prior to removing any waste from the site. Waste shall be removed from the site only during normal working hours unless otherwise specified. No waste may be taken from the site unless the Contractor and Environmental Consultant are present and the Environmental Consultant authorizes the release of the waste as described herein.
- C. All waste generated as part of the PCB project shall be removed from the site within ten (10) calendar days after successful completion of all PCB abatement work.
- D. Upon arrival at the Project Site, the Hauler must possess and present to the Environmental Consultant a valid New York State Department of Environmental Conservation Part 364 Waste Hauler's Permit. The Environmental Consultant may verify the authenticity of the hauler's permit with the proper authority.
- E. The Hauler, with the Contractor and the Environmental Consultant, shall inspect all material in the transport container prior to taking possession and signing the Hazardous Waste Manifests.

4.02 WASTE STORAGE CONTAINERS

- A. All waste containers shall be fully enclosed and lockable (i.e. enclosed dumpster, trailer, etc.).
- The Environmental Consultant shall verify that the waste storage container and/or truck tags (license plates) match that listed on the New York State Department of Environmental Conservation Part 364 permit. Any container not listed on the permit shall be removed from the site immediately.
- C. The container shall be plasticized and sealed with one layer of 6 mil plastic. Once on site, it shall be kept locked at all times, except during load out. The waste container shall not be used for storage of equipment or contractor supplies.
- While on-site, the container shall be labeled with PCB Warning Labels and DEC Hazardous D. Waste Labels as specified in Section 2.02.
- E. The New York State Department of Environmental Conservation Waste Hauler's Permit number shall be stenciled on both sides and back of the container.
- F. The container is not permitted to be loaded unless it is properly plasticized, has the appropriate danger signage affixed, and has the permit number appropriately stenciled on the container.
- G. The Owner may initiate random checks at the Disposal Site to insure that the procedures outlined herein are complied with.

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4.03 HAZARDOUS WASTE MANIFESTS

- A New York State Uniform Hazardous Waste Manifest shall be utilized solely as the waste Α. Manifest for transportation. A hauler billing form or bill of lading may be used if the hauler needs an independent record, but shall not be used as a shipping document.
- B. The Manifest shall be completed by the Contractor and verified by the Environmental Consultant that all the information and amounts are accurate and the proper signatures are in place.
- C. The Manifest shall have the appropriate signatures of the Owner's Representative (the Generator) and the Hauler representative prior to any waste being removed from the site.
- D. Copies of the completed Manifest shall be retained by the Environmental Consultant and shall remain on site for inspection.
- E. Upon arrival at the Disposal Site, the Manifest shall be signed by the Disposal Facility operator to certify receipt of PCB materials covered by the manifest.
- F. The Disposal Facility operator shall return the original Manifest to the Owner's Representative (the Generator) as required by the DEC in 6 NYCRR 372 within 45 days. The Environmental Consultant must call the facility to investigate if not returned within 35 days, and call the DEC and file an Exception report if not returned within 45 days.
- G. The Contractor shall utilize the Waste Disposal Log provided by the Owner. This log shall be maintained by the Project Supervisor and shall be kept on site at all times. (See Appendix A.)
- Originals of all waste disposal manifests disposal logs shall be submitted by the Contractor to Н. the Owner with the final close-out documentation.
- The Contractor must also submit reports and records per the requirements of 6 NYCRR 372.2 J.

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APPENDIX A

WASTE MANIFEST LOG

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DORMITORY AUTHORITY STATE OF NEW YORK WASTE MANIFEST LOG

Project:PCB Contractor:					Building:				
					Project Number:Environmental Consultant:				
						DATES (Chain of Eve		nts)	
Load No.	Hauler	NYSDEC #	License Plate No.	Size of Container		Departed from Site	Rec'd at Disposal Site	Manifest Returned	
					<u> </u>			_	

COMMENTS:

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APPENDIX B

CONTRACTOR'S ACKNOWLEDGEMENT STATEMENT

CONTRACTOR'S ACKNOWLEDGEMENT STATEMENT

Re:	Abatement of Non-Liquid PCB Materials						
	(Project Title)						
		(Project Location)					
	(DASNY Project	et Number)					
handling, a certify that CFR 1926. have receive health imp	and disposal of No. t the employees: a) 134; b) have been to wed training in the	ing individuals' employment in c n-Liquid PCB Materials at th have received the medical exami fit tested specifically for respirate proper handling of Non-Liquid involved, as well as the use and ed.	e referenced project, I hereby mations required by OSHA 29 ors used on the Project; and c) PCB materials, including the				
Employee	Name	Social Security Number (last four digits)	State Driver License ID#				
Supervisor	r Signature	Printed Name					
(Notary bl	ock here)	Title					

SECTION 028500 - MOLD REMEDIATION

PART 1 - GENERAL

1.01 SCOPE OF WORK

- A. This mold remediation Project shall consist of the removal and disposal of mold contaminated materials at The State University of New York at Oswego Funnelle Hall, located at 7060 New York State Route 104, Oswego, Oswego County, New York. The mold remediation work is being performed as part of a scheduled renovation project for the referenced building.
- B. The work shall include but not limited to the removal of Fiberglass Pipe Insulation within Basement Room Nos. JSR-BNE (2 Square Feet), JAB-B (15 Square Feet), and MCR-BN (110 Square Feet), in addition to the cleaning of a Wooden Cabinet within Room No. KIT-B (1 Square Foot). Work shall also include but not limited to the removal/cleaning of an A/C vent within Room No. FCC-1 (2 Square Feet) and a Wooden Cabinet in Room No. 46-APT-SW (2 Square Feet). Reference the 'HM' drawings for additional details and description.
- C. The Mold Remediation Contractor shall be aware of all conditions of the Project and is responsible for verifying quantities and locations of all Work to be performed. Failure to do so shall not relieve the Mold Remediation Contractor of its obligation to furnish all labor and materials necessary to perform the Work.
- D. All Work shall be performed in strict accordance with the Project Documents and all governing codes, rules, regulations and guidelines. Where conflicts occur between the Project Documents and applicable codes, rules, regulations and guidelines, the more stringent shall apply.
- E. Working hours shall be as required and approved by the Owner. Mold removal activities including, but not limited to, mold remediation area preparation, gross removal activities, cleaning activities, waste removal, etc. may need to be performed during 'off-hours' (including nights and weekends). In addition, multiple mobilizations may be required to perform the work identified in this project. The Mold Remediation Contractor shall coordinate all Work with the facility and Owner's representative regarding scheduling.

1.02 SUBMITTALS

- A. Pre-Work Submittals: Within 7 days prior to the pre-construction conference, the Mold Remediation Contractor shall submit 3 copies of the documentation listed below:
 - 1. Valid Mold Remediation Contractor NYS DOL license.
 - 2. Mold Remediation Work Plan. List of procedures proposed for use in performance of the work, when required:
 - List all mold remediation areas and containments, including the quantities of materials to be cleaned or removed in each area or containment,
 - b. Locations and types of all decontamination enclosures,
 - c. Entrances and exits to each mold remediation area and/or containments,
 - d. Type of remediation activity, technique for each mold remediation area and/or containment,
 - e. Procedures to be utilized for any cleaning and disinfecting solutions, and the proposed list of EPA registered biocides, disinfectants and microbial coatings to be utilized on the project,

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- Mold remediation project notification signs to be displayed at all accessible entrances to mold remediation areas.
- g. Number and location of High Efficiency Particulate Air (HEPA) filters and exhaust locations to the outside, with calculations for determining the number of HEPA filters, based on a minimum of 4 air changes per hour,
- Procedures for temporary dehumidification of mold remediation area in accordance with contract documents, including section 2.10 of this Part
- i. Location of water and electric connections for each mold remediation area,
- j. Waste removal procedures and transport routes from the mold remediation area to the waste storage container.

Note: Proposed work plan shall include marked-up drawing(s) of the project mold remediation area(s) indicating proposed locations for decontamination units, negative air exhaust, dehumidification units (inside mold remediation area), waste dumpster, contractor parking, equipment storage, remediation area entrance/exit points, and water and electrical supply.

- 3. Safety Data Sheets (SDS)
 - a. Provide an SDS on the EPA registered products selected for use on this project. Substitution of alternative products is not permitted without authorization.
- 4. Progress Schedule:
 - a. Provide an estimate of manpower to be utilized and the time required for completion of each major mold remediation area. Include estimated size, number of crews and work shifts.
- B. Project Close-out Submittals: Within 30 days of the completion of each remediation phase, the Contractor shall submit one hard copy of the documents listed below to DASNY Code Compliance and one copy to the environmental consultant for review and approval prior to Contractor's final payment. Once DASNY Code Compliance approves the close-out submittal, the Contractor shall provide three sets of the approved close-out documents (double-sided and bound) to DASNY Project Management, including one set to be distributed to the facility.
 - a. Daily Project Logs.
 - b. Provide the Contractor's Acknowledgement Statement (Appendix A) that lists all Workers used in the performance of the Project, including name and NYS DOL license. The Statement shall be notarized (Original notarized statement shall be sent to DASNY Code Compliance).

1.03 PRE-CONSTRUCTION CONFERENCE

- A. Prior to start of preparatory Work under the Contract, the Mold Remediation Contractor shall attend a pre-construction conference attended by the Owner, Facility Personnel, and Environmental Consultant.
- B. Agenda for this conference shall include but not limited to:
 - 1. Mold Remediation Contractor's scope of Work,
 - 2. Review of pre-work submittals and on-site documentation,
 - 3. Review of Work procedures including:
 - a. Job site preparation,
 - b. Pre-cleaning of surfaces,

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- c. Handling of moveable objects,
- d. Mold remediation area containment, including non-moveable objects
- e. Removal methods and decontamination,
- f. Final inspection and clearance preparation,
- 4. Building occupant notifications,
- 5. Environmental Consultant's duties, functions, and authority,
- 6. Temporary utilities,
- 7. Waste handling procedures and storage for disposal.
- C. In conjunction with the conference, the Mold Remediation Contractor shall accompany the Owner and Environmental Consultant on a pre-construction walk-through documenting existing conditions of finishes and furnishings, review overall Work Procedures, location of fire exits, fire protection equipment, water supply and temporary electric tie-in.

1.04 APPLICABLE GUIDANCE DOCUMENTS, REGULATIONS AND COMPLIANCE

- A. The Mold Remediation Contractor shall comply with the following guidance documents and regulations, pertaining to Work practices, protection of Workers, authorized visitors to the site and property adjacent to the Work, except where more stringent requirements are specified.
- B. Guidance Documents:
 - United States Environmental Protection Agency (EPA) Mold Remediation in Schools and Commercial Buildings, EPA 402-K-01-001.
 - 2. New York City Department of Health & Mental Hygiene Guidelines on Assessment and Remediation of Fungi in Indoor Environments.
- C. Federal Regulations:
 - 1. 29 CFR 1910.134, Respiratory Protection Standard (OSHA)
 - 2. 29 CFR 1926, Construction Industry (OSHA)
 - 3. 29 CFR 1926.417 and 1926.702, Lockout Tag-out (OSHA)
 - 4. 29 CFR 1926.451 to 1926.1060, Fall Protection (OSHA)
 - 5. 29 CFR 1910.1200, Hazard Communication Standard (OSHA)
- D. State Law/Regulations:
 - 1. NYS DOL Mold Law, Article 32, Sections 930 through 948

1.05 NOTICES

A. The Mold Remediation Contractor shall provide and coordinate with the Environmental Consultant and the Owner, regarding notification to the occupants and other Contractors in the affected area(s) of the mold presence, description of the remedial measures to be taken and a timetable for completion. Notification signage shall be posted at all accessible entrances to the remediation areas.

1.06 RECORD KEEPING

A. The Mold Remediation Contractor shall maintain a Daily Project Log consisting of a three ring binder. Prior to Mold Remediation Contractor demobilization, a copy of the completed daily project log shall be provided to the owner's on-site representative. During the active remediation, a copy shall be provided daily to the Environmental Consultant. The Daily Project Log shall be utilized each day to document the following information:

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- 1. Date and time of the project,
- 2. Name of Project Manager/Project Supervisor,
- 3. List of mold abatement workers, license number and expiration date,
- 4. Brief description of daily work activities,
- 5. Each remediation area shall have a daily sign in and sign out sheet, and the completed daily sign in/out sheets shall be maintained in the daily progress log,
- 6. Visual Clearance Inspection performed by the Environmental Consultant Assessor (signature, date and time of inspection).

1.07 PROJECT SUPERVISOR

- A. The Mold Remediation Contractor shall designate a full-time Project Supervisor who is qualified and a licensed NYS Mold Abatement Worker Supervisor to enter the mold remediation areas. The Project Supervisor must be able to read and write English fluently, as well as communicate in the primary language of the Workers.
- B. The Project Supervisor shall maintain a Daily Project Log and transmit a copy daily to the Environmental Consultant.
- C. The Project Supervisor shall be responsible for the performance of the Work and shall represent the Mold Remediation Contractor in all respects at the Project site. The Supervisor shall be the primary point of contact for the Environmental Consultant.

1.08 PROJECT MONITORING & ASSESSOR INSPECTIONS

- A. The Owner shall engage the services of an Environmental Consultant who shall serve as the Owner's Representative in regard to the performance of the mold remediation Project and provide direction as required throughout the remediation.
- B. The Mold Remediation Contractor is required to ensure cooperation of its personnel with the Environmental Consultant for the inspection, monitoring, and clearance requirements. The Mold Remediation Contractor shall comply with all direction given by the Environmental Consultant during the course of the Project.
- C. The Environmental Consultant shall review and approve or disapprove all submittals (pre-work, on-site, closeout), shop drawings and schedules.
- D. The Environmental Consultant shall provide visual inspections prior to the start of work and final clearance inspection of the mold remediation areas.
- E. The Environmental Consultant shall provide bulk and air sampling services when required for the Project.
- F. The Environmental Consultant shall have the authority to direct the actions of the Mold Remediation Contractor verbally and in writing to ensure compliance with the Project documents and all applicable laws/regulations.

1.09 RESPIRATORY PROTECTION

- A. Select respirators based upon the anticipated exposure with a minimum acceptable half-face negative pressure respirator for all mold remediation areas, and choose from those approved by the National Institute for Occupational Safety and Health (NIOSH).
- B. Respirators shall be individually fit-tested to personnel under the direction of an Industrial Hygienist on a yearly basis. Fit-tested respirators shall be permanently marked to identify the individual fitted, and use shall be limited to that individual.
- C. No respirators shall be issued to personnel without such personnel participating in a respirator training program.

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- D. High Efficiency Particulate Air (HEPA) respirator filters shall be approved by NIOSH and shall conform to the OSHA requirements in 29 CFR 1910.134.
- E. A storage area for respirators shall be provided by the Mold Remediation Contractor in a clean area of the personnel decontamination enclosure where they will be kept in a clean environment.
- F. The Mold Remediation Contractor shall provide and make available a sufficient quantity of respirator filters so that filter changes can be made as necessary during the work day.
- G. Filters used with negative pressure air purifying respirators shall not be used any longer than one eight (8) hour work day. Any loose respirator filters found within the mold remediation area, must be disposed of appropriately.
- H. Any authorized visitor, Worker, or supervisor found in the Mold Remediation Area not wearing the required respiratory protection shall be removed from the Project site and not be permitted to return.
- I. The Contractor shall have at least two (2) Powered Air Purifying Respirators stored on site designated for authorized visitors use. Appropriate respirator filters for authorized visitors shall be made available by the Contractor.

1.10 TRAINING

- A. As required by applicable federal and state laws/regulations, prior to assignment to mold remediation work, provide yearly fit test and instruct each employee with regard to use of respirators, and protective clothing,
- B. Instruct each worker regarding site-specific safety measures and emergency egress procedures,
- C. Provide hazard communication (HAZCOM) training regarding the potential for exposure to microbials (e.g., mold, bacteria, fungi), cleaning agents, anti-fungal coatings, and any other hazard(s) expected to be encountered during the mold remediation work. The training shall include how to recognize materials contaminated with mold, bacteria, and fungi; signs and symptoms of and hazards associated with exposure to mold, fungal, and bacterial contamination; how to prevent contamination outside the mold remediation area; and how employees can protect themselves from the expected exposures. Other identified hazard(s) shall be similarly addressed.

1.11 TEMPORARY UTILITIES

- A. Shut down and lock out all electrical power to the Mold Remediation Areas.
- B. Where available, obtain power from the Owner's existing system or provide temporary 120-240 volt, single phase, three wire, 100 amp electric service with Ground Fault Circuit Interrupters (GFCI) for all electric requirements within the Mold Remediation Area.
 - 1. Where available, obtain from Owner's existing system. Otherwise provide power from other sources (i.e. generator).
 - 2. Provide temporary wiring and "weatherproof" receptacles in sufficient quantity and location to serve all HEPA equipment and tools.
 - Provide wiring and receptacles as required by the Environmental Consultant for project monitoring and air sampling equipment (pumps, fans, leaf blowers, etc.), if necessary for intended tasks.
 - All power to the Mold Remediation Area shall be brought in from outside the area through GFCI's at the source.
- C. Provide temporary lighting with "weatherproof" fixtures for all mold remediation areas including decontamination areas.
 - The entire Mold Remediation Area shall be kept illuminated at all times.

- 2. Provide lighting as required by the Environmental Consultant for the purposes of performing required inspections.
- D. All temporary devices and wiring used in the Mole Remediation Area shall be capable of decontamination procedures including HEPA vacuuming and wet-wiping.
- E. Utilize domestic water service, if available, from Owner's existing system. Provide hot water heaters with sufficient capacity to meet Project demands.

PART 2 - PRODUCTS

2.01 PROTECTIVE CLOTHING

- A. Provide personnel utilized during the Project with disposable protective whole body clothing, head coverings, gloves and foot coverings. Provide disposable plastic or rubber gloves to protect hands. Cloth gloves may be worn inside the plastic or rubber for comfort, but shall not be used alone. Make sleeves secure at the wrists and make foot coverings secure at the ankles by the use of tape, or provide disposable coverings with elastic wrists or tops.
- B. The Mold Remediation Contractor shall not under any circumstances permit any person to enter the mold remediation areas without the appropriate protective clothing and equipment. The Mold Remediation Contractor shall provide protective clothing for use by DASNY and the Environmental Consultant. The Mold Remediation Contractor shall furnish as many sets as required for full-time monitoring.
- C. Eye protection and hard hats shall be provided and made available for all personnel entering any Mold Remediation Area.
- D. Authorized visitors shall be provided with suitable protective clothing, headgear, eye protection, and footwear whenever they enter the Mold Remediation Area.

2.02 HEPA FILTER EQUIPMENT

A. All negative air filtrations units and vacuum units shall be equipped with a High Efficiency Particulate Air filters.

2.03 CLEANING & DISINFECTING AGENTS

- A. Provide standard detergents to be used for cleaning and that shall be diluted in water and used in a manner as directed by manufacturer labeling.
- B. If approved for use by the Owner and Environmental Consultant in writing, any disinfecting agents shall be utilized as directed by manufacturer labeling.

2.04 POLYETHYLENE SHEETING

A. Provide fire-retardant polyethylene sheeting film in the largest sheet size possible to minimize seams, 6-mil thick.

2.05 DUCT TAPE

A. Provide duct tape with an adhesive that is formulated to stick aggressively to sheet polyethylene and other surfaces where it will be used to create a seal.

2.06 DISPOSAL BAGS

A. Provide unlabeled, 6-mil thick, leak-tight polyethylene bags. Asbestos warning labels are not permitted on the bags.

2.07 BARRIER TAPE

A. Provide yellow or red plastic caution tape 3 inches wide. "Asbestos" or "Lead" wording on the tape is not permitted.

2.08 DECONTAMINATION AREA

A. The Contractor shall provide a decontamination space for the purpose of separating each mold remediation area from the non-remediation areas of the building. This space/area provides for entering the remediation area, returning to the clean environment, cleaning of persons and equipment, and movement of properly-contained waste material.

2.09 DEHUMIDIFICATION UNITS

A. The Contractor shall provide the number of portable, large-capacity dehumidification units necessary to maintain a relative humidity below 55% within the mold remediation areas. The drain hose(s) for the unit(s) shall be routed to a functioning sewer drain or to the outdoors without reentering the mold remediation area. Dehumidification units shall be Underwriters Laboratory (UL) approved or equivalent. Dehumidification units are to remain active until xx materials have been adequately dried to a maximum moisture content of XX%.

2.10 WARNING SIGNAGE

A. Provide signage with a minimum size of 8-1/2 inches by 11 inches with a white background on which is printed in large type with wording in the format shown below:

MOLD REMEDIATION
DO NOT ENTER
AUTHORIZED PERSONNEL ONLY
RESPIRATORS AND PROTECTIVE CLOTHING
ARE REQUIRED IN THIS AREA

PART 3 - EXECUTION

3.01 GENERAL REQUIREMENTS

- A. The scope of work includes removal of visual fungal growth on contaminated materials. A copy of the mold remediation contractor's NYS DOL mold remediation license must be displayed onsite during remediation activities including removal of contaminated materials that can't be cleaned. The Mold Remediation Contractor shall generate a Mold Remediation Work Plan based upon the contract documents. The Work Plan shall be submitted and approved prior to its implementation. The remediation procedures shall be identified in the Work Plan for each remediation mold remediation area based on the size, complexity and remediation methods required.
- B. The following submittals, documentation, and postings shall be maintained on-site by the Mold Remediation Contractor during remediation activities at a location approved by the Environmental Consultant:
 - 1. Valid Mold Remediation Contractor license issued by New York State Department of Labor.
 - 2. NYS DOL Mold Abatement worker licenses for each person employed in the removal, handling, or disturbance of mold including supervisor.
 - 3. Project documents (specifications and drawings.)
 - 4. Approved Mold Remediation Work Plan
 - 5. Building Occupant Notification.

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- Applicable laws and regulations.
- 7. Safety Data Sheets of supplies/chemicals used on the Project.
- 8. Disposal Site/Landfill Permit from applicable regulatory agency.
- 9. List of emergency telephone numbers.
- 10. Daily Project Log.
- 11. Entry/Exit Logs.
- C. The following documentation shall be maintained on-site by the Environmental Consultant during abatement activities:
 - Valid Mold Assessor license issued by New York State Department of Labor.
 - 2. Project Monitor Daily Log
 - 3. Assessor's Written Report
 - 4. Completed Assessor Post-Remediation Visual Clearance Inspection Summaries

3.02 CONTAINMENT BARRIERS

- A. When containment of the mold remediation areas is not necessary, dust suppression methods shall be utilized.
- When containment of the mold remediation area is required, the Mold Remediation Contractor В. must be careful not to disturb fungal contaminated building materials while isolating mold remediation areas to prevent the release of fungal spores. Pre-cleaning of interior surfaces shall be completed prior to the erection of the containment. Moveable objects within the mold remediation area shall be discarded or HEPA vacuumed, wet-wiped and removed from the area or isolated from the work. Workers shall wear respirators when required, while installing isolation barriers if fungal contaminated surfaces (walls or surfaces with visible settled dusts) are likely to be disturbed. The Mold Remediation Contractor shall completely isolate the mold remediation areas for the duration of the work by sealing off all walls, floors, openings, and fixtures in the mold remediation areas including, but not limited to, heating and ventilation supply air ducts and diffusers and return air ducts and grilles (HVAC system totally deenergized - no HVAC system airflow into or out of mold remediation area), return air grilles, common return air plenums, doorways, corridors, windows, skylights, and lighting with polyethylene sheeting held securely in place as described in this section. The containment must be constructed to prevent the spread of mold to areas outside the containment. Warning signage shall be posted at all accessible containment barrier locations.
- C. Containment Entry and Exit Procedures shall be established as required for the work.
- D. Personnel, equipment and waste decontamination procedures shall be established as required for the work.

3.03 <u>NEGATIVE PRESSURE</u>

A. The Mold Remediation Contractor shall establish a negative air pressure differential inside the indoor enclosed mold remediation areas. Negative Pressure Systems shall be exhausted to the exterior of the building. The Mold Remediation Contractor shall ensure that negative air pressure differential is maintained the Environmental Consultant has determined that the mold remediation area has passed the final inspection. If the length of the exhaust will exceed 25ft, include adequate measures in the Mold Remediation Work Plan to maintain the required air changes (e.g. booster fans, increased exhaust tube diameter, interior exhaust to unoccupied area, etc.). See current federal and state asbestos regulations for accepted practices regarding extending length of negative air ventilation exhaust.

3.04 WORK PROCEDURES

A. All waste shall be decontaminated and/or removed under containment. As waste is removed, it shall be placed into a disposal container promptly. Disposal procedures, at a minimum, shall consist of single bagging using 6-mil polyethylene bags or single wrapped with 6-mil

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- polyethylene sheeting. Bags shall be taped to form an airtight seal. Waste from HEPA-filtered vacuums shall be single bagged in 6-mil polyethylene bags.
- B. The Mold Remediation Contractor at all times shall keep the site and mold remediation area free from accumulations of bagged material or rubbish caused by its operations and free from any flammable materials or other source of fire hazard.
- C. All visually contaminated materials and adjacent visually uncontaminated material shall be cleaned and/or removed under full containment unless specified otherwise.
- D. Cleaning and disinfecting agents shall be utilized to clean all remaining surfaces within the mold remediation area(s).
- E. In the event that areas adjoining the enclosed project area become or are suspected of becoming contaminated with spores as a result of the Mold Remediation Contractor's work, the Mold Remediation Contractor shall thoroughly clean the affected areas. These areas shall be subject to detailed visual inspection and potentially post-remediation clearance sampling by the Environmental Consultant.

3.05 CLEARANCE PREPARATION

- A. When containment areas are not utilized, the mold remediation area and areas used by remedial workers for egress shall be cleaned.
- B. When containment is utilized, all mold remediation area surfaces and layers of polyethylene barrier sheeting shall be cleaned. If negative pressure is utilized, the negative air machines shall remain in operation until notified by the Environmental Consultant of satisfactory clearance.

3.06 POST-REMEDIATION CLEARANCE INSPECTIONS

- A. After all visible accumulations of material and debris are removed the Mold Remediation Contractor shall notify the Environmental Consultant Assessor for a post-remediation final clearance visual inspection/assessment. The Mold Remediation Contractor (New York State licensed Mold Abatement Worker Supervisor) and Environmental Consultant (New York State licensed Mold Assessor) shall conduct a thorough visual inspection of the mold remediation area. The Environmental Consultant shall inspect the remaining building materials for the presence of moisture, utilizing a moisture meter to test porous materials. If during this inspection, any visible dust, debris and/or water damage is observed, visible mold growth is present on any surface, and/or moisture elevated above material-specific levels is detected for any impacted building material within the mold remediation area, the Mold Remediation Contractor shall remove, re-clean, and/or dehumidify as required. The Mold Remediation Contractor shall pay all associated costs for the re-cleaning dehumidification, and additional post-remediation verification inspection and any sampling services.
- B. Post-remediation verification sampling (if requested by the Owner) shall proceed only upon written notice of successful post-remediation visual clearance issued by the Environmental Consultant (Mold Assessor).
- C. Application of any anti-fungal coating shall proceed only upon receipt written notice of successful post-remediation verification visual inspection (and post-remediation verification sampling, if requested by Owner) issued by the Environmental Consultant. The anti-fungal coating shall not be applied prior to the post-remediation verification process.
- D. Breakdown of containment shall proceed only upon receipt of clearance issued by the Environmental Consultant Assessor and completion of anti-fungal coating application. No person shall remove or dismantle any containment structures or materials from a project site prior to receipt by the mold remediation contractor of satisfactory clearance as determined by the licensed mold assessment firm and described in the NYS DOL mold law.

E. The post-remediation Assessor inspection/assessment shall also include verification that the underlying cause of the mold has been remediated so that it is reasonably certain that the mold will not return to the remediated area.

3.07 POST-REMEDIATION VERIFICATION SAMPLING (if requested by owner)

A. The Environmental Consultant may conduct post-remediation air or dust sampling, at discretion of owner. Samples shall be analyzed by an AIHA accredited microbiological laboratory.

3.08 RESTORATION OF UTILITIES, FIRESTOPPING, AND FINISHES

- A. After final clearance, remove locks and restore electrical and HVAC systems. All temporary power shall be disconnected, power lockouts removed and power restored. All temporary plumbing shall be removed.
- B. Finishes damaged by the Mold Remediation Contractor including, but not limited to, plaster/paint damage due to duct tape and spray adhesives, and floor tile lifted due to wet or humid conditions, shall be restored and/or replaced prior to final payment. All foam and expandable foam products and materials used to seal mold remediation area openings shall be completely removed upon completion of remediation activities.
- C. All penetrations through fire rated construction shall be fire stopped using materials and systems tested in accordance with ASTM E814 on Projects where re-insulation is part of the required work.

PART 4 - DISPOSAL OF WASTE

4.01 APPLICABLE REGULATIONS

- A. State Regulations:
 - 1. 6 NYCRR Subparts 360-1 & 360-7, Construction and Demolition Debris Landfills
- B. Construction and Demolition (C&D) Debris shall be solid waste resulting from the remediation, demolition, construction, remodeling and repair.

END OF SECTION 02 85 00

APPENDIX A

CONTRACTOR'S ACKNOWLEGEMENT STATEMENT

CONTRACTOR'S ACKNOWLEDGEMENT STATEMENT

(Project Title)	
(Project Location)	······
(DASNY Project Number)	
disposal of mold impacted materials at the re eceived the medical examinations required be or respirators used on the Project; and c) have	employment in connection with the remediation, handling, and eferenced project, I hereby certify that the employees: a) have by OSHA 29 CFR 1926.134; b) have been fit tested specifically we received training as required by NYS DOL labor law Article enterials, including the health implications and risks involved, a revenue of the result of the result in the result
Employee Name	
	
	
	Printed Name
Supervisor Signature	·
	Title & License Number

Mold Abatement Worker License Number

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<u>SECTION 028700 - REMOVAL AND DISPOSAL OF UNIVERSAL WASTE AND FLUORESCENT</u> LAMPS

PART 1 - GENERAL

1.1 <u>DESCRIPTION OF WORK</u>

A. This specification covers the removal and disposal of Universal waste, including fluorescent lamps, high-intensity discharge (HID) lamps, mercury thermostats and switches, batteries and pesticides(not PCB lighting ballasts). Removed or replaced mercury thermostats shall be recycled as per current NYS DEC regulations, instead of disposal as Universal Waste. Demolition and removal of materials shall be as required to support the work.

1.2 SUBMITTALS

- A. Before Start of Work: Submit the following to the Owner's Representative for review. Do not start work until these submittals are returned with Owner's Representative's approval.
 - 1. Copy of State or local license for hazardous waste hauler;
 - 2. Certification of at least one on-site supervisor which has satisfactorily completed the OSHA 40 Hour Health and Safety Course for Handling Hazardous Materials;
 - 3. Certificates of workers which have successfully completed at least the OSHA 40-Hour Health and Safety Course for Hazardous Materials:
 - 4. Certificates of workers which have successfully completed the required employee training for universal waste or appropriate type of training to the type of wastes being managed;
 - 5. Schedule of start and finish times and dates for this work;
 - 2. Name and address of the universal waste handler or a destination facility where the waste materials is to be treated, deposited or recycled in accordance with all regulatory requirements (include contact person and telephone numbers), if the universal waste meets the definition of hazardous waste, the name and address of the hazardous waste treatment, storage and disposal (TSD) facility, the name and address of the mercury thermostat recycling collection site;
 - 3. Material Safety Data Sheets for all materials requiring removal;
 - 4. If Contractor introduces any chemical into the work environmental, a MSDS for that chemical is required before use:
 - 5. Contingency Plan for handling emergency spills or leaks;
 - 6. Provide a copy of the NYS DEC Part 364 Waste Transporter permit for Universal Waste Transporters that transport more than 500 pounds of universal waste in a single shipment since they must be a permitted waste transporter:
 - 7. Large Quantity Handlers of universal waste must provide documentation of notification to the EPA and/or the appropriate local government agency in advance of its intentions to transport the waste and receive from the facility or provide an EPA identification number prior to exceeding 5,000 kilograms of waste on-site;
 - 8. Provide a record of all universal waste shipments received and sent offsite from the project.

REMOVAL AND DISPOSAL OF UNIVERSAL WASTE AND FLUORESCENT LAMPS- SECTION 028700 SUNY OSWEGO PAGE -2-

1.3 <u>DEFINITIONS</u>

- A. Large Quantity Handler (LQH) of Universal Waste shall be a waste handler who accumulates 5,000 kilograms or more of universal waste (batteries, pesticides, thermostats, or lamps, calculated collectively) at any time. This designation as a large quantity handler of universal waste is retained through the end of the calendar year in which 5,000 kilograms (11,000 pounds) or more total of universal waste is accumulated. The LQH shall notify the EPA, acquire or co-ordinate with a facility regarding an EPA identification number, and provide records for each shipment. The LQH shall ensure all employees are thoroughly familiar with proper waste handling and emergency procedures, relative to their responsibilities during normal facility operations and emergencies.
- B. Small Quantity Handler of Universal Waste (SQH) shall be a waste handler who does not accumulate 5,000 kilograms (11,000 pounds) or more of total universal waste (batteries, pesticides, thermostats, or lamps, calculated collectively) at any time.
- C. Destination Facility shall be a facility that legitimately and can legally accept universal waste from offsite so that the universal waste can be treated, disposed, or recycled in accordance with the regulatory requirements.
- D. Universal Waste Transporter shall be anyone who transports universal waste. In New York, universal waste transporters that transport greater than 500 pounds of universal waste in a single shipment must be a permitted hazardous waste transporter pursuant to Federal and State regulations. Proper notification with the receiving handler agreeing to receive the shipment is required by the Universal Waste Transporter.
- E. Universal Waste consists of the following discarded materials, as identified in 6 NYCRR 374-3: Fluorescent light bulbs high-intensity discharge (HID) lamps, mercury thermostats and switches, batteries, and pesticides. Removed or replaced mercury thermostats must be delivered to a designated mercury thermostat collection site as per current NYC DEC regulations. Disposal of mercury thermostats in a solid waste management facility is prohibited. PCB ballasts/capacitors from light fixtures shall not be treated as universal waste, they shall be handled and disposed of as hazardous waste. See the Hazardous Waste Disposal Specification for these wastes.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Polyethylene Sheet: A single polyethylene film in the largest sheet size possible to minimize seams, 6.0 mil thick, clear, frosted, or black.
- B. Duct Tape: Provide duct tape in 3" widths, witty an adhesive which is formulated to stick aggressively to sheet polyethylene.
- C. Spray Cement: Provide spray adhesive in aerosol cans which is specifically formulated to stick tenaciously to sheet polyethylene.
- D. Disposal Bags: Provide 6 mil thick leak-tight polyethylene bags.
- E. Labels: As required by the EPA and OSHA for handling, transportation, and disposal of hazardous waste.

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F. Drums: Recovery or salvage drums acceptable for disposal of hazardous waste. Prior approval of drums is required. Drums or containers must meet the required OSHA EPA (40 CFR Parts 264265 and 300), and DOT regulations (49 CFR Parts 171-178). Use of damaged drums will not be allowed.

PART 3 - EXECUTION

3.1 UNIVERSAL WASTE

- A. Employee training shall ensure that all employees are thoroughly familiar with proper waste handling and emergency procedures, relative to their responsibilities during normal operations and emergencies and to the type of waste they are handling.
- B. Mercury thermostats shall be segregated from other Universal Wastes to allow for required recycling.
- C. Once the properly labeled containers holding the universal waste have been filled and sealed, they shall be stored in designated accumulation areas as agreed upon by the Owners Representative and Contractor. They shall not be allowed to store in transportation vehicles, or onsite for more than one year from when the waste has been generated.
- D. Documentation when a universal waste in storage was first accumulated shall be provided. This is to be done by dating and labeling the waste with the date of the earliest accumulation that can document the length of time the universal waste has been accumulated.
- E. Maintenance of an inventory system on-site that identifies the earliest date that any universal waste in a group of universal waste items or a group of containers of universal waste became a waste was received.
- F. Any waste developed from the work that exhibits one or more characteristics of hazardous waste, that are not specifically identified by EPA and DEC as Universal Waste, must be handled accordingly and not as a universal waste. See the Hazardous Waste Disposal Specification for those wastes.

3.2 Off-Site Shipment of Universal Waste

- A. Off-Site shipments shall meet the requirements for offsite shipments and is prohibited from sending or taking universal waste to a place other than a designated universal waste handler or a universal waste destination facility.
- B. LQH's of universal waste must notify EPA in writing and develop an EPA identification number or co-ordinate with the facility regarding use of their EPA identification number, prior to exceeding 5,000 kilograms of universal waste onsite.
- C. SQH's do not need to notify EPA, receive an EPA identification number or keep records of shipments of universal waste.
- D. LQH's must keep a record of all universal waste shipments received or sent offsite, and must retain those records for at least three years from the date of receipt or shipment. Records may include invoices, manifests, logs, bills or lading, or other shipping documents.

- E. The Contractor shall provide certified copies of all receipts obtained from designated mercury thermostat recycling collection sites within 30 days of thermostat acceptance by collection site.
- F. The Contractor shall furnish all certified copies of manifests (interim storage and final disposal) within regulatory requirements. Within 30 days from acceptance of the waste by the disposal facility, the Contractor shall provide the Owner with Certificate of Disposal documents, as a requirement for final payment.

END OF SECTION 02 87 00

SECTION 01 45 33 - SPECIAL INSPECTIONS AND STRUCTURAL TESTING

PART 1 GENERAL

1.01 **GENERAL REQUIREMENTS**

A. Special Inspections and Structural Testing shall be in accordance with Chapter 17 of the New York State Uniform Code (NYSUC).

1.02 **DEFINITIONS**

- A. Registered Design Professional: Licensed Professional Engineer or Registered Architect whose seal appears in the Construction Drawings. Unless noted otherwise, references to the Registered Design Professional in this section refer to the Structural Engineer for building design.
- B. RDP for Geotechnical Engineering: Licensed Professional Engineer whose seal appears on the Geotechnical Investigation. The RDP for Geotechnical Engineering shall perform or oversee Agent 2 services as indicated in the Schedule of Special Inspections. If a Geotechnical Investigation was not performed or if the RDP for Geotechnical Engineering is not retained to perform Agent 2 services, a licensed Geotechnical Engineer shall be retained to perform these duties.
- C. Code Enforcement Official: Officer or other designated authority charged with administration and enforcement of the NYSUC. For projects under jurisdiction of New York State agencies such as the Department of Education (SED), State University Construction Fund (SUCF), Office of General Services (OGS), and Dormitory Authority (DASNY), the Code Enforcement Official is an official from agency having jurisdiction.
- D. Special Inspector (SI): Professional Engineer licensed in the State of New York [or other state], acting on behalf of the Owner, that implements the Special Inspection Program for the project.
- E. Testing/Inspecting Agency: Agent retained by Special Inspector or Owner and coordinated by Special Inspector to perform some inspection services on behalf of Special Inspector.
- F. Testing/Inspecting Agency (Agent 1): Professional Engineer licensed in the State of New York [or other state] that is qualified to perform structural inspections. The Special Inspector shall have a minimum of three years of experience performing inspections for similar projects.
- G. Testing/Inspecting Agency (Agent 2): Professional Geotechnical Engineer licensed in the state of New York [or other state], that is qualified to perform inspections for preparation of building subgrades and foundations.
- H. Testing/Inspecting Agency (Agents 3 or 4): Agency or firm qualified to inspect certain structural elements and perform field and laboratory tests to determine the characteristics and quality of building materials and workmanship.
- I. Statement of Special Inspections: Documents prepared by the Registered Design Professional and filed with and approved by the Code Enforcement Official as a condition of obtaining a building permit. The Statement of Special Inspections is represented by this specification and includes the Schedule of Special Inspections.

- J. Schedule of Special Inspections: An itemized list of inspections, verifications, and tests (including frequency) required for the project and individuals, agencies, or firms who will be retained to perform these services. The Schedule of Special Inspections is located in at the end of this specification.
- K. Inspect and Inspection: Visual observation of materials, equipment, or construction work as defined in the Statement of Special Inspections, to determine that the work is in substantial conformance with the requirements of the Contract Documents.
- L. Continuous Special Inspection: Full-time observation of work by the Special Inspector or Testing Agency while the work is being performed.
- M. Periodic Special Inspections: Part-time or intermittent observation of work by the Special Inspector or Testing Agency for work that has been or is being performed and at completion of work.

1.03 **QUALIFICATIONS**

- A. Special Inspector and Testing/Inspecting Agency shall be accepted by the Registered Design Professional (RDP) and the Code Enforcement Official.
- B. Special Inspections shall be performed by agents who have relevant experience for each category of inspections indicated in the drawings.
- C. Minimum qualifications of inspection agents are indicated in the drawings.

1.04 **SUBMITTALS**

- A. Special Inspector and Testing/Inspecting Agency shall submit to the Registered Design Professional and Code Enforcement Official for review, a copy of their qualifications including names and qualifications of each inspector and technician who will be performing inspections or tests.
- B. Special Inspector and Testing/Inspecting Agency shall disclose past or current business relationship or potential conflict of interest with Contractor or Subcontractors whose work will be inspected or tested.

1.05 **PAYMENT**

- A. Owner will engage and pay for services of Special Inspector and Testing/Inspecting Agency.
- B. If materials requiring Special Inspections are fabricated in a plant not within 200 miles of project site, Contractor shall be responsible for travel expenses of Special Inspector or Testing/Inspecting Agency.
- C. Contractor shall be responsible for cost of retesting or reinspection of work failing to comply with requirements of Contract Documents.

1.06 OWNER RESPONSIBILITIES

A. Owner will provide Special Inspector with complete set of Contract Documents sealed by the Registered Design Professional and approved by the Code Enforcement Official.

1.07 **CONTRACTOR RESPONSIBILITIES**

- A. Contractor shall cooperate with Special Inspector and his agents so Special Inspections and testing may be performed without hindrance.
- B. As indicated in the Schedule of Special Inspections, Contractor shall notify Special Inspector or Testing/Inspecting Agency at least 48 hours in advance of a required inspection or test.
- C. Contractor shall provide incidental labor and facilities to provide access to work to be inspected or tested, to obtain and handle samples at site or at source of products to be tested, to facilitate tests and inspections, and for storing and curing of test samples.
- D. If Special Inspections or testing require the use of Contractor's scaffolding to access work areas, Contractor shall provide competent person to perform daily evaluation of scaffolding to verify it is safe to use. Contractor shall notify Special Inspector and Testing Agent of this review before each use. Contractor is responsible for safe assembly and stability of scaffolding.
- E. Contractor shall keep latest set of Construction Drawings, field sketches, accepted shop drawings, and specifications at project site for field use by Inspectors and Testing Technicians.
- F. Contractor shall perform remedial work if required and sign nonconformance reports stating remedial work has been completed. Contractor shall submit signed reports to Special Inspector as work proceeds.
- G. The Special Inspection program shall not relieve Contractor of obligation to perform work in accordance with requirements of Contract Documents or from implementing an effective Quality Control program.
- H. Contractor shall be solely responsible for construction site safety.

1.08 **SPECIAL INSPECTOR RESPONSIBILITIES**

- A. Special Inspector shall hold a Special Inspections preconstruction meeting at least 7 days prior to initial planned date for start of construction. Attendees shall include Contractors, Owner's Representative, Testing Agency, Special Inspector, and Registered Design Professionals for Structural Engineering and for Architecture. Discussions shall include the following:
 - 1. Review of specifications and Schedule of Special Inspections for work requiring Special Inspections.
 - 2. Responsibilities of Contractors, Owner, Testing Agency, Special Inspector, and Registered Design Professional.
 - 3. Notification and reporting procedures.
- B. Special Inspector shall record and distribute minutes from the Special Inspection Preconstruction meeting.
- C. Special Inspector shall review inspection and material testing reports and coordinate the services of the Testing/Inspecting Agencies as follows:

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- Verify inspections have been performed in accordance with the Schedule of Special Inspections.
- 2. Verify reports are being distributed to the Contractor, Owner, Architect, Code Enforcement Official, and Registered Design Professional (RDP) for Structural Engineering.
- 3. Verify discrepancies have been recorded and are being tracked.
- D. Special Inspector shall make site visits to inspect work as designated in the Statement of Special Inspections. Discrepancies will be brought to the attention of the Contractor and RDP.
- E. Special Inspector shall keep records of inspections and tests.
- F. Special Inspector shall review Certificates of Compliance for conformance with the standards specified in the Contract Documents. Discrepancies will be brought to the attention of the Contractor and RDP.
- G. Special Inspector shall submit a final report of Special Inspections in accordance with Section 3.4 of this specification.

1.09 **LIMITS ON AUTHORITY**

- A. Special Inspector or Testing/Inspecting Agency shall not release, revoke, alter, or enlarge on requirements of Contract Documents.
- B. Special Inspector or Testing/Inspecting Agency shall not have control over Contractor's means and methods of construction.
- Special Inspector or Testing/Inspecting Agency shall not be responsible for construction site safety.
- D. Special Inspector or Testing/Inspecting Agency shall not have authority to stop work.

PART 2 INSPECTIONS AND TESTING

2.01 STRUCTURAL STEEL

- A. Special Inspector shall perform the following:
 - Verify Fabricator maintains detailed fabrication and Quality Control procedures:
 - a. Review procedures for completeness and adequacy relative to code requirements.
 - b. If Fabricator is designated as AISC-Certified Fabricator, Special Inspection for shop-fabricated members and assemblies is not required.
 - c. If Fabricator is not designated as AISC-Certified Fabricator, Contractor shall reimburse Owner via execution of credit change order for cost of Special Inspections and testing in Fabricator's shop.
 - Review manufacturer's Certificates of Compliance for high-strength bolts and weld filler material.
 - 3. Review certified mill test reports.
 - 4. Inspect steel frame joint details for compliance with approved Construction Documents.

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- B. Testing Agency shall perform the following:
 - 1. Material verification of high-strength bolts, nuts, and washers, including review of identification markings and manufacturer's Certificate of Compliance.
 - a. Test high-strength bolt assemblies in a tension measuring device to verify material conformance prior to installation. Assemble bolt, nut, and washer on a loose plate and tension by tightening nut to develop required tension in Table 7.1 of "Specification for Structural Joints Using High Strength Bolts."
 - 2. Verification that copies of accepted field welding procedure specifications are available on site for reference by erector's welders.
 - 3. Verification that erector's welder's qualifications are current and appropriate for joint type, welding position, and welding process to be used.
 - 4. Verification that joint fit-up for partial and complete penetration groove welds are in compliance with AWS tolerances as follows:
 - a. Visually inspect 50 percent of joints scheduled for partial and complete penetration groove welds.
 - b. Visually inspect 50 percent of column splices scheduled for partial and complete penetration groove welds.
 - Visually inspect 100 percent of tension member splices, column splices, and moment connections that are part of the lateral force resisting system.
 - 5. Inspect high-strength bolting.
 - a. Joints designated as snug tight require only visual inspection.
 - b. Joints designated as fully tensioned or slip critical require visual inspection during installation.
 - Checking after installation using calibrated wrenches will not be permitted.
 - 6. Material verification of structural steel and metal deck, including review of identification markings.
 - 7. Perform pull-out tests on adhesive, expansion, and sleeve anchors.
 - 8. Material verification of weld filler materials, including review of identification markings.
 - 9. Inspect welding of structural steel.
 - a. Visually inspect welds according to AWS.
 - b. Schedule inspection of field welding in timely manner utilizing vertical access means and methods utilized by Contractor to perform the welding.
 - c. Ultrasonic inspection (UT) according to ASTM E 587 is required for partial and complete penetration field groove welds as follows:
 - 1) UT inspect 50 percent of joints scheduled for partial and complete penetration groove welds.
 - 2) UT inspect 50 percent of column splices scheduled for partial and complete penetration groove welds.

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- 3) UT inspect 100 percent of tension member splices, column splices, and moment connections that are part of lateral force resisting system.
- 4) UT inspect 50 percent or minimum of six of the joints scheduled for partial or complete penetration groove welds completed by each welder. Increase inspection percentage to 100 percent for each welder with more than one rejected weld.
- d. Magnetic particle inspection according to ASTM E 709 is required for Fabricators not certified by AISC Quality Certification Program for 10 percent of shop fillet welds.
- e. Magnetic particle inspection according to ASTM E 709 is required for 10 percent of field fillet welds.
- f. UT inspect according to ASTM E 587 is required for 10 percent of shop partial or complete penetration welds and 100 percent of shop partial or complete penetration groove welds in tension members.
- g. Inspect shear connectors in accordance with AWS D1.1, Section 7. Observe bend tests performed by Contractor. Refer to Section 053000, Part 3 for bend test requirements.
- h. Inspect every shear connector by striking once with 10-pound hammer. Direction of hammer swing shall be parallel with member containing connector. Inspection by striking with hammer does not replace bend tests in accordance with AWS.
- 10. Inspect condition of erected materials.
 - a. Visually inspect erected steel for damage.
 - b. Visually inspect connections and framing to verify compliance with Contract Documents and accepted shop drawings.
- 11. Inspect column plumbness and splices:
 - a. Inspect erected columns for plumbness within tolerances specified in Section 051200, Part 3: Execution.
 - b. Inspect columns for fit up within tolerances specified in AISC *Manual of Steel Construction*, Specification Section M4.
- 12. Additional testing shall be performed as follows if required.
 - a. Testing Agency shall perform additional tests of connections and framing members field modified by Contractor to correct errors in shop drawings, fabrication, or erection.
 - b. Testing and reporting of field modifications shall be in accordance with this section, Special Inspections, and have the following additional requirements:
 - 1) Magnetic particle inspection according to ASTM E 709 is required for 100 percent of fillet welds.
 - 2) Ultrasonic inspection according to ASTM E 587 is required for 100 percent of full-penetration welds.
 - 3) Perform pull-out tests on 100 percent of each type of adhesive, expansion, or sleeve anchor used by applying a load equal to 125 percent of allowable pull-out strength listed in manufacturer's literature.

c. Contractor shall reimburse Owner for cost of additional tests performed.

PART 3 DOCUMENTATION

3.01 RECORDS AND REPORTS

- A. Prepare detailed reports of each test or inspection. Include the following general information:
 - 1. Project name and number.
 - 2. Date of test or inspection.
 - 3. Name of Testing Agency or Inspecting Agency.
 - 4. Name of technician or inspector.
 - 5. Weather conditions.
 - 6. Locations and elevations of specific areas tested or inspected referenced to grid lines.
 - 7. Description of test or inspection.
 - 8. Reference to applicable ASTM standard.
 - 9. Summary of observations, results, and recommendations.
 - 10. Description of areas or materials requiring retesting or reinspection.
- B. Reports for each drilled pile or pier shall contain the following information:
 - 1. Elevation of bottom and top.
 - 2. Centerline location at top.
 - 3. Variation of shaft from plumb.
 - 4. Elevation of top and bottom of casings left in place.
 - 5. Volume of grout or concrete in each pile or pier.
 - 6. Condition of bearing strata and verification of review by RDP for Geotechnical Engineering.
 - 7. Water seepage.
 - 8. Unusual conditions.
 - 9. Delays in placement of grout or concrete, and location of construction joints in shafts.
 - 10. Dates of starting excavation or drilling, completion of excavation or drilling, inspections, and placement of concrete.
 - 11. Number of blows for every foot penetration and rate of penetration under last five blows of hammer.
 - 12. Kind and size of hammer used in driving.
- C. Concrete compressive strength test reports shall contain the following information:
 - 1. Name of Contractor and concrete supplier.
 - 2. Name of concrete testing service.
 - 3. Name of technician making and testing specimens.
 - 4. Truck number and delivery ticket number.
 - 5. Date and location within structure of concrete placement.
 - 6. Concrete type, class, mix proportions of materials, and design compressive strength at 28 days.
 - 7. Slump, air content, unit weight, and concrete temperature.
 - 8. Total time period between batching and completing placement for each truck.
 - 9. Compressive strength and type of break for tests.

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- D. Field reports for concrete inspection shall contain general information noted above plus ambient temperature and cylinder numbers.
- E. Test reports for masonry materials shall include proportions, composition, and compressive strength.

3.02 **COMMUNICATION**

- A. Testing/Inspecting Agency shall immediately notify Contractor, Special Inspector, and Registered Design Professional by telephone, fax, or e-mail of test results failing to comply with requirements of Contract Documents.
- B. Special Inspector shall immediately notify Contractor of work found to be in nonconformance with Contract Documents during inspections. If nonconforming work is not corrected while Special Inspector is on-site, Special Inspector shall notify Registered Design Professional within 24 hours (one business day) and issue an inspection report noting the non-conformance.
- C. Special Inspector and each Testing/Inspecting Agent shall use a log to record and track non-conforming work during construction. Non-Conformance log shall include the following information:
 - 1. Description of non-conformance.
 - 2. Date of non-conformance.
 - 3. Description of RDP response if received.
 - 4. Status of nonconformance: 'Open' or 'Closed.'

Updated log shall be attached to each inspection report. Special Inspector or Testing/Inspecting Agent may use Non-Conformance Log form provided at end of this section or other similar form.

D. If non-conforming work is not corrected at time of substantial completion of structure or other appropriate time, Special Inspector shall notify Code Enforcement Official.

3.03 **DISTRIBUTION OF REPORTS**

- A. Testing/Inspecting Agency shall submit reports to Special Inspector and Registered Design Professional within 7 days of inspection or test. Legible handwritten reports may be submitted if final typed copies are not available.
- B. Special Inspector shall distribute reports to the Contractor, Owner, Architect, Code Enforcement Official, and RDP for Structural Engineering within 7 days of inspections. Legible handwritten reports may be submitted if final typed copies are not available.
- C. If requested by the Code Enforcement Official, Special Inspector shall submit interim reports that include inspections and tests performed since beginning of construction or since previous interim report. Interim reports shall be addressed to the Code Enforcement Official with copies sent to the Registered Design Professionals (Structural Engineer and Architect) and Contractor. Interim reports shall be signed by Agent performing inspections.

3.04 FINAL REPORT OF SPECIAL INSPECTIONS

A. At completion of work, each Testing/Inspecting Agency shall submit Agent's Final Report

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- of Special Inspections to Special Inspector stating work was completed in substantial conformance with Contract Documents and appropriate inspections and tests were performed. Testing/Inspecting Agency may use Agent's Final Report of Special Inspections form provided at end of this section or other similar form.
- B. At completion of work, Special Inspector shall compile a Final Report of Special Inspections including each Agent's Final Report of Special Inspections. The Final Report of Special Inspections shall state required inspections have been performed and itemize nonconforming work not corrected or resolved as required by the NYSUC. Interim reports from all Agents will not be included unless specifically requested by the Owner or Code Enforcement Official. The Final Report shall be stamped by a New York State Professional Engineer.
- C. Special Inspector may use Final Report of Special Inspections form provided at end of this section or other similar form based on CASE Form 102-2001.
- D. Special Inspector shall submit Final Report of Special Inspections to Registered Design Professional and Code Enforcement Official prior to issuance of a Certificate of Use and Occupancy.

AGENT X NON-CONFORMANCE LOG

PROJECT:
PROJECT NUMBER:

Status	(See Note						
Date Contractor Verification Received	(See Note						
SI Reinspectio n Required							
Date of RDP Response Received							
Summary of Non- Conformance							
Special Inspection Report No. Reference/Date							
Non- Conformance Item No.	(See Note 1)	NC 1	NC 2	NC 3	NC 4	NC 5	NC 6

New items are in bold. For each non-conformance item above, the General Contractor or Subcontractor must sign and submit the Contractor Verification statement located in the RDP Response Report. 2. Non-conformance items remain "OPEN" until the Contractor Verification have been received. When the signed verifications have been received by the RDP, the item will be "CLOSED".

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Testing/Inspection Agent's Final Report of Special Inspections

Project Name:	Inspection Agent:
Location:	
Owner:	_Special Inspector:
Owner Address:	Structural RDP:
Ryan Biggs Clark Davis Project No.:	_
project and designated for this Agent in the	f, the Special Inspections and testing required for this Statement of Special Inspections (which includes of Special Inspections) have been performed and esolved except for the following:
Comments:	
[Attach continuation sheets if required to comple	ete description of uncorrected discrepancies.]
Respectfully submitted, Agent of the Special Inspector [TITLE]	
(Type or print name)	
Address	
	Design Professional Seal or Certification
City, State, Zip	

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Final Report of Special Inspections

Project Name:	Special Inspector:
Location:	Special Inspector: Special Inspector Project No.:
Owner:	Architect of Record:
Owner Address:	Structural RDP:
Ryan Biggs Clark Davis Project No.:	
indicated in the Statement of Special Insp	e, and belief, Special Inspections required for this project, as ections, (which includes Specification Section 01 45 33 and the en performed and discovered discrepancies have been reported
Comments:	
[Attach continuation sheets if required	to complete description of uncorrected discrepancies.]
part of this Final Report. Upon request	al Report form a basis for and are to be considered an integral, the interim Testing and Special Inspection reports can be ial Inspections are attached and are also a part of this Final
Respectfully submitted, Special Inspector [TITLE]	
(Type or print name)	
Signature Date	Professional Seal
	Professional Seaf

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Contractor's Statement of Responsibility

Project Name:	Contractor:	
Location:	Contractor Project No.:	
Owner:	Architect of Record:	
Owner Address:	Structural RDP:	
Ryan Biggs Clark Da	s Project No.:	
As the Contractor resunderstand the special of Special Inspection Inspections). I verify the spections of the special	onsible for the construction of, I review requirements for the seismic/wind-force-resisting systems listed in the S (which includes Specification Section 01 45 33 and the Schedule of following:	ewed and Statement of Special
and the distribute. Control will be a Code Enforcem Each person ex	kercising control within my organization, the method and frequency of n of reports have been reviewed and are understood. ercised to obtain conformance with the Construction Documents approvat Official. cising such control and his position in the organization have been identified been reviewed and accepted by the RDP.	ed by the
Comments [Attach co	tinuation sheets if required]:	
Respectfully submitte		
(Type or print name)		
Signature	Date	
Address		
 City, State, Zip		

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SCHEDULE OF SPECIAL INSPECTIONS FOR BUILDING STRUCTURES

INSPECTION AGENTS
1. SPECIAL INSPECTOR, P.E.
2. GEOTECHNICAL ENGINEERING/INSPECTOR
3. TESTING/INSPECTING AGENCY
4. TESTING/INSPECTING AGENCY

THE OWNER OR THE OWNER'S REPRESENTATIVE SHALL RETAIN A SPECIAL INSPECTOR WHO WILL PERFORM INSPECTIONS AND TESTING AND/OR OVERSEE THE WORK OF AN INSPECTION AND TESTING AGENCY. THE SPECIAL INSPECTOR SHALL BE A PROFESSIONAL ENGINEER EXPERIENCED IN THE DESIGN OF BUILDINGS AND REGISTERED IN THE STATE OF NEW YORK.

THE CONTRACTOR OR SUBCONTRACTOR PERFORMING THE WORK CANNOT RETAIN THE SPECIAL INSPECTOR. ANY CONFLICT OF INTEREST MUST BE DISCLOSED TO THE CODE ENFORCEMENT OFFICIAL PRIOR TO COMMENCING CONSTRUCTION.

THE NAMES AND QUALIFICATIONS OF AGENTS MUST BE SUBMITTED TO THE CODE ENFORCEMENT OFFICIAL AND REGISTERED DESIGN PROFESSIONAL PRIOR TO COMMENCING CONSTRUCTION. THE QUALIFICATIONS OF ALL PERSONNEL PERFORMING INSPECTION AND TESING ACTIVITIES ARE SUBJECT TO APPROVAL BY THE CODE ENFORCEMENT OFFICIAL. MINIMUM QUALIFICATIONS OF THE TESTING AGENTS ARE INDICATED IN THE SCHEDULE.

KEY OF MINIMUM QUALIFICATIONS OF INSPECTION AGENTS (MQIA)				
PE	NEW YORK STATE REGISTERED PROFESSIONAL ENGINEER			
RDP	NEW YORK STATE REGISTERED DESIGN PROFESSIONAL ENGINEER			
EIT	ENGINEER IN TRAINING SUPERVISED BY A PE – INTERN ENGINEER			
ACI-CCI	AMERICAN CONCRETE INSTITUTE CERTIFIED CONCRETE CONSTRUCTION INSPECTOR			
ACI-CFTT	AMERICAN CONCRETE INSTITUTE CERTIFIED CONCRETE FIELD TESTING TECHNICIAN – GRADE 1			
ICC-RCSI	ICC REINFORCED CONCRETE SPECIAL INSPECTOR			
ICC-RCC	ICC REINFORCED CONCRETE CERTIFICATION			
ICC-SMC	ICC STRUCTURAL MASONRY CERTIFICATION			
ICC-SSWC	ICC STRUCTURAL STEEL AND WELDING CERTIFICATION			
AWS-CWI	AMERICAN WELDING SOCIETY CERTIFIED WELDING INSPECTOR			
ICC-SAFC	ICC SPRAY-APPLIED FIREPROOFING CERTIFICATION			
ASNT	AMERICAN SOCIETY OF NON-DESTRUCTIVE TESTING – LEVEL II OR III			
ICC-PCC	ICC PRESTRESSED CONCRETE CERTIFICATION			

CATEGORY	MINIMUM QUALIFICATIONS OF INSPECTION AGENTS (MQIA)
A. REINFORCED CONCRETE	CURRENT ICC REINFORCED CONCRETE SPECIAL INSPECTOR OR ACI CONCRETE CONSTRUCTION INSPECTOR
	CONCRETE FIELD TESTING CAN BE BY AN ACI CONCRETE FIELD TESTING TECHNICAL WITH GRADE 1 CERTIFICATION
	3. INTERN ENGINEER WITH RELEVANT EXPERIENCE
	4. NEW YORK STATE REGISTERED DESIGN PROFESSIONAL ENGINEER (RDP) WITH RELEVANT EXPERIENCE
B. WELDING	CURRENT AWS CERTIFIED WELDING INSPECTOR
	2. CURRENT ICC STRUCTURAL STEEL AND WELDING CERTIFICATE PLUS ONE YEAR OF RELEVANT EXPERIENCE
	3. CURRENT LEVEL II CERTIFICATION FROM THE AMERICAN SOCIETY FOR NON-DESTRUCTIVE TESTING (NDT)
	4. CURRENT LEVEL III PROVIDED PREVIOUSLY CERTIFIED AS NDT LEVEL II
C. HIGH-STRENGTH BOLTING AND STEEL	CURRENT ICC STRUCTURAL STEEL AND WELDING CERTIFICATE PLUS ONE YEAR OF RELEVANT EXPERIENCE
FRAME INSPECTION	2. INTERN ENGINEER WITH RELEVANT EXPERIENCE
	3. RDP WITH RELEVANT EXPERIENCE
D. SPRAYED FIRE-RESISTANT	CURRENT ICC SPRAY-APPLIED FIREPROOFING CERTIFICATION AND ONE YEAR OF RELEVANT EXPERIENCE
MATERIALS	2. INTERN ENGINEER WITH RELEVANT EXPERIENCE
	3. RDP WITH RELEVANT EXPERIENCE
E. SMOKE CONTROL	EXPERTISE IN FIRE PROTECTION ENGINEERING, MECHANICAL ENGINEERING, AND CERTIFIED AS AN AIR BALANCER
	2. THE RDP RESPONSIBLE FOR DESIGN
F. GENERAL	QUALIFIED PERSON WITH ONE YEAR OF RELEVANT EXPERIENCE
	2. INTERN ENGINEER WITH RELEVANT EXPERIENCE
	3. RDP WITH RELEVANT EXPERIENCE

STEEL CONSTRUCTION: SPECIAL INSPECTION IS REQUIRED. (TABLE 1705.2.1)							
TYPE	AGENT NO.	MQIA	CONT.	PERIODIC	REFERENCED STANDARD	CODE	
MATERIAL VERIFICATION OF STRUCTURAL STEEL AND METAL DECK:							
A. IDENTIFICATION MARKINGS TO CONFORM TO ASTM STANDARDS SPECIFIED IN THE APPROVED CONSTRUCTION DOCUMENTS.	1 OR 3	E.1-E.3		X 100%			
B. MANUFACTURER'S CERTIFIED MILL TEST REPORTS REQUIRED.	1			X 100%			
MINIMUM INSPECTIONS PRIOR TO WELDING	3	D.1, D.2, M.1	Х		AISC 360 TABLE N5.4-1		
MINIMUM INSPECTIONS DURING WELDING	3	D.1, D.2, M.1	Х		AISC 360 TABLE N5.4-2		
MINIMUM INSPECTIONS AFTER WELDING	3	D.1, D.2, M.1		X 100%	AISC 360 TABLE N5.4-3		
UT SHALL BE PERFORMED ON CJP GROOVE WELDS SUBJECTS TO TRANSVERSELY APPLIED TENSION LOADING IN BUTT-T, AND CORNER JOINTS	3	D.1, D.2, M.1			AISC 360 N5.5b		
A. FOR RISK CATEGORY III OR IV STRUCTURES				X 100%			
B. FOR RISK CATEGORY II STRUCTURES				X 10%			
MAGNETIC PARTICLE SHALL BE PERFORMED ON FILLET WELDS				X 10%			
MINIMUM INSPECTIONS PRIOR TO HIGH- STRENGTH BOLTING (EXCEPT FOR SNUG-	3	E.1, M.1	Х		AISC 360 TABLE N5.6-1		

TIGHT JOINTS).						
MINIMUM INSPECTIONS DURING HIGH- STRENGTH BOLTING (EXCEPT FOR SNUG- TIGHT JOINTS).	3	E.1, M.1			AISC 360 TABLE N5.6-2	
A. TURN-OF-NUT WITH MATCH MARKING, DIRECT- TENSION- INDICATOR METHOD, TWIST- OFF-TYPE TENSION CONTROL BOLT METHOD				X 100%		
B. CALIBRATED WRENCH METHOD, TURN-OF-NUT METHOD WITHOUT MATCHMAKING.			X			
MINIMUM INSPECTION AFTER HIGH-STRENGTH BOLTING	3	E.1, M.1		Х	AISC 360 TABLE N5.6-3	
MINIMUM INSPECTIONS FOR SNUG-TIGHT HIGH- STRENGTH BOLTING – 100% VISUAL.	3	E.1, M.1		Х		
INSPECT FABRICATED OR ERECTED STEEL AS APPROPRIATE TO VERIFY COMPLIANCE WITH THE CONSTRUCTION DRAWINGS. INSPECT BRACES, STIFFENERS, MEMBER LOCATIONS, AND JOINT DETAILS.	1 OR 3	E.1, E.2, E.3, M.1		X	AISC 360 N5.7	
VERIFY COLUMN PLUMBNESS AND SPLICES	3	E.1		X 100%		
PERFORM PULL-OUT TESTS ON DRILLED-IN, ADHESIVE, EXPANSION, AND SLEEVE ANCHORS: A. TEST 10% OF EACH ANCHOR TYPE (MINIMUM OF	3	E.1		X 100%	ACI 318 17.8.2	

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	2) BY APPLYING A LOAD EQUAL TO 125% ALLOWABLE PULL-OUT STRENGTH.				
В.	TEST 100% OF ANCHORS BY PULLING WITH A CLAW HAMMER USING THE WEIGHT OF ONE MAN.				
C.	ADHESIVE ANCHORS INSTALLED IN HORIZONTALLY OR UPWARDLY INCLINED ORIENTATIONS TO RESIST SUSTAINED TENSION LOADS.		X	ACI 318 17.8.2.4	

END OF SECTION 01 45 33 - SPECIAL INSPECTIONS & STRUCTURAL TESTING (11/18)

SECTION 03 34 60 - CONCRETE FLOOR FINISHING

PART 1 GENERAL

1.01 **DESCRIPTION**

A Scope of Work.

The work of this section includes all labor, materials, plant tools, equipment, trucking, insurance and all related items to furnish and install all work of this section as shown by the drawings and specifications.

1. Sealing and painting exposed concrete floors with epoxy coating.

1.02 **SUBMITTALS**

- A. Submit under provisions of Section 013300.
- B. Product Data: For each sealing system indicated, including:
 - 1. Material List: An inclusive list of required coating materials. Indicate each material and cross-reference specific coating, finish system, and application. Identify each material by manufacturer's catalog number and general classification.
 - 2. Preparation instructions and recommendations.
 - 3. Manufacturer's Information: Manufacturer's technical information, including label analysis and instructions for handling, storing, and applying each coating material.
 - 4. Manufacturer's information inclusive of VOC g/L content complying with LEED v4 New Construction Indoor Air Quality requirements, inclusive of those outlined in Section 01 8113 of this book, and SCAQMD requirements.

1.03 **DEFINITIONS**

- 1. LEED as used in this section refers to Leadership in Energy and Environmental Design. Products listed meet LEED criteria for environmentally safe interior primers and coatings.
- 2. VOC as used in this Section refers to Volatile Organic Compounds found in primers and coatings. The level of VOC's appear after each product listed in the Schedule in grams per liter (g/L).
- 3. CDPH Standard Method v1.1: This credit uses the California Department of Public Health (CDPH) Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers, v.1.1–2010, for the emissions testing and requirements of all products and materials

1.04 **QUALITY ASSURANCE**

- A. Installer Qualifications: A firm or individual experienced in applying paints and coatings similar in material, design, and extent to those indicated for this Project, whose work has resulted in applications with a record of successful in-service performance.
- B. Manufacturer Qualifications: A firm with minimum ten (10) years successful experience with coatings specified in this Section.

- C. Existing Concrete Surface: The existing concrete shall be in a sound condition. Do not apply sealer system to damaged, loose or spalling concrete. Do not apply sealer system to damp concrete. Perform previous coating test to determine if concrete is bare/open or previously coated.
 - 1. Previously Coated Existing Concrete Floors:
 - a. Determine if the previous coating is a permanent coating or removable coating by applying a small amount of floor stripper to the surface. If previous coating is a permanent coating, perform Adhesion Test to make sure previous coating adheres to the surface. If the previous coating does not adhere properly, it shall be removed with the "Malish Diamabrush System." Previous coating shall be visually sound without any peeling or flaking. If it is not sound, remove the previous coating with the "Malish Diamabrush System."
 - .1 Previous Coating Test: Sprinkle a small amount of water on the existing concrete floor surface. If the water beads up instead of soaking into the concrete surface, there is an existing coating or seal.
 - .2 Adhesion Test: Using a razor blade angled 45 degrees to the floor, scribe an "X" pattern all the way through the coating to bare concrete. Apply duct tape to the area and firmly press into place with your fingers. After allowing the tape to sit for 60 seconds, quickly pull off the tape. If most of the seal is pulled off, adhesion is not sufficient for coating.
 - 2. Bare/Open Existing Concrete Floors:
 - a. If the concrete floor slab is bare/open, perform an "Excess Moisture Test" to ensure there is no excess moisture or hydro-static pressure in the existing concrete slab. If test reveals excess moisture or hydrostatic pressure, STOP, correct the moisture problem before proceeding. Do NOT proceed if problem cannot be corrected. Multiple test patches may be performed on large floors.
 - .1 Excessive Moisture Test: Attach a two (2) foot by two (2) foot square of clear plastic sheeting to the floor by sealing all four (4) sides with duct tape. Wait 24 hours. If moisture beads on the plastic or the floor is discolored from being damp, the floor slab contains excess moisture.
 - 3. If there are any cracks or chips that need to be filled in the existing concrete slab prior to preparation for the three (3) part sealer system, repair as recommended by the sealer system manufacturer.
- D. LEED v4 compliance, LEED v4 compliance, 100 percent of interior applied coatings products by volume must comply with the we-applied VOC content limits. Coatings wetapplied on site must comply with applicable VOC limits of the California Air Resources Board (CARB) 2007, Suggested Control Measure (SCM) for Architectural Coatings, or the South Coast Air Quality management District (SCAQMD) Rule1113, effective June 3, 2011. Both the CARB 2007 SCM and SCAQMD Rule 1113 are cited in the LEED v4 EQ Credit 2, Low Emitting Materials Reference Guide.

1.05 **DELIVERY, STORAGE, AND HANDLING**

A. Deliver materials to Project site in manufacturer's original, unopened packages and containers bearing manufacturer's name and label.

B. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 50 degrees F. Maintain storage containers in a clean condition, free of foreign materials and residue.

1.06 **PROJECT CONDITIONS**

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits. Concrete must be cool enough to allow full concrete stain penetration.
- B. Unless indicated otherwise, apply sealer system only when temperatures of the existing concrete surfaces to be sealed and surrounding air are between 50- and 95-degrees F.
- C. Do not apply sealer system if relative humidity is higher than 85 percent.

PART 2 PRODUCTS

2.01 MATERIALS (BASIS OF DESIGN)

A. Basis of Design: PPG Amerlock 2 Epoxy Coating, Self-Priming, Low VOC, Semi-Gloss, Color Match PPG 1005-4 Slate Pebble, two coats required.

PART 3 EXECUTION

3.01 **INSTALLATION**

- A. Verify floor surfaces are acceptable for application of this work. Notify the Architect's office in writing of unsatisfactory preparation before proceeding.
- B. Beginning of installation means acceptance of existing surfaces.

3.02 PREPARATION FOR EPOXY CONCRETE SEALER

- Remove existing ceramic floor tile and thin set adhesive down to existing bare concrete slab.
- B. Determine if the existing concrete floor slab is "open" (bare) or previously coated as specified in paragraph 1.03(C) above.
- C. Preparation of Open (Bare) Existing Concrete Floor: Apply a test patch and check for adhesion in accordance with paragraph 1.03(C) above.
 - 1. Scrub with a floor machine or automatic scrubber equipped with a 3M SPP pad, using a degreaser or cleaner recommended by the sealer manufacturer similar and equal to "Hillyard" SM-1 at 6 oz. per gallon of water.
 - 2. Remove the cleaning solution with a wet vacuum or auto-scrubber and rinse the floor thoroughly with clean water. If necessary, repeat cleaning procedure until concrete is clean and free of dirt and oil.
 - Apply a small test area to make sure the existing concrete floor slab isn't contaminated. Coating shall be applied and allow to uniformly dry. If the existing concrete floor slab is contaminated, continue with alternate prep method of using the "Malish Diamabrush" system. After using the "Malish Diamabrush" system, retest.

3.04 **CLEANING**

A. After completing concrete sealing, clean adjacent surfaces. Remove spattered sealer by washing and scraping without scratching or damaging adjacent finished surfaces.

3.05 **PROTECTION**

- A. Protect work of other trades against damage from sealer. Correct damage by cleaning, repairing or replacing, and resealing, as approved by the Architect.
- B. Provide "Wet Paint" signs to protect newly sealed concrete floors. After completing sealing operations, remove temporary protective wrappings provided by other to protect their work.
- After work of other trades is complete, touch up and restore damaged or defaced sealed surfaces.

END OF SECTION 03 34 60 - CONCRETE FLOOR FINISHING

SECTION 042000 - UNIT MASONRY

PART 1 GENERAL

1.01 **DESCRIPTION**

- A. Scope of Work:
 - 1. All masonry and accessory items for a complete Installation.
 - a. Repair/replace existing CMU walls at locations where removals occur to interface with new construction.

1.02 **QUALITY ASSURANCE**

- A. Mason Qualifications:
 - 1. Installer: Company specializing in performing the work of this Section with minimum 5 years documented experience.
 - 2. Skilled craftsmen, experienced in laying concrete block masonry units, shall be employed.
 - 3. Knowledgeable and experienced in protection and precautions required during cold weather masonry construction.
- B. Source Quality Control:
 - 1. Continuity: All masonry units of one type supplied from same source.

1.03 **SUBMITTALS**

- A. Product Data: Provide product data on all specified products describing physical and performance characteristics and sizes.
- B. Samples:
 - 1. Anchors and ties.
- C. Certificates:
 - 1. Certification: From supplier that all masonry units are in conformance with provisions as required by specification.

1.04 **PRODUCT DELIVERY, STORAGE AND HANDLING**

- A. Delivery: Masonry materials delivered dry and undamaged.
- B. Storage:
 - 1. Cement, Lime: Rain tight shed.
 - 2. Concrete Blocks: On planks and protected from the weather.
 - 3. Damaged Materials: Remove promptly from site.
 - 4. Sand: In area not previously contaminated by salt.
- C. Handling:
- Care shall be taken not to break off corners, chip or fracture faces of exposed

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edges.

2. Damaged units will be rejected.

PART 2 PRODUCTS

- 2.01 Gray Portland Cement: Type I, ASTM C-150
- 2.02 Hydrated Lime: ASTM C-207, Type S.
- 2.03 Water: Clean, free from oil, acids, alkali, salt or other deleterious substances.
- 2.04 Aggregate: Clean, sharp, natural sand, free from loam, clay, organic impurities and deleterious substances, ASTM C-144.
- 2.05 Mortar:
 - A. All Interior Units: Type S per ASTM C-270 using gray Portland cement, lime, and sand proportioned 2:1:8 by volume.

2.06 **CONCRETE MASONRY UNITS**

A. Hollow Non-Load Bearing Units: ASTM C129, Type I - Moisture Controlled; normal weight.

2.07 REINFORCEMENT

- A. Horizontal Joint Reinforcement: Welded, of truss design, mill galvanized, with prefabricated corners and intersections, of appropriate width, for wall conditions.
 - Single Wythe Walls: Welded No. 9-gauge mill galvanized, truss-type at 16 inches o.c.
- B. Existing Block To New Block Tie-In Anchor: Corrugated Buck Anchor, Hot Dip Galv., 2" wide x 16 ga. x 8" long.

PART 3 EXECUTION

3.01 **INSPECTION**

- A. Inspect existing conditions to assure surfaces are properly prepared, free of dirt and other material.
- B. Start of work constitutes acceptance of substrata.
- C. Report to Architect in writing of conditions which will adversely affect the execution of work.

3.02 PREPARATION

A. Remove adjacent existing block to provide full block course. THE EXISTING BONDING IS STACK BOND and shall be maintained.

3.03 INSTALLATION

A. Mortar

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- 1. Mixing:
 - a. Equipment: Clean and watertight.
 - b. Materials: Clean.
 - c. Measuring: Positive methods, determined at start of job.
 - d. Water: Hold to minimum.
 - e. Method: Cement, lime and sand mixed dry and thoroughly, remix wet.
 - f. Retempering: Discard mortar after initial set except for pointing.
 - g. Waterproofing Admixture: Add in quantity recommended by manufacturer.
- B. Single wythe partitions and fire separations:
 - 1. Laying:
 - a. Masonry block cells vertical, all block laid in full bed of mortar.
 - b. Vertical joints fully buttered and pointed neatly.
 - c. Wetting of concrete block units prohibited.
 - d. Joints: MATCH EXISTING. In areas where block will be covered, cut joint flush.
 - 2. Coursing: MATCH EXISTING.
 - 3. Bonding: MATCH EXISTING.
 - 4. Topping Out: Sawed blocks fitted tightly against roof deck.
 - 5. Fire Separations: Provide certification for required rating.
 - a. Topping Out: Smoke tight to bottom of steel beams and at decks.
 - 6. Horizontal Joint Reinforcing: Every second course 16-inch o.c. vertically. Install reinforcing in the first two courses above finish floor and the last two courses below the structural deck of top of wall.
 - 7. Existing Block To New Block Tie-In Anchor: Every second course 16-inch o.c. vertically. Install at in the first two courses above finish floor and the last two courses below the structural deck of top of wall.
 - a. Fasten with galvanized steel masonry fasteners, 1½" min. embedment.
- C. Setting, Frames and Lintels:
 - 1. Hollow Metal Door Frames: Furnished under Section 081000, build-in anchors, fill back of frames solid with cement grout.
 - 2. Lintels: Furnished under Section 055000, build-in as scheduled. Provide 6" bearing openings less than 6'-0", 8" otherwise.

3.04 **CLEANING DOWN AND POINTING**

- A. Pointing:
 - 1. Mortar: Lime, cement mortar, re-tempered after setting one hour after mixing.
 - 2. All defective joints.
- B. Cleaning Down Masonry:
 - During process of work: Wipe off excess mortar and dry brush at end of day's work.

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- 2. Final cleaning: After completion of roofing.
- 3. Method: Brush with mild soap solution and water. Stained units remaining after cleaning shall be replaced.
- 4. Limitations:
 - a. No wet cleaning during freezing weather.
 - b. No acid or acid solutions permitted without written permission of the Architect.
 - c. Soap solution shall be as approved by the Architect.

END OF SECTION 042000 - CONCRETE UNIT MASONRY

SECTION 05 50 00 - METAL FABRICATIONS

PART 1 GENERAL

1.01 **DESCRIPTION**

A. Scope of Work:

The work of this section includes all labor, materials, plant, tools, equipment, trucking, insurance and all related and incidental items to furnish and install all work of this section as shown by the drawings and specifications.

- 1. Loose lintels, miscellaneous angles.
- 2. Framing for lavatory countertops.
- 3. Fabricated floor and wall expansion joint covers.
- B. Work Furnished, But Installed Under Other Sections
 - Furnish metal fabrications to be cast in concrete to Section 03 30 00 - Cast-In-Place Concrete.
- C. Related Work (Specified Elsewhere)
 - 1. Section 06 20 00 Finished Carpentry
 - 2. Section 09 24 00 Gypsum Wall Board

1.02 **QUALITY ASSURANCE**

- A. Application Qualifications: All welding, whether performed in the shop or field, shall be done by operators who have been certified by tests as prescribed in the "Standard Qualifications Procedure" of the American Welding Society.
- B. Reference Standards: All work under this section shall conform to applicable standards of current issue.
 - 1. ASTM A36 Structural Steel.
 - 2. ASTM A386 Zinc-Coating (Hot-Dip) on Assembled Steel Products.
 - 3. FS TT-P-31 Paint, Oil: Iron Oxide, Ready Mix, Red and Brown.
 - 4. FS TT-P-641 Primer Coating, Zinc Dust-Zinc Oxide (for Galvanized Surfaces.)
 - 5. FS TT-P-645 Primer, Paint, Zinc Chromate, Alkyd Type.
 - 6. ANSI/ASTM A123 Zinc (Hot Galvanized) Coatings on Products Fabricated for Rolled, Pressed, and Forges Steel Shapes, Plates, Bars, and Strip.
 - 7. ASTM A525 General Requirements for Steel Sheet, Zinc-coated (Galvanized) by the Hot-Dip Process.

1.03 **SUBMITTALS**

- A. Product Data: Provide product data on all specified products describing physical and performance characteristics and sizes.
- B. Shop Drawings. Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, accessories and items to be shop painted. Indicate component details, materials, finishes, connection and joining methods, and the relationship to adjoining work. Include erection drawings, elevations, and details. Indicate welded connections using standard AWS welding symbols. Indicate net weld lengths.

1.04 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Product Delivery: All items to be firmly supported during transit, loading and unloading; no dumping from trucks permitted.
- B. Storage: All steel work stored on platforms, skids, or other supports resting on drained ground in a manner required to avoid damage to fabricating items. Protect all materials from dirt and rust.
- C. Handling: Done in a manner to prevent abrasion of shop coat and bending of section.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Galvanized Steel Sections:
- B. Bolts, Nuts, and Washers: ASTM A307.
- C. Welding Materials: AWS D1.1; type required for materials being welded.
- D. Threaded Rods (3/8"): ASTM A307
- E. 3/8" Dia. Epoxy Screen Anchors (by Powers, Hilti, or equal)
- F. Primer: 90-97 Tnemec-Zinc at 3.0-3.5 mils, DFT.
- G. Touch-up Primer for Galvanized Surfaces: FS[TT-P-64]. [TT-P-645].

2.02 **FABRICATION**

- A. Verify dimensions at site prior to shop fabrication.
- B. Fabricate items with joints tightly fitted and secured.
- C. Fit and shop assemble in largest practical sections, for handling through building openings and delivery to site.
- D. Grind exposed welds flush and smooth with adjacent finished surface. Ease exposed edges to small uniform radius.
- E. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of structure, except where specifically noted otherwise.
- F. Make exposed joints butt tight, flush, and hairline.
- G. Supply components required for anchorage of metal fabrications. Fabricate anchorage and related components of same material and finish as metal fabrication, except where specifically noted otherwise.
- H. Galvanized steel frames and associated structural supports, associated clips, angles, etc. at lavatory supports.
 - Lavatory frames and structural supports (in wall) where called for on the drawings shall be furnished and installed as ANSI/ASTM A-123. (See Section 09 90 00 Painting for finish type).
- I. "Minor Lintels" applies to miscellaneous small lintels over heat ducts, vents and other

openings or recesses in tile, concrete block, or brick walls, the appropriate amount of which can be determined by scanning plans.

1. Provide one angle for each 4" of wall thickness over doors, miscellaneous and recessed openings such as display cases, electric panel boxes, drinking fountains, extinguisher cabinets, convectors, or other recessed heating units, louvers, etc., as follows:

Openings 0" to 4'-0" 1 L4 x 3-1/2 x 5/16" LLV
Openings to 4' to 5'-6" 1 L5 x 3-1/2 x 5/16" LLV
Openings to 5'-6" to 7' 1 L6 x 4 x 3/8" LLV
Openings over 7' 8" I-Beam plus 1/4 plate

2. Lintels in 4" and 6" partitions shall be of reinforced concrete, block or tile, 8" depth, unless noted to contrary, reinforced with two #5 rods - 1 top and 1 bottom.

2.03 **FINISH**

- A. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.
- B. Do not prime surfaces in direct contact bond with concrete or where field welding is required.
- C. Prime paint items scheduled with one coat.
- D. Spot and touch up all welds, bolts, or places where the shop prime coat has been broken or omitted. Paint shall be the same as used for the shop coat and shall be supplied by the Fabricator. Before "touch-up" coat is applied at welds, all flux and scale shall be removed, and the area wire brushed clean. Touch-up or field painting is not required on steel to be encased in concrete.

PART 3 EXECUTION

3.01 **PREPARATION**

- A. Field Measurements: Verify all measurements at project site, coordinate with other trades.
- B. Obtain Architect's approval prior to site cutting or making adjustments not scheduled.
- C. Clean and strip site primed steel items to bare metal where site welding is schedule.
- D. Make provision for erection loads with temporary bracing, keep work in alignment.
- E. Supply items required to be cast into concrete or embedded in masonry with setting templates, to appropriate Sections.

3.02 **INSTALLATION**

- A. Install items plumb and level, accurately fitted, free from distortion or defects.
- B. Perform field welding in accordance with AWS D1.1.
- C. After installation, touch-up field welds, scratched or damaged surfaces with primer.

SECTION 05 12 00 - STRUCTURAL STEEL

PART 1 GENERAL

1.01 **RELATED DOCUMENTS**

- A. Drawings and general provisions of contract, including general and supplementary conditions and Division 1 specification sections, apply to this section.
- B. LEED requirements are specified in Division 1.

1.02 **DESCRIPTION OF WORK**

A. This section includes structural steel.

1.03 **QUALITY ASSURANCE**

- A. Comply with latest editions of:
 - American Institute of Steel Construction (AISC), "Manual of Steel Construction," including:
 - ANSI/AISC 360, "Specification for Structural Steel Buildings."
 - AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."
 - Research Council on Structural Connections (RCSC), "Specification for Structural Joints Using High-Strength Bolts."
 - 2. American Welding Society, Inc. (AWS)
 - a. AWS D1.1 "Structural Welding Code Steel."
 - b. AWS C5.4 "Recommended Practices for Stud Welding."
 - 3. Research Council on Structural Connections (RCSC), Educational Bulletin No. 4, "Recommended Erection and Field Inspection Procedures for High-Strength Bolts in Structural Steel Assemblies."
 - 4. American Hot-Dip Galvanizers Association, Inc.; Zinc Institute Inc.
 - a. "Inspection Manual for Hot-Dip Galvanized Products."
 - 5. Steel Structures Painting Council (SSPC)
 - a. "Surface Preparation Specifications."
- B. Qualifications for Welding Work:
 - Qualify welding processes and welding operators in accordance with AWS standards.
 - Provide one of the following certifications for welders to be employed in work.
 - a. Certification of satisfactorily passing AWS qualification tests within previous 12 months to perform type of welding in work.
 - b. Work record signed by supervisor showing regular employment within previous 12 months to perform type of welding in work.
- C. Qualifications for Fabricator, Detailer, and Erector:

- 1. Fabricator, Detailer, and Erector of structural steel shall have minimum 3 years experience in fabricating, detailing, and erecting structural steel.
 - Erector Qualifications: Erector shall be AISC Certified Erector, Category CSE.
 - b. Fabricator Qualifications: Fabricator shall be AISC Certified Fabricator, Category STD.
 - c. AISC Certification for Fabricators and Erectors may be waived at the discretion of Owner, Architect, and Engineer provided acceptable written quality assurance and quality control plan is submitted.
- 2. Submit written description of ability.
- 3. At completion of fabrication, Fabricator shall submit Certificate of Compliance to Special Inspector and Code Enforcement Official stating work was performed in accordance with approved Construction Documents in accordance with Chapter 17 of the *International Building Code* (IBC) as referenced by the *New York State Uniform Code*.

1.04 **SPECIAL INSPECTIONS**

A. Refer to Specification Section 01 45 33 and Schedule of Special Inspections.

1.05 MATERIAL EVALUATION/QUALITY CONTROL

- A. Contractor shall employ testing laboratory acceptable to Engineer and Architect to perform material evaluation tests.
- B. Submit testing service qualifications demonstrating experience with similar types of projects.
- C. The Registered Design Professionals (RDPs) for Structural Engineering and Architecture will visit construction site at appropriate intervals to determine if work is in general conformance with Contract Documents and specifications. Notify RDPs 48 hours before anticipated time of completion for a given section of work so they may determine if site observations are required. If site observations are required, do not conceal framing until RDPs have had opportunity to make observations.

1.06 **SUBMITTALS**

- A. General: Review of submittals will be for general conformance only. Compliance with requirements for materials, fabrication, erection, and dimensioning of structural steel shall be Contractor's responsibility. Resubmitted shop drawings shall have revisions identified and dated.
- B. Shop Drawings: Submit detailed drawings showing:
 - 1. Submit Shop Drawings showing details of each individual steel shipping piece.
 - 2. Submit Erection Drawings showing location and attachment of individual steel shipping pieces. Including field installation details in Erection Drawings.
 - 3. Reference Contract Drawing number and addendum number in each shop and Erection drawing.
 - 4. Shop and Erection drawings shall show:
 - a. Details including cuts, copes, camber, connections, holes, bolts, and other pertinent information.
 - b. Material, including ASTM designations and grades or manufacturer's

data as appropriate.

- c. Welds with size, length, and type.
- d. Anchor rod locations.
- 5. Shop and Erection drawings shall be checked by detailer and noted as checked in drawings before submitting. Failure to submit checked Shop and Erection drawings will be cause for their return without review. If drawings are not prepared by detailer under direct control of Fabricator, Fabricator shall stamp each drawing and initial or sign stamp to certify review and approval of drawings and conformance with Fabricator's shop practice and capability.
- C. Material Data: Submit to Special Inspector and Engineer laboratory test reports and other data as required to show compliance with specifications. Submit producer's or manufacturer's specifications and installation instructions for the following products:
 - 1. Structural steel, including certified copies of mill reports covering chemical and physical properties.
 - 2. High-strength bolts, including nuts and washers.
 - 3. Unfinished bolts and nuts.
 - 4. Welding electrodes.
 - 5. Post-installed anchors (expansion, sleeve, or chemical adhesive) if used.
- D. Bolt Certification: Submit to Special Inspector and Engineer certifications that bolts, nuts, and washers furnished comply with specifications. Submit manufacturer's inspection certificates for mill tests. For fasteners to be accepted, lot numbers on kegs, boxes, or bags must correlate with lot numbers shown in accepted test certificates and identification numbers in mill test reports. Manufacturer's symbol and grade markings must appear on bolts and nuts.
- E. Field Modifications: Submit drawings showing field modifications required to conform to actual field conditions or as required to correct errors in shop drawings, fabrication, or erection.
- F. Erector's Welding Procedure Specifications: Submit welding procedure specifications for joint types detailed for field welding.
- G. LEED Submittal:
 - Recycled Content: Submit documentation that materials satisfy requirements for recycled content as indicated in Division 1 – General Requirements. Product data shall indicate percentages by weight of post-consumer and preconsumer recycled content.
 - a. Include cost for each product having recycled content.
 - Regional Materials: Submit documentation that materials satisfy requirements for regional materials as indicated in Division 1 – General Requirements. Product data shall indicate location and distance from project site of material manufacturer as well as point of extraction, harvest, or recovery for each raw material.
 - a. Include cost for each regional material and percentage or fraction of weight considered to be regional.
 - 3. Low Emitting Materials: Product data for adhesives, coatings, and sealants used on interior of building indicating VOC content of each product used. Indicate

VOC content in g/L calculated according to 40CFR 59, Subpart D (EPA method 24). Refer to Division 1 for VOC limits and requirements.

1.07 **PRODUCT HANDLING**

- A. Store material in horizontal position on supports above ground.
- B. Protect from weather, and keep free of dirt and debris.
- C. Handle material carefully so it is not bent or marred.
- D. Store bolted fastener components in closed containers protected from moisture and contamination. Remove from protective storage containers only number of fasteners required for one shift. Return fasteners not installed at end of work day to protective storage.
- E. Repair or replace damaged materials. Do not incorporate in work fastener components that accumulate rust or dirt.

1.08 **WORKMANSHIP**

- A. Contractor shall be responsible for correction of work not conforming to specified requirements. Correct deficient work as directed by Engineer.
- B. Remove work found to be defective. Replace with new acceptable work.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Materials shall be new and free from rust.
- B. Rolled-Steel Plates and Bars: ASTM A 36 or ASTM A 572, Grade 50.
- C. Rolled-Steel Angles, C, MC, S, M, ST and MT Shapes: ASTM A 36 or ASTM A 572, Grade 50.
- D. Rolled-Steel W and WT Shapes: ASTM A 992.
- E. Rolled-Steel HP Shapes: ASTM A572, Grade 50.
- F. Steel Pipe: ASTM A 53, Type E or S, Grade B.
- G. Unfinished Bolts, Nuts, and Washers: ASTM A 307, Grade A.
- H. High-Strength Bolts: ASTM A 325 or A 490, Type 1, plain.
- I. High-Strength Bolts, Galvanized: ASTM A 325, Type 1.
- J. Threaded Rods: ASTM A 36.
- K. Nuts: ASTM A 563. Grade and finish to match bolt or rod type.
- L. Washers: ASTM F 436 (ASTM F 844 for ASTM A 307 bolts, A 36 rods and F 1554 Grade 36 anchor rods). Finish to match bolt or rod type.

- M. Electrodes: E70 and in accordance with AWS.
 - 1. E308 for Type 304 stainless steel.
 - 2. E316 for Type 316 stainless steel.
- N. Nonshrink Grout: Corp of Engineers CRD-C 621. "CS-100" by Conspec Industries; "NS Grout" by Euclid Chemical Co.; "SikaGrout 212" by Sika Corp.; "Masterflow 928" by Master Builders Solutions; or accepted equivalent.
- O. Hot-Dip Galvanizing: Hot-dip galvanize after fabricating in accordance with ASTM A 123. Restraighten members after galvanizing if necessary to be square and true. Items to be hot-dip galvanized are identified in drawings.
- P. Galvanizing Touch-up Compound: Zinc-rich, anti-corrosion paint complying with ASTM A780. "ZRC Galvilite" by ZRC Worldwide; "Roval ZC Galvanizing Repair" by Roval Corporation; or accepted equivalent. Use for field touch-up of hot-dip galvanized surfaces.
- Q. Chemical Adhesive Anchors:
 - 1. Anchors to solid concrete:
 - a. Anchors for use when base material temperature is 0°F or greater: "HIT-lce" by Hilti; "Epcon A7" by ITW Ramset/Red Head; "AC 100 Plus" by Powers Fasteners; "AT Acrylic-Tie" by Simpson/Strong-Tie; or accepted equivalent.
 - b. Anchors for use when base material temperature is 40°F or greater; "HIT-HY 200 Safe Set System with HIT-Z Rod or Hollow Drill Bit System" or "HIT-RE 500-SD" by Hilti; "Epcon C6" by ITW Ramset/Red Head; "T308 Plus" by Powers Fasteners; "ET Epoxy-Tie" by Simpson/Strong-Tie; or accepted equivalent.

2.02 **FABRICATION**

- A. Fabricate structural steel in strict accordance with reviewed shop drawings and referenced standards.
- Fabricate and assemble structural material in shop to greatest extent possible.
- C. Fit stiffeners neatly between girder flanges. Where tight fits are required to transmit bearing, mill or grind ends of stiffeners for even bearing against flange.
- D. Provide camber as indicated in drawings. Where no camber is indicated, fabricate steel with mill camber up. Camber by mechanical means or by use of V-heat up to 1,200 degrees F maximum.
- E. Remove extension bars or runoff plates upon completing and cooling groove welds. Grind ends of welds smooth and flush with edges of abutting parts.
- F. Provide holes for securing other work to structural steel framing. Comply with AISC Specification 360, Section M2 for surface roughness for holes.
- G. For members to be hot-dip galvanized, comply with the American Galvanizer's Association Design Guide: The Design of Products to be Hot-Dip Galvanized After Fabrication.

H. Finish bottom of column and weld to base plate. Use flat base plates.

2.03 **CONNECTIONS**

- A. Comply with requirements of this section unless indicated otherwise in drawings.
- B. A licensed Professional Engineer (Connection Design Engineer) shall be retained by Fabricator to design connections in accordance with Option 3 in AISC Code of Standard Practice for Steel Building and Bridges.
- C. Use connection dimensions and sizes complying with AISC-published recommendations and limitations shown in drawings.
- D. For shear connections, use only connections published in the AISC *Steel Construction Manual* without modification unless otherwise indicated in Drawings.
- E. Weld or bolt shop connections.
- F. Bolt field connections wherever possible.
- G. Minimum Capacity of Beam Connections: For connections not detailed, provide connection capacity for shear, axial, and moment reactions shown in drawings. If reactions are not shown in drawings, base on either Allowable Stress Design or Load and Resistance Factor Design as follows:
 - 1. Shear Connections:
 - a. At least 50 percent of uniform load from Maximum-Uniform Load Tables in AISC *Steel Construction Manual*, Part 3, for given steel member (ASD or LRFD, as appropriate).
 - b. At least 70 percent of uniform load from Maximum Uniform Load Tables in AISC Steel Construction Manual, Part 3, for beams and girders with shear connectors (ASD or LRFD, as appropriate).
 - c. Concentrated loads near supports must be added.

2. Moment Connections:

- Design moment connections for full bending capacity for given steel member.
- H. Use AISC Single-Plate, Single-Angle, Double-Angle, or End-Plate Shear Connection for beam-to-beam connections.
- I. Provide high-strength or unfinished threaded fasteners installed snug-tight for bolted bearing connections of secondary framing members to primary members including girts, door framing systems, and roof openings.
- J. Provide high-strength fasteners for principal bolted connections unless otherwise indicated.
- K. Fabricator shall provide connections to properly transmit total reactions, moments, and axial forces either indicated in drawings or reasonably inferred from information provided.
- L. Provide snug-tightened joints using bearing bolts with thread condition N for bolted connections unless indicated otherwise. Provide pretensioned or slip-critical joints where shown or noted in drawings. For slip-critical joints, provide AISC Class A faying surface

condition.

M. Remove burrs that prevent solid seating of connected parts.

2.04 **LEED CRITERIA**

- A. Recycled Content: Structural steel sections shall contain minimum recycled content as follows (post-consumer plus 1/2 preconsumer recycled content):
 - 1. Bars, Angles, Pipe, Channels, and Hollow Structural Sections: 94 percent recycled content.
 - 2. Plates: 85 percent recycled content.
 - 3. Rolled Steel W-Shapes: 85 percent recycled content.

PART 3 EXECUTION

3.01 **JOB CONDITIONS**

A. Examine conditions under which work shall be erected. Do not proceed until unsatisfactory conditions are corrected.

3.02 **ERECTION**

- A. Set structural frames accurately to lines and elevations indicated. Align and adjust various members forming part of a complete frame or structure before permanently fastening.
- B. Fit up connections to be field welded in compliance with AWS standard tolerances for review by the Special Inspector or Testing Agency prior to field welding.
- C. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact after assembly.
- D. Perform necessary adjustments to compensate for discrepancies in elevations and alignment. Level and plumb individual members of structure within specified tolerances.
- E. Splice members only where shown or specified.
- F. Maintain work in stable condition during erection.
- G. Install field connections and framing as detailed in Contract Documents and accepted shop drawings. If Contractor finds field modifications are necessary, submit documentation of proposed field modifications to Architect and Engineer for review and acceptance before beginning.
 - 1. Use of thermal cutting for field modifications is prohibited unless documented and accepted by Engineer before beginning.
 - 2. Use of thermal cutting for enlarging or cutting bolt holes in field is prohibited.

3.03 TOLERANCES

- A. Tolerances shall be within limits in AISC "Code of Standard Practice."
- B. Fabrication and mill tolerance shall be within limits in AISC "Standard Mill Practice."

3.04 **TOUCH-UP PAINTING**

- A. After erection is complete, touch up paint-damaged shop coats and welded areas with shop primer paint applied in accordance with manufacturer's instructions.
- B. Touch up paint damaged galvanized surfaces and welded areas with galvanizing touchup compound or cold-galvanizing compound applied in accordance with manufacturer's instructions.
- C. Prepare surfaces of hot-dip galvanized members where the galvanization was omitted, or damaged in accordance with SSPC-SP3 "Power Tool Cleaning." Prepare field-welded galvanized members similarly.
- D. Remove weld slag before applying touch-up paint.

3.05 **PROTECTION**

- A. Do not use members for storage or work platforms until permanently secured.
- B. Do not exceed load capacity of members with construction loads.

END OF SECTION 05 12 00 STRUCTURAL STEEL (07/17)

SECTION 061000 - ROUGH CARPENTRY

PART 1 GENERAL

1.01 **DESCRIPTION**

A. Scope of Work

The work of this Section includes all labor, materials, plant, tools equipment, trucking, insurance and all r elated items to furnish and install all work of this Section as shown by the Drawings and the Specifications.

- 1. All rough work usually performed by carpenters.
- 2. Framing for countertops and shelving.
- 3. Miscellaneous blocking, furring and grounds for attachment of built-in work and equipment.
- 4. Rough hardware.
- 5. Provide all runways and temporary works for the proper execution of runways and ladders.
- 6. Cut, fit and block for the installation of the mechanical trades.
- 7. Provide wood grounds or blocking for the installation of the mechanical trades.
- 8. Nailers and backing for setting finish materials.
- 9. Set metal doorframes: plumb, straight and square.
- 10. Installation of items furnished in other sections.

B. Related work specified elsewhere:

- 1. Section 062000 Finished Carpentry.
- 2. Under Division 7 Insulation.
- 3. Under Division 9 Metal Stud Partitions.

1.02 **SUBMITTALS**

- A. Product Data: For all specified products.
- B. LEED Compliance Product data for all composite wood specified.
 - Manufacturer's information demonstrating all composite wood materials on site have low formaldehyde emissions that meet the California Air Resources Board ATCM for formaldehyde requirements for ultra-low-emitting formaldehyde (ULEF) resins or no added formaldehyde resins. All testing data from manufacturer must be tested by an approved third-party testing agency.

1.03 **DEFINITIONS**

- LEED as used in this section refers to Leadership in Energy and Environmental Design. Products listed meet LEED criteria for environmentally safe interior primers and coatings.
- 2. Composite Wood Projects are wood-based panels made from pieces, chips, particles, or fibers bonded together with a resin.
- 3. Formaldehyde means a colorless gas at room temperature that at elevated concentrations has a strong, pungent odor and can be irritating to the eyes, nose, and lungs (i.e., CAS No. 50-00-0).
- 4. No-added formaldehyde based resins means resins formulated with no added formaldehyde as part of the resin cross linking structure for making hardwood plywood, particleboard, or medium density fiberboard. No-added formaldehyde based resins include, but are not limited to, resins made from soy, polyvinyl

acetate, or methylene diisocyanate.

5. "Ultra-low-emitting formaldehyde (ULEF) resins" means resins formulated such that average formaldehyde emissions are consistently below the Phase 2 emission standards in section 93120.2, as provided in section 93120.3(d).

1.04 **QUALITY ASSURANCE**

- A. Grading rules of the following Associations apply to materials furnished under this section:
 - 1. American Plywood Association (APA).
 - 2. National Particle Board Association (NPB).
 - Western Wood Products Association (WWPA).
 - 4. Southern Forest Products Association (SFPA).
 - 5. National Hardwood Lumber Association.
 - 6. American Wood Preservers Association (AWPA)
- B. Grade Marks: Identify all plywood and lumber by official grade mark.
- C. All lumber shall be kiln dried and well-seasoned, and of grade specified.

1.05 **SUBMITTALS**

- A. Certification
 - 1. Pressure Treated Wood: Submit certification by the treating plant stating chemicals and process used, net amount of salts retained and conformance with applicable standards.
 - 2. Submit in writing choice of stress grade lumber for approval.
 - Submit certification that lumber to be used in rated walls complies with applicable standards.

1.06 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Protect lumber from weather in transit and at project site, keep raised off the ground, covered with watertight covering, ventilated, and block passage of ground moisture.
- B. Store in accordance with A.P.A. "Panel Care and Installation" Guide.
- C. High pressure laminate to be stored with top face down and a caul board placed on top to protect material from damage and warpage. Protect laminate from moisture and do not allow contact with floor or outside wall.
- D. Laminate and substrate to acclimate for at least 48 hours at same ambient condition. Optimum conditions are 75 F. and at a relative humidity of 45 to 55%. Provide air circulation around product.

PART 2 PRODUCTS

2.01 STRESS GRADE LUMBER

A. Size as indicated, No. 2 Douglas Fir, Hem Fir, Western Spruce, dressed four sides (S4S) Kiln Dried, 15% maximum moisture content. Lumber shall develop a minimum extreme fiber stress 1000 lbs/square inch.

2.02 **PLYWOOD**

A. APA B-C, Group 1, "Exterior Type" thickness as indicated on drawings for exterior use of where plywood will be subjected to moisture or high humidity.

2.03 **ROUGH HARDWARE**

- A. Expansion anchors: Meeting Federal Spec. FF-S-325, Group II Type 4 Class 1 and zinc plated in accordance with Federal Spec QQ-Z-325C, Type II, Class 3. Use: Anchoring to concrete.
- B. Sleeve Anchors: Meeting Federal Spec. FF-S-325, Group II, Type 3, Class 3, zinc plated head type as appropriate for application. Use: Anchoring to concrete block.
- C. Miscellaneous Hardware: Toggle bolts, lag screws / bolts, nails etc., non-rusting type.

PART 3 EXECUTION

3.01 **INSTALLATION**

- A. Expansion and Sleeve Anchors: Minimum installation depth and method of expansion as recommended by anchor manufacturer.
- B. Nailers, blocking, furring set to deck and slab, power driven studs, drive screws acceptable, except where bolting is indicated.
- C. Nailing: In accordance with industry standards of good practice.
- D. Install metal door bucks: Plumb and stay-in-place at masonry walls and at metal stud partitions.
- E. Install materials furnished under other sections of the specifications per detail drawings and approved shop drawings.
- F. Runways and Ladders:
 - 1. Furnish, set, and maintain runways or ladders leading from the lowest level of the building to the roof for the general use of all workmen.
 - 2. Provide all runways and temporary works for the proper execution of work under this heading.
- G. Enclosure of building: Should weather conditions require it, the Contractor shall enclose the building to prevent damage to his or other work. He shall set temporary glazed sash and provide temporary doors with suitable locks if required.
- H. Cutting, Fitting, and Blocking:
 - 1. Contractor is to do all cutting and fitting of his work required for the accommodation of the mechanical and equipment contractors.
 - 2. Install fire retardant wood blocking (2x4 minimum or as noted on drawings) for all fin radiation, shelving support brackets, toilet accessories, sink support braces, grab bars, mirrors, signage, surface mounted lighting, hand dryers and all other equipment / accessories requiring wall mount support. Secure wood blocking to metal framing at both ends.
 - 3. Set access door and panels furnished by the mechanical contractors as directed.

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- I. Wood Grounds:
 - 1. Required where so noted on the drawings.
 - 2. This contractor shall also put up necessary cant strips and grounds for the reception of work by others.
- J. Wood Furring:
 - 1. Do all required furring and blocking for reception of work by this or other trades, including mechanical.
 - 2. Furring for attachment of acoustical materials is specified under that heading.
- K. Builder's Hardware: The contractor shall furnish all rough hardware such as nails, screws, bolts, etc.
- L. Application of Finishing Hardware: Carpenters under this section shall apply Finishing hardware furnished under Section 087000 of these specifications.

END OF SECTION 061000 - ROUGH CARPENTRY

SECTION 062000 - FINISH CARPENTRY

PART 1 GENERAL

1.01 **DESCRIPTION**

A. Scope of Work:

The work of this Section includes all labor, materials, plant, tools equipment, trucking, insurance, and all related items to furnish and install all work of this Section as shown by the Drawings and the Specifications.

- 1. Hang Doors
- 2. Install Finish Hardware
- Install Toilet Accessories
- 4. Install Signage
- 5. Quartz Surface Countertops and Backsplash
- 6. Shelves, Brackets & Standards
- 7. All Finished Carpentry usually performed by Carpenters.
- 8. Shop Drawings of all Fabricated Work.
- 9. Samples.

B. Related Work Specified Elsewhere:

- 1. Section 061000 Rough Carpentry
- 2. Section 082000 Wood Doors
- 3. Section 087000 Door Hardware
- Section 108000 Toilet Room Accessories

1.02 **QUALITY ASSURANCE**

A. Standards:

- 1. The quality standards of the Architectural Woodwork Institute (AWI) shall apply and by reference are made part of this specification.
- 2. American National Standards Institute (ANSI)

B. Quartz Surface Material Standards:

- 1. Allowable tolerances for quartz surface materials:
 - a. Variation in component size: ±1/8" (3 mm) over a 10' length.
 - b. Location of openings: $\pm 1/8$ " (3 mm) from indicated location.
 - c. Maximum 1/8" (3 mm) clearance between quartz surfaces and each wall.
- 2. Performance requirements for guartz surface materials:
 - a. Moisture Absorption: typical results 0.02%: ASTM C97
 - b. Modulus of Rupture: typical results 6,800 psi; ASTM C99
 - c. Compressive Strength: typical results 24,750 psi; ASTM C170
 - d. Abrasion Resistance: typical results 223; ASTM C501
 - e. Bond Strength: typical results 205 psi; ASTM C482
 - f. Thermal Shock: passes 5 cycles: ASTM 484

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- g. Coefficient of Thermal Expansion: typical results 1.2x10⁻⁵ inch/°F; ASTM C531
- h. Breaking Strength of Tile: typical results 3,661 lbf; ASTM C648
- i. Resistance to Freeze Thaw Cycling: unaffected 15 cycles; ASTM C1026
- j. Coefficient of Friction Pull Method: .75 avg. dry / .55 avg. wet; ASTM C1028
- k. Surface Burning Characteristics: typical results 17; ASTM E84
- I. Smoke Density: flaming 196, non-flaming 69; ASTM E662
- m. Stain Resistance: Unaffected; ANSI Z124.6

1.03 **SUBMITTALS**

A. Samples:

- 1. Samples shall be furnished as follows:
 - a. Type: Each species of wood or plywood.

Size: 4 inches by 12 inches. Quantity: Two of each type.

b. Type: Quartz Surface Countertop, Backsplash and Sidesplash.

Size: 6 inches by 6 inches

Quantity: Two of each type.

Color: To be selected by the Architect, submit samples for color selection.

C Type: Compact Laminate Panels

Size 4 inches x4 inches

Quantity: Two of each type

B. Shop Drawings:

- 1. Submit for approval all finish carpentry fabrications. Shop drawings shall be 3" = 1'- 0" minimum scaled drawings.
- 2. Take all field measurements for finished work at the project site. If details are found at variance with the existing conditions, notify the Architect in writing immediately.
- C. LEED Compliance Product Data For all composite wood
 - Manufacturer's information demonstrating all composite wood materials on site have low formaldehyde emissions that meet the California Air Resources Board ATCM for formaldehyde requirements for ultra-low-emitting formaldehyde (ULEF) resins or no added formaldehyde resins. All testing data from manufacturer must be tested by an approved third-party testing agency.

1.04 **DEFINITIONS**

- LEED as used in this section refers to Leadership in Energy and Environmental Design. Products listed meet LEED criteria for environmentally safe interior primers and coatings.
- 2. Composite Wood Projects are wood-based panels made from pieces, chips, particles, or fibers bonded together with a resin.
- 3. Formaldehyde means a colorless gas at room temperature that at elevated concentrations has a strong, pungent odor and can be irritating to the eyes, nose, and lungs (i.e., CAS No. 50-00-0).
- 4. No-added formaldehyde based resins means resins formulated with no added formaldehyde as part of the resin cross linking structure for making hardwood

plywood, particleboard, or medium density fiberboard. No-added formaldehyde based resins include, but are not limited to, resins made from soy, polyvinyl acetate, or methylene diisocyanate.

5. "Ultra-low-emitting formaldehyde (ULEF) resins" means resins formulated such that average formaldehyde emissions are consistently below the Phase 2 emission standards in section 93120.2, as provided in section 93120.3(d).

1.05 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. All material shall be carefully transported, handled to avoid damage, stored in protected heated areas in the building, off the floor on dry boards.
- B. Handle materials to prevent damage to finished surfaces.
 - 1. Provide protective coverings to prevent physical damage or staining following installation for duration of project.
- C. Maintain indoor temperature and humidity within the range recommended by the *Architectural Woodwork Standards* for the location of the project.

1.06 WARRANTIES

- A. Quartz Surface Countertops, Backslashes, Side-splashes:
 - 1. Provide manufacturer's 10-year warranty against defects in materials.
 - a. Warranty shall provide material to repair or replace defective materials.
 - Damage caused by physical or chemical abuse or damage from excessive heat will not be warranted.

PART 2 PRODUCTS

2.01 QUARTZ SURFACE COUNTERTOPS

A. Manufacturer:

Basis of Design: Silestone, ECO Line Series

Color: Iron Ore Finish: Polished

Edge Treatment: Basic Eased

- B. Homogeneous quartz surfacing material meeting Class A surface burning characteristics per ASTM E 84 and NSF/ANSI Standard 51 food contact, splash and drip zone listings, containing 93% pure quartz with additions of high performance polyester resin, pigments and special effects.
- C. Thickness minimum 1 1/4"
- D. Seaming: Seams to be hard-seamed w/ two-part epoxy. Seam to break over lavatory structural support member.
- E. Sink mounting:
 - 1. Undermount

F. Accessory products:

- 1. Manufacturer's approved bowl clips brass inserts and fasteners for attachment of under mount sinks.
- 2. Mounting Adhesive: Provide structural grade '50 year' silicone or epoxy adhesive. As recommended by manufacturer for application and use.
- 3. Quartz Surface Adhesive: Provide epoxy or polyester adhesive as recommended by manufacturer for application and conditions of use.
- 4. Adhesive which will be visible in finished work shall be tinted to match quartz Surface.
- 5. Joint Sealant: Clear sealant of type recommended by manufacturer for application and use. Provide anti-bacterial type in toilet, bath, food preparation areas.
- 6. Solvent: Denatured alcohol for cleaning quartz surfacing to assure adhesion of adhesives and sealants.
- 7. Cleaning Agents: Mild soap and water.

2.02 QUARTZ SURFACE BACKSPLASH & SIDESPLASH

- A. Basis of Design: Same as above.
- B. Homogeneous quartz surfacing material meeting Class A surface burning characteristics per ASTM E 84 and NSF/ANSI Standard 51 food contact, splash and drip zone listings, containing 93% pure quartz with additions of high performance polyester resin, pigments and special effects
- C. Thickness minimum 3/4" with radius top edge.
- D. Backsplash and side-splashes to be installed on-site.
- E. Seaming: Seams to be hard-seamed w/ two-part epoxy.
- F. Accessory & installation products: Same as above.

2.03 FACTORY FABRICATION OF QUARTZ SURFACE MATERIALS

A. Shop assembly

- 1. Fabricate components to greatest extent practical to sizes and shapes indicated, in accordance with approved shop drawings and manufacturer's printed instructions and technical bulletins.
- 2. Form joints between components using manufacturer's standard joint adhesive joints.
 - a. Reinforce as required.
- 3. Provide factory cutouts for plumbing fittings and bath accessories as indicated on the drawings.
- 4. Rout and finish component edges with clean, sharp returns.
 - a. Rout cutouts, radii and contours to template.
 - b. Cutouts shall have a minimum of 3/8 inch radius.

2.04 **COMPACT LAMINATE PANELS**

A. Basis of Design: Wilsonart Compact Laminate Solid Core Panels, ½" Thick Class 'A' Fire Rated

Color: Williamsburg Cherry #7936K-07 (Textured Gloss)

2.05 SHELVES, STANDARDS & BRACKETS

- A. Standard and Bracket System: As manufactured by Knape & Vogt, 2700 Oak Industrial Drive NE, Grand Rapids MI 49505.
 - 1. Standard: 85 Series, Anochrome (ANO), 16 Gauge, 3'-0" long, 85 ANO 24
 - 2. Bracket: 185 Series, Anochrome (ANO), 16 Gauge, 12", 185 ANO 12. (4-Regiured)
- B. Shelves: 3/4" Red Oak Veneered Plywood w/ 1/2" Red Oak edge band all around, Prime & paint to match wall color. See Paint Spec for color.

PART 3 EXECUTION

3.01 **PREPARATION**

- A. The contractor shall take all field dimensions required to make all portions on his work fit properly and function for its intended use.
- B. The work to be done under this contract shall be so coordinated as to cause no interruption to the work.
- C. All work shall be performed at such times and in such a manner as to interfere as little as possible with the Owner's or other contractor's operations.
- D. The contractor shall field cut all holes in counter-tops for sinks from a template supplied by Plumbing Contractor.

3.02 **INSTALLATION**

- A. Quartz Surface Materials:
 - 1. Install components plumb and level, in accordance with approved shop drawings and product installation details.
 - a. Tops:
 - Flat and true to within 1/8" (3 mm) of a flat surface over a 10' length.
 - Allow a minimum of 1/16" to a maximum of 1/8" (3 mm) clearance between surface and each wall.
 - Horizontal Surface Installation: Apply continuous bead of mounting adhesive around perimeter of structural substrate and supports.

- 2. Form field joints using manufacturer's recommended adhesive, with joint widths no greater than 1/8" (3 mm) in finished work.
 - a. Keep components and hands clean when making joints.
- Sinks:
 - a. Adhere undermount sinks/bowls to countertops using manufacturer's recommended adhesive and mounting hardware.
- 4. Provide backsplashes and side-splashes at all new quartz countertops and as indicated on the drawings. Adhere to countertops using manufacturer's standard color-matched silicone sealant. Vertical Surface Installation: Apply continuous bead of mounting adhesive around perimeter. In addition, apply ¼ inch mounting adhesive bead every 8 inches on vertical center.
- B. Workmanship and Installation:
 - 1. Only skilled mechanics shall be employed to install finish carpentry. Work shall be neatly scribed to adjacent surfaces as required. Cut finish work for the installation of any of the mechanical and electrical trades.
 - 2. All work shall be installed straight and true to line, plumb and level.

3.03 ADJUSTING & TOUCHUP

- A. Before completion of the installation, the installer shall adjust all moving and operating parts to function smoothly and correctly.
- B. All nicks, chips, and scratches in the finish shall be filled and retouched. Damaged items that cannot be repaired shall be replaced.

3.04 **CLEANING AND PROTECTION**

- A. Keep components clean during installation.
 - 1. Remove adhesives, sealants and other stains.
- B. Protect surfaces from damage until date of substantial completion.
 - Replace damaged work.

END OF SECTION 062000 - FINISH CARPENTRY

SECTION 072000 - INSULATION

PART 1 GENERAL

1.01 **DESCRIPTION**

A. Scope of Work:

The work of this section includes all labor, material, plant, tools, equipment, trucking, insurance and all related items to furnish and install all work of this Section as shown by the Drawings and the Specifications.

- 1. Partition Sound insulation.
- 2. Flexible insulation stuffing.
- Mineral Wool insulation.
- B. Related Work Specified Elsewhere:
 - 1. Section 092500 Gypsum Wall Board

1.02 **SUBMITTALS**

- A. Product Data: Provide product data for all specified products.
- B. Samples: Submit sample of products described under scope.
- C. Manufacturer's Literature: Submit copies for approval.
 - Manufacturer's information inclusive of VOC g/L content complying with LEED v4
 New Construction Indoor Air Quality requirements, inclusive of those outlined in
 Section 01 8113 of this book, and SCAQMD requirements.

1.03 **DEFINITIONS**

- LEED as used in this section refers to Leadership in Energy and Environmental Design. Products listed meet LEED criteria for environmentally safe interior primers and coatings.
- 2. VOC as used in this Section refers to Volatile Organic Compounds found in primers and coatings. The level of VOC's appear after each product listed in the Schedule in grams per liter (g/L).
- 3. CDPH Standard Method v1.1: This credit uses the California Department of Public Health (CDPH) Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers, v.1.1–2010, for the emissions testing and requirements of all products and materials

1.04 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Delivery: In manufacturer's original wrappings, dry and protected from moisture. Transporting in vehicles protected with tarpaulins.
- B. Storage: In rain-tight shed, on plank and protected from vapor. Weighted or banded tarpaulins if stored in out-of-doors.

C. Handling: Care should be taken not to break off corners, damaged insulation will be rejected.

PART 2 PRODUCTS

2.01. PARTITION SOUND INSULATION (Basis of Design)

- A. 3½" & 5½" thick, unfaced fiberglass "Sound Attenuation" batts by Owens-Corning, sized to friction fit between metal stud partitions framing. Use at all sound retardant partitions.
 - 1. Surface Burning Characteristics (ASTM E84 Test Procedures)

Flame Spread: 25 Smoke Developed: 50

2.02 FLEXIBLE INSULATION STUFFING

A. Same as sound insulation; use for filling all voids (NOT MEANT FOR VENTILATION).

2.03 MINERAL WOOL INSULATION (2 Hour Rated Shaftwall) (Basis of Design)

A. 1 1/2" thick "Thermafiber Safing" mineral wool insulation by Owens Corning

PART 3 EXECUTION

- A. Partition Sound Insulation: Install between metal studs, friction fit in place. Edges of units shall be laid in close contact with each other and with restricting surfaces to prevent passage of air at joints. When applied in heights over 8 feet, supplementary support should be provided to hold insulation in place until the interior finish is applied.
- B. Flexible insulation stuffing: Install where indicated and/or where required to fill voids.
- C. Mineral Wool Insulation: Install between metal studs, friction fit in place. Edges of units shall be laid in close contact with each other and with restricting surfaces to prevent passage of air at joints.

END OF SECTION 072000 - INSULATION

SECTION 075110 - BUILT UP ROOF REPAIRS (ASPHALT)

PART 1 GENERAL

1.01 **DESCRIPTION**

A. Scope of Work:

- 1. Work under this section shall include all labor, material, and equipment necessary to completely repair existing roof materials and install new flashings at new roof penetrations as designated on the drawings.
- 1. Inspection of existing conditions
- 2. Preparation of substrate
- 3. Modified Bituminous roofing membrane repairs
- 4. Roof insulation
- 5. New HVAC equipment roof curb installation
- 6. New roof equipment support installations
- 7. New pipe/conduit curb installations

C. Related work specified elsewhere:

- 1. Section 03 30 00 Cast-in Place Concrete
- 2. Section 03 01 00 Strengthening of Cast-in Place Concrete
- 2. Section 06 10 00 Rough Carpentry

D. General System Description

- 1. Cut existing roofing system down to the existing roof deck, as required to install roof equipment supports, roof curbs and pipe/conduit curbs. The existing granule surfaced modified bitumen membrane roofing system is installed over ¼" cover-board, tapered polyisocyanurate roofing insulation and modified bitumen vapor retarder adhered to an existing poured-in-place concrete roof deck.
- Cut openings in the existing poured-in-place concrete roof deck for ductwork and condensate piping by HVAC Contractor and metal conduits by Electrical Contractor as indicated on the Drawings for new roof curbs. Verify size and location on the roof for the roof openings with the HVAC Contractor prior to cutting holes.
- 3. Provide new treated wood blocking the same thickness as the existing roof insulation.
- 4. Install new prefabricated metal insulated roof curb furnished by HVAC Contractor on new treated wood blocking.
- 5. Provide new prefabricated metal pipe/conduit curbs and equipment supports on new wood blocking.
- 6. Patch vapor retarder, roof insulation, cover-board and roofing membrane to match existing roofing system up to the top of roof curb and equipment support cants.
- 7. Flash roof curbs and equipment supports.

1.02 **QUALITY ASSURANCE**

- A. Products specified are those manufactured by Soprema Inc. All new roofing repair products used shall be acceptable to Soprema.
 - B. Acceptable Applicator/Installer: Roofing applicator/installer shall be licensed or certified by the existing roofing system manufacturer to repair the existing roofing

system.

- 1. The existing roofing system has a "Soprema" 25 Platinum NDL Roof Warranty in place. Soprema contact number: (330) 334-0066
- 2. The original roofing contractor was Dewald Roofing Co. Inc.
- 3. Maintaining the existing roofing guarantee is imperative. Prior to cutting the existing roofing system, the General Contractor shall contact "Soprema" and obtain written approval to cut the roofing system and install the roof accessories. Submit "Soprema's" written approval to the Architect's office. Soprema may inspect the work at various intervals during construction and will conduct a final inspection at end of roofing repair work.

1.03 **SUBMITTALS**

- A. Product Data: Provide three (3) copies of the manufacturer's data sheets for all new materials, including roof accessories, to be used. Include recommendations and installation instructions.
- B. Shop Drawings:
 - 1. Roofing details at ¼ full size or larger.
- C. Certificates:
 - 1. Furnish to the Architect, prior to starting work:
 - Copy of the approved roofer agreement with the manufacturer of materials to be used.
 - b. Copy of FM and U.L. Material assembly listing from approved guide, note any deviation of options selected.
 - c. Written statement from the manufacturer that the selected assembly is compatible in all respects with existing roofing system.
 - d. Certification from the manufacturer that materials meet the applicable ASTM and Federal Specifications as herein specified.
 - e. Complete system description of the repair materials.
 - 2. Submit "Soprema's" written certification that after roofing system repairs are made the original roofing guarantee will still be in force.
- D. Railing Submittals:
 - 1. Manufacturer's data sheets on each product to be used, including:
 - a. Preparation instructions and recommendations.
 - b. Shop Drawings: Indicate profiles, sizes, connections, size and type of fasteners and accessories.
 - c. Field Measurements: Verify field measurements prior to assembly and/or ordering.
 - d. Installation Instructions

1.04 **DELIVERY, STORAGE AND HANDLING**

A. Delivery: Material shall be delivered in the manufacturer's original sealed and labeled containers and in quantities required to allow continuity of application.

- B. Storage: Materials shall be stored out of direct exposure to the elements. Roll goods shall be stored on end of a clean flat surface. Material shall be protected against moisture.
- A. Handling: Material shall be handled in such a manner as to preclude damage and contamination with moisture or foreign matter.
- B. All waste materials and debris shall be cleaned up daily and placed in suitable metal containers or shall be removed from the project site at the end of each working day. Special care shall be taken in disposal of flammable materials.

1.05 **WARRANTY**

A. The existing roof system is a Soprema fully adhered system that was installed in 2014. The existing roof system is covered by a Soprema 25 Platinum NDL Roof Warranty. All repairs to the existing roof must be done by a contractor authorized by Soprema to maintain the integrity of the Warranty. Contractor shall warrant to the owner that the work will be done in a workmanlike manor in accordance with these specifications and current Warranty. Provide a two (2) year roofer's guarantee on contractor's letterhead. Guarantee shall cover materials and workmanship at areas of new roof penetrations only.

PART 2 PRODUCTS

2.01 ROOFING MATERIALS & REPAIR PROCEDURES

- a. Concrete deck with an existing roof that will be removed down to the deck or the existing hot asphalt applied vapor barrier.
- b. Prime the vapor barrier with SOPREMA Elastocol 350 Primer at the rate of one gallon per one hundred to one hundred and fifty (100 150 ft²/gal) square feet per gallon.
- c. Install one ply of SOPREMA Elastophene SP 3.0 heat welded.
- d. Install SOPREMA Sopra-ISO tapered one-eighth inch per foot minimum one and one-half (1-½) inch thick ASTM C 1289, Type II, Grade 2 polyisocyanurate insulation system adhered with SOPREMA Duotack insulation adhesive applied in ½" to ¾" wide ribbons spaced 4" o.c. in the field of the roof, 4" o.c. on the perimeter of the roof and 4" o.c. in the corners of the roof.
- e. Install One-quarter (1/4) inch thick SOPREMA Sopraboard adhered with SOPREMA Duotack insulation adhesive applied in ½" to ¾" wide ribbons spaced 4" o.c. in the field of the roof, 4" o.c. on the perimeter of the roof and 4" o.c. in the corners of the roof. Two plies of SOPREMA Elastophene Flam, heat welded.
- f. Install one ply of SOPREMA Elastophene LS FR GR, heat welded.
- g. At wall base flashing install one ply of SOPREMA Sopralene Flam 180 heat welded to a noncombustible substrate primed with SOPREMA Elastocol 350 Primer.
- h. At wall cap flashing install one ply of SOPREMA Sopralene Flam 180 FR GR heat welded.
- i. **Optional** flashings and penetrations may be flashed with SOPREMA Alsan Liquid Reinforced Membrane System per published data.
- j. The finished roof repair to have positive drainage.

2.02 **ROOF ACCESSORIES**

A. Non-Penetrating Roof Edge Protection System:

Basis of Design - KeeGuard® Non-Penetrating Roof Edge Protection System, including

pipe railings, uprights, bases, counterweights and fittings. Kee Safety, Inc., 100 Stradtman St., Buffalo, NY 14206; Toll Free Tel: 800-851-5181. Equal products of other manufacturer's will be considered.

a. References

- American National Standards Institute (ANSI) A21.I Safety Requirements for Floor and Wall Openings, Railings and Toe Boards.
- American National Standards Institute (ANSI) A58.I Minimum Design Loads in Buildings and Other Structures.
- American National Standards Institute (ANSI) Al 17.1 Accessible and Usable Buildings and Facilities.
- American Society of Testing and Materials (ASTM) A47 Standard Specification for Ferrite Malleable Iron Castings.
- American Society of Testing and Materials (ASTM) A53 Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
- American Society of Testing and Materials (ASTM) A153 Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
- American Society of Testing and Materials (ASTM) A500 Standard Specification for cold-formed welded and seamless carbon steel structural tubing.
- Occupational Safety & Health Administration (OSHA): 1910.23 Guarding Floor and Wall Openings and Holes.

b. Railings Structural Requirements:

- 1. Handrail, wall rail and guardrail assemblies and attachments shall withstand a minimum concentrated load of 200 pounds (90719 g) applied in any direction on the top rail.
- 2. Infill area of guardrail system capable of withstanding a horizontal concentrated load of 200 pounds (90719 g) applied to one square foot (8165 g/sm) at any point in the system. Load not to act concurrently with loads on top rail of system in determining stress on guardrail.
- c. Railing System Description & Installation (including pipe railings, uprights, bases, counterweights and fittings):
- 1. Freestanding counterweighted guardrail system with 42 inch (1067 mm) minimum height to provide a pedestrian egress barrier on the roof to withstand a minimum load of 200 lb (90719 g) in any direction to the top rail per OSHA Regulation 29 CFR 1910.23.
- 2. Pipe: Steel, 1-1/2 inches (48 mm) schedule 40, galvanized.
- 3. Tube: Galvanized tube, 12 gauge, 1-1/2 inches, 1.90 inches (48 mm)OD.
- 4. Rails and Posts: Galvanized Tube, 12 gauge, 1-1/2 inches 1.90 inches (38 mm) diameter.
- Counterweight Levers: Galvanized Tube, 12 gauge, 1-1/4 inches 1.660 inches (38 mm) diameter.
- 6. Mounting Bases: Steel bases are galvanized and are supplied with a rubber pad on

- underside of the component.
- 7. Counterweights: Molded recycled PVC with one fixing collar per counterbalance.
- 8. Fasteners: stainless steel or galvanized.
- Fit exposed connections accurately together to form tight joints. For all connections with Kee Klamp fittings, each set screw is to be tightened to 29 foot pounds (39 Nm) of torque.
- Perform cutting, and fitting required for installation of handrails. Set handrails and accurately in location, alignment, and elevation, measured from established lines and levels.
- 11. Touch-up, repair or replace damaged products before Substantial Completion.
- 12. Provide adhered modified bitumen pads of the same material as the existing roof membrane under all railing counterweights. Pads to be 3" larger on all sides than the counterweight.

2.03 PREFORMED FLASHING SLEEVES

- A. Plumbing Vent Stack Flashing: Thaler Model # SJ-26 Removable cap insulated stack flashing height as shown on drawings .064 mill finished 1100-OT alloy aluminum with deck flange compatible w/ Roof Membrane.
 - 1. Provide removable metal hood and slotted metal collar type where indicated on the drawings.

2.04 **PIPE/CONDUIT SUPPORTS**

- A. Install at all new piping and conduits associated with the new rooftop mechanical equipment. Space at 4'-0" on center. Provide a piece of the roof membrane used on the roof under the support (adhered) to protect the existing/new roof membrane (2" wider than the support on all sides).
- B. Miro Industries. Inc., Model 2.5 Conduit Support 12 or approved equal.

PART 3 EXECUTION

3.01 **PREPARATION OF SURFACES**

A. Remove all loose gravel, dirt, dust, heavy accumulations of bitumen, and foreign material from the roof with power brooms, water, air, vacuum, or any combination necessary for sufficient cleaning at areas of new roof penetrations. Any substrate damage is the responsibility of the contractor and shall be immediately repaired. If water is used allow roof to dry completely before proceeding.

END OF SECTION 075110 - BUILT UP ROOF REPAIRS (ASPHALT)

SECTION 07 84 00 - FIRESTOPPING SPECIFICATION

PART 1 - GENERAL

1.01 SUMMARY

- A. Provide firestop systems consisting of a material, or combination of materials installed to retain the integrity of fire resistance rated construction by maintaining an effective barrier against the spread of flame, smoke and/or hot gases through penetrations, fire resistive joints, and perimeter openings in accordance with the requirements of the Building Code for this project.
- B. Firestop systems shall be used in locations including, but not limited to, the following:
 - 1. Penetrations through fire resistance rated floor and roof assemblies including both empty openings and openings containing penetrants.
 - 2. Penetrations through fire resistance rated wall assemblies including both empty openings and openings containing penetrants.
 - 3. Membrane penetrations in fire resistance rated wall assemblies where items penetrate one side of the barrier.
 - 4. Joints between fire resistance rated assemblies.
 - 5. Perimeter gaps between rated floors/roofs and an exterior wall assembly.
- C. Related Sections include, but are not limited to, the following:
 - 1. Division 07 Thermal and Moisture Protection
 - 2. Division 09 Finishes
 - 3. Division 22 Plumbing
 - 4. Division 26 Electrical

1.02 REFERENCES

- A. New York State Uniform Fire Prevention and Building Code (New York City Building Code) Editing Note: change according to location and code authority for project.
- B. National Fire Protection Association (NFPA)
 - 1. NFPA 101 (Life Safety Code)
- C. American Society For Testing and Materials Standards (ASTM):
 - ASTM E84: Standard Test Method for Surface Burning Characteristics of Building Materials.
 - 2. ASTM E814: Standard Test Method for Fire Tests of Through-Penetration Firestops.
 - 3. ASTM E1966: Test Method for Resistance of Building Joint Systems.
 - 4. ASTM E1399: Test Method for Cyclic Movement and Measuring Minimum and Maximum Joint Width.
 - 5. ASTM E119: Methods of Fire Tests of Building Construction and Materials.
 - 6. ASTM E2174: Standard Practice for On-Site Inspection of Installed Fire Stops
 - 7. ASTM E2307: Standard Test Method for Determining the Fire Endurance of Perimeter Fire Barrier Systems Using the Intermediate-Scale, Multi Story Test Apparatus (ISMA)

- 8. ASTM E2393-04 Standard Practice for On-Site Inspection of Installed Fire Resistive Joint Systems and Perimeter Fire Barriers
- D. Underwriters Laboratories Inc. (UL):
 - 1. UL Qualified Firestop Contractor Program.
 - 2. UL 263: Fire Tests of Building Construction and Materials.
 - 3. UL 723: Surface Burning Characteristics of Building Materials.
 - 4. UL 1479: Fire Tests of Through-Penetration Fire Stops.
 - 5. UL 2079: Tests for Fire Resistance of Building Joint Systems.
- E. UL Fire Resistance Directory -Volume 2:
 - 1. 1. Through-Penetration Firestop Devices (XHJI)
 - 2. 2. Fire Resistive Ratings (BXUV)
 - 3. 3. Through-Penetration Firestop Systems (XHEZ)
 - 4. 4. Fill, Void, or Cavity Material (XHHW)
- F. Omega Point Laboratories (OPL)
 - 1. Building Products, Materials & Assemblies Volume II
- G. G.Factory Mutual Research (FM):
 - 1. FM 4991: FM Approval Standard of Firestop Contractors Class 4991

1.03 DEFINITIONS

- A. Firestopping: The use of a material or combination of materials in a fire-rated structure (wall or floor) where it has been breached, so as to restore the integrity of the fire rating on that wall or floor.
- B. System: The use of a specific firestop material or combination of materials in conjunction with a specific wall or floor construction type and a specific penetrant(s).
- C. Barrier: Any bearing or non-bearing wall or floor that has an hourly fire and smoke rating.
- D. Through-penetration: Any penetration of a fire-rated wall or floor that completely breaches the barrier.
- E. Membrane-penetration: Any penetration in a fire-rated wall or floor/roof-ceiling assembly that breaches only one side of the barrier.
- F. Fire Resistive/Construction Joint: Any gap, joint, or opening, whether static or dynamic, between two fire rated barriers including where the top of a wall meets a floor; wall edge to wall edge applications; floor edge to floor edge configurations; floor edge to wall.
- G. Perimeter Barrier: Any gap, joint, or opening, whether static or dynamic, between a fire rated floor assembly and an exterior wall assembly.
- H. Approved Testing Agencies: Not limited to: Underwriters Laboratory (UL), Factory Mutual (FM), Warnock Hersey, and Omega Point Laboratory (OPL).

1.04 PERFORMANCE REQUIREMENTS

- A. Penetrations: Provide through-penetration and membrane-penetration firestop systems that are produced and installed to resist the spread of fire, passage of smoke and other hot gases according to requirements indicated, to restore the original fire-resistance rating of assembly penetrated.
 - 1. Provide and install complete penetration firestopping systems that have been tested and approved by nationally accepted testing agencies per ASTM E814 or UL 1479 fire tests in a configuration that is representative of field conditions.
 - 2. F-Rated Systems: Provide firestop systems with F-ratings indicated, as determined per ASTM E814 or UL 1479, but not less than one (1) hour or the fire resistance rating of the assembly being penetrated.
 - 3. T-Rated Systems: Provide firestop systems with T-ratings indicated, as well as F-ratings, as determined per ASTM E814 or UL 1479, where required by the Building Code.
 - 4. L- Rated Systems: Provide firestop systems with L- ratings less than 5cfm/sf.
 - 5. W-Rated systems: Provide firestop systems that are resistant to water. For piping penetrations for plumbing and wet-pipe sprinkler systems, provide moisture-resistant through-penetration firestop systems.
 - 6. For penetrations involving non-metallic, CPVC, PVC, or plastic piping, tubing or conduit, provide firestop systems that are chemically compatible in accordance with Manufacturer requirements.
 - 7. For penetrations involving insulated piping, provide firestop systems not requiring removal of insulation.
 - 8. For penetrations involving fire or fire/smoke dampers, only firestop products approved by the damper manufacturer shall be installed in accordance with the damper installation instructions.
- B. Fire Resistive Joints: Provide joint systems with fire resistance assembly ratings indicated, as determined by UL 2079 (ASTM E1399 and E1966), but not less than the fire resistance assembly rating of the construction in which the joint occurs. Firestopping assemblies must be capable of withstanding anticipated movements for the installed field conditions.
 - 1. For firestopping assemblies exposed to view, traffic, moisture, and physical damage, provide products that after curing do not deteriorate when exposed to these conditions both during and after construction.
 - 2. For floor penetrations exposed to possible loading and traffic, provide firestop systems capable of supporting floor loads involved either by installing floor plates or by other means, as specified by the Architect.
 - 3. L- Rated Systems: Provide firestop systems with L- ratings less than 5cfm/sf.
- C. Firestopping products shall have flame spread ratings less than 25 and smoke-developed ratings less than 450, as determined per ASTM E 84. Note: Firestop products installed in plenum spaces shall have a smoke developed rating less that 50.
- D. Engineering Judgment (EJ): Where there is no specific third party tested and classified firestop system available for an installed condition, the Contractor shall obtain from the firestopping material manufacturer an Engineering Judgment (EJ) to be submitted to the Approving Authority, Design Professional and Authority Having Jurisdiction for approval prior to installation. The EJ shall follow International Firestop Council (IFC) guidelines.

1.05 SUBMITTALS

A. Product Data: For each type of firestopping product selected. Manufacturers certification must verify that firestopping materials are free of asbestos, lead and contain volatile organic compounds (VOCs) within limits of the local jurisdiction.

- B. Design Listings: Submit system design listings, including illustrations, from a qualified testing and inspecting agency that is applicable to each firestop configuration.
- C. Installation Instructions: Submit the manufacturer's installation instruction for each firestop assembly.
- D. Where there is no specific third party tested and classified firestop system available for a particular configuration, the Contractor shall obtain from the firestopping material manufacturer an Engineering Judgment (EJ) for submittal.
- E. Material Safety Data Sheet (MSDS): Submit for each type of firestopping product selected.
- F. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Submit documents as per 1.06, B.
- G. A quality control manual approved by FM or UL (if applicable).
- H. Firestop Schedule: Submit schedule (see appendix A) itemizing the following:
 - 1. Manufacturer's product reference numbers and/or drawing numbers.
 - 2. Listing agency's design number.
 - 3. Penetrating Item Description/Limits: Material, size, insulated or uninsulated, and combustibility.
 - 4. Maximum allowable annular space or maximum size opening.
 - 5. Wall type construction.
 - 6. Floor type construction.
 - 7. Hourly Fire resistance rating of wall or floor.
 - 8. F rating.
 - 9. T, L, and W rating, if applicable.
- I. Firestop Application Log: A separate binder shall be prepared and kept on site for use by the Inspection Agency and the Authority Having Jurisdiction. The binder shall contain the following:
 - 1. The binder shall be a three (3) ring binder.
 - 2. Firestop Schedule (see appendix A)
 - 3. All approved firestopping assemblies including engineering judgments shall be provided and organized by trade.
 - 4. Copy of manufacturer's installation instruction for each firestop assembly.
 - 5. A matrix or table of contents listing each assembly shall be provided.
 - 6. The binder shall be updated as new firestop assemblies or EJ's are added.
 - 7. The binder shall be kept on-site at a location approved by the Owner.

1.06 QUALITY ASSURANCE

- A. Provide firestopping system design listings from UL, FM, Warnock Hersey or OPL in accordance with the appropriate ASTM Standard(s) per article 1.5.
- B. Contractor Qualifications: An acceptable Firestop Contractor shall be:
 - 1. Licensed by State or Local Authority where applicable, or
 - 2. FM Research approved in accordance with FM Standard 4991, or
 - 3. UL Qualified Firestop Contractor, or
 - 4. Meet the following requirements
 - a. Installation personnel shall be trained by the approved firestop manufacturer.

- b. The installation firm shall be experienced in installing firestop systems and fire resistive joint systems similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful performance.
- c. Qualifications include having the necessary experience, staff, and training to install manufacturer's products per specified tested and listed system requirements.
- d. Minimum of three (3) years experience and shown to have successfully completed not less than 5 comparable scale projects and provide references.
- C. Single Source Limitations: Obtain firestop systems for all conditions from a single manufacturer.
- D. Materials from different firestop manufacturers shall not be installed in the same firestop system or opening.
- E. Firestopping material shall be asbestos and lead free and shall not incorporate nor require the use of hazardous solvents.
- F. Firestopping sealants must be flexible, allowing for normal movement.
- G. Firestopping materials shall not shrink upon drying as evidenced by cracking or pulling back from contact surfaces such that a void is created.
- H. Firestopping materials shall be moisture resistant and may not dissolve in water after curing.
- I. Materials used shall be in accordance with the manufacturer's written installation instructions.
- J. Identify installed firestop systems with preprinted metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches (150 mm) of edge of the firestop systems so that labels will be visible to anyone seeking to remove penetrating items or firestop systems. Use mechanical fasteners for metal labels. For plastic labels, use self-adhering type with adhesives capable of permanently bonding labels to surfaces on which labels are placed and provide a label material that will result in partial destruction of label if removal is attempted. Include the following information on labels:
 - 1. The words "Warning Firestop System Do Not Disturb. Notify Building Management of Any Damage."
 - 2. Contractor's name, address, and phone number.
 - 3. Firestop system designation of applicable testing and listing agency.
 - Date of installation.
 - 5. Firestop system manufacturer's name.
 - 6. Installer's name.
- K. Inspection of penetrations through fire rated floor and wall assemblies shall be in accordance with ASTM E2174, Standard Practice for On-Site Inspection of Installed Fire Stops and ASTM E2393-04 Standard Practice for On-Site Inspection of Installed Fire Resistive Joint Systems and Perimeter Fire Barriers. The Owner may engage a qualified, independent inspection agency, or material testing agency to perform these inspections.
- L. Field Mock-up Installations: Prior to installing firestopping, erect mock-up installations for each type firestop system indicated in the Firestop Schedule to verify selections made and to establish standard of quality and performance by which the firestopping work will be judged by the Owner or Owner's Representative. Obtain acceptance of mock-up installations by the Owner or Owner's Representative before start of firestopping installation. Provide at least 72 hour notice to Owner or Owner's Representative prior to inspection.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver firestopping products to Project site in original, unopened containers or packages with intact and legible manufacturer's labels identifying product and manufacturer, date of manufacture/expiration, lot number, listing agency's classification marking, and mixing instructions for multi-component materials.
- B. Store and handle materials per manufacturer's instructions to prevent deterioration or damage due to moisture, temperature changes, contaminants, or other causes.
- C. All firestop materials shall be installed prior to expiration date.

1.08 PROJECT CONDITIONS

- A. Environmental Limitations: Install firestopping when ambient or substrate temperatures are within limits permitted by the manufacturer's written instructions. Do not install firestopping when substrates are wet due to rain, frost, condensation, or other causes.
- B. Ventilate per the manufacturers written instructions on the product's Material Safety Data Sheet.
- C. Verify the condition of the substrates before starting work.
- D. Care should be taken to ensure that firestopping materials are installed so as not to contaminate adjacent surfaces.

1.09 COORDINATION

- A. Coordinate areas prior to firestopping installation with the Owner, Construction Manager and/or all other Contractors.
- B. Coordinate construction of openings and penetrating items to ensure that firestopping assemblies are installed according to specified requirements. Opening shall not exceed maximum restrictions allowable for annular spacing per listing or acceptable Engineering Judgments.
- C. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate through-penetration firestop systems.
- D. Do not conceal firestopping installations until the Owner's inspection agency or Authorities Having Jurisdiction have examined each installation.
- E. Schedule firestopping after installation of penetrants and joints but prior to concealing or obstructing access to areas requiring firestopping.
- F. Preinstallation Conference: This conference should be a joint meeting attended by the Owner's Representative and all prime contractors, respective firestopping sub-contractors and firestopping company field advisor to review project requirements. The agenda for the conference should include the following topics:
 - 1. Review scope of work.
 - 2. Review shop drawings and firestop application log.
 - 3. Review mock-up requirements.
 - 4. Discuss identification labels and locations.

- 5. Review schedule, coordination and sequencing with all trades.
- 6. Review any engineering judgments or other special requirements.
- 7. Function and frequency of inspections and testing labs.
- G. Destructive testing shall be performed at mock up and at pre-determined intervals according to ASTM E 2174 and ASTM E 2393-04 by the inspector and with the installing Contractor present. Inspector to test for in place installation conformance to tested and listed system or engineering judgment details. Non-conformances will result in additional destructive testing, at the cost of the installer.

PART 2 - PRODUCTS

2.01 FIRESTOPPING – GENERAL

- A. Firestopping products specified in system design listings by approved testing agencies may be used providing they conform to the construction type, penetrant type, annular space requirements and fire rating involved in each separate assembly.
- B. Manufacturer of firestopping products shall have been successfully producing and supplying these products for a period of not less than three years and be able to show evidence of at least ten projects where similar products have been installed and accepted.
- C. Accessories: Provide components for each firestop system that is needed to install fill materials and to comply with "Performance Requirements" Article. Use only components specified by the firestopping manufacturer and by the approved testing agencies for the firestop systems indicated. Accessories include, but are not limited to the following items:
 - 1. Permanent forming/damming/backing materials, including the following:
 - a. Slag wool fiber insulation.
 - b. Foams or sealants used to prevent leakage of fill materials in liquid state.
 - c. Fire-rated form board.
 - d. Polyethylene/polyurethane backer rod.
 - e. Rigid polystyrene board.
 - 2. Temporary forming materials.
 - 3. Substrate primers.
 - 4. Steel sleeves
- D. All firestopping products and systems shall be designed and installed so that the basic sealing system will allow the full restoration of the thermal and fire resistance properties of the barrier being penetrated with minimal repair if penetrants are subsequently removed.

2.02 <u>MIXING</u>

A. For those products requiring mixing before application, comply with firestopping manufacturer's written instructions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other items or procedures needed to produce products of uniform quality with optimum performance characteristics for application indicated.

2.03 MANUFACTURERS

- A. Subject to compliance with the requirements, provide products by one of the following or equivalent manufacturers:
 - 1. Grace Construction Products.
 - 2. Nelson Firestop Products.
 - 3. Hilti Firestop Products.
 - 4. A/D Fire Protection Systems Inc.
 - 5. RectorSeal Corporation (The).
 - 6. Specified Technologies Inc.
 - 7. 3M; Fire Protection Products Division.
 - 8. Tremco; Sealant/Weatherproofing Division.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates and conditions for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
- C. Verify that all pipes, conduits, cables, and/or other items which penetrate fire-rated construction have been permanently installed prior to installation of firestops.

3.02 PREPARATION

- A. Surface Cleaning: Clean out openings immediately before installing firestop systems to comply with written recommendations of firestopping manufacturer and the following requirements:
 - 1. Remove from surfaces of opening substrates and from penetrating items foreign materials that could interfere with adhesion of firestop systems.
 - 2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with firestop systems. Remove loose particles remaining from cleaning operation.
 - 3. Remove laitance and form-release agents from concrete.

3.03 FIRESTOP SYSTEMS INSTALLATION

- A. General: Install firestop systems to comply with "Performance Requirements" article in Part 1 and firestopping manufacturer's written installation instructions and published drawings for products and applications indicated.
- B. Installation of firestopping shall be performed by an applicator/installer qualified as described in article 1.7.
- C. Apply firestopping in accordance with approved testing agencies listed system designs or manufacturer's EJ per the manufacturer's installation instructions.
- D. Verify that environmental conditions are safe and suitable for installation of firestop products.

- E. Install forming/damming/backing materials and other accessories required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire resistance ratings required.
- F. Install joint forming/damming materials and other accessories required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths of installed firestopping material relative to joint widths that allow optimum movement capability and achieve fire resistance ratings required.
- G. Install metal framing, curtain wall insulation, mechanical attachments, safing materials and firestop materials as applicable within the system design.
- H. Install fill materials for firestop systems by proven techniques to produce the following results:
 - 1. Fill voids, joints and cavities formed by openings, forming materials, accessories, and penetrating items as required to achieve fire-resistance ratings indicated.
 - 2. Apply materials so they fully contact and adhere to substrates formed by openings and penetrating items.
 - 3. For fill materials that will remain exposed after completing Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.
 - 4. Tool non-sag firestop materials after their application and prior to the time skinning begins. Use tooling agents approved by the firestopping manufacturer.
- I. On vertical pipe penetrations, lift riser clamps to permit the installation of firestopping around the entire pipe penetration. For penetrations involving fire or fire/smoke dampers, only firestop products approved by the damper manufacturer shall be installed in accordance with the damper installation instructions.

3.04 FIELD QUALITY CONTROL

- A. Inspecting Agency: Authorities Having Jurisdiction, the Owner, or Owner's Representative shall be allowed to perform random destructive testing during inspection of firestop systems to verify compliance per listings or manufacturer's installation instructions. All areas of work must be accessible until inspection by the applicable Authorities Having Jurisdiction and inspection agencies. The contractor shall be responsible to repair all tested assemblies with no cost to the owner.
- B. Proceed with enclosing firestop systems with other construction only after inspections are complete.
- C. Where deficiencies are found, repair or replace firestop systems so they comply with requirements.

3.05 CLEANING AND PROTECTION

- A. Clean off excess fill materials adjacent to openings, as Work progresses by methods and with cleaning materials that are approved in writing by firestopping manufacturer(s) and that do not damage materials in which openings occur. Leave finished work in neat, clean condition with no evidence of spillovers or damage to adjacent surfaces.
- B. Provide final protection and maintain conditions during and after installation that ensure firestop systems are without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated

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firestop systems immediately and install new materials to produce firestop systems complying with specified requirements.

END OF SECTION 07 84 00

SECTION 079000 - SEALANTS

PART 1 GENERAL

1.01 **DESCRIPTION**

- A. Scope of Work:
 - 1. The work of this section includes all labor, material, plant, tools, equipment, trucking, insurance and all related items to furnish and install all work of this section as shown by the drawings and specifications.

Provide caulking and sealants at all openings and penetrations as indicated and specified to provide a weather-tight structure for all new construction.

- 2. The following items are specifically included without limiting the generality implied by these specifications:
 - a. Caulk with sealing compound:
 - 1) Miscellaneous joints where indicated on the drawings.
 - b. Caulk with caulking compound:
 - 1) Interior non-watertight joints.
- B. Related work specified elsewhere:
 - 1. Section 093200 Unglazed Ceramic Mosaic Tile
 - 2. Section 093350 Porcelain Tile.
 - 3. Section 108000 Toilet Accessories (Grab Bars)
 - 4. Division 15 Toilet Fixtures.

1.02 **QUALITY ASSURANCE**

- A. Use only qualified workmen thoroughly skilled and especially trained in the techniques of caulking, who can demonstrate their ability to fill joints solidly and neatly.
- B. Mixing and application of sealing compound shall be in strict accordance with the manufacturer's printed directions. Initial mixing and application shall be under the direct supervision of the manufacturer's representative.

1.03 **SUBMITTALS**

- A. Samples:
 - 1. Submit samples for color selection for each type sealant.
 - 2. Pieces of backing material 6" long of each type.
- B. Product Data:
 - 1. Manufacturer's specifications, recommendations and installations for sealant, backing and associated materials.
 - 2. Manufacturer's published data, Letter of Certification or Certified Test Laboratory Report that each material complies with requirements and is intended for application indicated.

C. LEED Compliance:

Manufacturer's information inclusive of VOC g/L content complying with LEED v4
New Construction Indoor Air Quality requirements, inclusive of those outlined in
Section 01 8113 of this book, and SCAQMD requirements.

1.04 **DEFINITIONS**

- LEED as used in this section refers to Leadership in Energy and Environmental Design. Products listed meet LEED criteria for environmentally safe interior primers and coatings.
- 2. VOC as used in this Section refers to Volatile Organic Compounds found in primers and coatings. The level of VOC's appear after each product listed in the Schedule in grams per liter (g/L).
- 3. CDPH Standard Method v1.1: This credit uses the California Department of Public Health (CDPH) Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers, v.1.1–2010, for the emissions testing and requirements of all products and materials

1.05 **DELIVERY, STORAGE AND HANDLING**

- A. Deliver caulking and sealing compounds to the job in unbroken, sealed containers bearing the manufacturer's mixing directions. Store materials in sealed containers in a dry protected area above the ground or floor in an area maintained at (plus or minus) 70°F.
- B. Protect caulking materials before, during and after installation. Protect the installed work of other trades during installation.
- C. Do not use caulking materials that have been stored for a period of time exceeding the maximum recommended shelf life of the materials.

1.06 **CERTIFICATES AND GUARANTEE**

- A. The Contractor shall furnish, in duplicate, to the Architect and before work is started, an affidavit or certificate of compliance from the manufacturer of the materials proposed for use stating that the material meets the standards and requirements specified.
- B. Provide manufacturer's standard guarantee.
- C. Upon completion of the work the Contractor shall furnish to the Architect a written guarantee that all joints will remain full and will be watertight for a period of two (2) years from completion and acceptance of the contract work.

1.07 **JOB CONDITIONS**

A. No exterior caulking shall be applied when the air temperature is under 40 F.

PART 2 PRODUCTS

2.01 **INTERIOR CAULKING**:

A. Wet Areas - (Soft Joints in Tile and Other Areas Requiring Caulking Where Tile is Installed) Silicone Sealant: Mildew resistant, acid curing sealant. Type S, Grade NS, Class 25, low

modulus neutral curing silicone sealant, complying with ASTM C 920, (LATICRETE LATASIL). Use (LATICRETE LATASIL 9118 Primer as required by manufacturer).

B. Non-Wet Areas - 950A Siliconized Acrylic Latex Caulk by Sherwin Williams (or equal). Primarily used at all interior caulking that is not for the purpose of sealing water-tight and that will receive a paint finish and interior joints between dissimilar materials.

2.02 BACKER ROD

A. Extruded closed cell expanded polyethylene or polyurethane foam or extruded synthetic rubber rod or tube as approved by the sealant manufacturer, a larger than joint to be caulked; Sonneborn "Sonofoam". No material shall be used that is impregnated with oils, asphalt or solvents that tend to bleed.

2.03 **EXPANSION JOINT FILLER**

A. Polyethylene, closed cell filler, 2" thick Sonoflex.

2.04 **PRIMER**

A. Primer, solvents, and cleaners, non-staining, of type proven by tests to be compatible with the compound or sealant used. The brand used shall be as recommended by the manufacturer of the compound or sealant. The manufacturer's recommendations shall be followed in handling, storing, and curing.

2.05 **CLEANER**

A. As recommended by sealant manufacturer.

2.06 **SEALANT COLOR**

A. Match color of adjoining material as close as possible unless otherwise indicated.

2.07 PRE-COMPRESSED FOAM TAPE SEALANT

A. Self-expanding polyurethane foam joint sealant composed of polyester polyurethane foam impregnated with neoprene rubber suspended in a water based emulsion, "Willseal", as manufactured by Illbrock, Inc., Minneapolis, MN, 55412, 612-521-3555.

2.08 ACOUSTIC SEALANT

A. Equivalent to acoustical sealant by USG, meeting ASTM C919 and ASTM C834.

PART 3 EXECUTION

3.01 **PREPARATION OF SURFACES**

A. Primer

Thoroughly clean joints and apply primer prior to application of joint backing, bond breaker or sealants.

1. Protective coatings such as lacquers, rust-preventing coatings, oil or wax film, etc.

must be removed from all metal surfaces, and solvents wiped dry.

2. Brick, concrete block, concrete, mortar joints, etc., shall be brushed clean and all loose particles removed. Joints in the above surfaces shall be primed as recommended by the manufacturer of the sealing compound or sealant used, and allowed to become dry before application.

B. Joint Backing

In joints where the depth of the joint exceeds the required depth of the sealant, install joint backing to provide backing and uniform depth of sealant. Joint backing shall be installed with approximately 30% compression. Do not stretch, twist, puncture or tear joint backing. Butt joint backing at intersections.

C. Bond Breaker Tape

Install bond breaker tape smoothly at back of joint where backing is not required or cannot be installed. (Sealant shall adhere only to the sides and not to the back of the joint so as to eliminate three-sided adhesion).

- D. Painted surfaces should be caulked before application of final coat of paint.
- E. All joints improperly caulked or failing shall be completely cleaned and re-caulked.
 - 1. Failure shall be considered as: leakage, hardening, cracking, crumbling, shrinking, running or sagging of compound, staining of adjacent surfaces, or any condition not characteristic of the compound use.

3.03 INSTALLATION

A. Sealant Application

Apply sealant in accordance with manufacturer's application manual and instruction, using hand guns or pressure equipment, with proper nozzle size, on clean, dry, properly prepared substrates. Force sealant into joint and against sides of joint to make uniform. Avoid pulling of the sealant from the sides. Fill sealant space completely with sealant.

B. Tooling

Tooling is required to ensure firm full contact with the interfaces of the joint. Tool joints to form smooth, uniform beads with slightly concave surfaces. Finish joints shall be straight, uniform, smooth, neatly finished. Remove any excess sealant from adjacent surfaces of joint, with no pin holes or voids, leaving the work in a neat, clean condition. Tooling agents should only be used if recommended by the sealant manufacturer.

- C. Where an irregular surface or sensitive joint border exists, the applicator shall apply masking tape at the edge of the joint to insure joint neatness and protection. Tape to be removed after sealant is applied.
- D. Acoustical Sealant Application:
 - At partition walls, provide continuous beads of acoustic sealant at juncture of both faces of runners with floor and ceiling construction, and wherever gypsum board abuts dissimilar materials, prior to installation of gypsum board.
 - At ceilings, provide continuous beads of sealant wherever gypsum board abuts dissimilar materials.

- 3. Provide continuous bead of sealant behind faces of control joints prior to installation of control joint accessories.
- 4. After installation of gypsum board base layers, cut face layer sheets ½ inch less than floor-to-ceiling height and position with 1/4 inch open space between gypsum board and floor, ceiling and dissimilar vertical construction. Fill 1/4 inch open space with continuous sealant beads after installation of face layer.
- 5. At openings and cutouts, fill open spaces between gypsum board and fixtures, cabinets, ducts and other flush or penetrating items, with continuous bead of sealant.
- 6. Seal sides and backs of electrical boxes to completely close off openings and joints.
- E. Sealant Applied in Fastener Holes at Grab Bars:
 - See SECTION 108000 TOILET ACCESSORIES, PART 2 PRODUCTS, 2.03 GRAB BARS for information.

3.04 **CLEANING**

A. Clean of excess compound or smears immediately to the satisfaction of the Architect with cleaning material recommended by the manufacturer of the compound. Leave all work neat and clean.

END OF SECTION 079000 - SEALANTS

SECTION 081000 - HOLLOW METAL WORK

PART 1 GENERAL

1.01 **DESCRIPTION**

- A. Scope of Work:
 - Furnish all hollow metal door and window frames, side lights, cover plates, etc., with shop primed finish, ready for field finishing by painter. Any field welding required to properly assembly all components shall be included in this section of the work.
- B. Related work specified elsewhere:
 - 1. Section 079000 Sealants
 - Section 082000 Wood Doors
 - 3. Section 087000 Hardware
 - 4. Section 092500 Gypsum Wall Board
 - 5. Section 099000 Painting

1.02 **QUALITY ASSURANCE**

- A. Acceptable Manufacturers:
 - Materials specified are those of Steelcraft Architectural Systems, as manufactured by Steelcraft, 9017 Blue Ash Road, Cincinnati, Ohio 45242. Equivalent products of other manufacturers will be considered.
 - Fire rating shall meet positive pressure requirements of UBC 7-2-1997, IBC 2000, UL10C or ASTM 2074-00.

1.03 **SUBMITTALS**

- A. Shop Drawings: Submit completely checked shop drawings indicating all items to be provided, together with their relationship and anchorage to surrounding construction. Show all differing glass rabbet conditions at full scale.
- B. Certification: Where labeled doors are scheduled, frame shall carry Underwriter's Laboratories label.
- C. Manufacturer's Catalog:
 - 1. Submit catalog with shop drawings indicating construction standards.

1.04 **PRODUCT SHIPMENT, DELIVERY AND STORAGE**

- A. Protect all work from damage during shipment and at the site. Store on wood blocking off the floor to prevent damage and rust. Damaged or rusted items shall be removed from the site and replaced at no additional cost to the Owner. Ship frames with temporary stay at bottom to prevent racking.
- B. All items identified with removable metal or plastic tag, indicating location, size, swing and other pertinent information. Felt pen marking is strictly forbidden. Protection wrappings shall bear identification of each individual item.
- C. Schedule of delivery to project site: The hollow metal contractor shall submit a confirmed schedule of delivery of all items under his contract to the Architect for approval at the time

of submission of shop drawings.

PART 2 PRODUCTS

2.01 **MATERIALS**

A. Sheet Steel: (Galvanized Steel Door Frames Required at all Bathroom Doors) Sheet steel for doors shall be stretcher leveled. "Labeled" doors and frames are required at specific locations noted on the Door Schedule.

Schedule of Gauges	Frames	Doors
Exterior	14 Gauge (Galvanized)	16 Gauge (Galvanized)
Interior	16 Gauge	16 Gauge

- B. Reinforcement and anchors: Mill steel ASTM A7 or A36.
 - 1. Hinge, closer, holder and strike for panic hardware reinforcement shall be 8 gauge.
 - 2. Lock reinforcement shall be 16 gauge.
 - 3. Adequate reinforcing shall be provided for other hardware as required.
 - 4. Galvanized frames shall have galvanized hardware reinforcement.
- C. Glazing Channels:
 - 1. U-Shape steel channels of same gauge as framing or door scheduled, prepared for counter sunk fasteners, unless shown otherwise.
 - 2. Stop height and glazing channel dimensions per details, but not less than what is recommended by the Flat Glass Marketing Association's "Glazing Manual" for size, type and thickness of glazing material.
- D. Shop Finish: Clean, zinc phosphate treatment, final chromate rinse and prime painted with one coat of baked on rust inhibitive enamel paint after fabrication (all metal doors and frames).

2.02 **FABRICATION**

- A. Framing Profile:
 - 1. Door Frames: 2" face dimension, double rabbeted frame, jamb depth as required or detailed for jamb condition.
 - 2. Window frames: 2" face dimension double rabbeted frame, as detailed on the drawing.
- B. Framing, Door and Window:
 - 1. All joints and corners of frame assemblies as shown and noted on drawings shall be welded and ground smooth at the face of the section.
 - Frame assemblies shall be shipped to the project site completely welded.
 Field joints will only be permitted when total assembly exceeds shipping or entry into the building limitations.
 - 2. All door frames shall be welded one-piece, mortised and reinforced for high frequency heavy duty hinge preparation and all scheduled hardware.

- 3. Plastic strike box to be provided behind all hardware cut-outs.
- 4. Provide temporary stay at bottom of frames.
- 5. Glazing stops: Steel channel or bar stock.
- C. Doors: Flush doors, with edge seams continuously welded, of sheet steel as specified for intended use. Doors shall have beveled hinge and lock edges.
 - Construction:
 - a. All edges and cut-outs reinforced with inverted steel welded channel, closures flush with face sheets.
 - b. Top and bottom steel reinforcing channels shall be spot welded within the doors.
 - 2. Reinforce with minimum 12 gauge internal steel reinforcement for all scheduled hardware. Note that galvanized doors shall have galvanized hardware reinforcing.
 - 3. Scheduled openings: Size as scheduled, fabricate glazing stops by welding metered corners into a 4-sided frame. Secure side to be welded to door, other side to be screwed at 6" o.c.
 - 4. Label: Provide UL label on doors and frames where scheduled **DO NOT PAINT LABELS!**
- D. All welded frame assemblies shall be shipped to job site completely welded. Field splices welded and ground smooth.
- E. All welding exposed to view shall be completely filled and ground smooth.
- F. Doors with grinding marks on faces will be rejected by Architect.

PART 3 EXECUTION

3.01 **INSTALLATION**

- A. All frames shall be plumb and square and in alignment with other work.
- B. Any framing shipped to job in pieces to facilitate transportation shall be field erected, welded and welds ground smooth with shop coat touch-up.
- C. Repair and refinish all components in this section if damaged by the construction process.

END OF SECTION 081000 - HOLLOW METAL WORK

SECTION 082000 - WOOD DOORS

PART I GENERAL

1.01 **DESCRIPTION**

- A. The work of this section includes all labor, materials, plants, tools, equipment, trucking and all related items to furnish and install all work of this section as shown by the drawings and specifications.
 - 1. Pre-finished Flush Doors (Interior)
 - 2. Pre-finishing, pre-fitting and pre-matching wood doors.
- B. Related work specified elsewhere:
 - 1. Section 079000 Sealants.
 - 2. Section 081000 Hollow Metal Work.
 - 3. Section 087000 Hardware.

1.02 **QUALITY ASSURANCE**

- A. Acceptable Manufacturers (or equal):
 - Marshfield Door Systems
 1401 East Fourth Street
 Marshfield, WI 54449-7780
 - 2. VT Industries, Inc. 1000 Industrial Park PO Box 490 Holstein, Iowa 51025 Phone: (800) 827-1615
 - Eggers Industries
 164 North Lake Street
 Neenah, WI 54956
 Phone: (920) 722-6444
 - Algoma Hardwoods, Inc.
 1001 Perry Street
 Algoma, Wisconsin 54201
 Phone: (800) 678-8910
 - 5. Masonite Architectural 218 S Palmetto Ave Marshfield, Wisconsin, 54449 Phone: (877) 332-4484
 - 6. Fire rating shall meet positive pressure requirements of UBC 7-2-1997, IBC 2000, UL10C or ASTM 2074-00.

Category AB@: Additional edge sealing required.

B. Meet or exceed WDMA I.S. 1-A Premium Grade

1.03 **SUBMITTALS**

- A. Shop Drawings: Submit completely checked shop drawings indicating all items to be provided, together with their relationship and anchorage to surrounding construction. Show all differing glass rabbet conditions at full scale.
- B. Certification: Where labeled doors are scheduled, door and frame shall carry Underwriter's Laboratories label.
- C. Manufacturer's Catalog:
 - 1. Submit catalog with shop drawings indicating construction standards.
- D. Samples:
 - 1. Construction sample cut away to show studs, rails, core, crossband and face veneer, sample 6" x 6".
 - 2. Furnish color for door, when pre-finished doors are specified.
- E. Manufacturer's Guarantee:
 - 1. Two (2) copies of each product guarantee.
- F. Manufacturer's information inclusive of VOC g/L content complying with LEED v4 New Construction Indoor Air Quality requirements, inclusive of those outlined in Section 01 8113 of this book, and SCAQMD requirements. Laboratory Test Reports: For composite wood products, £ Dndicating compliance with requirements for low-emitting materials.
- G. Composite Wood Products: Manufactured with ultra-low-emitting formaldehyde resins as defined in California Air Resources Board's "Airborne Toxic Control Measure to Reduce Formaldehyde Emissions from Composite Wood Products" or with no added formaldehyde. Laboratory Test Reports: For adhesives, indicating Üompliance with requirements for low-emitting materials.

1.04 **DEFINITIONS**

- LEED as used in this section refers to Leadership in Energy and Environmental Design. Products listed meet LEED criteria for environmentally safe interior primers and coatings.
- 2. Composite Wood Projects are wood-based panels made from pieces, chips, particles, or fibers bonded together with a resin.
- 3. Formaldehyde means a colorless gas at room temperature that at elevated concentrations has a strong, pungent odor and can be irritating to the eyes, nose, and lungs (i.e., CAS No. 50-00-0).
- 4. No-added formaldehyde based resins means resins formulated with no added formaldehyde as part of the resin cross linking structure for making hardwood plywood, particleboard, or medium density fiberboard. No-added formaldehyde based resins include, but are not limited to, resins made from soy, polyvinyl acetate, or methylene diisocyanate.

1.05 **QUALITY & TESTING STANDARDS**

- A. ASTM E152 Methods of Fire Tests and Door Assemblies.
- B. NFPA 252 Standard Methods of Fire Tests of Door assembly

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- C. UBC 7-2, 1997
- D. UL 10 (b) Fire Tests for Door Assemblies Neutral Pressure
- E. UL 10 (c) Fire Tests for Door Assemblies Positive Pressure
- F. Quality Standards:
 - 1. WDMA Industry Standard I.S. 1-A-2004 (Window and Door Manufacturers Association).
 - a). WDMA TR-6 Factory Finish Catalyzed Polyurethane OP-6 Opaque ("Paint") Finish
 - 3. WI Manual of Millwork, 11th Edition, 2003
 - 4. ANSI A115. W Series, Wood Door Hardware Standards. (American National Standard Institute)

G. Labeling Agencies

- Underwriters Laboratories, Inc. (UL) (Neutral pressure and positive pressure rated doors
- 2. Intertek Testing Services-Warnock Hersey (ITS-WH) (Ratings for both neutral and Positive pressure rated doors)

1.06 **PRODUCT SHIPMENT, DELIVERY AND STORAGE**

- A. Do not deliver wood doors until the building is closed in and wet operations are completed and dry. Protect doors against dampness during and after delivery. Store wood doors away from any work in progress in a well-ventilated room away from direct sunlight and where they will not be exposed to extreme changes in humidity and temperature.
- B. All wood doors shall be delivered to the project site in manufacturer protective polyvinyl or plastic wrapped coverings and palletized on skids. To protect doors when unloading and moving to designated areas, manufacturer is to install metal or wood cleats on bottom rail of doors at the factory to help prevent damage to bottom edge and adjoining face veneers. Comply with manufacturer's standard information title "Care and Finishing of Wood Doors", furnished when doors are delivered.
- C. Protect all work from damage during shipment and at the site. Store doors on wood blocking off the floor to prevent damage. Damaged items shall be removed from the site and replaced at no additional cost to the Owner.
- D. All items identified with removable metal or plastic tag, indicating location, size, swing and other pertinent information. Felt pen marking is strictly forbidden. Protection wrapping shall bear identification of each individual item.
- E. Schedule of delivery to project site: The wood door contractor shall submit a confirmed schedule of delivery of all items under his contract to the Architect for approval at the time of submission of shop drawings.

1.07 **WARRANTY**

A. All interior doors shall have a lifetime guarantee against defects in material and workmanship which would render them unserviceable or unfit.

PART 2 PRODUCTS

2.01 **MATERIALS**

Basis of Design: Masonite Architectural Cendura Series

- A. Workmanship Comply with WDMA workmanship for veneer faces, vertical edges, crossbands, horizontal edges and dimensional tolerances.
- B. Door Construction Grade:
 - 1. Fabricate the work of this section to WDMA Premium Grade.
 - 2. Standard Construction to be per **Extra Heavy Duty Performance Levels**.
- C. Wood Door Facing:
 - 1. Wood Veneer Rotary Cut, Natural Birch
- D. Veneer Matching:
 - Book Match
- E. Assembly of Spliced Veneers:
 - 1. Running Book Match

2.02 FABRICATION

- A. Door Core Construction:
- 1. Non-Rated Core to be Structural Composite Lumber (Note: All doors to be assembled with Type 1 exterior adhesive)
- 2. 20 Minute Fire Rated Core to be Structural Composite Lumber (SCL-20) (Note: All doors to be assembled with Type 1 exterior adhesive)
- 3. Vertical Edge (Stiles) Edge to match face veneer. (May include veneer banding with structural composite lumber backers or inner panels).
- B. Horizontal Edges (Rails)
 - 1. Manufacturer's standard. (MDF top and bottom rails not permitted).
 - 2. As required to meet positive pressure ratings.
 - 3. Horizontal Edge (Stiles) Edge to match face veneer. (May include veneer banding with structural composite lumber backers or inner panels).
- C. Adhesives
 - 1. Face adhesives: Per WDMA TM-6 (See 2.02, A, 1, above)
- D. Face Material
 - 1. Veneer Species: Natural Birch
 - 2. Veneer Grade: 'A'

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3. Veneer Cut: Rotary

4. Veneer Match: Book / Running

E. Color of door stain to be "Espresso" by Masonite Architectural

2.03 PRE-FIT AND PRE-MACHINED

- All interior wood doors to be installed in welded hollow metal frames and shall be completely pre-fit and pre-machined by the door manufacturer per NFPA 80 requirements and dimensions. Pre-machining shall include pre-fitting to width and height, beveling as required, mortising for hinges, locks, flush bolts, closures and drilling for all additional hardware, except that which is to be surface applied. Contractor shall be responsible for boring lead holes, wood screw holes, mounting holes for face plates, and other surface applied hardware listed on the hardware schedule unless special arrangements are made with the door manufacture prior to submittal of shop drawings to the Architect.
- B. Factoring Pre-Finishing: All wood doors shall be completely pre-finished at the factory to meet or exceed WDMA I.S. TR-6. Finish shall be in strict conformance with the A.W.I. quality standards section 1500, system #3 for premium grade.
 - 1. All pre-finished wood doors shall be individually wrapped in 2-mil poly-bags as specified in Section 1.05-B of this specification.
 - 3. Factory finished doors to be installed just prior to substantial completion.
 - 4. All doors into Toilet Rooms to be undercut 1".
 - 5. All 6 six sides of doors to be prefinished.

PART 3 EXECUTION

3.01 **INSTALLATION**

- A. Installation of Wood Doors: All wood doors shall be expertly installed in their proper frames as scheduled. Doors shall swing in their respective openings free of hinge binding or improper latching. Undercut doors for floor finishes or coverings and ventilating purposes where required. Do not install doors in frame openings that are not plumb or out of tolerance for size or alignment. Verify that opening sizes and tolerances are acceptable and ready to receive this work. Pilot drill screw and bolt holes using templates provided by hardware manufacturer.
- B. Installation of Finish Hardware: Install accurately and securely without marking or defacing hardware or finish on doors. Test to assure proper alignment and operation. Protect finish hardware with suitable covering until completion of the project. Clean, polish and leave all hardware in perfect working condition.
- C. Leave all doors in perfect working condition with no mars, scratches, etc. visible.
- D. All frames shall be plumb and square and in alignment with other work.
- E. Repair and refinish all components in this section if damaged by the construction process.
- F. Install all wood doors in accordance with requirements of NWMA Standard Door Guarantee.

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- G. Do not trim doors to fit frame opening. Undercutting of doors will be permitted only as per door schedule.
- F. Exercise caution when drilling pilot holes and installing hinges so that pilot holes are not over-drilled and screws are not over torqued.
- G. Adjust doors for smooth and balanced door movement.
- H. Refinish and reseal any doors that required site alteration.

3.02 **CLEANING**

A. The contractor shall be responsible for removal of protective materials and cleaning with recommended cleaners all materials of this section.

END OF SECTION 082000 - WOOD DOORS

SECTION 083050 - METAL ACCESS DOORS

PART 1 GENERAL

1.01 **DESCRIPTION**

- A. Scope of Work: The work of this section includes all labor, materials, plant, tools, equipment, trucking, insurance and all related and incidental items to furnish and install all work of this section as shown by the drawings and specifications.
 - Metal Access Doors (Stainless Steel)
- B. Related Work Specified Elsewhere:
 - 1. Section 06 10 00 Rough Carpentry
 - 2. Section 09 25 00 Gypsum Wall Board
 - 3. Section 09 33 50 Porcelain Tile
 - 4. Section 09 54 00 Ceiling Suspension System

1.02 **QUALITY ASSURANCE**

- A. Acceptable Manufacturer:
 - 1. Basis of Design: Acudor Products, Inc., 80 Little Falls Road, Fairfield, NJ 07004 (973) 575-5120. Manufacturers of equal quality and performance will be considered.

1.03 **SUBMITTALS**

- A. Shop Drawings: Submit completely checked shop drawings indicating all items to be provided, together with their relationship and anchorage to surrounding construction.
- B. Certification: Where labeled doors are scheduled, door and frame shall carry Underwriter's Laboratories label.
- C. Manufacturer's Catalog:
 - 1. Submit catalog with shop drawings indicating construction standards.

1.04 PRODUCT SHIPMENT, DELIVERY AND STORAGE

- A. Protect all work from damage during shipment and at the site. Store on wood blocking off the floor to prevent damage and rust. Damaged or rust items shall be removed from the site and replaced at no additional cost to the Owner.
- B. All items identified with removable metal or plastic tags, indicating location, size, swing and other pertinent information. Felt pen marking is strictly forbidden. Protection wrappings shall bear identification of each individual item.

PART 2 PRODUCTS

2.01 **MATERIALS**

- A. Stainless Steel Access Door (Non-Rated):
 - 1. Basis of Design: Type 1 Style "ADWT", Flush Stainless Steel Door and Mounting

Frame by "Acudor Products, Inc. Access Door to be Airtight / Watertight. (Sizes as indicated on drawings)

- a. Door frame Fully Welded 16 Gauge Stainless Steel (#4 Finish).
- b. Door 16 Gauge Stainless Steel (#4 Finish).
- c. Watertight / Airtight Seal Continuous Bulb Trim Gasket (ASTM E 283 & ASTM E 331).
- d. Hinge Continuous Stainless Steel Piano Hinge.
- e. Lock Watertight Rim Cylinder Lock (by access door manufacturer)
- f. Cam Lock Door Latch Stainless Steel Spanner Head Screws.

PART 3 INSTALLATION

3.01 **INSTALLATION**

- A. All frames shall be plumb and square and in alignment with other work. Provide support to structure.
- B. Replace if damaged by the construction process.
- C. Coordinate precise location in walls, ceilings, etc. with MEP & FP trades so shut offs, dampers, etc. are located directly above door opening.

END OF SECTION 083050 - METAL ACCESS DOORS

SECTION 08 41 23 - FIRE RATED ALUMINUM STOREFRONTS (ALTERNATE #1)

PART 1 GENERAL

1.01 **DESCRIPTION**

A. Scope of Work:

The work of this section includes all labor, materials, plant, tools, equipment, trucking and all related items to furnish and install all work of this section as shown by the drawings and specifications.

- 1. Framing shall be fire resistive, temperature rise, framing system with decorative cladding for 60 minute interior application.
- 2. Application of fire rated framing includes:
 - a. Vision lites in fire rated doors, full vision fire rated doors, sidelites, borrowed lites, windows, transoms and transparent walls with fire rating requirement as specified.
- B. Related work specified elsewhere:
 - 1. See Alternates Section 012300
 - 2. Section 078400 Firestopping
 - 3. Section 079000 Sealants
 - 4. Section 087000 Door Hardware
 - 5. Section 088000- Glazing

1.02 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A manufacturer capable of fabricating fire rated storefronts that meet or exceed performance requirements indicated and of documenting this performance by test reports, calculations and providing field service representation during construction, approving acceptable installer and approving application method.
- B. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.
- C. Source Limitations for Glazing Accessories: Obtain glazing accessories from one source for each product and installation method indicated.
- D. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are classified and labeled by UL, for fire ratings indicated, based on testing according to NFPA 252. Assemblies must be factory-welded or come complete with factory-installed mechanical joints and must not require job site fabrication.
- E. Fire-Rated Glazed Partition Assemblies: Assemblies complying with NFPA 80 that are classified and labeled by UL, for fire ratings indicated, based on testing according to NFPA 257. Assemblies must be factory-welded or come complete with factory-installed mechanical joints and must not require job site fabrication.
- F. Listings and Labels Fire Rated Assemblies: Under current follow-up service by Underwriters Laboratories® maintaining a current listing or certification. Label assemblies accordance with limits of manufacturer's listing.

- G. Regulatory Requirements: Comply with provisions of the following:
 - Where indicated to comply with accessibility requirements, comply with ANSI A117.1 as follows:
 - a. Handles, Pulls, Latches, Locks, and other Operating Devices: Shape that is easy to grasp with one hand and does not require tight grasping, tight pinching, or twisting of the wrist.
 - b. Door Closers: Comply with the following maximum opening-force requirements indicated:
 - 1.) Accessible doors no more than 5 lbf push or pull force.
 - 2.) Fire Doors: Minimum opening force allowable by authorities having jurisdiction.

1.04 **SUBMITTALS**

- A. Shop Drawings: For fire rated framed entrances and storefronts. Include plans, elevations, sections, full-size details, and attachments to other work.
 - 1. Include details of provisions for assembly expansion and contraction and for draining moisture occurring within the assembly to the exterior.
 - 2. Include full-size isometric details of each vertical-to-horizontal intersection of aluminum-framed entrances and storefronts, showing the following:
 - a. Joinery, including concealed welds.
 - b. Anchorage.
 - c. Expansion provisions.
 - d. Glazing.

B. Product Data:

- 1. Technical Information: Submit latest edition of manufacturer's product data providing product descriptions, technical data, Underwriters Laboratories, Inc. listings and installation instructions.
- C. Hardware schedule: list of manufacture supplied hardware and verification of cylinder size complying with Section 08 70 00.
- D. Samples:
 - 1. One 8-inch by 10-inch samples for glass.
 - 2. Sample of steel frame w/ aluminum cap.
 - 3. Sample of steel door frame.
- E. Qualification Data: For manufacturer and Installer.
- F. Sample Warranties: Submit manufacturer's warranty.
- G. Maintenance Data: For framed entrances and storefronts to include in maintenance manuals.
- H. Manufacturer's color chart: Submit manufacturer's standard color palette from finishes specified for architects color selection.

1.05 PRODUCT SHIPMENT, DELIVERY AND STORAGE

- A. Protect all work from damage during shipment and at the site. Store materials on wood blocking off the floor to prevent damage. Damaged items shall be removed from the site and replaced at no additional cost to the Owner. Ship frames with temporary stay at bottom to prevent racking.
- B. All items identified with removable metal or plastic tag, indicating location, size, swing and other pertinent information. Felt pen marking is strictly forbidden. Protection wrappings shall bear identification of each individual item.
- C. Schedule of delivery to project site: The aluminum entrance contractor shall submit a confirmed schedule of delivery of all items under his contract to the Architect for approval at the time of submission of shop drawings.

1.06 **PROJECT CONDITIONS**

- A. Obtain field measurements prior to fabrication of frame units. If field measurements will not be available in a timely manner coordinate planned measurements with the work of other sections.
 - 1. Note whether field or planned dimensions were used in the creation of the shop drawings.
 - 2. Coordinate the work of this section with others effected including but not limited to: other interior and/or exterior envelope components and door hardware beyond that provided by this section

1.07 **WARRANTY**

A. Provide the manufacturer's standard five-year manufacturer warranty for glass, doors and frames.

PART 2 PRODUCTS

2.01 **MANUFACTURERS**

- A. Manufacturer Glazing Material: "Pilkington Pyrostop" fire-rated glazing as manufactured by the Pilkington Group and distributed by Technical Glass Products, 8107 Bracken Place SE, Snoqualmie, WA 98065 (800-426-0279)
- B. Frame System: "Fireframes® Aluminum Series" fire-rated frame system as manufactured and supplied by Technical Glass Products, 8107 Bracken Place SE, Snoqualmie, WA 98065 (800-426-0279).
- C. Door System: "Fireframes® Designer Series by TGP" fire-rated steel system as manufactured and supplied by Technical Glass Products, 8107 Bracken Place SE, Snoqualmie, WA 98065 (800-426-0279)

2.02 **PERFORMANCE REQUIREMENTS**

A. Fire Partition Rating Requirements: 60 minutes for entire system.

2.03 MATERIALS

A. Glass:

- 1. 60 Minute Fire Rated Glazing in partition meeting ASTM E-119: Composed of multiple sheets of Pilkington "Optiwhite" high visible light transmission glass laminated with an intumescent interlayer, 7/8" thick.
- 2. Impact Safety Resistance: ANSI Z97.1 and CPSC 16 CFR1201 (Cat. I and II).
- 3. Logo: Each piece of fire-rated glazing shall be labeled with a permanent logo including name of product, manufacture, testing laboratory (UL), fire rating period, safety glazing standards, and date of manufacture.
- 4. Glazing Accessories: Manufacturer's standard compression gaskets, standoff, spacers, setting blocks and other accessories necessary for a complete installation.

B. Aluminum Frames: 60 Minute

- 1. Steel Frame The steel framing members are made of two halves, nom. 1.9 in. wide with a nom. minimum depth of 1.38 in. with lengths cut according to glazing size.
- 2. Aluminum Trim Supplied with the steel framing members. Nom. 2 in. wide with a nom. depth of 1.54 in. with lengths cut according to glazing size.
- 3. Stainless Steel Standoffs Supplied with the steel framing members. Nom 5/16 in. diameter with a nom. minimum depth of 1 1/8 in. with depth adjusted to match Glass Panel thickness.
- 4. Stainless Steel Moment and Connecting Braces: Supplied with the steel framing members. Nom 3/8 in. thick with a nom. minimum depth of 1 1/8 in. with depth adjusted to match Glass Panel thickness.
- 5. Framing Member Fasteners Supplied with the steel framing members. Screws are M6 x16mm Button Head Socket Cap Screws for frame assembly and #6 x 1" Pan Head Sheet Metal Screws for door installation.
- 6. Glazing Gasket Supplied with the steel framing members. Nom. 3/4 in. by 3/16 in. black applied to the steel framing members to cushion and seal the glazing material when installed.

C. Steel Door System: 60 minute

- 1. Frame: Steel formed tubing.
- 2. Fasteners: As recommended by manufacturer
- 3. Glazing Accessories: calcium silicate setting blocks.
- 4. Glazing Compounds: Approved Fibrefrax.

2.04 **FABRICATION**

- A. Obtain reviewed shop drawings prior to fabrication.
- B. Fabrication Dimensions: Fabricate fire-rated assembly to field dimensions.
- C. Factory prepared fire-rated steel door assemblies to be pre-hung, prefinished with hardware preinstalled for field mounting.
- Field glaze door and frame assemblies.
- E. Furnish frame assemblies pre-welded.
 - 1. When necessary, splice frames too large for shop fabrication or shipping or to fit in available building openings.
 - 2. Fit with suitable fasteners.

3. Knock-down frames are not permitted

2.05 FINISHES. GENERAL

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Finish frames after assembly.
- C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable. Noticeable variations in the same piece are not acceptable.

2.06 **FACTORY FINISHES**

- A. Aluminum Frames: Class I, Clear Anodic Finish: AA-M12C22A41 (Mechanical Finish: non-specular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, clear coating 0.018 mm or thicker) complying with AAMA 611.
- B. Steel Door System: Color-Coated Finish: Apply manufacturer's standard powder coating finish system complying with AAMA 2603 applied to factory-assembled frames before shipping, complying with manufacturer's written instructions for surface preparation including pretreatment, application, and minimum dry film thickness.
 - 1. Color and Gloss: To match Aluminum frames as close as possible.

PART 3 EXECUTION

3.01 INSTALLATION

- A. All frames shall be plumb and square and in alignment with other work. Install glazing in strict accordance with fire resistant glazing material manufacturer's specifications. Field cutting or tampering is not permissible.
- B. Install in strict accordance with the approved shop drawings. Firmly pack perimeter of framing system to rough opening with mineral wool fire stop insulation or appropriately rated intumescent sealant.
- C. Repair and refinish all components in this section if damaged by the construction process.
- D. Provide insulation of dissimilar metals by taping or spraying with lacquer.
- E. Prefabrication: All hardware, with the exception of door closer, to be shipped to door manufacturer. <u>Door manufacturer shall install hardware on doors</u>. Complete fabrication, assembly, finishing and other work before shipment to project site. Disassemble components only as necessary for shipment and installation.
 - 1. Perform fabrication operations, including cutting, fitting, forming, drilling and grinding of metal work to prevent damage to exposed finish surfaces. For hardware, perform those operations prior to application of finishes.
- F. Reinforcing: Install reinforcing as required for hardware and necessary for high traffic performance requirements, sag resistance and rigidity. Provide manufacturer's standard reinforcement for each type of hardware required, not less than .125" thick.

3.02 ADJUSTING AND CLEANING

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- A. Touch-Up Painting: Immediately after installation, touch-up scratched, nicked, abraded, chipped, or otherwise damaged areas of the finish so as to be unnoticeable.
- B. Cleaning: Wash to remove any deleterious material from finished surfaces immediately.
 - 1. Do not clean with astringent cleaners. Use a clean "grit free" cloth and a small amount of mild soap and water or mild detergent.
- C. Adjust door function and hardware for smooth operation. Coordinate with other hardware suppliers for function and use of any other attached hardware.

3.03 **PROTECTION**

A. Provide final protection and maintain conditions in a manner acceptable to the Installer, who shall ensure that the glazed storefronts shall be without damage at time of Substantial Completion.

END OF SECTION 08 41 23 - FIRE RATED ALUMINUM ENTRANCES & STOREFRONTS

SECTION 087000 - HARDWARE

PART 1 GENERAL

1.01 **DESCRIPTION**

- A. Scope of Work:
 - 1. Provide all materials, equipment and appliances to furnish and install hardware as required on the Door Schedule and as specified.
 - 2. Hardware supplier will be responsible for coordinating keying systems with the Owner.
- B. Related Work Specified Elsewhere:
 - 1. Section 081000: Hollow Metal Frames.
 - 2. Section 082000: Wood Doors.

1.02 **QUALITY ASSURANCE**

A. Items listed in the schedule are for quality reference only.

1.03 **SUBMITTALS**

- A. Hardware Schedule
 - Complete lists of all items furnished indicating quantities, locations, sizes and door number.
 - 2. Catalog cuts of each item supplied.
 - Where the shape of the door or frame to be equipped with hardware is such as to
 prevent or make unsuitable the use of exact type hardware specified, suitable
 approved hardware having the same operation and quality as the type specified
 shall be furnished.
 - 4. If requested by the Architect, a sample of each hardware item will be supplied.
 - 5. All blueprint templates and/or template information shall be sent to each manufacturer who requires such information. (Example: Hollow metal door and frame manufacturers, etc.) Approved hardware schedules shall be sent to each manufacturer who requires template information.
- B. UL Label Certification

Wherever labeled doors and frames are scheduled, provide hardware with UL Certification.

C. Maintenance Materials

Provide Owner a full set of wrenches and other special tools as required to properly adjust hardware. See 3.01, E below.

1.04 PRODUCT DELIVERY, STORAGE, HANDLING AND COORDINATION

A. The hardware shall be delivered promptly to the project site, with sufficient time in advance for the proper inspection before setting. The hardware shall be properly wrapped in separate packages, complete with all trimmings, screws, etc., and shall be distinctly labeled and numbered for each location. A typewritten schedule shall accompany each shipment in conformity with the approved detailed schedule.

- B. Each carton shipped by the manufacturer, containing knobs, handles, bars or pulls shall contain a sufficient quantity of sheet cloth or cotton backed paper of adequate size to cover and protect the hardware when wrapped around the same.
- C. Provide area or room in building to store materials at the project site in a dry, well ventilated, off ground and under cover for protection of hardware from damage by the weather. Take special care to prevent damage of all operable equipment and controls.
- D. The Contractor shall be responsible for removal of protective materials and final cleaning using clear water and a non-abrasive detergent. Any protection necessary because of cleaning of adjacent materials shall be the responsibility of the General Contractor.
- E. The hardware supplier shall coordinate hardware with related trades such as metal doors, frames, millwork, etc.
- F. Immediately after the award of this Contract, it shall be the responsibility of the hardware supplier to request approved shop drawings from such trades with which hardware must be coordinated.

PART 2 PRODUCTS

2.01 **HARDWARE**

A. See Hardware Group Schedule 3.03 for type of hardware to be installed.

PART 3 EXECUTION

3.01 **INSTALLATION**

- A. Furnish all materials specified in labeled, unbroken packages to the site for installation.
- B. All hardware removed from existing doors shall be turned over to the Owner (if requested).
- C. All hardware shall be installed by carpentry mechanics, skilled in the application of hardware and in accordance with the recommendations of the appropriate manufacturer. All instruction sheets and installation details, which are packed with hardware, shall be read and understood before any attempt is made to install the hardware.
- D. Hardware and all other items shall be accurately fitted and secured in place, adjusted to operate perfectly and be free from scratches or other defacements.
- E. After installation, all templates, instruction sheets and installation details shall be placed in a file folder to be turned over to the Owner when the building is accepted.
- F. After the building is occupied, the hardware supplier shall contact the Owner and arrange an appointment with the custodian or maintenance engineer. The hardware supplier will then instruct this person in the proper use, servicing adjustment and maintenance of hardware.

3.02 FINAL ADJUSTMENT OF FINISH HARDWARE

- A. It is the responsibility of the Contractor to make final adjustments to finish hardware.
- B. Notify the Architect prior to making such adjustments and upon completion. Report in a letter that all hardware is in proper operation and ready for inspection.

3.03 HARDWARE GROUP SCHEDULE

Note: SUNY Oswego requirement: Drill and tap to fasten all hardware/hinges (except for sex bolt applications). No self-drilling or self-tapping fasteners unless approved by the Campus representative, regardless what type of fasteners are supplied with the hardware by the manufacturer.

Hardware Groups

Group 01 – Each door # -04, -05, -06, -07, -10, -11, -13, -14 to receive:

3 ea	Hinges	T4A3386 4.5" x 4.5" x 32D	McKinney
1 ea	Lockset	50-8225 LNL x 26D	Sargent
1 ea	Closer	DC8200 x A10 x M54 x 689	Corbin/Russwin
1 ea	Kickplate	K0050 10" High x 2" LDW x 32D	Rockwood
1 ea	Wall Stop	#406 x 32D	Rockwood
1 set	Seals	S88D	Pemko

Group 02 - Each door #-03, -15 to receive:

3 ea	Hinges	T4A3386 4.5" x 4.5" x 32D	McKinney
1 ea	Lockset	50-8225 LNL x 26D	Sargent
1 ea	Closer	DC8210 x A3 x M54 x 689	Corbin/Russwin
1 ea	Kickplate	K0050 10" High x 2" LDW x 32D	Rockwood
1 ea	Wall Stop	#406 x 32D	Rockwood
1 set	Seals	S88D	Pemko

Group 03 – Each door #-00, -01, -08, -16, -17 to receive:

Hinges	T4A3386 4.5" x 4.5" x 32D	McKinney
Lockset	8204 LNL x 26D	Sargent
Closer	DC8200 x A3 x M54 x 689	Corbin/Russwin
Kickplate	K0050 10" High x 2" LDW x 32D	Rockwood
Wall Stop	#406 x 32D	Rockwood
Seals	S88D	Pemko
	Lockset Closer Kickplate Wall Stop	Lockset 8204 LNL x 26D Closer DC8200 x A3 x M54 x 689 Kickplate K0050 10" High x 2" LDW x 32D Wall Stop #406 x 32D

Group 04 – Each door #-09 to receive:

3 ea	Hinges	T4A3386 4.5" x 4.5" NRP x 32D	McKinney
1 ea	Lockset	8204 LNL x 26D	Sargent
1 ea	Closer	DC8210 x A3 x M54 x 689	Corbin/Russwin
1 ea	Kickplate	K0050 10" high x 2" LDW x 32D (Outside)	Rockwood
1 ea	Kickplate	K0050 32" high x 2" LDW x 32D (Inside)	Rockwood
1 ea	Wall Stop	#406 x 32D	Rockwood
1 set Se	eals	S88D	Pemko

Group 05 – Each pair of doors #B16B-1 to receive:

6 ea	Hinges	T4A3786 4.5" x 4.5" NRP x 26D	McKinney
1 ea	Panic	ED55470B x N957 x 32D	Corbin/Russwin
1 ea	Panic	ED5470B (No Trim) x 32D	Corbin/Russwin
1 ea	Rim Cyl	#34 x 26D	Sargent
2 ea	Closers	DC8210 x A3 x 689	Corbin/Russwin
2 ea	Wall Stops	#406 x 32D	Rockwood
1 set	Astragals	305CN	Pemko
1 set	Seals	S88D	Pemko

DORMITORY AUTHORITY OF THE STATE OF NEW YORK FUNNELLE HALL BATHROOM RENOVATIONS SUNY OSWEGO

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Group 06 - Each door # RPM-1 & RPW -1 to receive:

3 ea	Hinges	T4A3386 4.5" x 4.5" x 26D	McKinney
1 ea	Lockset	50-8225 LNL x 26D	Sargent
1 ea	Kickplate	K0050 10" High x 2" LDW x 32D	Rockwood
1 ea	Wall Stop	#406 x 32D	Rockwood
1 ea	Elec Strike	1600CDB-LM x 630	HES
1 set	Seals	S88D	Pemko

(Group 06 - Remove existing door operator and actuators, to be reused. Operator to be re-installed on new door/frame. Electric strike to be tied to door operator. Deadbolt monitor in electric strike to not allow actuators to operate when deadbolt is thrown.)

All Sargent locks to be keyed to the existing Sargent master key system, information will be provided by SUNY Oswego.

END OF SECTION 087000 - HARDWARE

SECTION 08 80 00 - GLASS AND GLAZING

PART 1 GENERAL

1.01 **DESCRIPTION**

A. Scope of Work:

The work of this section includes all labor, material, plant, tools, equipment, trucking, insurance and all related items to furnish and install all work of this Section as shown by the Drawings and the Specifications.

- 1. Provide all glass and glazing for exterior entrances, vestibules, vision lights, and as shown on the drawings.
- 2. Provide all glass and glazing for interior fire-rated partition, doors, vision lights and as shown on the drawings.
- B. Related work specified elsewhere:
 - 1. See Alternates Section 012300
 - 2. Section 084123 Fire-Rated Aluminum Entrances and Storefronts
 - 3. Section 062000 Finished Carpentry.
 - Section 082000 Wood Doors.

1.02 **QUALITY ASSURANCE**

- A. Manufacturer Qualifications for Insulating-Glass Units with Sputter-Coated, Low-E Coatings: A qualified insulating-glass manufacturer who is approved and certified by coated-glass manufacturer.
- B. Source Limitations for Glass: Obtain coated tempered float glass and insulating glass from single source from a single manufacturer for each glass type.
- C. Source Limitations for Glass Sputter-Coated with Solar Control Low-E Coatings: Where solar-control low-E coatings of primary glass manufacturer that has established a certified fabricator program is specified, obtain sputter-coated solar control low-E coated glass in fabricated units certified by coated glass manufacturer.
- D. Safety Glazing Labeling: Where safety glazing labeling is indicated, permanently mark glazing with certification label of the SGCC or the manufacturer acceptable to the authority having jurisdiction. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which the glass complies.
- E. Installer Qualifications: A qualified installer who employs glass installers for this Project who are certified under the National Glass Association's Certified Glass Installer Program.
- F. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below unless more stringent requirements are indicated. See these publications for glazing terms not otherwise defined in this Section or in referenced standards.
 - GANA Publications: "Glazing Manual."
 - 2. IGMA Publication for Insulating Glass: SIGMA TM-3000, "North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use."

1.03 **DEFINITIONS**

- Glass Thicknesses: Indicated by thickness designations in millimeters according to ASTM C 1036.
- B. Inter-space: Space between lites of an insulating-glass unit that contains dehydrated air or other specified gas.
- C. Sealed Insulating Glass Unit Surface Designations:

Surface 1 – Exterior surface of the outer glass lite.

Surface 2 – Inter-space surface of the outer glass lite.

Surface 3 – Inter-space surface of the inner glass lite.

Surface 4 – Interior surface of the inner glass lite.

Surface 5 – Interlayer Surface (for laminated glass lites)

Surface 6 – Interior Surface (for laminated glass lites)

D. Deterioration of Insulating Glass: Failure of hermetic seal under normal use that is attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning insulating glass contrary to manufacturer's written instruction. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.

1.04 **SUBMITTALS**

- A. Product Data: For each type of product and glazing material.
- B. Glass Samples: Two (2) 12" x 12" samples of each glass type used.
- C. Glazing Accessory Samples: For sealants, in 12-inch lengths.
- D. Manufacturer's Guarantee: Two (2) copies of each guarantee specified.
- E. Drawings: Submit full size detail or rabbet proportion showing and listing all materials elected for use in glazing and sealing glass. One detail for each differing condition.
- F. Qualification Data:
 - 1. For Installer.
 - 2. For manufacturer of insulating-glass units.
- G. Manufacturer's Warranty: Two (2) copies of each warranty specified.

1.05 **JOB CONDITIONS**

- A. Protection: Protect all glazing from breakage; any glazing damaged or broken during construction of the project shall be replaced by this Contractor at no additional cost to the Owner.
- B. Temperature: No glazing shall be done during any period when the temperature is below 50°F. or during the winter season. If glazing is done during the winter, the area being glazed must be enclosed and heated so that the sash and the glass will be at a temperature of 50°F. before compound and sealants are set in or on them.

1.06 **SPECIAL REQUIREMENT**

A. The manufacturer of the various specified glazing materials shall have an approved representative at the project site at start of glazing operations to fully instruct glazing contractor's workmen in specified operations and to see that specified materials are properly used.

1.07 **WARRANTY**

- A. Manufacturer's Special Warranty for Coated-Glass Products: Manufacturer agrees to replace coated-glass units that deteriorate within specified warranty period. Deterioration of coated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in coating.
 - 1. Warranty Period: 10 years from date of Substantial Completion
- B. Manufacturer's Special Warranty for Laminated Glass: Manufacturer agrees to replace laminated-glass units that deteriorate within specified warranty period. Deterioration of laminated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning laminated glass contrary to manufacturer's written instructions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard.
 - 1. Warranty Period: 10 years from date of Substantial Completion.
- C. Manufacturer's Special Warranty for Insulating Glass: Manufacturer agrees to replace insulating-glass units that deteriorate within specified warranty period. Deterioration of insulating glass is defined as failure of hermetic seal under normal use that is not attributed to glass breakage or to maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.
 - 1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 PRODUCTS

2.01 **MANUFACTURERS**

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Guardian Industries Corp.
 - 2. AFG Industries, Inc.
 - Pilkington North America
- B. Source Limitations for Glass: Obtain from single source from single manufacturer for each glass type.
- C. Source Limitations for Glazing Accessories: Obtain from single source from single manufacturer for each product and installation method.

2.02 **PERFORMANCE REQUIREMENTS**

- A. General: Installed glazing systems shall withstand normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, or installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.
- B. Structural Performance: Glazing shall withstand the following design loads within limits and under conditions indicated determined according to the IBC and ASTM E 1300.
- C. Design Wind Pressures: Determine design wind pressures applicable to Project according to ASCE/SEI 7, based on heights above grade indicated on Drawings.
 - Wind Design Data:

a. Basic Wind Speed: 90 mph

b. Importance Factor: 1.0

c. Exposure Category: B

- D. Vertical Glazing: For glass surfaces sloped 15 degrees or less from vertical, design glass to resist design wind pressures based on glass type factors for short-duration load.
- E. Maximum Lateral Deflection: For glass supported on all four edges, limit center-of-glass deflection at design wind pressure to not more than 1/50 times the short-side length or 3/4 inches, whichever is less.
- F. Differential Shading: Design glass to resist thermal stresses induced by differential shading within individual glass lites.
- G. Safety Glazing: Where safety glazing is indicated, provide glazing that complies with 16 CFR 1201, Category II.
- H. Thermal and Optical Performance Properties: Provide glass with performance properties specified, as indicated in manufacturer's published test data, based on procedures indicated below:
 - 1. For laminated-glass lites, properties are based on products of construction indicated.
 - For insulating-glass units, properties are based on units of thickness indicated for overall unit and for each lite.
 - 3. U-Factors: Center-of-glazing values, according to NFRC 100 and based on LBL's WINDOW 5.2 computer program, expressed as Btu/sq. ft. x h x deg F.
 - 4. Solar Heat-Gain Coefficient and Visible Transmittance: Center-of-glazing values, according to NFRC 200 and based on LBL's WINDOW 5.2 computer program.
 - 5. Visible Reflectance: Center-of-glazing values, according to NFRC 300.

2.03 GLASS PRODUCTS

- A. Fully Tempered Float Glass (if indicated in 2.09 Glass Types): ASTM C 1048, Kind FT (fully tempered), Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear) or Class 2 (tinted) as indicated, Quality-Q3.
 - 1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion

parallel to bottom edge of glass as installed unless otherwise indicated.

- B. Heat-Strengthened Float Glass (if indicated in 2.09 Glass Types): ASTM C 1048, Kind HS (heat strengthened), Type I, Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear) or Class 2 (tinted) as indicated, Quality-Q3.
 - 1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.

2.04 LAMINATED GLASS

- A. Laminated Glass: ASTM C 1172 (if indicated in 2.09 Glass Types): Use materials that have a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after fabrication and installation.
 - 1. Polyvinyl Butyral (PVB) clear Interlayer
 - 2. Laminate glass with to comply with interlayer manufacturer's written instructions.

2.05 **INSULATING GLASS**

- A. Insulating-Glass Units (if indicated in 2.09 Glass Types): Factory-assembled units consisting of sealed lites of glass separated by a dehydrated inter-space, qualified according to ASTM E 2190.
 - Sealing System: Dual seal, with manufacturer's standard primary and secondary sealants.
 - 2. Spacer: Warm edge spacer.
 - 3. Desiccant: Molecular sieve or silica gel, or blend of both.
- B. Glass: Comply with applicable requirements in "Glass Products" Article as indicated by designations in "Insulating-Glass Types" Article.
 - 1. Provide kind FT (fully tempered) float glass in place of annealed or kind HS (heat strengthened) float glass where safety glass is indicated, except where laminated PVB inter-layers qualify as safety glazing.
 - 2. Provide kind HS (heat strengthened) float glass in place of annealed float glass where needed to resist thermal stresses induced by differential shading of individual glass lites and to comply with glass design requirements specified the "Performance Requirements" article.

2.06 GLAZING SEALANTS / COMPOUNDS

A. General: Provide materials as recommended by the manufacturer for the required application and condition of installation in each case. Provide only compounds that are proven to be fully compatible with surfaces contacted and fire rating requirements.

2.07 MISCELLANEOUS GLAZING MATERIALS

- A. General: Provide products of material, size, and shape complying with referenced glazing standard, with requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.
- B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.

- C. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.
 - 1. Located at ¼ points, full width of rabbet by 3" minimum to 8" maximum long, height as detailed or scheduled.
- D. Spacers: Elastomeric blocks or continuous extrusions of hardness required by glass manufacturer to maintain glass lites in place for installation indicated.
 - 1. Short lengths, 1/8" thick spaced 18" to 24" around perimeter of glass on both sides.
- E. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).

2.08 FABRICATION OF GLAZING UNITS

- A. Fabricate glazing units in sizes required to fit openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.
 - 1. Allow for thermal movements from ambient and surface temperature changes acting on glass framing members and glazing components.

2.09 GLASS TYPES

A. Type "1" Glass: Basis of Design - Glass shall be fire-rated and impact safety rated 7/8" tint-free, Pilkington "Pyropstop" comprised of layers of Pilkington "Optiwhite" colorless, wireless, low-iron float glass with clear intumescent interlayer. All glass shall meet ASTM E-119, UL 263: Fire Tests of Building Construction and Material fire rated to 60 minutes with hose stream, and Impact Safety Resistance: CPSC 16 CFR 1201 Cat. I & II. Each piece of fire-rated glazing material shall be labeled with a permanent logo including name of product, manufacturer, testing laboratory, fire rating period and safety glazing standards.

PART 3 EXECUTION

3.01 **INSPECTION**

- A. Inspect all openings prior to setting of sheet glazing since commencement of glazing constitutes acceptance of openings.
- B. Correct conditions detrimental to the proper and timely completion of the work. Do not proceed until unsatisfactory conditions have been corrected.
- Inspect glass edges for clean cut, undamaged edges, prior to installation.

3.02 **PREPARATION**

- A. Fix all movable items securely in a closed and locked position until glazing sealant has thoroughly cured.
- B. Prepare surrounds and glass as required to provide a clean, dry, uncontaminated surface to which glazing materials are to bond.
- C. All glass shall be factory cut to size, accurately and true with proper clearances. No field

grinding, cutting, nipping or other alterations allowed.

3.03 **INSTALLATION**

- A. All glass and glazing shall be installed in strict accordance with the referenced standards as listed under Paragraph 1.02 Quality Assurance, as applicable, and with the glazing manufacturer's recommended procedures for a water tight installation.
- B. Provide and install all necessary, neoprene setting spacers and accessories required for proper setting and spacing of glass. Glass in all types of glazed openings shall be carefully set and positioned in the glazing channel so that in no place will glass come in contact with metal or wood. All spaces between glass and the glazing channels or stops shall be completely filled with specified glazing materials.
- C. Use stops and screws furnished with items to be glazed and secure glass in place.
- D. All special finished type fasteners shall be carefully installed to prevent scratching of finishes. Touch-up all marred fasteners with specified touch-up paint.
- E. All glazed exterior openings, with loose interior glazing beads, shall have an approved preformed glazing tape installed between the outside face of the glass and the fixed outside leg of the sash rabbet. This tape shall be approximately c" thick and of width the height of the outside leg of the sash rabbet. Between the edges of the glass, the inside face of the glass and the glazing bead there shall be a full bed of glazing sealant. Above method of glazing shall result in no voids at any point between the metal or wood and glass around the perimeter of the opening.
- F. All glass interior glazed openings, including doors, etc., shall be set with a backing of felt or elastic rubber both sides of the glass. Setting in glazing compound will not be permitted.
- G. All glass shall be properly cut and set with waves horizontal to minimize distortion.

3.04 **CLEANING**

- A. All glass shall be carefully set and shall be left clean and whole at the completion of the building. Broken glass shall be replaced by the General Contractor.
- B. Upon completion of glazing, the glazing is not to be cleaned except for removal of excess compound from adjacent surfaces. The General Contractor shall employ a professional window cleaner who shall clean thoroughly both sides of all glass immediately prior to final acceptance of the building at the time approved by the Architect. Final cleaning shall include exterior and interior glass and the surfaces of doors, windows and walls adjacent thereto.

END OF SECTION 08 80 00 - GLASS AND GLAZING

SECTION 09 23 10 - PLASTER PATCHING

PART 1 GENERAL

1.01 DESCRIPTION

- A. Scope of Work:
 - 1. Plaster patching of all deteriorated surfaces shown and indicated on the drawings or a quantity indicated in plaster patching allowance.
 - a. Plaster on existing concrete block.
- B. Existing Plastering Systems requiring Patching:
 - 1. Interior wall assembly: Structo base, scratch and brown coats with gauging plaster finish on existing concrete block.

1.02 JOB CONDITIONS

- A. Plaster patching shall not be applied to surfaces, the temperature of which is below freezing. A minimum temperature of 55 deg. F. shall be maintained in the building for a period of at least seven (7) days prior to application of plaster, during plastering and until plaster is completely dry.
- B. In cold, damp weather, properly regulated heat shall be provided to avoid sweat-outs.
- C. In hot, dry weather, unusual drafts and too rapid drying shall be avoided until plaster has set.

1.03 SUBMITTALS

- A. Provide product data on specified products (including all trim accessories), describing physical and performance characteristics, sizes, patterns and color available.
- B. MSDS (Material Safety Data Sheets)

PART 2 PRODUCTS

2.01 MATERIALS

- A. Materials where identified by manufacturer are for convenience only, equivalent products of Bestwall International Corp, National Gypsum, Inland Steel Products Co., Wheeling Corrugation Co., or U.S. Gypsum are acceptable.
- B. Accessories Galvanized.
 - Corner Bead 26-gauge galvanized expanded bead USG1-A.
 - 2. Cornerite USG Diamond Mesh copper alloy.
 - 3. Casing Bead 24-gauge square type No. 66 or equal (back to back for control joint).
- C. Plaster:
 - 1. Water: Potable, clean, free from oil, grease, alkali and other impurities that would

- affect set of plaster.
- 2. Finish lime: Hydrated finishing lime complying with ASTM spec. C-206 latest edition. USG ivory double hydrated finishing lime, National Gypsum Co., Gold Bond E-Z soak lime finish.
- 3. Gauging plaster (Finish Coat): Specially ground calcined gypsum complying with ASTM Spec. C-28-68. USG Champion and Star-White National gypsum Co. Gold Bond Gauging Plaster, Best Co.
- 4. Base coat (scratch and brown coats): Structo-Base Gypsum Plaster.
- 5. Sand for base coats, natural sand, conforming to ASTM C35-70. Sand shall be clean, sharp, free from loam, clay, organic impurities and frozen material and not show darker than standard color when subjected to colormetric test conforming to ASTM C40-66. Once the source of sand is established, it shall not be changed without written approval of the Architect.
- D. Plaster Bonder: U.S. G. Plaster Bonder.

2.02 MIXES

A. Base coat plaster and sand shall be mixed in proportion of 2.0 cu. ft. of base coat sand per 100 lbs. of plaster.

PART 3 EXECUTION

3.01 DEMOLITION OF DETERIORATED PLASTER

- A. Remove deteriorated plaster down to the existing concrete block. Clean & perp concrete block substrate.
 - 1. Cut out and patch all defective or damaged plaster.
 - 2. Cut out and patch stained or discolored finished plaster.
 - 3. Match patch of defective or damaged plaster to existing work in form, texture and color.
- B. Prior to starting plaster patching, the contractor for plastering shall examine all existing blocking, grounds, etc., installed. Notify the Architect, in writing, of any defects and do not proceed until all defects have been corrected. Starting of work shall imply acceptance of surfaces by this Contractor.
- C. Inspection will be made at the start and as work progresses.

3.02 PREPARATION

- A. This contractor shall build up all plaster grounds as required to carefully level with other work.
- B. Protection of adjacent surfaces: Finished surfaces such as tile, metal frames, metal windows, and metal partitions shall be protected from damage during plaster patching. Protection shall consist of covering with a non-staining kraft paper or polyethylene sheet and joints sealed with tape or adhesive. Metal frames may be protected with a removable type of masking tape or an approved type of non-staining petroleum jelly mixed in accordance with manufacturer's directions. Maintain protection in place during plaster patching and remove when plaster work is completed. (Any damage to finished surfaces caused as a result of plaster operation shall be corrected and the cost thereof paid by the plastering contractor.)

3.03 **INSTALLATION**

A. Grounds:

1. Metal casing bead screed and other metal plastering accessories used as grounds shall be of size and dimension to provide for proper plaster thickness and proper meeting of adjacent surfaces.

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B. Replacing Damaged Metal Accessories:

- 1. General provisions applying to all metal accessories:
 - Casing beads shall be applied at all intersections of plaster and unlike a. materials.
 - Corner beads shall be secured to supports properly aligned, plumb and b.
 - Control joints: C.
 - 1) Construction changes within the plane of the wall.
 - 2) Break continuity of plaster at control joints.

C. Stabilize Sound Plaster:

- 1. Using a 3/16" masonry bit, drill holes every three (3) inches around the damaged plaster area, about one (1) inch from the edge. Drill until the bit hits the concrete
- 2. Vacuum the holes to remove all dust and debris; spray them and the edge of secure plaster with plaster bonder.
- After 15 minutes, with a caulking gun fill all unmarked holes with a squirt of plaster 3. adhesive. When the holes begin to overflow, pull the caulk gun with the adhesive tube away from the plaster surface and wipe off the excess with a damp sponge.
- Screw plastic anchoring rings into the concrete block a drill with a Phillips 4. screwdriver bit. If there is a crack in a wall, secure it first by working from the bottom up. Tighten the rings gently until you see the adhesive oozing out of the holes. Screw in enough rings in the loose plaster, so that every hole oozes. Allow to dry overniaht.
- 5. Unscrew the anchoring rings, when the adhesive has dried. Scrape off the plaster surface to remove any protrusions. Apply spackle with a drywall knife over the holes to fill in the voids and cover all other holes up. Sand when dry.

D. Mixing Plaster:

- Mixing of plaster shall be done in mechanical type mixers, except that hand mixing 1. may be used when approved by the Architect. Provide a sufficient number of mixers to carry on the work.
- Measurements shall be by volume or weight as specified. 2.
- Do not use any frozen, caked or lumpy materials, or material that has partially set. 3.
- Re-tempered plaster that has partially set shall not be used. Clean mixer of all set or hardened material before materials for a new batch are loaded.
- Keep mixing tools and equipment clean. Mix each batch separately. The mixing 5. proportions, sequence and cycle of operations and time shall be in accordance with the material manufacturer's specifications.

E. Plaster Repair & Veneer Procedures:

All loose, unsound plaster shall be removed down to the substrate. Loose 1.

material within cracks shall be removed and the crack cleaned, without increasing the size of the crack. Retie any broken tie wires on metal lath (if present). Remove loose paint and surface material adjacent to holes or cracks.

- 2. Repair & Re-cover existing Plaster wall per USG Tech NOTE NO. LOOK002, dated 1.30,2009. Included at the end of this Section. Using materials as specified.
- 3. Contractor shall finish existing walls to an as new condition to, free of cracks, holes dimples, protrusion or any other imperfection.
- F. Repair and Resurface (Where slight to moderate filling is required):
 - 1. Rough up the existing surface, especially if painted.
 - 2. Completely clean the surface with TSP (Tri Sodium Phoshate) solution.
 - 3. Apply Plaster Bonder, USG Plaster Bonder.
 - 4. Fill low spots with either DIAMOND or IMPERIAL Brand Veneer Basecoat Plaster. (Thickness no greater than 1/4" per layer).
 - 5. Scratch finish of each coat for keying of next layer and allow each coat to dry.
 - 6. Parge whole wall with a thin, 1/16" minimum layer of DIAMOND or IMPERIAL Brand Veneer basecoat plaster embedding a glass fiber mesh for structure (same mesh as used on synthetic stucco systems (EIFS), again scratching surface for finish coat.
 - 7. Finish with a thin, 1/16" finish coat of DIAMOND Interior Finish Plaster or lime gauging finish plaster.
- G. Repair and Resurface (Where slight to large filling is required):
 - 1. Rough up the existing surface, especially if painted.
 - 2. Completely clean the surface with TSP (Tri Sodium Phoshate) solution.
 - 3. Treat the wall with Plaster Bonder, USG Plaster Bonder.
 - Fill low spots with RED TOP Gypsum Plaster sanded 100:2 (100 lb. Plaster; 2 cu. Ft. sand) or STRUCTO-BASE at thickness no greater than 3/8" per layer. (Use material most similar to existing)
 - 5. Scratch finish of each coat for keying of next layer and allow each coat to dry. Install 3.4 self-furring metal lath over whole wall using fasteners long enough to anchor into framing.
 - 6. Parge whole wall with a layer of RED TOP Gypsum Plaster sanded 100:3 or STRUCTOBASE as needed to cover lath, again scratching surface for finish coat.
 - 7. Finish with a thin, 1/16" finish coat DIAMOND Interior Finish Plaster or lime gauging finish plaster.
- H. Final finish shall be a Level 5 finish.
- I. Cleaning
 - At the completion of the finish plaster work, clean all plaster from beads, screeds, metal base and metal trim, leaving work ready for finishing by others. Remove all plaster rubbish, excess material, scaffolding, tools and equipment from building, leaving floors broom clean.
 - 2. Remove stains from plaster surfaces that would adversely affect subsequent finishes.

3.04 ADJUST AND CLEAN

- A. Patching
 - Upon completion, point-up plaster around trim and other locations where plaster meets dissimilar materials.

B. Cleaning

- 1. Remove plaster and protective materials from expansion beads, perimeter beads, and adjacent surfaces.
- 2. Remove stains from plaster surfaces that would adversely affect subsequent finishes.

END OF SECTION 09 23 10 - PLASTER PATCHING

SECTION 092500 - GYPSUM WALL BOARD

PART 1 GENERAL

1.01 **DESCRIPTION**

- A. Scope
 - 1. Interior Gypsum Wall Board
 - 2. Metal Studs and Furring
 - 3. Accessories
 - 4. Existing Plaster Repair
- B. Related Work Specified Elsewhere
 - 1. Section 072000 Batt and Sound Insulation
 - 2. Section 093350 Unpolished Porcelain Tile
 - 3. Section 099000 Painting

1.02 **QUALITY ASSURANCE**

- A. Metal stud products specified are those of Marino/Ware, except for slotted top runners (deflection track), which are those of Sliptrack Systems, SLP-TRK (888) 475-7875. Equal products of other manufacturer's will be considered.
- B. Manufacturer of Gypsum Board and Accessories: Products specified establish standard of quality and are manufactured by United States Gypsum Company (USG), Chicago, IL (or equal).
- C. Applicator shall have a minimum five years of documented experience in metal framing, drywall application and finishing.
- D. Installation shall be in accordance with the manufacturer's current printed instructions.
- E. Reference Standards:
 - 1. Applicable requirements of ASTM C754 for installation of steel framing.
 - 2. Install gypsum board in accordance with applicable requirements and recommendations of Gypsum Association GA 216, "Recommended Specifications for the Application and Finishing of Gypsum Board" except for more stringent requirements of manufacturer.
 - Apply acoustical sealant in accordance with applicable requirements of ASTM C919.

1.03 **SYSTEM REQUIREMENTS**

- A. Performance Requirements: Fabricate and install systems as indicated but not less than that required to comply with ASTM C754 under the following conditions:
 - 1. Gypsum board partitions:
 - a. Standard systems: Maximum deflection of I/240 of partition height.
 - b. Systems to receive water resistant gypsum board or backer board: Maximum deflection of I/360 of partition height.
 - 2. Interior suspended ceilings and soffits: Maximum deflection of I/360 of distance between supports.
- B. Fire Resistance Ratings: Where fire resistance classifications are indicated, provide

materials and application procedures identical to those listed by UL or tested according to ASTM E119 for type of construction shown.

C. Acoustical Ratings: Where sound ratings are indicated, provide materials and application procedures identical to those tested by manufacturer to achieve Sound Transmission Class (STC) scheduled or indicated in accordance with ASTM E90.

1.04 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. All products delivered in their original unopened packages and stored in enclosed shelter providing protection from damage and moisture.
- B. Damaged or deteriorated materials to be removed from site.

1.05 **ENVIRONMENTAL CONDITIONS**

A. In cold weather and during gypsum panel joint finishing, temperatures within the building shall be maintained within the range of 55°F. to 70°F. (13°C. to 21°C.). Adequate ventilation shall be provided to carry off excess moisture.

1.06 **SUBMITTALS**

- A. Provide product data on specified products (including all trim and accessories), describing physical and performance characteristics and sizes.
- B. MSDS (Material Safety Data Sheets)
- C. Manufacturer's standard warranty.
- Provide samples of each wall board type specified with Product Data Submittal.
- E. LEED Compliance: Manufacturer's information inclusive of VOC g/L content complying with LEED v4 New Construction Indoor Air Quality requirements, inclusive of those outlined in Section 01 8113 of this book, and SCAQMD requirements.

1.07 **DEFINITIONS**

- LEED as used in this section refers to Leadership in Energy and Environmental Design. Products listed meet LEED criteria for environmentally safe interior primers and coatings.
- 2. VOC as used in this Section refers to Volatile Organic Compounds found in primers and coatings. The level of VOC's appear after each product listed in the Schedule in grams per liter (g/L).
- 3. CDPH Standard Method v1.1: This credit uses the California Department of Public Health (CDPH) Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers, v.1.1–2010, for the emissions testing and requirements of all products and materials

PART 2 PRODUCTS

2.01 INTERIOR METAL STUDS AND STEEL RUNNERS

- A. Studs
 - 1. 2 ½" 212 S162-33 (2-1/2" deep, 1-5/8" flange C-stud, 20 gauge).
 - 2. 3 5/8" 358 S162-33.
 - 3. 6" 600 S162-33.
 - 4. 2 ½" 212 CT-032 (2-1/2" deep, 1-5/8" flange CT-stud, 20 gauge @ 2 hr. Shaftwall locations).
- B. Bottom Runners
 - 1. 2 ½" 212 T125-18 (2-1/2" deep, 1-1/4" flange track, 25 gauge).
 - 2. 3 5/8' 358 T125-33.
 - 3. 6" 600 T125-27
 - 4. 2 ½' (2-1/2" deep, 1-5/8" flange J-runner (tabbed track), 25 gauge @ 2 hr. Shaftwall locations).
- C. Slotted Top Runners (Deflection Track)
 - 1. 25 gauge thick, ASTM A653/A653M, Grade 33.
 - 2. [2-1/2] [3-5/8] [4] [6] [8] inch wide as needed.
 - 3. 10' 0" long.
- D. Shaftwall Studs
 - 1. 2 ½' Type CH shaftwall metal studs, 16" o.c. 20 gauge galvanized
- E. Gauge Identification (Stud and runner components are identified by the following color code.)
 - 1. 26 gauge Brown
 - 2. 25 gauge Unmarked
 - 3. 22 gauge Black
 - 4. 20 gauge White
- F. Fasteners For Securing Studs To Runners
 - 1. ASTM C1002, self-drilling, self-tapping steel screws 5/8" type-12 pan head screws (low profile head) unless otherwise specified.
- G Finish for all metal framing members: Galvanize to ASTM A924/A924M, Provide G60 coating class.

2.02 WALL / CEILING BOARD (Basis of Design)

- A. Wall Board:
 - 1. Inside Bathrooms & Shower Stalls (Basis of Design):
 - a. Aggregated Portland cement board with woven glass fiber mesh facing; complying with ANSI A118.9.
 - b. Thickness: 5/8" inch.
 - c. Acceptable product: Durock Cement Board by USG or equivalent.

- d. Accessories:
 - Durock Steel Screws 1 5/8" Type S or S-12 with anti-corrosive coating.
 - Durock 2" Wide alkali-resistant mesh tape.
 - Adhesive: As recommended by manufacturer.
 - Joint Treatment: See 2.03, F, below.
- 2. Outside Bathrooms (Internal Corridors, Storage Rooms, Janitor's Closet, IT/Data Closets. etc.)
 - a. Abuse/Water Resistant GWB High-density paperless gypsum and cellulose panels with long edges tapered to form a shallow channel for joint reinforcement; complying with ASTM C1278, C1629.
 - b. Thickness: 5/8" inch.
 - c. Acceptable product: Equivalent to FIBEROCK® Aqua-Tough™
 by USG.
 - d. Accessories: Same as Above.
- B. Ceiling / Soffit Board (All spaces where a GWB ceiling is called for on Finish Schedule)
 - a. Abuse/Water Resistant GWB High-density paperless gypsum and cellulose wall panels with long edges tapered to form a shallow channel for joint reinforcement; complying with ASTM C1278, C1629.
 - b. Thickness: 5/8" inch.
 - c. Acceptable product: Equivalent to FIBEROCK® Aqua-Tough™ by USG.
 - Accessories: Same as Above.
- C. Wall Board @ 2 hr Rated Shaftwalls:
 - 1. Gypsum Liner Panels:
 - a. Noncombustible, moisture- and mold-resistant gypsum core encased in moisture- and mold-resistant, 100 percent recycled blue face and back papers; complying with:
 - ASTM C1396
 - Per ASTM E136, noncombustible gypsum core
 - Per ASTM E84, flame spread is 20; smoke developed is 0
 - b. Thickness: 1" inch.
 - c. Panels: USG SHEETROCK® Mold Tough® Gypsum Liner Panels (Type SLX).
 - d. Accessories: Same as Above.
 - 2. Gypsum Wall Board:
 - a. Noncombustible, moisture- and mold-resistant gypsum core encased in moisture- and mold-resistant, green face and brown back papers face and back papers; complying with:
 - ASTM C1396
 - ASTM C473
 - Per ASTM E136, noncombustible gypsum core
 - Per ASTM E84, flame spread is 0; smoke developed is 0
 - b. Thickness: ½"
 - c. Panels: USG SHEETROCK® Brand Mold Tough Firecode 'C' Panels (Type C)
 - d. Accessories: Same as Above

2.03 ACCESSORIES AND TRIM

- A. Furring Channels: USG DWC 20, face 1 ½", depth or 7/8" (as noted on drawings).
- B. Control Joint: USG No. 093 (or equal)
- C. Outside Corners: USG Dur-A-Bead (or equal)
- D. Abutting Dissimilar Materials or at End Caps (non-rated): USG 200-B or Trim Tex Tear-Away Bead
- E. At Juncture with Ceilings: USG #402 for 5/8"
- F. Plaster to GWB Transition: USG #66 Expanded Flange Edge Casing Bead (or equal). Paintable and sized appropriately to accept adjoining material.
- G. Joint Treatment: Note Level 5 finish required at all Aqua-Tough walls, ceilings and soffits receiving a paint finish.
 - 1. Pre-fill:

Abuse/Water Resistant GWB Ceilings & Soffits: USG Dur-A-Bond 90 joint compound (Multi-Purpose)
Cement Board: Laticrete 254
UL GREENGUARD Gold compliant

2. Joint Reinforcement:

Abuse/Water Resistant GWB Ceilings & Soffits: 2" wide Alkali-resistant mesh tape Cement Board: 2" wide Alkali-resistant mesh tape

Taping / Coating:

Aqua-Tough Walls, Ceilings & Soffits: Dur-A-Bond 90 Multi-Purpose Cement Board: The same thin set mortar that will be used for tile installation (Laticrete 254 or equal) UL GREENGUARD Gold compliant

4. Topping Coat:

Abuse/Water Resistant GWB Ceilings & Soffits: USG Joint topping compound, except at Bathroom spaces and & Internal Corridor spaces. Cement Board: Not required at ceramic tile walls.

PART 3 EXECUTION

3.01 INTERIOR ABUSE/WATER RESISTANT PANELS (USG Aqua-Tough Or Equal)

- A. Install board in strict accordance with manufacturer's recommendations (unless otherwise specified) to underside of deck above.
- B. A single layer of 5/8" gypsum panel (Aqua-Tough) shall be applied vertically over the studs. Screw the panels 8" o.c. staggered at edges of panels and 12" o.c. in the field areas. Where two (2) layers of gypsum drywall panels are indicated, the first layer shall be screwed horizontally and the second layer cemented and screwed to the first with vertical joints. *All* drywall partitions shall have a 3 ½" or 5 1/2" layer of unfaced "fiberglass" sound batts inserted between the studs.
- C. All joints in Aqua-Tough or Cement Board, whether exposed to view or not, shall be taped. Joints shall be hand sanded smooth, ready for the application of finishes by others.

- 1. All walls / soffits without tile: Level 5 Finish required.
- D. Sealant shall be used at the intersection of all drywall construction where drywall meet walls, ceilings and floors of other finish material. Sealant shall be applied in two parallel strips near the edges of abutting finish material.
- E. Note that gypsum wall board accessory trim is required where gypsum board abuts ceramic tile or other dissimilar finishes. Provide a sealant joint between the trim and ceramic tile other dissimilar material per 'D' above.
- F. At completion of drywall finishing work, prior to application of finishes, Architect shall be notified for inspection.

3.02 CEMENT BACKER BOARD (All Bathroom/Shower Walls)

- A. Install cement backer board in strict accordance with manufacturer's recommendations, unless otherwise specified.
- B. Where required, a single layer of 5/8" fiberglass reinforced cementitious panel (rough side toward room) shall be applied over the furring or studs. Screw panels 8" o.c. at edges and in field areas. Provide corrosion-resistant-coated steel screws as recommended by backer board manufacturer and required for complete installation. Installation to comply with comply with ANSI A108.11
- C. Drive screws so bottom of heads are flush with panel surface, to provide firm panel contact with framing. Do not overdrive fasteners.
- D. Apply "Durock", 2" glass fiber mesh tape over joints and corners. Apply tile-setting mortar (not joint compound) over mesh tape forcing it through tape to completely fill and level joints.

3.03 INTERIOR METAL STUD PARTITIONS

- A. Attach steel runners at floor and roof or floor deck, full height partitions, with recommended fasteners located 2" from each end and spaced 24" o.c.
- B. At suspended ceilings, use toggle or molly bolts spaces 16" o.c.
- C. Studs shall be spaced 16" o.c. and mechanically fastened to steel runners.
- D. All metal stud work shall be installed per manufacturer's standard details and most current printed directions.
- E. Secure studs to slotted top runner with #8 wafer-head screws.
- B. At the top runner, maintain minimum deflection gap of 5/8 inch between top of stud and top of slotted runner. Limit vertical movement to one (1) inch, plus or minus 2 inch.

END OF SECTION 092500 - GYPSUM WALLBOARD

SECTION 09 31 00 - GLAZED CERAMIC WALL TILE

PART 1 GENERAL

1.01 **DESCRIPTION**

A. Scope of Work:

The work of this section includes all labor, materials, plant, tools, equipment, trucking, insurance and all related items to furnish and install all work of this section as shown by the drawings and specifications.

- 1. Caulking with sealant between all tile and dissimilar materials.
- Cleaning and sealing of glazed ceramic wall tile.
- 3. Shop drawings and samples.
- B. Related work specified elsewhere:
 - Section 062000 Finished Carpentry
 - 2. Section 092500 Gypsum Wall Board

1.02 QUALITY ASSURANCE

- A. Basis of Design: The following products specified are those of American Olean.
 - For Tile Setting Materials: The following products specified are those of LATICRETE Company; equal products of other manufacturers will be considered. UL GREENGUARD Gold Certified For Low Chemical Emissions (ULCOM/GG UL 2818).
- B. Applicator Qualifications:
 - This contractor shall be a licensed applicator in accordance with specifications supplied by the manufacturer.
- C. Applicable Standards and Specifications:
 - All the work, except as may be specified otherwise shall be installed, grouted, cured, cleaned and protected in accordance with the applicable provisions of the following ANSI Specifications and the Tile Council.
 - a. Handbook for ceramic tile installation, latest edition, of Tile Council of America, Inc.

1.03 **SUBMITTALS**

- A. Provide product data on specified products (including all setting materials), describing physical and performance characteristics and sizes.
- B. Samples of all specified products.
- C. Submit tile manufacturer's maintenance guides.

- D. Submittal Requirements: Submit the following "Required LEED Criteria" certification items as listed below. Refer to Division 1 for additional requirements:
 - 1. UL GREENGUARD Certification Program For Chemical Emissions For Building Materials, Finishes And Furnishings, UL 2818 or UL GREENGUARD Gold certificates provided by the tile installation materials manufacturer on UL GREENGUARD letterhead stating "This product has been UL GREENGUARD Gold Product Certified For Low Chemical Emissions by the UL Environment under the UL GREENGUARD Certification Program For Chemical Emissions For Building Materials, Finishes And Furnishings" for each tile installation product used to verify Low VOC product information.
 - 2. Contractor's certification of LEED Compliance: Submit Contractor's certification verifying the installation of specified LEED Compliant products.
 - 3. Product Cut Sheets for all materials that meet the LEED performance criteria. Submit Product Cut Sheets with Contractor or Sub-contractor's stamp, as confirmation that submitted products were installed on Project.
 - 4. Material Safety Data Sheets for all applicable products.
- E. LEED Credit Submittals for the following:
 - a. LEED Reference Guide for Green Building Design and Construction, LEED v4 Edition MR Credit Construction and Demolition Waste Management
 - b. LEED Reference Guide for Green Building Design and Construction, LEED v4 EQ Credit Low-Emitting Materials: Manufacturer's product data for tile installation materials, including UL GREENGUARD Gold Certificate on UL GREENGUARD letterhead stating product VOC emissions.

1.04 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Delivery of all products to job site in manufacturer's unopened, original, standard containers with grade seals unbroken and labels intact.
- B. Keep tile cartons dry.

1.05 **JOB CONDITIONS**

- A. Environmental Conditions:
 - 1. Maintain temperature of 50EF., minimum during tile work and for seven (7) days after completion.
 - 2. Provide adequate lighting for good grouting and clean up.
 - 3. Observe all manufacturer's safe-handling, open flame and ventilation precautions.
 - 4. Use spark-proof fans when natural ventilation is questionable.

B. Protection

- All materials shall be properly stored and covered at all times to prevent staining or damage from weather and other construction operations.
- 2. After initial cleaning, install heavy kraft paper, cardboard or other approved protective material over tile floors until other major construction operations are concluded, and follow moist cured recommendations.
- 3. Prohibit all foot and wheel traffic from using newly tiled floors at least for seven (7) days.

PART 2 PRODUCTS (Basis of Design)

2.01 **GENERAL**

A. Provide tile certified by the Tile Council of America (TCA) to equal or exceed the standard grade requirements of ANSI A-137.1 – Latest Edition. Setting and grouting materials, manufactured under TCA License, shall be provided with identification and formula on each container. Materials shall be supplied from only one source for each type, size, color, to minimize variations in appearance and quality.

2.02 **GLAZED CERAMIC WALL TILE**

- A. Basis of Design: American Olean, Bright Collection (Price Group 2)
 - a. Field Wall Tile: Ice White 0025, 4 ½ x 4 ½, (Bright Glazed)
 - b. Wall Bullnose: Ice White, S-4449, (Bright Glazed)
 - c. Wall Bullnose Corner: Ice White, SCRL-4449, (Bright Glazed)

2.03 MATERIALS FOR SETTING WALL TILES

- A. Water: Clean and drinkable.
- B. Latex Mortars: ANSI A118.4 (LATICRETE 254 Platinum)
- C. Mortar Bed: Latex Portland Cement (LATICRETE 3701 Mortar)
- D. Waterproof Membrane: Load Bearing Bonded Waterproof Membrane ANSI 118.10 (LATICRETE Hydro Ban), UL GREENGUARD Gold compliant

2.04 SETTING METHODS & MATERIALS (WALL TILE)

- A. Glazed ceramic wall tiles shall be installed over liquid applied waterproofing over 5/8" abuse/water resistant GWB (high-density paperless gypsum and cellulose wall panels FIBEROCK® Aqua-Tough™), according to NTCA Handbook Method W244C-11.
 - 1. Joints in tile shall be 1/8" straight and true.

2.05 **GROUTING MATERIALS**

- A. Chemical Resistant Water Cleanable tile Grouting Epoxy ANSI A118.3 (LATICRETE SpectraLock Pro), UL GREENGUARD Gold Certified For Low Chemical Emissions (ULCOM/GG UL 2818).
- B. Grout Color: Laticrete #44 Bright White

2.06 **SEALANTS**

A. Silicone Sealant: Mildew resistant, acid curing sealant. Type S, Grade NS, Class 25, low modulus neutral curing silicone sealant, complying with ASTM C 920, (LATICRETE LATASIL). Use (LATICRETE LATASIL 9118 Primer as required by manufacturer). Color to match grout color., UL GREENGUARD Gold Certified For Low Chemical Emissions (ULCOM/GG UL 2818).

2.07 **PROTECTIVE MATERIALS**

- A. Neutral stripper such as "Aqua Mix, Inc.", Heavy-Duty Tile & Grout Cleaner.
- B. Heavy duty, non-staining construction paper with compatible masking tapes.
- C. Clear sealer such as "Aqua Mix, Inc.", Stone Sealer's Choice (Water-Based).

PART 3 EXECUTION

3.01 **ACCEPTABILITY OF SURFACES**

A. Before tiling, be sure variations of surface to be tiled fall within maximum variations shown below:

WALLS

Dry Set Mortar 3/8" in 8' Epoxy Mortar 3/8" in 8' Organic Adhesive 3/8" in 8'

Report all unacceptable surfaces to the Architect and do not tile such surfaces until they are leveled enough to meet above requirements. Leveling coat (is) included in this section.

B. Before tiling, be sure surfaces to be tiled are free of curing membranes, oil, grease, wax and dust.

3.02 **LAYOUT**

- A. Follow tile pattern as shown on Construction Drawings.
- B. Determine locations of all movement joints before starting tile-work.
- C Determine locations of all special design construction before starting tile-work.
- D. Layout all tile-work so as to minimize cuts less than one-half in size.
- E. Locate cuts in walls and floors so as to be least conspicuous.
- F. Align all joints to give straight uniform grout lines, plumb and level.
- G. Make joints between tile sheets same width as joints within sheets so extent of each sheet is not apparent in finished work.

3.03 WORKMANSHIP

- A. Supply first-class workmanship in all tile-work.
- B. Use all products in strict accordance with recommendations and directions of manufacturers.
- C. Proportion all mixes in accordance with latest ANSI Standard Specifications.

DORMITORY AUTHORITY OF THE STATE OF NEW YORK FUNNELLE HALL BATHROOM RENOVATIONS GLAZED CERAMIC WALL TILE - SECTION 09 31 00 SUNY OSWEGO PAGE -5-

- D. Smooth all exposed cut edges.
- E. Be sure cut edges are clean before installing tiles.
- F. Fit tile carefully against trim and around pipes, electric boxes, and other built-in fixtures so that escutcheons, plates and collars will completely overlap cut edges.
- G. Be sure all tile-work is free of grout film upon completion.
- H. After grouting, damp curing is necessary. Follow moist cured recommendations.
- I. When using ceramic tile sheets, minimize tearing sheets apart by drilling pipe holes as much as possible.

3.04 **INSTALLATION**

- A. Supply first-class workmanship on all tile work.
- B. Use all products in strict accordance with recommendations and directions of manufacturers and the applicable standards specified.
- C. Compliance with standard specifications: Except as otherwise indicated on drawings or specified, the installation of all tile shall be in accordance with the applicable General Requirements for Inspection, Preparation, Protection, Workmanship and Application as described in the latest American Standards Specifications.
- D. Tile shall be cut and drilled to fit properly around all equipment without damage to the tile, fit carefully at intersections, trim, drains, and fixtures. Fit tile closely around pipes and fittings so that plates, escutcheons and collars will overlap cuts.

3.06 PROTECTION AND CLEANING WALL TILE

- A. Chipped, cracked, crazed or spalled tile shall not be used. All tiles, which becomes damaged or defaced in any way before the project is completed, shall be replaced at no additional cost to the owner.
- B. The finished areas of tile work must be free of spots, stains, grout film, etc. The total installation shall be uniform in color and finish. Clean per tile manufacturers recommendations.

END OF SECTION 09 31 00- GLAZED CERAMIC WALL TILE

SECTION 093200 - GLAZED PORCELAIN MOSAIC

PART 1 GENERAL

1.01 **DESCRIPTION**

A. Scope of Work:

The work of this section includes all labor, materials, plant, tools, equipment, trucking, insurance and all related and incidental items to furnish and install all work of this section as shown by the drawings and specifications.

- 1. Glazed porcelain mosaic tile floors.
- 2. Caulking with sealant between all tile and dissimilar materials and between floor and base tiles and solid surface wall cladding.
- 3. Sealing of porcelain mosaic floor tile.
- 4. Shop drawings and samples.

B. Related Work Specified:

- 1 Section 079000 Sealants
- 2. Section 093350 Porcelain Tile

1.02 **QUALITY ASSURANCE**

- A. Acceptable Manufacturers:
 - 1. Basis of Design: Floor tile products specified are those of Daltile
 - 2. Basis of Design: Tile Setting Materials The following products specified are those of LATICRETE Company; equal products of other manufacturers will be considered. UL GREENGUARD Gold Certified For Low Chemical Emissions (ULCOM/GG UL 2818).
- B. Applicator Qualifications:
 - 1. This contractor shall be licensed applicator in accordance with specifications supplied by the manufacturer.
- C. Applicable Standards and Specifications:
 - 1. All the work, except as may be specified otherwise shall be installed, grouted, cured, cleaned and protected in accordance with the applicable provisions of the following ANSI Specifications and the Tile Council.
 - a. Handbook for ceramic tile installation, latest edition, of Tile Council of America, Inc. (Latest Edition).
 - b. Ceramic Mosaic Tile installed in Portland Cement Mortar, Specifications A108.5
- D. Floor Drain and Ceramic Tile Installation Mock-up:
 - Contractor is required to provide a mock-up of the waterproofing system around a typical floor drain. The mock-up will include all waterproofing components installed per the manufacturer's instructions as well as tile installation around the drain. Contractor is not to proceed with the waterproofing of additional floor

drains until a representative from the waterproofing manufacturer has reviewed and approved the mock-up. The Architect and Engineer will follow the mock-up as well.

E. Shower Stall Basin Testing:

- 1. Shower stall basin shall be flood tested for a minimum of 3 hours after both coats of liquid applied waterproofing have been applied and allowed to dry and prior to tile installation. Plumbing contractor shall provide test ball to GC for this procedure.
- 2. After the shower stall basin has been flood tested, the shower operation shall be observed by the contractor for a minimum of two (2) hours to assure a leak-free, clog-free assembly.
- 3. The contractor shall document the shower stall flood and basin testing.

1.03 **SUBMITTALS**

- A. Provide product data on specified products (including all trim, accessories and setting materials), describing physical and performance characteristics and sizes.
- B. Samples of all specified products.
- C. Extra stock for maintenance: Upon completion of work, the contractor shall deliver extra material in amounts listed below for each different type, size, pattern and color of material used on the job to Owner for use in future repair and maintenance work. Furnish tile in original boxes, properly marked, for size, pattern, types and colors. This tile will not be used by the Contractor during the guarantee period.

Supply Extra Stock:

Floor Tile: four (4) extra boxes each of 12"x12" mesh mounted 2x4 porcelain mosaic floor tile for each color selection used.

- D. Submit tile manufacturer's maintenance guides for maintaining all products specified.
- E. Submittal Requirements: Submit the following "Required LEED Criteria" certification items as listed below. Refer to Division 1 for additional requirements:
 - A. UL GREENGUARD Certification Program For Chemical Emissions For Building Materials, Finishes And Furnishings, UL 2818 or UL GREENGUARD Gold certificates provided by the tile installation materials manufacturer on UL GREENGUARD letterhead stating "This product has been UL GREENGUARD Gold Product Certified For Low Chemical Emissions by the UL Environment under the UL GREENGUARD Certification Program For Chemical Emissions For Building Materials, Finishes And Furnishings" for each tile installation product used to verify Low VOC product information
 - B. Contractor's certification of LEED Compliance: Submit Contractor's certification verifying the installation of specified LEED Compliant products.
 - C. Product Cut Sheets for all materials that meet the LEED performance criteria. Submit Product Cut Sheets with Contractor or Sub-contractor's stamp, as confirmation that submitted products were installed on Project.
 - D. Material Safety Data Sheets for all applicable products.
- F. LEED Credit Submittals for the following;

- LEED Reference Guide for Green Building Design and Construction, LEED v4 Edition MR Credit Construction and Demolition Waste Management
- LEED Reference Guide for Green Building Design and Construction, LEED v4 EQ Credit Low-Emitting Materials: Manufacturer's product data for tile installation materials, including UL GREENGUARD Gold Certificate on UL GREENGUARD letterhead stating product VOC emissions.

1.04 **PRODUCT DELIVERY, STORAGE AND HANDLING**

- A. Delivery of all products to job site in manufacturer's unopened, original, standard containers with grade seals unbroken and labels intact.
- B. Keep tile cartons dry.

1.05 **JOB CONDITIONS**

- A. Environmental Conditions:
 - 1. Maintain temperature of 50°F., minimum during tile work and for seven (7) days after completion.
 - 2. Provide adequate lighting for good grouting and clean up.
 - 3. Observe all manufacturer's safe-handling, open flame and ventilation precautions.
 - 4. Use spark-proof fans when natural ventilation is questionable.

B. Protection

- 1. All materials shall be properly stored and covered at all times to prevent staining or damage from weather and other construction operations.
- 2. After initial cleaning, install heavy kraft paper, cardboard or other approved protective material over tile floors until other major construction operations are concluded, and follow moist cured recommendations.
- 3. Prohibit all foot and wheel traffic from using newly tiled floors at least for seven (7) days.

PART 2 PRODUCTS

2.01 **GENERAL**

A. Provide tile certified by the Tile Council of America (TCA) to equal or exceed the standard grade requirements of ANSI A-137.1 - 2008. Setting and grouting materials, manufactured under TCA License, shall be provided with identification and formula on each container. Materials shall be supplied from only one source for each type, size, color, to minimize variations in appearance and quality.

2.02 GLAZED PORCELAIN MOSIAC FLOOR TILE

Basis of Design:

- A. Type PT-3 Size: 12"x12 "mesh mounted mosaic (2" x 4" x 3/8" tiles)
- B. Pattern: Florentine

- C. Color: Daltile NOCIOLLA #FL09.
- D. Master set back mounted sheets.
- E. Glazed finish.
- F. Coefficient of Friction:

Dynamic Coefficient of Friction Wet: Greater than or equal to 0.42 (Non-Abrasive Tile) Static Coefficient of Friction: Greater than or equal to 0.6

2.03 MATERIALS

- A. Portland Cement Fortified Mortar ANSI 118.4 Mortar Bed (LATICRETE 3701 Fortified Mortar) (Shower Stalls)
- B. Water: Clean and drinkable.
- C. Latex Mortars: ANSI A118.4 (LATICRETE 254 Platinum)
- D. Waterproof Membrane: Load bearing Bonded Waterproof Membrane (LATICRETE Hydro Ban) (2 coats @ all Bathroom and Internal Corridors Floors), UL GREENGUARD Gold compliant

2.04 SETTING METHODS & MATERIALS (Floor Tile Over Mortar Bed @ Shower Stalls)

- A. Ceramic mosaic floor tiles shall be installed over a latex fortified bonded mortar bed (Basis of Design: LATICRETE 3701 Fortified Mortar) sloped as indicated on drawings over 2 coats of liquid applied waterproofing (Basis of Design: LATICRETE Hydro Ban) composed in accord with the Tile Council of America "Handbook", F121 and B422 evenly spread and thoroughly tamped, floated to a true even surface, level or uniformly pitched to floor drains if required.
- B. Bonded thin load bearing waterproof membrane (2 coats) shall be applied to properly prepared mortar bed according to manufacturers' instructions. ANSI 118.10
- C. Floor tiles shall be securely set over membrane using a Latex Fortified Thin Set Mortar. ANSI 118.4
 - 1. Joints in tile shall be ¹/₈" straight and true.
 - 2. The total thickness of mortar bed and tile shall be 3"+/- on this project unless otherwise indicated. Included in the mortar shall be 2" x 2" x 1/16 mesh.

2.05 **SETTING METHODS & MATERIALS (Floor Tile Over Concrete)**

- A. Ceramic mosaic floor tiles shall be installed over a latex fortified bonded mortar bed over 2 coats of liquid applied waterproofing composed in accord with the Tile Council of America "Handbook", F122 and F122A.
- B. Bonded thin load bearing waterproof membrane (2 coats) shall be applied to properly prepared concrete substrate per ANSI 118.10.
- C. Floor tiles shall be securely set over membrane using a Latex Fortified Thin Set Mortar. ANSI 118.4
 - 1. Joints in tile shall be $\frac{1}{8}$ " straight and true.

2.06 **GROUTING MATERIALS**

A. Chemical Resistant Water Cleanable Tile Grouting Epoxy ANSI A118.3 (Basis of Design: LATICRETE SpectraLock Pro), UL GREENGUARD Gold compliant

Per Basis of Design

Grout Color: Laticrete Mocha #35

2.07 **SEALANTS**

A. Tubs and shower receptors: Silicone Sealant: Mildew resistant, acid curing sealant. Type S, Grade NS, Class 25, low modulus neutral curing silicone sealant, complying with ASTM C 920, (Basis of Design: LATICRETE LATASIL). Use (Basis of Design: LATICRETE LATASIL 9118 Primer as required by manufacturer). Color to match grout color.

2.08 **PROTECTIVE MATERIALS**

- A. Neutral stripper such as Hillyard Renovator.
- B. Heavy duty, non-staining construction paper with compatible masking tape.
- B. Clear sealer such as Hillyard's Seal 341.

2.09 THRESHOLDS

Basis of Design: Best Tile Pana Light Marble

- A. Thresholds:
 - 1. At Accessible Shower Curbs: Type 'A' (see drawings) ADA Compliant Hollywood Double Bevel Threshold, size as shown on drawings.
 - 2. At accessible shower stalls, under bathroom doors and where shown at Internal Corridors: Type 'B' Double Bevel Threshold

2.10 **EDGE PROTECTION FLOOR TRIM**

 Typical Where Floor Tile Interfaces with VCT @ Corridor Recesses: Schluter®-RENO-U AEU-125 Satin Anodized Aluminum

PART 3 EXECUTION

3.01 **ACCEPTABILITY OF SURFACES**

A. Before tiling, verify that all new mortar bed surfaces to be tiled fall within maximum variations show below:

	WALLS	<u>FLOORS</u>
Dry Set Mortar	1⁄4" in 8'	1/4" in 10'
Epoxy Mortar	1/8" in 8'	1⁄4" in 10'
Organic Adhesive	1/8" in 8'	¹ / ₁₆ " in 3'

Report all unacceptable surfaces to the architect and do not tile such surfaces until they

are leveled enough to meet above requirements. Leveling coat (is) included in this section.

C. Before tiling, make certain surfaces to be tiled are free of curing membranes, oil, grease, wax and dust.

3.02 **LAYOUT**

- A. Determine locations of all movement joints before starting tile-work.
- B. Determine locations of all special design construction before starting tile-work.
- C. Layout all tile-work so as to minimize cuts less than one-half in size.
- D. Locate cuts in floors so as to be least conspicuous.
- E. Align all joints to give straight uniform grout lines, plumb and level.
- F. Make joints between tile sheets same width as joints within sheets so extent of each sheet is not apparent in finished work.

3.03 **WORKMANSHIP**

- A. Supply first-class workmanship in all tile-work.
- B. Use all products in strict accordance with recommendations and directions of manufacturers.
- C. Proportion all mixes in accordance with latest ANSI Standard Specifications.
- D. Smooth all exposed cut edges.
- E. Be sure cut edges are clean before installing tiles.
- F. Fit tile carefully against trim and around pipes, electric boxes, and other built-in fixtures so that escutcheons, plates and collars will completely overlap cut edges.
- G. When using ceramic tile sheets, minimize tearing sheets apart by drilling pipe holes as much as possible.
- H. Be sure all tile-work is free of grout film upon completion. Read and follow manufacturers grout cleaning requirements precisely during installation.

3.04 **INSTALLATION**

- A. Supply first-class workmanship on all tile work.
- B. Use all products in strict accordance with recommendations and directions of manufacturers and the applicable standards specified.
- C. Compliance with standard specifications: Except as otherwise indicated on drawings or specified, the installation of all tile shall be in accordance with the applicable General Requirements for Inspection, Preparation, Protection, Workmanship and Application as described in the latest American Standards Specifications.
- D. Tile shall be cut and drilled to fit properly around all equipment without damage to the tile,

fit carefully at intersections, trim, drains, and fixtures. Fit tile closely around pipes and fittings so that plates, escutcheons and collars will overlap cuts.

3.05 **EXPANSION JOINTS**

- A. Provide expansion joints in tile work where indicated on drawings and as specified, consisting of approved compressible backing strip and sealant specified.
- B. Provide expansion joints in following locations:
 - 1. Where tile work abuts restraining surfaces, such as walls, curbs, shower bases, parapets, columns, pipes, drains, etc.
 - 2. Over joints in structural floor joints and control joints in masonry.
 - 3. Where changes in backing material occurs.
 - 4. Located 24' to 36' each way in large interior areas.
 - 5. Between tile and dissimilar finish materials unless covered with wood or metal trim.
- C. Expansion joints, installed as recommended: Handbook for Ceramic Tile Installation, latest edition.

3.06 PROTECTION AND CLEANING FLOOR TILE

- A. After grout has cured for thirty (30) days, all floor tile shall be thoroughly stripped with Hillyard's Renovator to the satisfaction of the Architect. Tile work shall be adequately protected to prevent damage from adjoining work.
- B. Chipped, cracked, crazed or spalled tile shall not be used. All tile which becomes damaged or defaced in any way before the building is completed shall be replaced at no additional cost to the owner.
- C. Immediately following final stripping, tile shall be sealed with three (3) coats of Hillyard's Seal 341 in accordance with manufacturer's recommendations.
- D. After sealing, polish and buff as directed by sealer manufacturer. The finished areas must be free of spots or stains. The total installation shall be uniform in color and finish.

3.07 **PROTECTION FROM TRAFFIC**

- A. Prohibit all foot and wheel traffic from using newly tiled floors for at least 3 days, preferably 7 days.
- B. Place large, flat boards in walkways and wheel-ways for 7-days where use of newly tiled floors with cement type grout is unavoidable.

END OF SECTION 093200 - UNGLAZED CERAMIC MOSAICS

SECTION 093350 - POLISHED PORCELAIN TILE

PART 1 GENERAL

1.01 **DESCRIPTION**

A. Scope of Work:

The work of this section includes all labor, materials, plant, tools, equipment, trucking, insurance and all related items to furnish and install all work of this section as shown by the drawings and specifications.

- 1. Porcelain Tile Floors and Walls.
- 2. Caulking with sealant between all tile and dissimilar materials.
- 3. Cleaning and sealing of unpolished porcelain tile walls.
- 4. Trim and Transitions
- 5. Shop drawings and samples.

B. Related Work Specified Elsewhere:

- 1. Section 079000 Sealants
- 2. Section 092500: Gypsum Wall Board
- 3. Section 093200: Unglazed Ceramic Mosaic
- 3. Section 108000 Toilet Accessories

1.02 **QUALITY ASSURANCE**

A. Acceptable Manufacturers:

1. Basis of Design: Tile Setting Materials - The following products specified are those of LATICRETE Company; equal products of other manufacturers will be considered. Must be UL GREENGUARD Gold compliant.

B. Applicator Qualifications:

- 1. This contractor shall be a licensed applicator in accordance with specifications supplied by the manufacturer.
- C. Applicable Standards and Specifications:
 - All the work, except as may be specified otherwise shall be installed, grouted, cured, cleaned and protected in accordance with the applicable provisions of the following ANSI Specifications and the Tile Council.
 - a. Handbook for ceramic tile installation, latest edition of Tile Council of America, Inc.

D. Wall Tile Installation Mock-up:

 Contractor is required to provide a mock-up as specified in, 2.02 PORCELAIN WALL TILE.

1.03 **SUBMITTALS**

A. Provide product data on specified products (including all trim, accessories and setting materials), describing physical and performance characteristics and sizes.

- B. Samples of all specified products.
- C. Extra stock for maintenance: Upon completion of work, the contractor shall deliver extra material in amounts listed below for each different type, size, pattern and color of material used on the job to Owner for use in colors. The Contractor will not use this tile during the quarantee period.

Supply Extra Stock:

- Field Wall Tile: six (6) extra boxes of 12"x-24" polished porcelain tile (Type 1)
- Accent Wall Tile: six (2) extra boxes of 12"x24 polished porcelain tile (Type 2)
- D. Submit tile manufacturer's maintenance guides to Owner for his use in maintaining all unpolished porcelain tile specified.
- E. Submittal Requirements: Submit the following "Required LEED Criteria" certification items as listed below. Refer to Division 1 for additional requirements:
 - 1. UL GREENGUARD Certification Program For Chemical Emissions For Building Materials, Finishes And Furnishings, UL 2818 or UL GREENGUARD Gold certificates provided by the tile installation materials manufacturer on UL GREENGUARD letterhead stating "This product has been UL GREENGUARD Gold Product Certified For Low Chemical Emissions by the UL Environment under the UL GREENGUARD Certification Program For Chemical Emissions For Building Materials, Finishes And Furnishings" for each tile installation product used to verify Low VOC product information.
 - 2. Contractor's certification of LEED Compliance: Submit Contractor's certification verifying the installation of specified LEED Compliant products.
 - 3. Product Cut Sheets for all materials that meet the LEED performance criteria. Submit Product Cut Sheets with Contractor or Sub-contractor's stamp, as confirmation that submitted products were installed on Project.
 - 4. Material Safety Data Sheets for all applicable products.
- F. LEED Credit Submittals for the following:
 - a. LEED Reference Guide for Green Building Design and Construction, LEED v4
 Edition MR Credit Construction and Demolition Waste Management
 - b. LEED Reference Guide for Green Building Design and Construction, LEED v4 EQ Credit Low-Emitting Materials: Manufacturer's product data for tile installation materials, including UL GREENGUARD Gold Certificate on UL GREENGUARD letterhead stating product VOC emissions.

1.04 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Delivery of all products to job site in manufacturer's unopened, original, standard containers with grade seals unbroken and labels intact.
- B. Keep tile cartons dry.

1.05 **JOB CONDITIONS**

- A. Environmental Conditions:
 - 1. Maintain temperature of 50 degrees F, minimum during tile work and for seven (7) days after completion.

- 2. Provide adequate lighting for good grouting and clean up.
- 3. Observe all manufacturers safe-handling, open flame and ventilation precautions.
- 4. Use spark-proof fans when natural ventilation is questionable.

B. Protection

- 1. All materials shall be properly stored and covered at all times to prevent staining of damage from weather and other construction operations.
- 2. After initial cleaning, install heavy kraft paper, cardboard or other approved protective material over tile floors until other major construction operations are concluded, and follow moist cured recommendations.
- 3. Prohibit all foot and wheel traffic from using newly tiled floors at least for seven (7) days.

PART 2 PRODUCTS

2.01 **GENERAL**

A. Provide tile certified by the Tile Council of America (TCA) to equal or exceed the standard grade requirements of ANSI A-137.1 - 2008. Setting and grouting materials, manufactured under TCA License, shall be provided with identification and formula on each container. Materials shall be supplied from only one source for each type, size, color, to minimize variations in appearance and quality.

2.02 POLISHED PORCELAIN WALL TILE

Note: Mock-up required for wall tile, including shower niche/recess with Schluter Rondec trim and outside corner accessories. General Contractor and Tile Subcontractor shall review wall tile layout in a typical bathroom, Internal Corridors and Corridor recesses with architect prior to full scale installation beginning.

- A. Type PT-1 Field Wall Tile: (Basis of Design)
 Daltile Florentine, Nociolla 12x24 Porcelain (Stacked Bond)
- B. Type PT-2 Accent Wall Tile: (Basis of Design)
 Daltile Unity, Avorio 12x24 Polished (Stacked Bond)
- C. Type PT-3 Shower Niches: Basis of Design:Daltile Florentine, Nociolla #FL09, 2x4, (polished finish to match wall tile finish)

2.03 MATERIALS FOR SETTING WALL TILES

Basis of Design:

- A. Water: Clean and drinkable.
- B. Latex Mortars: ANSI A118.4 (LATICRETE 254 Platinum)
- C. Waterproof Membrane: Load Bearing Bonded Waterproof Membrane ANSI 118.10 (LATICRETE Hydro Ban), UL GREENGUARD Gold compliant

2.04 <u>SETTING METHODS & MATERIALS (WALL TILE OUTSIDE OF SHOWER STALLS BUT WITHIN BATHROOMS)</u>

Basis of Design:

- A. Polished porcelain wall tiles shall be installed over cement board (Durock Cement Board or equal) and two coats of bonded waterproof membrane (Laticrete Hydro Ban), run up wall 1'-0" min. as noted and detailed on drawings, similar to NTCA Handbook Method W244C-11 and B415-11.
 - 1. Joints in tile shall be 1/8" straight and true.

2.07 SETTING METHODS & MATERIALS (WALL TILE IN SHOWER STALLS)

Basis of Design:

- A. Polished porcelain wall tiles shall be installed over cement board (Durock Cement Board or equal) and two coats of bonded waterproof membrane (Laticrete Hydro Ban) full height on all walls within the shower area. NTCA Handbook Method W244C-11 and B415-11.
 - 1. Joints in tile shall be 1/8" straight and true.

2.08 SETTING METHODS & MATERIALS (WALL TILE @ INTERNAL CORRIDORS)

Basis of Design:

- A. Polished porcelain wall tiles shall be installed over Abuse/Water Resistant GWB and two coats of bonded waterproof membrane (Laticrete Hydro Ban), run up wall 1'-0" min. as noted and detailed on drawings, similar to NTCA Handbook Method W244C-11 and B415-11.
 - 1. Joints in tile shall be 1/8" straight and true.

2.09 SETTING METHODS & MATERIALS (FLOOR TILE ON CONCRETE)

Basis of Design:

- A. Porcelain mosaic floor tiles shall be installed over slurry coat of thin set latex fortified mortar in accord with the Tile Council of America "Handbook", F122 and F122A.
- B. Two coats of bonded waterproof membrane shall be applied over the thin set latex fortified mortar according to manufacturers' instructions. ANSI 118.10.
- C. Floor tiles shall be securely set over waterproof membrane using a Latex Fortified Thin Set Mortar. ANSI 118.4
 - 1. Joints in tile shall be 1/8" straight and true.

2.10 **GROUTING MATERIALS**

Basis of Design:

- A. Chemical Resistant Water Cleanable Tile Grouting Epoxy ANSI A118.3 (LATICRETE SpectraLock Pro) or equal. UL GREENGUARD Gold compliant.
 - a. Grout Color at Walls: Laticrete #35 Mocha

2.11 **SEALANTS**

Basis of Design:

A. Silicone Sealant: Mildew resistant, acid curing sealant. Type S, Grade NS, Class 25, low modulus neutral curing silicone sealant, complying with ASTM C 920, (LATICRETE LATASIL). Use (LATICRETE LATASIL 9118 Primer as required by manufacturer). Color to match grout color. UL GREENGUARD Gold compliant

2.12 **PROTECTIVE MATERIALS**

- A. Neutral stripper such as "Aqua Mix, Inc.", Heavy-Duty Tile & Grout Cleaner.
- B. Heavy duty, non-staining construction paper with compatible masking tapes.
- C. Clear sealer such as "Aqua Mix, Inc.", Stone Sealer's Choice (Water-Based).

2.13 EDGE PROTECTION TRIM @ WALL TILE

Basis of Design:

- A. Wall Tile Trim At All Outside & Inside Corners, Perimeter at Door Jambs Included:
 - Outside Corner Trim: Schluter®-RONDEC RO 100 AE Satin Anodized Aluminum (3/8" nominal tile thickness).
 - Outside Corner Accessory Trim: Double Leg Outside Corner Schluter®-RONDEC
 E2L-RO 100 AE Satin Anodized Aluminum (At all outside corner transitions)
 - Inside Corner Accessory Trim: Schluter®-Double Leg Inside Corner I2L/RO 100 AE Satin Anodized Aluminum (At all inside corners)

2.14 **PREFORMED NICHES**

A. "Noble Niches Preformed Recesses" (See Drawings for Size) by Noble Company (800) 878-5788 (www.noblecompany.com)

Made from high density, extruded polystyrene (XPS) and coated with an acrylic polymer finish. Install per manufacturer's instructions.

B. Provide mock-up of shower niches (tile & tile trim).

PART 3 EXECUTION

3.01 **ACCEPTABILITY OF SURFACES**

A. Before tiling, verify that all new mortar bed surfaces to be tiled fall within maximum variations show below:

	WALLS	<u>FLOORS</u>
Dry Set Mortar	1⁄4" in 8'	½" in 10'
Epoxy Mortar	1/8" in 8'	½" in 10'
Organic Adhesive	1/8" in 8'	¹ / ₁₆ " in 3'

Report all unacceptable surfaces to the architect and do not tile such surfaces until they are leveled enough to meet above requirements. Leveling coat (is) included in this

section.

B. Before tiling, be sure surfaces to be tiled are free of curing membranes, oil, grease, wax and dust.

3.02 **LAYOUT**

- A. Follow tile pattern as shown on Construction Drawings.
- B. Determine locations of all movement joints before starting tile-work.
- C Determine locations of all special design construction before starting tile-work.
- D. Layout all tile-work so as to minimize cuts less than one-half in size.
- E. Locate cuts in walls and floors so as to be least conspicuous.
- F. Align all joints to give straight uniform grout lines, plumb and level.
- G. Make joints between tile sheets same width as joints within sheets so extent of each sheet is not apparent in finished work.

3.03 **WORKMANSHIP**

- A. Supply first-class workmanship in all tile-work.
- B. Use all products in strict accordance with recommendations and directions of manufacturers.
- C. Proportion all mixes in accordance with latest ANSI Standard Specifications.
- D. Smooth all exposed cut edges.
- E. Be sure cut edges are clean before installing tiles.
- F. Fit tile carefully against trim and around pipes, electric boxes, and other built-in fixtures so that escutcheons, plates and collars will completely overlap cut edges.
- G. Be sure all tile-work is free of grout film upon completion.
- H. After grouting, damp curing is necessary. Follow moist cured recommendations.
- I. When using ceramic tile sheets, minimize tearing sheets apart by drilling pipe holes as much as possible.

3.04 **INSTALLATION**

- A. Supply first-class workmanship on all tile work.
- B. Use all products in strict accordance with recommendations and directions of manufacturers and the applicable standards specified.
- C. Compliance with standard specifications: Except as otherwise indicated on drawings or specified, the installation of all tile shall be in accordance with the applicable General Requirements for Inspection, Preparation, Protection, Workmanship and Application as described in the latest American Standards Specifications.

D. Tile shall be cut and drilled to fit properly around all equipment without damage to the tile, fit carefully at intersections, trim, drains, and fixtures. Fit tile closely around pipes and fittings so that plates, escutcheons and collars will overlap cuts.

3.05 **EXPANSION JOINTS**

- A. Provide expansion joints in tile work where indicated on drawings and as specified, consisting of approved compressible backing strip and sealant specified.
- B. Provide expansion joints in following locations:
 - 1. Where floor tile work abuts restraining surfaces, such as wall bases, curbs, shower bases, parapets, columns, pipes, drains, etc.
 - 2. Over joints in structural floor joints and control joints in masonry.
 - 3. Where changes in backing material occurs.
 - 4. Located 24' to 36' each way in large interior areas.
 - 5. Between tile and dissimilar finish materials unless covered with wood or metal trim.
- C. Expansion joints, installed as recommended: Handbook for Ceramic Tile Installation, latest edition.

3.07 PROTECTION AND CLEANING WALL TILE

- A. Chipped, cracked, crazed or spalled tile shall not be used. All tiles, which becomes damaged or defaced in any way before the project is completed, shall be replaced at no additional cost to the owner.
- B. The finished areas of tile work must be free of spots, stains, grout film, etc. The total installation shall be uniform in color and finish. Clean per tile manufacturers recommendations.

3.08 PROTECTION AND CLEANING FLOOR TILE

- A. After grout has cured for thirty (30) days, all floor tile shall be thoroughly stripped with specified stripper to the satisfaction of the Architect. Tile work shall be adequately protected to prevent damage from adioining work.
- B. Chipped, cracked, crazed or spalled tile shall not be used. All tile which becomes damaged or defaced in any way before the building is completed shall be replaced at no additional cost to the owner.
- C. Immediately following final stripping, tile shall be sealed with three (3) coats of specified sealer in accordance with manufacturer's recommendations.
- D. After sealing, polish and buff as directed by sealer manufacturer. The finished areas must be free of spots or stains. The total installation shall be uniform in color and finish.
- E. Be sure all tile-work is free of grout film upon completion. Read and follow manufacturers grout cleaning requirements precisely during installation.

3.09 PROTECTION FROM TRAFFIC

A. Prohibit all foot and wheel traffic from using newly tiled floors for at least 3 days, preferably 7 days.

B. Place large, flat boards in walkways and wheel-ways for 7-days where use of newly tiled floors with cement type grout is unavoidable.

END OF SECTION 093350 - POLISHED PORCELAIN TILE

SECTION 095000 - ACOUSTICAL TREATMENT

PART 1 GENERAL

1.01 DESCRIPTION

- A. Scope of Work: The work of this section includes all labor, materials, plant, tools, equipment, trucking, insurance and all related and incidental items to furnish and install all work of this section as shown by the drawings and specifications.
 - 1. Acoustical Board AC-BD #1 Basement Corridor
 - 2. Acoustical Board AC-BD #2 1st Floor Main Lounge, Alternate #1 (Group Study Rooms), 1st Floor Toilet Rooms, 1st Floor fire Command Center
 - Acoustical Board AC-BD #3 Basement Kitchenette Area. Remove existing suspended acoustical ceiling system as required for access above. Store and protect for re-installation in same locations.
- B. See "Room Finish Schedule" for areas requiring acoustical treatment.
- C. Related work specified elsewhere:
 - 1. Section 095400 Ceiling Suspension System.
 - 2. Coordinate with the mechanical and electrical trades for location and preparation for items of their work under Division 15 and Division 16.

1.02 SYSTEM DESCRIPTION

A. Suspended ceiling system consisting of main tees and cross-tees snapped together to form modules of 24" x 24" for the installation of lay-in acoustical panels, air diffusers and light fixtures.

1.03 QUALITY ASSURANCE

- A. Subcontractor qualifications: Installer shall have successful experience in installation of ceiling suspension systems on projects with requirements similar to requirements specified.
- B. Source quality control: Manufacturer will provide test certification for suspension system as required to meet performance standards specified by various agencies.

1.04 REFERENCES

- A. ASTM C635, Standard Specifications for Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings.
- B. ASTM C636, Recommended Practice for Installation of Metal Suspension System for Acoustical Tile and Lay-in Panels.
- C. CISCA Ceiling Systems Installation Handbook.

1.05 SUBMITTALS

- A. Provide product data on specified products (including accessories), describing physical and performance characteristics and sizes.
 - a. Manufacturer's information inclusive of VOC g/L content complying with LEED v4 New Construction Indoor Air Quality requirements, inclusive of those outlined in Section 01

8113 of this book, and SCAQMD requirements.

- B. Samples: Submit samples of all specified acoustical panel(s) for review of type, finish color.
- Shop Drawings: Furnish shop drawings showing complete ceiling layout and details of acoustic treatment.

1.06 **DEFINITIONS**

- 1. LEED as used in this section refers to Leadership in Energy and Environmental Design. Products listed meet LEED criteria for environmentally safe interior primers and coatings.
- 2. VOC as used in this Section refers to Volatile Organic Compounds found in primers and coatings. The level of VOC's appear after each product listed in the Schedule in grams per liter (g/L).
- 3. CDPH Standard Method v1.1: This credit uses the California Department of Public Health (CDPH) Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers, v.1.1–2010, for the emissions testing and requirements of all products and materials

1.07 <u>DELIVERY, STORAGE AND HANDLING</u>

- A. Delivery of materials: Deliver materials in original, unopened packages clearly labeled with manufacturer's name, item description, part number, type and class, as applicable.
- B. Inspection: Promptly inspect delivered materials, file freight claims for damage during shipment, and order replacement material as required.
- C. Storage: Store in manner that will prevent warpage, scratches or damage of any kind. Prevent interference to/by other trades and any other adverse job conditions due to storage locations or methods.
- D. Handling: Handle in such manner to insure against racking, distortion or physical damage of any kind.

1.08 PROJECT CONDITIONS

- A. Environmental requirements:
 - 1. Building conditions: Building shall be enclosed with all windows and exterior doors in place and glazed and the roof watertight before installation of acoustic treatment.
 - Interior temperature in building: Climatic conditions in areas to receive ceiling suspension systems shall rage from 50EF. (15.56EC.) to 85EF. (29.44EC.) and relative humidity of not more than 50% shall be maintained before installation of components.
- B. Coordination with other work:
 - 1. General: Coordinate with other work supported by or penetrating through the ceiling, including mechanical and electrical work and partition systems.

- 2. Mechanical work: Ductwork above suspension systems shall be complete and permanent heating and cooling systems operating.
- 3. Electrical work: Installation of conduit above suspension system shall be complete before installation of acoustic treatment.
- C. Protection: Protect completed work above suspension system from damage during installation of acoustic treatment.

1.09 EXTRA MATERIALS

A. The Contractor is to leave, where directed, one (1) full box of each of the ceiling tile types used on the project. Obtain a receipt for same from the Owner's project representative and submit copy of receipt to the Architect's office.

1.10 WARRANTY

A. Panel Warranty: When used with a USG Donn Brand suspension system, this panel has a 30 year warranty that it shall be free from manufacturing defects. When used without a USG Donn Brand suspension system, the period of warranty is 10 years.

PART 2 PRODUCTS

2.01 MANUFACTURER

A. Products specified are those manufactured by, USG Corporation. Equal products or other manufacturer's will be considered.

2.02 ACOUSTICAL PANEL (LAY-IN)

- A. Acoustical panels shall be:
 - 1. Basis of Design: "AC-BD" #1: USG "Mars" Acoustical Panels Item Number: 86185 (Basement Corridor)
 - a. Classification: Provide panels complying with ASTM E 1264 for type, form, and pattern as follows:
 - Type and Form: Type IV, Form 1&2
 - Pattern: Pattern E.G
 - Surface Burning Characteristics: Class A, Flame Spread: 50 or Less, Smoke Developed: 50 or Less
 - b. Color: White
 - c. Recycled Content: Not less than 69%
 - d. LR: Not less than .90
 - e. NRC: Not less than .75 in accordance with ASTM C423. Product to have UL acoustical compliance.
 - f. CAC: Not less than 35 in accordance with ASTM E1414. Product to have UL acoustical compliance.
 - g. Edge Detail: Square
 - h. Thickness: 3/4 in
 - i. Size: 2' x 2'
 - j. Formaldehyde and VOC Classification: Low
 - 2. Basis of Design: "AC-BD" #2: USG "Frost Panels," Item Number: 418 (1st Floor Lounge, 1st Floor Toilet Rooms, 1st Floor Fire Command Center, Alternate #1)

- a. Classification: Provide panels complying with ASTM E 1264 for type, form, and pattern as follows:
 - Type and Form: Type III, Form 4
 - Pattern: Pattern E
 - Surface Burning Characteristics: Class A, Flame Spread: 25, Smoke Developed: 15
- b. Color: White
- c. Recycled Content: Not less than 71%
- d. LR: Not less than 83.
- e. NRC: Not less than 70 in accordance with ASTM C423. Product to have UL acoustical compliance.
- f. CAC: Not less than 38 in accordance with ASTM E1414. Product to have UL acoustical compliance.
- g. Edge Detail: Reveal sized to fit flange of exposed suspension system members. Fineline.
- h. Thickness: 3/4 in
- i. Size: 2' x 2'
- j. Formaldehyde and VOC Classification: "Zero-Emitting"
- 3. AC-BD #3 Basement Kitchenette Area. Remove existing suspended acoustical ceiling system as required for access above. Store and protect the existing acoustical panels and the grid system for re-installation in same locations.

PART 3 EXECUTION

3.01 INSPECTION

- A. Examine areas to receive materials for conditions, which will adversely affect installation. Provide written report of unacceptable surfaces.
- B. Do not start work until unsatisfactory conditions are corrected.
- C. Work to be concealed: Verify work above ceiling suspension system is complete and installed in manner which will not affect layout and installation of suspension system components.
- Beginning of installation shall signify acceptance of conditions in areas to receive ceiling acoustic treatment.

3.02 PREPARATION

A. Field dimensions must be verified prior to installation.

3.03 INSTALLATION

- A. Standard reference: Install in accordance with ASTM C636, CISCA installation standards and other applicable code requirements.
- B. Manufacturer's reference: Install in accordance with manufacturer's current printed recommendations.

3.04 CLEANING

A. Suspension: Remove acoustical material and perform any necessary cleaning maintenance with non-solvent based commercial cleaner.

- B. Touch up all minor scratches and spots, as acceptable, or replace damaged sections when touch-up is not permitted.
- C. Removal of debris: Remove all debris resulting from work of this section.

END OF SECTION 095000 - ACOUSTICAL TREATMENT

SECTION 095400 - CEILING SUSPENSION SYSTEM

PART 1 GENERAL

1.01 DESCRIPTION

- A. Scope of Work:
 - 1. Nailing bar system for gypsum board ceilings/soffits.
 - 2. Lay-in ceiling panel system.
- B. Related work specified elsewhere:
 - 1. Section 092500: Gypsum Wallboard
 - 2. Section 095000: Acoustical Tile
 - 3. Section 099000: Painting
 - 4. Coordinate with the mechanical and electrical trades for location and preparation for items of their work under Division 15 and Division 16.

1.02 SYSTEM DESCRIPTION

- A. Nailing Bar Ceiling System:
 - Suspended ceiling system consisting of main and cross nailing tees for installation of mechanically fastened gypsum board, air diffusers and surface mounted/recessed light fixtures.
- B. Lay-in Ceiling Panels System:
 - Suspended ceiling system consisting of main tees and cross tees snapped together to form modules of 24" x 24" for installation of lay-in acoustical panels, air diffusers and light fixtures.

1.03 REFERENCES

- A. CISCA Ceiling Systems Installation Handbook.
- B. ASTM C635 Standard specification for the manufacture, performance, and testing of metal suspension systems for acoustical tile and lay-in panel ceilings.
- C. ASTM C636 Standard practice for installation of metal ceiling suspension systems for acoustical tile and lay-in panels.

1.04 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Delivery of materials: Deliver materials in original, unopened packages clearly labeled with manufacturer's name, item description, part number, type and class, as applicable.
- B. Inspection: Promptly inspect delivered materials, file freight claims for damage during shipment, and order replacement material as required.
- C. Storage: Store in manner that will prevent warpage, scratches or damage of any kind. Prevent interference to/by other trades and any other adverse job conditions due to storage locations or methods.
- D. Handling: Handle in such manner to insure against racking, distortion or physical damage

of any kind.

1.05 PROJECT CONDITIONS

- A. Environmental Requirements:
 - Building Conditions: Building shall be enclosed with all windows and exterior doors in place and glazed and the roof watertight before installation of suspension system.
 - 2. Interior Temperature in Building: Climatic conditions in areas to receive ceiling suspension system shall rage from 50NF. to 85NF. and relative humidity of not more than 50% shall be maintained before installation of components.
- B. Coordination with Other Work:
 - 1. General: Coordinate with other work penetrating through the ceiling, including mechanical and electrical work and partition systems.
 - 2. Mechanical Work; Ductwork above suspension systems shall be complete and permanent heating and cooling systems operating before installation of suspension systems.
 - 3. Electrical Work: Installation of conduit above suspension systems shall be complete before installation of suspension systems.
- C. Protection: Protect completed work above suspension system from damage during installation of suspension system components.

1.06 SUBMITTALS

- A. Provide product data on specified products (including accessories), describing physical and performance characteristics and sizes. Submit manufacturer's descriptive literature or standard drawings showing details of system with project conditions clearly identified, and manufacturer's recommended installation instructions.
- B. Samples: Submit samples for all components of the suspension system.
- C. Shop Drawings: Furnish shop drawings showing complete grid layout and details of acoustic treatment.

1.07 **QUALITY ASSURANCE**

A. Gypsum Board Suspension Systems:

Basis of Design: `System specified is Series #640 Non-Fire Rated, Furring System by Chicago Metallic Sash Company. Equal products of other manufactures will be accepted.

Interior suspended ceilings and soffits: Maximum deflection of I/360 of distance between supports.

- B. Acoustical Board Suspension Systems:
 - A. Use with AC-BD #1 Basis of Design: "DONN® DX/DXL Acoustical Suspension System™, by USG Corporation. Equal products of other manufacturers will be accepted.
 - B. Use with AC-BD #2 Basis of Design: "**DONN® DXI Identitee™ (DXI)**", by USG Corporation. Equal products of other manufacturers will be accepted.

C. Remove the existing suspended acoustical ceiling suspension system at the Basement Kitchenette Area as required for access above. Store and protect the existing acoustical panels and the grid system for re-installation in same locations. (Coordinates with AC-BD#3 in Spec Section 095000)

1.08 WARRANTY

A. Suspension System Warranty: When used with a USG acoustical ceiling panel, this suspension system has a Lifetime 30 year warranty that it shall be free from the occurrence of 50% red rust. When used without a USG acoustical ceiling panel, the period of warranty is 10 years.

PART 2 PRODUCTS

2.01 CEILING SUSPENSION SYSTEM FOR INTERIOR GYPSUM WALLBOARD

- A. Non-Fire Rated Ceilings:
 - 1. Basis of Design: Series #640 as manufactured by Chicago Metallic Sash Co.

a.	#640.00C	Main Tees
b.	#664.00C	Cross Tees
C.	#1274.01H	Cross Tees
d.	#1450.00	Wall Angle

2. 12-gauge galvanized steel wire hangers.

2.02 SUSPENDED ACOUSTICAL LAY-IN CEILINGS

- A. Non Fire Rated Ceilings:
 - Basis of Design: "DONN® DXI Identitee™ (DXI) ", as manufactured by the USG Corporation. Use at AC-BD #2
 - a. ASTM C635, commercial quality pretreated and painted hot-dipped galvanized cold-rolled steel, exposed surfaces prefinished in manufacturer's standard corrosion resistant enamel paint finish; color: Flat White #050 or as selected from manufacturer's standard colors.
 - b. Main Tees: UL Classified **Intermediate Duty** Classification; Double-web design; 1-13/16" high; rectangular top bulb; 9/32" deep x 9/16" wide bottom face with center recessed section nominal 1/4"; cross tee holes and hanger wire holes at 6" o.c.; mitered intersections 12" o.c.; integral reversible splices.
 - c. Cross Tees:
 - 1-13/16" high; roll-formed into double-web design with rectangular bulb; 9/32" deep x 9/16" wide bottom face with center recessed section nominal 1/4"; high tensile steel end clips clenched to web.
 - Main tees and cross tees shall be positively locked, but still be removable without the use of tools.
 - d. Accessories:

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- 1. Wall Molding: Angle shape; 1" mounting flange by 9/16" face flange; hemmed edges; exposed surface pre-finished to match suspension system components.
- 2. Inside Corner: Field-mitered joints at wall molding.
- 3. Outside Corner: Prefabricated corner cap; formed to 90° angle; hemmed edge; size and finish to match wall molding.
- 4. Sleeve:
 - a. Face Sleeve TFS-5
 - b. Intersection Sleeve TFS-5 DXIFC
- 5. Hanger Wire: Hanger Wire: Galvanized carbon steel; soft temper; pre-stretched; yield stress load at least three times the design load but not less than 12-gauge.

B. Fire Rated Ceilings:

- 1. Basis of Design: "DONN® Brand DX/DXL 15/16" Acoustical Suspension System", as manufactured by the USG Corporation. Use at AC-BD #1
 - a. ASTM C635, commercial quality pretreated and painted hot-dipped galvanized cold-rolled steel, exposed surfaces prefinished in manufacturer's standard corrosion resistant enamel paint finish; color: Flat White #050 or as selected from manufacturer's standard colors.
 - b. Main Tees: Item No. DX/DXL24 UL Classified; Narrow Face, Capped, Double Web, Cold Rolled Steel Suspension System: Main and Cross Tees as defined by ASTM C635, commercial quality pretreated and painted hot-dipped galvanized cold-rolled steel, exposed surfaces prefinished in manufacturer's standard corrosion resistant enamel paint finish:
 - 1. Structural Classification: Intermediate duty.
 - Cross Tees:
 - 3. Grid Module: As shown on drawings.
 - 4. Color: standard flat white

2. Accessories

a. Wall molding: Inside Corner: Field-mitered joints at wall molding. Prefabricated corner cap; formed to 90° angle; hemmed edge; size and finish to match wall molding. Outside Corner: Prefabricated corner cap; formed to 90° angle; hemmed edge; size and finish to match wall molding.

PART 3 EXECUTION

3.01 <u>INSTALLATION</u>

- A. Gypsum Board Ceilings Suspended and Furred
 - 1. Provide suspension and gypsum board ceilings as shown and specified.
 - 2. Main runners shall be spaced not to exceed 4-0" o.c. and supported at intervals of not greater than 4'-0". Where runner hanger spacing must be greater than 4'-0" provide additional structural support above main runner. Hanger wires shall be wrapped tightly with at least 3 full turns. All runners shall be installed perpendicular to the structural framing above.
 - 3. Furring or nailing tees shall be spaced 1'- 4" on center.
 - 4. Where ceilings are in direct contact with underside of structural members:" channels or nailing channels, 132" and 1'-4" respectively o.c. shall be clipped to

DORMITORY AUTHORITY OF THE STATE OF NEW YORK FUNNELLE HALL BATHROOM RENOVATIONS CEILING SUSPENSION SYSTEM - SECTION 095400 SUNY OSWEGO PAGE -5-

the lower structural flange or 2" runner channels with suitable clips or ties and gypsum board applied to these channels.

- 5. Gypsum board shall be screwed to nailing tees specified with 13" USG Drywall Screw type S, bugle head on not to exceed 12" centers.
- B. Suspended Lay-In Ceilings:

Install ceiling panels and suspension system, including necessary hangers, grillage, splines, and other supporting hardware, in accordance with ASTM C636, CISCA Ceiling Systems Handbook, (UL Design) and any applicable code requirement.

1. Spacing of suspension system:

Main Tees: 4'- 0" o.c.
Four (4) Foot Cross Tees: 2'- 0" o.c.
Two (2) Foot Cross Tees: 2'- 0" o.c.

- 2. Hangers, Not less than 12 Gauge wire spaced at not more than four (4) feet on centers on all main tees. Place hangers at the four corners of any 2' x 4' recessed fixture.
- 3. Frame all openings in the grid system for recessed fixtures.
- 4. Install accessories as applicable to meet project requirements.
- C. Electrical lighting fixtures will be surface and recessed mounted, coordinate and provide additional hangers as required. All electrical lighting fixtures will be supported from the structure above and not the suspended ceiling system.
- D. Hanger spacing shall be designed for a maximum allowable deflection of 1/360.

3.02 CLEAN-UP

A. As required for installation of other materials.

END OF SECTION 095400 - CEILING SUSPENSION SYSTEM

SECTION 09650 - RESILIENT FLOORING

PART 1 GENERAL

1.01 **DESCRIPTION**

A. Scope of Work:

The work of this section includes all labor, material, plant, tools, equipment, trucking, insurance and all related items to furnish and install all work of this section as shown by the drawings and specifications.

- Rubber Cove Bases.
- 2. Samples.

1.02 **SUBMITTALS**

- A. Product Data: Provide product data on specified products, describing physical and performance characteristics, sizes, patterns and color available.
- B. Samples: Provide samples of all products specified. Samples shall also indicate the available colors and patterns for the Architect's color selection.
- C. MSDS (Material Safety Data Sheets)
- D. LEED Compliance: Manufacturer's information inclusive of VOC g/L content complying with LEED v4 New Construction Indoor Air Quality requirements, inclusive of those outlined in Section 01 8113 of this book, and SCAQMD requirements.

1.03 **DEFINITIONS**

- 1. LEED as used in this section refers to Leadership in Energy and Environmental Design. Products listed meet LEED criteria for environmentally safe interior primers and coatings.
- 2. VOC as used in this Section refers to Volatile Organic Compounds found in primers and coatings. The level of VOC's appear after each product listed in the Schedule in grams per liter (g/L).
- CDPH Standard Method v1.1: This credit uses the California Department of Public Health (CDPH) Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers, v.1.1–2010, for the emissions testing and requirements of all products and materials

1.04 **OPERATION AND MAINTENANCE DATA**

- A. Cleaning and maintenance data shall be submitted to Architect at completion of the project.
- B. Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning, stripping, and re-waxing.

1.05 **ENVIRONMENTAL REQUIREMENTS**

A. Store materials for three days prior to installation in area of installation to achieve temperature stability.

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B. Maintain in building, ambient temperature 70EF minimum or as required by adhesive manufacturer three days prior to, during and 48 hours after installation of materials.

1.06 **EXTRA MATERIALS**

A. The Contractor is to leave, where directed, at least (1 box) of perfect floor tile of each of the colors used and 20 lineal feet of base. Obtain a receipt for same from the Owner's project representative and submit copy of receipt to the Architect's office.

1.07 QUALITY ASSURANCE

A. Use only qualified workmen thoroughly skilled and especially trained in the techniques of VCT flooring installation.1.02.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in labeled packages. Store and handle in strict compliance with manufacturer's recommendations. Protect from damage due to weather, excessive temperatures, and construction operations.
- B. Deliver materials sufficiently in advance of installation to condition materials to the required temperature prior to installation.

1.09 **WARRANTY**

A. Provide manufacturer's standard 10 warranty against defects in manufacturing and workmanship of all flooring products. Provide manufacturer's warranty as specified under each product as applicable, including limited wear, defect and conductivity.

PART 2 PRODUCTS

2.01 VINYL COMPOSITION TILE FLOORS (VCT)

Basis of Design:

- A. Where floors on the drawings or finish schedule are indicated as "VCT" these shall be of vinyl composition tile, Type IV Composition 1 "Through Chip", 12" x 1/8".
- B. Vinyl Composition Tile:
 - Johnsonite Azrock VCT Color: V241 Springtime
- C. All tile shall be cut with absolutely square corners and same length on all four sides. Colors shall be clean and true and shall match approved samples in Architect's office to the satisfaction of the Architect.
- D. Surface Burning Characteristics:

Flame Spread: 0-25 Smoke Development: 50

E. All adhesives to comply with Manufacturer's recommendations and LEED V4 New Construction IEQ Credit: Low Emitting Materials, Greenguard Gold Certified

2.02 RUBBER BASE

Basis of Design:

- A. Where rubber base is indicated on the Room Finish Schedule it shall be standard toe "cove" type.
- B. Rubber base shall be 1/8" (3.2mm) thick Type TS, Thermoset Vulcanized Extruded Rubber Base as manufactured by Roppe Corporation. It shall be constructed of first-quality materials proper vulcanized, and shall be smooth and free from imperfections which detract from its appearance. The base shall conform to the requirements of Standard Specification F-1861, Group 1 (solid).
- C. Base shall be four (4) inches high unless otherwise indicated.
- D. RB-1: Color: Roppe 630 Pine
 - RB-2: Color: Roppe 123 Charcoal
 - RB-3: Color Match Existing (Basement Corridor and First Floor Lounge)
 - RB-4: Color To be selected from manufacturer's standard color options. (Alternate #1)
- E. All adhesives to comply with Manufacturer's recommendations and LEED V4 New Construction IEQ Credit: Low Emitting Materials, Greenguard Gold Certified

2.03 ACCESSORIES

- A. Subfloor Filler: Type recommended by flooring material manufacturer or Camp's Latex Liquid Felt. Material is required to be Greenguard Gold Certified.
- B. Primers and Adhesives: Waterproof; types recommended by flooring manufacturer. Linoleum paste shall not be used for setting rubber bases. Material is required to be Greenguard Gold Certified.
- C. Transition Type 1 Tile to VCT: Typical Where Floor Tile Interfaces with VCT @ Corridor Recesses: Schluter®-RENO-U AEU-125 Satin Anodized Aluminum
- D. Transition Type 2 VCT to Concrete: Typical at all Locations Where VCT Interfaces with Exposed Concrete: Similar or Equal to Roppe Part #23 (Rubber)
- E. Transition Type 3 Carpet to Concrete: Typical at New Electrical Closet @ First Floor Lounge. Similar or Equal to Roppe Part #40 (Rubber)

PART 3 EXECUTION

3.01 **EXAMINATION**

- A. Verify that concrete substrate surfaces are smooth and flat with maximum variation of c inch in 10 ft. and are ready to receive work.
- B. Perform ASTM F-2170 in situ Relative Humidity tests using Wagner Rapid RH probes only; confirm all moisture content is </= 85% for elevated slabs; for slabs on/below grade, confirm presence of vapor barrier beneath slab and moisture content is </= 85%; if no vapor barrier is present or confirmed, topical moisture mitigation capable of handling 100% is mandatory.

C. Beginning of installation means acceptance of existing substrate and site conditions.

3.02 **PREPARATION**

Note: Prepare all slabs according to ASTM F710-11 Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring guidelines

- A. Perform three moisture tests for the first 1000 sq. ft. then one test to be conducted for every 1,000 sq. ft. of flooring and the results not exceed 7 lbs. per 1,000 sq. ft. in 24 hours when tested in accordance with ASTM F 1869 Standard Test method for Measuring Vapor Emission Rate of Concrete Subfloor using Anhydrous Calcium Chloride. Or 90% when tested accordance with ASTM F 2170 Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs using in situ Probes. Surface pH of the concrete should range between 7 and 10. If the tests results exceed the limitations, the installation must not proceed until the problem has been corrected.
- B. A clean non-burnished concrete surface free from any paint, wax, oil, grease, is required. The surface should not have any alkaline salts, laitance, mold, mildew, residual adhesive, chemical adhesive removers or anything that may prevent bonding to it.
- C. Remove subfloor ridges and bumps. Fill low spots, cracks, joints, holes and other defects with "MAPEI" PLANI/PATCH PRP110 with PLANI/PATCH PLUS PRP 312 additive or equal subfloor filler in strict accord with the manufacturer's recommendations and specifications.
- D. Apply, trowel and float "MAPEI" PLANI/PATCH PRP110 with PLANI/PATCH PLUS PRP 312 additive or equalfiller to leave a smooth, flat, hard surface [over entire room].
- E. Prohibit traffic from area until filler is cured.
- F. Vacuum clean substrate immediately prior to installing the flooring to remove all loose particles. If required, only use water based sweeping compounds. Do not use any wax or oil based compounds that leave behind a residue that may interfere with the adhesive bond.
- G. Perform mat bond tests in each major area (1 per ~1,000 sq. ft.) This shall consist of the proposed subfloor preparation, mitigation and leveling or smoothing products as required by the manufacturer. Do not proceed with the installation until all the results of the bond test are acceptable.
- H. If topical moisture mitigation is used on slabs on or below grade, a minimum of 1/8" cementitious underlayment is required as a "blotter" layer for water-based adhesives.

3.03 **INSTALLATION - TILE MATERIAL**

- A. Install in accordance with manufacturer's instructions.
- B. Mix tile from container to ensure shade variations are consistent.
- C. Adhesive: Basis of Design Tarkett 100 Clear Thin Spread Adhesive. Spread only enough adhesive to permit installation of materials before initial set. Porous (concrete) floor coverage rate to be 250 to 300 square feet per gallon using a U notch trowel.
- D. Set flooring in place, press with heavy roller to attain full adhesion.

- E. Layout resilient flooring to provide ~equal size at perimeter. Adjust layout as necessary to reduce the amount of resilient flooring which is cut to less than half full width.
- F. Lay resilient flooring with arrows in the same direction (excluding borders).
- G. Install resilient flooring without voids at seams. Lay seams together without stress.
- H. Cut/scribe resilient flooring neatly at perimeter and obstructions.
- I. Extend resilient flooring into reveals, closets, and similar openings.
- J. Terminate flooring at centerline of door openings where adjacent floor finish is dissimilar or as detailed on drawings.
- G. Install edge strips at unprotected or exposed edges, and where flooring terminates.

3.04 **INSTALLATION - BASE MATERIAL**

- A. Install in accordance with manufacturer's instructions including adhesives approved for the installation intended.
- B. Fit joints tight and vertical. Maintain minimum measurement of 18 inches between joints. Install in longest practical lengths.
- C. Miter internal corners. At external corners, 'V' cut back of base strip to b of its thickness and fold. At exposed ends use pre-molded units. Hand form and wrap bases around all interior and exterior corners.
- D. Install base on solid backing. Bond tight to wall and floor surfaces. Base shall be sanded on the back for better adhesion.
- E. Scribe and fit to door frames and other interruptions.

3.07 **PROTECTION**

A. Prevent all traffic for a minimum of 12 hours and heavy rolling loads for 72 hours to allow the adhesive to set up. After 12 hours protect the flooring from damage during construction operations using Masonite, plywood or a similar product, ensuring first that the flooring surface is free of all debris. Lay panels so that the edges form a butt joint and tape the joint to prevent both movement and debris entrapment underneath them. Inspect immediately before covering and after removal for final acceptance.

3.08 **CLEANING**

- A. Remove excess adhesive from floor, base, and wall surfaces without damage.
- B. Perform initial maintenance to remove mold release agent per manufacturer's cleaning requirements.
- C. Perform nora pro clean initial maintenance as per General Maintenance guideline.

END OF SECTION 096500 - RESILIENT FLOORING

SECTION 096800 - CARPET (ALTERNATE #1)

PART 1 GENERAL

1.01 **DESCRIPTION**

- A. Scope of Work: The work of this section includes all labor, materials, plant, tools, equipment, trucking, insurance and all related items to furnish and install all work of this section as shown by the drawings and this specification.
- B. The following items are specifically included without limiting the generality implied by these specifications:
 - 1. The carpet work includes the furnishing and installing of all Carpet Tile in all rooms and spaces where called for on the drawings and as scheduled herein, including all labor, materials, tools, equipment, taxes, insurance, temporary signs and barricades and all incidental and related items to provide a complete and satisfactory carpet installation in all respects.
 - 2. See drawings for carpeted areas.

1.02 **QUALITY ASSURANCE**

- A. The carpet manufacturer shall have no less than fifteen years of production experience with modular carpet similar to type specified. Published product literature of carpet manufacturer shall clearly indicate compliance of products with requirements of this section.
- B. Name and experience record of firm or sub-subcontractor which will lay the carpet. The installer must have been in business for at least five (5) years.

1.03 **SUBMITTALS**

- A. Provide product data on specified products (including accessories), describing physical and performance characteristics and sizes.
- B. Samples of the quality, color and pattern of carpet.
- C. All applicable product warranties provided by manufacturer.
- D. Submit manufacturer's installation instruction. Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning and shampooing.
- E. Manufacturer's information inclusive of VOC g/L content complying with LEED v4 New Construction Indoor Air Quality requirements, inclusive of those outlined in Section 01 8113 of this book, and SCAQMD requirements.

1.04 **DEFINITIONS**

- LEED as used in this section refers to Leadership in Energy and Environmental Design. Products listed meet LEED criteria for environmentally safe interior primers and coatings.
- 2. VOC as used in this Section refers to Volatile Organic Compounds found in primers and coatings. The level of VOC's appear after each product listed in the Schedule in grams per liter (g/L).
- 3. CDPH Standard Method v1.1: This credit uses the California Department of Public Health (CDPH) Standard Method for the Testing and Evaluation of Volatile

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Organic Chemical Emissions from Indoor Sources Using Environmental Chambers, v.1.1–2010, for the emissions testing and requirements of all products and materials

1.05 **SUPERVISION**

A. Supervision of carpet installation shall be total and complete responsibility of the carpet subcontractor. Unsatisfactory installation resulting from work performed not per manufacturer's recommendations shall be the responsibility of the carpet subcontractor and may result in removal and relaying of the carpet at the expense of the subcontractor or installer sub-subcontractor.

1.06 **DELIVERY AND STORAGE**

- A. All carpet shall be delivered to the job site in original mill wrappings having register number and tags.
 - Upon written request, the successful carpet subcontractor may precut the carpet for installation in his warehouse based on his approved layout shop drawings. If said permission is granted, register numbers and tags shall be removed and turned over to the architect or his designated representative upon delivery of the carpet to the site.
- B. Store under cover in well ventilated spaces as soon as delivered and protect from damage, dirt, stains, and moisture.
- C. Storage areas shall be heated to a maintained minimum temperature of 65EF. Carpet shall be stored in said areas a minimum of forty-eight hours prior to the start of installation.

1.07 **WARRANTY**

- A. Provide a written warranty by carpet manufacturer for a period of not less than 15 years, including the following:
 - 1. Wear Surface fiber wear shall not be more than 10% by weight in 15 years. (Note: Wear warranty shall not require use of chair pads)
 - 2. Static Static generation shall be less than 3.0 kV at 70° F, and 20% R.H.
 - 3. No delamination
 - 4. No edge ravel
 - 5. No dimensional instability (i.e., shrinkage, curling and doming) which adversely affect the ability of the tile to lie flat
- B. Contractor shall warrant all installation services will be free from defects in workmanship for a period of at least one (1) year following their completion, and that in the event of defective services, the installation provider will re-perform the affected services and, as necessary, supply new products of the same or similar grade sufficient to repair or replace products adversely affected.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Basis of Design: Alternate No. 1 (Group Study Rooms)
 - Basis of Design
 InterfaceFLOR, LLC. USA
 1503 Orchard Hill Road
 LaGrange, GA 30240
 Tel: 800-634-6032
- B. Carpet: Driftwood
 - a. Product Number: 38940AK00
 - b. Color: To be selected from Interface standard color options.
 - c. Carpet Type: Tiled. Size: 9.845" x 39.38"
- C. Carpet Requirements:
 - 1. Construction: Tufted Textured Loop
 - Soil/Stain Protection: Protekt²®
 - 3. Antimicrobial: Antifungal and Antibacterial ASTM E 2471-05 Standard Test Method for Use of Seeded Agar for Screening Assessment of Antimicrobial Activity in Carpet. Minimum allowable growth ratings on washed and unwashed carpet samples after 72 hours incubation are complete to partial inhibition (<10% sample coverage) on shaven primary and unshaven fiber layers. Or, if AATCC 174 Parts II & III (AATCC 171 Washed) is used, shall pass both Part II and Part III of AATCC 174 with a minimum of 90% reduction both gram negative and gram positive bacteria and no visible growth against the fungi.
 - 4. Yarn System: 100% Recycled Content Type 6 Nylon.
 - 5. Dye Method: 100% Solution Dyed
 - 6. Tufted Yarn Weight: 18 oz per yard
 - 7. Machine Guage: 1/12"
 - 8. Pile Height: Minimum 0.15 in.
 - 9. Pile Thickness: .095
 - 10. Stitches: 8.7/in.
 - 11. Pile Density: 6,821 oz/yd
 - 12. Non-directional Installation Method: All product shall be designed for random installation, meaning that each and every tile can be installed in any of the four possible directions without regard to pile direction, pattern or orientation of any adjacent tiles while still creating a finished carpet tile assembly that appears to be a visually continuous carpeted surface with no tile appearing out of place or improperly positioned.
 - 13. Smoke Density: ASTM E-662
 - Lightfastness: AATCC 16-E
 - 15. Static: AATCC-134<3.0 KV
- D. Carpet Accessories:
 - Installation connectors Compounded acrylic adhesive, applied to PET
 polyester backing with PET polyester release liner (clear 3" x 3" polyester
 squares with small quantity of a pressure sensitive adhesive applied on
 one side of the polyester film). The squares connect the carpet modules

- together to form a stable surface over almost any hard surface. The connectors shall contain no liquid components and shall have "zero" calculated VOC's. Refer to InterfaceFLOR TacTiles.
- 2. Carpet edge guard, non-metallic Extruded or molded heavy duty vinyl or rubber carpet edge guard of size and profile indicated, and with minimum two inch wide anchorage flange; colors selected by architect/designer from among standard colors available within the industry.

E. Rubber Bases:

- 1. Where "rubber" base is indicated on the drawings it shall be 4" cove type.
- 2. Rubber base shall be c@ (3.175mm) thick Type TS, Thermoset Vulcanized Extruded Rubber Base as manufactured by Roppe Corporation [or approved equal.] It shall be constructed of first-quality materials proper vulcanized, and shall be smooth and free from imperfections which detract from its appearance. The base shall conform to the requirements of Standard Specification F-1861, Group 1 (solid).
- 3. RB-4: Color To be selected from manufacturer's standard color options. (Alternate #1)

PART 3 EXECUTION

3.01 COORDINATION AND SUPERVISION OF THE WORK

- A. The carpet subcontractor shall, through personal supervision or supervision of a competent superintendent, insure that all work is coordinated properly and is being carried out in accordance with the letter and intent of these specifications.
- B. Special precautions must be taken to keep carpet working areas free of traffic while carpet is being installed, by use of barricades and signs. The carpet subcontractor is responsible for keeping work areas free of all traffic while carpet installation is in progress.
- C. If work conditions are detrimental to proper and timely completion of carpeting, the carpet subcontractor shall notify the architect in writing and not proceed until such conditions are corrected.
- D. The carpet subcontractor shall vacuum and mop the floors for the installation of carpet in the areas scheduled for new carpet.
- E. Carpeted rooms shall have straight, 4" high, straight rubber base installed by carpet subcontractor, OR BASE TYPE AS SHOWN AND NOTED ON DRAWINGS. Color as selected by Architect.
- F. Carpet subcontractor shall inspect all surfaces to receive carpet. Surfaces to be dry, clean and level with base installed and cleared of all removable obstructions.
 - Carpet subcontractor shall notify the architect of any evident surface conditions which will prevent him from producing satisfactory finished work.
 - Starting any work without such notification shall constitute acceptance of surface conditions to receive carpet.

3.02 **INSTALLATION**

- A. Install carpet according to carpet manufacturer's printed instructions and in accordance with the Carpet and Rug Institute's Installation Standard. A "no-glue" waterless method of installation is required.
- B. Install carpet under open-bottom obstructions and under removable flanges and furnishings, and into alcoves and closets of each space.
- C. Provide cut outs where required. Conceal cut edges with protective edge guards or overlapping flanges.
 - D. Run carpet under open bottom items such as heating convectors, and install tight against walls, columns and cabinets so the entire floor area is covered with carpet. Cover over all floor type door closures.
 - E. Install edging guard at all openings and doors wherever carpet terminates, unless indicated otherwise.
 - F. Cutting shall be done in accordance with the manufacturer's recommendation, using the tools designed for the carpet being installed.
 - G. Use leveling compound where necessary. Any floor filling or leveling shall have a minimum of 4'0" of feather.
 - H. Expansion joints Do not bridge building expansion joints with continuous carpeting.

3.03 CLEAN UP

- A. Upon completion of the installation, the carpet subcontractor shall remove all scrap pieces, wrappings, and other installation debris from the areas of work.
- B. Upon completion of the clean-up, the carpet areas shall be vacuumed and left ready for occupancy of the Owner.

END OF SECTION 096800 - CARPET

SECTION 099000 - PAINTING

PART 1 GENERAL

1.01 **DESCRIPTION**

A. Scope of Work:

The work of this section includes all labor, material, plant, tools, equipment, trucking, insurance and all related items to furnish and install all work of this section as shown by the drawings and specifications.

- B. The following items are specifically included without limiting the generality implied by these specifications:
 - 1. The following specifications cover the complete painting and finishing of all new surfaces throughout the interior of the building, except as otherwise specified:
 - a. In altered rooms where only one, two, or three walls or a portion of any wall, floor, ceiling, etc., are new, the existing unaltered walls, ceiling, and/or floor or portion thereof are to have the same finish (paint) as called for in the specifications for similar new work.
 - b. Where painting is called for, three coats of finish are required over all newly patched areas. Adjacent existing work where finish is in good condition shall require two coats.
 - c. It is the intent that all present rooms, which are to have major alterations are to be left, when completed, as finished rooms with no visible signs of patching.
 - The painting subcontractor shall be responsible for inspecting the work of others prior to the application of any paint or finishing materials. If any surface to be finished cannot be put in proper condition for finishing by customary cleaning, sanding, or puttying operations, the painting Sub-Contractor shall immediately notify the General Contractor and/or Architect in writing; or assume responsibility for and rectify any unsatisfactory finish resulting.
 - 3. The painting subcontractor shall not only protect his work at all time, but shall also protect all adjacent work and materials by suitably covering or other method during progress of work. Upon completion of the work, he shall remove all paint and varnish spots from the floors, glass and other surfaces. He shall remove from the premises all rubbish and accumulated materials of whatever nature not caused by other trades and shall leave his part of the work in clean, orderly and acceptable condition.
 - 4. The painting contractor shall examine the specifications for the various other trades and shall thoroughly familiarize himself with all their provisions regarding their painting. All surfaces that are left unfinished by the requirements of other specifications shall be painted or finished as part of this contract in areas scheduled to be painted.
- C. Related work specified elsewhere:
 - 1. Shop coats on hollow metal work: Section 081000.
 - 2. Additional factory pre-finished items as specified.
- D. Description of Work:
 - 1. The painting and finishing of all exposed surfaces.

- a. All new work shall be done with coatings that are AOTC-Compliant@ (Ozone Transportation Commission).
- b. Existing materials as indicated on the "Room Finish Schedule".

1.02 **QUALITY ASSURANCE**

A. Basis if Design: Except as otherwise noted, products specified are those of **PPG** as noted in 3.08 SCHEDULE. Use of equal quality and type products manufactured by the other manufacturers will be considered only after submittal of a substitute paint systems listing all surfaces and proposed coating system to be applied. Manufacturer's current literature on each product giving the name, generic type, descriptive information, solids by volume and recommended dry mil film thickness must also be submitted. No request for substitution shall be considered that would decrease dry mil film thickness or offer a change in the generic type of coating specified.

B. Quality Control

- 1. All materials used on the work shall be exactly as hereinafter specified in brand and quality (only "First Line" or "Best Grade" products as listed in a published price list and regularly produced by the approved paint manufacturer will be permitted on the project site.) No claim by the painting sub-Contractor as to the unsuitability or unavailability of any material specified, or his unwillingness to use same, or inability to produce first class-work with same, will be entertained unless such claims are made in writing and submitted with the bid of the Prime Contractor.
- 2. Materials used for coating systems for each type surface shall be the product of a single manufacturer.
- 3. All materials shall be used only as specified by the manufacturer's direction of a single manufacturer.
- 4. The Prime Contractor's bid shall be based on the use of the goods of the specific brand, quality and color, as hereinafter specified under typical finishes for interior work.
- 5. All colors and finishes shall be selected and approved by the Architect. The number of colors to be used on the project shall be determined by the Architect. Panels for finish and color shall be prepared by the painting sub-Contractor in advance, with the materials as specified, for the approval of the Architect.
- 6. Applicator Qualifications: Application of at least 10,000 square feet of specified materials within last three years. The workmanship shall be of the very best. Only skilled mechanics shall be employed.
 - a. The Contractor shall, through personal supervision or supervision of a competent superintendent, insure that all work is proceeding properly and is being carried out in accordance with the letter and intent of these specifications.
 - b. All unnecessary delays shall be avoided and a sufficient force of skilled workmen shall be employed on this work at all times to expedite its early completion.

7. Job Mock-Up:

- a. Minimum 6 ft. x 6 ft. application of specified coating systems on each type of surface for each color selected by Architect.
- b. Mock-ups to serve as standard for acceptance of work.
- c. Leave mock-ups in place as part of completed project.

1.03 **SUBMITTALS**

- A. Product Data: Manufacturer's product literature. Include a statement as to the percentage of solids by volume. In addition to actual material data, submit material for manufacturer's directions and recommendations as to environmental conditions, surface preparation, priming, mixing, reduction, spreading rate, application and storage.
- B. Manufacturer's information inclusive of VOC g/L content complying with LEED v4 New Construction Indoor Air Quality requirements, inclusive of those outlined in Section 01 8113 of this book, and SCAQMD requirements.
- C. Samples: Submit samples for color selection.
- D. Maintenance Materials / Attic Stock:
 - 1. Painting contractor shall leave at the job and obtain a receipt for one (1) full gallon sealed can of each type and color of finish coat of paint and stain used. Properly identify each can with labels and/or color patches on outside of can, as well as locations where contents were used.
- E. The painting sub-Contractor shall furnish in triplicate a written affidavit that the materials used in executing the painting sub-contract meet in all respects the "First Line" or "Best Grade" quality specified.
- F. Sustainable Design Submittals:
 - 1. Product Data: For paints and coatings, indicating VOC content.
 - "Laboratory Test Reports" Subparagraph below applies to LEED v4. Coordinate with requirements for paints and coatings.
 - 2.Laboratory Test Reports: For paints and coatings, indicating compliance with requirements for low-emitting materials.
 - Retain "Samples for Initial Selection" and "Samples for Verification" paragraphs below for two-stage Samples.

1.04 **PRODUCT DELIVERY, STORAGE AND HANDLING**

- A. All paints, varnishes, enamels, lacquers, stains, paste fillers, and similar materials must be delivered in the original containers, with the seals unbroken and labels intact.
- C. Materials used on the job shall be stored in a single place designated by the Owner's representative. Such storage place shall be kept neat and clean and all damage thereto or its surroundings shall be made good. Any soiled or used rags, waste, etc., must be removed from the building at the close of each day's work and every precaution taken to avoid the danger of fire. Containers are to be kept closed when not in use.

1.05 **DEFINITIONS**

- 1. LEED as used in this section refers to Leadership in Energy and Environmental Design. Products listed meet LEED criteria for environmentally safe interior primers and coatings.
- 2. VOC as used in this Section refers to Volatile Organic Compounds found in primers and coatings. The level of VOC's appear after each product listed in the Schedule in grams per liter (g/L).

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3. CDPH Standard Method v1.1: This credit uses the California Department of Public Health (CDPH) Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers, v.1.1–2010, for the emissions testing and requirements of all products and materials

1.06 **ENVIRONMENTAL REQUIREMENTS**

- A. Apply exterior coatings only under the following prevailing conditions.
 - 1. Air and surface temperatures are not below 40°F or above 120°F.
 - 2. Relative humidity is not above 85 percent and surface temperature is at least 5°F above dew point.
 - 3. Wind velocity is under 20 mph.
- B. Apply interior coating utilizing continuous ventilation and heating facilities to maintain surface and ambient temperatures above 45°F for 24-hours before, during and 48 hours after application of finishes, unless required otherwise by manufacturer's instructions.
- C. Minimum Application Temperature for Varnish and Polyurethane Finishes: 65°F for interior, unless required otherwise by manufacturer's instructions.
- D. Provide lighting level of 50 ft. candles measured mid-height at substrate surface.
- E. IF Lead is present in existing paint systems Reference OSHA 29 CFR 1926-62 AEmployee Construction Workers Exposed to Lead@ and Section 02086.

1.07 **JOB CONDITIONS**

A. The painting contractor shall not only protect his work at all time, but shall also protect all the adjacent work and materials by suitably covering or other method during progress of his work. Upon completion of the work, he shall remove all paint and varnish spots from the floor, glass surfaces, etc.

PART 2 PRODUCTS

2.01 **COLORS**

A. Colors: See 3.08 Schedule below. If not indicated below, colors will be selected by the Architect prior to commencement of the painting operation from the manufacturer's color charts.

2.02 **PAINT**

- A. Paint: See Paint Systems 3.08 for typical finish types.
- B. All coatings shall be OTC-Compliant (Ozone Transportation Commission).

2.03 Material Compatibility

Systems could fail if paints used for individual coats are incompatible. MPI's paint systems match primers and topcoats and take compatibility into consideration.

1. Materials for use within each paint system shall be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by

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manufacturer, based on testing and field experience.

2. For each coat in a paint system, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.

"VOC content" and "Low-Emitting Materials" paragraphs below apply to LEED v4.

For interior applications, LEED v4 compliance, 100 percent of interior applied paint and coatings products by volume must comply with wet-applied VOC content limits. Paint and coatings wet-applied on site must comply with applicable VOC limits of the California Air Resources Board (CARB) 2007, Suggested Control Measure (SCM) for Architectural Coatings, or the South Coast Air Quality Management District (SCAQMD) Rule 1113, effective June 3, 2011. Both the CARB 2007 SCM and SCAQMD Rule 1113 are cited in the LEED v4 EQ, "Low-Emitting Materials Reference Guide." Choose one wet-applied VOC content limit compliance path below, either CARB or SCAQMD.

For CARB 2007 SCM, see https://arb.ca.gov/coatings/arch/Approved 2007 SCM.pdf.

For SCAQMD Rule 1113 (more restrictive), see www.agmd.gov/docs/default-source/planning/architectural-coatings/current-activities-sup port-documents/rule 1113-amended June 3, 2011.pdf.

PART 3 EXECUTION

3.01 INSPECTION

- A. The painting contractor shall be responsible for inspecting the work of others prior to the application of any paint or finishing materials. Floors and entire spaces where painting is to commence shall be free of dust and debris, vacuumed and floor wet mopped by the general contractor. If any surfaces to be finished cannot be put in proper condition for finishing by customary cleaning, sanding and puttying operations, the painting contractor shall immediately notify the general contractor and/or Architect, in writing, or assume responsibility for and rectify any unsatisfactory finish results.
- B. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:
 - 1. Plaster and Gypsum Wallboard: 12 percent.
 - 2. Masonry, Concrete, and Concrete Unit Masonry: 12 percent.
 - 3. Interior Located Wood: 15 percent, measured in accordance with ASTM D2016.
 - Exterior Located Wood: 15 percent, measured in accordance with ASTM D2016.
- C. Beginning of installation means acceptance of substrate.

3.02 **PREPARATION**

- A. The painting subcontractor shall review color schedules for rooms before applying any paint or finish. All priming coats and undercoats shall be tinted to the approximate shade of the final coat to assure uniformity of the color in the finish.
- B. Remove electrical plates, hardware, light fixture trim, and fittings prior to preparing surfaces or finishing.
- Correct minor defects and clean surfaces which affect work of the Section.
- D. Shellac and seal marks which may bleed through surface finishes.
- E. Impervious Surfaces: Remove mildew by scrubbing with solution of tri-sodium phosphate

and bleach. Rinse with clean water and allow surface to dry.

- F. Aluminum Surfaces Scheduled for Paint Finish: Remove surface contamination by steam or high pressure water. Remove oxidation with acid etch and solvent washing. Apply etching primer immediately following cleaning.
- G. Insulated Coverings: Remove dirt, grease, and oil from canvas and cotton.
- H. Galvanized Surfaces: Remove surface contamination and oils and wash with solvent. Apply coat of etching primer.
- I. Concrete and Unit Masonry Wall Surfaces Scheduled to Receive Paint Finish: Remove dirt, loose mortar, scale, salt or alkali powder, and other foreign matter. Remove oil and grease with a solution of tri-sodium phosphate; rinse well and allow to dry. Remove stains caused by weathering of corroding metals with a solution of sodium metasilicate after thoroughly wetting with water. Allow to dry.
- J. Uncoated Steel and Iron Surfaces: Remove grease, scale, dirt, and rust. Where heavy coatings of scale are evident, remove by wire brushing or sandblasting; clean by washing with solvent. Apply a treatment of phosphoric acid solution, ensuring weld joints, bolts, and nuts are similarly cleaned. Spot prime paint after repairs.
- K. Shop Primed Steel Surfaces: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces. [Prime metal items including shop primed items.]
- L. Interior Wood Items Scheduled to Receive Finish: Wipe off dust and grit prior to priming. Seal knots, pitch streaks, and sappy sections with two coats of sealer. Fill nail holes and cracks after primer has dried; sand between coats.
- M. Exterior Wood Scheduled to Receive Paint Finish: Remove dust, grit and foreign matter. Seal knots, pitch streaks, and sappy sections with two coats of sealer. Fill nail holes with tinted exterior caulking compound after prime coat has been applied.

3.03 **PROTECTION**

- A. Protect elements surrounding the work of this Section from damage or disfiguration.
- B. Repair damage to other surfaces caused by work of the Section.
- C. Furnish drop cloths, shields, and protective methods to prevent spray or droppings from disfiguring other surfaces.
- D. Remove empty paint containers from site.

3.04 **APPLICATION**

- A. Each coat of paint or varnish shall be approved by the Owner's Project Representative before succeeding coat is applied. Final coats shall be approved by the Architect before application after review of job mock-ups for each color to be used on the project.
- B. Apply products in accordance with manufacturer's instructions, unless otherwise specified. Apply under adequate illumination, evenly spread and smoothly flowed on without runs or sags.
- C. Do not apply finishes to surfaces that are not dry.

- D. Apply each coat uniformly at the minimum wet film rate furnished by the manufacturer of paint, stain or coating.
- E. Apply each coat of paint slightly darker than preceding coat unless otherwise approved.
- F. Sand lightly between coats to achieve required finish.
- G. Allow applied coat to thoroughly dry before next coat is applied.
- H. Final coat of paint or coating <u>must</u> have visual evidence of solid hiding and uniform appearance. Stain shall be applied uniformly.
- I. Where clear finishes are required, tint fillers to match wood. Work fillers into the grain before set. Wipe excess from surface.
- J. Prime back surfaces of interior woodwork with primer paint.
- K. Prime back surfaces of interior woodwork scheduled to receive stain or varnish finish with gloss varnish reduced 25 percent with mineral spirits.
- L. Door tops, bottoms and edges to receive same finish as door face, remove door from frame during application. Apply finish after they are fitted by carpenters.
- M. Make edges of paint, stain or coating adjoining other materials or colors sharp and clean with no overlapping.

3.05 FINISHING MECHANICAL AND ELECTRICAL EQUIPMENT

- A. Refer to Division 21, 22, 23 & 26 for schedule of color coding and identification banding of equipment, ductwork, piping and conduit.
- B. Paint shop primed equipment.
- C. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately with enamel in color selected by Architect. This shall include convector fronts, grills and diffusers (furnished and installed by Heating & Ventilating Contractor in prime finish).
 - 1. Miscellaneous metal cabinets, such as fire extinguisher cabinets, electrical control cabinets, metal access doors and frames, etc. which do not have a factory applied finish, shall be finished with Type 2 finish. If factory primed, primer coat specified may be omitted.
 - 2. Mechanical equipment in Electrical, Mechanical and Fan Rooms are not part of the painting subcontractor's work.
- D. Prime and paint with two-coats of paint type selected for adjacent surface in color to match adjacent surface, insulated and exposed pipes, conduit, boxes, insulated and exposed ducts, hangers, brackets, collars and support, except where items are pre-finished in areas scheduled to be painted. All grease shall be removed prior to priming.
- E. Replace identification markings on mechanical or electrical equipment when painted accidently.
- F. Paint exposed conduit, electrical equipment and sprinkler piping occurring in finished areas. The same color as walls unless designated to be color coded.
- G. Paint both sides and edges of plywood backboards for electrical and telephone equipment before

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installing equipment.

- H. Color code equipment, piping, conduit, and exposed ductwork in accordance with requirements indicated. Color band and identify with flow arrows, names or numbering as indicated.
- Replace electrical plates, hardware, light fixture trim, and fittings removed prior to finishing.

3.06 CLEANING AND TOUCH-UP

- A. As Work proceeds, promptly remove paint where spilled, splashed or spattered.
- B. During progress of Work maintain premises free of unnecessary accumulation of tools, equipment, surplus materials, and debris.
- C. Collect cotton waste, cloths, and material which may constitute a fire hazard, place in closed metal containers and remove daily from site.
- D. Spot painting to correct soiled or damaged paint surfaces will be allowed only when touch up spot is blended into surrounding finish and is invisible to normal viewing. Otherwise, re-coat entire section to corners or visible stopping point. Touch up should be accomplished by same method used in applying the original coating: when sprayed, touch up with spray; if brushed, use a brush for touch up; and if rolled, use same texture roller cover as used on the original painting.

3.07 SHOP & FIELD PAINTING

- A. Many materials incorporated into the project are given the first or priming coat in the shop or mill. If a shop coat is applied by a material supplier, this coat may be omitted by the painting subcontractor.
- B. Shop painted metal shall be cleaned and shop coat re-touched where marred, before succeeding coats are applied. Oil or grease must be removed with a suitable solvent.
- C. Field paint on structural steel shall be applied by the painting Contractor. Field paint shall be black Detroit Superior Graphite No. 30, Socony No. 11-J221, Truscon "Bar- Ox" Cheeseman-Elliott No. 340, or Apex "Inhibitive" Black Field Coat. Exposed exterior steel or iron shall have metal finish as specified under 3.08 herein. See also Section 5120.
- D. Miscellaneous steel and iron work, which is exposed, such as pipe rails and supports, lintels, stair handrail brackets, angle base iron and steel ladders, wrought iron eyes, equipment hanger and supports and other miscellaneous metals of all kinds, shall have Type 2 finish or equivalent as approved by Architect. Unexposed work shall have a field coat as above specified for structural steel. See paragraph (c).

3.08 SCHEDULE

- A. Paint Systems: Products below are Basis of Design See Schedules, Notes and Drawings for Scope of Work.
- B. Interior Finishes
 - 1. Paint Type 1 Hollow Metal Door Frames "Moist Area":

Galvanized frames to be shop primed at factory.

2 Coats Paint: PPG DTM 90-474 (Semi-Gloss)

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Color1: Color Match "Sherwin Williams 6187 Rosemary" @ all new door frames on floors 2-9

Color2: Match adjacent door frame colors. Owner to supply frame colors.

2. Paint Type 2 USG FIBEROCK Agua-TOUGH

At new GWB Corridor walls and existing plaster Corridor walls.

1 Coat Plaster Bonder USG Plaster Bonder

1 Coat Plaster Finish USG Diamond Veneer finish - Sanded

1 Coat Primer PPG Seal Grip - Acrylic Latex (17-21)

2 Coats Paint PPG 6500 Latex Acrylic Semi (see note below)

Color: Color Match Sherwin Williams "Aesthetic White 7035"

Note: Repair / patch all damage to existing surfaces receiving a new topcoat prior to painting.

3. Paint Type 3 USG FIBEROCK Agua-TOUGH

At new exposed GWB walls and existing plaster walls not receiving PT-2

1 Coat Primer PPG Seal Grip - Acrylic Latex (17-21)

2 Coats Paint PPG 6500 Latex Acrylic Semi (see note below)

Color: Color Match Sherwin Williams "Aesthetic White 7035" (see Basement Corridor color exception below)

Note: Basement Corridor paint color shall match the existing paint color on the walls currently. Owner will provide information on the color and sheen.

Note: Repair / patch all damage to existing surfaces receiving a new topcoat prior to painting.

4. **Paint Type 4** New CMU:

All new CMU walls

1 Coat Filler PPG 6-7 Block Fill

2 Coats Paint PPG 6-00 Latex Semi

Color: Color Match Sherwin Williams "Aesthetic White 7035"

Note: Repair / patch all damage to existing surfaces receiving a new topcoat prior to painting.

5. **Paint Type 5** Existing CMU:

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Where existing CMU has been top-coated with a semi-gloss paint type. All surfaces to be cleaned and dulled as per paint manufacturer's recommendations.

2 Coats Paint PPG 6-00 Latex Semi

Color: Color Match Sherwin Williams "Aesthetic White 7035"

Note: Repair / patch all damage to existing surfaces receiving a new topcoat prior

to painting.

6. **Paint Type 6** Plywood Shelves:

1 Coat Primer PPG Seal Grip - Acrylic Latex (17-21)

2 Coats Paint PPG Speedhide Pro EV Zero (Gloss Finish)

Color: Color Match Sherwin Williams 7757 High Reflective White

7. Paint Type 7 Existing Ceramic Tile @ Janitor's Closet:

1 Coat Primer PPG Seal Grip Stain Blocking Primer

2 Coat Paint PPG Break Through! 250 Interior/Exterior Water

Borne Acrylic

Match Sherwin Williams "Aesthetic White 7035"

Note: Repair / patch all damage to existing surfaces receiving a new topcoat prior to painting.

8. Paint Type 8 Exposed Concrete Ceilings:

1 Coat Filler PPG 6-7 Block Fill

2 Coats Paint PPG 6-00 Flat

Color: Color Match Sherwin Williams 7757 High Reflective White

Note: Repair / patch all damage to existing surfaces receiving a new topcoat prior

to painting.

9. **Paint Type 9** Exposed GWB ceilings at all new bathrooms, excluding where tile will be installed at shower stall ceilings.

1 Coat primer PPG Speedhide 6-2 Interior Latex Sealer

2 Coats Paint PPG Pitt-Glaze WB1 Interior Eggshell Acrylic

Epoxy

Color: Color Match Sherwin Williams 7757 High Reflective White

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10. Paint Type 10 Internal Corridor ceilings on floors 2-9 and Main Corridor Soffit ceilings on floors 2-9

1 Coat Primer PPG Seal Grip - Acrylic Latex (17-21)

2 Coats Paint PPG 6500 Latex Acrylic - Flat

Color: Color Match Sherwin Williams 7757 High Reflective White

Note: Repair / patch all damage to existing surfaces receiving a new topcoat prior

to painting.

SYSTEMS NOTE: On factory primed surfaces, the first coat (prime coat) may be eliminated. All bare or patched areas must be spot primed.

END OF SECTION 099000 - PAINTING

SECTION 10 40 00 - IDENTIFYING DEVICES

PART 1 GENERAL

1.01 **DESCRIPTION**

A. Scope of Work:

The scope of this section includes all labor, materials, plant. tools. equipment. trucking and all related items to furnish and install all work of this section as shown on the drawings and specifications.

Interior Signage.

1.02 **QUALITY ASSURANCE**

- A. Meets ANSI A117.1, 1992, 4.28.
- B. Scratch resistant surface.
- C. NEMA Rated "Self-Extinguishing".
- D. Installers Qualifications: Manufacturer of products or an entity that employs installers and supervisors who are trained and approved by manufacturer.

1.03 **SUBMITTALS**

- A. Samples for color selection. Include fabrication and installation details and attachments to other work. Show sign mounting heights, locations of supplementary supports to be provided by other installers, and accessories. Show message list, typestyles, graphic elements, including raised characters and Braille, and layout for each sign at least half size.
- B. Shop Drawing: Showing sizes, installation details and copy. Include fabrication and installation details and attachments to other work. Show sign mounting heights, locations of supplementary supports to be provided by other installers, and accessories. Show message list, typestyles, graphic elements, including raised characters and Braille, and layout for each sign at least half size
- C. Certificate on NEMA Rating.

PART 2 PRODUCTS

2.01 ROM IDENTIFICATION SIGNS

- A. Room Identification Sign: Sign with smooth, uniform surfaces; with message and characters having uniform faces, sharp corners, and precisely formed lines and profiles; and as follows:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. APCO Graphics, Inc.
 - b. ASI Sign Systems, Inc.
 - c. Best Sign Systems, Inc.
 - d. InPro Corporation (IPC).

- e. Mohawk Sign Systems.
- f. Vomar Products. Inc.
- 2. Laminated-Sheet Sign: Non-glare clear acrylic face sheet with raised or subsurface graphics, as indicated, laminated to backing sheet to produce composite sheet.
 - a. Surface-Applied Graphics: 0.031-inch applied vinyl film.
 - b. Braille: 0.031-inch diameter stainless steel or clear acrylic beads, as indicated.
 - c. Colors: As indicated.
- 3. Sign-Panel Perimeter: Finish edges smooth.
 - a. Edge Condition: Square cut.
 - b. Corner Condition in Elevation: Square.
- 4. Mounting: Two-face tape.
- 5. Text and Typeface: Accessible raised characters and Braille, typeface as indicated

2.02 **SIGNAGE SCHEDULE**

- A. Signage Standard: Comply with "Oswego State University of New York" Interior Signage Standards.
- B. Accessibility Standard: Comply with applicable provisions in the USDOJ's "2010 ADA Standards for Accessible Design", the ABA standards of the Federal agency having jurisdiction and ICC A117.1.
- C. Quantity/Type:

Note: SUNY Oswego "Campus Signage Diagrams & Details" are attached and are coordinated with signage Types listed below. Room number/names will be confirmed with Owner during Submittal process.

(80)

(80)

(16)

Basement: Main Electric Room Transformer Room Fire Alarm Room	(1) (1) (1)	Sign Type 1.3 Sign Type 1.3 Sign Type 1.3
First Floor: Women's Toilet Room Men's Toilet Room Fire Command Center Electrical Panel Closet	(1) (1) (1) (1)	Sign Type 5.2a Sign Type 5.2a Re-Use Existing Sign Type 1.3
Floors 2 Thru 9: Bathroom Toilet Room Bathroom (ADA Compliant) Bathroom (At Corridor) Storage Janitor's Closet Linen Closet	(56) (08) (16) (64) (40) (24) (16)	Sign Type 5.2b Sign Type 5.2b Sign Type 5.2c Sign Type 5.2b Sign Type 1.3 Sign Type 1.3 Sign Type 1.3

Group Study Room (Alternate #1)

IT/Data Closet

Fire Alarm Room

Sign Type 1.3

Sign Type 1.3

Sign Type 1.3

Sign Type 1.3

- 1. Size: 9 by 3½ inches.
- 2. Backer: 0.125-inch non-glare clear acrylic sheet subsurface painted C7.
- Header: 0.125-inch clear acrylic with C8 plastic laminate (grain horizontal) adhered.
- a. Text 1: ¾-inch Helvetica Bold and ¼-inch Grade II stainless steel Braille.
- 4. Name Plate: 9 by 1½ inches, 0.125-inch non-glare clear acrylic sheet with subsurface applied graphics and painted C6.
- a. Text 2: ½-inch Helvetica Regular subsurface silkscreened C10.

Sign Types 5.2, 5.2a, 5.2b

- 1. Size: 6 by 10 inches.
- 2. Backer: 0.125-inch clear acrylic.
- 3. Header: 0.125-inch clear non-glare acrylic subsurface painted C7.
 - a. Text 1: 3/4-inch Helvetica Bold and 1/4-inch Grade II clear Braille.
 - b. Icon: 3 by 2½ inches subsurface silkscreened C2.
 - c. Text 2: 5/8-inch Helvetica Bold and 1/4-inch Grade II clear Braille.
- D. Surface Burning Characteristics:

Flame Spread: 0-25 Smoke Development: 54

E. Accessories:

- a. Two-Face Tape: Manufacturer's standard high-bond, foam-core tape, 0.063" thick, with adhesive on both sides.
- b. Glass Mounted Backer: Clear enamel-receptive vinyl sheet, painted C7

2.03 **SIGN MATERIALS**

- A. Acrylic Sheet: ASTM D 4802, category as standard with manufacturer for each sign, Type UVF (UV filtering).
- B. Vinyl Film: UV-resistant vinyl film with pressure-sensitive, permanent adhesive; die cut to form characters or images as indicated on Drawings. C. Plastic Laminate: Metallic brushed aluminum (C8).
- 1. Product: Wilson Art; Satin Brushed Natural Aluminum 6257.
- C. Paints and Coatings for Sheet Materials: Inks, dyes, and paints that are recommended by manufacturer for optimum adherence to surface and are UV resistant for colors indicated.

- 1. C2: White.
- C3: Chrome Yellow.
- C6: Passive.
- 4. C7: Iron Ore.
- C9: Red.
- 6. C10: Black.
- D. Mineral-Fiber Board: Maximum flame-spread and smoke-developed indexes of 25 and 10, respectively; minimum density of 25 lb/cu. ft.
- E. Facing Material: Fabric from same dye lot; color and pattern as indicated by manufacturer's designations.
 - 1. Manufacturer: Guilford of Maine.
 - 2. Pattern/Color: FR 701/Pearl.
 - 3. Fiber Content: 100 percent woven polyester.

PART 3 EXECUTION

3.01 **PREPARATION**

- A. See drawings for intended locations.
- B. Prepare surfaces in accordance with manufacturer's recommendations.

3.02 **INSTALLATION**

- A. In accordance with manufacturer's recommended procedures and details for installation type specified.
- B. Install signs level, plumb, true to line, and at locations and heights indicated, with sign surfaces free of distortion and other defects in appearance.
- C. Install signs so they do not protrude or obstruct according to the accessibility standard.
- D. Before installation, verify that sign surfaces are clean and free of materials or debris that would impair installation.
- E. Accessibility: Install signs in locations on walls as indicated on Drawings and according to the accessibility standard.
- F. Mounting Methods:
 - Two-Face Tape: Clean bond-breaking materials from substrate surface and remove loose debris. Apply tape strips symmetrically to back of sign and of suitable quantity to support weight of sign without slippage. Keep strips away from edges to prevent visibility at sign edges. Place sign in position and push to engage tape adhesive.
 - 2. Where signs are mounted on clear glass, provide glass-mounted backer to opposite surface to conceal back of sign.

- G. Remove and replace damaged or deformed signs and signs that do not comply with specified requirements. Replace signs with damaged or deteriorated finishes or components that cannot be successfully repaired by finish touchup or similar minor repair procedures.
- H. Remove temporary protective coverings and strippable films as signs are installed.
- I. On completion of installation, clean exposed surfaces of signs according to manufacturer's written instructions and touch up minor nicks and abrasions in finish. Maintain signs in a clean condition during construction and protect from damage until acceptance by Owner.

END OF SECTION 10 40 00 - IDENTIFYING DEVICES

Oswego Color Palette

COLOR:



C2 - White

Vinyl: White (220-10)
Paint: Satin White MP2025P
Ink: Standard White Ink
Rowmark: Bright White (311-204)



C3 - Chrome Yellow

Vinyl: Chrome Yellow (220-145) Paint: Chrome Yellow MP40817



C6 - Passive SW7064

Paint: Passive MP36387



C7 - Iron Ore SW7069

Paint: Iron Ore MP36465



C8 - Metal Laminate

Wilson Art Satin Brushed Natural Aluminum #6257

PAPER:



C9 - Red

Paint: 485C MP00643 Ink: Standard Red Ink



C10 - Black

Vinyl: Black (220-12) Paint: Anodic Black MP31630 Ink: Standard Black Ink Rowmark: Black (311-401)





Fox River Paper Company Quest Color: Silver Finish: Vellum & 1/2" x 11"

SYMBOL:



























Restroom Icons









Regulatory Icons

FONT:

Aa

Helvetica Regular

Aa

Helvetica Bold

Aa

Helvetica Bold Condensed

Aa

Helvetica Black Condensed



Building Icon



In Case of Fire Icon

Oswego State University

Interior Signage

Product Code

Sign Type

Typestyle

Copy Color

Graphic Code

Logo U/C U/I U/C Plaque Color

Plaque Mounting

Installation Wall Material

Frame Mounting

Corner Radius

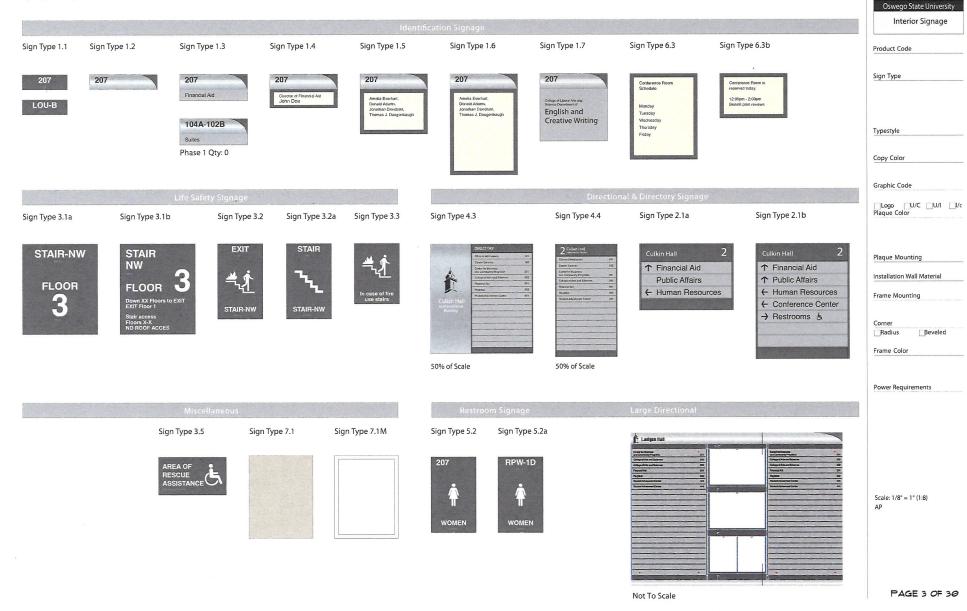
Beveled

Frame Color

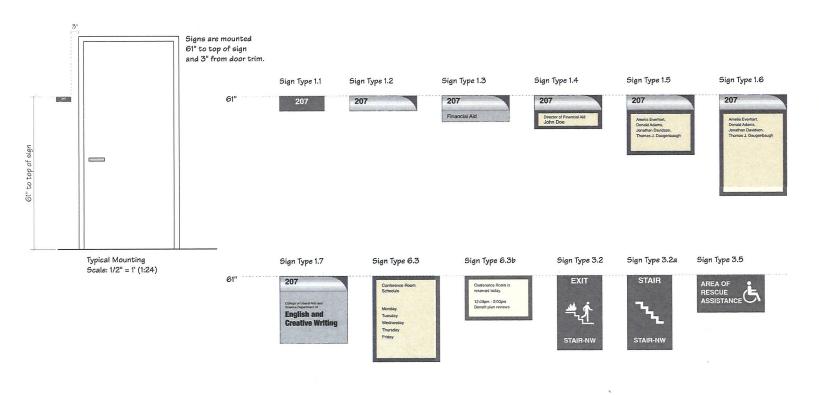
Power Requirements

Scale: N/A AP

Oswego Sign Family



Oswego Mounting



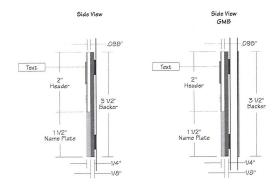
	Sign Type 5.2	Sign Type 5.2a	Sign Type 7.1	Sign Type 7.1M
81"	207	RPW-1D		
	*	*		
	WOMEN	WOMEN		

Oswego State University
Interior Signage
Product Code
Sign Type
Typestyle ~
Copy Color
Graphic Code
LogoU/CU/II/o
Plaque Mounting
Installation Wall Material
Frame Mounting
Corner Radius Beveled
Frame Color
Power Requirements
Power Requirements
Power Requirements
Power Requirements

Scale: 1/8" = 1" (1:8) AP







SIGN CONSTRUCTION

Backer - 9" x 3 1/2"

1/8" thick Non-Glare Plex, subsurface painted C7.

Mounted to wall with 1/16" FT/SA.

Header - 9" x 2"
.098" thick clear plex, with C8 laminate (horiz. grain) attached with 468MP. Mounted to Backer with perimiter 4970 Tessa Tape.

Text 1 - 3/4" Helvetica Bold & 1/4" Braille 1/32" Rowmark Applique Lettering in C10 with 1/32" Grade II Stainless Steel Bead Braille

Name Plate - 9" x 1 1/2"
1/8" thick Non-Glare Plex, subsurface applied copy & painted C6.
Mounted to Backer with Tessa Tape.

Text 2 - Helvetica Regular - 1/2" Subsurface silkscreened copy C1O.

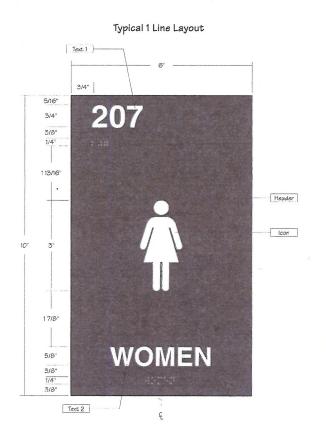
GMB - Glass Mounted Backer - 3 1/2" x 9" 220-114 Clear Enamel Recpetive Yinyl painted C7 Mount on back side of glass.

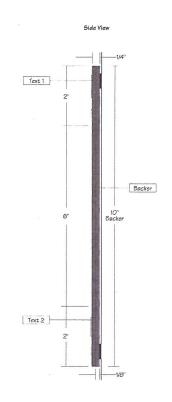
rroau	at Cada
370	ict Code
Sign '	
1.3 ON	•
Types	tyle tica Regular & Bold
ILLIAC	uca Rogulai a Dola
Сору	Color
	lack (311-401) or Black Ini
Grant	hic Code
RAL/S	hic Code 35
	go XU/C XU/I
Plaqu	e Color
	W Passive SW7064 = MP3
	V Iron Ore SW7069 = MP3 ilson Art Satin Alum. #62
LOW	1907 Art Satir Alum. #62
Plaqu	e Mounting
FT/S/	
Insta	llation Wall Material
Fram	e Mountina
Fram	e Mounting
Corne	er.
Corne	er.
Corne Ra	er.
Corne Ra	er dius Beveled
Corne Ra	er dius Beveled
Corne Ra Fram	or dius [Beveled e Color
Corne Ra Fram	er dius Beveled
Corne Ra Fram	or dius [Beveled e Color
Corne Ra Fram	or dius Boveled e Color
Corne Ra Fram	or dius Boveled e Color

Oswego State University

PAGE 9 OF 30

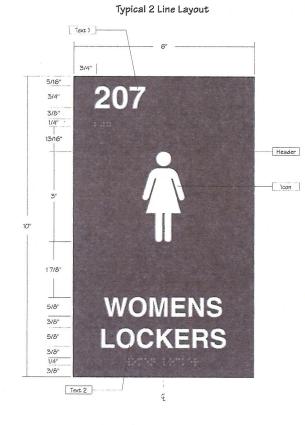
Scale: 1/2" = 1" (1:2)





OPTION:

TOILET ROOM



SIGN CONSTRUCTION

Backer - 6" x 10"

1/8" thick Clear Plex

Mounted to wall with 1/16" F1/5A.

Header - 6" x 10"

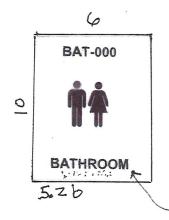
1/8" thick Non-Glare plex, subsurface painted C7.

Mounted to Backer with white Tessa tape.

Text 1 - Helvetica Bold, 3/4" & 1/4" Braille 1/32" Rowmark Applique Lettering in C2 with 1/32" Grade II Clear Bead Braille.

Text 2 - Helvetica Bold, 5/8" & 1/4" Braille 1/32" Rowmark Applique Lettering in C2 with 1/32" Grade II Clear Bead Braille.

Icon - 3" & 2 1/2" Subsurface silkscreened icon C2.



207 (1:8)

207

MEN MEN

Alternate Layouts:



5.2C

Oswego State University Interior Signage Product Code Sign Type 5.2 Typestyle Helvetica Bold Copy Color C2 Bright White (311-204) or White Ink Graphic Code Logo XIU/C U/I U/I VC C7 SW Iron Ore SW7069 = MP36465 Plaque Mounting FT/SA Installation Wall Material Frame Mounting Corner Radius Beveled Frame Color

> Scals: 1/2" = 1" (1:2) AP

Power Requirements

PAGE 23 OF 30

SECTION 10 44 16 - FIRE EXTINGUISHERS, CABINETS AND ACCESSORIES

PART 1 GENERAL

1.01 **DESCRIPTION**

A. Scope of Work:

The work of this section includes all labor, materials, plant, tools, equipment, trucking, insurance and all related and incidental items to furnish and install all work of this section as shown by the drawings and specification.

- Fire extinguishers.
- Accessories.

B. References:

NFPA 10 - Portable Fire Extinguishers.

1.02 **QUALITY ASSURANCE**

- A. Follow all requirements, recommendations and appendices to comply with the following publications, codes, standards, and listings/approvals:
 - National Fire Protection Association (NFPA):
 - a. NFPA 10-1984: Standard for Portable Fire Extinguishers.
 - b. NFPA 241-1986: Standard for Safeguarding Construction, Alteration and Demolition Operations.
 - 2. Factory Mutual Engineering Corporation (FM):
 - a. 1987 Approval Guide with Supplements.
 - 3. Underwriter's Laboratories, Inc. (UL): 1987 Fire Protection Equipment Directory with Supplement.
 - 4. 2015 New York State Uniform Fire Prevention and Building Code.
 - 5. OSHA Rules and Regulations.
 - 6. All requirements of insurance and other authorities having jurisdiction.
- B. Extinguishers and components shall be UL listed for fire protection service and bear the marking of the respective agency.

1.03 **SUBMITTALS**

- A. Provide product data on specified products describing physical and performance characteristics and sizes.
- B. Submit manufacturer's installation instructions, including physical dimensions, operational features, color and finish, anchorage details, rough-in measurements, locations and details.

1.04 OPERATION AND MAINTENANCE DATA

A. Include test, refill or recharge schedules, procedures, and recertification requirements for fire extinguishers.

1.05 **ENVIRONMENTAL REQUIREMENTS**

A. Do not install extinguishers, when ambient temperatures may cause freezing.

PART 2 PRODUCTS

2.01 **GENERAL**

- A. Mixing of manufacturer's or models of the same or similar component will not be acceptable.
- B. Units shall include extinguishing agents.

2.02 HAND PORTABLE FIRE EXTINGUISHERS

- A. General: Stored pressure type; all metal control valve with discharge hose, red enameled or polished stainless steel finish. Minimum ratings and agent capacities are noted.
- B. Dry Chemical Type DOT Steel Cylinder:
 - 1. Multi-purpose ammonium phosphate based agent:
 - a. 5 lb. capacity 2A:10B:C rating.
- D. Manufacturers:
 - 1. Amerex
 - 2. Ansul
 - 3. General
 - 4. Walter Kidde
 - 5. Or approved equal

2.03 FIRE-RATED CABINETS

- A. Hollow door construction; semi-concealed continuous hinge; full panel door with double strength clear tempered glass; 20-gauge steel tub with baked white enamel; baked white prime coat steel door, frame and exposed trim; handle with cam action or friction latch. Semi-Recessed, fire-rated type with space for the appropriate extinguishers as indicated.
 - 1. Basis of Design: Croker-Standard, Model FR 1610.
- B. Makes:
 - 1. Croker-Standard
 - 2. Potter-Roemer
 - 3. W.D. Allen Company
 - 4. Or approved equal

2.04 **BRACKET**

A. An appropriate bracket as recommended by the extinguisher manufacturer for surface mounted extinguisher.

PART 3 EXECUTION

3.01 **GENERAL**

- A. The installation shall be performed in a workmanlike manner as determined by the Owner's Representative and in accordance with NFPA 10 and manufacturer's printed installed instructions.
- B. Provide identification decals, hangers and accessories.

3.02 **SCHEDULE**

A. Locations indicated on drawings.

END OF SECTION 10 44 16 - FIRE EXTINGUISHERS, CABINETS AND ACCESSORIES

SECTION 108000 - TOILET ACCESSORIES

PART 1 GENERAL

1.01 **DESCRIPTION**

A. Scope of Work:

The scope of work of this section includes all labor, materials, plant, tools, equipment, trucking and all related items to furnish and install all work of this section as shown on the drawings and specifications.

- 1. Toilet and Washroom Accessories
- 2. Attachment Hardware
- Mirrors
- 4. Grab Bars
- Shower Curtain Rods
- Towel/Robe Hooks
- 7. Shelves
- 8. Toilet Tissue Dispenser (Provided by Owner, Installed by GC)
- 9. Sanitary Napkin Disposal (Provided by Owner, Installed by GC)
- 10. Shower Curtains and Hooks

1.02 **QUALITY ASSURANCE**

A. Basis of Design: American Specialties, Inc., Equal products by other manufacturer's will be considered.

1.03 **RELATED WORK UNDER OTHER SECTIONS**

A. Where accessories are mounted on partitions, the installer shall do all drilling for the mounting of the required accessories.

1.04 **SUBMITTALS**

- A. Product Data: Submit product information containing catalog cuts, illustrations and descriptions of each of the specified accessories. Marked up copies of manufacturer's catalogs will not be accepted.
- B. Warranty: Manufacturer's Warranty for each toilet accessory Item.

PART 2 PRODUCTS

2.01 MIRRORS

A. Basis of Design: Inter-Lok Stainless Steel Angle Framed Mirror with Shelf - Model No 0600 (Tempered Glass), (18" Wide x 36" High) as manufactured by American Specialties, Inc., 441 Saw Mill River Road, Yonkers, New York 10701-4913.

2.02 GRAB BARS

A. Basis of Design: 1-1/2" Diameter Grab Bars with Flanges for Concealed Mounting shall be Series 3800 of American Specialties, Inc., 441 Saw Mill River Road, Yonkers, New York 10701- 4913. All grab bars shall have non-slip surface (peened). Provide solid wood blocking (fire treated lumber in rated walls) in thickness necessary so that screws used to fasten seat frame to the wall embed 3" minimum. Secure grab bars to blocking with 5/16" diameter x 3" long stainless steel round head sheet metal screws.

- 1. At Water Closets (all three configurations required):
 - a. Configuration Type 01-P: 36", Behind Water Closet
 - b. Configuration Type 01-P: 42", Side of Water Closet
 - c. Configuration Type 01-P: 18", Side Wall at Water Closet (Vertical)
- 2. At Transfer Type Accessible Showers (both configurations required):
 - a. Configuration Type 60-P: 18" x 30"
 - b. Configuration Type 01-P: 18" Control Wall (Vertical)
- 3. At Alternate Roll-In Type Accessible Showers (both configurations required):
 - a. Configuration Type 01-P: 48" Back Wall
 - b. Configuration Type 01-P: 18" Control Wall

Note: At all Grab Bar screw hole attachments, provide Latasil Sealant (or equal) to prevent water infiltration.

Silicone Sealant: Mildew resistant, acid curing sealant. Type S, Grade NS, Class 25, low modulus neutral curing silicone sealant, complying with ASTM C 920, (LATICRETE LATASIL) (or equal).

2.03 **SHOWER CURTAIN RODS**

A. Basis of Design: Shower Curtain Rod with Concealed Mounting Flanges shall be Model No 1204-SIZE AS REQUIRED PER INDIVIDUAL SHOWER UNIT as fabricated by American Specialties, Inc., 441 Saw Mill River Road, Yonkers, New York 10701-4913

Note: Rod height locations may vary slightly. Set rod so that the curtain will be 1/4" to 3/8" max. from the floor finish.

2.04 SHOWER CURTAIN

A. Basis of Design: Accessible Environments, Inc. - Model KACX Heavy Duty Weighted Shower Curtain, Commercial Grade, Phone: (800) 643-5906 https://www.accessinc.com/

Description: Vintex SoffTICK 50099-10.5, flame retardant, hypo-allergenic, stainless steel grommets spaced every 6" at top of curtain, porcelain weights sewn into the bottom hem. Color: White

Notes:

1. All Shower curtains to be 6" larger than the actual opening into the shower stall. Verify sizes of the various shower stall openings prior to issuing Submittals or ordering.

2. See shower rod height note in 2.03 above.

2.05 SHOWER CURTAIN HOOKS

A. Basis of Design: Bradley – Model 9540, Shower Curtain Hook with Rollers (Bradex)

Description: Stainless steel wire with snap fasteners, brass rollers with nickel plating (5

rollers per hook), to be compatible with 1-14" dia. shower curtain rod

2.05 **ROBE HOOK**

A. Basis of Design: Robe Hook: Single Robe Hook - Model No. 7340-S as manufactured by American Specialties, Inc. 441 Saw Mill River Road Yonkers, New York 10701-4913. (Install one Hook on back of each bathroom door.)

2.07 **SOAP DISPENSER (SD)**

A. Supplied by Owner, Installed by General Contractor. Coordinate delivery with Owner. (Install one per bathroom.)

2.08 TOILET TISSUE DISPENSER

A. Supplied by Owner, Installed by General Contractor. Coordinate delivery with Owner. (Install one per bathroom.)

2.09 **HAND DRYER**

- A. Basis of Design: ThinAir Hand Dryer by Excel Dryer Inc. Model TA-SB. Cover: Stainless steel with brushed number 4 finish. Surface Mounted
 - a. High Efficiency Surface Mounted ADA Compliant Hand Dryer: ThinAir; high speed, energy efficient, rapid drying, automatic sensor, surface mounted, ADA Compliant, adjustable speed and sound control, adjustable heat control, electric hand dryer; entire dryer internally grounded. Warranty 5 year limited.
 - b. Nominal Size: 8-29/32 inches (226 mm) wide by 13-11/16 inches (348 mm) high by 4 inches (102 mm) deep. Install at ADA Mounting Height Requirements.
 - c. Power Source: 208 277 Volts, 3.6 4.0 Amps, 50/60 Hz, 735 950 Watts.
 - d. Accessories: Brushed Stainless Steel Anti-Microbial Wall Guards: Plastic Microban Anti-microbial Wall Guards 31-3/4 inches (806 mm) by 15-3/4 inches (400 mm) by 1/16- inch (1.5 mm) deep with 1/2-inch (13 mm) radius corners with double sided construction grade 3M adhesive tape on the mounting side. (2 per set). Guards provided by Excel Dryer Inc.

2.10 SHOWER SEAT – TRANSFER TYPE SHOWERS

A. Basis of Design: American Specialties - Rectangular Phenolic Fold-Up Shower Seat Model No. 8203-33. Frame 18-8 type 304 stainless steel. Seat frame and support legs shall be 1" diameter and 1-1/4" square x 18 gauge with 3/16" mounting flanges and 16 gauge guide bracket/arm support. All exposed surfaces shall have satin finish. Seat shall be 5/16" thick phenolic with white color top & bottom surfaces and shall have black edges. Structural assembly shall be of welded construction and all exposed edges and corners

shall be radiused and/or deburred. Support arm shall fold up with when in retracted position to provide low profile against wall. No extra fittings shall be required to retain seat in storage position. Guide bracket shall control seat lowering into operating position. Unit shall satisfy 2010 Accessibility Standards and ANSI A117.1 when mounted properly. Provide floor to ceiling 2x6 solid wood framing (fire treated lumber in rated walls) in thickness necessary so that screws used to fasten seat frame to the wall embed 3" minimum. Secure seat frame to wood framing with 1/4" diameter x 3" long stainless steel round head sheet metal screws. Refer to manufacturer's installation instructions.

2.11 SHOWER SEAT – ALTERNATE ROLL-IN TYPE SHOWERS

A. Basis of Design: American Specialties - Rectangular Phenolic Fold-Up Shower Seat Model No. 8203. Frame 18-8 type 304 stainless steel. Seat frame and support legs shall be 1" diameter and 1-1/4" square x 18 gauge with 3/16" mounting flanges and 16 gauge guide bracket/arm support. All exposed surfaces shall have satin finish. Seat shall be 5/16" thick phenolic with white color top & bottom surfaces and shall have black edges. Structural assembly shall be of welded construction and all exposed edges and corners shall be radiused and/or deburred. Support arm shall fold up with when in retracted position to provide low profile against wall. No extra fittings shall be required to retain seat in storage position. Guide bracket shall control seat lowering into operating position. Unit shall satisfy 2010 Accessibility Standards and ANSI A117.1 when mounted properly. Provide floor to ceiling 2x6 solid wood framing (fire treated lumber in rated walls) in thickness necessary so that screws used to fasten seat frame to the wall embed 3" minimum. Secure seat frame to wood framing with 1/4" diameter x 3" long stainless steel round head sheet metal screws. Refer to manufacturer's installation instructions.

2.12 BARRIER FREE COLLAPSIBLE WATER DAM

A. Basis of Design: KR Specialties, Model #66CWR Water Retainer Dam, White with Model #EX1615 Finished Square Corner End caps (pair required), White. Continuous water retainer strips are secured to top of saddle with a continuous peel and stick tape on back and a continuous bead of silicone adhesive caulking (clear) along both edges of the retainer strip where it interfaces with saddle. Wipe caulk smooth and let cure before use. Set both faces of end caps in silicone adhesive caulking (clear). Wipe surfaces clean with rubbing alcohol. Follow manufacturer's installation instructions closely.

2.13 **MISCELLANEOUS**

- A. Fasteners, Screws and Bolts: Stainless Steel type, tamperproof where noted on drawings.
- B. Expansion Shields: Fiber, lead or rubber as recommended by accessory manufacturer for component and substrate.
- C. Provide fire treated wood support blocking in all rated partitions that will receive surface mounted accessories / equipment.

PART 3 EXECUTION

3.01 **INSTALLATION**

A. All items plumb, level and true to line, rigidly anchored as recommended by manufacturer.

PAGE -1-

FIRE SUPPRESSION REQUIREMENTS - 210010 SUNY OSWEGO

BASIC FIRE SUPPRESSION REQUIREMENTS SECTION 210010

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

All drawings and general provisions of Contract, including all General and Α. Supplementary Conditions, Division 1 Specification Sections, and Instructions to Bidders apply to this section and all other sections of Division 21.

1.2 SCOPE OF WORK

- A. Include in bid all labor, materials, tools, plant, transportation, equipment, insurance, temporary protection, permits, taxes and all necessary items required to provide complete and operational systems shown and described.
- B. References to codes and Standards called for in the Contract Documents mean the latest edition, amendment and revisions to the codes and standards in effect on the date of these Contract Documents.
- C. Minimum composition requirements and/or installation methods for the following materials and work are included in this section:
 - 1. Miscellaneous Supports.
 - 2. Access Doors and Panels.
 - 3. Fire Stopping.
 - 4. Cutting and Patching.
- D. Contract shall include, but not be limited to:
 - 1. Fire Protection.

1.3 REGULATIONS AND CODE COMPLIANCE

- Α. All work and materials shall conform to and be installed, inspected and tested in accordance with the governing rules and regulations of federal, state and local governmental agencies.
- B. The following is a list of codes and standards that will apply to this project:
 - 1. Building Code of New York State, 2015.
 - 2. Existing Building Code of New York State, 2015.
 - 3. Energy Conservation Construction Code of New York State, 2015.

- 4. Plumbing Code of New York State, 2015.
- 5. Fire Code of New York State, 2015.
- 6. DASNY specification section 078400.
- 7. New York State Department of Labor Rules and Regulations.
- 8. New York State Department of Health.
- 9. Federal Occupational Safety and Health Administration OSHA.
- 10. National Life Safety Code, NFPA 101.
- 11. National Electrical Code, NFPA 70.
- 12. Local Codes and Ordinances for the City of Oswego.
- 13. NEMA Standards.
- 14. Underwriters Laboratory (UL).
- 15. Factory Mutual and/or Owner's Insurance Carrier.
- 16. New York Board of Fire Underwriters.
- 17. Combustion Toxicity Amendment to the New York State Uniform Fire Prevention and Building Code.
- 18. National Fire Protection Association (NFPA) All chapters.
- 19. Authority Having Jurisdiction DASNY.

1.4 LICENSING & PERMITS

- A. The Contractor shall hold a license to perform the work as issued by the City of Oswego.
- B. Apply for and obtain all required permits and inspections, include costs for all fees and charges within bid.
- C. Refer to General Conditions of the Contract for additional requirements.

1.5 GLOSSARY

ACI	American Concrete Institute
ADA	Americans with Disabilities Act
AGA	American Gas Association
AGCA	Associated General Contractors of America,

FIRE PROTECTION - DIV. 21
BASIC

FIRE SUPPRESSION REQUIREMENTS - 210010

SUNY OSWEGO PAGE -3-

Inc. AIA American Institute of Architects

AISC American Institute of Steel Construction

AMCA Air Moving and Conditioning

Association ANSI American National Standards

Institute

ARI Air-Conditioning and Refrigeration Institute

ASHRAE American Society of Heating, Refrigeration and Air-

Conditioning Engineers

ASME American Society of Mechanical
Engineers ASPE American Society of Plumbing
Engineers ASTM American Society for Testing
Materials AWSC American Welding Society Code
AWWA American Water Works Association
EIA Electronic Industries Association

FCC Federal Communications

Commission FM Factory Mutual Insurance

Company

IEEE Institute of Electrical and Electronics

Engineers IRI Industrial Risk Insurers

ISO International Standards Organization

NEC National Electrical Code

NEMA National Electrical Manufacturers'
Association NESC National Electrical Safety Code
NFPA National Fire Protection Association

NYBFU New York Board of Fire

Underwriters

NYS/DEC New York State Department of Environmental Conservation NYS/UFBC New York State Uniform Fire Prevention and Building Code

OSHA Occupational Safety and Health Administration

SBI Steel Boiler Institute

SMACNA Sheet Metal and Air Conditioning Contractors

National Association

TIA Telecommunications Industry Association

UFPO Underground Facilities Protective Organization UL Underwriter's Laboratories, Inc.

1.6 DEFINITIONS

Approved / Approval Written permission to use a material or system.

As Called For Materials, equipment including the

execution specified/shown in the contract

documents.

Code Requirements Minimum requirements.

Concealed Work installed in pipe and duct shafts, chases or recesses,

inside walls, above ceilings, in slabs or below grade.

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Design Equipment Refer to the article, BASIS OF DESIGN.

Design Make Refer to the article, BASIS OF DESIGN.

Equal or Equivalent Equally acceptable as determined by

Owner's

Representative.

Exposed Work not identified as concealed.

Final Acceptance Owner acceptance of the project from Contractor upon

certification by Owner's Representative.

Furnish Supply and deliver to installation location.

Furnished by Others Receive delivery at job site or where called for and install.

Inspection Visual observations by Owner's site Representative.

Install Mount and connect equipment and associated materials

ready for use.

Labeled Refers to classification by a standards agency.

Make Refer to the article, BASIS OF DESIGN.

Or Approved Equal Approved equal or equivalent as determined by Owner's

Representative.

Owner's representative The Prime Professional

Prime Professional Architect or Engineer having a contract directly with the

Owner for professional services.

Provide Furnish, install and connect ready for use.

Relocate Disassemble, disconnect, and transport equipment to new

locations, then clean, test, and install ready for use.

Replace Remove and provide new item.

Review A general contractual conformance check of

specified products.

Roughing Pipe, duct, conduit, equipment layout and installation.

Satisfactory As specified in contract documents.

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Site Representative Construction Manager or Owner's Inspector at the work

site.

Refer to General Conditions of the Contract for additional definitions.

1.7 BASIS OF DESIGN

- A. The contract documents are prepared on basis of one manufacturer as "design equipment," even though other manufacturers' names are listed as acceptable makes. If the Contractor elects to use one of the listed makes other than "design equipment," submit detailed drawings, indicating proposed installation of equipment.
- B. The Contractor shall make all necessary field measurements and investigations to assure that the equipment and assemblies will meet contract requirements.
 - Show maintenance clearances, service removal space required, and other pertinent revisions to the design arrangement. Make required changes in work of all other trades, at no increase in any contract. Provide larger motors, electrical feeders, circuit breakers, equipment, additional control devices, valves, fittings and other miscellaneous equipment required for proper operation and assume responsibility for the proper location of roughing and connections by other trades.
- C. Remove and replace door frames, access doors, walls ceilings or floors required to install other than design make equipment. If revised arrangement submittal is rejected, revise and resubmit specified "design equipment" item which conforms to contract documents.

1.8 INTENT OF DRAWINGS

A. The drawings are diagrammatic, unless detailed dimensioned drawings are included. Drawings show approximate locations of equipment, and fixtures. Exact locations are subject to the approval of the Owner's Representative.

1.9 ELECTRONIC CAD DRAWING FILES

- A. The Engineer may provide the Contractor with Cad files for this project with the understanding that these Cad files shall be used for reference purposes only, and not as shop drawings or as-built documents. It is the Contractors' responsibility to provide detailed, coordinated shop drawings and documentation prior to installation. The purpose of the Contractors' coordination shop drawings is to account for all trades and field conditions and identify any conflicts that shall be resolved prior to installation.
- B. Any additional cost for changes due to conflicts as a result of the Contractors' failure to provide properly coordinated documents will be the responsibility of the Contractors and not of the Engineer.

1.10 QUALITY ASSURANCE

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- A. Manufacturers of equipment shall be firms regularly and currently engaged in the production of equipment and accessories provided. The design and size of each item of equipment provided for this project needs to have been in satisfactory and efficient operation on at least three (3) installations for not less than three (3) years.
- B. Suppliers of equipment must have factory trained and authorized personnel for the service of all equipment provided.
- C. Apply and install materials, equipment, and specialties in accordance with manufacturer's written instructions. Conflicts between the manufacturer's instructions and the contract documents shall be referred to the Owner's Representative for resolution.
- D. The contractor shall engage the services of a qualified installer for the installation and application of joint sealers, firestopping, cutting and patching.
- E. All work shall be done in a neat and workmanlike manner. All methods of construction, details of workmanship, that is not specifically described or indicated in the contract documents, shall be subject to the control and approval of the Owner's Representative. Equipment and materials shall be of the quality and manufacture indicated. The equipment specified is based upon the acceptable manufacturers listed. Where "approved equal" is stated, equipment shall be equivalent in every way to that of the equipment specified and subject to approval.

PART 2 - PRODUCTS

2.1 EQUIPMENT AND MATERIAL MINIMUM REQUIREMENTS

- A. Provide Materials That Meet the Following Minimum Requirements:
 - 1. Materials shall have a flame spread rating of 25 or less and a smoke developed rating of 50 or less, in accordance with NFPA 255.
 - 2. All equipment and material for which there is a listing service shall bear a UL label.
 - 3. Potable water systems and equipment shall be built according to AWWA Standards.
 - 4. Electrical equipment and systems shall meet UL Standards and requirements of the N.E.C. This listing requirement applies to the entire assembly. Any modifications to equipment to suit the intent of the specifications shall be performed in accordance with these requirements.
 - 5. All materials, unless otherwise specified, shall be new and be the

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- standard products of the manufacturer. Used equipment or damaged material will be rejected.
- 6. The listing of a manufacturer as "acceptable" does not indicate acceptance of a standard or catalogued item of equipment. All equipment and systems must conform to the Specifications.

2.2 SUBSTITUTIONS

- A. The Materials, products and equipment described in the Bidding Documents establish a standard of required quality, functions, dimensions and appearance that must be met by any proposed substitution.
- B. Proposed substitutions must be submitted in writing to the Architect and Engineer a minimum of ten (10) days prior to the date for receipt of Bids. Each request shall include the name of the proposed material equipment being substituted, cut sheets, installation drawings, performance and test data, warranties and location of three (3) similar installations with reference names of owner or Facility personnel responsible for maintaining equipment. At that time the equipment will be evaluated and, if determined to be acceptable, an Addendum will be issued to all bidders.
- C. Requests for substitution shall be made only by a Bidder. Requests for substitution from sales representatives, vendors or suppliers are unacceptable and will not be considered.

2.3 FACTORY-ASSEMBLED PRODUCTS

- A. Provide maximum standardization of components to reduce spare part requirements.
- B. Manufacturers of equipment assemblies which include components made by others shall assume complete responsibility for final assembled unit.
 - 1. All components of an assembled unit need not be products of same manufacturer.
 - 2. Constituent parts which are alike shall be product of a single manufacturer.
 - 3. Components shall be compatible with each other and with the total assembly for intended service.
 - Contractor shall guarantee performance of assemblies of components, and shall repair or replace elements of the assemblies as required to deliver specified performance of the complete assembly.

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- C. Components of equipment shall bear manufacturer's name or trademark, model number and serial number on a name plate securely affixed in a conspicuous place, or cast integral with, stamped or otherwise permanently marked upon the components of the equipment.
- D. Major items of equipment which serve the same function must be the same make and model. Exception will be permitted if performance requirements cannot be met.

2.4 COMPATIBILITY OF RELATED EQUIPMENT

A. Equipment and materials installed shall be compatible in all respects with other items being furnished and with existing items so that a complete and fully operational system will result.

2.5 SPECIAL TOOLS

A. If any part of equipment requires a special tool for assembly, adjustment or maintenance thereof and such tool is not readily available on commercial tool market, it shall be furnished by the Contractor.

2.6 LIFTING ATTACHMENTS

A. Provide equipment with suitable lifting attachments to enable equipment to be lifted in its normal position. Lifting attachments shall withstand any handling conditions that might be encountered without bending or distortion of shape, such as rapid lowering and braking of load.

2.7 MISCELLANEOUS SUPPORTS

- A. Metal bars, plates, tubing, etc. shall conform ASTM standards:
 - 1. Steel plates, shapes, bars, and grating ASTM A 36
 - 2. Cold-Formed Steel Tubing ASTM A 500
 - 3. Hot Rolled Steel Tubing ASTM A 501
 - 4. Steel Pipe ASTM A 53, Schedule 40, welded
- B. Metal Fasteners shall be Zinc-coated, type, grade and class as required.

2.8 ACCESS DOORS AND PANELS

- A. Steel access doors and Frames shall be factory fabricated and assembled units complete with attachment devices and fasteners ready for installation. Joints and seams shall be continuously welded steel, with welds ground smooth and flush.
- B. Construction:
 - 1. Frames:

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- a. 16-gage steel with 1-inch wide exposed perimeter flange and adjustable masonry anchors for units installed in masonry, pre- cast, cast in place concrete, ceramic tile
- b. 16-gage steel, perforated flanges with bead for gypsum or plaster wall board.
- c. 16-gage steel with galvanized expanded metal lath and exposed casing bead, welded to perimeter of frame for full bed plaster applications.

Access Doors:

- a. Provide 14-gage sheet steel flush panel doors with concealed continuous piano hinge factory installed, primed and painted, set to open 175 degrees.
- b. Provide fire rated, insulated flush panel doors, with continuous piano hinge and self-closing mechanism rated for 1-½ hour "B" labeled, in fire rated partitions.
- 3. Provide flush, screwdriver operated cam locks on all access doors.

2.9 CONCRETE BASES

A. Provide concrete bases for all floor mounted equipment. Provide 3,000 lb. concrete, chamfer edges, trowel finish, and securely bond to floor by roughening slab and coating with cement grout. Bases shall be 2-inches high unless otherwise indicated, shape and size to accommodate equipment. Set anchor bolts in sleeves before pouring and after anchoring and leveling, fill equipment bases with grout.

2.10 FIRE-STOPPING

A. Refer to section 078400 – "Fire-stopping" for requirements.

PART 3 - EXECUTION

3.1 SHOP DRAWINGS/PRODUCT DATA/SAMPLES

- A. Submit Shop Drawings on all items of equipment and materials to be furnished and installed. Submission of Shop Drawings and samples shall be accompanied by a transmittal letter, stating name of project and contractor, number of drawings, titles, and other pertinent data called for in individual sections.
- B. Shop Drawings shall be dated and contain the following information. Incomplete submittals will not be accepted.

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- 1. Number each submittal.
- 2. Name of project.
- 3. Name of prime professional.
- 4. Name of prime contractor.
- 5. Description or names of equipment, materials and items. Complete identification of locations at which materials or equipment are to be installed.
- C. All products specified in an individual Division 21 section shall be submitted at the same time.
- D. Indicate deviations from contract requirements on the Letter of Transmittal.
- E. Corrections or comments made on the Shop Drawings during the review do not relieve Contractor from compliance with requirements of the drawings and specifications. The Contractor is responsible for confirming and correcting all quantities; checking electrical characteristics and dimensions; selecting fabrication processes and techniques of construction; coordinating his work with that of all other trades; and performing his work in a safe and satisfactory manner.

3.2 COORDINATION DRAWINGS

- A. Before construction work commences, Contractors for all trades shall submit Coordination Drawings in the form of reproducible transparencies drawn at not less than 3/8" = 1'-0" scale. Coordination Drawings are required throughout all areas for all trades. These drawings shall identify and show resolutions of trade conflicts. Mechanical Equipment Rooms shall be drawn early in the Coordination Drawing process, simultaneous with all other congested areas. Prepare Coordination Drawings as follows:
 - The Division 23 Contractor will prepare the base plan Coordination Drawings showing all ductwork and all pertinent piping and equipment. These drawings may be sepias of the required ductwork Shop Drawings. The drawings shall be coordinated with cable tray, lighting fixtures, sprinklers, air diffusers, other ceiling mounted items, ceiling heights, structural work, maintenance clearances, electric code clearance, reflected ceiling plans, and other contract requirements. Reposition proposed locations of work after coordination drawing review by the Construction Manager and the Architect. Provide adjustments to exact size, location and offsets of ducts, pipes, conduit, etc., to achieve reasonable appearance objectives. Provide these adjustments as part of Base Bid Contracts. Minor revisions need not be redrawn.
 - 2. The Division 23 Contractor will provide sepia transparencies and/or

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prints and submit the base plan to all major trades' Contractors.

- 3. The Division 21 Contractor will draft location of piping and equipment on the base plan, indicating areas of conflict and suggested resolutions.
- 4. Do not install equipment, equipment foundations or piping until Coordination drawings have been approved.

3.3 PROTECTION OF PERSONS AND PROPERTY

A. Contractor shall assume responsibility for Construction Safety at all times and provide, as part of contract: scaffolding, shielding, dust/fume protection, mechanical/electrical protection, special grounding, safety railings, barriers, and other safety feature required to provide safe conditions for all workmen and site visitors.

3.4 EXISTING SYSTEMS AND CONDITIONS

- A. Prior to beginning work inspect and test all existing systems that will be affected by the work in this contract. Provide a report to the Owner indicating any problems or defects found. If no problems or system defects are submitted, the contractor shall be responsible for correcting problems found at the completion of the project that are determined to be caused by the work of this contract.
- B. Inspect the entire work area for defects in the existing construction such as scratches, holes etc. Submit a complete list and photographs of existing damage, to the Owner prior to beginning work. If existing damage is not documented the contractor shall repair all damage to like new condition, that is determined to have been caused by the work in this contract.
- C. The Owner's representative shall determine if the contractor has damaged existing systems or construction and approve the repairs.

3.5 ASBESTOS RECOGNITION AND PRECAUTIONS

- A. The contractor shall be responsible for coordination of all required removal work, coring, cutting and patching with the Owner's asbestos management plan. Prior to performing such work identify areas containing asbestos. Notify the Owner so that they may make arrangements for abatement and/or containment prior to work proceeding. The contractor shall be responsible for cleaning all areas where asbestos is released due to the failure to coordinate with the asbestos management plan. Refer to Division 1 sections for further requirements.
- B. The disturbance or dislocation of asbestos-containing materials causes asbestos fibers to be released into the building's atmosphere, thereby creating a health hazard to workmen and building occupants. Consistent with Industrial Code Rule 56 and the content of recognized asbestos-control work, the Contractor shall apprise all of his workers, supervisory personnel, subcontractors, Owner and Consultants who will be at the job site of the seriousness of the hazard and of proper safeguards and work procedures which must be followed, as described in

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New York State Department of Labor Industrial Code Rule 56. Fluorescent Bulbs which are not specifically designated as not containing Mercury shall be disposed of in compliance with the requirements of the New York State Department of Environmental Conservation and all applicable Federal Laws.

C. Refer to Division 2 Sections for further requirements.

3.6 REMOVALS

- A. Where existing equipment removals are called for, submit complete list to Owner's Representative. All items that Owner wishes to retain that do not contain asbestos or PCB Material shall be delivered to location directed by Owner. Items that Owner does not wish to retain shall be removed from site and legally disposed of. Removal and disposal of material containing asbestos and/or PCB's shall be in accordance with Federal. State and Local law requirements. Where equipment is called for to be relocated. Contractor shall carefully remove, clean and recondition, then reinstall. Remove all abandoned piping, wiring, equipment, lighting, ductwork, tubing, supports, fixtures, etc. Visit each room, crawl spaces and roofs to determine total Scope of Work. The disturbance or dislocation of asbestos-containing materials causes asbestos fibers to be released into the building's atmosphere, thereby creating a health hazard to workmen and building occupants. Consistent with Industrial Code Rule 56 and the content of recognized asbestos-control work, the Contractor shall apprise all of his workers, supervisory personnel, subcontractors, Owner and Consultants who will be at the job site of the seriousness of the hazard and of proper safeguards and work procedures which must be followed, as described in New York State Department of Labor Industrial Code Rule 56.
- B. Completely remove all piping, conduit, controls, and other devices associated with the equipment not to be reused in the new work. This includes all pipe, valves, fittings, insulation, conduit, junction boxes, panels, and all hangers, including the top connection and any fastenings to building structural systems. Patch, paint and seal all openings, after removals and other penetrations in roof, walls, floors, in an approved manner and in accordance with plans and specifications where specifically covered. Structural integrity of the building system shall be maintained. Reference shall also be made to the architectural, structural, mechanical, site, and electrical drawings and specifications for additional facilities to be demolished or handled.
- C. Ream pipes after cutting and clean before installing. Cap or plug equipment and pipe openings during construction.

3.7 FREEZING AND WATER DAMAGE

- A. Take all necessary precautions with equipment, systems and building to prevent damage due to freezing and/or water damage. Repair or replace, at no change in contract, any such damage to equipment, systems and building. Perform first seasons winterizing in presence of Owner's operating staff.
- 3.8 ROUGH-IN

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- A. Due to small scale of Drawings, it is not possible to indicate all offsets, fittings, changes in elevation, etc. Verify final locations for rough-ins with field measurements and with the equipment being connected. Verify exact location and elevations at work site prior to any rough in work. **DO NOT SCALE PLANS**. If field conditions, details, changes in equipment or shop drawing information require a significant change to the original documents, contact the Owner's representative for approval before proceeding.
- B. All equipment locations shall be coordinated with other trades to eliminate interference with required clearances for equipment maintenance and inspections.
 - 1. Coordinate work with other trades and determine exact routing of all duct, pipe, conduit, etc., before fabrication and installation. Coordinate with Architectural Drawings. Verify with Owner's Representative exact location and mounting height of all equipment in finished areas, such as thermostats, fixtures, communication and electrical devices, including panels. Coordinate all work with the architectural reflected ceiling plans and/or existing Architecture. Mechanical and electrical drawings show design arrangement only for Diffusers, grilles, registers, air terminals, lighting fixtures, sprinklers, speakers and other items. Do not rough-in contract work without reflected ceiling location plans.
 - Before roughing for equipment furnished by Owner or in other contracts, obtain from Architect and other Contractors, approved roughing drawings giving exact location for each piece of equipment. Do not "rough in" services without final layout drawings approved for construction. Cooperate with other trades to insure proper location and size of

connections to insure proper functioning of all systems and equipment. Obtain written authorization from the Owner's representative or other contractor for any "rough ins" that, due to project schedule, are required before approved coordination drawings are available. Any work installed without written authorization or approved coordination drawings, causing a conflict will be relocated by this contractor at no expense to the Owner.

- 3. For equipment and connections provided in this contract, prepare roughing drawings as follows:
 - a. Existing equipment being relocated: Measure the existing equipment and prepare drawings for installation in new location.
 - b. New equipment: Obtain equipment roughing drawings and dimensions then prepare rough-in drawings.
- 4. Where more than one trade is involved in an area, space or chase, all shall cooperate and install their own work to utilize the space equally

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between them in proportion to their individual requirements. In general, ductwork shall be given preference except where grading of piping becomes a problem, followed by piping then electrical wiring. If, after installation of any equipment, piping, ducts, conduit, and boxes, it is determined that ample maintenance and passage space has not been provided, rearrange work and/or furnish other equipment as required for ample maintenance space. Any changes in the size or location of the material or equipment supplied, which may be necessary in order to meet field conditions or in order to avoid conflicts between trades, shall be brought to the immediate attention of the Owner's Representative and approval received before such alterations are made.

C. Provide easy, safe, and code mandated clearances at controllers, motor starters, valve access, and other equipment requiring maintenance and operation. Contractor shall relocate existing work in the way of new construction. VISIT SITE BEFORE BIDDING TO DETERMINE SCOPE OF WORK. Provide new materials, including new piping and insulation for relocated work.

3.9 CUTTING AND PATCHING

A. Each trade shall include their required cutting and patching work. Refer to "General Conditions of the Contract for Construction," for additional requirements. Cut and drill from both sides of walls and/or floors to eliminate splaying. Patch, cut or abandoned holes left by removals of equipment or piping. Patch adjacent existing work disturbed by installation of new work including insulation, walls and wall covering, ceiling and floor covering, other finished surfaces. Patch openings and damaged areas equal to existing surface finish. Cut openings in prefabricated construction units in accordance with manufacturer's instructions

3.10 CONCEALMENT

A. Conceal all contract work above ceilings and in walls, below slabs, and elsewhere throughout building. If concealment is impossible or impractical, notify Owner's Representative before starting that part of the work and install only after his review. In areas with no ceilings, install only after Owner's Representative reviews and comments on arrangement and appearance.

3.11 ACCESS DOORS AND PANELS

- A. Install access doors, sized to permit complete access for any concealed and/or inaccessible junction boxes, control and monitoring devices, valves and other plumbing and/or fire protection equipment requiring access for maintenance or operation.
- B. Set frames accurately in position and securely attach to supports with face panels plumb and level in relation to adjacent finish surfaces.
- C. Adjust hardware and panels after installation for proper operation.

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3.12 CHASES

A. In New Construction:

- Certain chases, recesses, openings, shafts, and wall pockets will be provided as part of "General Building Construction Plans and Specifications." Mechanical and Electrical Trades work shall provide all other openings required for their contract work.
- 2. Check Architectural and Structural Design and Shop Drawings to verify correct size and location for all openings, recesses and chases in general building construction work.
- 3. Assume responsibility for correct and final location and size of such openings.
- 4. Rectify improperly sized, improperly located or omitted chases or openings due to faulty or late information or failure to check final location.
- 5. Provide 18 gauge galvanized sleeves and inserts. Extend all sleeves 2" above finished floor. Set sleeves and inserts in place ahead of new construction, securely fastened during concrete pouring. Correct, by drilling, omitted or improperly located sleeves. Assume responsibility for all work and equipment damaged during course of drilling. Firestop all unused sleeves.
- 6. Provide angle iron frame where openings are required for contract work, unless provided by General Construction Contractor.

B. In Existing Buildings:

- 1. Drill holes for floor and/or roof slab openings.
- 2. Multiple pipes smaller than 1" properly spaced and supported may pass through one 6" or smaller diameter opening.
- Seal voids in fire rated assemblies with a fire-stopping seal system to maintain the fire resistance of the assembly. Provide 18 gauge galvanized sleeves at fire rated assemblies. Extend sleeves 2" above floors.
- 4. In wall openings, drill or cut holes to suit. Provide 18 gauge galvanized sleeves at shafts and fire rated assemblies. Provide fire-stopping seal between sleeves and wall in drywall construction. Provide fire-stopping similar to that for floor openings.

3.13 FIRE-STOPPING

A. Fire-stopping for Openings Through Fire and Smoke Rated Wall, Ceiling and Floor Assemblies:

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1. Refer to DASNY section 078400 – "Fire-stopping".

3.14 SUPPORTS

A. Provide required supports, beams, angles, hangers, rods, bases, braces, and other items to properly support contract work. Supports shall meet the approval of the Owner's Representative. Modify studs, add studs, add framing, or otherwise reinforce studs in metal stud walls and partitions as required to suit contract work. If necessary, in stud walls, provide special supports from floor to structure above. For Precast Panels/Planks and Metal Decks, support fire protection work as determined by manufacturer and Owner's Representative. Provide heavy gauge steel mounting plates for mounting contract work. Mounting plates shall span two or more studs. Size, gauge, and strength of mounting plates shall be sufficient for equipment size, weight, and desired rigidity.

3.15 PAINTING

- A. This Contract Includes the following:
 - 1. Painting for all cut and patch work performed as part of Division 21 contract.
 - 2. Painting required for touch-up of surfaces damaged due to the installation of division 21 work.
 - 3. Painting as required to repair finish of equipment furnished.
 - 4. Painting as called for on Division 21 Drawings.

3.16 ADDITIONAL ENGINEERING SERVICES

- A. In the event that the Consultant is required to provide additional engineering services as a result of substitution of equivalent materials or equipment by the Contractor, or changes by the Contractor in dimension, weight, power requirements, etc., of the equipment and accessories furnished, or if the Consultant is required to examine and evaluate any changes proposed by the Contractor for the convenience of the Contractor, then the Consultant's expenses in connection with such additional services shall be paid by the Contractor and may be deducted from any moneys owed to the Contractor.
- B. In the event that the Consultant is required to provide additional engineering services as a result of Contractor's errors, omissions or failure to conform to the requirements of the Contract Documents, or if the Consultant is required to examine and evaluate any changes proposed by the Contractor solely for the convenience of the Contractor, then the Consultant's expense in connection with such additional services shall be paid by the Contractor and may be deducted from any moneys owed to the Contractor.

3.17 ALL TRADES TEMPORARY HEAT

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A. Refer to the Standard General Conditions of the Contract for Construction and Supplemental General Conditions.

3.18 TEMPORARY FACILITIES

- A. Refer to the standard General Conditions of the contract for Construction and Supplemental General Conditions.
 - 1. Continuity of operation of existing facilities will require temporary installation or relocation of equipment and piping.
 - 2. All piping and equipment shall be properly supported, sloped to drain, operate without excessive stress, and shall be insulated where injury can occur to personnel by contact with operating facilities.
 - 3. Temporary facilities and piping shall be completely removed and any openings in structures sealed. Provide necessary blind flanges and caps to seal open piping remaining pressurized.

3.19 CLEANING

- A. It is the Contractor's responsibility to keep clean all equipment, piping and sprinklers provided under this contract for the duration of the project. Each trade shall keep the premises free from an accumulation of waste material or rubbish caused by his operations. The facilities require an environment of extreme cleanliness, and it is the Contractor's responsibility to adhere to the strict regulations regarding procedures on the existing premises. After all tests are made and installations completed satisfactorily:
 - 1. Thoroughly clean entire installation, both exposed surfaces and interiors.
 - 2. Remove all debris caused by work.
 - 3. Remove tools, surplus, materials, when work is finally accepted.

3.20 FIRE SUPPRESSION EQUIPMENT CONNECTIONS

- A. Provide complete fire suppression connections to all fire suppression equipment. Provide control connections to equipment where indicated on the drawings. Provide valves on piping ahead of each piece of equipment.
- B. Provide all piping, trim, accessories and connections as required for proper equipment operation of equipment provided by this contract.
- C. Refer to Manufacturer's drawings/specifications for requirements of special equipment. Verify connection requirements before bidding and confirm prior to roughing.

3.21 FIRE SUPPRESSION INSTALLATIONS

A. All installations shall comply with the following requirements:

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- Coordinate fire suppression systems, equipment, and materials installation with other building components. Be responsible for any changes in openings and locations necessitated by the equipment installed.
- The Architect shall control the placement of all wall and ceiling mounted fire suppression equipment and devices in all rooms with the exception of mechanical and electrical equipment rooms. When drawing details are not available, consult with the Architects representative for actual location.
- 3. Verify all dimensions with field measurements.
- 4. Arrange for all chases, slots and openings in other building components, which are not indicated on drawings, to allow for fire suppression installations.
- 5. Coordinate the installation of required supporting devices and sleeves to be set in poured-in-place concrete and other structural components, as they are constructed.
- 6. Coordinate ordering and installation of all equipment with long lead times or having a major impact on work by other trades so as not to delay the job or impact the construction schedule. Pay close attention to equipment that must be installed prior to building enclosure.
- 7. Where mounting heights are not detailed or dimensioned, install systems, materials and equipment to provide the maximum headroom possible.
- 8. Install systems, materials and equipment to conform with approved submittal data to greatest extent possible. Conform to arrangements indicated by the Contract Documents, recognizing that portions of the work are shown only in diagrammatic form. Where coordination requirements conflict with individual system requirements, refer the conflict to the Engineer or the Owner's Representative.
- 9. Store Materials on dry base, at least 6-inches above-ground or floor. Store so as not to interfere with other work or obstruct access to buildings or facilities. Provide waterproof/windproof covering. Remove and provide special storage for items subject to moisture damage. Protect against theft or damage from any cause. Replace items stolen or damaged, at no cost to Owner.
- 10. Set all equipment to accurate line and grade, level all equipment and align all equipment components.
- 11. All tolerances in alignment and leveling, and the quality of workmanship for each stage of work shall be as required by the manufacturer and subject to approval by the Owner's representative.

- 12. All finished equipment surfaces damaged during construction shall be brought to "as new" condition by touch up or repainting. Any rust shall be removed and primed prior to repainting.
- 13. Provide all scaffolding, rigging, hoisting and services necessary for erection and delivery of equipment and apparatus furnished into the premises. These items shall be removed from premises when no longer required.
- 14. No fire suppression equipment shall be hidden or covered up prior to inspection by the Owner's representative. All work that is determined to be unsatisfactory shall be corrected immediately.
- 15. All fire suppression work shall be installed level and plumb, parallel and perpendicular to other building systems and components.
- 16. Conceal all contract work above ceilings and in walls, and elsewhere throughout building. If concealment is impossible or impractical, notify Owner's Representative before starting that part of the work and install only after his approval. In areas with no ceilings, install only after Owner's Representative reviews and comments on arrangement and appearance.
- 17. Install access panels or doors where units are concealed behind finished surfaces.

3.22 ELECTRICAL EQUIPMENT CONNECTIONS

- A. Provide complete power connections to all electrical equipment. Provide control connections to equipment where indicated on the drawings. Provide disconnect ahead of each piece of equipment. Ground all equipment in accordance with the latest edition of the NEC.
- B. Provide all power wiring, electric equipment, switches, and connections as required for proper equipment operation of Owner-Furnished Equipment and Equipment furnished by other contracts. Provide control wiring where noted in the documents.
- C. Refer to Manufacturer's drawings/specifications for requirements of special equipment. Verify connection requirements before bidding and confirm prior to roughing.

3.23 CONTINUITY OF SERVICES

A. The building will be in use during construction operations. Maintain existing systems in operation within all rooms of building at all times. Refer to "General Conditions of the Contract for Construction" for temporary facilities for additional contract requirements. Schedules for various phases of contract work shall be coordinated with all other trades and with Owner's Representative. Provide, as part of contract, temporary fire protection and electrical connections and

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relocation as required to accomplish the above. Obtain approval in writing as to date, time, and location for shut-down of existing facilities or services.

3.24 START UP AND OWNER INSTRUCTIONS

- A. Before acceptance of the work, furnish necessary skilled labor to operate all systems by seasons. Instruct the Owner's designated personnel on the proper operation and maintenance of systems and equipment. Obtain written acknowledgment from person instructed prior to acceptance repeat the instructions if asked to do so. Contractor is fully responsible for systems until acceptance, even though operated by Owner's personnel, unless otherwise agreed in writing. Provide operating, maintenance and starting precautions and procedures to be followed by the Owner for operating systems and equipment. Mount the instruction in clear plastic holder on or adjacent to the equipment.
- B. Where supervision by a manufacturer is called for, provide manufacturer's certified technician or engineer to supervise the startup, testing and adjustment of the equipment or system. Where two or more manufacturers are involved (i.e. variable frequency drive and air handling unit) both manufacturers shall be present at start up. The manufacturer shall provide a written report detailing the testing and start-up including problems that occurred and their method of resolution.
- C. Refer to Division 1 Sections for additional requirements.

3.25 OPERATION AND MAINTENANCE MANUALS

A. Provide Operation and Maintenance Manuals. Include three copies each of approved Shop Drawings, wiring diagrams, piping diagrams, spare parts lists, asbuilt drawings and manufacturer's instructions. Include typewritten instructions, describing equipment, starting/operating procedures, emergency operating instructions, seasonal changeover, freeze protection, precautions and recommended maintenance procedures. Include name, address, and telephone number of supplier manufacturer Representative and service agency for all major equipment items. Bind above items in three ring binders with name of project and DASNY project number on the cover. Deliver to Owner's Representative before request for acceptance.

3.26 RECORD DOCUMENTS

- A. Prepare and provide record documents in accordance with Division 1 Sections. In addition to those requirements, provide the following:
 - 1. Utilities below floors, slabs and grade: During construction, maintain accurate records of all final locations and inverts for all services inside and outside of the buildings, beneath grade and below floors.
 - Take dimensions from a given fixed bench mark, such as the corner of a building, and neatly and clearly indicate same on reproducible prints.

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FIRE SUPPRESSION REQUIREMENTS - 210010 PAGE -21-

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- 3. Provide Record Drawings for all Contract Work.
- 4. Pay all costs of reproducible tracings and make all required corrections.
- 5. Incorporate all field changes, change orders and other modifications into the final Record Drawings.
- B. Provide record documents electronically on a compact disk (CD), DVD or flash drive to the Owner. Also provide one (1) set of prints to the Owner.

END OF SECTION

FIRE SUPPRESS

FIRE SUPPRESSION PIPING SYSTEMS AND ACCESSORIES - 210502 PAGE -1-

FIRE SUPPRESSION PIPING SYSTEMS AND ACCESSORIES SECTION 210502

PART 1 - GENERAL

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1.1 WORK INCLUDED

A. Provide labor, materials, equipment and services to perform operations required for the complete installation and related Work as required in Contract Documents.

1.2 SUBMITTALS

- A. Schedule of all pipe materials, fittings and connections to be utilized on this Project.
 - 1. Include manufacturer's product data for all pipe and fittings.

PART 2 - PRODUCTS

2.1 GENERAL

A. All piping and fittings used on this Project shall be new and marked with manufacturer's name; and shall comply with all applicable ASTM and ANSI Standards.

2.2 STEEL PIPING AND FITTINGS

- A. Pipe: ASTM A53, or ASTM A106 seamless, Schedule 40 weight black finish, threaded for screwed (threaded) connections or cut-grooved for grooved mechanical connections. Pipe used for all fire protection systems shall be UL listed and FM approved.
- B. Fittings: Same material and pressure class as adjoining pipe.
 - 1. Screwed fittings: Malleable iron, black finish; fittings shall be UL listed and FM approved for all fire protection systems.
- C. Joints and Connections:
 - 1. Screwed (threaded) connections:
 - a. Unions: ASA malleable cast iron, bronze to iron seat, 300 lb. wwp; for sizes 2 inch and smaller.\
 - b. Flanges: Cast iron companion type; for sizes 2-1/2 inch and larger.

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FIRE SUPPRESSION PIPING SYSTEMS AND ACCESSORIES - 210502 PAGE -2-

- 2. Grooved mechanical connections:
 - a. Couplings of malleable iron (ASTM A470) or ductile iron (ASTM A536) with painted coating, designed for cut-grooved piping.
 - b. Gaskets suitable for water service -30°F to 230°F of EPDM, Grade E for wet and antifreeze systems. Silicon gaskets required for plain end connections for dry systems.
 - c. Bolts and nuts: Heat treated, hex head carbon steel (ASTM A183) cadmium plated or zinc electroplated.
 - d. Fittings: Elbows, tees, laterals, reducers, adapters, mechanical tees and reducing couplings as required. Same construction as couplings.
 - e. Design equipment: Victaulic, rigid system, Style 07 couplings.
 - f. Fire protection systems: UL listed and FM approved; 250 psi wwp; use a gasket and coupling system similar to Victaulic Flush-Seal for all dry type systems; follow all terms of listings/approvals.
 - g. Makes: Victaulic, Grinnell, Tyco or Viking.
- D. Gauge and Instrument Connections: Nipples and plugs for adapting gauges and instruments to piping system shall be IPS brass.

2.3 THINWALL STEEL PIPE

- A. Pipe: ASTM A53, or A135.
 - 1. 2-1/2 inch through 4-inch pipe: Wall thickness of 0.120 inch.
 - 2. 6-inch pipe: Wall thickness of 0.134 inch.
 - 3. 8-inch pipe: Wall thickness of 0.188 inch.
- B. Black or galvanized finish as called for ends chamfered for welding or roll grooved for mechanical grooved connection.

2.4 COPPER PIPE AND BRAZED FITTINGS

- A. Pipe: Hard temper, ASTM B88, Type L.
- B. Tees, Elbows and Reducers: Cast bronze ASTM B62, ANSI B16.22.
- C. Unions And Flanges:

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FIRE SUPPRESSION PIPING SYSTEMS AND ACCESSORIES - 210502 PAGE -3-

1. 2-inch and smaller: Unions, brazed type, cast bronze, ground joint, 150 lb. swp.

D. Brazing Materials:

Make: Silver brazing alloy, Airco Sil-45 or "Sil-Fos".

2.5 SPECIAL FITTINGS

- A. Copper To Steel Piping:
 - 1. Dielectric pipe fittings.

2.6 DIELECTRIC PIPE FITTINGS

- A. Tensile strength, ASME B16.8, union 250 psi, or flange design, 175 psi, pressure rating, at 210 Deg. F, threaded or solder joint, constructed to prevent gasket from squeezing into internal opening.
- B. Make: Watts, Epco or Capitol Manufacturing.

2.7 HANGERS, INSERTS AND SUPPORTS

- A. Hangers, Inserts and Clamps: Anvil, Carpenter & Patterson, Central Iron, B-Line, Grinnell, Tolco.
 - 1. Hangers and building attachments shall be UL listed and FM approved for fire suppression systems.

B. Hangers:

- 1. Adjustable, wrought malleable iron or steel. Epoxy or PVC coated where in contact with copper piping. Cadmium plated or galvanized for exterior.
- 2. Adjustable ring type where piping is installed directly on hanger for piping 3-inch and smaller.
- 3. Adjustable steel clevis type for piping 4-inch and larger.
- 4. Nuts and rods with electroplated zinc or cadmium (0.005 inch minimum) finish.

C. Spacing Schedule:

	Steel	Copper	Rod Size
1" & smaller	8'	6'	3/8"
1-1/4" to 2"	10'	8'	3/8"
2-1/2" to 4"	12'	10'	5/8"

FIRE SUPPRESSION PIPING SYSTEMS AND ACCESSORIES - 210502 SUNY OSWEGO PAGE -4-

Pipe Size	12'	10'	3/4"

- D. Piping systems with material not listed above, supported and protected in accordance with manufacturer's recommendations and NFPA 13 and 14.
- E. Inserts: Design equipment Grinnell Fig. #281, maximum loading 1000 lbs., galvanized finish and Fig. #285, maximum loading 400 lbs.
 - 1. Make: Globestrut, Grinnell, Unistrut, B-Line.

F. Supports:

- 1. For weights under 1000 lbs.: "Drill-In" inserts equal to Phillips "Red Head" "U" Channel, beam clamps or other structurally reviewed support. The factor of safety shall be at least four. Follow manufacturer's recommendations.
- 2. For weights above 1000 lbs.: Drill through floor slabs and provide flat flush plate welded to top of rod or provide additional "Drill-In" inserts and hangers to reduce load per hanger below 1000 lbs.

2.8 PIPING ACCESSORIES

- A. Escutcheon Plates: Steel or cast iron polished chrome, split hinge type with setscrew, high plates where required for extended sleeves. Chrome plated in finished areas.
- B. Cleanout plugs, bushings, nipples, required for instruments and gauges to be brass.
- C. Pipe Roll Stand: Cast iron roll stand.
 - 1. Make: Advanced Thermal Systems, Carpenter and Patterson, ITT Grinnell, Pipe Shields.

2.9 SLEEVES

A. Standard Type:

- 1. Schedule 40 black steel pipe sleeves, two pipe sizes larger than the pipe, for structural surfaces.
- Sheet metal sleeves for nonstructural surfaces and existing construction.
 Sheet metal sleeves shall be 18-gauge minimum and braced to prevent collapsing.

2.10 SEALING ELEMENTS

A. Waterproof Type:

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FIRE SUPPRESSION PIPING SYSTEMS AND ACCESSORIES - 210502 PAGE -5-

- 1. Exterior walls, below grade, and above basement or vault floor: Synthetic rubber material with zinc plated bolts.
- 2. Make: "Link-Seal" Series 200, 300 or 400, Pyropac.

2.11 FIRESTOP SYSTEM FOR OPENINGS THROUGH FIRE RATED WALL FLOOR ASSEMBLIES

A. Refer to DASNY section 078400 – "Fire-stopping".

2.12 STACK SLEEVE

- A. With flashing clamp and threaded pipe sleeve extension.
- B. Design Equipment: Jay R. Smith Series 1720 with caulking recess and flashing clamp.
- C. Make: Jay R. Smith, Zurn or Wade.

2.13 PIPING MATERIALS AND SCHEDULE

A. See Exhibit "A", "Schedule of Piping Materials" at end of this Section for Fire Protection piping.

PART 3 - EXECUTION

3.1 EQUIPMENT AND SYSTEMS

- A. Install equipment and systems in accordance with provisions of each applicable Section of these Specifications and Local, State Codes and Regulations having jurisdiction.
- B. Accurately establish grade and elevation of piping before setting sleeves.
- C. Install piping without springing or forcing (except where specifically called for), making proper allowance for expansion and anchoring.
- D. Arrange piping at equipment with necessary offsets, unions, flanges, and valves, to allow for easy part removal and maintenance.
- E. Offset piping and change elevation as required, to coordinate with other Work. Avoid contact with other mechanical or electrical systems. Make changes in direction and branch connections with fittings.
- F. Provide adequate means of draining risers, circuits and systems.
- G. Conceal piping unless otherwise called for. Do not install valves, unions and

FIRE SUPPRESSION PIPING SYSTEMS AND ACCESSORIES - 210502 SUNY OSWEGO PAGE -6-

flanges in inaccessible locations.

- H. Ream pipes after cutting and clean before installing. Cap or plug equipment and pipe openings during construction.
- I. Install piping parallel with lines of building, properly spaced to provide clearance for insulation.
- J. Materials within a system and between systems shall be consistent. If this is not possible, install dielectric fittings.

3.2 HANGERS, INSERTS AND SUPPORTS

- A. Piping shall not be supported by wires, band iron, chains, or from other piping, or by vertical expansion bolts. Support piping with individual hangers from inserts, welded supports, or beam clamps of proper configuration and loading design requirements for each location; replace if not suitable. Follow manufacturer's safe loading recommendations. Suspend with rods of sufficient length for swing, using proper diameter rod for pipe size.
- B. Provide additional structural steel members, having one coat rustproof paint, where required for proper support.
- C. Hangers, when attached to joists, shall only be placed at the top or bottom chord panel point. Only concentric type hangers are permissible; "C" type not permitted on joists.
- D. Provide riser clamps for each riser at each floor.

3.3 PIPE CONNECTIONS

- A. Brazed Connections: Make joints with silver brazing alloy in accordance with manufacturer's instructions. Remove working parts of valves before applying heat.
- B. Threaded Connections: Clean out tapering threads, made up with pipe dope; screwed until tight connection. Pipe dope must be specifically selected for each application.
- C. Dielectric Pipe Fittings: Protect fittings from excessive heat.
- D. Grooved Mechanical Joints: Lubricate and install gasket and couplings. Follow Manufacturer's recommendations.

3.4 SLEEVES

A. Provide for pipes passing through floors, walls or ceilings. Extend 1/8 inch above finished floor in finished areas. In above grade Mechanical Rooms and other areas with floor drains use steel pipe sleeves 2-inches above floor.

FUNNELLE HALL BATHROOM RENOVATIONS

FIRE SUPPRESSION PIPING SYSTEMS AND ACCESSORIES - 210502 **PAGE -7-**

- B. Use steel pipe sleeves in bearing wall, structural slabs, beams and other structural surfaces, and where called for.
- C. Sleeves shall be as small as practical, consistent with insulation, so as to preserve fire rating.
- D. Fill abandoned sleeves with concrete.

3.5 SLEEVE PACKING

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- A. Seal Void Space At Sleeves As Follows:
 - Interior locations: Firmly pack with fiberglass and caulk. 1.
 - 2. Exterior walls above grade: Use link-seal.
 - 3. Exterior walls below grade and basement floors: Use link-seal.
 - 4. Cored holes: Use sealing element.
 - 5. Fire rated, partitions and floor slabs: Use fire rated sealing elements, materials and methods.
 - 6. Waterproofed floors: Use waterproof sealing element, device or compound.

3.6 **ESCUTCHEON PLATES**

A. Provide polished chrome escutcheon plates for all exposed piping passing through floors, walls or ceilings in all rooms, except in Attics.

3.7 **TESTS**

Refer to other Division 21 sections for testing of Fire Suppression Systems. Α.

PIPE LINE SIZING 3.8

Α. Pipe sizes called for are to be maintained. Pipe size changes made only as reviewed by Owner's Representative. Where discrepancy in size occurs, the larger size shall be provided.

EXHIBIT "A" - PIPING MATERIALS (FIRE PROTECTION) (Notes at end of Exhibit "A")

Service	Pipe Materials	Fittings	Connections
Sprinkler (Wet)		Malleable or ductile or cast iron	Threaded

FIRE SUPPRESSION PIPING SYSTEMS AND ACCESSORIES - 210502 SUNY OSWEGO PAGE -8-

Schedule 40, black steel 2-1/2" and larger		Roll grooved mechanical type couplings
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NOTES FOR EXHIBIT A:

- NOTE 1: Rigid type grooved couplings required at valves.
- NOTE 2: Schedule 40 means wall thickness per ASTM Schedule 40.
- NOTE 3: Use adjustable swivel ring hangers for 1-inch through 4-inch sprinkler piping. Use adjustable clevis hangers for fire main loop piping.
- NOTE 4: Paint all interior above grade fire suppression piping with 1 coat Brunning Silathane Rust Inhibiting Primer #52014 and 2 coats Brunning Silethane (urethane) Semi-Gloss Enamel #52100 series. Color shall be "Red". Apply paint in accordance with manufacturer's directions. Remove spilled and splattered paint from all surfaces. Piping shall include standpipes, risers, mains and branch piping.

END OF SECTION

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GENERAL DUTY VALVES FOR WATER BASED FIRE SUPPRESSION PIPING **SECTION 210523**

PART 1 - GENERAL

1.1 WORK INCLUDED

Α. Provide labor, materials, equipment and services to perform operations required for the complete installation and related Work as required in the Contract Documents.

1.2 **SUBMITTALS**

- A. All valves and accessories listed under "Part 2 – Products" of this Section.
 - 1. Submit cut sheets, specifications and dimensioned drawings.

PART 2 - PRODUCTS

2.1 **VALVES**

- A. General: Valves shall have following requirements:
 - UL Listed and FM approved and labeled for intended fire protection 1. service. Sprinkler systems 175 psi wwp.
 - 2. Working pressure stamped or cast on bodies per MSS SP-25.
 - Stem packing serviceable without removing valve from line and shall be 3. free of asbestos.

В. Acceptable Manufacturers:

- 1. Gate Valves: Central, Kennedy, NIBCO, Milwaukee, Mueller, Stockham.
- 2. Butterfly/Ball Control Valves: Anvil, Central, Grinnell, Kennedy, NIBCO, Milwaukee, Stockham, Tyco, Victaulic.
- Check Valves: Central, Grinnell, Kennedy, NIBCO, Stockham. 3.
- 4. To establish a standard of quality and identify features, certain manufacturer's numbers are given in the following paragraphs.

C. Gate Valves:

1. 2-inch and smaller: Bronze body, threaded ends, Stockham #B-133.

GENERAL DUTY VALVES FOR WATER BASED FIRE SUPPRESSION PIPING - 210523 SUNY OSWEGO PAGE -2-

- 2. 2-1/2 inch and larger: OS&Y pattern. IBBT, flanged ends, 200 psi wwp, resilient wedge disc, Stockham #G-610.
- D. Butterfly/Ball Control Valves with Provision Tamper Switch:
 - 1. General: Iron or bronze body.
 - 2. 2-inch and smaller: Nibco model # KT-505-W-8.
 - 3. 2-1/2 inch and larger: Grinnell model #770FP or Gruvlok.

E. Check Valves:

- 1. General: Swing type rubber faced.
- 2. 2-inch and smaller: Bronze body, threaded end, Grinnell model #3315.
- 3. 2-1/2 inch and larger: IBBM, flanged or grooved ends, Grinnell model #780FP.
- F. Trim, Drain and Test Valves: Ball, plug, angle or globe type, bronze body, threaded ends, UL listed.
- G. Valves For Gauges And Instruments:
 - 1. ¼-inch size: Brass bar stock for 1000 psi and 300 Deg. F; Trerice model #735 needle type valve.
- H. Hose Thread Drain Valves:
 - 1. Bronze body with 2-piece standard port ball valve. Female NPT x 3/4 inch hose end, brass cap and chain, 200 psi WOG.
 - 2. Make: Watts model #B-6000-CC.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General:

- 1. Provide valves of type called for and where required to service equipment and fixtures.
- 2. Inspect all valves after installation; make adjustments if required to ensure valve operates properly. Replace all damaged valves.
- 3. Provide valves at major building and system sections, and where shown

GENERAL DUTY VALVES FOR WATER BASED FIRE SUPPRESSION PIPING - 210523 SUNY OSWEGO PAGE -3-

on Contract Drawings.

- 4. Provide chain wheels, guides, and chain loops for valves, where called for.
- 5. Locate valves with stems at or above horizontal positions and swing check valves in horizontal position only.
- 6. Provide hose threaded drain valves at all system low points and as called for. Provide drain valves at all elevation changes. In addition to these requirements, provide where specifically indicated on the drawings.

END OF SECTION

IDENTIFICATION FOR FIRE SUPPRESSION PIPING AND EQUIPMENT - 210553 SUNY OSWEGO PAGE -1-

IDENTIFICATION FOR FIRE SUPPRESSION PIPING AND EQUIPMENT SECTION 210553

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Provide labor, materials, equipment and services as required for the complete installation designed in Contract Documents.

1.2 QUALIFICATIONS

A. All identification devices shall comply with ANSI A13.1 for lettering size, length of color field, colors, and viewing angles.

1.3 SUBMITTALS

- A. Submit product data for each identification material and device, and for all items specified under "Part 2 Products" of this Section.
- B. Submit valve schedule for all piping systems typewritten on 8 1/2 inch x 11 inch paper, indicating code number, location and valve function.
- C. Submit schedule of piping, equipment and valve identification for review before labeling.

1.4 ACCEPTABLE MANUFACTURERS

A. Allen Systems, Inc., W.H. Brady Co., Calpico, Craftmark Identification Systems or Seton Name Plate Corp.

PART 2 - PRODUCTS

2.1 GENERAL

A. Provide manufacturer's products of categories and types required for each application.

2.2 PIPING IDENTIFICATION

- A. Pipe Labels (Inside buildings):
 - 1. Piping/Insulation with outside diameter of 8-inches and less: Provide self-adhesive, vinyl press and peel type markers with directional flow arrows, pipe temperature -40 degrees F to 175 degrees F. UV resistance and legend printed four (4) times for 360 degree visibility.
 - 2. Make: Seton "Opti-Code" or approved equal.

IDENTIFICATION FOR FIRE SUPPRESSION PIPING AND EQUIPMENT - 210553 SUNY OSWEGO PAGE -2-

B. Pipe labels shall conform to the following identification table:

PIPE SERVICE <u>IDENTIFICATION / LABEL</u>

Fire Protection - Mains FIRE PROTECTION MAIN

(RED)

Fire Protection - Wet Standpipe WET STANDPIPE (RED)

Fire Protection - Wet Sprinkler WET SPRINKLER SYSTEM

(RED)

2.3 VALVE IDENTIFICATION

A. Valve Tags:

 Standard brass valve tags, 2" diameter with 1/2" high numerals. Identify all plumbing services with 1/4" letters above the valve number ("FP."). Attach to valves using brass "jack" chain and brass "S" hook. Make: Seton Style No. M4507 tags, Style No. 16182 chain and Style No. 16195, 6 and 7 No. hooks.

B. Valve Chart:

1. Provide valve chart for all valves provided as a part of this project.
Provide date on chart when printed. Frame and place under clear glass.
Hang in Mechanical Room or in a location as directed by the Owner.

2.4 SIGNS

- A. Engraved Stock Plastic: Scratch-resistant, non-static, high pressure laminate with contrasting inner core color.
 - 1. Finish and Color: As selected from manufacturer's standard colors and finishes, unless otherwise indicated.
 - 2. Exposed Engraved Inner Core: White, unless otherwise indicated.
 - 3. Thickness: 1/8 inch, unless otherwise indicated
- B. Engraved Process: Machine engraved letters, numbers, symbols, and other graphic devices to produce precisely formed copy indented to a uniform depth with sharply formed edges. Engrave copy through the exposed face ply to expose the core ply.
- C. Control, drain and test valves shall be provided with permanently marked identification signs of baked enamel substantial metal construction. The signs shall be permanently mounted on the piping or wall at the valve, or on the valve, but shall not be hung on the valve with wires or chains that permits easy

IDENTIFICATION FOR FIRE SUPPRESSION PIPING AND EQUIPMENT - 210553 SUNY OSWEGO PAGE -3-

removal of the sign.

- 1. The sign shall clearly indicate the valve's purpose and what portion of the structure it serves.
- 2. Provide signs at each alarm check to clearly indicate hydraulic calculation data.

PART 3 - EXECUTION

3.1 GENERAL

- A. Provide valve tags for all fire protection valves provided on project. Provide a valve tag chart for all valves provided on the project.
- B. Control, drain and sectional valves shall be provided with permanently marked identification signs. The signs shall be permanently mounted on the piping or wall at the valve, or on the valve, but shall not be hung on the valve with wires or chains which permits easy removal of sign.
- C. Provide piping identification with directional flow arrows for all piping on project.
 - 1. Provide labels on straight runs of piping at 12'-0" intervals, minimum.
 - 2. Provide labels adjacent to valves, flanges, branches and changes in direction.
 - 3. Provide labels where piping enters and leaves a partition, wall, floor or ceiling.

END OF SECTION

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ELECTRIC WIRING FOR FIRE SUPPRESSION SYSTEMS - 210901 PAGE -1-

ELECTRIC WIRING FOR FIRE SUPPRESSION SYSTEMS SECTION 210901

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Provide labor, materials, equipment and services to perform operations required for the complete installation and related Work as required in Contract Documents.
- B. Provide "control" wiring circuits for equipment and associated control devices. Control wiring includes 120 volt and lower wiring for control signals directing equipment operation.
- C. Provide certain "power" wiring as called for. Power wiring includes 120 volt and higher branch circuit wiring required for equipment operation.
- D. Assistance as required and coordination with Division 26, "Electric".

1.2 QUALIFICATIONS

- A. Wiring installed in compliance with NEC, local governing codes, and applicable requirements of Division 26 "Electric".
- B. Wiring installed only by qualified electricians.

1.3 COORDINATION

A. Provide complete wiring diagrams for equipment and systems. Deliver wiring diagrams to proper parties in time for roughing of conduit, equipment connections, and avoid delay in construction schedule. Wiring diagrams and roughing information to clearly indicate items to be mounted and/or wired as part of the work of Division 26 "Electric".

PART 2 - PRODUCTS

2.1 WIRING MATERIALS

A. Refer to Division 26 "Electric" for information regarding conduit, wire, insulation, wiring devices and methods.

PART 3 - EXECUTION

ELECTRIC WIRING FOR FIRE SUPPRESSION SYSTEMS - 210901 SUNY OSWEGO PAGE -2-

3.1 GENERAL

A. Check electrical wiring pertaining to equipment for completeness and correctness of connections. Correct any misapplied motor and/or motor starter, improper thermal overload device, or device which fails to function and resultant damage, whether due to incorrect connections or improper information on wiring diagrams.

3.2 WIRING FOR CONTROL SYSTEMS

- A. Provide control wiring for equipment.
- B. Wiring circuits shall be in conduit. Rigid type for wet locations and exposed to weather. EMT in dry, non-hazardous locations for concealed or exposed work. Provide 18 inch maximum length flexible, jacketed conduit at motors and devices subject to vibration. Conduit supported on 5 foot centers. Do not attach directly to hot surfaces, piping, or ductwork.
- C. Control wiring shall be in separate conduit from power wiring.
- D. Provide green grounding wire circuits from starter, and run ground wire through conduit to each remote auxiliary relay, pushbutton station, remote panel, or other device with potentials in excess of 50 volts contained within. Size ground wire per NEC.
- E. Furnish pushbutton stations, pilot lights, selector switches, auxiliary starter contacts, and other devices required for functions specified.

3.3 MISCELLANEOUS ELECTRIC WIRING

A. Provide power and control wiring between sections of equipment, between remote panels, and disconnect switches.

3.4 FIELD WIRING IN STARTERS, CONTROLLERS AND PANELS

- A. Wiring within starters, controllers, and control panels, shall be routed neatly in gutter space, away from moving and/or heat producing parts.
- B. Provide 30 ampere, 600 volt rated terminal blocks. Do not place more than two wire connections on pilot device or relay terminal. Where more than two circuit connections are required use terminal blocks.
- C. Provide nylon self-insulated, locking type spade lugs for all control wires.
- D. Cables and wires shall be neatly bundled and lashed with nylon cable straps.

3.5 HAZARDOUS LOCATIONS

- A. Provide installation in hazardous locations as follows:
 - Provide seal-offs for hazardous Class 1 locations according to NEC

ELECTRIC WIRING FOR FIRE SUPPRESSION SYSTEMS - 210901 SUNY OSWEGO PAGE -3-

Article 501 "Class 1 Locations".

2. Follow NEC requirements for special occupancies, wiring methods, sealing, fittings and other NEC rules and articles as applicable.

END OF SECTION

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WATER BASED FIRE SUPPRESSION SYSTEMS - 211000
PAGE -1-

WATER BASED FIRE SUPPRESSION SYSTEMS SECTION 211000

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Provide labor, materials, equipment and services to perform operations required for the complete installation and related Work as required in Contract Documents.

1.2 QUALITY ASSURANCE

- A. Follow all requirements, recommendations and appendices of the following publications, codes, standards, and listings:
 - 1. New York State Health Department: Cross Connection Control Manual.
 - 2. NFPA 24, National Fire Protection Association Standard for the Installation of Private Fire Service Mains and Their Appurtenances.

1.3 SUBMITTALS

- A. All items specified under "Part 2 Products" of this Section.
- B. Executed form NY DOH-1013 for each backflow prevention device provided on project. Provide original forms to the Engineer.

PART 2 - PRODUCTS

2.1 FIRE PROTECTION SYSTEMS PIPING

A. Refer to Section 210502, "Fire-Suppression Piping Systems and Accessories", for piping materials.

2.2 FIRE PROTECTION VALVES

A. Refer to Section 210523, "General Duty Valves for Water-Based Fire-Suppression Piping" for valves.

2.3 BACKFLOW PREVENTION DEVICES

- A. Double Check Valve (DCV) type: Fire Service
 - 1. Approved for use and listed as an acceptable device by the New York State Department of Health. Relief air shall not enter the same opening in the device as the relief water discharge.

WATER BASED FIRE SUPPRESSION SYSTEMS - 211000 PAGE -2-

- 2. Sizes 6-inch and larger: Stainless Steel housing and sleeve. All devices shall have stainless steel nuts and bolts and stainless-steel internal parts with flanges or unions on each side of device.
- 3. Four test cocks, strainer and isolation resilient wedge valves. Provide one test cock on the inlet side of the upstream valve.
- 4. Provide drain assembly from each device with funnel and full size indirect waste line to the nearest floor drain.
- 5. Make: 6-inch Watts #LF709-OSY

PART 3 - EXECUTION

3.1 GENERAL

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A. Installation shall conform to Article 1.2 of this section and shall be provided in a workmanlike manner as determined by the Owner's Representative and the Contract Specifications.

3.2 STERILIZATION

A. Provide sterilization of fire piping in accordance with all requirements of the New York State Health Department Guidelines.

3.3 TESTS AND FLUSHING

- A. Provide all necessary items to complete proper testing of all fire protection water piping. Isolate existing systems as required.
- B. Flush all fire protection piping to remove debris, sediment, dirt, rust, corrosion and other foreign material.
- C. Piping Supplying Fire Protection Water Only: Test at 200 psi hydrostatic pressure for two hours. All tests shall be witnessed by the Owner's designated representative or the Engineer.
- D. A successful air test is not acceptable as the final test; however, the Division 21 contractor shall provide interim air testing of steel piping only as construction progresses.
- E. Make all leaks tight. No caulking of leaks shall be permitted. Remove and replace all defective fittings, piping and connections.
- F. Pay all costs of tests. Perform all tests in a safe manner. Remove all discharged water resulting from testing procedures.
- G. Certify in writing that all required fire protection water tests have been conducted and successfully completed. Use Material and Test Certificates of NFPA 24

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format for fire protection piping systems. Submit all certifications to the Engineer and to the Owner's designated representative.

H. Test all backflow prevention devices provided on this project. Fill out test report Form DOH-1013 for each backflow prevention device and submit to the Engineer for review of installation and processing.

END OF SECTION

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FIRE STANDPIPE SYSTEMS SECTION 211200

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Provide labor, materials, equipment and services to perform operations required for the complete installation and related Work as required in Contract Documents.

1.2 RELATED WORK

- A. Section 210010 "Basic Fire Suppression Requirements".
- B. Section 210502 "Fire Suppression Piping Systems and Accessories".
- C. Section 210523 "General Duty Valves for Water Based Fire Suppression Systems".
- D. Section 211000 "Water Based Fire Suppression Systems".
- E. Section 211313 "Wet-Pipe Sprinkler Systems".
- F. Section 213113 "Electric Driven Centrifugal Fire Pumps".

1.3 QUALITY ASSURANCE

- A. Follow all requirements, recommendations and appendices to comply with the following latest editions of the publications, codes, standards, and listings/approvals:
 - 1. National Fire Protection Association (NFPA):
 - a. NFPA 14: Standard for the Installation of Standpipe and Hose Systems.
 - b. NFPA 24: Standard for the Installation of Private Fire Service Mains and Their Appurtenances.
 - c. NFPA 25: Standard for the Inspection, Testing and Maintenance of Water-Based Fire Protection Systems.
 - d. NFPA 241: Standard for Safeguarding Construction, Alteration and Demolition Operations.
 - e. NFPA 1961: Standard on Fire Hose.
 - 2. Factory Mutual Engineering Corporation (FM):

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- a. Approval Guide with Supplements.
- 3. Underwriters Laboratories, Inc. (UL): Fire Protection Equipment Directory with Supplement.
- 4. New York State Uniform Fire Prevention Code, 2010.
- 5. OSHA Rules and Regulations.
- 6. All requirements of the Owner's insurance company.
- 7. Local Authority Having Jurisdiction: DASNY.
- B. Equipment, devices, hangers, and components shall be UL listed and labeled for the intended fire protection service.
- C. Fire protection work shall be performed by an experienced firm regularly engaged in the installation of fire protection standpipe systems.
- D. The requirements of this Project's Contract Documents may meet or exceed the requirements of NFPA and other Codes and Standards listed by this Section. The Fire Protection Contractor shall comply with all requirements of the Project Documents in such cases. In situations where NFPA may allow several different methods, for sprinkler and fire protection related work and hydraulics, ultimately the method utilized for this project will be determined by these Contract Documents <u>and</u> the Project Engineer. Verify all such situations prior to the bid date.

1.4 SYSTEM DESCRIPTION

- A. The system shall be an automatic wet, Class 1 standpipe system.
 - 1. System shall be arranged:
 - a. With the supply valves open and water pressure maintained at all times.
- B. Water supply shall be through the existing 6-inch underground fire protection water main to the systems fire pump. Calculated water supply data at the municipal main indicates the following:
 - 1. 78 psi static.
 - 2. 41 psi residual with 662 gpm flowing.
 - 3. Date of flow test: February 2018.
- C. A Fire department connection shall be provided to allow the servicing fire department to augment the system's normal automatic water supply.

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- 1. The system shall be required to maintain the 100 psi minimum residual pressure requirements of NFPA 14.
- D. Water supply control valves shall be electrically supervised and mechanically locked for proper position. Water flow and supervisory circuits shall be in accordance with the requirements of electrical specifications. Electric connections to standpipe equipment shall be by the Division 26 Contractor. Furnish wiring diagrams for all equipment.
- E. Provide 3/16 in. x 1 in. cadmium plated carbon steel chains and master keyed all brass case hardened padlocks to lock water supply valves in the proper position.

1.5 SUBMITTALS

A. Product Data:

- 1. Submit manufacturer's catalog cut, specifications and installation instructions for each item or component of fire protection system. Clearly indicate pertinent information such as, but not limited to:
 - a. Manufacturer, model number.
 - b. Materials, size and type connection.
 - c. Pressure ratings of components.
 - d. FM approval/UL listing.

B. Drawings:

- 1. Submit complete NFPA 14 drawings, hydraulic calculations with cross reference to applicable drawings, water supply data and equipment schedule with ratings, controllers and all components for the system to the Engineer, Owner's designated representative, Insurance Underwriter and the Authority Having Jurisdiction (DASNY).
- All requirements of NFPA 14 shall be met on the submitted plans and hydraulic calculations. Drawings shall be coordinated with all other work and trades. The Contractor shall be responsible for securing a permit from THE Authority Having Jurisdiction (DASNY) prior to the installation of the system.
- 3. All pipe sizes shown on the bid documents shall be hydraulically calculated by the Contractor. The Contractor shall increase all pipe sizes as required to ensure proper system operation.
- C. Record Drawings: Submit record drawings, hydraulic calculations, test reports and NFPA Above and Below Ground Material and Test Certificates to the Owner's designated representative, Engineer, Insurance Underwriter and the

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Authority Having Jurisdiction (DASNY).

PART 2 - PRODUCTS

2.1 GENERAL

A. Mixing of manufacturers or models of the same or similar component will not be acceptable. All products to be listed for 250 psi minimum.

2.2 MAIN ALARM VALVE EQUIPMENT

- A. Alarm Check Valve: 6-inch vertical with alarm trim for variable pressure operation.
 - 1. Trim:
 - Main drain and valve.
 - b. Gauges.
 - c. Galvanized pipe and trim fittings.
 - 2. Flanged inlet with grooved or flanged outlet.
 - 3. Make: Gem Model #F2001, Reliable Model E, Viking Model #G-1 or approved equal.

2.3 ALARM EQUIPMENT

- A. Electric Pressure Switches: At main riser to indicate water-flow condition.
 - 1. Case: Drip proof.
 - 2. Service and range: As required for air or water service.
 - Adjustable differential.
 - 4. S.P.D.T. contacts.
 - 5. 24 VDC.
 - 6. Make: Autocall, Potter Electric, Reliable or approved equal.
- B. Electric Paddle Type Waterflow Indicators:
 - 1. Dual S.P.D.T. contacts.

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- 2. 24 VDC.
- 3. Make: Autocall WF-5, Potter Electric VSR-D or VSR-T, Reliable or approved equal.
- C. Electric Tamper Switches: Supervise valves controlling water supplies in the open/proper position. Integral with the valve or separate with provisions to actuate a supervisory alarm upon valve movement and upon removal of the device cover. With mounting brackets and hardware.
 - 1. 24 VDC, S.P.D.T. contacts.
 - 2. Make: Potter Electric Model OSYSU-A for OS&Y valves and Model PIVSU-A for post indicator and butterfly valves or approved equal.

2.4 GAUGES

- A. Accuracy: ANSI B40.1 Grade B, ±2% of span; 0 to 300 psi standard range.
 - 1. Case: Anodized aluminum, glass lens; copper alloy tube, tip and socket; brass movement.
 - 2. Connection: 1/4 in. NPT male bottom connection.

2.5 SYSTEM COMPONENT IDENTIFICATION

- A. Control, drain and sectional valves shall be provided with permanently marked identification signs of baked enamel substantial metal construction. The signs shall be permanently mounted on the piping or wall at the valve, or on the valve, but shall not be hung on the valve with wires or chains which permits easy removal of the sign.
 - 1. The sign shall clearly indicate the valve's purpose and what portion of the structure it serves.
- B. Provide additional signs as required such as for fire department use only; pressure exceeds 150 psi at this valve etc., and decals identifying contents of each cabinet assembly.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. The nature of the work requires coordination with other trades. Shop fabrication shall be done at the Contractor's risk. Relocation of piping and components to avoid obstructions may be necessary. Relocation, if required, shall be done at the Contractor's expense.
- B. The installation shall be performed in a workmanlike manner as determined by

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the Owner's Representative and in accordance with the Contract Documents, manufacturer's printed installation instructions, and submitted and Owner's Representative reviewed drawings.

- 1. Piping shall not pass directly over electric panel boards, switchboards, motor control centers, and similar electric and telephone equipment.
- 2. Piping shall be installed concealed above finish ceiling areas and in fire rated stair enclosures.
- 3. Install hose valves to provide a minimum 3-inch clearance around the entire threaded connection to facilitate hose connection.
- 4. Provide an accessible pressure gauge near the topmost outlet of each standpipe.
- 5. Exposed pipe shall be left clean for painting.
- C. A standpipe system shall be provided for use by the City of Oswego Fire Department at all times during construction. Follow all requirements of the City of Oswego Fire Department, OSHA, and Contract Documents.
 - 1. Provide 18 in. x 18 in., NFPA 178 style, reflective finish signs identifying duplex fire department connections during construction.
 - 2. Provide the system with temporary 1-1/2 in. listed lined hose reel or rack assemblies and water supply so not more than 100 ft. of hose covers all portions of any floor during construction.
 - 3. Notify the City of Oswego Fire Department in writing that the temporary standpipe is in service, the locations of fire department connections and 2-1/2 in. hose valves, and hose threads utilized. Obtain and deliver a copy of the fire department's written acknowledgement to the Owner's Representative.
- D. Coordinate and activate the system to operational status as soon as possible.
- 3.2 PIPING, VALVES, HANGERS, ETC.
 - A. Refer to other applicable Division 21 sections.
 - B. Run slightly off level to low points, provide drain valves arranged per Contract Documents.

3.3 TESTS

- A. General:
 - 1. Pipe installation shall be inspected by Owner's Representative prior to

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being covered by building construction.

- Give the Owner's Representative, advance notice of final tests. Perform tests in a safe manner. Provide written certification that tests have been successfully completed. Use NFPA Above and Below Ground Material and Test Certificate Forms.
- 3. Correct system leaks prior to final test. Do not utilize water additives, caulking, etc. to correct leaks. Provide all required appliances, equipment, instruments, devices and personnel. Make all leaks tight. No caulking of leaks shall be permitted. Remove and replace all defective fittings, piping, hose valves and connections.
- 4. Provide all necessary items to complete proper testing of all fire suppression standpipe piping. Isolate existing systems as required.
- 5. Flush all Standpipe piping to remove debris, sediment, dirt, rust, corrosion and other foreign material. Flush all piping before connecting fire protection valves. Utilize open pipe ends wherever possible.

B. Pressure Tests:

- 1. Hydrostatic tests: Minimum 200 psi and in accordance with NFPA 14 for two hours.
 - a. All tests shall be witnessed by the Engineer or the Owner's Representative.
 - b. A successful air test is not acceptable as the final test; however, the Division 21 contractor shall perform interim air testing of piping as construction progresses.
- 2. Air test: Minimum 40 psi for 24 hours with loss not to exceed 1.5 psi within the 24 hour duration.
- 3. Pay all costs of tests. Perform all tests in a safe manner. Remove all discharged water resulting from testing procedures
- 4. Do not subject existing systems to excess pressures.
- Certify in writing that all required fire suppression water tests have been conducted and successfully completed. Use Material and Test Certificates of NFPA 25 format for fire protection piping systems. Submit all certifications to the Owner's designated representative and Engineer.

C. Alarm Tests:

1. Demonstrate activation of alarms.

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- D. Flow Tests: Give advance notice to the City of Osweglo Fire Department so they may be present if they desire.
 - 1. Flow 500 gpm from the topmost outlet of the most remote standpipe.
 - 2. Concurrently flow 250 gpm from the topmost outlet of each of the other standpipes for a total flow not to exceed 750 gpm.
 - 3. Record the residual pressures and flows at the topmost outlet of each standpipe during the test.

3.4 SYSTEM TURNOVER

- A. Prior to final acceptance, instruct the Owner's designated representative and the City of Oswego Fire Department in the proper operation, maintenance, testing, inspection and emergency procedures for all systems furnished, for a period of time as needed.
- B. Provide one new original pamphlet of NFPA 14 and NFPA 25 to the Owner's designated representative. Indicate in writing to the Owner's Representative the provisions for proper maintenance, inspection and testing of the systems as required by local fire codes.
- C. Notify the City of Oswego Fire Department in writing that the permanent system is operational.

END OF SECTION

WET-PIPE SPRINKLER SYSTEMS SECTION 211313

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Provide labor, materials, equipment and services to perform operations required for the complete installation and related Work as required in Contract Documents.

1.2 RELATED WORK

- A. 210010 "Basic Fire Suppression Requirements".
- B. 210502 "Fire Suppression Piping Systems and Accessories".
- C. 210523 "General Duty Valves for Water Based Fire Suppression Piping".

1.3 QUALITY ASSURANCE

- A. Follow all requirements, recommendations and appendices to comply with the latest edition of the following publications, codes, standards, and listings/approvals:
 - 1. National Fire Protection Association (NFPA):
 - a. NFPA 13: Standard for the Installation of Sprinkler Systems.
 - b. NFPA 24: Standard for the Installation of Private Fire Service Mains and Their Appurtenances.
 - c. NFPA 25: Recommended Practice for the Inspection, Testing and Maintenance of Water-Based Fire Protection Systems.
 - d. NFPA 241: Standard for Safeguarding Construction, Alteration and Demolition Operations.
 - e. NFPA 291: Recommended Practice for Flow Testing and Marking of Hydrants.
 - 2. Factory Mutual Engineering Corporation (FM):
 - a. Approval Guide with Supplements.
 - 3. Underwriters Laboratories, Inc. (UL): Fire Protection Equipment Directory with Supplement.
 - 4. New York State Uniform Fire Prevention and Building Code.

- 5. OSHA Rules and Regulations.
- 6. Requirements of the Owner's insurance company.
- 7. Authority Having Jurisdiction: DASNY.
- B. Equipment, devices, hangers, and components shall be UL listed and FM approved and labeled for the intended fire protection service.
- C. The fire protection work shall be performed by an experienced firm regularly engaged in the installation of fire protection sprinkler systems.
- D. The requirements of this Project's Contract Documents may meet or exceed the requirements of NFPA and other Codes and Standards listed by this Section. The Fire Protection Contractor shall comply with all requirements of the Project Documents in such cases. In situations where NFPA may allow several different methods for sprinkler and fire protection related work and hydraulics, ultimately the method utilized for this project will be determined by these Contract Documents and the Project Engineer. Verify all such situations prior to the bid date.

1.4 SYSTEM DESCRIPTION

- A. The fire protection system shall be a wet pipe automatic sprinkler system to properly protect all spaces as indicated on the contract drawings.
- B. Water supply shall be from the existing 6-inch underground fire protection water main to the systems fire pump. Calculated water supply data at the municipal main indicates the following:
 - 1. 78 psi static.
 - 2. 41 psi residual with 662 gpm flowing.
 - 3. Date of flow test: February 2018.
- C. A fire department connection shall be provided to allow the servicing fire department to augment the system's normal automatic water supply.
- D. The system shall be hydraulically calculated as a light hazard system in accordance with all provisions of the Contract Documents and the Authority Having Jurisdiction (DASNY).
- E. Use of the room design method will not be permitted. Hydraulic calculations shall be based upon the specific hazard for the areas being protected. The following minimum requirements shall be provided as actually installed in the protected spaces.
 - 1. Light hazard: These areas shall include the corridors, lobbies, offices, workrooms, lounges, closets, toilet rooms and bedrooms.

- a. Water density: 0.1 gpm/sq. ft.
- b. Hydraulic remote area: 1,500 sq. ft.
- c. Total combined hose demand: 100 gpm.
- 2. Ordinary Hazard Group 2: These areas shall include all Mechanical and Electrical Spaces:
 - a. Water density: 0.2 gpm/sq. ft.
 - b. Hydraulic remote area: 1,500 sq. ft.
 - c. Total combined hose demand: 100 gpm.
- F. Maximum coverage for any sprinkler head shall not exceed NFPA requirements.
- G. A minimum 5 psi safety factor shall be provided between the available municipal water supply curve and the total system demand point. The total system demand point shall be at the municipal water main and include the calculated sprinkler and interior hose stream demands plus the exterior hose stream demand at the residual pressure required for proper system operation.
- H. The maximum velocity of flow shall not exceed 20 ft. per second in above ground piping except as resulting from throttling of flow in sprinkler riser/drop nipples or 15 ft. per second in pipe segments that contain paddle type waterflow indicators.
- I. Include allowances in hydraulic calculations for head losses through paddle type flow switches and roll grooved pipe segments.
- J. Water supply control valves shall be electrically supervised and mechanically locked for proper position. Waterflow and supervisory circuits shall be in accordance with the requirements of electrical specifications. Electric connections to sprinkler system equipment shall be by this Contractor. Furnish wiring diagrams for all equipment.
- K. Provide 3/16 in. x 1 in. cadmium plated carbon steel chains and master keyed all brass case hardened padlocks to lock water supply valves in the proper position.

1.5 SUBMITTALS

- A. Product Data:
 - 1. Submit manufacturer's catalog cut, specifications and installation instructions for each item or component of fire protection system. Clearly indicate pertinent information such as, but not limited to:
 - a. Manufacturer, including model number(s).
 - b. Materials, size and type of connection.

- c. Pressure ratings of components.
- d. FM approval/UL listing.

B. Drawings:

- 1. Submit complete NFPA 13 drawings, hydraulic calculations with cross reference to applicable drawings, water supply data, and equipment schedule with ratings including those of <u>all</u> components for the system, including fire and jockey pumps to the Owner's designated representative, Insurance Underwriter, Authorities Having Jurisdiction (DASNY) and the Engineer.
 - a. Hydraulic calculations shall be submitted for each design density/remote area with items in NFPA 13 incorporated including sketches to indicate flow quantities, sprinklers operating and direction of flow for pipes in looped and gridded systems.
 - b. Drawings and hydraulic calculations shall identify all adjustments applied as permitted by NFPA-13.
- 2. All requirements of NFPA 13 shall be met on submitted plans and calculations. Drawings shall be coordinated with all other work and trades.
- 3. All pipe sizes shown on the bid documents shall be hydraulically calculated by the Contractor. The Contractor shall increase all pipe sizes as required to ensure proper system operation.

C. Record Drawings:

- Submit Record Drawings, hydraulic calculations, test reports, and NFPA Above and Below Ground Material and Test Certificates to the Owner's Representative, Insurance Underwriter, the Authority Having Jurisdiction (DASNY) and the Engineer.
 - a. A digital copy of as-built drawings in AutoCAD format shall be provided to the Owner.
- 2. Do not order equipment, piping, materials, etc. and do not install any work until all sprinkler drawings and calculations have been approved in writing by the Project's Fire Protection Engineer.

PART 2 - PRODUCTS

2.1 GENERAL

A. Mixing of manufacturers or models of the same or similar component will not be acceptable.

2.2 GAUGES

- A. Accuracy: ANSI B40.1 Grade B, +2% of span; 0 to 300 psi standard range.
 - 1. Case: Anodized aluminum, glass lens; copper alloy tube, tip and socket; brass movement.
 - 2. Connection: 1/4 in. NPT male bottom connection.

2.3 ALARM EQUIPMENT

- A. Electrically Operated Alarm Bell:
- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Fire-Lite Alarms, Inc.; a Honeywell company.
 - b. Notifier; a Honeywell company.
 - c. Potter Electric Signal Company.
- 2. Standard: UL 464.
- 3. Type: Vibrating, metal alarm bell.
- 4. Size: 8-inch minimum- diameter.
- 5. Finish: Red-enamel factory finish, suitable for outdoor use.
- B. Electric Waterflow:
 - 1. Pressure switches: At main riser to indicate waterflow condition.
 - a. Case: Drip-proof.
 - b. Service and range: As required for air or water service.
 - c. Adjustable differential.
 - S.P.D.T. contacts.
 - e. 24 VDC.
 - f. Design equipment: Potter Electric, Autocall, or approved equal.
 - 2. Paddle type waterflow indicators:
 - a. Dual S.P.D.T. contacts.
 - b. 24 VDC.
 - c. Design equipment: Autocall WF-5, Potter Electric VSR-D or VSR-T or approved equal.

- C. Electric Tamper Switches: Supervise valves controlling water supplies in the open/proper position. Integral with the valve or separate with provisions to actuate a supervisory alarm upon valve movement and upon removal of the device cover, with mounting brackets and hardware.
 - 1. 24 VDC, S.P.D.T contacts.
 - 2. Design equipment: Potter Electric Model OSYSU-A for OS&Y valves and Model PIVSU-A for post indicator and butterfly valves.

2.4 SYSTEM COMPONENT IDENTIFICATION

- A. Control, drain, test and sectional valves shall be provided with permanently marked identification signs of baked enamel substantial metal construction. The signs shall be permanently mounted on the piping or wall at the valve, or on the valve, but shall not be hung on the valve with wires or chains that permits easy removal of the sign.
 - 1. The sign shall clearly indicate the valve's purpose and what portion of the structure it serves.
- B. Additional signs shall be provided at each alarm check valve to clearly indicate hydraulic calculation data.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. The nature of the work requires coordination with other trades. Shop fabrication shall be done at the Contractor's risk. Relocation of piping and components to avoid obstructions may be necessary. Relocation, if required, shall be done at the Contractor's expense. The installation shall be performed in a workmanlike manner as determined by the Owner's Representative and in accordance with the Contract Documents, manufacturer's printed installation instructions, and submitted and Owner's Representative reviewed drawings.
- B. Piping shall not pass directly over electric panelboards, switchboards, motor control centers, and similar electric and telephone equipment. However, protection for these spaces shall be provided.
- C. Piping shall be installed concealed above finish ceiling areas with sprinklers located in the center guarter points of ceiling tiles where ceiling tiles are used.
- D. Piping in the basement where installed exposed shall be left clean for painting.
- E. Provide a readily removable flushing connection consisting of a cap at each end of cross mains.

- F. Provide mechanical guards for sprinkler heads in mechanical and storage spaces, less than 8 feet above finished floor subject to mechanical damage. Provide sprinkler head guards where indicated on the Contract Drawings.
- G. Pipe ball drip valves to discharge at a funnel drain or to the exterior. Pipe 2 in. main drains discharge to the exterior at approximately 24 in. above finished grade.
- H. Securely install the spare sprinkler cabinets to the building wall at the main riser, or as indicated on the Contract Drawings.
- I. Upright sprinklers directly on branch lines shall be installed with their frame parallel to the piping.
- J. Inspector's test valves shall be installed 7'-0" or less above the finished floor.
- K. Fire department connections shall be installed 3'-0" above finished grade and electrical alarm bell approximately 10'-0" above finished grade or as high as possible.
- L. Provide sprinkler protection under ductwork, groups of ductwork and other obstructions to water spray and distribution. Use intermediate level sprinklers if subject to water spray from above.
- M. Exposed pipe shall be left clean for painting. Refer to section 210502 "Fire Suppression Piping Systems and Accessories".
- N. Coordinate and activate the systems or portions of the system to operational status as soon as possible.
- 3.2 PIPING, VALVES, HANGERS, ETC.
 - A. Refer to other applicable sections. Run slightly off level to low points; provide drain valves arranged per the Contract Documents.

3.3 ADDITIONAL SPRINKLERS AND MECHANICAL SPRINKLER GUARDS

A. Include an allowance for providing 12 additional sprinklers and 4 additional mechanical sprinkler guards installed at locations where job conditions or equipment selections may require. Provide a credit for sprinklers and guards not installed.

3.4 TESTS

A. General:

 Give the Owner's designated representative advance notice of final tests. Perform tests in a safe manner. Provide written certification that tests have been successfully completed. Use NFPA Above and Below Ground Material and Test Certificate Forms.

- Correct system leaks prior to final test. Do not utilize water additives, caulking, etc., to correct leaks. Provide all required appliances, equipment, instruments, devices and personnel. Make all leaks tight; no caulking of leaks shall be permitted. Remove and replace all defective fittings, piping and connections.
- 3. Provide all necessary items to complete proper testing of all fire protection water piping. Isolate existing systems as required.
- 4. Flush all fire protection piping to remove debris, sediment, dirt, rust, corrosion and other foreign material. Flush all piping before connecting fire protection valves. Utilize open pipe ends wherever possible.

B. Pressure Tests:

- 1. Hydrostatic tests: Minimum 200 psi and in accordance with NFPA 13 for two hours.
 - a. All tests shall be witnessed by the Engineer or the Owner's Representative.
 - A successful air test is not acceptable as the final test; however, the Division 21 contractor shall perform interim air testing of piping as construction progresses.
- 2. Pay all costs of tests. Perform all tests in a safe manner. Remove all discharged water resulting from testing procedures.
- 3. Do not subject existing systems to excess pressures.
- 4. Certify in writing that all required fire protection water tests have been conducted and successfully completed. Use Material and Test Certificates of NFPA 25 format for fire protection piping systems. Submit all certifications to the Owner's designated representative.

C. Alarm Tests:

Demonstrate activation of alarms.

2.

3.5 SYSTEM TURNOVER

A. Prior to final acceptance, provide a "Statement of compliance" letter to DASNY, instruct the Owner's Representative in the proper operation, maintenance, testing, inspection and emergency procedures for all systems furnished, for a period of time as needed. Provide two copies of NFPA 13 and 25, one set to be turned over at the beginning of the project. Indicate in writing to the Owner's designated representative the provisions for proper maintenance, testing, and inspection of the systems as required by national and local fire codes.

END OF SECTION

BASIC PLUMBING REQUIREMENTS SECTION 220010

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. All drawings and general provisions of Contract, including all General and Supplementary Conditions, Division 1 Specification Sections, and Instructions to Bidders apply to this section and all other sections of Division 22.

1.2 SCOPE OF WORK

- A. Include in bid all labor, materials, tools, plant, transportation, excavation, equipment, insurance, temporary protection, permits, taxes and all necessary related items required to provide complete and operational systems shown and described.
- B. References to codes and Standards called for in the Contract Documents mean the latest edition, amendment and revisions to the codes and standards in effect on the date of these Contract Documents.
- C. Minimum composition requirements and/or installation methods for the following materials and work are included in this section:
 - 1. Miscellaneous Supports.
 - 2. Access Doors and Panels.
 - Fire Stopping.
 - 4. Flashing and Sealing.
 - 5. Cutting and Patching.
- D. Contract shall include, but not be limited to:
 - 1. Plumbing.

1.3 REGULATIONS AND CODE COMPLIANCE

- A. All work and materials shall conform to and be installed, inspected and tested in accordance with the governing rules and regulations of federal, state and local governmental agencies.
- B. The following is a list of codes and standards that will apply to this project:
 - 1. Building Code of New York State, 2015.
 - Existing Building Code of New York State, 2015.

- 3. Energy Conservation Construction Code of New York State, 2015.
- 4. Plumbing Code of New York State, 2015.
- 5. New York State Uniform Fire Prevention and Building Code with the 2017 Uniform Code Supplement.
- 6. DASNY firestopping specification section 078400.
- 7. New York State Department of Labor Rules and Regulations.
- 8. New York State Department of Health.
- 9. Federal Occupational Safety and Health Administration OSHA.
- 10. National Electrical Code, NFPA 70.
- 11. NEMA Standards.
- 12. Underwriters Laboratory (UL).
- 13. Local Codes and Ordinances for the City of Oswego.
- 14. Factory Mutual and/or Owner's Insurance Carrier.
- 15. New York Board of Fire Underwriters.
- 16. Combustion Toxicity Amendment to the New York State Uniform Fire Prevention and Building Code.
- 17. National Fire Protection Association (NFPA) All chapters.
- 18. City of Oswego Plumbing Department.
- 19. Oswego State College Facilities Planning Department.
- 20. Authority Having Jurisdiction DASNY.

1.4 LICENSING & PERMITS

- A. The Contractor shall hold a license to perform the work as issued by the City of Oswego.
- B. Apply for and obtain all required permits and inspections, include costs for all fees and charges within bid.
- C. Refer to General Conditions of the Contract for additional requirements.

1.5 GLOSSARY

DORMITORY AUTHORITY OF THE STATE OF NEW YORK FUNNELLE HALL BATHROOM RENOVATIONS BASIC PLUMBING REQUIREMENTS - 220010 SUNY OSWEGO PAGE -3-

ACI American Concrete Institute
ADA Americans with Disabilities Act
AGA American Gas Association

AGCA Associated General Contractors of America, Inc.

AIA American Institute of Architects

AISC American Institute of Steel Construction
AMCA Air Moving and Conditioning Association
ANSI American National Standards Institute
ARI Air-Conditioning and Refrigeration Institute

ASHRAE American Society of Heating, Refrigeration and Air-Conditioning

Engineers

ASME American Society of Mechanical Engineers
ASPE American Society of Plumbing Engineers
ASTM American Society for Testing Materials

AWSC American Welding Society Code
AWWA American Water Works Association
EIA Electronic Industries Association
FCC Federal Communications Commission
FM Factory Mutual Insurance Company

IEEE Institute of Electrical and Electronics Engineers

IRI Industrial Risk Insurers

ISO International Standards Organization

NEC National Electrical Code

NEMA National Electrical Manufacturers' Association

NESC National Electrical Safety Code
NFPA National Fire Protection Association
NYBFU New York Board of Fire Underwriters

NYS/DEC New York State Department of Environmental Conservation NYS/UFBC New York State Uniform Fire Prevention and Building Code

OSHA Occupational Safety and Health Administration

SBI Steel Boiler Institute

SMACNA Sheet Metal and Air Conditioning Contractors National

Association

TIA Telecommunications Industry Association
UFPO Underground Facilities Protective Organization

UL Underwriter's Laboratories, Inc.

1.6 DEFINITIONS

Approved / Approval Written permission to use a material or system.

As Called For Materials, equipment including the execution

specified/shown in the contract documents.

Code Requirements Minimum requirements.

Concealed Work installed in pipe and duct shafts, chases or recesses,

inside walls, above ceilings, in slabs or below grade.

Design Equipment Refer to the article, BASIS OF DESIGN.

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Design Make Refer to the article, BASIS OF DESIGN.

Equal or Equivalent Equally acceptable as determined by Owner's

Representative

Exposed Work not identified as concealed.

Final Acceptance Owner acceptance of the project from Contractor upon

certification by Owner's Representative.

Furnish Supply and deliver to installation location.

Furnished by Others Receive delivery at job site or where called for and install.

Inspection Visual observations by Owner's site Representative.

Install Mount and connect equipment and associated materials

ready for use.

Labeled Refers to classification by a standards agency.

Make Refer to the article, BASIS OF DESIGN.

Or Approved Equal Approved equal or equivalent as determined by Owner's

Representative.

Owner's representative The Prime Professional

Prime Professional Architect or Engineer having a contract directly with the

Owner for professional services.

Provide Furnish, install and connect ready for use.

Relocate Disassemble, disconnect, and transport equipment to new

locations, then clean, test, and install ready for use.

Replace Remove and provide new item.

Review A general contractual conformance check of

specified products.

Roughing Pipe, duct, conduit, equipment layout and installation.

Satisfactory As specified in contract documents.

Site Representative Construction Manager or Owner's Inspector at the work

site.

Refer to General Conditions of the Contract for additional definitions.

1.7 BASIS OF DESIGN

- A. The contract documents are prepared on basis of one manufacturer as "design equipment," even though other manufacturers' names are listed as acceptable makes. If Contractor elects to use one of the listed makes other than "design equipment," submit detailed drawings, indicating proposed installation of equipment.
- B. The Contractor shall make all necessary field measurements and investigations to assure that the equipment and assemblies will meet contract requirements. Show maintenance clearances, service removal space required, and other pertinent revisions to the design arrangement. Make required changes in work of all other trades, at no increase in any contract. Provide larger motors, electrical feeders, circuit breakers, equipment, additional control devices, valves, fittings and other miscellaneous equipment required for proper operation and assume the responsibility for the proper location of roughing and connections by other trades.
- C. Remove and replace door frames, access doors, walls ceilings or floors required to install other than design make equipment. If revised arrangement submittal is rejected, revise and resubmit specified "design equipment" item which conforms to contract documents.

1.8 INTENT OF DRAWINGS

A. The drawings are diagrammatic, unless detailed dimensioned drawings are included. Drawings show approximate locations of equipment, and fixtures. Exact locations are subject to the approval of the Owner's Representative.

1.9 ELECTRONIC CAD DRAWING FILES

- A. The Engineer may provide the Contractor with Cad files for this project with the understanding that these Cad files shall be used for reference purposes only, and not as shop drawings or as-built documents. It is the Contractors' responsibility to provide detailed, coordinated shop drawings and documentation prior to installation. The purpose of the Contractors' coordination shop drawings is to account for all trades and field conditions and identify any conflicts that shall be resolved prior to installation.
- B. Any additional cost for changes due to conflicts as a result of the Contractors failure to provide properly coordinated documents will be the responsibility of the Contractors and not of the Engineer.

1.10 QUALITY ASSURANCE

A. Manufacturers of equipment shall be firms regularly and currently engaged in the production of equipment and accessories provided. The design and size of each item of equipment provided for this project needs to have been in satisfactory and efficient operation on at least three (3) installations for not less than three (3)

years.

- B. Suppliers of equipment must have factory trained and authorized personnel for the service of all equipment provided.
- C. Apply and install materials, equipment, and specialties in accordance with manufacturer's written instructions. Conflicts between the manufacturer's instructions and the contract documents shall be referred to the Owner's Representative for resolution.
- D. The contractor shall engage the services of a qualified installer for the installation and application of joint sealers, flashing, access panels, cutting and patching.
- E. All work shall be done in a neat and workmanlike manner. All methods of construction, details of workmanship, that is not specifically described or indicated in the contract documents, shall be subject to the control and approval of the Owner's Representative. Equipment and materials shall be of the quality and manufacture indicated. The equipment specified is based upon the acceptable manufacturers listed. Where "approved equal" is stated, equipment shall be equivalent in every way to that of the equipment specified and subject to approval.

PART 2 - PRODUCTS

2.1 EQUIPMENT AND MATERIAL MINIMUM REQUIREMENTS

- A. Provide Materials That Meet the Following Minimum Requirements:
 - 1. Materials shall have a flame spread rating of 25 or less and a smoke developed rating of 50 or less, in accordance with NFPA 255.
 - 2. All equipment and material for which there is a listing service shall bear a UL label.
 - 3. Potable water systems and equipment shall be built according to AWWA Standards.
 - 4. Gas-fired equipment and system shall meet AGA Regulations and shall have AGA label.
 - 5. Electrical equipment and systems shall meet UL Standards and requirements of the N.E.C. This listing requirement applies to the entire assembly. Any modifications to equipment to suit the intent of the specifications shall be performed in accordance with these requirements.
 - 6. All materials, unless otherwise specified, shall be new and be the standard products of the manufacturer. Used equipment or damaged material will be rejected.
 - 7. The listing of a manufacturer as "acceptable" does not indicate

acceptance of a standard or catalogued item of equipment. All equipment and systems must conform to the Specifications.

2.2 SUBSTITUTIONS

- A. The materials, products and equipment described in the Bidding Documents establish a standard of required quality, functions, dimensions and appearance that must be met by any proposed substitution.
- B. Proposed substitutions must be submitted in writing to the Architect and Engineer. Each request shall include the name of the proposed material, product or equipment being substituted, cut sheets, installation drawings, performance and test data, warranties and location of three (3) similar installations with reference names of owner or facility personnel responsible for maintaining equipment.
- C. Approval by the Architect and/or Engineer to proceed with a substitution does not relieve the contractor from meeting all of the dimensional requirements and maintaining the full functionality and performance of the material, product or equipment used as the basis of design.
- D. Requests for substitution from sales representatives, vendors or suppliers are unacceptable and will not be considered.

2.3 FACTORY-ASSEMBLED PRODUCTS

- A. Provide maximum standardization of components to reduce spare part requirements.
- B. Manufacturers of equipment assemblies which include components made by others shall assume complete responsibility for final assembled unit.
 - 1. All components of an assembled unit need not be products of same manufacturer.
 - 2. Constituent parts which are alike shall be product of a single manufacturer.
 - 3. Components shall be compatible with each other and with the total assembly for intended service.
 - Contractor shall guarantee performance of assemblies of components, and shall repair or replace elements of the assemblies as required to deliver specified performance of the complete assembly.
- C. Components of equipment shall bear manufacturer's name or trademark, model number and serial number on a name plate securely affixed in a conspicuous place, or cast integral with, stamped or otherwise permanently marked upon the components of the equipment.
- D. Major items of equipment which serve the same function must be the same make

and model. Exception will be permitted if performance requirements cannot be met.

2.4 COMPATIBILITY OF RELATED EQUIPMENT

A. Equipment and materials installed shall be compatible in all respects with other items being furnished and with existing items so that a complete and fully operational system will result.

2.5 SPECIAL TOOLS

A. If any part of equipment requires a special tool for assembly, adjustment or maintenance thereof and such tool is not readily available on commercial tool market, it shall be furnished by the Contractor.

2.6 LIFTING ATTACHMENTS

A. Provide equipment with suitable lifting attachments to enable equipment to be lifted in its normal position. Lifting attachments shall withstand any handling conditions that might be encountered without bending or distortion of shape, such as rapid lowering and braking of load.

2.7 MISCELLANEOUS SUPPORTS

- A. Metal bars, plates, tubing, etc. shall conform ASTM standards:
 - 1. Steel plates, shapes, bars, and grating ASTM A 36
 - 2. Cold-Formed Steel Tubing ASTM A 500
 - 3. Hot Rolled Steel Tubing ASTM A 501
 - 4. Steel Pipe ASTM A 53, Schedule 40, welded
- B. Metal Fasteners shall be Zinc-coated, type, grade and class as required.

2.8 ACCESS DOORS AND PANELS

A. Steel access doors and Frames shall be factory fabricated and assembled units complete with attachment devices and fasteners ready for installation. Joints and seams shall be continuously welded steel, with welds ground smooth and flush.

B. Construction:

- 1. Frames:
 - a. 16-gage steel with 1-inch wide exposed perimeter flange and adjustable masonry anchors for units installed in masonry, precast, cast in place concrete, ceramic tile
 - b. 16-gage steel, perforated flanges with bead for gypsum or plaster wall board.

c. 16-gage steel with galvanized expanded metal lath and exposed casing bead, welded to perimeter of frame for full bed plaster applications.

2. Access Doors:

- a. Provide 14-gage sheet steel flush panel doors with concealed continuous piano hinge factory installed, primed and painted, set to open 175 degrees.
- b. Provide fire rated, insulated flush panel doors, with continuous piano hinge and self-closing mechanism rated for 1-½ hour "B" labeled, in fire rated partitions.
- 3. Provide flush, screwdriver operated cam locks on all access doors.

2.9 CONCRETE BASES

A. Provide concrete bases for all floor mounted equipment. Provide 3,000 lb. concrete, chamfer edges, trowel finish, and securely bond to floor by roughening slab and coating with cement grout. Bases shall be 3-inches high unless otherwise indicated, shape and size to accommodate equipment. Set anchor bolts in sleeves before pouring and after anchoring and leveling, fill equipment bases with grout.

2.10 FIRE-STOPPING

A. Refer to section 078400 – "Fire-stopping" for requirements.

PART 3 - EXECUTION

3.1 SHOP DRAWINGS/PRODUCT DATA/SAMPLES

- A. Submit Shop Drawings on all items of equipment and materials to be furnished and installed. Submission of Shop Drawings and samples shall be accompanied by a transmittal letter, stating name of project and contractor, number of drawings, titles, and other pertinent data called for in individual sections.
- B. Shop Drawings shall be dated and contain the following information. Incomplete submittals will not be accepted.
 - 1. Number each submittal.
 - Name of project.
 - 3. Name of prime professional.
 - 4. Name of prime contractor.

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- Description or names of equipment, materials and items. Complete identification of locations at which materials or equipment are to be installed.
- C. All products specified in an individual Division 22 section shall be submitted at the same time.
- D. Indicate deviations from contract requirements on the Letter of Transmittal.
- E. Corrections or comments made on the Shop Drawings during the review do not relieve Contractor from compliance with requirements of the drawings and specifications. The Contractor is responsible for confirming and correcting all quantities; checking electrical characteristics and dimensions; selecting fabrication processes and techniques of construction; coordinating his work with that of all other trades; and performing his work in a safe and satisfactory manner.

3.2 COORDINATION DRAWINGS

- A. Before construction work commences, the Contractor shall submit Coordination Drawings in the form of reproducible transparencies drawn at not less than 3/8" = 1'-0" scale. Coordination Drawings are required throughout all areas for all trades. These drawings shall identify and show resolutions of trade conflicts. Mechanical Equipment Rooms shall be drawn early in the Coordination Drawing process, simultaneous with all other congested areas. Prepare Coordination Drawings As Follows:
 - The Division 23 Contractor will prepare the base plan Coordination Drawings showing all ductwork and all pertinent piping and equipment. These drawings may be sepias of the required ductwork Shop Drawings. The drawings shall be coordinated with cable tray, lighting fixtures, sprinklers, air diffusers, other ceiling mounted items, ceiling heights, structural work, maintenance clearances, electric code clearance, reflected ceiling plans, and other contract requirements. Reposition proposed locations of work after coordination drawing review by the Construction Manager and the Architect. Provide adjustments to exact size, location and offsets of ducts, pipes, conduit, etc., to achieve reasonable appearance objectives. Provide these adjustments as part of Base Bid Contracts. Minor revisions need not be redrawn.
 - 2. The Division 23 Contractor will provide sepia transparencies and/or prints and submit the base plan to all major trades' Contractors.
 - 3. The Division 22 Contractor will draft location of piping and equipment on the base plan, indicating areas of conflict and suggested resolutions.
 - 4. Do not install equipment, equipment foundations or piping until Coordination drawings have been approved.

3.3 PROTECTION OF PERSONS AND PROPERTY

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A. Contractor shall assume responsibility for Construction Safety at all times and provide, as part of contract, all trench or building shoring, scaffolding, shielding, dust/fume protection, mechanical/electrical protection, special grounding, safety railings, barriers, and other safety feature required to provide safe conditions for all workmen and site visitors.

3.4 EXISTING SYSTEMS AND CONDITIONS

- A. Prior to beginning work inspect and test all existing systems that will be affected by the work in this contract. Provide a report to the Owner indicating any problems or defects found. If no problems or system defects are submitted, the contractor shall be responsible for correcting problems found at the completion of the project that are determined to be caused by the work of this contract.
- B. Inspect the entire work area for defects in the existing construction such as scratches, holes etc. Submit a complete list and photographs of existing damage, to the Owner prior to beginning work. If existing damage is not documented the contractor shall repair all damage to like new condition, that is determined to have been caused by the work in this contract.
- C. The Owner's representative shall determine if the contractor has damaged existing systems or construction and approve the repairs.

3.5 ASBESTOS RECOGNITION AND PRECAUTIONS

- A. The contractor shall be responsible for coordination of all required removal work, coring, cutting and patching with the Owner's asbestos management plan. Prior to performing such work identify areas containing asbestos. Notify the Owner so that they may make arrangements for abatement and/or containment prior to work proceeding. The contractor shall be responsible for cleaning all areas where asbestos is released due to the failure to coordinate with the asbestos management plan. Refer to Division 1 sections for further requirements.
- B. The disturbance or dislocation of asbestos-containing materials causes asbestos fibers to be released into the building's atmosphere, thereby creating a health hazard to workmen and building occupants. Consistent with Industrial Code Rule 56 and the content of recognized asbestos-control work, the Contractor shall apprise all of his workers, supervisory personnel, subcontractors, Owner and Consultants who will be at the job site of the seriousness of the hazard and of proper safeguards and work procedures which must be followed, as described in New York State Department of Labor Industrial Code Rule 56. Fluorescent Bulbs which are not specifically designated as not containing Mercury shall be disposed of in compliance with the requirements of the New York State Department of Environmental Conservation and all applicable Federal Laws.
- C. Refer to Division 2 Sections for further requirements.

3.6 REMOVALS

A. Where existing equipment removals are called for, submit complete list to Owner's Representative. All items that Owner wishes to retain that do not

contain asbestos or PCB Material shall be delivered to location directed by Owner. Items that Owner does not wish to retain shall be removed from site and legally disposed of. Removal and disposal of material containing asbestos and/or PCB's shall be in accordance with Federal, State and Local law requirements. Where equipment is called for to be relocated. Contractor shall carefully remove, clean and recondition, then reinstall. Remove all abandoned piping, wiring, equipment, lighting, ductwork, tubing, supports, fixtures, etc. Visit each room, crawl spaces and roofs to determine total Scope of Work. The disturbance or dislocation of asbestos-containing materials causes asbestos fibers to be released into the building's atmosphere, thereby creating a health hazard to workmen and building occupants. Consistent with Industrial Code Rule 56 and the content of recognized asbestos-control work, the Contractor shall apprise all of his workers, supervisory personnel, subcontractors, Owner and Consultants who will be at the job site of the seriousness of the hazard and of proper safeguards and work procedures which must be followed, as described in New York State Department of Labor Industrial Code Rule 56.

- B. Completely remove all piping, conduit, controls, and other devices associated with the equipment not to be reused in the new work. This includes all pipe, valves, fittings, insulation, conduit, junction boxes, panels, and all hangers, including the top connection and any fastenings to building structural systems. Patch, paint and seal all openings, after removals and other penetrations in roof, walls, floors, in an approved manner and in accordance with plans and specifications where specifically covered. Structural integrity of the building system shall be maintained. Reference shall also be made to the architectural, structural, mechanical, site, and electrical drawings and specifications for additional facilities to be demolished or handled.
- C. Ream pipes after cutting and clean before installing. Cap or plug equipment and pipe openings during construction.

3.7 FREEZING AND WATER DAMAGE

A. Take all necessary precautions with equipment, systems and building to prevent damage due to freezing and/or water damage. Repair or replace, at no change in contract, any such damage to equipment, systems and building. Perform first seasons winterizing in presence of Owner's operating staff.

3.8 FREEZING AND WATER DAMAGE

A. Take all necessary precautions with equipment, systems and building to prevent damage due to freezing and/or water damage. Repair or replace, at no change in contract, any such damage to equipment, systems and building. Perform first seasons winterizing in presence of Owner's operating staff.

3.9 ROUGH-IN

A. Due to small scale of Drawings, it is not possible to indicate all offsets, fittings, changes in elevation, etc. Verify final locations for rough-ins with field measurements and with the equipment being connected. Verify exact location

and elevations at work site prior to any rough in work. **DO NOT SCALE PLANS**. If field conditions, details, changes in equipment or shop drawing information require a significant change to the original documents, contact the owner's representative for approval before proceeding.

- B. All equipment locations shall be coordinated with other trades to eliminate interference with required clearances for equipment maintenance and inspections.
 - 1. Coordinate work with other trades and determine exact routing of all duct, pipe, conduit, etc., before fabrication and installation. Coordinate with Architectural Drawings. Verify with Owner's Representative exact location and mounting height of all equipment in finished areas, such as thermostats, fixtures, communication and electrical devices, including panels. Coordinate all work with the architectural reflected ceiling plans and/or existing Architecture. Mechanical and electrical drawings show design arrangement only for Diffusers, grilles, registers, air terminals, lighting fixtures, sprinklers, speakers and other items. Do not rough-in contract work without reflected ceiling location plans.
 - 2. Before roughing for equipment furnished by Owner or in other contracts, obtain from Architect and other Contractors, approved roughing drawings giving exact location for each piece of equipment. Do not "rough in" services without final layout drawings approved for construction. Cooperate with other trades to insure proper location and size of connections to insure proper functioning of all systems and equipment. Obtain written authorization from the Owners representative or other contractor for any "rough ins" that, due to project schedule, are required before approved coordination drawings are available. Any work installed without written authorization or approved coordination drawings, causing a conflict will be relocated by the electrical contractor at no expense to the Owner.
 - 3. For equipment and connections provided in this contract, prepare roughing drawings as follows:
 - a. New equipment: Obtain equipment roughing drawings and dimensions then prepare rough-in drawings.
 - 4. Where more than one trade is involved in an area, space or chase, all shall cooperate and install their own work to utilize the space equally between them in proportion to their individual requirements. In general, ductwork shall be given preference except where grading of piping becomes a problem, followed by piping then electrical wiring. If, after installation of any equipment, piping, ducts, conduit, and boxes, it is determined that ample maintenance and passage space has not been provided, rearrange work and/or furnish other equipment as required for ample maintenance space. Any changes in the size or location of the material or equipment supplied, which may be necessary in order to meet field conditions or in order to avoid conflicts between trades, shall be brought to the immediate attention of the Owner's Representative and

approval received before such alterations are made.

C. Provide easy, safe, and code mandated clearances at controllers, motor starters, valve access, and other equipment requiring maintenance and operation. Contractor shall relocate existing work in the way of new construction. VISIT SITE BEFORE BIDDING TO DETERMINE SCOPE OF WORK. Provide new materials, including new piping and insulation for relocated work.

3.10 CUTTING AND PATCHING

A. The Division 22 contract shall include their required cutting and patching work unless shown as part of the General Construction work on the architectural drawings. Refer to "General Conditions of the Contract for Construction," for additional requirements. Cut and drill from both sides of walls and/or floors to eliminate splaying. Patch, cut or abandoned holes left by removals of equipment or fixtures. Patch adjacent existing work disturbed by installation of new work including insulation, walls and wall covering, ceiling and floor covering, other finished surfaces. Patch openings and damaged areas equal to existing surface finish. Cut openings in prefabricated construction units in accordance with manufacturer's instructions.

3.11 CONCEALMENT

A. Conceal all contract work above ceilings and in walls, below slabs, and elsewhere throughout building. If concealment is impossible or impractical, notify Owner's Representative before starting that part of the work and install only after his review. In areas with no ceilings, install only after Owner's Representative reviews and comments on arrangement and appearance.

3.12 ACCESS DOORS AND PANELS

- A. Install access doors, sized to permit complete access for any concealed and/or inaccessible junction boxes, control and monitoring devices, valves and other plumbing and/or fire protection equipment requiring access for maintenance or operation.
- B. Set frames accurately in position and securely attach to supports with face panels plumb and level in relation to adjacent finish surfaces.
- C. Adjust hardware and panels after installation for proper operation.

3.13 CHASES

A. New Construction:

- Certain chases, recesses, openings, shafts, and wall pockets will be provided as part of "General Building Construction Plans and Specifications." Mechanical and Electrical Trades work shall provide all other openings required for their contract work.
- 2. Check Architectural and Structural Design and Shop Drawings to verify

correct size and location for all openings, recesses and chases in general building construction work.

- Assume responsibility for correct and final location and size of such openings.
- 4. Rectify improperly sized, improperly located or omitted chases or openings due to faulty or late information or failure to check final location.
- 5. Provide 18 gauge galvanized sleeves and inserts. Extend all sleeves 2" above finished floor. Set sleeves and inserts in place ahead of newconstruction, securely fastened during concrete pouring. Correct, by drilling, omitted or improperly located sleeves. Assume responsibility for all work and equipment damaged during course of drilling. Firestop all unused sleeves.
- 6. Provide angle iron frame where openings are required for contract work, unless provided by General Construction Contractor.

B. In Existing Buildings:

- 1. Drill holes for floor and/or roof slab openings.
- 2. Multiple pipes smaller than 1" properly spaced and supported may pass through one 6" or smaller diameter opening.
- 3. Seal voids in fire rated assemblies with a fire-stopping seal system to maintain the fire resistance of the assembly. Provide 18 gauge galvanized sleeves at fire rated assemblies. Extend sleeves 2" above floors.
- 4. In wall openings, drill or cut holes to suit. Provide 18 gauge galvanized sleeves at shafts and fire rated assemblies. Provide fire-stopping seal between sleeves and wall in drywall construction. Provide fire-stopping similar to that for floor openings.

3.14 FIRE-STOPPING

- A. Fire-stopping for Openings Through Fire and Smoke Rated Wall and Floor Assemblies:
 - 1. Refer to section 078400 "Fire-stopping" for requirements.

3.15 FLASHING AND SEALING

A. Opening through roofs shall be flashed in manner not to affect roof guarantee or bond. Engage qualified Roofing Contractor licensed by the Roofing manufacturer, as part of contract. Provide non-ferrous flashing pieces, skirts, hoods and collars as required to make pipes, conduits, and other penetrations watertight. Where curbs are called for with respect to rectangular openings in new roofs, flashing will be done by others unless specifically indicated otherwise.

Caulk and waterproof with additional material so as to seal airtight and watertight.

B. Apply all flashing and sealers within the temperature and humidity limits permitted by the manufacturer.

3.16 FLASHING AND SEALING

- A. Opening through roofs shall be flashed in manner not to affect roof guarantee or bond. Engage qualified Roofing Contractor licensed by the Roofing manufacturer, as part of contract. Provide non-ferrous flashing pieces, skirts, hoods and collars as required to make pipes, conduits, and other penetrations watertight. Where curbs are called for with respect to rectangular openings in new roofs, flashing will be done by others unless specifically indicated otherwise. Caulk and waterproof with additional material so as to seal airtight and watertight.
- B. Apply all flashing and sealers within the temperature and humidity limits permitted by the manufacturer

3.17 UTILITY COMPANY SERVICES

A. Make arrangements with National Fuel Gas Corporation for a new gas service to the Owner's distribution equipment. Provide underground gas service as called for and all pads, valves, meter, regulator and concrete bollards as required by the Utility Company. Coordinate all activities between the Owner and the Utility Company. The installation of the gas service shall comply with the published Utility Company standards. PAY ALL UTILITY COMPANY CHARGES. INCLUDE CHARGES IN THE BASE BID.

3.18 PAINTING

- A. This Contract Includes the following:
 - 1. Painting for all cut and patch work performed as part of the Division 22 contract.
 - 2. Painting required for touch-up of surfaces damaged due to the installation of the Division 22 work.
 - 3. Painting as required to repair finish of equipment furnished.
 - 4. Refer to Section 09900-Painting, for general description of materials and methods
 - 5. Painting as called for on Division 22 drawings.

3.19 ALL TRADES TEMPORARY HEAT

A. Refer to the Standard General Conditions of the Contract for Construction and Supplemental General Conditions.

3.20 TEMPORARY FACILITIES

- A. Refer to the standard General Conditions of the contract for Construction and Supplemental General Conditions.
 - 1. Continuity of operation of existing facilities will require temporary installation or relocation of equipment and piping.
 - 2. All piping and equipment shall be properly supported, sloped to drain, operate without excessive stress, and shall be insulated where injury can occur to personnel by contact with operating facilities.
 - 3. Temporary facilities and piping shall be completely removed and any openings in structures sealed. Provide necessary blind flanges and caps to seal open piping remaining pressurized.

3.21 CLEANING

- A. It is the Contractor's responsibility to keep clean all equipment and fixtures provided under this contract for the duration of the project. Each trade shall keep the premises free from an accumulation of waste material or rubbish caused by his operations. The facilities require an environment of extreme cleanliness, and it is the Contractor's responsibility to adhere to the strict regulations regarding procedures on the existing premises. After all tests are made and installations completed satisfactorily:
 - 1. Thoroughly clean entire installation, both exposed surfaces and interiors.
 - 2. Remove all debris caused by work.
 - 3. Remove tools, surplus, materials, when work is finally accepted.

3.22 PLUMBING EQUIPMENT CONNECTIONS

- A. Provide complete plumbing connections to all plumbing equipment. Provide control connections to equipment where indicated on the drawings. Provide valves on piping ahead of each piece of equipment.
- B. Provide all piping, trim, accessories and connections as required for proper equipment operation of Equipment provided by this contract, Owner-Furnished Equipment and Equipment furnished by other contracts,
- C. Refer to Manufacturer's drawings/specifications for requirements of special equipment. Verify connection requirements before bidding and confirm prior to roughing.

3.23 PLUMBING INSTALLATIONS

- A. All installations shall comply with the following requirements:
 - 1. Coordinate plumbing systems, equipment, and materials installation with

- other building components. Be responsible for any changes in openings and locations necessitated by the equipment installed.
- 2. The Architect shall control the placement of wall and ceiling mounted plumbing equipment and devices in all rooms with the exception of mechanical and electrical equipment rooms. When drawing details are not available, consult with the Architects representative for actual location.
- 3. Verify all dimensions with field measurements.
- 4. Arrange for all chases, slots and openings in other building components that are not indicated on drawings, to allow for plumbing installations.
- 5. Coordinate the installation of required supporting devices and sleeves to be set in poured-in-place concrete and other structural components, as they are constructed.
- 6. Coordinate ordering and installation of all equipment with long lead times or having a major impact on work by other trades so as not to delay the job or impact the construction schedule. Pay close attention to equipment that must be installed prior to building enclosure.
- 7. Where mounting heights are not detailed or dimensioned, install systems, materials and equipment to provide the maximum headroom possible.
- 8. Install systems, materials and equipment to conform with approved submittal data, including coordination drawings, to greatest extent possible. Conform to arrangements indicated by the Contract Documents, recognizing that portions of the work are shown only in diagrammatic form. Where coordination requirements conflict with individual system requirements, refer the conflict to the Architect.
- 9. Store Materials on dry base, at least 6-inches above-ground or floor. Store so as not to interfere with other work or obstruct access to buildings or facilities. Provide waterproof/windproof covering. Remove and provide special storage for items subject to moisture damage. Protect against theft or damage from any cause. Replace items stolen or damaged, at no cost to Owner.
- 10. Set all equipment to accurate line and grade, level all equipment and align all equipment components.
- 11. All tolerances in alignment and leveling, and the quality of workmanship for each stage of work shall be as required by the manufacturer and subject to approval by the Owners representative.
- 12. All finished equipment surfaces damaged during construction shall be brought to "as new" condition by touch up or repainting. Any rust shall be removed and primed prior to repainting.

- 13. Provide all scaffolding, rigging, hoisting and services necessary for erection and delivery of equipment and apparatus furnished into the premises. These items shall be removed from premises when no longer required.
- 14. No plumbing equipment shall be hidden or covered up prior to inspection by the Owners representative. All work that is determined to be unsatisfactory shall be corrected immediately.
- 15. All plumbing work shall be installed level and plumb, parallel and perpendicular to other building systems and components.
 - 16. Conceal all contract work above ceilings and in walls, below slabs, and elsewhere throughout building. If concealment is impossible or impractical, notify Owner's Representative before starting that part of the work and install only after his approval. In areas with no ceilings, install only after Owner's Representative reviews and comments on arrangement and appearance.
- 17. Install access panels or doors where units are concealed behind finished surfaces.

3.24 CONTINUITY OF SERVICES

A. The building will be in use during construction operations. Maintain existing systems in operation within all rooms of building at all times. Refer to "General Conditions of the Contract for Construction" for temporary facilities for additional contract requirements. Schedules for various phases of contract work shall be coordinated with all other trades and with Owner's Representative. Provide, as part of contract, temporary fire protection and electrical connections and relocation as required to accomplish the above. Obtain approval in writing as to date, time, and location for shut-down of existing facilities or services.

3.25 START UP AND OWNER INSTRUCTIONS

- A. Before acceptance of the work, furnish necessary skilled labor to operate all systems by seasons. Instruct the owners designated personnel on the proper operation and maintenance of systems and equipment. Obtain written acknowledgment from person instructed prior to acceptance repeat the instructions if asked to do so. Contractor is fully responsible for systems until acceptance, even though operated by Owner's personnel, unless otherwise agreed in writing. Provide operating, maintenance and starting precautions and procedures to be followed by the Owner for operating systems and equipment. Mount the instruction in clear plastic holder on or adjacent to the equipment.
- B. Where supervision by a manufacturer is called for, provide manufacturer's certified technician or engineer to supervise the startup, testing and adjustment of the equipment or system. Where two or more manufacturers are involved (i.e. variable frequency drive and air handling unit) both manufacturers shall be present at start up. The manufacturer shall provide a written report detailing the

testing and start-up including problems that occurred and their method of resolution.

C. Refer to Division 1 Sections for additional requirements.

3.26 OPERATION AND MAINTENANCE MANUALS

A. Provide Operation and Maintenance Manuals. Include one copy each of approved Shop Drawings, wiring diagrams, piping diagrams, spare parts lists, as-built drawings and manufacturer's instructions. Include typewritten instructions, describing equipment, starting/operating procedures, emergency operating instructions, seasonal changeover, freeze protection, precautions and recommended maintenance procedures. Include name, address, and telephone number of supplier manufacturer Representative and service agency for all major equipment items. Bind above items in a three ring binder with name of project on the cover. Deliver to Owner's Representative before request for acceptance.

3.27 RECORD DOCUMENTS

- A. Prepare and provide record documents in accordance with Division 1 Sections. In addition to those requirements provide the following:
 - Utilities below floors, slabs and grade: During construction, maintain accurate records of all final locations and inverts for all services inside and outside of the buildings, beneath grade and below floors.
 - 2. Take dimensions from a given fixed bench mark, such as the corner of a building, and neatly and clearly indicate same on reproducible prints.
 - Provide Record Drawings for all Contract Work.
 - 4. Submit reproducible tracings, with all required corrections and submit complete set of final approved record drawings in PDF file format on CD.
 - 5. Incorporate all field changes, change orders and other modifications into the final Record Drawings.
- B. Provide record documents electronically on a compact disk (CD), DVD or flash drive to the Owner. Also provide one (1) set of prints to the Owner.

END OF SECTION

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PLUMBING PIPING SYSTEMS AND ACCESSORIES **SECTION 220502**

PART 1 – GENERAL

1.1 WORK INCLUDED

Α. Provide labor, materials, equipment and services to perform operations required for the complete installation and related Work as required in Contract Documents

1.2 **SUBMITTALS**

Α. Schedule of all pipe materials, fittings and connections to be utilized on this Project.

1.3 LEED Submittals

Α. Product Data for Credit IEQ 4.1: For solvent cements and adhesive primers, documentation including printed statement of VOC content.

PART 2 - PRODUCTS

GENERAL 2.1

All piping and fittings used on this Project shall be new and marked with Α. manufacturer's name; and shall comply with all applicable ASTM and ANSI Standards.

2.2 STEEL PIPING AND FITTINGS

- Pipe: ASTM A53, or ASTM A106 seamless, Schedule 40, or extra strong Α. (Schedule 80) weight; black or galvanized finish as called for; ends chamfered for welding, threaded for screwed (threaded) connections or roll-grooved for grooved mechanical connections.
- B. Fittings: Same material and pressure class as adjoining pipe.
 - Welded fittings: Factory forged, seamless construction, butt weld type, 1. chamfered ends. Where branch connections are two or more sizes smaller than main size, use of "Weldolets," "Thredolets" or "Sockolets" acceptable. Mitered elbows, "shaped" nipples, and job fabricated reductions not acceptable. Socket weld type, 2000 psi wp, where called
 - 2. Screwed fittings: Malleable iron, black or galvanized finish as called for; drainage type where called for.

- C. Joints and Connections:
 - 1. Welded connections:
 - a. Flanges: Welding neck type. Slip-on type not to be provided except where called for and shall not be provided in conjunction with butterfly valves.
 - 2. Screwed (threaded) connections:
 - a. Unions: ASA malleable cast iron, bronze to iron seat, 300 lb. wwp; for sizes 2-inch and smaller.
 - b. Flanges: Cast iron companion type; for sizes 2-1/2 inch and larger.
- D. Gauge and Instrument Connections: Nipples and plugs for adapting gauges and instruments to piping system shall be IPS brass.

2.3 COPPER PIPE AND SOLDER FITTINGS

- A. Domestic Water Piping: Above ground hard temper, ASTM B88; Type L as called for. Plans show copper tube sizes.
- B. Sanitary Waste, Sanitary Vent and Indirect Waste Piping: Above ground hard temper, ASTM B88; Type DWV as called for. Plans show copper tube sizes.
- C. Copper is not allowed for urinal waste (above or below ground), no exceptions.
- D. Tees, Elbows and Reducers: Wrought copper; solder end connections; ASTM B62, ASTM B16.22.
- E. Unions And Flanges:
 - 1. 2-inch and smaller: Unions, solder type, wrought copper, ground joint, 150 lb. swp.
 - 2. 2-1/2-inch and larger: Flanged, wrought copper, companion type, ASME drilled, solder connection, 150 lb. swp.
- F. Solder Materials: No-lead solder, using alloys made from tin, copper, silver and nickel.
 - 1. Make: Harris "Bridgit", Englehart "Silverbright 100", Willard Industries "Solder Safe (silver bearing), Canfield "Watersafe".
 - 2. Solder is to conform with ASTM B32

PLUMBING PIPING SYSTEMS AND ACCESSORIES - 220502 PAGE -3-

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3. Flux as per ASTM B813.

2.4 COPPER PIPE AND PRESS FITTINGS

- A. Pipe Standard: Conforming to ASTM B75 or B88, Type 'L' as called for. Plans show copper tube sizes.
- B. Fitting Standard: Conforming to ASME B16.18, ASME B16.22 or ASME B16.26.
- C. Press Fitting: Copper press fittings shall conform to the material and sizing requirements of ASME B16.18 or ASME B16.22. O-rings for copper press fittings shall be EPDM and comply with NSF-61 requirements.
- D. The contractor shall be a qualified installer, licensed within the jurisdiction and familiar with the installation of copper press joint systems.
- E. Make: "ProPress" by Viega North America or approved equal.

2.5 SOIL PIPE AND FITTINGS

- A. Pipe: ASTM A74 service weight cast iron, coated.
- B. Fittings: Service weight type with "push-on" type fittings with ASTM C564 extra heavy neoprene gasket of same manufacturer as piping.
- C. No-Hub: (No-Hub pipe allowed for above ground applications only)
 - 1. Pipe: ASTM A888 no-hub cast iron, coated.
 - Fittings: Heavy-DutyCast iron no-hub pattern with neoprene gasket and 24 gauge, Type 304 stainless steel clamp assembly; ASTM C1540.
 - a. Make: Clamp-All, Husky, Tyler "Widebody".

2.6 POLYETHYLENE PIPING

- A. ASTM D2513, SDR-11 polyethylene piping and fittings, PE2306 orange.
- B. Make: Dupont, Plexco, Phillips or approved equal.

2.7 SPECIAL FITTINGS

- A. Cast Iron To Lead Pipe: Red brass ferrules and wiped joints. Caulk ferrule into cast iron hub.
- B. Copper To Cast Iron: Cast bronze, cast iron to sweat adapter.
- C. Copper To Steel Piping:

- 1. Cast bronze copper to iron male or female adapter with shoulder for drainage piping only.
- 2. Dielectric pipe fittings.
- D. Steel To Cast Iron: Cast iron soil pipe connector with spigot and IPS male thread end (Manhoff fittings).
- E. No-Hub, Cast Iron, Glass, Polypropylene Or High Silicon Cast Iron: Proper adapter to piping being connected.

2.8 DIELECTRIC PIPE FITTINGS

A. Tensile strength, ASME B16.8, union 250 psi, or flange design, 175 psi, pressure rating, at 210 Deg. F, threaded or solder joint, constructed to prevent gasket from

squeezing into internal opening.

B. Make: Epco, Capitol Manufacturing, Watts.

2.9 HANGERS, INSERTS AND SUPPORTS

A. Hangers, Inserts, Clamps: Carpenter & Patterson, Central Iron, B-Line, ITT Grinnell.

B. Hangers:

- Adjustable, wrought malleable iron or steel. Copper plated or PVC coated where in contact with copper piping. Cadmium plated or galvanized for exterior.
- 2. Adjustable ring type where piping is installed directly on hanger for piping 3-inch and smaller.
- 3. Adjustable steel clevis type for piping 4-inch and larger.
- 4. Nuts and rods with electroplated zinc or cadmium (0.005 inch minimum) finish.

C. Spacing Schedule:

Pipe	Rod		
Size	Steel	Copper	Size
1-1/4" & smaller	8'	6'	3/8"
1-1/2" to 2"	10'	8'	3/8"
2-1/2" to 4"	12'	10'	5/8"
5" and 6"	12'	10'	3/4"
8" & larger	To suite	e loading co	nditions.

PLUMBING PIPING SYSTEMS AND ACCESSORIES - 220502 PAGE -5-

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Cast-iron pipe: Each horizontal joint, 5-feet maximum O.C.

D. Cast Iron No-Hub Supports:

- 1. In accordance with manufacturers recommendations.
- Vertical piping supported at each stack base and at each floor. Freestanding vertical pipe should be adequately staked or braced during construction to maintain alignment. Bases of stacks shall be supported on concrete, brick laid in cement mortar, metal brackets attached to the building construction or by other methods approved by the Owner's Representative.
- 3. Horizontal piping supported within 24 inch each side of the coupling joint at 10 foot intervals for 10 foot pipe lengths and at 5 foot intervals for 5 foot pipe lengths. Supports or hangers placed to maintain alignment and grade with provision made to prevent shear. Greater than 3 inch diameter pipe braced at changes of direction to prevent horizontal movement.
- E. Piping systems with material not listed above, supported and protected in accordance with manufacturer's recommendations.
- F. Inserts: Design equipment Grinnell Fig. #281, maximum loading 1000 lbs., galvanized finish, and Fig. #285, maximum loading 400 lbs. Make: Globestrut, Grinnell, Unistrut, B-Line.
- G. Metal Stud Isolators: Design equipment Sioux Chief Series 558, high density polyethylene, flame retardant. Provide where piping penetrates studs within stud wall

H. Supports:

- 1. For weights under 1000 lbs.: "Drill-In" inserts equal to Phillips "Red Head" "U" Channel, beam clamps or other structurally reviewed support. The factor of safety shall be at least four. Follow manufacturer's recommendations.
- 2. For weights above 1000 lbs.: Drill through floor slabs and provide flat flush plate welded to top of rod or provide additional "Drill-In" inserts and hangers to reduce load per hanger below 1000 lbs.
- 3. For metal decks: Drill hole through for hanger rods and imbed a welded plate in concrete or use Phillips "Red Head" devices designed for this application, with a safety factor of four.

I. Trapeze Hangers:

1. For plumbing systems only.

- 2. Hangers shall be supported with rod sized with a safety factor of four.
- 3. May be manufactured type "U" shaped channel, or suitable angle iron or channel.
- 4. Securely fasten piping to trapeze with "U" bolt or straps, dissimilar metals shall not touch, use isolation gaskets.
- 5. Make: Globestrut, Kindorf, Unistrut, B-Line.

2.10 PIPING ACCESSORIES

- A. Escutcheon Plates: Steel or cast iron polished chrome, split hinge type with setscrew, high plates where required for extended sleeves. Chrome plated in finished areas and at plumbing fixtures.
- B. Cleanout plugs, bushings, nipples, required for instruments and gauges to be brass.

2.11 SLEEVES

A. Standard Type:

- 1. Schedule 40 black steel pipe sleeves, two pipe sizes larger than the pipe, for structural surfaces.
- 2. Sheet metal sleeves for nonstructural surfaces. Sheet metal sleeves shall be 18-gauge minimum and braced to prevent collapsing.

2.12 SEALING ELEMENTS

A. Waterproof Type:

1. Exterior walls, below grade, and above basement or vault floor: Synthetic rubber material with zinc plated bolts. Make: "Link-Seal" Series 200, 300 or 400, Pyropac.

2.13 FIRESTOP SYSTEM FOR OPENINGS THROUGH FIRE RATED WALL FLOOR ASSEMBLIES

A. Refer to section 078400 – "Fire-stopping" for requirements.

2.14 STACK SLEEVE

- A. With flashing clamp and threaded pipe sleeve extension.
- B. Design Equipment: Jay R. Smith Series 1720 with caulking recess and flashing clamp.

PLUMBING PIPING SYSTEMS AND ACCESSORIES - 220502 PAGE -7-

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C. Make: Jay R. Smith, Zurn or Watts.

2.15 PIPING MATERIALS AND SCHEDULE

A. See Exhibit "A", "Schedule of Piping Materials" at end of this Section for Plumbing piping.

2.16 WATER PRESSURE-REDUCING VALVE

A. Water Regulators:

- 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Honeywell International Inc.
 - b. Watts; a division of Watts Water Technologies, Inc.; Watts Regulator Company.
 - c. Zurn Industries, LLC; Plumbing Products Group; Wilkins Water Control Products.
- 2. Standard: ASSE 1003.
- 3. Comply with NSF-61 requirements.
- 4. Pressure Rating: Initial working pressure of 150 psig.
- 5. Size: Refer to Drawings.
- 6. Design Outlet Pressure Setting: 80 psig.
- 7. Body: Bronze with chrome-plated finish for NPS 2 and smaller; cast iron with interior lining that complies with AWWA C550 or that is FDA approved for NPS 2-1/2 and NPS 3.
- 8. Valves for Booster Heater Water Supply: Include integral bypass.
- 9. End Connections: Threaded for NPS 2 and smaller; flanged for NPS 2-1/2 and NPS 3.

PART 3 - EXECUTION

3.1 EQUIPMENT AND SYSTEMS

PLUMBING PIPING SYSTEMS AND ACCESSORIES - 220502 PAGE -8-

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- A. Install equipment and systems in accordance with provisions of each applicable Section of these Specifications, and Local/State Codes/Regulations having jurisdiction.
- B. Accurately establish grade and elevation of piping before setting sleeves.
- C. Install piping without springing or forcing (except where specifically called for), making proper allowance for expansion and anchoring.
- D. Arrange piping at equipment with necessary offsets, unions, flanges, and valves, to allow for easy part removal and maintenance.
- E. Offset piping and change elevation as required, to coordinate with other Work. Avoid contact with other mechanical or electrical systems. Make changes in direction and branch connections with fittings.
- F. Provide adequate means of draining and venting units, risers, circuits and systems.
- G. Conceal piping unless otherwise called for. Do not install valves, unions and flanges in inaccessible locations.
- H. Ream pipes after cutting and clean before installing. Cap or plug equipment and pipe openings during construction.
- I. Install piping parallel with lines of building, properly spaced to provide clearance for insulation.
- J. Materials within a system and between systems shall be consistent. If this is not possible, install dielectric fittings.

3.2 HANGERS, INSERTS AND SUPPORTS

- A. Piping shall not be supported by wires, band iron, chains, other piping or by vertical expansion bolts. Support piping with individual hangers from concrete inserts, welded supports, or beam clamps of proper configuration and loading design requirements for each location; replace if not suitable. Follow manufacturer's safe loading recommendations. Suspend with rods of sufficient length for swing, using proper diameter rod for pipe size.
- B. Provide additional structural steel members, having one coat rustproof paint, where required for proper support.
- C. Provide oversized hangers where insulation/supports must pass between pipe and hanger.
- D. Provide continuous support or extra supports for plastic pipe per manufacturer's requirements.

PLUMBING PIPING SYSTEMS AND ACCESSORIES - 220502 PAGE -9-

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 - E. Hangers, when attached to joists, shall only be placed at the top or bottom chord panel point. Only concentric type hangers are permissible; "C" type not permitted on joists.
 - F. Provide riser clamps for each riser at each floor.
 - G. Use trapeze hangers where a group of piping can be installed.

3.3 PIPE CONNECTIONS

- A. No-Lead Solder Connections: Nonacid flux and clean off excess flux and solder.
- B. Threaded Connections: Clean out tapering threads, made up with pipe dope; screwed until tight connection. Pipe dope must be specifically selected for each application.
- C. Dielectric Pipe Fittings: Protect fittings from excessive heat.
- D. Press Fitting Connections: Copper press fittings shall be made in accordance with the manufacturer's installation instructions. The tubing shall be fully inserted into the fitting and the tubing marked at the shoulder of the fitting. The fitting alignment shall be checked against the mark on the tubing to assure the tubing is fully engaged (inserted) in the fitting. The joints shall be pressed using the tool approved by the manufacturer.

3.4 WELDING

- A. Welding shall be performed in compliance with the welding procedure specifications prepared by the National Certified Pipe Welding Bureau. Welded piping fabricated by qualified welder. Use certified welder where specifically required by code or insurance company.
- B. Use full length pipe where possible; minimum distance between welds, 18 inch on straight runs. Welds must be at least full thickness of pipe with inside smooth and remove cutting beads, slag and excess material at joints; chamfer ends. Minimum gap 1/8 inch, maximum 1/4 inch, for butt welds. Overlaps on position and bench welds to be not less than 3/4 inch. One internal pass and one external pass minimum required on slip-on flanges.
- C. Do not apply heat to rectify distorted pipe due to concentrated welding; replace distorted pipe.
- D. Welding Is Prohibited In Existing Building Except In Following Areas:
 - 1. Generator 012.
- When welding galvanized pipe, apply cold galvanizing on joint following welding.

3.5 SLEEVES

- A. Provide for pipes passing through floors, walls or ceilings. Extend 1/8 inch above finished floor in finished areas. In above grade Mechanical Rooms and other areas with floor drains use steel pipe sleeves 2-inches above finished floor.
- B. Use steel pipe sleeves in bearing wall, structural slabs, beams and other structural surfaces, and where called for.
- C. Sleeves shall be as small as practical, consistent with insulation, so as to preserve fire rating.
- D. Fill abandoned sleeves with concrete.

3.6 SLEEVE PACKING

- A. Seal Void Space At Sleeves As Follows:
 - 1. Interior locations: Firmly pack with fiberglass and caulk.
 - 2. Exterior walls above or below grade and above basement floors: Use link-seal.
 - 3. Cored holes: Use sealing element.
 - 4. Fire rated, partitions and floor slabs: Use fire rated sealing elements, materials and methods.
 - 5. Waterproofed floors: Use waterproof sealing element, device or compound.

3.7 ESCUTCHEON PLATES

A. Provide polished chrome escutcheon plates for all exposed piping passing through floors, walls or ceilings, in all rooms except in Boiler, Fan and Mechanical Rooms.

3.8 METAL STUD ISOLATORS

A. Piping shall have continuous insulation when passing through the isolator.

3.9 TESTS

- A. Refer to other Sections for testing of Plumbing Systems.
- B. Emergency Generator exhaust piping shall be tested as per the generator manufacturer's start-up instructions. Testing shall be witnessed by the engineer and the owner's representative.

3.10 ADJUSTING

PLUMBING PIPING SYSTEMS AND ACCESSORIES - 220502 PAGE -11-

A. Set field-adjustable pressure set points of water pressure-reducing valves.

3.11 PIPE LINE SIZING

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A. Pipe sizes called for are to be maintained. Pipe size changes made only as reviewed by Owner's Representative. Where discrepancy in size occurs, the larger size shall be provided.

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PLUMBING PIPING SYSTEMS AND ACCESSORIES - 220502 PAGE -12-

EXHIBIT "A" - PIPING MATERIALS (PLUMBING) (Notes at end of Exhibit "A")

Service	Pipe Materials	Fittings	Connections
Domestic water	Type L copper	Wrought copper	No-lead solder
interior hot, cold and hot water re- circulating 4" and smaller		Wrought copper	Press-Fit
Sanitary, Sanitary Vent, and Storm (buried)	Service weight cast iron soil pipe	Cast iron hub and spigot	Neoprene gasket compression type
Sanitary, Sanitary Vent and Storm (not buried) SEE NOTE 2	Service weight cast iron	Cast iron hub and spigot	Neoprene gasket compression type
		No-Hub	No-Hub neoprene gasket and stainless steel clamp
	Type DWV copper	Wrought copper	No-lead solder
Indirect Waste	Type DWV copper	Wrought copper	No-lead solder
Engine Exhaust	Schedule 80 black steel	Butt welded	Welded
Natural Gas (exterior, below grade)	SDR-11 Polyethylene	Fusion welded	Fusion welded
Natural Gas (exterior above grade) SEE NOTE 1	Schedule 40 galvanized steel	Butt welded	Welded
Natural gas (interior) SEE NOTE 1	Schedule 40 black steel	2" and smaller malleable 2-1/2" and over butt welded	Screwed Welded

PLUMBING PIPING SYSTEMS AND ACCESSORIES - 220502 PAGE -13-

NOTES FOR EXHIBIT A:

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NOTE 1: Exposed interior and exterior natural gas piping: One coat of alkyd primer and two coats of exterior acrylic latex gloss enamel. Color "Yellow". Apply paint in accordance with manufacturer's directions. Remove spilled and splattered paint from all surfaces.

NOTE 2: Due to ceiling height restrictions, type DWV copper piping and fittings shall be used for all branch sanitary waste and vent piping serving plumbing fixtures on floors two (2) through nine (9).

END OF SECTION

PAGE -1-

GENERAL DUTY VALVES FOR PLUMBING PIPING SECTION 220523

PART 1 – GENERAL

1.1 WORK INCLUDED

Provide labor, materials, equipment and services to perform operations required Α. for the complete installation and related Work as required in Contract Documents.

1.2 **SUBMITTALS**

- All valves and accessories listed under "Part 2 Products" of this Section. A.
 - 1. Submit cut sheets, specifications and dimensioned drawings.
 - 2. Show compliance with ANSI/NSF-372 for valves intended to supply drinking water.

PART 2 - PRODUCTS

2.1 **VALVES**

- Α. General: Valves shall have following requirements:
 - 1. Working pressure stamped or cast on bodies per MSS SP-25.
 - 2. Stem packing serviceable without removing valve from line and shall be free of asbestos.
 - Valves intended to supply drinking water shall comply with requirements 3. of ANSI/NSF-61 and ANSI/NSF-372.
 - 4. Materials used in all bronze valves shall conform to ASTM B61 and B62.
 - 5. Valves used in insulated piping is to have stem extensions.

B. Makes:

- 1. Gate valves: Watts, Milwaukee, Hammond or Nibco.
- 2. Check valves: Watts, Milwaukee, Hammond or Nibco.
- 3. Ball valves: Watts, Hammond, Milwaukee or Nibco.
- 4. Balance valves: Watts, Bell & Gossett, Armstrong or Taco.

GENERAL DUTY VALVES FOR PLUMBING PIPING - 220523 PAGE -2-

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- 5. Gas valves: Watts, Homestead, Nordstrom (Flowserve Corp.) or Resun (R&M Energy Systems).
- 6. To establish a standard of quality and identify features, certain manufacturer's numbers are given in the following paragraphs.

C. Gate Valves:

1. 2-1/2-inch and larger (OS&Y): Epoxy coated ductile iron body, resilient wedge, flanged, 250 wwp, Nibco F-607-RW.

D. Swing Check Valves:

- 1. 2-1/2-inch through 4-inch: Bronze, threaded ends, 300# WOG. Watts LFCV. Provide in horizontal positions only.
- 2. 2-inch and smaller: Bronze, 200# WOG. Threaded ends, Watts LFCV. Solder ends, Watts LFCVS. Provide in horizontal positions only.

E. Silent (Spring) Check Valves:

- 1. 2-1/2 inch and larger: Cast iron body, bronze alloy disc, stainless steel spring, flanged, Class 125. Nibco F-910-LF.
- 2. 2-inch and smaller: Bronze body, PTFE disc, stainless steel spring and stem, 250# swp. Threaded ends, Nibco T-480-Y-LF. Solder ends, Nibco S-480-Y-LF. Provide in vertical or horizontal position.

F. Ball Valves:

- 2-inch and smaller: Lead-free brass body with hard chrome-plated leadfree brass ball and stem, full port opening, teflon seats, end entrance, 600 #WOG, 150 #WSP. Threaded ends, Watts LFFBV-3C. Solder (sweat) ends, Watts LFFBVS-3C.
 - a. Valve shall have separate packing nut and handle nut.
- 2. 2-1/2-inch and larger: Lead-free brass body with hard chrome-plated lead-free brass ball and stem, full port opening, teflon seats, end entrance, 400 #WOG, 125 #WSP. Threaded ends, Watts LFFBV-3C. Solder (sweat) ends, Watts LFFBVS-3C.
 - a. Valve shall have separate packing nut and handle nut.

G. Balance Valves:

1. Lead-free brass body with stainless steel ball. Body shall have 1/4" NPT tapped drain port.

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GENERAL DUTY VALVES FOR PLUMBING PIPING - 220523 PAGE -3-

- 2. Calibrated balance valve with provisions for connecting a portable differential pressure meter suitable as a service valve. Meter connections shall have built-in check valves. Valves shall have memory stop feature with an integral pointer to register degree of valve opening. Valve shall have internal seals.
- 3. Balance valves sizes shall be based upon gpm range rather than pipe size.

Balance Valve Size	GPM Range	
1/2"	up to 2.5	
3/4"	2.5 - 4.5	
1"	4.5 - 10	
1-1/4"	10 - 15	
1-1/2"	15 - 30	

4. Design equipment: Bell & Gossett "Circuit Setter Plus", model CB-xx-LF Series; Watts Series LFCSM-61-S, or approved equal.

H. Valves For Gauges And Instruments:

1. 1/4 inch size: Stainless steel body, seat and stem. Rated for 6000 psi (maximum) and 200 Deg. F (maximum). Design equipment: Trerice series 735 needle valve.

I. Gas Valves:

- 1. 2-inch and smaller: Bronze body, screwed ends, full port ball valve, CSA approved and UL listed. Watts model #FBV-3.
- 2. 2-1/2 inch and larger: Manual actuated with lever actuators, short pattern, lubricated plug type, 200 lb. WOG, flanged, UL listed and CSA approved. Homestead Figure 612.

J. Hose Thread Drain Valves:

1. Lead-free copper silicon alloy body with 2-piece full port brass ball valve. Female NPT x 3/4 inch hose end, brass cap with polypropylene tether chain, 600 #WOG. Design Equipment: Watts model #LFFBVS-3C-CC.

K. Pressure Reducing Valves (PRV)

- 1. Standard capacity, all bronze, lead free body, renewable stainless steel seat, stainless steel strainer, and thermal expansion bypass feature.
- 2. Valve parts shall be replaceable without dismantling or removing the valve from the line being served.
- 3. Valve shall be rated for a maximum temperature of 160 degrees Fahrenheit and be rated for an initial pressure of 300 pounds maximum.

GENERAL DUTY VALVES FOR PLUMBING PIPING - 220523 PAGE -4-

The adjustable pressure range shall be from 25 psi to 75 psi.

- 4. NPT threaded female union inlet x NPT female outlet.
- 5. Provide 160 pound gauge and tapping on valve body.
- 6. Provide isolation valves on each side of the PRV as indicated on the Contract Drawings.
- 7. Provide where indicated on the Contract Drawings.
- 8. Make: Watts model #LFU5B-Z3-GG or approved equal.

PART 3 - EXECUTION

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3.1 INSTALLATION

A. General:

- 1. Provide valves of type called for and where required to service equipment and fixtures.
- Use extreme care and caution when soldering valve connections to piping
 to prevent valve seat damage. Apply heat with the flame directed away
 from the center of the valve body. Inspect all valves after soldering,
 tighten valve packing nut and make adjustments if required to ensure
 valve operates properly. Replace all damaged valves.
- 3. Provide valves at major building and system sections and where shown on the Contract Drawings.
- 4. Provide extended stem on insulated valves so valve handle is outside of insulation.
- 5. Locate valves with stems at or above horizontal positions and swing check valves in horizontal position only. Provide vertical lift check valves only in vertical positions.
- 6. Ball valves shall be used for water service through 4-inch unless otherwise noted.
- 7. Install balance valves as recommended by the manufacturer. Provide recommended pipe diameter clearance upstream and downstream from each balance valve provided.
- 8. Provide hose threaded drain valves at all low points, strainers, equipment, and as called for on the Contract Drawings.

IDENTIFICATION FOR PI

IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT - 220553 PAGE -1-

IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT SECTION 220553

PART 1 - GENERAL

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1.1 WORK INCLUDED

A. Provide labor, materials, equipment and services as required for the complete installation designed in Contract Documents.

1.2 QUALIFICATIONS

A. All identification devices shall comply with ANSI A13.1 for lettering size, length of color field, colors, and viewing angles.

1.3 SUBMITTALS

- A. Submit product data for each identification material and device, and for all items specified under "Part 2 Products" of this Section.
- B. Submit valve schedule for all piping systems typewritten on 8 1/2 inch x 11 inch paper indicating code number, location and valve function.
- C. Submit schedule of piping, equipment and valve identification for review before labeling.
- D. Submit color samples: Manufacturer's standard colors for sign material and finishes specified.

1.4 ACCEPTABLE MANUFACTURERS

A. Allen Systems, Inc., W.H. Brady Co., Calpico, Craftmark Identification Systems or Seton Name Plate Corp.

PART 2 - PRODUCTS

2.1 GENERAL

A. Provide manufacturer's products of categories and types required for each application.

2.2 PIPING IDENTIFICATION

- A. Pipe Labels (Inside buildings):
 - 1. Piping/Insulation with outside diameter of 8-inches and less: Provide self-adhesive, vinyl press and peel type markers with directional flow arrows, pipe temperature -40 degrees F to 175 degrees F. UV resistance and

SUNY OSWEGO IDENTIFICATION

IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT - 220553 PAGE -2-

legend printed four (4) times for 360 degree visibility.

2. Make: Seton "Opti-Code" or approved equal.

B. Pipe labels shall conform to the following identification table:

PIPE SERVICE IDENTIFICATION / LABEL

Domestic Cold Water

Domestic Hot Water

Domestic Hot Water Re-circulation

Domestic Hot Water Re-circulation

Domestic Hot Water Re-circulation

Domestic Hot Water Re-circulation DOMESTIC HOT WATER RECIRCULATION

Natural Gas
Sanitary Sewer
Sanitary Sewer Vent
Indirect Waste
Storm Sewer
Sanitary Sewer Vent
Sanitary Sewer Sanitary Vent
Sanitary

C. Underground Pipe Identification and Detection Marking:

1. Provide Metallic Detection Tape for all underground sanitary sewers, natural gas lines and water piping. Provide 2" wide tape, 0.035". Make: Seton style 37000 series 2 inch tape for burial 4 inches to 6 inches below surface, style 37000 series 6 inch tape for burial deeper than 6 inches.

2.3 VALVE IDENTIFICATION

A. Valve Tags:

1. Standard brass valve tags, 2" diameter with 1/2" high numerals. Identify all plumbing services with 1/4" letters above the valve number ("PLBG."). Attach to valves using brass "jack" chain and brass "S" hook. Make: Seton Style No. M4507 tags, Style No. 16182 chain and Style No. 16195, 6 and 7 No. hooks.

B. Valve Chart:

1. Provide valve chart for all valves provided as a part of this project. Frame and place under clear glass. Hang in Mechanical Room or in location as directed by the Owner.

2.4 SIGNS

- A. Engraved Stock Plastic: Scratch-resistant, non-static, high pressure laminate with contrasting inner core color.
 - 1. Finish and Color: As selected from manufacturer's standard colors and finishes, unless otherwise indicated.

IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT - 220553 SUNY OSWEGO PAGE -3-

- 2. Exposed Engraved Inner Core: White, unless otherwise indicated.
- 3. Thickness: 1/8 inch, unless otherwise indicated
- B. Engraved Process: Machine engraved letters, numbers, symbols, and other graphic devices to produce precisely formed copy indented to a uniform depth with sharply formed edges. Engrave copy through the exposed face ply to expose the core ply.

PART 3 - EXECUTION

3.1 GENERAL

- A. Provide valve tags for all valves provided on project. Provide a valve tag chart for all valves provided on the project.
- B. Provide piping identification with directional flow arrows for all piping on project.
 - 1. Provide labels on straight runs of piping at 15'-0" intervals, minimum.
 - 2. Provide labels where piping enters and leaves a partition, wall, floor or ceiling.
- C. Underground pipe detection tape:
 - 1. Bury detection tape approximately 12-inches directly above the pipe and at least 6-inches below grade to mark the location of the buried pipe.
- D. Provide signs at gas meter, attached to valves using chain and fasteners.
 - 1. Lettering for building service gas valve: "Building Gas Service".
 - 2. Lettering for generator gas valve: "Gas Service for Standby Generator".

PLUMBING PUMPS SECTION 220580

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Provide labor, materials, equipment and services to perform operations required for the complete installation and related Work as required in Contract Documents.

1.2 SUBMITTALS

- A. All items specified under "Part 2 Products" of this Section.
- B. Warrantees and maintenance instructions.
- C. Wiring diagrams for pumps and related controls.

1.3 LEED Submittals

A. Product Data for Prerequisite EA 2: Documentation indicating that units comply with applicable requirements in ASHRAE/IESNA 90.1, without amendments, Section 7 - "Service Water Heating."

PART 2 - PRODUCTS

2.1 DOMESTIC HOT WATER RE-CIRCULATION PUMPS

A. General:

- 1. Pumps shall be of all bronze construction, permanently lubricated.
- 2. Motor shall have built-in thermal overload protection.
- 3. Pumps shall be controlled by an aquastat controller; Johnson Controls model #A19ABC-39 or an approved equal.
- 4. Provide all control wiring and 120 volt circuits for pumps, and system control and operation. Provide all control wiring for aquastats and domestic hot water system control devices. Refer to Section 220901 "Electrical Wiring for Plumbing Systems".
- 5. Acceptable manufacturers: Grundfos, Armstrong, Bell & Gossett, Stratos or Taco.
- B. Tag: RP-1.

PLUMBING - DIV. 22 PLUMBING PUMPS - 220580 PAGE -2-

- 1. Capacity: Refer to Schedule on Drawings.
- Pipe Connection Size: Refer to Schedule on Drawings.
- 3. Electrical: Refer to Schedule on Drawings.
- 4. Make: Refer to Schedule on Drawings.

2.2 DOMESTIC WATER PRESSURE BOOSTER PUMPSYSTEM

- A. Equipment Tag: BP-1
- B. Provide a variable speed, two (2) pump, packaged pressure booster system. Total system capacity of 238 GPM with a system pressure required at the pump discharge header of 43 PSI and a minimum pump suction pressure of 13 PSI.
- C. The system shall be wired for 208 volt, 60 cycle, 3 phase power. Pumps shall include 10 HP, 3450 RPM motors.
- D. Pumps shall be cast iron, stainless fitted.
- E. Motors shall be of the pulse width modulated integrated motor/variable frequency drive design.
- F. The suction and discharge manifolds shall be constructed of #316 stainless steel, 300 pound flanges and liquid filled pressure gauges and switches to detect low suction pressure. Set pressure for system shutdown at 10 PSI.
- G. The control panel shall be mounted in a UL Type 3R rated enclosure. The controller shall operate the pumps to maintain design pressure while using minimum energy and alternating between pumps. Pumps shall changeover automatically to maintain system pressure depending on demand, time and fault. The control panel shall include a main disconnect, circuit breakers for each pump and the control circuit and control relays for alarm functions.
- H. The controller shall have a keypad and LED display screen. System functions shall be programmable through the keypad. These programmable functions and information shall include, but not be limited to:
 - 1. Pump status.
 - 2. Elapsed running hours for each pump.
 - 3. System pressure set-point.
 - 4. Actual system pressure.
 - 5. Pump speed (percent).
 - 6. Pump minimum and maximum speed (percent).

PLUMBING - DIV. 22 PLUMBING PUMPS - 220580 PAGE -3-

- 7. System faults.
- 8. Pressure transducer design settings.
- 9. Pump priority.
- 10. Standby pump designation.
- 11. Current pump rotation order.
- 12. Friction loss compensation (set-point).
- 13. High and low discharge pressure shut-down limit.
- 14. Low suction pressure shut-down limit.
- 15. Analog input for remote set-point control.
- 16. Digital input for remote stop/start.
- I. The control cabinet shall include:
 - 1. Pump run light (pump motors include this as standard).
 - 2. Pump fault lights (pump motors include this as standard).
 - 3. Visual alarm.
 - 4. Audible alarm.
- J. The system shall be skid mounted on a fabricated #304 stainless steel frame and set on a concrete pad. The system shall be completely factory assembled, hydraulically and electrically tested at the factory prior to shipment and set to receive suction, discharge and electrical connections. All control devices shall be pre-set to suit actual job conditions.
- K. A totalizing water meter shall be included on the skid.
- L. Provide a Thrush Model #FXA-300, 80 gallon draw-down, replaceable bladder tank, 24" inches in diameter x 55" high.
- M. Motors provided shall be energy efficient to comply with New York State Energy Codes.
- N. Make: Refer to Schedule on Drawing.
- O. Acceptable Manufacturers: Grundfos, Armstrong or Patterson.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Pumps shall be installed, aligned and started in accordance with the manufacturers written installation instructions.
- B. Install pumps in locations to provide access for maintenance and replacement of parts.
- C. Support pumps and piping separately so that piping does not support pumps.
- D. Provide the services of a factory trained mechanic to start up the system based on factory recommendations. Provide owner instruction at time of start up. Submit three (3) copies of start-up report to the Owner's Representative.

3.2 DOMESTIC HOT WATER RE-CIRCULATION PUMP

- A. Install pump in accordance with the manufacturer's written instructions.
- B. Install pump in the horizontal position.
- C. Install an isolation valve on the pump inlet. Install a check valve, balancing valve and pressure gauge on the pump outlet.

3.3 DOMESTIC WATER PRESSURE BOOSTER PUMPSYSTEM

- A. Install pump package on a 3-inch high, concrete housekeeping pad. Provide neoprene vibration isolators on pump system skid.
- B. Piping from the system discharge header to the expansion tank shall be copper piping, sized as per the expansion tank connection size. Provide a ball valve between the header and expansion tank.
- C. The system shall be factory tested and calibrated at design conditions.
- D. Install flexible connectors on suction and discharge header with dielectric isolation.
- E. Provide the services of a factory trained mechanic to start up the system based on factory recommendations. Provide owner instruction at a time designated after the system has been started and calibrated.

3.4 TESTING

- A. Test domestic water pressure booster system for operation.
- B. Certify in writing that tests have been performed and the systems are properly operating. Submit three (3) copies of all test reports to the Owner's representative. Include all test reports within O&M manual.

PLUMBING INSULATION SECTION 220700

PART 1 – GENERAL

- 1.1 WORK INCLUDED
 - A. Provide labor, materials, equipment and services to perform operations required for the complete installation and related Work as required in Contract Documents.
- 1.2 SUBMITTALS
 - A. Manufacturer data. Schedule of insulation applications.
- 1.3 LEED Submittals:
 - A. Product Data for Credit IEQ 4.1: For adhesives and sealants, documentation including printed statement of VOC content and chemical components.

PART 2 - PRODUCTS

- 2.1 GENERAL
 - A. Insulation, Jackets, Adhesives, And Coatings, Shall Comply With The Following:

Treatment of jackets or facings for flame and smoke safety must be permanent. Water soluble treatments not permitted.

- 1. Insulation, including finishes and adhesives on the exterior surfaces of pipes and equipment, shall have a flame spread rating of 25 or less and a smoke developed rating of 50.
- 2. Asbestos or asbestos bearing materials not permitted.
- 2.2 PIPE INSULATION (RIGID TYPE)
 - A. Preformed rigid sectional pipe covering, 4 lb. nominal density fiberglass. Maximum thermal conductivity (k), on a flat surface, shall be 0.25 Btu/sq. ft. hr. OF/in. at 75OF mean temperature. White Kraft outer surface bonded to aluminum foil and reinforced with fiberglass yarn.
- 2.3 GLASS-FIBER, PREFORMED PIPE INSULATION
 - 1. Type I, 850 Deg F Materials: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 547, Type I, Grade A.
- 2.4 PLASTIC JACKETING

A. PVC jacket, 20 mill thickness. Solvent adhesive welded joints.

2.5 MAKE

- A. Fiberglass: Certainteed, Knauf, Manville, Owens-Corning, or approved equal.
- B. Ceramic Fiber: Unifrax or approved equal.
- C. Cellular Polyisocyanurate: Celotex, NRG, R-Max, or approved equal.
- D. Adhesives: Benjamin Foster (BF), Mono-Eco, Tremco; numbers designate quality of adhesive.

2.6 MATERIALS AND SCHEDULES

A. See Exhibits at the end of this section.

PART 3 – EXECUTION

3.1 GENERAL REQUIREMENTS

- A. Provide Thermal Insulation:
 - 1. Insulation is required on piping and equipment unless otherwise called for.
 - 2. Only on clean, dry surfaces and after work has been tested.
 - 3. On cold surfaces with continuous unbroken vapor seal.
 - 4. Exposed surfaces shall be white.
 - 5. Pipes shall be individually insulated.
- B. Do not cover inspection stampings, openings, petcocks, hand-holes, manholes, access doors, plugged outlets, air vents, plugged openings or petcocks.

3.2 PIPE INSULATION

- A. Insulate piping systems including fittings, valves, flanges, unions, strainers, and other attachments installed in piping system, whether exposed or concealed.
- B. Piping within Exterior Walls, Spaces, Overhangs and/or where subject to freezing: Insulate pipe with double the thickness called for.
 - 1. Piping In Wall Chases: In addition to the above, pack chase with loose glass fiber insulation.

C. Plumbing Equipment:

- Install insulation on exposed hot and cold plumbing piping to within 18 in.
 of fixture or equipment connection.
- 2. Insulate exposed domestic hot water and waste piping for plumbing fixtures designated for use by the handicapped. Refer to section 224200 "Commercial Plumbing Fixtures".
- D. Joints In Section Pipe Covering Made As Follows:
 - 1. Standard: Longitudinal laps and butt joint sealing strips cemented with BF 85-20 or factory applied pressure sensitive adhesive lap seal. Stapled with outward clinching staples.
 - 2. Vapor barrier: For cold services, Longitudinal laps and 4 in. vapor barrier strip at butt joints shall be sealed with white BF 85-20. Seal ends of pipe insulation at valves, flanges, and fittings with white BF 85-20.

E. Fittings, Valves And Flanges:

- 1. Hot and cold water:
 - a. Concealed: Insulating cement of the same thickness as adjacent pipe insulation. Cold water to be vapor sealed with BF 30-36 "Seal-Fas".
 - b. Exposed: Pre-molded fitting covers of the same material and thickness as the adjacent pipe insulation and finished with glass cloth applied and coated with BF 30-36 "Seal-Fas."
- 2. Optional: In lieu of the standard method above, the Contractor has the option of using Zeston, Ceel-Tite System, or Proto. Tape all joints at covers.

3.3 RECOVERING

A. Field application of 6 oz. white, glass cloth, cemented and applied over standard jacket. Properly cut at fittings to avoid wrinkles and coat with BF 30-36. Leave ready for painting. Provide as called for.

EXHIBIT "I" - PIPE INSULATION MATERIALS (Notes are at end of Exhibit I)

<u>SERVICE</u>	INSULATION MATERIAL	PIPE <u>SIZE</u>	INSULATION THICKNESS	<u>REMARKS</u>
Domestic cold water	Glass fiber	1-1/2" and larger 1-1/4" and smaller	1" 1/2"	See Note 1
Domestic hot water supply and return (up to 140 ⁰)	Glass fiber	1-1/2" and larger 1-1/4" and smaller	1-1/2" 1"	As required per the Energy Conservation Construction Code See Note 1
AC unit drains and overflows	Glass fiber	All sizes	1/2"	
Roof conductor lines	Glass fiber	All sizes	1"	Insulate body of drain and conductor piping, horizontal and vertical down to connection point of existing storm sewer to remain above the basement floor slab

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DOMESTIC WATER SYSTEMS BALANCING SECTION 220801

PART 1 – GENERAL

1.1 WORK INCLUDED

A. Provide labor, materials, equipment and services to perform operations required for complete adjusting and balancing Work as required in Contract Documents.

1.2 SUBMITTALS

- A. Provide information in report form listing items required by the Project specifications. Report shall be typed and three copies submitted for review. Results shall be guaranteed. Contractor shall be subject to recall to the job site to verify report information before acceptance of the report by the Owner's Representative.
- B. Report format shall consist of the following:
 - 1. Title sheet with job name, contractor, engineer, date, balance contractor's name, address, telephone number and contact person's name and the balancing technician's name.

1.3 QUALIFICATIONS

- A. Follow procedures and methods published by one or more of the following:
 - 1. Individual manufacturer requirements and recommendations.
- B. Maintain qualified person at project for system operation, trouble shooting and perform mechanical adjustments in conjunction with balancing procedure.
- C. Balancing contractor shall be current member of AABC or NEBB.

1.4 GENERAL REQUIREMENTS

- A. Before concealment of systems visit the job site to verify and advise on type and location of balancing devices and test points. Make changes as required to balancing facilities.
- B. Place systems in satisfactory operating condition.
 - 1. Adjusting and balancing shall be accomplished as soon as the systems are complete and before Owner takes possession.
 - 2. Prior to balancing adjust balancing devices for full flow; fill, vent and clean plumbing systems, replace temporary strainers.

DOMESTIC WATER SYSTEMS BALANCING - 220801 PAGE -2-

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3. Initial adjustment and balancing to quantities as called for or as directed by the Engineer, to satisfy job conditions.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS

A. Provide tools, ladders, recording meters, gauges, thermometers, velometers, anemometers, inclined gauge manometers, magnehelic gauges, amprobes, voltmeters, psychrometers and tachometers required. Instruments used shall be accurately calibrated as per AABC or NEBB requirements.

PART 3 - EXECUTION

3.1 PREPARATION

A. Examine Bid Documents and notify Owner's Representative of any questions regarding balancing, within thirty days after receipt of bid and prior to starting work.

3.2 WATER SIDE

- A. Test, adjust and record the following:
 - 1. Domestic Hot Water Re-circulating Pumps:
 - Check rotation.
 - b. GPM.
 - c. Running suction pressure.
 - d. Running discharge pressure.
 - e. Running load amps.
 - f. RPM motor.
 - g. Complete nameplate motor and pump.
 - 2. Domestic Hot Water Re-circulation System Balancing Valves:
 - a. Balance every valve to GPM noted on the Drawings.

ELECTRICAL WIRING FOR PLUMBING SYSTEMS SECTION 220901

PART 1 – GENERAL

1.1 WORK INCLUDED

- A. Provide labor, materials, equipment and services to perform operations required for the complete installation and related Work as required in Contract Documents.
- B. Provide "control" wiring circuits for equipment and associated control devices. Control wiring includes 120 volt and lower wiring for control signals directing equipment operation.
- C. Provide certain "power" wiring as called for. Power wiring includes 120 volt and higher branch circuit wiring required for equipment operation.
- D. Assistance, as required and coordination with Division 26, "Electric".

1.2 QUALIFICATIONS

- A. Wiring installed in compliance with NEC, local governing codes, and applicable requirements of Division 26, "Electric".
- B. Wiring installed only by qualified electricians.

1.3 COORDINATION

A. Provide complete wiring diagrams for equipment and systems. Deliver wiring diagrams to proper parties in time for roughing of conduit, equipment connections, and avoid delay in construction schedule. Wiring diagrams and roughing information to clearly indicate items to be mounted and/or wired as part of the work of Division 26, "Electric".

PART 2 - PRODUCTS

2.1 WIRING MATERIALS

A. Refer to Division 26 "Electric" for information regarding conduit, wire, insulation, wiring devices and methods.

PART 3 – EXECUTION

3.1 GENERAL

A. Check electrical wiring pertaining to equipment for completeness and

correctness of connections. Correct any misapplied motor and/or motor starter, improper thermal overload device, or device which fails to function and resultant damage, whether due to incorrect connections or improper information on wiring diagrams.

3.2 WIRING FOR CONTROL SYSTEMS

- A. Provide control wiring for equipment.
- B. Wiring circuits shall be in conduit. Rigid type below slabs, wet locations, exposed to weather and hazardous locations. EMT in dry, non-hazardous locations for concealed or exposed work. Provide 18 in. maximum length flexible, jacketed conduit at motors and devices subject to vibration. Conduit supported on 5 ft. centers. Do not attach directly to hot surfaces, piping, or ductwork.
- C. Control wiring shall be in separate conduit from power wiring.
- D. Provide green grounding wire circuits from starter, and run ground wire through conduit to each remote auxiliary relay, pushbutton station, remote panel, or other device with potentials in excess of 50 volts contained within. Size ground wire per NEC.
- E. Furnish pushbutton stations, pilot lights, selector switches, auxiliary starter contacts, and other devices required for functions specified.

3.3 MISCELLANEOUS ELECTRIC WIRING

A. Provide power and control wiring between sections of equipment, between shipping splits, between remote panels, and disconnect switches

3.4 FIELD WIRING IN STARTERS, CONTROLLERS AND PANELS

- A. Wiring within starters, controllers, and control panels, shall be routed neatly in gutter space, away from moving and/or heat producing parts.
- B. Provide 30 ampere, 600 volt rated terminal blocks. Do not place more than two wire connections on pilot device or relay terminal. Where more than two circuit connections are required use terminal blocks.
- C. Provide nylon self-insulated, locking type spade lugs for all control wires.
- D. Cables and wires shall be neatly bundled and lashed with nylon cable straps.

3.5 HAZARDOUS LOCATIONS

- A. Provide installation in hazardous locations as follows:
 - 1. Provide seal-offs for hazardous Class 1 locations according to

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ELECTRICAL WIRING FOR PLUMBING SYSTEMS - 220901 PAGE -3-

NEC Article 501 "Class 1 Locations".

2. Follow NEC requirements for special occupancies, wiring methods, sealing, fittings and other NEC rules and articles as applicable.

FACILITY WATER DISTRIBUTION SECTION 221100

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Provide labor, materials, equipment and services to perform operations required for the complete installation and related Work as required in Contract Documents.

1.2 QUALITY ASSURANCE

- A. Follow all requirements, recommendations and appendices of the following publications, codes, standards, and listings:
 - 1. AWWA / ANSI C600: American Water Works Association Standard for Installation of Ductile Iron Water Mains and Their Appurtenances.
 - New York State Health Department.
 - Plumbing Code of New York State, 2015.
 - 4. ANSI/NSF-61, Drinking Water System Components Health Effects.
 - 5. ANSI/NSF-372, Drinking Water System Components Lead Content.

1.3 SUBMITTALS

- A. All items specified under "Part 2 Products" of this Section.
- B. Written certification for domestic water system tests. Submit with O&M Manuals.

PART 2 - PRODUCTS

2.1 DOMESTIC WATER PIPING

A. Refer to Section 220502 - "Plumbing Piping Systems and Accessories" for piping materials.

PART 3 - EXECUTION

3.1 GENERAL

A. Installation shall conform to Article 1.2 of this section and shall be provided in a workmanlike manner as determined by the Owner's Representative and the Contract Specifications.

3.2 PIPING

- A. Run all water piping slightly off level to low points. Provide drain valves and caps at all low points in the domestic water system.
- B. Provide water hammer arrestors where shown or specified. Provide water hammer arrestors where solenoid or quick closing valves are installed.
- C. Branch headers serving flush valves and fixtures shall be run full size to the last fixture being served unless otherwise noted.
- D. All exposed water piping under fixtures shall be chrome plated brass.
- E. Provide dielectric pipe fittings when connecting systems of dissimilar metals. Refer to Section 220502 "Plumbing Piping Systems and Accessories".
- F. Supply piping to all fixtures, faucets, shower accessories, hydrants, flush valves and equipment shall be anchored to prevent movement. Provide additional structural members and supports as required.

3.3 CLEANING AND DISINFECTION OF DOMESTIC WATER PIPING

- A. Cleaning and disinfection of the domestic water piping shall be in accordance with all requirements of the New York State Department of Health and the authority having jurisdiction (DASNY). Specific cleaning and disinfection procedures shall be obtained from the New York State Department of Health. Prior to disinfecting, flush piping thoroughly to remove any debris, sediment, dirt, rust, corrosion and other foreign material. (200 ppm chlorine for 3 hours)
- B. Clean and disinfect all domestic water piping that has been altered, extended or repaired.
- C. After testing, flushing, cleaning and disinfection procedures are complete, collect bacteriological test samples. A minimum of two (2) samples shall be taken. Locations of the samples shall be designated by the Owner's Representative. Collect samples in sterile bottles and send to a New York State Department of Health approved laboratory for analysis.
- D. Submit sample test results to the engineer and the Owner's Representative.
- E. The Contractor shall clean, disinfect, flush and re-test domestic water piping until the sample test results are satisfactory.

3.4 TESTS AND FLUSHING

- A. Provide all necessary items to complete proper testing of all domestic and fire protection water piping. Isolate existing systems as required.
- B. Flush all domestic water piping to remove debris, sediment, dirt, rust, corrosion and other foreign material. Flush all piping before connecting to

fixture faucet and flush valves. Upon completion of flushing, Contractor shall remove all faucet aerators and all system strainers, clean them thoroughly and reinstall. Refer to Section 224200 – "Commercial Plumbing Fixtures". Utilize open pipe ends wherever possible.

- C. Piping Supplying Domestic Water Only Test at 125 psi hydrostatic pressure for two hours. All tests shall be witnessed by the Engineer or the Owner's Representative.
- D. A successful air test is not acceptable as the final test; however, the Division 22 contractor shall provide interim air testing of piping as construction progresses.
- E. Make all leaks tight. No caulking of leaks shall be permitted. Remove and replace all defective fittings, piping and connections.
- F. Pay all costs of tests. Perform all tests in a safe manner. Remove all discharged water resulting from testing procedures.
- G. Certify in writing that all required domestic water tests have been conducted and successfully completed. Submit all certifications to the Engineer and the Owner's Representative.

FACILITY WASTE WATER SYSTEMS SECTION 221301

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Provide labor, materials, equipment and services to perform operations required for the complete installation and related Work as required in Contract Documents.

1.2 SUBMITTALS

- A. All items specified under "Part 2 Products" of this Section.
- B. Submit written certification for sanitary waste, sanitary vent and storm water piping system tests. Submit with O&M Manuals.

PART 2 – PRODUCTS

2.1 PLUMBING DRAINAGE SYSTEM

A. Refer to Section 220502 - "Plumbing Piping Systems and Accessories" for piping materials.

PART 3 – EXECUTION

3.1 GENERAL

A. Prior to commencing work, the Contractor shall verify all inverts and locations. Any discrepancy between the plans and field conditions shall be reported in writing to the Owner and Engineer within three (3) days of discovery. No work shall start until all discrepancies have been resolved. All costs related to Contractor's failure to verify and/or report discrepancies or problems will be borne by the Contractor.

3.2 FLASHING

- A. For all Floor Drains (FD):
 - 1. Cooperate closely with the General Contractor (GC).
 - 2. Division 22 Contractor is responsible for tightness.
 - Floor drains: 24 inch square, 4 pounds per foot lead sheet, held by clamping ring. No flashing required for floor drains in slabs on grade. Coordinate location of drains for equipment with locations of pads and equipment.

3.3 INTERIOR PIPING INSTALLATION

- A. Minimum Pitch: Piping 3-inches and under = 1/4 inch per foot, 4-inches and larger = 1/8 inch per foot.
- B. Thermoplastic Sewer Pipe:
 - 1. Protect plastic pipes passing through concrete floors with one half inch (1/2 in.) of insulation material inside sleeve.
 - 2. Fire walls shall not be penetrated by plastic pipe.
 - 3. Pipe shall not be installed when the temperature is below 20°F.
 - 4. Install pipe on firm, stable and uniform trench bottom and compacted to a point three pipe diameters above the bottom of the pipe. Backfill to a depth of 1 ft. 0 in. above the top of the pipe shall be free of stones greater than 1 in. diameter.

3.4 TESTING

- A. Provide necessary items to complete proper testing of Work.
 - 1. Test all sections of sanitary, waste and vent piping installed by this Project. Test existing piping as called for.
 - 2. Maintain 10 feet head of water above highest point of section being tested for 15 minutes minimum.
 - 3. For interior piping, leaks of any volume detected in sewers or in floors or walls of appurtenant structures shall be permanently stopped. Should any leaks, defective joints or defective construction be found, they shall be promptly made good. Should any defective pipes or specials be discovered they shall be removed and replaced with sound pipes or specials in a satisfactory manner at the Contractor's own expense.
 - 4. Air test not acceptable as final test.
 - 5. Pay all costs of test.
 - 6. Provide written certification that tests have been conducted and successfully completed. Submit to Owner's Representative.

SUMP PUMPS SECTION 221429

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Packaged drainage-pump units.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
- B. Wiring Diagrams: For power, signal, and control wiring.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For pumps and controls, to include in operation and maintenance manuals.

1.5 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. UL Compliance: Comply with UL 778 for motor-operated water pumps.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Retain shipping flange protective covers and protective coatings during storage.
- B. Protect bearings and couplings against damage.
- C. Comply with pump manufacturer's written rigging instructions for handling.

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PART 2 - PRODUCTS

2.1 PACKAGED DRAINAGE-PUMP UNITS

- A. Packaged Submersible Drainage-Pump Units:
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - a. Bell & Gossett Domestic Pump; ITT Corporation.
 - b. Goulds Pumps; ITT Corporation.
 - c. Grundfos Pumps Corp.
 - d. Liberty Pumps.
 - e. Little Giant Pump Co.
 - 2. Description: Factory-assembled and -tested, automatic-operation, basin-mounted, sumppump unit.
 - 3. Pump Type: Submersible, end-suction, single-stage, close-coupled, overhung-impeller centrifugal pump as defined in HI 1.1-1.2 and HI 1.3.
 - 4. Casing: Metal.
 - 5. Impeller: Brass.
 - 6. Pump Seal: Mechanical.
 - 7. Motor: Hermetically sealed, capacitor-start type, with built-in overload protection.
 - 8. Power Cord: Three-conductor, waterproof cable of length required but not less than 72 inches, with grounding plug and cable-sealing assembly for connection at pump.
 - 9. Pump Discharge Piping: Factory or field fabricated, galvanized, ASTM A 53/A 53M, Schedule 40, PVC pipe.
 - 10. Control: Motor-mounted float switch.
 - 11. Basin: Plastic.

B. Capacity and Characteristics:

- 1. Capacity: Refer to Schedule on Drawings.
- 2. Total Dynamic Head: Refer to Schedule on Drawings.
- 3. Speed: Refer to Schedule on Drawings.
- 4. Discharge Pipe Size: Refer to Schedule on Drawings.
- 5. Electrical Characteristics:
 - a. Motor Horsepower: Refer to Schedule on Drawings.
 - b. Volts: Refer to Schedule on Drawings.
 - c. Phases: Refer to Schedule on Drawings.

2.2 MOTORS

A. Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements for motors specified in Section 220513 "Common Motor Requirements for Plumbing Equipment."

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- 1. Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.
- B. Motors for submersible pumps shall be hermetically sealed.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine roughing-in for plumbing piping to verify actual locations of storm drainage piping connections before sump pump installation.

3.2 INSTALLATION

A. Pump Installation Standards: Comply with HI 1.4 for installation of sump pumps.

3.3 CONNECTIONS

A. Install piping adjacent to equipment to allow service and maintenance.

3.4 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections.
- B. Perform tests and inspections.
 - 1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

C. Tests and Inspections:

- 1. Perform each visual and mechanical inspection.
- 2. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
- 3. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
- 4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- D. Pumps and controls will be considered defective if they do not pass tests and inspections.
- E. Prepare test and inspection reports.

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3.5 STARTUP SERVICE

- A. Engage a factory-authorized service representative to perform startup service.
 - 1. Complete installation and startup checks according to manufacturer's written instructions.

3.6 ADJUSTING

- A. Adjust pumps to function smoothly, and lubricate as recommended by manufacturer.
- B. Adjust control set points.

3.7 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain controls and pumps.

FACILITY NATURAL GAS SYSTEMS SECTION 221600

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Provide labor, materials, equipment and services to perform operations required for the complete installation and related Work as indicated in the Contract Documents.

1.2 INSTALLATION

- A. Install Work In Compliance With:
 - 1. Fuel Gas Code of New York State, 2015.
 - 2. New York State Uniform Fire Prevention and Building Code.
 - American Gas Association (AGA).
 - 4. Local utility company National Fuel Gas Corporation.
 - 5. Local Building Code City of Oswego.
 - 6. Authority Having Jurisdiction DASNY.

1.3 SUBMITTALS

- A. All items specified under "Part 2 Products" of this Section.
- B. Submit written certification for natural gas system tests. Submit with the O&M Manuals.

PART 2 - PRODUCTS

2.1 NEW GAS SERVICE

A. Installation by National Fuel Gas Corporation.

2.2 PIPING

A. Interior and exterior: Refer to Section 220502, "Plumbing Piping Systems and Accessories," for piping materials.

2.3 GAS VALVES

A. Interior and exterior: Refer to Section 220523, "General Duty Valves for Plumbing Piping.

PART 3 - EXECUTION

3.1 GAS PIPING

A. General:

- 1. Make arrangements with National Fuel Gas Corporation for service. Pay all associated costs.
- 2. Pipe joining qualifications: Welded piping shall be fabricated by an approved welder. Welder shall be certified under API Code III.
- B. Interior: Pitch up in direction of flow. Install 6-inch long drip legs at low points or as indicated on Contract Drawings.

3.2 ARRANGEMENTS

- A. Submit application to and receive approval from National Fuel Gas Corporation for provision of a natural gas service to the Owner's distribution equipment. The gas service shall be new and include piping and meter assembly. The size and arrangement of equipment shall be determined by National Fuel Gas Corporation prior to the start of Construction. Coordinate all activities between the Owner and the local utility company. The installation of natural gas piping shall comply with all published Utility Company standards.
- B. The building service load is 1,158 cubic feet per hour (cfh). The maximum gas pressure inside the building shall not exceed 14"w.c.
- C. Provide sleeves where required for gas service piping. Coordinate with the prior to the start of construction.
- D. Coordinate all concrete pad and gravel base requirements with National Fuel Gas Corporation prior to the start of construction.
- E. Provide a lockable fenced enclosure or concrete bollards as required. The front and sides of the meter assembly shall be fully protected. Coordinate with National Fuel Gas Corporation prior to the start of construction.

3.3 GAS PIPING TESTS

- A. Provide necessary items to complete proper testing of natural gas piping.
- B. Perform tests as required by the local utility company. Tests shall be witnessed by the local utility company. Make all arrangements and pay costs.
 - 1. 5 psi air pressure for two hours. Tests shall be performed before connection to equipment with regulators.
 - 2. Provide written certification that tests have conducted and satisfactorily completed. Submit the Engineer and to the Owner's Representative.

Submit test results with the O&M manuals.

PLUMBING EQUIPMENT SECTION 223000

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Provide labor, materials, equipment and services to perform operations required for the complete installation and related Work as required in Contract Documents.

1.2 SUBMITTALS

A. Submit shop drawings for all items specified under "Part 2 - Products" of this Section.

PART 2 - PRODUCTS

- 2.1 FLOOR DRAINS (FD)
 - A. Type FD-1: (Toilet Rooms)
 - Coated cast iron body with bottom outlet, vandal-proof secured 6x6 inch square strainer composed of polished nickel bronze, flashing clamp and collar and drain weep-holes. Verify type of outlet required on a per location basis before ordering drains.
 - 2. Make: Zurn Model #ZN-415-6S-VP.
 - 3. Provide an inline floor drain trap seal insert. Size as indicated on the drawings. Verify outlet size on a per location basis before ordering insert.
 - 4. Make: Sure Seal model #SS3000 or approved equal.

2.2 CLEANOUTS (CO, WPCO, DPCO, GCO)

- A. Deck Plate Cleanout (DPCO) floors: Coated cast iron body with round scoriated and polished nickel bronze top, vandal-proof feature, adjustable leveling feature, bronze plug and flashing clamp, carpet marker or tile cover as required and anchor flange with clamp collar. All connections and fittings to be gas and water tight.
 - 1. Make: Zurn Model #ZN-1400-BP-KC.
- B. Wall Plate Cleanout (WPCO) walls: Coated cast iron ferrule with bronze plug

and stainless steel smooth access cover with securing screw, vandal-proof.

- 1. Horizontal: Zurn Model #Z-1400-sz-VP.
- C. Grade Cleanout (GCO) exterior locations: Square, Dura-Coated cast iron body, watertight thread plug and polished stainless steel round top with vandal proof screws.
 - 1. Make: Zurn Model #ZS-1400-VP.
- D. Acceptable cleanout manufacturers: Zurn, Jay R. Smith, Watts or MIFAB. All cleanouts shall be of one manufacturer.

2.3 HOSE BIBB (HB) - INTERIOR

- A. Type HB:
 - 1. Hose Bibb shall be approved by ASSE Standard 1019-B and be listed by IAPMO.
 - 2. Fully recessed hot & cold water hose bibb with wall mounting bracket, 3/4- inch hot and cold female inlets and 3/4-inch male hose thread outlet with vacuum breaker, handle operated control valves, stainless steel wall box and hinged cover with operating key lock and "Water" cast on cover. Provide with one (1) parts repair kit (suffix RK).
 - 3. Make: Zurn Model # Z1327-EZ-VB-RK.
- B. Acceptable wall hydrant manufacturers: Zurn, Jay R. Smith, Watts or MIFAB. All water hydrants shall be of one manufacturer.

2.4 SHOCK ABSORBERS (SA)

- A. Devices must meet or exceed requirements of the Plumbing and Drainage Institute Standard PDI WH 201 and ASSE Standard 1010.
- B. Types of devices listed by the Contract Documents shall be based on the P.D.I. system corresponding to the following N.Y.S. water fixture unit ranges:
 - 1. Type A 1 through 11 fixture units.
 - 2. Type B 12 through 32 fixture units.
 - 3. Type C 33 though 60 fixture units.
- C. Make: Zurn "Shoktrol", Z-1700 Series.
- D. Acceptable Water Hammer Arrestor / Shock Absorber manufacturers: Zurn, Jay

R. Smith, Precision Plumbing Products or Watts.

2.5 PRESSURE GAUGES - DOMESTIC WATER (P)

- A. 4 1/2 inch diameter dial pressure gauge with stainless steel case and plastic lens, range: 0 to 160 psi. Provide bar stock needle valve inline ahead of gauge.
 - 1. Make: Weksler Type EA14.
- B. Acceptable pressure gauge manufacturers: American, Ashcroft, Weiss or Weksler.

2.6 FRESH AIR INTAKE

- A. 8-inch diameter, polished nickel bronze fresh air inlet cover, vandal proof screws, pipe clamp fitted for 3-inch vent piping.
 - 1. Make: Jay R Smith model #9005.
- B. Acceptable fresh air intake manufacturers: Jay R Smith, Zurn or Watts.

2.7 WATER METER

- A. Compound-Type Water Meters:
 - 1. Description:
 - a. Standard: AWWA C702.
 - b. Pressure Rating: 150-psig working pressure.
 - c. Body Design: Combined turbine and disc meter.
 - d. Registration: In gallons or cubic feet as required by utility company.
 - e. Case: Bronze.
 - f. End Connections for Meters NPS 2-1/2 and Larger: Flanged.

2. Accessories:

- a. pressure gauge on the downstream side of the water meter.
- b. 4" x 3" reducer type fitting on inside of strainer and outside of water meter.
- c. 3" isolation ball type valves and unions on each side of the water meter.
- d. 3" strainer on the inside of the water meter.
- B. Coordinate meter requirements with local water authority and Oswego state college. Provide meter meeting either of the following, per water provider's preference.

- 1. Remote Registration System: Direct-reading type complying with AWWA C706; modified with signal-transmitting assembly, low-voltage connecting wiring, and remote register assembly as required by utility company.
- 2. Connect meter to Campus Central DDC system.

2.8 WATER HEATER

A. MANUFACTURERS

- Available Manufacturers: Manufacturer shall be a company specializing in manufacturing the products specified in this section with minimum twenty years' experience. The water heaters shall be manufactured by a company that has achieved certification to the ISO 9001Quality Management System.
- 2. The water heaters shall be ETL listed as a complete unit. The heater shall satisfy current Federal Energy Policy Act standards for stand-by heat losses as established for indirect fired water heaters incorporating storage tanks.
- 3. Service Access: The water heater shall be provided with access covers for easily accessing all serviceable components.
- 4. Manufacturers: PVI is the basis of design. Acceptable manufacturers shall be subject to compliance with the requirements.

B. CONSTRUCTION

- 1. Water heater will be a, storage-type design indirectly heated by boiler water through a stainless-steel u-tube bundle.
- 2. The storage section of the water heater shall be ASME HLW stamped and National Board Registered for a maximum allowable working pressure of 150 psi and pressure tested at 1-1/2 times working pressure.
- 3. All tank connections/ fittings shall be nonferrous. Tank shall be equipped with a ball-type drain valve. Tank design will include a manway sized access to the tank interior.
- 4. The storage tank shall be an unlined pressure vessel constructed from phase-balanced austenitic and ferritic duplex steel with a chemical structure containing a minimum of 21% chromium to prevent corrosion and mill certified per ASTM A 923Methods A to ensure that the product is free of detrimental chemical precipitation that affects corrosion resistance. The material selected shall be tested and certified to pass stress chloride cracking test protocols as defined in ISO 3651-2and ASTM G123 00(2005) "Standard Test Method for Evaluating Stress-Corrosion Cracking of Stainless Alloys with Different Nickel Content in Boiling Acidified Sodium Chloride Solution."

- Waterside surfaces shall be welded internally utilizing joint designs to minimize volume of weld deposit and heat input. All heat affected zones (HAZ) shall be processed after welding to ensure the HAZ corrosion resistance is consistent with the mill condition base metal chemical composition. Weld procedures (amperage, volts, welding speed, filler metals and shielding gases) utilized shall result in a narrow range of austenite-ferrite microstructure content consistent with phase balanced objectives for welds, HAZ and the base metal.
- 6. All internal and external tank surfaces shall undergo full immersion passivation and pickling processing to meet critical temperature, duration and chemical concentration controls required to complete corrosion resistance restoration of pressure vessel surfaces. Other passivation and pickling methods are not accepted. Immersion passivation and pickling certification documents are required and shall be provided with each product.
- 7. Materials shall meet ASME Section II material requirements and be accepted by NSF 61 for municipal potable water systems. Storage tank materials shall contain more than 80% post-consumer recycled materials and be 100% recyclable.
- 8. Water contacting tank surfaces will be non-porous and exhibit 0% water absorption.
- 9. Lined or plated storage tanks will not be acceptable.
- 10. The water heater will not require anode rods and none will be used. Tanks that employ anodes will not be acceptable.
- 11. The heat exchanger shall be a stainless-steel tubes. Tube side is designed for 150 psi at 450 deg F with #300 flanges. Shell side is designed for 150 psi at 450 deg F with #300 flanges.
- 12. Inlet steam will be controlled via an electrically actuated 2-way control valve

C. PERFORMANCE

1. Water heater will meet the tank insulation requirements of ASHRAE 90.1-2010

D. WATER HEATER TRIM

- 1. As a minimum, the heater will be equipped with the following:
 - an *immersion* operating thermostat
 - an immersion temperature limiting device
 - an ASME- or AGA-rated temperature and pressure relief valve

- 2. Operating and safety controls shall meet the requirements of ETL
- 3. The water heater shall employ an electronic operating control with digital temperature readout. Operator shall be capable of connecting to a building automation system through serial connection using Modbus RTU protocol.
- 4. A protocol gateway for BacNet MSTP/IP will be provided.

2.9 DIGITAL MIXING VALVE

- A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - 1. Armstrong International, Inc.
 - 2. Leonard Valve Company.
 - 3. Powers; a division of Watts Water Technologies, Inc.
- B. Standard: ASSE 1017.
- C. Pressure Rating: 125 psigminimum unless otherwise indicated.
- D. Type: Cabinet-type, thermostatically controlled, water mixing valve.
- E. Material: Bronze body with corrosion-resistant interior components.
- F. Connections: Threaded union inlets and outlet.
- G. Accessories: Manual temperature control, check stops on hot- and cold-water supplies, and adjustable, temperature-control handle.
- H. Tempered-Water Setting: Refer to Schedule.
- I. Tempered-Water Design Flow Rate: Refer to Schedule.
- J. Valve Finish: Chrome plated.
- K. Piping Finish: Copper.
- L. Cabinet: Factory fabricated, stainless steel, for surface mounting and with hinged stainless-steel door.
- M. Electrical Requirements: Refer to Schedule

PART 3 - EXECUTION

3.1 EQUIPMENT CONNECTIONS

A. Plumbing Contractor Shall:

- 1. Provide all roughing and final domestic water, waste, vent, and gas connections to all fixtures and equipment requiring same as called for by the Contract Documents.
- 2. Refer to the Contract Documents for roughing schedules, equipment and lists indicating scope of connections required.
- 3. Provide loose key stops, traps ("P", etc.), tailpieces, adapters, gas or air cocks and all necessary piping, fittings and connections from roughing point to fixtures and equipment.
- 4. Provide for installation of sinks, faucets, outlets, traps, tailpieces, etc. furnished by an Equipment or Casework Contractor. These items shall be delivered in easily identified cartons, to the proper room for the Division 22 Contractor's installation.
- 5. Install controls and devices furnished by others as noted on the Construction Documents.
- 6. Provide cold water line with reduced pressure zone backflow prevention devices at locations noted on the Construction Documents. Continuation of piping downstream from devices by others when noted.
- 7. Provide relief valve discharge piping from equipment relief valves to floor drains, mop service sinks or exterior.

3.2 FLOOR DRAINS

- A. Install floor drains where shown on the Contract Drawings. Install in accordance with manufacturer's written instructions.
- B. Connect floor drain to sanitary waste piping. Connect waterproofing membrane, where furnished, to flashing clamp.
- C. Level strainer with final floor finish. Clean strainer holes of all construction debris.
- D. Maintain floor drain body clean of debris during construction.

3.3 CLEANOUTS

A. Install cleanouts out of traffic patterns; provide offset as required from sanitary line being served. Do not locate cleanouts under doors or under lockers. Distance between cleanouts on piping 4-inches and smaller = 50 feet; piping over 4-inches = 100 feet. Provide cleanouts at all changes in direction of piping greater than 45⁰. Provide cleanouts at base of soil, waste, and vent stacks, and roof conductors. Provide additional cleanouts where shown on the Contract Drawings.

B. Cleanouts: Same nominal size as pipe, but not larger than 4-inch.

3.4 HOSE BIBBS

A. Provide hose bibbs where shown on the Contract Drawings. Mount at a minimum of 1'-6" above the finished floor.

3.5 SHOCK ABSORBERS

- A. Provide shock absorbers in the vertical position.
- B. Provide a ball valve between each shock absorber and the line being served.
- C. Provide shock absorbers where shown or specified. Provide shock absorbers where solenoid valves or quick closing valves are installed.

3.6 PRESSURE GAUGES

A. Provide where called for and where water service enters building. Provide bar stock needle valve on each gauge line.

3.7 WATER HEATER

A. INSTALLATION

1. Install water heaters level and plumb in accordance with manufacturers written instructions and referenced standards.

B. FINISHING

1. The storage and heating sections shall be completely factory packaged on a single skid, requiring only job site hookup to utilities, venting, and plumbing. The heater shall be insulated to ASHRAE 90.1-2010 requirements, jacketed with enameled steel panels, and mounted on heavy-duty channel skids. The heater shall fit properly in the space provided and installation shall conform to all local, state, and national codes.

C. START-UP

1. Start up on the unit will be performed by factory trained and authorized personnel. A copy of the startup report will be provided to the owner.

3.8 DIGITAL MIXING VALVE

A. Install temperature-actuated, water mixing valves with check stops or shutoff valves on inlets and with shutoff valve on outlet.

B. Install cabinet-type units recessed in or surface mounted on wall as specified.

END OF SECTION

COMMERCIAL PLUMBING FIXTURES SECTION 224200

PART 1 – GENERAL

1.1 WORK INCLUDED

A. Provide all labor, materials, equipment and services to perform operations required for the complete installation and related Work as required in Contract Documents.

1.2 SUBMITTALS

- A. Submit shop drawings for all items specified under "Part 2 Products" of this Section.
- B. Submit wiring diagrams and manufacturer's electrical requirements for all electronically operated fixtures and trim.
- C. Submit manufacturer's color charts for cabinet finishes and fixture colors.
- D. Submit operations and maintenance information for each fixture, faucet and trim piece. Include this information in the Operations and Maintenance Manual specified in Section 220010.

1.3 DESCRIPTION OF FIXTURES

- A. All fixtures, trim and fixture accessories shall be similar and equal to the manufacturer's plate numbers specified in this section. All fixtures and supply trim shall meet the requirements of the New York State Department of Environmental Conservation and shall be listed by that Agency. All exposed parts of fixture trim shall have a polished chrome finish. All tubular drainage products ("P" traps, nipples, etc.) for sinks and lavatories shall be 17-gauge brass.
- B. All fixtures, trim and fixture accessories shall be subject to compliance with the specified requirements and shall be manufactured by the following:
 - 1. Water Closets and Lavatories: Sloan, American Standard, Kohler, Zurn or Toto.
 - Mop Service Sinks: Swanstone, Fiat or Stern-Williams.
 - 3. Faucets: Groehe, Delta Commercial or Chicago.
 - 4. Flush Valves: Sloan, Zurn or Toto.
 - 5. Water Closet Seats: Bemis, Beneke, Church or Olsonite.

- 6. Fixture Supports and Carriers: Watts, Zurn or Jay R. Smith.
- 7. Lavatory and Sink Trim: McGuire, Brass-Craft, Cambridge or EBCO.
- C. Fixture Cuts: Submit shop drawings in folders with cuts of all fixtures, brass trim and accessories before placing order for fixtures. Provide roughing sheets for all fixtures. Provide dimensions for all fixtures, trim and accessories.
- D. Samples: Submit fixture and accessory samples when requested by Owner and/or Owner's Representative.
- E. Roughing Sheets: Submit roughing sheets in duplicate for each type of fixture when requested.
- F. Provide the Owner with special wrenches, tools and devices necessary for servicing plumbing fixtures and trim in a quantity of one device for each 5 (five) fixtures (provide a minimum of one device if fixture quantity is less than five). Provide the Owner with faucet repair kits complete with all parts in a quantity of 1 (one) kit for each 20 (twenty) faucets (provide a minimum of one kit for each faucet if fixture quantity is less than twenty).

1.4 LEED Submittals:

A. Product Data: Documentation indicating flow and water consumption requirements.

PART 2 - PRODUCTS

- 2.1 WATER CLOSETS (WC)
 - A. Type WC-1:
 - 1. American Standard model #Afwall Millenium FloWise-1.6/1.1 WES DF, vitreous china, siphon jet, fully glazed trap-way, elongated, 1.1 to 1.6 gallons per flush, wall hung water closet with 1½ inch top spud.
 - Sloan ECOS 111 Hardwired-1.28-HW with screwdriver angle stop,
 1.28 gallons per flush, vacuum breaker and seat bumper on angle stop.
 - b. Church model #9500SSC, white solid plastic open front closet seat with combination self-sustaining and external check holds/hinges, less cover.
 - c. Zurn model #ZN1201-HD4 or ZN1202-N4 fully adjustable, thinwall closet carrier fitting with 4-inch no-hub waste outlet and 2inch vent outlet. Provide carrier and all required fittings and connections. Verify wall and chase space and piping requirements

DORMITORY AUTHORITY OF THE STATE OF NEW YORK FUNNELLE HALL BATHROOM RENOVATIONS SUNY OSWEGO

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before ordering any items.

d. Mount at ADA required height. Provide fixture in compliance with all ADA required clearances and dimensions.

2.2 LAVATORIES (LAV)

A. Type LAV-1:

- 1. Zurn Caxton, undermount, 19 inches x 16 inches with one faucet hole, vitreous china front overflow lavatory with self- draining deck and, fitted with following:
 - a. Sloan Optima EAF 200 Sensor Activated 0.5 gpm deck mounted faucet, polished chrome finish, single hole, hardwired and integrated side mixer.
 - b. McGuire model #155-WC chrome plated P.O. plug with open grid strainer and offset 1-1/4 inch, 17-gauge tailpiece.
 - c. McGuire model #8902 chrome plated, 17-gauge, 1-1/4 inch x 1-1/2 inch "P" trap with cleanout plug and metal, chrome plated set screw wall escutcheon.
 - d. McGuire model #167LK, 3/8 in. chrome plated wall supplies with loose key angle stops, cast brass set screw escutcheons and 12- inch long flexible risers.
 - e. Provide Truebro "Lav Guard" insulated coverings on waste and supply piping.
 - f. Mount fixture at ADA required height. Provide fixture in compliance with all ADA required clearances and dimensions.

B. Type LAV-2

- Zurn Soho, wall mounted, 20 inches x 18 inches with one faucet hole, vitreous china front overflow lavatory with self- draining deck, drilled for concealed arm carrier and, fitted with following:
 - a. Sloan Optima EAF 200 Sensor Activated 0.5 gpm deck mounted faucet, polished chrome finish, single hole, hardwired and integrated side mixer.
 - b. McGuire model #155-WC chrome plated P.O. plug with open grid strainer and offset 1-1/4 inch, 17-gauge tailpiece.
 - c. McGuire model #8902 chrome plated, 17-gauge, 1-1/4 inch x 1-1/2 inch "P" trap with cleanout plug and metal, chrome plated set screw wall escutcheon.

- d. McGuire model #167LK, 3/8 in. chrome plated wall supplies with loose key angle stops, cast brass set screw escutcheons and 12- inch long flexible risers.
- e. Provide Truebro "Lav Guard" insulated coverings on waste and supply piping.
- f. Mount fixture at ADA required height. Provide fixture in compliance with all ADA required clearances and dimensions.

2.3 SHOWERS (SH)

A. Type SH-1:

- 1. Shower shall be fitted with the following:
 - a. Zurn Temp-Guard Shower Unit Z7301-SS-MT-S9 which includes a pressure balancing mixing valve with all working parts constructed of brass, bronze and stainless steel, polished chrome finish with integral service stops, adjustable stop screw to limit handle turn, hand lever diverter with volume control, fixed 1.5 GPM super shower head with flow restrictor, in-line vacuum breaker, wall connection and flange.
 - b. Laticrete Hydro Ban Linear Drain or equal, 24" long drain with cement mortar bed.
 - c. Mount all hardware and controls as directed by the Architect.
 - d. Shower base provided by G.C.
 - e. Brushed 18 Guage, 304 Stainless Steel Recessed Shower Assembly to be custom fabricated. See details on drawings.
 - f. See spec 093200 "Unglazed Ceramic Mosaic Tile" for flood test requirements in shower stall floors.
- B. Type SH-2, SH-3:
 - 1. Shower shall be fitted with the following:
 - a. Zurn Temp-Guard Shower Unit Z7301-SS-MT-DV2P-HW which includes a pressure balancing mixing valve with all working parts constructed of brass, bronze and stainless steel, polished chrome finish with integral service stops, adjustable stop screw to limit handle turn, hand lever diverter with volume control, fixed 1.5 GPM super shower head with flow restrictor, arm and flange, hand held shower on 30-inch slide bar, flexible metal hose, in-line vacuum breaker, wall connection and flange.
 - b. Provide floor drain for the shower.

- Mount all hardware and controls as directed by the Architect.
 Provide fixture in compliance with all ADA required clearances and dimensions.
- d. Shower base provided by G.C.
- e. See spec 093200 "Unglazed Ceramic Mosaic Tile" for flood test requirements in shower stall floors.

2.4 ELECTRIC WATER COOLER (EWC)

A. Type DF-1:

- 1. Elkay Model # LZS8WSLP lead free, self-closing, signal station, electric water coolers, color "Light Gray Granite" with refrigerated bottle filling stations which is on the low level, two piece stainless steel basin and backsplash, flexible safety bubbler, non-pressurized tank, vandal-proof push-bars on three sides, refrigerated bottle filling station with electronic sensor activation and 20 second shut-off timer, recessed in wall, "Water Sentry Plus" 3,000 gallon water filter system, 1.1 gpm fill rate.
 - a. Fountain Top: 18-8 type 302 stainless steel, polished satin finish.
 - b. Self-closing, vandal proof hand operated stops with automatic stream regulator located inside of cabinet.
 - c. Surfaces and materials in contact with water to be certified lead free per EPA regulations.
 - d. Compressor: Hermetically sealed, ½ hp, 120 volts, 60 Hz., single phase.
 - e. Unit Capacity: 8.0 GPH 80°F water inlet, 50°F water outlet with room temperature at 90°F.
 - f. Provide a floor mounted support carrier for units. Watts model #CA-431-1.
 - g. Provide waste "P" trap and cold water supply for each unit.
 - h. Mount fixture in compliance with all ADA required clearances and dimensions.

2.5 MOP SERVICE SINK (MS-1)

A. Type MS-1:

- 1. Mustee Model #63M, floor mounted, 24-inch x 24-inch x 10-inch deep, high impact resistant fiberglass construction mop service sink, 3-inch cast brass drain with gasket, dome strainer with integral lint basket, color as selected by the college and the architect, fitted with the following:
 - a. Chicago Faucets model #835-RCF service sink faucet (2.2 gpm) with vacuum breaker, pail hook, polished chrome finish, adjustable stop arms and ¾ inch hose thread outlet.
 - b. Provide Hose and Hose Holder, Mop Hanger, Bumper Guards, and Wall Guards

PART 3 - EXECUTION

3.1 FIXTURES, EQUIPMENT AND SYSTEMS

A. Install fixtures, trim, accessories, equipment and systems as shown on the Drawings or as specified herein in accordance with the provisions of each applicable Section of these Specifications and in compliance with all Federal, State and Local codes having jurisdiction.

3.2 FIXTURES

A. Install all fixtures on chair carriers except as specified. Vitreous china to be fired before and after glaze is applied (twice fired) and shall be without decoration unless otherwise noted.

B. Chromium Plating:

1. All supply and drainage trim and accessories shall have a minimum thickness of 0.002 inch chromium applied over a nickel plating having a minimum thickness of 0.0002 inch.

C. Screws, Bolts and Nuts:

- 1. All screws, nuts and bolts shall be of size, type and finish to fit requirements and to harmonize with adjacent material.
- 2. Nut and bolt heads exposed at fixtures shall be hexagon with bonnet cap and chromium plated brass.

D. Erection:

- 1. Properly install fixtures and associated supply and drainage piping and securely support.
- 2. Carefully drill holes for thru-bolts to avoid chipping blocks or plaster where required over plates.
- 3. Except where chair carriers are specified, attach fixtures with hangers

or brackets. Attach to walls as follows:

- a. Masonry construction:
 - Secure fixture hangers to partition by thru-bolts extending through a steel plate on opposite side of partition.
 - 2) Carefully drill holes to avoid chipping.
 - 3) Obtain Owner's Representative's approval prior to work.
- b. Metal stud construction:
 - Anchor backing for fixtures or equipment to 1/8 inch x
 inch steel plate bolted or riveted to at least three studs.
 - 2) Obtain Owner's Representative's approval prior to work.
- E. Protection: Immediately after installation, thoroughly cover metal trimmings and fixture to prevent damage or scratches. Condition of all fixtures is the responsibility of the Division 22 contractor until the Owner takes final possession of the Project.
- F. Cleaning: At completion of Work, clean all fixtures complete with their trimmings; put in working order and in first-class condition and appearance.
- G. Installation:
 - 1. Exact mounting height to be determined by Owner's Representative, Architectural Drawings and (where applicable) all ADA requirements.
 - 2. Perimeter of fixtures in contact with wall and floor to be caulked with DAP white flexible "Kwik-Seal" tub and tile caulk. Caulk shall be non-shrinking type.

END OF SECTION

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COMMON WORK RESULTS FOR HVAC SECTION 230500

PART 1 - GENERAL

1.1 CONDITIONS

- A. All work included in this Contract shall be subject to the following parts of the specifications and the Contractor for this portion of the work is required to refer especially thereto.
 - 1. Division 1-General Requirements.

1.2 WORK INCLUDED

The work of this Contract shall include and provide for all labor, tools, materials necessary for installation and for proper operation even though not specifically mentioned or indicated on plans, but which are usually provided or essential for proper operation of the system.

- A. Ventilating Work.
- B. Insulation Work.
- C. Temperature Control Work.
- D. Testing and Balancing.
- E. Heating Work.

1.3 LAWS, PERMITS AND INSPECTIONS

- A. Comply with all Federal, State, County, Municipal, NFPA, NBFU, AGA, UL, and Utility Co. Laws, ordinances and regulations that cover the work.
- B. Conform to any local codes.
- C. Apply for and obtain all required permits and inspections.
- D. Pay all fees.
- E. Furnish all certificates of approval.

1.4 STANDARDS OF WORKMANSHIP

A. All work shall be executed in accord with recognized standards of workmanship. All work shall be installed in a neat and orderly manner. If, in the judgment of the Engineer, the workmanship is not acceptable, the work in question is to be removed and reinstalled in a manner satisfactory to the Engineer.

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- B. Unless specifically noted otherwise no building structural members including beams, columns, load bearing walls, etc. shall be cut, drilled or modified in any way for the installation of any HVAC equipment without written approval of the Structural Engineer.
- C. Contractor's Responsibility:
 - 1. The Contractor shall be responsible for establishing grades and elevations, and checking of all interferences, and shall verify all dimensions and locations in the field for work specified in the HVAC sections of these specifications.

1.5 REVIEW OF MATERIALS

A. Materials:

- 1. Equipment or material of same type or classification, used for the same purpose, shall be products of the same manufacturer. All material shall be new and of the latest design of manufacturer providing equipment or materials. Equipment and accessories not specifically described or identified by manufacturer's catalog numbers shall be designed in conformity with ASME, or other applicable technical standards, suitable for maximum working pressure and shall have neat and finished appearance.
- B. Contractor is responsible for all information submitted in shop drawings to the Architect/Engineer for review. Contractor shall review all shop drawing submittals for full compliance with construction documents prior to forwarding to the Architect/Engineer for review. All products, options and accessories noted in the specification shall be highlighted in the corresponding submittals by the supplier or contractor noting compliance prior to submitting to the Architect/Engineer for review. Manufacture specific deviance shall also be noted. The absence of information on shop drawings, which may have not been noted for correction during the Architect/Engineer Review, shall be brought to the attention of the above by the contractor for any additional coordination prior to release of submittals for manufacture and shipment. Required revisions and modifications to work from uncoordinated submittals will be at the expense of the installing contractor. Also, any options missing in the submittal and not corrected will presumably be an acceptable field modification. The contractor must provide the specified option at his own costs. Shop drawings will be submitted according to Section 01 33 00.
- C. Shop Drawings: In accord with the time limits and requirements of Div. 1, this Contractor is to submit seven (7) copies of all shop drawings to the Architect with evidence of checking by Contractor
- D. Samples: If requested by the Architect or Engineer, this Contractor shall submit samples of materials for their review. Upon approval, the samples are to be removed from the Architect's office and stored at the project until such time as the project is completed or the Architect or Engineer has given written permission for the samples to be removed from the site. At the completion of the project, all samples are to be delivered in good condition to the Owner.

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E. Shop drawings shall be checked by HVAC Contractor prior to submission, and stamped with the words "Checked for Compliance".

1.6 PAINTING

- A. Paint all hangers and exposed or unpainted or ungalvanized iron work in the Heating, Ventilation and Air Conditioning Systems with two brush coats of Black Rust-Oleum paint.
- B. Touch up any damaged surfaces on factory painted equipment.
- C. Surfaces seen through grilles and registers: 2 coats flat black paint.

1.7 MINOR DEVIATIONS

- A. Plans: The plans are in part diagrammatic and are not to be construed as relieving this Contractor from on-site coordination between the work of this Contract and the work of other Contractors.
- B. Specifications: The design of this Project is based upon use of the specified materials. Should substitutions be proposed, this contractor is responsible for any added costs to this and other Contracts if such arise. Necessary revision to the drawings will be the financial responsibility of this contractor. All substitutions should be submitted to the Architect/Engineer ten days prior to bid where upon an addendum can be issued if the product(s) is(are) determined to be acceptable.

1.8 ELECTRICAL

- A. It shall be the responsibility of the HVAC contractor to insure that the voltage and current characteristics of the electrical equipment furnished by him shall be suitable for the electrical services as specified or indicated. If the electrical requirements change for a substitution, the HVAC contractor must bear all increased costs associated with the substitution modification.
- B. The Electrical Contractor is responsible only for wiring as shown on the Electrical Drawings. The HVAC Contractor (Division 23) is responsible for all devices, circuits, raceways, conductors, interlocks and appurtenances shown or required for proper operation of the work of this contract and which is not specifically shown as part of the electrical contract Division 26.
- C. All single phase motors shall have a minimum service factor of 1.35, three phase motors shall have a 1.15 service factor. All single phase motors shall be provided with integral thermal overload protection.
- D. All motors shall meet or exceed the New York State Energy Code requirements. Motors 1 HP and larger shall be premium efficiency.

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1.9 INSPECTIONS

A. The undertaking of job inspections by Architect or Engineer shall not be construed as supervision of actual construction, nor make them responsible for providing a safe place for performance of work by Contractors or Contractors' employees or those of suppliers of Contractors, or for access, visits, use, work, travel, or occupancy by any person.

1.10 PROTECTIVE COVERING

A. Properly protect in an approved manner, all finished surfaces of equipment against all damage from plaster, paint, scratching denting, etc., until all other trades have completed their work. Protect all openings to prevent entry of debris.

1.11 PROTECTION FROM FREEZING

A. During construction and until final acceptance, protect from freezing all fixtures, equipment and piping, both in building, trenches, etc. Any damage shall be repaired or replaced at Contractor's expense to meet Architect's approval.

1.12 STANDARDS

- A. All ductwork to be in accordance with SMACNA standards.
- B. All filters to be ARI rated.
- C. All fans to be AMCA capacity and sound power rated.
- D. All Electrical equipment to be UL listed.
- E. All terminal air delivery devices to be ADC rated.
- F. Conform to ANSI B31-5 Code for pressure piping and refrigerant piping.

1.13 ACCESS DOORS

- A. Unless otherwise specified, the HVAC contractor shall furnish access panels for concealed valves, expansion joints, valves, traps, strainers, dampers, and other parts requiring accessibility for operation and maintenance to the general contractor who shall install all access panels in drywall or masonry construction. Access panels generally are not shown on drawings to allow for installation flexibility.
- B. Provide where indicated and where required for access to all equipment. Size 16" x 24" unless otherwise noted. It is to be noted that various type frames are required for specific wall and ceiling finishes. Any door having an area exceeding 324 square inches shall have 2 cam locks.

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1.14 NOISE AND VIBRATION

- A. Mechanical and electrical equipment shall operate without noise and vibration as determined by Architect. Maximum sound lever in occupied spaces shall be RC-35.
- B. If noise or vibration is transmitted to occupied portions of the building by equipment, piping, ducts, etc., make necessary changes and additions, as approved at no expense to the Owner.

1.15 CUTTING AND PATCHING

- A. This Contractor shall do all cutting and patching necessary for inclusion of his work.
- B. Any modifications, attachments, etc., to roof must be completed only after the roof bonding agent has been notified and appropriate installation details given.

1.16 JOB SUPERVISION

A. Furnish at site during construction a competent and experienced foreman. He shall have complete charge of all field work of this Contract. He shall be authorized to act for the Contractor in his absence, and to accept instructions from the Architect or Engineer.

1.17 EQUIPMENT IDENTIFICATION

- A. Equipment to be labeled to include all installed as a part of this contract.
- B. Identification markers shall be 2-1/4" x 4-1/2" for all equipment.
- C. Markers shall be stick-on type as manufactured by Seton Nameplate Co. or Westline Products.

1.18 EQUIPMENT ARRANGEMENTS

- A. Because all equipment of equal capacity is not necessarily of same arrangements, size of construction, the plans are prepared on basis of one manufacturer's equipment, even though all other manufacturer's names are mentioned and contractor elects to use some of their equipment which differs in arrangements, size, etc., he does so subject to following conditions:
- B. If requested by Engineers, submit in each case, a sketch to scale, indicating installation proposed equipment, showing maintenance and service space.
- C. If revised arrangements meet approval.
 - 1. Make all incidental changes in piping, ductwork, supports, insulation, etc.
 - 2. Provide any additional motors, controllers, valves, fittings and other additional equipment required for proper operation of system resulting from the selection of equipment.
 - 3. Include all changes in general construction necessitated by this equipment.
 - 4. Each contractor responsible for proper location of roughing and connections by other trades.

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- 5. Make such changes at no increase in contract price.
- D. If revised arrangement does not meet approval because of increase in static, possibility of increase in noise, lack of space or headroom, insufficient clearance for removal of parts, or any reason then provide equipment which conforms to contract drawings.

1 19 ADJUSTMENT AND LUBRICATION

A. Includes:

- 1. Verification that all motors are in proper rotation.
- 2. Verification that all dampers are closed tightly.
- 3. Verification that all electrical work is free from grounds.
- 4. Verification that all piping systems are air free and of proper pressure.
- B. As soon as installed, lubricate and leave in good working order, all motors, bearings, etc., in accordance with manufacturer's instructions.
- C. Provide 8-1/2" x 11" lubrication chart, type in capital letters, mounted in wood frame under clear plastic. Hang where indicated. HVAC contractor to provide chart listing all motors.
- D. List following information:
 - 1. Name and location of equipment.
 - 2. Type of lubrication recommended by manufacturer.
 - 3. Lubrication period recommended by manufacturer.

1.20 PROJECT CLOSE-OUT

- A. Provide the following as a requirement for project close-out. Included, but not limited to, are the following:
 - 1. Operation and Maintenance Manuals (Instruction Portfolios).
 - 2. Project Record Drawings (As-builts) including wiring and piping diagrams.
 - 3. Lubrication/Valve Charts.
 - 4. Testing & Balancing Reports.
 - 5. Letter of Automatic Temperature Control Work Completion.
 - 6. Completed Commissioning Reports
 - 7. Refer to Division I for additional requirements.

1.21 DEMONSTRATION OF COMPLETE MECHANICAL SYSTEMS

A. Work Included:

- 1. Thoroughly demonstrate and instruct designated representatives of the Owner in the care and operation of all the heating, ventilating, and air conditioning systems and equipment furnished and installed as a part of this contract.
- 2. Manufacturers of certain equipment specified herein shall provide technically qualified factory representatives to train the Owner's representative in the care, maintenance, and operation of their product. This instruction and service of the factory representative shall be furnished as specified elsewhere in the specifications. This time is in addition to what is specified above and will not be counted as part of the contractor's instructions.

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- 3. The time and place of all training shall be coordinated and scheduled by the Architect at the convenience of the Owner.
 - a. Submit letters attesting to the satisfactory completion of all instructions. Letters shall include date of completion of instruction, names of persons in attendance and be countersigned by authorized representative of Owner. Those signing the letter shall indicate that they have received and understand the training.
 - b. Following equipment and systems included:
 - Heat Exchanger
 - Fans
 - Pumps
 - Heat Recovery Units
 - Chiller
 - Fan Coil Units
 - Steam PRVs
 - Steam Condensate Pump
 - Building Automation System
 - c. Contractor shall include the training letters in the O & M Manuals.

END OF SECTION 230500

FIRESTOPPING SECTION 230510

PART 1 - GENERAL

1.01 DESCRIPTION

A. Work Included:

- 1. Comply with the International Fire Code.
- 2. Firestopping of all pipe and/or duct penetrations through fire rated walls, and non-rated ceilings.
- 3. Smoke stopping of all pipe and/or duct penetrations through ceilings and partitions.

1.02 REFERENCES

- A. Underwriters Laboratories:
 - 1. UL Fire Resistance Directory:
 - a. Through-penetration firestop devices (XHCR).
 - b. Fire resistance ratings (BXUV).
 - c. Through-penetration firestop systems (XHEZ).
 - d. Fill, void, or cavity material (XHHW).
- B. American Society for Testing and Materials Standards:
 - 1. ASTM E814-88: Standard Test Method for Fire Test of Through-Penetration Firestops.

1.03 DEFINITIONS

- A. Assembly: Particular arrangement of materials specific to given type of construction described or detailed in referenced documents.
- B. Barriers: Time rated fire walls, smoke barrier walls, time rated ceiling/floor assemblies and structural floors.
- C. Firestopping: Methods and materials applied in penetrations and unprotected openings to limit spread of heat, fire, gasses and smoke.

- D. Penetration: Opening or foreign material passing through or into barrier or structural floor such that full thickness of rated materials is not obtained.
- E. System: Specific products and applications, classified and numbered by Underwriters Laboratories, Inc. to close specific barrier penetrations.
- F. Sleeve: Metal fabrication or pipe section extending through thickness of barrier and used to permanently guard penetration. Sleeves are described as part of penetrating system in other sections and may or may not be required.

1.04 SYSTEM DESCRIPTION

A. Design Requirements:

- 1. Fire-rated construction: Maintain barrier and structural floor fire resistance ratings including resistance to cold smoke at all penetrations, connections with other surfaces or types of construction, at separations required to permit building movement and sound or vibration absorption, and at other construction gaps.
- 2. Smoke barrier construction: Maintain barrier and structural floor resistance to cold smoke at all penetrations, connections with other surfaces and types of construction and at all separations required to permit building movement and sound or vibration absorption, and at other construction gaps.

1.05 SUBMITTALS

- A. Product data: Manufacturer's specifications and technical data including the following:
 - 1. Detailed specification of construction and fabrication.
 - 2. Manufacturer's installation instructions.
- B. Quality control submittals:
 - 1. Statement of qualifications.

1.06 OUALITY ASSURANCE

- A. Installer's qualifications: Firm experienced in installation or application of systems similar in complexity to those required for this project, plus the following:
 - 1. Acceptable to or licensed by manufacturer, State or local authority where applicable.
 - 2. At least 2 years experience with systems.
 - 3. Successfully completed at least 5 comparable scale projects using this system.

- B. Local and State regulatory requirements: Submit forms or acceptance for proposed assemblies not conforming to specific UL Firestop System numbers, or UL classified devices.
- C. Materials shall have been tested to provide fire rating at least equal to that of the construction.

1.07 DELIVERY, STORAGE AND HANDLING

A. Packing and shipping:

- 1. Deliver products in original unopened packaging with legible manufacturer's identification.
- 2. Coordinate delivery with scheduled installation date, allow minimum storage at site.
- B. Storage and protection: Store materials in a clean, dry, ventilated location. Protect from soiling, abuse, moisture and freezing when required. Follow manufacturer's instructions.

1.08 PROJECT CONDITIONS

- A. Environmental Requirements:
 - 1. Furnish adequate ventilation if using solvent.
 - 2. Furnish forced air ventilation during installation if required by manufacturer.
 - 3. Keep flammable materials away from sparks or flame.
 - 4. Provide masking and drop cloths to prevent contamination of adjacent surfaces by firestopping materials.

1.09 GUARANTEE

A. Submit copies of written guarantee agreeing to repair or replace joint sealers which fail in joint adhesion, extrusion resistance, migration resistance, or general durability or appear to deteriorate in any other manner not clearly specified by submitted manufacturer's data as an inherent quality of the material for the exposure indicated. The guarantee period shall be one year from date of substantial completion.

PART 2 - PRODUCTS

2.01 THROUGH-PENETRATION FIRESTOPPING OF FIRE-RATED CONSTRUCTION

- A. System or devices listed in the UL Fire Resistance Directory under categories XHCR and XHEZ may be used, providing that it conforms to the construction type, penetrant type, annular space requirements and fire rating involved in each separate instance, and that the system may be symmetrical for wall applications, Systems or devices must be asbestos free. The majority of the through penetration firestopping will not be through fire rated construction.
 - 1. Additional requirements: Withstand the passage of cold smoke either as an inherent property of the system, or by the use of a separate product included as a part of the UL system or device, and designed to perform this function.

2. Manufacturer:

- a. 3M.
- b. Additional manufacturer's: Hilti, USG.
- c. All manufacturer's must be listed in the UL Fire Resistance directory for the UL System involved and as further defined in the Systems and Applications Schedule.
- 3. All firestopping products must be from a single manufacturer. All trades shall use products from the same manufacturer.

2.02 SMOKE-STOPPING AT SMOKE PARTITIONS

A. Through-penetration smoke-stopping: Any system complying with the requirements for through-penetration firestopping in fire-rated construction, from UL Fire Resistance Directory is acceptable, provided that the system includes the specified smoke seal or will provide a smoke seal. The length of time of the fire resistance may be disregarded.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verification of Conditions: Examine areas and conditions under which work is to be performed and identify conditions detrimental to proper or timely completion.
 - 1. Verify barrier penetrations are properly sized and in suitable condition for application of materials.
 - 2. Do not proceed until unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Clean surfaces to be in contact with penetration seal materials of dirt, grease, oil, loose materials, rust or other substances that may affect proper fitting, adhesion, or the required fire resistance.

3.03 INSTALLATION

- A. Install penetration seal materials in accordance with printed instructions of the UL Fire Resistance Directory and in accordance with manufacturer's instruction.
- B. Seal holes or voids made by penetrations to ensure an effective smoke barrier.
- C. Where floor openings without penetrating items are more than four inches in width and subject to traffic or loading, install firestopping materials capable of supporting same loading as floor.
- D. Protect materials from damage on surfaces subject to traffic.
- E. Where large openings are created in walls or floors to permit installation of pipes, ducts, cable tray, buss duct or other items, close unused portions of opening with firestopping material tested for the application. See UL Fire Resistance Directory.

3.04 FIELD QUALITY CONTROL

- A. Examine penetration sealed areas to ensure proper installation before concealing or enclosing areas.
- B. Keep areas of work accessible until inspection by applicable code authorities.

3.05 ADJUSTING AND CLEANING

- A. Clean up spills of liquid components.
- B. Neatly cut and trim materials as required.
- C. Remove equipment, materials and debris, leaving area in undamaged, clean condition.

END OF SECTION 230510

COMMON MOTOR REQUIREMENTS FOR HVAC EQUIPMENT - 230513 PAGE -1-

COMMON MOTOR REQUIREMENTS FOR HVAC EQUIPMENT **SECTION 230513**

PART 1 - GENERAL

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1.1 RELATED DOCUMENTS

Drawings and general provisions of the Contract, including General and Supplementary Α. Conditions and Division 01 Specification Sections, apply to this Section.

1.2 **SUMMARY**

A. Section includes general requirements for single-phase and polyphase, general-purpose, horizontal, small and medium, squirrel-cage induction motors for use on ac power systems up to 600 V and installed at equipment manufacturer's factory or shipped separately by equipment manufacturer for field installation.

1.3 COORDINATION

- A. Coordinate features of motors, installed units, and accessory devices to be compatible with the following:
 - 1. Motor controllers.
 - 2. Torque, speed, and horsepower requirements of the load.
 - Ratings and characteristics of supply circuit and required control sequence. 3.
 - Ambient and environmental conditions of installation location. 4.

PART 2 - PRODUCTS

2.1 GENERAL MOTOR REQUIREMENTS

- Comply with NEMA MG 1 unless otherwise indicated. A.
- В. Comply with IEEE 841 for severe-duty motors.

22 MOTOR CHARACTERISTICS

- Duty: Continuous duty at ambient temperature of 40 deg C and at altitude of 3300 feet above A. sea level.
- Capacity and Torque Characteristics: Sufficient to start, accelerate, and operate connected loads В. at designated speeds, at installed altitude and environment, with indicated operating sequence, and without exceeding nameplate ratings or considering service factor.

COMMON MOTOR REQUIREMENTS FOR HVAC EQUIPMENT - 230513 SUNY OSWEGO PAGE -2-

- 2.3 POLYPHASE MOTORS
 - A. Description: NEMA MG 1, Design B, medium induction motor.
 - B. Efficiency: Energy efficient, as defined in NEMA MG 1.
 - C. Service Factor: 1.15.
 - D. Multispeed Motors: Variable torque.
 - 1. For motors with 2:1 speed ratio, consequent pole, single winding.
 - 2. For motors with other than 2:1 speed ratio, separate winding for each speed.
 - E. Multispeed Motors: Separate winding for each speed.
 - F. Rotor: Random-wound, squirrel cage.
 - G. Bearings: Regreasable, shielded, antifriction ball bearings suitable for radial and thrust loading.
 - H. Temperature Rise: Match insulation rating.
 - I. Insulation: Class F.
 - J. Code Letter Designation:
 - 1. Motors 15 HP and Larger: NEMA starting Code F or Code G.
 - 2. Motors Smaller than 15 HP: Manufacturer's standard starting characteristic.
 - K. Enclosure Material: Cast iron for motor frame sizes 324T and larger; rolled steel for motor frame sizes smaller than 324T.

2.4 POLYPHASE MOTORS WITH ADDITIONAL REQUIREMENTS

- A. Motors Used with Reduced-Voltage and Multispeed Controllers: Match wiring connection requirements for controller with required motor leads. Provide terminals in motor terminal box, suited to control method.
- B. Motors Used with Variable Frequency Controllers:
 - 1. Windings: Copper magnet wire with moisture-resistant insulation varnish, designed and tested to resist transient spikes, high frequencies, and short time rise pulses produced by pulse-width modulated inverters.
 - 2. Energy- and Premium-Efficient Motors: Class B temperature rise; Class F insulation.
 - 3. Inverter-Duty Motors: Class F temperature rise; Class H insulation.
 - 4. Thermal Protection: Comply with NEMA MG 1 requirements for thermally protected motors.
- C. Severe-Duty Motors: Comply with IEEE 841, with 1.15 minimum service factor.

2.5 SINGLE-PHASE MOTORS

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- A. Motors larger than 1/20 hp shall be one of the following, to suit starting torque and requirements of specific motor application:
 - 1. Permanent-split capacitor.
 - 2. Split phase.
 - 3. Capacitor start, inductor run.
 - 4. Capacitor start, capacitor run.
- B. Multispeed Motors: Variable-torque, permanent-split-capacitor type.
- C. Bearings: Prelubricated, antifriction ball bearings or sleeve bearings suitable for radial and thrust loading.
- D. Motors 1/20 HP and Smaller: Shaded-pole type.
- E. Thermal Protection: Internal protection to automatically open power supply circuit to motor when winding temperature exceeds a safe value calibrated to temperature rating of motor insulation. Thermal-protection device shall automatically reset when motor temperature returns to normal range.

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 230513

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SLEEVES AND SLEEVE SEALS FOR HVAC PIPING - 230517 PAGE -1-

SLEEVES AND SLEEVE SEALS FOR HVAC PIPING SECTION 230517

PART 1 - GENERAL

SUNY OSWEGO

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Sleeves.
 - 2. Stack-sleeve fittings.
 - 3. Sleeve-seal systems.
 - 4. Grout.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

PART 2 - PRODUCTS

2.1 SLEEVES

- A. Galvanized-Steel Wall Pipes: ASTM A 53/A 53M, Schedule 40, with plain ends and welded steel collar; zinc coated.
- B. Galvanized-Steel-Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, zinc coated, with plain ends.
- C. PVC-Pipe Sleeves: ASTM D 1785, Schedule 40.
- D. Galvanized-Steel-Sheet Sleeves: 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint.
- E. Molded-PVC Sleeves: With nailing flange for attaching to wooden forms.

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2.2 SLEEVE-SEAL SYSTEMS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Link-Seal, GPT Industries.
 - 2. Advance Products & Systems, Inc.
 - 3. CALPICO. Inc.
 - 4. Metraflex Company (The).
 - 5. Pipeline Seal and Insulator, Inc.
 - 6. Proco Products, Inc.
- B. Description: Modular sealing-element unit, designed for field assembly, for filling annular space between piping and sleeve.
 - 1. Sealing Elements: EPDM-rubber interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
 - 2. Pressure Plates: Stainless steel.
 - 3. Connecting Bolts and Nuts: Stainless steel of length required to secure pressure plates to sealing elements.

2.3 GROUT

- A. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.
- B. Characteristics: Non-shrink; recommended for interior and exterior applications.
- C. Design Mix: 5000-psi, 28-day compressive strength.
- D. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 SLEEVE INSTALLATION

- A. Install sleeves for piping passing through penetrations in floors, partitions, roofs, and walls.
- B. For sleeves that will have sleeve-seal system installed, select sleeves of size large enough to provide 1-inch annular clear space between piping and concrete slabs and walls.
 - 1. Sleeves are not required for core-drilled holes.
- C. Install sleeves in concrete floors, concrete roof slabs, and concrete walls as new slabs and walls are constructed

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SLEEVES AND SLEEVE SEALS FOR HVAC PIPING - 230517

- 1. Permanent sleeves are not required for holes in slabs formed by molded-PE or -PP sleeves
 - 2. Cut sleeves to length for mounting flush with both surfaces.
 - a. Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches above finished floor level.
 - 3. Using grout, seal the space outside of sleeves in slabs and walls without sleeve-seal system.
 - D. Install sleeves for pipes passing through interior partitions.
 - 1. Cut sleeves to length for mounting flush with both surfaces.
 - 2. Install sleeves that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation.
 - 3. Seal annular space between sleeve and piping or piping insulation; use joint sealants appropriate for size, depth, and location of joint. Comply with requirements for sealants specified in Section 079200 "Joint Sealants."
 - E. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Comply with requirements for firestopping specified in Section 078413 "Penetration Firestopping."

3.2 SLEEVE-SEAL-SYSTEM INSTALLATION

- A. Install sleeve-seal systems in sleeves in exterior concrete walls and slabs-on-grade at service piping entries into building.
- B. Select type, size, and number of sealing elements required for piping material and size and for sleeve ID or hole size. Position piping in center of sleeve. Center piping in penetration, assemble sleeve-seal system components, and install in annular space between piping and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make a watertight seal.

3.3 SLEEVE-SEAL-FITTING INSTALLATION

- A. Install sleeve-seal fittings in new walls and slabs as they are constructed.
- B. Assemble fitting components of length to be flush with both surfaces of concrete slabs and walls. Position waterstop flange to be centered in concrete slab or wall.
- C. Secure nailing flanges to concrete forms.
- D. Using grout, seal the space around outside of sleeve-seal fittings.

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3.4 SLEEVE AND SLEEVE-SEAL SCHEDULE

- A. Use sleeves and sleeve seals for the following piping-penetration applications:
 - 1. Exterior Concrete Walls above Grade:
 - a. Piping Smaller Than NPS 6: Galvanized-steel pipe sleeves.
 - b. Piping NPS 6 and Larger: Galvanized-steel wall sleeves.
 - 2. Exterior Concrete Walls below Grade:
 - a. Piping Smaller Than NPS 6: Galvanized-steel wall sleeves or pipe sleeve with sleeve-seal system.
 - 1) Select sleeve size to allow for 1-inch annular clear space between piping and sleeve for installing sleeve-seal system.
 - b. Piping NPS 6 and larger: Galvanized-steel wall sleeves or pipe sleeve with sleeve-seal system.
 - 1) Select sleeve size to allow for 1-inch annular clear space between piping and sleeve for installing sleeve-seal system.
 - 3. Concrete Slabs-on-Grade:
 - a. Piping Smaller Than NPS 6: Galvanized-steel-pipe sleeves with sleeve-seal system.
 - 1) Select sleeve size to allow for 1-inch annular clear space between piping and sleeve for installing sleeve-seal system.
 - b. Piping NPS 6 and Larger: Galvanized-steel-pipe sleeves with sleeve-seal system.
 - 1) Select sleeve size to allow for 1-inch annular clear space between piping and sleeve for installing sleeve-seal system.
 - 4. Interior Partitions:
 - a. Piping Smaller Than NPS 6: PVC-pipe sleeves.
 - b. Piping NPS 6 and Larger: Galvanized-steel-sheet sleeves.

END OF SECTION 230517

ESCUTCHEONS FOR HVAC PIPING SECTION 230518

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Escutcheons.
 - 2. Floor plates.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

PART 2 - PRODUCTS

2.1 ESCUTCHEONS

- A. One-Piece, Cast-Brass Type: With polished, chrome-plated finish and setscrew fastener.
- B. Split-Casting Brass Type: With polished, chrome-plated finish and with concealed hinge and setscrew.

2.2 FLOOR PLATES

- A. One-Piece Floor Plates: Cast-iron flange with holes for fasteners.
- B. Split-Casting Floor Plates: Cast brass with concealed hinge.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install escutcheons for piping penetrations of walls, ceilings, and finished floors.

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- B. Install escutcheons with ID to closely fit around pipe, tube, and insulation of piping and with OD that completely covers opening.
 - 1. Escutcheons for New Piping:
 - a. Piping with Fitting or Sleeve Protruding from Wall: One-piece, deep-pattern type.
 - b. Chrome-Plated Piping: One-piece, cast-brass or split-casting brass type with polished, chrome-plated finish.
 - c. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One-piece, cast-brass or split-casting brass type with polished, chrome-plated finish.
 - d. Bare Piping at Ceiling Penetrations in Finished Spaces: One-piece, cast-brass or split-casting brass type with polished, chrome-plated finish.
 - e. Bare Piping in Unfinished Service Spaces: One-piece, cast-brass or split-casting brass type with polished, chrome-plated finish.
 - f. Bare Piping in Equipment Rooms: One-piece, cast-brass or split-casting brass type with polished, chrome-plated finish.
- C. Install floor plates for piping penetrations of equipment-room floors.
- D. Install floor plates with ID to closely fit around pipe, tube, and insulation of piping and with OD that completely covers opening.
 - 1. New Piping: One-piece, floor-plate type.
 - 2. Existing Piping: Split-casting, floor-plate type.

3.2 FIELD QUALITY CONTROL

A. Replace broken and damaged escutcheons and floor plates using new materials.

END OF SECTION 230518

METERS AND GAGES FOR HVAC PIPING SECTION 230519

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

- 1. Bimetallic-actuated thermometers.
- 2. Duct-thermometer mounting brackets.
- 3. Thermowells.
- 4. Dial-type pressure gages.
- 5. Gage attachments.

B. Related Requirements:

- 1. Section 231123 "Facility Natural-Gas Piping" for gas meters.
- 2. Section 232216 "Steam and Condensate Piping Specialties" for steam and condensate meters.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings:
 - 1. Include diagrams for power, signal, and control wiring.

1.3 INFORMATIONAL SUBMITTALS

A. Product Certificates: For each type of meter and gage.

1.4 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

PART 2 - PRODUCTS

2.1 BIMETALLIC-ACTUATED THERMOMETERS

- A. Standard: ASME B40.200.
- B. Case: sealed type(s); stainless steel with 5-inch nominal diameter.

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- C. Dial: Nonreflective aluminum with permanently etched scale markings and scale in deg F and deg C.
- D. Connector Type(s): Union joint, adjustable angle, with unified-inch screw threads.
- E. Connector Size: 1/2 inch, with ASME B1.1 screw threads.
- F. Stem: 0.25 or 0.375 inch in diameter; stainless steel.
- G. Window: Plain glass or plastic.
- H. Ring: Stainless steel.
- I. Element: Bimetal coil.
- J. Pointer: Dark-colored metal.
- K. Accuracy: Plus or minus 1.5 percent of scale range.

2.2 DUCT-THERMOMETER MOUNTING BRACKETS

A. Description: Flanged bracket with screw holes, for attachment to air duct and made to hold thermometer stem.

2.3 THERMOWELLS

A. Thermowells:

- 1. Standard: ASME B40.200.
- 2. Description: Pressure-tight, socket-type fitting made for insertion in piping tee fitting.
- 3. Material for Use with Copper Tubing: CNR or CUNI.
- 4. Material for Use with Steel Piping: CRES.
- 5. Type: Stepped shank unless straight or tapered shank is indicated.
- 6. External Threads: NPS 1/2, ASME B1.20.1 pipe threads.
- 7. Internal Threads: 1/2, with ASME B1.1 screw threads.
- 8. Bore: Diameter required to match thermometer bulb or stem.
- 9. Insertion Length: Length required to match thermometer bulb or stem.
- 10. Lagging Extension: Include on thermowells for insulated piping and tubing.
- 11. Bushings: For converting size of thermowell's internal screw thread to size of thermometer connection.
- B. Heat-Transfer Medium: Mixture of graphite and glycerin.

2.4 DIAL-TYPE PRESSURE GAGES

- A. Direct-Mounted, Metal-Case, Dial-Type Pressure Gages:
 - 1. Standard: ASME B40.100.

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- 2. Case: Liquid-filled, Solid-front, pressure relief type(s); cast aluminum or drawn steel; 6-inch nominal diameter.
- 3. Pressure-Element Assembly: Bourdon tube unless otherwise indicated.
- 4. Pressure Connection: Brass, with NPS 1/4 or NPS ½, ASME B1.20.1 pipe threads and bottom-outlet type unless back-outlet type is indicated.
- 5. Movement: Mechanical, with link to pressure element and connection to pointer.
- 6. Dial: Nonreflective aluminum with permanently etched scale markings graduated in psi.
- 7. Pointer: Dark-colored metal.
- 8. Window: Glass or plastic.
- 9. Ring: Stainless steel.
- 10. Accuracy: Grade A, plus or minus 1 percent of middle half of scale range.

2.5 GAGE ATTACHMENTS

- A. Snubbers: ASME B40.100, brass; with NPS 1/4 or NPS 1/2, ASME B1.20.1 pipe threads and piston-type surge-dampening device. Include extension for use on insulated piping.
- B. Siphons: Loop-shaped section of brass pipe with NPS 1/4 or NPS 1/2 pipe threads.
- C. Valves: Brass ball, with NPS 1/4 or NPS 1/2, ASME B1.20.1 pipe threads.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install thermowells with socket extending to center of pipe and in vertical position in piping tees.
- B. Install thermowells of sizes required to match thermometer connectors. Include bushings if required to match sizes.
- C. Install thermowells with extension on insulated piping.
- D. Fill thermowells with heat-transfer medium.
- E. Install direct-mounted thermometers in thermowells and adjust vertical and tilted positions.
- F. Install duct-thermometer mounting brackets in walls of ducts. Attach to duct with screws.
- G. Install direct-mounted pressure gages in piping tees with pressure gage located on pipe at the most readable position.
- H. Install valve and snubber in piping for each pressure gage for fluids (except steam).
- I. Install valve and syphon fitting in piping for each pressure gage for steam.
- J. Install test plugs in piping tees.
- K. Install flow indicators in piping systems in accessible positions for easy viewing.

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- L. Install thermometers in the following locations:
 - 1. Inlet and outlet of each hydronic zone.
 - 2. Two inlets and two outlets of each chiller.
 - 3. Two inlets and two outlets of each hydronic heat exchanger.
- M. Install pressure gages in the following locations:
 - 1. Discharge of each pressure-reducing valve.
 - 2. Inlet and outlet of each condenser-water connection.
 - 3. Suction and discharge of each pump.

3.2 CONNECTIONS

- A. Install meters and gages adjacent to machines and equipment to allow space for service and maintenance of meters, gages, machines, and equipment.
- B. Connect flowmeter-system elements to meters.
- C. Connect flowmeter transmitters to meters.
- D. Connect thermal-energy meter transmitters to meters.

3.3 ADJUSTING

- A. After installation, calibrate meters according to manufacturer's written instructions.
- B. Adjust faces of meters and gages to proper angle for best visibility.

3.4 THERMOMETER SCHEDULE

- A. Thermometers at inlet and outlet of each hydronic zone shall be the following:
 - 1. Sealed, bimetallic-actuated type.
 - 2. Direct-mounted, metal-case, vapor-actuated type.
- B. Thermometers at inlets and outlets of each chiller shall be one of the following:
 - 1. Sealed, bimetallic-actuated type.
 - 2. Direct-mounted, metal-case, vapor-actuated type.
- C. Thermometers at inlets and outlets of each condenser shall be the following:
 - 1. Sealed, bimetallic-actuated type.
 - 2. Direct-mounted, metal-case, vapor-actuated type.
- D. Thermometers at inlets and outlets of each hydronic heat exchanger shall be the following:
 - 1. Sealed, bimetallic-actuated type.
 - 2. Direct-mounted, metal-case, vapor-actuated type.
- E. Thermometers at outside-, return-, supply-, air ducts shall be the following:

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- 1. Sealed, bimetallic-actuated type.
- 2. Direct-mounted, metal-case, vapor-actuated type.
- F. Thermometer stems shall be of length to match thermowell insertion length.

3.5 THERMOMETER SCALE-RANGE SCHEDULE

- A. Scale Range for Chilled-Water Piping: 0 to 100 deg F.
- B. Scale Range for Condenser-Water Piping: 0 to 150 deg F.
- C. Scale Range for Heating, Hot-Water Piping: 20 to 240 deg F.
- D. Scale Range for Steam and Steam-Condensate Piping: 20 to 240 deg F.
- E. Scale Range for Air Ducts: 0 to 150 deg F.

3.6 PRESSURE-GAGE SCHEDULE

- A. Pressure gages at discharge of each pressure-reducing valve shall be the following:
 - 1. Liquid-filled Solid-front, pressure-relief, direct-mounted, metal case.
- B. Pressure gages at inlet and outlet of each chiller chilled-water and condenser-water connection shall be the following:
 - 1. Liquid-filled Solid-front, pressure-relief, direct-mounted, metal case.
- C. Pressure gages at suction and discharge of each pump shall be the following:
 - 1. Liquid-filled Solid-front, pressure-relief, direct-mounted, metal case.

3.7 PRESSURE-GAGE SCALE-RANGE SCHEDULE

- A. Scale Range for Chilled-Water Piping: 0 to 160 psi.
- B. Scale Range for Condenser-Water Piping: 0 to 160 psi.
- C. Scale Range for Heating, Hot-Water Piping: 0 to 160 psi.
- D. Scale Range for Steam Piping: 0 to 100 psi.

END OF SECTION 230519

GENERAL-DUTY VALVES FOR HVAC PIPING - 230523 PAGE -1-

GENERAL-DUTY VALVES FOR HVAC PIPING SECTION 230523

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Bronze ball valves.
 - 2. High-performance butterfly valves.
 - 3. Bronze swing check valves.
 - 4. Iron swing check valves.

B. Related Sections:

1. Section 230553 "Identification for HVAC Piping and Equipment" for valve tags and schedules.

1.3 DEFINITIONS

- A. CWP: Cold working pressure.
- B. EPDM: Ethylene propylene copolymer rubber.
- C. NBR: Acrylonitrile-butadiene, Buna-N, or nitrile rubber.
- D. NRS: Nonrising stem.
- E. OS&Y: Outside screw and yoke.
- F. RS: Rising stem.
- G. SWP: Steam working pressure.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of valve indicated.

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1.5 QUALITY ASSURANCE

- A. Source Limitations for Valves: Obtain each type of valve from single source from single manufacturer.
- B. ASME Compliance:
 - 1. ASME B16.10 and ASME B16.34 for ferrous valve dimensions and design criteria.
 - 2. ASME B31.1 for power piping valves.
 - 3. ASME B31.9 for building services piping valves.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Prepare valves for shipping as follows:
 - 1. Protect internal parts against rust and corrosion.
 - 2. Protect threads, flange faces, grooves, and weld ends.
 - 3. Set gate valves closed to prevent rattling.
 - 4. Set ball valves open to minimize exposure of functional surfaces.
 - 5. Set butterfly valves closed or slightly open.
 - 6. Block check valves in either closed or open position.
- B. Use the following precautions during storage:
 - 1. Maintain valve end protection.
 - 2. Store valves indoors and maintain at higher than ambient dew point temperature. If outdoor storage is necessary, store valves off the ground in watertight enclosures.
- C. Use sling to handle large valves; rig sling to avoid damage to exposed parts. Do not use hand wheels or stems as lifting or rigging points.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR VALVES

A. Refer to HVAC valve schedule articles for applications of valves.

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- B. Valve Pressure and Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.
 - C. Valve Sizes: Same as upstream piping unless otherwise indicated.
 - D. Valve Actuator Types:

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- 1. Hand wheel: For valves other than quarter-turn types.
- 2. Hand lever: For quarter-turn valves NPS 6, and smaller.
- E. Valves in Insulated Piping: With 2-inch stem extensions and the following features:
 - 1. Gate Valves: OS&Y, with rising stem.
 - 2. Ball Valves: With extended operating handle of non-thermal-conductive material, and protective sleeve that allows operation of valve without breaking the vapor seal or disturbing insulation.
 - 3. Butterfly Valves: With extended neck.
- F. Valve-End Connections:
 - 1. Flanged: With flanges according to ASME B16.1 for iron valves.
 - 2. Grooved: With grooves according to AWWA C606.
 - 3. Solder Joint: With sockets according to ASME B16.18.
 - 4. Threaded: With threads according to ASME B1.20.1.
- G. Valve Bypass and Drain Connections: MSS SP-45.

2.2 BRONZE BALL VALVES

- A. Two-Piece, Full-Port, Bronze Ball Valves with Stainless-Steel Trim:
 - 1. <u>Manufacturers</u>: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Hammond Valve.
 - b. NIBCO INC.
 - c. Watts Water Technologies, Inc.
 - 2. Description:

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a. Standard: MSS SP-110.

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b. SWP Rating: 150 psig.

c. CWP Rating: 600 psig.

d. Body Design: Two piece.

e. Body Material: Bronze.

f. Ends: Threaded.

g. Seats: PTFE or TFE.

h. Stem: Stainless steel.

i. Ball: Stainless steel, vented.

j. Port: Full.

2.3 HIGH-PERFORMANCE BUTTERFLY VALVES

- A. Class 150, Single-Flange, High-Performance Butterfly Valves:
 - 1. <u>Manufacturers</u>: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Crane Co.; Crane Valve Group; Stockham Division.
 - b. Milwaukee Valve Company.
 - c. NIBCO INC.
 - d. Xomox Corporation.

2. Description:

- a. Standard: MSS SP-68.
- b. CWP Rating: 285 psig at 100 deg F.
- c. Body Design: Lug type; suitable for bidirectional dead-end service at rated pressure without use of downstream flange.
- d. Body Material: Carbon steel, cast iron, ductile iron, or stainless steel.
- e. Seat: Reinforced PTFE or metal.

GENERAL-DUTY VALVES FOR HVAC PIPING - 230523 PAGE -5-

- f. Stem: Stainless steel; offset from seat plane.
- g. Disc: Carbon steel.
- h. Service: Bidirectional.

2.4 BRONZE SWING CHECK VALVES

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- A. Class 125, Bronze Swing Check Valves with Bronze Disc:
 - 1. <u>Manufacturers</u>: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Crane Co.; Crane Valve Group; Stockham Division.
 - b. Hammond Valve.
 - c. Milwaukee Valve Company.
 - d. NIBCO INC.
 - e. Watts Water Technologies, Inc.
 - 2. Description:
 - a. Standard: MSS SP-80, Type 3.
 - b. CWP Rating: 200 psig.
 - c. Body Design: Horizontal flow.
 - d. Body Material: ASTM B 62, bronze.
 - e. Ends: Threaded.
 - f. Disc: Bronze.

2.5 IRON SWING CHECK VALVES WITH CLOSURE CONTROL

- A. Class 125, Iron Swing Check Valves with Lever- and Spring-Closure Control:
 - 1. <u>Manufacturers</u>: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. NIBCO INC.

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- b. Hammond Valve.
- c. Milwaukee Valve Company.
- d. Cincinnati Valve Company Lunkenheimer Valve.

2. Description:

- a. Standard: MSS SP-71, Type I.
- b. NPS 2-1/2 to NPS 12, CWP Rating: 200 psig.
- c. NPS 14 to NPS 24, CWP Rating: 150 psig.
- d. Body Design: Clear or full waterway.
- e. Body Material: ASTM A 126, gray iron with bolted bonnet.
- f. Ends: Flanged.
- g. Trim: Bronze.
- h. Gasket: Asbestos free.
- i. Closure Control: Factory-installed, exterior lever and spring.

2.6 IRON GATE VALVES

- A. Class 125, OS&Y, Iron Gate Valves:
 - 1. <u>Manufacturers</u>: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Crane Co.; Crane Valve Group; Stockham Division.
 - b. Hammond Valve.
 - c. Milwaukee Valve Company.
 - d. NIBCO INC.
 - e. Powell Valves.
 - f. Watts Water Technologies, Inc.

2. Description:

- a. Standard: MSS SP-70, Type I.
- b. NPS 2-1/2 to NPS 12, CWP Rating: 200 psig.
- c. NPS 14 to NPS 24, CWP Rating: 150 psig.

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- d. Body Material: ASTM A 126, gray iron with bolted bonnet.
- e. Ends: Flanged.
- f. Trim: Bronze.
- g. Disc: Solid wedge.
- h. Packing and Gasket: Asbestos free.

PART 3 - EXECUTION

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3.1 EXAMINATION

- A. Examine valve interior for cleanliness, freedom from foreign matter, and corrosion. Remove special packing materials, such as blocks, used to prevent disc movement during shipping and handling.
- B. Operate valves in positions from fully open to fully closed. Examine guides and seats made accessible by such operations.
- C. Examine threads on valve and mating pipe for form and cleanliness.
- D. Examine mating flange faces for conditions that might cause leakage. Check bolting for proper size, length, and material. Verify that gasket is of proper size, that its material composition is suitable for service, and that it is free from defects and damage.
- E. Do not attempt to repair defective valves; replace with new valves.

3.2 VALVE INSTALLATION

- A. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.
- B. Locate valves for easy access and provide separate support where necessary.
- C. Install valves in horizontal piping with stem at or above center of pipe.
- D. Install valves in position to allow full stem movement.
- E. Install check valves for proper direction of flow and as follows:
 - 1. Swing Check Valves: In horizontal position with hinge pin level.

3.3 ADJUSTING

A. Adjust or replace valve packing after piping systems have been tested and put into service but before final adjusting and balancing. Replace valves if persistent leaking occurs.

3.4 GENERAL REQUIREMENTS FOR VALVE APPLICATIONS

- A. If valve applications are not indicated, use the following:
 - 1. Shutoff Service: Ball, or High-Performance Butterfly Valves.
 - 2. Butterfly Valve Dead-End Service: Single-flange (lug) type, rated for dead-end service.
 - 3. Pump-Discharge Check Valves:
 - a. NPS 2, and Smaller: Bronze swing check valves with bronze disc.
 - b. Options for NPS 2-1/2, and Larger:
 - 1) Iron swing check valves with lever and weight or with spring or iron.
- B. If valves with specified SWP classes or CWP ratings are not available, the same types of valves with higher SWP classes or CWP ratings may be substituted.
- C. Select valves, except wafer types, with the following end connections:
 - 1. For Copper Tubing, NPS 2 and Smaller: Threaded ends except where solder-joint valveend option is indicated in valve schedules below.
 - a. Where solder joints are used, provide unions for disassembly.
 - 2. For Steel Piping, NPS 2, and Smaller: Threaded ends.
 - 3. For Steel Piping, NPS 2-1/2, and Larger: Flanged ends.

3.5 CONDENSER WATER AND HEATING-WATER VALVE SCHEDULE

- A. Pipe NPS 2, and Smaller:
 - 1. Bronze Valves: May be provided with solder-joint ends instead of threaded ends.
 - a. Where solder joints are used, provide unions for disassembly.
 - 2. Ball Valves: Two piece, full port, bronze with stainless-steel trim.
 - 3. Bronze Swing Check Valves: Class 125, bronze disc.

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- B. Pipe NPS 2-1/2, and Larger:
 - 1. Iron Ball Valves, NPS 2-1/2 to NPS 10: Class 150.
 - 2. High-Performance Butterfly Valves: Class 150, single flange.
 - 3. Iron Swing Check Valves: Class 125, with resilient seats.
 - 4. Iron Gate Valves: Class 125, NRS or OS&Y where indicated on plans.

END OF SECTION 230523

HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT - 230529 PAGE -1-

HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT SECTION 230529

PART 1 - GENERAL

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1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

- 1. Metal pipe hangers and supports.
- 2. Trapeze pipe hangers.
- 3. Metal framing systems.
- 4. Thermal-hanger shield inserts.
- 5. Fastener systems.
- 6. Pipe stands.
- 7. Equipment supports.

B. Related Sections:

- 1. Section 055000 "Metal Fabrications" for structural-steel shapes and plates for trapeze hangers for pipe and equipment supports.
- 2. Section 233113 "Metal Ducts" for duct hangers and supports.

1.3 DEFINITIONS

A. MSS: Manufacturers Standardization Society of The Valve and Fittings Industry Inc.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

1.5 QUALITY ASSURANCE

- A. Structural Steel Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code Steel."
- B. Pipe Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.

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PART 2 - PRODUCTS

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2.1 METAL PIPE HANGERS AND SUPPORTS

A. Carbon-Steel Pipe Hangers and Supports:

- 1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
- 2. Galvanized Metallic Coatings: Pre-galvanized or hot dipped.
- 3. Nonmetallic Coatings: Plastic coating, jacket, or liner.
- 4. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion to support bearing surface of piping.
- 5. Hanger Rods: Continuous-thread rod, nuts, and washer made of galvanized carbon steel or stainless steel.

B. Copper Pipe Hangers:

- 1. Description: MSS SP-58, Types 1 through 58, copper-coated-steel, factory-fabricated components.
- 2. Hanger Rods: Continuous-thread rod, nuts, and washer made of copper-coated steel.

2.2 TRAPEZE PIPE HANGERS

A. Description: MSS SP-69, Type 59, shop- or field-fabricated pipe-support assembly made from structural carbon-steel shapes with MSS SP-58 carbon-steel hanger rods, nuts, saddles, and U-bolts.

2.3 METAL FRAMING SYSTEMS

A. MFMA Manufacturer Metal Framing Systems:

- 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. <u>Cooper B-Line, Inc.</u>
 - b. <u>Flex-Strut Inc.</u>
 - c. Kindorf Thomas & Betts Corporation.
 - d. Unistrut Corporation; Tyco International, Ltd.
- 2. Description: Shop- or field-fabricated pipe-support assembly for supporting multiple parallel pipes.
- 3. Standard: MFMA-4.
- 4. Channels: Continuous slotted steel channel with inturned lips.
- 5. Channel Nuts: Formed or stamped steel nuts or other devices designed to fit into channel slot and, when tightened, prevent slipping along channel.

- 6. Hanger Rods: Continuous-thread rod, nuts, and washer made of carbon steel or stainless steel.
- 7. Paint Coating: Epoxy.

2.4 THERMAL-HANGER SHIELD INSERTS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. ERICO International Corporation.
 - 2. <u>Pipe Shields, Inc.</u>; a subsidiary of Piping Technology & Products, Inc.
 - 3. Rilco Manufacturing Co., Inc.
- B. Insulation-Insert Material for Cold Piping: ASTM C 591, Type VI, Grade 1 polyisocyanurate with 125-psig minimum compressive strength and vapor barrier.
- C. Insulation-Insert Material for Hot Piping: ASTM C 591, Type VI, Grade 1 polyisocyanurate with 125-psig minimum compressive strength.
- D. For Trapeze or Clamped Systems: Insert and shield shall cover entire circumference of pipe.
- E. For Clevis or Band Hangers: Insert and shield shall cover lower 180 degrees of pipe.
- F. Insert Length: Extend 2 inches beyond sheet metal shield for piping operating below ambient air temperature.

2.5 FASTENER SYSTEMS

- A. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.
- B. Mechanical-Expansion Anchors: Insert-wedge-type, stainless- steel anchors, for use in hardened portland cement concrete; with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.
- C. Threaded lag hangers for securement to wood trusses and beams.

2.6 PIPE STANDS

A. General Requirements for Pipe Stands: Shop- or field-fabricated assemblies made of manufactured corrosion-resistant components to support piping.

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2.7 EQUIPMENT SUPPORTS

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A. Description: Welded, shop- or field-fabricated equipment support made from structural carbon-steel shapes.

2.8 MISCELLANEOUS MATERIALS

- A. Structural Steel: ASTM A 36/A 36M, carbon-steel plates, shapes, and bars; black and galvanized.
- B. Grout: ASTM C 1107, factory-mixed and -packaged, dry, hydraulic-cement, non-shrink and nonmetallic grout; suitable for interior and exterior applications.
 - 1. Properties: Non-staining, noncorrosive, and nongaseous.
 - 2. Design Mix: 5000-psi, 28-day compressive strength.

PART 3 - EXECUTION

3.1 HANGER AND SUPPORT INSTALLATION

- A. Metal Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from the building structure.
- B. Metal Trapeze Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Arrange for grouping of parallel runs of horizontal piping, and support together on field-fabricated trapeze pipe hangers.
 - 1. Pipes of Various Sizes: Support together and space trapezes for smallest pipe size or install intermediate supports for smaller diameter pipes as specified for individual pipe hangers.
 - 2. Field fabricate from ASTM A 36/A 36M, carbon-steel shapes selected for loads being supported. Weld steel according to AWS D1.1/D1.1M.
- C. Metal Framing System Installation: Arrange for grouping of parallel runs of piping, and support together on field-assembled metal framing systems.
- D. Thermal-Hanger Shield Installation: Install in pipe hanger or shield for insulated piping.
- E. Fastener System Installation:
 - 1. Install powder-actuated fasteners for use in lightweight concrete or concrete slabs less than 4 inches thick in concrete after concrete is placed and completely cured. Use operators that are licensed by powder-actuated tool manufacturer. Install fasteners according to powder-actuated tool manufacturer's operating manual.

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- 2. Install mechanical-expansion anchors in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.
- 3. Install lag hangers in wood at center of member thickness.

F. Pipe Stand Installation:

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- 1. Pipe Stand Types except Curb-Mounted Type: Assemble components and mount on smooth roof surface. Do not penetrate roof membrane.
- 2. Curb-Mounted-Type Pipe Stands: Assemble components or fabricate pipe stand and mount on permanent, stationary roof curb.
- G. Install hangers and supports complete with necessary attachments, inserts, bolts, rods, nuts, washers, and other accessories.
- H. Equipment Support Installation: Fabricate from welded-structural-steel shapes.
- I. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.
- J. Install lateral bracing with pipe hangers and supports to prevent swaying.
- K. Install building attachments within concrete slabs or attach to structural steel. Install additional attachments at concentrated loads, including valves, flanges, and strainers, NPS 2-1/2 and larger and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.
- L. Load Distribution: Install hangers and supports so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.
- M. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and to not exceed maximum pipe deflections allowed by ASME B31.9 for building services piping.

N. Insulated Piping:

- 1. Attach clamps and spacers to piping.
 - a. Piping Operating Above Ambient Air Temperature: Clamp may project through insulation.
 - b. Piping Operating Below Ambient Air Temperature: Use thermal-hanger shield insert with clamp sized to match OD of insert.
 - c. Do not exceed pipe stress limits allowed by ASME B31.9 for building services piping.
- 2. Install MSS SP-58, Type 39, protection saddles if insulation without vapor barrier is indicated. Fill interior voids with insulation that matches adjoining insulation.
 - a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.

- 3. Install MSS SP-58, Type 40, protective shields on cold piping with vapor barrier. Shields shall span an arc of 180 degrees.
 - a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.
- 4. Shield Dimensions for Pipe: Not less than the following:
 - a. NPS 1/4 to NPS 3-1/2: 12 inches long and 0.048 inch thick.
 - b. NPS 4: 12 inches long and 0.06 inch thick.
 - c. NPS 5 and NPS 6: 18 inches long and 0.06 inch thick.
- 5. Thermal-Hanger Shields: Install with insulation same thickness as piping insulation.

3.2 EQUIPMENT SUPPORTS

- A. Fabricate structural-steel stands to suspend equipment from structure overhead or to support equipment above floor.
- B. Grouting: Place grout under supports for equipment and make bearing surface smooth.
- C. Provide lateral bracing, to prevent swaying, for equipment supports.

3.3 METAL FABRICATIONS

- A. Cut, drill, and fit miscellaneous metal fabrications for trapeze pipe hangers and equipment supports.
- B. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.
- C. Field Welding: Comply with AWS D1.1/D1.1M procedures for shielded, metal arc welding; appearance and quality of welds; and methods used in correcting welding work; and with the following:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. Finish welds at exposed connections so no roughness shows after finishing and so contours of welded surfaces match adjacent contours.

3.4 ADJUSTING

A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.

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B. Trim excess length of continuous-thread hanger and support rods to 1-1/2 inches.

3.5 PAINTING

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- A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.
 - 1. Apply paint by brush or spray to provide a minimum dry film thickness of 2.0 mils.
- B. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

3.6 HANGER AND SUPPORT SCHEDULE

- A. Specific hanger and support requirements are in Sections specifying piping systems and equipment.
- B. Comply with MSS SP-69 for pipe-hanger selections and applications that are not specified in piping system Sections.
- C. Use hangers and supports with galvanized metallic coatings for piping and equipment that will not have field-applied finish.
- D. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.
- E. Use carbon-steel pipe hangers and supports, metal trapeze pipe hangers, or metal framing systems and attachments for general service applications.
- F. Use copper-plated pipe hangers and copper or stainless-steel attachments for copper piping and tubing.
- G. Use padded hangers for piping that is subject to scratching.
- H. Use thermal-hanger shield inserts for insulated piping and tubing.
- I. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
 - 1. Adjustable, Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated, stationary pipes NPS 1/2 to NPS 30.
 - 2. Yoke-Type Pipe Clamps (MSS Type 2): For suspension of up to 1050 deg F, pipes NPS 4 to NPS 24, requiring up to 4 inches of insulation.
 - 3. Carbon- or Alloy-Steel, Double-Bolt Pipe Clamps (MSS Type 3): For suspension of pipes NPS 3/4 to NPS 36, requiring clamp flexibility and up to 4 inches of insulation.

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- 4. Steel Pipe Clamps (MSS Type 4): For suspension of cold and hot pipes NPS 1/2 to NPS 24 if little or no insulation is required.
 - 5. Pipe Hangers (MSS Type 5): For suspension of pipes NPS 1/2 to NPS 4, to allow off-center closure for hanger installation before pipe erection.
 - 6. Adjustable, Swivel Split- or Solid-Ring Hangers (MSS Type 6): For suspension of noninsulated, stationary pipes NPS 3/4 to NPS 8.
 - 7. Adjustable, Steel Band Hangers (MSS Type 7): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8.
 - 8. Adjustable Band Hangers (MSS Type 9): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8.
 - 9. Adjustable, Swivel-Ring Band Hangers (MSS Type 10): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8.
 - 10. Split Pipe Ring with or without Turnbuckle Hangers (MSS Type 11): For suspension of noninsulated, stationary pipes NPS 3/8 to NPS 8.
 - 11. Extension Hinged or Two-Bolt Split Pipe Clamps (MSS Type 12): For suspension of noninsulated, stationary pipes NPS 3/8 to NPS 3.
 - 12. U-Bolts (MSS Type 24): For support of heavy pipes NPS 1/2 to NPS 30.
 - 13. Clips (MSS Type 26): For support of insulated pipes not subject to expansion or contraction.
 - 14. Pipe Saddle Supports (MSS Type 36): For support of pipes NPS 4 to NPS 36, with steel-pipe base stanchion support and cast-iron floor flange or carbon-steel plate.
 - 15. Pipe Stanchion Saddles (MSS Type 37): For support of pipes NPS 4 to NPS 36, with steel-pipe base stanchion support and cast-iron floor flange or carbon-steel plate, and with U-bolt to retain pipe.
 - 16. Adjustable Pipe Saddle Supports (MSS Type 38): For stanchion-type support for pipes NPS 2-1/2 to NPS 36 if vertical adjustment is required, with steel-pipe base stanchion support and cast-iron floor flange.
 - 17. Single-Pipe Rolls (MSS Type 41): For suspension of pipes NPS 1 to NPS 30, from two rods if longitudinal movement caused by expansion and contraction might occur.
 - 18. Adjustable Roller Hangers (MSS Type 43): For suspension of pipes NPS 2-1/2 to NPS 24, from single rod if horizontal movement caused by expansion and contraction might occur.
 - 19. Complete Pipe Rolls (MSS Type 44): For support of pipes NPS 2 to NPS 42 if longitudinal movement caused by expansion and contraction might occur but vertical adjustment is not necessary.
 - 20. Pipe Roll and Plate Units (MSS Type 45): For support of pipes NPS 2 to NPS 24 if small horizontal movement caused by expansion and contraction might occur and vertical adjustment is not necessary.
 - 21. Adjustable Pipe Roll and Base Units (MSS Type 46): For support of pipes NPS 2 to NPS 30 if vertical and lateral adjustment during installation might be required in addition to expansion and contraction.
 - J. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
 - 1. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers NPS 3/4 to NPS 24.

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- 2. Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): For support of pipe risers NPS 3/4 to NPS 24 if longer ends are required for riser clamps.
- K. Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
 - 1. Steel Turnbuckles (MSS Type 13): For adjustment up to 6 inches for heavy loads.
 - 2. Steel Clevises (MSS Type 14): For 120 to 450 deg F piping installations.
 - 3. Swivel Turnbuckles (MSS Type 15): For use with MSS Type 11, split pipe rings.
 - 4. Malleable-Iron Sockets (MSS Type 16): For attaching hanger rods to various types of building attachments.
 - 5. Steel Weldless Eye Nuts (MSS Type 17): For 120 to 450 deg F piping installations.
- L. Building Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
 - 1. Steel or Malleable Concrete Inserts (MSS Type 18): For upper attachment to suspend pipe hangers from concrete ceiling.
 - 2. Top-Beam C-Clamps (MSS Type 19): For use under roof installations with bar-joist construction, to attach to top flange of structural shape.
 - 3. Side-Beam or Channel Clamps (MSS Type 20): For attaching to bottom flange of beams, channels, or angles.
 - 4. Center-Beam Clamps (MSS Type 21): For attaching to center of bottom flange of beams.
 - 5. Welded Beam Attachments (MSS Type 22): For attaching to bottom of beams if loads are considerable and rod sizes are large.
 - 6. C-Clamps (MSS Type 23): For structural shapes.
 - 7. Top-Beam Clamps (MSS Type 25): For top of beams if hanger rod is required tangent to flange edge.
 - 8. Side-Beam Clamps (MSS Type 27): For bottom of steel I-beams.
 - 9. Steel-Beam Clamps with Eye Nuts (MSS Type 28): For attaching to bottom of steel Ibeams for heavy loads.
 - 10. Linked-Steel Clamps with Eye Nuts (MSS Type 29): For attaching to bottom of steel Ibeams for heavy loads, with link extensions.
 - 11. Malleable-Beam Clamps with Extension Pieces (MSS Type 30): For attaching to structural steel.
 - 12. Welded-Steel Brackets: For support of pipes from below or for suspending from above by using clip and rod. Use one of the following for indicated loads:
 - a. Light (MSS Type 31): 750 lb.
 - b. Medium (MSS Type 32): 1500 lb.
 - c. Heavy (MSS Type 33): 3000 lb.
 - 13. Side-Beam Brackets (MSS Type 34): For sides of steel or wooden beams.
 - 14. Plate Lugs (MSS Type 57): For attaching to steel beams if flexibility at beam is required.
 - 15. Horizontal Travelers (MSS Type 58): For supporting piping systems subject to linear horizontal movement where headroom is limited.

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- M. Saddles and Shields: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
 - 1. Steel-Pipe-Covering Protection Saddles (MSS Type 39): To fill interior voids with insulation that matches adjoining insulation.
 - 2. Protection Shields (MSS Type 40): Of length recommended in writing by manufacturer to prevent crushing insulation.
 - 3. Thermal-Hanger Shield Inserts: For supporting insulated pipe.
- N. Spring Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
 - 1. Restraint-Control Devices (MSS Type 47): Where indicated to control piping movement.
 - 2. Spring Cushions (MSS Type 48): For light loads if vertical movement does not exceed 1-1/4 inches
 - 3. Spring-Cushion Roll Hangers (MSS Type 49): For equipping Type 41, roll hanger with springs.
 - 4. Spring Sway Braces (MSS Type 50): To retard sway, shock, vibration, or thermal expansion in piping systems.
 - 5. Variable-Spring Hangers (MSS Type 51): Preset to indicated load and limit variability factor to 25 percent to allow expansion and contraction of piping system from hanger.
 - 6. Variable-Spring Base Supports (MSS Type 52): Preset to indicated load and limit variability factor to 25 percent to allow expansion and contraction of piping system from base support.
 - 7. Variable-Spring Trapeze Hangers (MSS Type 53): Preset to indicated load and limit variability factor to 25 percent to allow expansion and contraction of piping system from trapeze support.
 - 8. Constant Supports: For critical piping stress and if necessary to avoid transfer of stress from one support to another support, critical terminal, or connected equipment. Include auxiliary stops for erection, hydrostatic test, and load-adjustment capability. These supports include the following types:
 - a. Horizontal (MSS Type 54): Mounted horizontally.
 - b. Vertical (MSS Type 55): Mounted vertically.
 - c. Trapeze (MSS Type 56): Two vertical-type supports and one trapeze member.
- O. Comply with MSS SP-69 for trapeze pipe-hanger selections and applications that are not specified in piping system Sections.
- P. Comply with MFMA-103 for metal framing system selections and applications that are not specified in piping system Sections.

END OF SECTION 230529

VIBRATION CONTROLS FOR HVAC SECTION 230548.13

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

- 1. Elastomeric isolation pads.
- 2. Restrained elastomeric isolation mounts.
- 3. Housed-restrained-spring isolators.
- 4. Elastomeric hangers.
- 5. Spring hangers.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Delegated-Design Submittal: For each vibration isolation device.
 - 1. Include design calculations for selecting vibration isolators.

PART 2 - PRODUCTS

2.1 ELASTOMERIC ISOLATION PADS

A. Elastomeric Isolation Pads:

- 1. Fabrication: Single or multiple layers of sufficient durometer stiffness for uniform loading over pad area.
- 2. Size: Factory or field cut to match requirements of supported equipment.
- 3. Pad Material: Oil and water resistant with elastomeric properties.
- 4. Surface Pattern: Waffle pattern.
- 5. Infused nonwoven cotton or synthetic fibers.
- 6. Load-bearing metal plates adhered to pads.

2.2 HOUSED-RESTRAINED-SPRING ISOLATORS

- A. Freestanding, Steel, Open-Spring Isolators with Vertical-Limit Stop Restraint in Two-Part Telescoping Housing:
 - 1. Two-Part Telescoping Housing: A steel top and bottom frame separated by an elastomeric material and enclosing the spring isolators. Housings are equipped with adjustable snubbers to limit vertical movement.

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- a. Drilled base housing for bolting to structure with an elastomeric isolator pad attached to the underside. Bases shall limit floor load to 500 psig.
- b. Threaded top housing with adjustment bolt and cap screw to fasten and level equipment.
- 2. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load
- 3. Minimum Additional Travel: 50 percent of the required deflection at rated load.
- 4. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
- 5. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.

2.3 ELASTOMERIC HANGERS

- A. Elastomeric Mount in a Steel Frame with Upper and Lower Steel Hanger Rods:
 - 1. Frame: Steel, fabricated with a connection for an upper threaded hanger rod and an opening on the underside to allow for a maximum of 30 degrees of angular lower hanger-rod misalignment without binding or reducing isolation efficiency.
 - 2. Dampening Element: Molded, oil-resistant rubber, neoprene, or other elastomeric material with a projecting bushing for the underside opening preventing steel to steel contact.

2.4 SPRING HANGERS

- A. Combination Coil-Spring and Elastomeric-Insert Hanger with Spring and Insert in Compression:
 - 1. Frame: Steel, fabricated for connection to threaded hanger rods and to allow for a maximum of 30 degrees of angular hanger-rod misalignment without binding or reducing isolation efficiency.
 - 2. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
 - 3. Minimum Additional Travel: 50 percent of the required deflection at rated load.
 - 4. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
 - 5. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
 - 6. Elastomeric Element: Molded, oil-resistant rubber or neoprene. Steel-washer-reinforced cup to support spring and bushing projecting through bottom of frame.
 - 7. Adjustable Vertical Stop: Steel washer with neoprene washer "up-stop" on lower threaded rod.
 - 8. Self-centering hanger rod cap to ensure concentricity between hanger rod and support spring coil.

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PART 3 - EXECUTION

3.1 VIBRATION CONTROL DEVICE INSTALLATION

- A. Coordinate the location of embedded connection hardware with supported equipment attachment and mounting points and with requirements for concrete reinforcement and formwork specified in Section 033000 "Cast-in-Place Concrete."
- B. Installation of vibration isolators must not cause any change of position of equipment, piping, or ductwork resulting in stresses or misalignment.

END OF SECTION 230548.13

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IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT SECTION 230553

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

- 1. Equipment labels.
- 2. Warning signs and labels.
- 3. Pipe labels.
- 4. Duct labels.
- 5. Stencils.
- 6. Valve tags.
- 7. Warning tags.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples: For color, letter style, and graphic representation required for each identification material and device.
- C. Equipment Label Schedule: Include a listing of all equipment to be labeled with the proposed content for each label.
- D. Valve numbering scheme.
- E. Valve Schedules: For each piping system to include in maintenance manuals.

1.4 COORDINATION

- A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.
- B. Coordinate installation of identifying devices with locations of access panels and doors.

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C. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 - PRODUCTS

2.1 EQUIPMENT LABELS

A. Metal Labels for Equipment:

- 1. Material and Thickness: Stainless steel, 0.025-inch, Aluminum, 0.032-inch or anodized aluminum, 0.032-inch minimum thickness, and having predrilled or stamped holes for attachment hardware.
- 2. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
- 3. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
- 4. Fasteners: Stainless-steel rivets or self-tapping screws.
- 5. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.
- B. Label Content: Include equipment's Drawing designation or unique equipment number, Drawing numbers where equipment is indicated (plans, details, and schedules), plus the Specification Section number and title where equipment is specified.
- C. Equipment Label Schedule: For each item of equipment to be labeled, on 8-1/2-by-11-inch bond paper. Tabulate equipment identification number and identify Drawing numbers where equipment is indicated (plans, details, and schedules), plus the Specification Section number and title where equipment is specified. Equipment schedule shall be included in operation and maintenance data.

2.2 WARNING SIGNS AND LABELS

- A. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/16 inch thick, and having predrilled holes for attachment hardware.
- B. Letter Color: White.
- C. Background Color: Red.
- D. Maximum Temperature: Able to withstand temperatures up to 160 deg F.
- E. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
- F. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater

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viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.

- G. Fasteners: Stainless-steel rivets or self-tapping screws.
- H. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.
- I. Label Content: Include caution and warning information, plus emergency notification instructions.

2.3 PIPE LABELS

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- A. General Requirements for Manufactured Pipe Labels: Preprinted, color-coded, with lettering indicating service, and showing flow direction.
- B. Pretensioned Pipe Labels: Precoiled, semirigid plastic formed to partially cover circumference of pipe and to attach to pipe without fasteners or adhesive.
- C. Self-Adhesive Pipe Labels: Printed plastic with contact-type, permanent-adhesive backing.
- D. Pipe Label Contents: Include identification of piping service using same designations or abbreviations as used on Drawings, pipe size, and an arrow indicating flow direction.
 - 1. Flow-Direction Arrows: Integral with piping system service lettering to accommodate both directions, or as separate unit on each pipe label to indicate flow direction.
 - 2. Lettering Size: At least 1-1/2 inches high.

2.4 DUCT LABELS

- A. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/16 inch thick, and having predrilled holes for attachment hardware.
- B. Letter Color: Green.
- C. Background Color: White.
- D. Maximum Temperature: Able to withstand temperatures up to 160 deg F.
- E. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
- F. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
- G. Fasteners: Stainless-steel rivets or self-tapping screws.

- H. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.
- I. Duct Label Contents: Include identification of duct service using same designations or abbreviations as used on Drawings, duct size, and an arrow indicating flow direction.
 - 1. Flow-Direction Arrows: Integral with duct system service lettering to accommodate both directions, or as separate unit on each duct label to indicate flow direction.
 - 2. Lettering Size: At least 1-1/2 inches high.

2.5 STENCILS

- A. Stencils: Prepared with letter sizes according to ASME A13.1 for piping; minimum letter height of 1-1/4 inches for ducts; and minimum letter height of 3/4 inch for access panel and door labels, equipment labels, and similar operational instructions.
 - 1. Stencil Material: Fiberboard or metal.
 - 2. Stencil Paint: Exterior, gloss, acrylic enamel black unless otherwise indicated. Paint may be in pressurized spray-can form.
 - 3. Identification Paint: Exterior, acrylic enamel in colors according to ASME A13.1 unless otherwise indicated.

2.6 VALVE TAGS

- A. Valve Tags: Stamped or engraved with 1/4-inch letters for piping system abbreviation and 1/2-inch numbers.
 - 1. Tag Material: Brass, 0.032-inch minimum thickness, and having predrilled or stamped holes for attachment hardware.
 - 2. Fasteners: Brass wire-link or beaded chain.
- B. Valve Schedules: For each piping system, on 8-1/2-by-11-inch bond paper. Tabulate valve number, piping system, system abbreviation (as shown on valve tag), location of valve (room or space), normal-operating position (open, closed, or modulating), and variations for identification. Mark valves for emergency shutoff and similar special uses.
 - 1. Valve-tag schedule shall be included in operation and maintenance data.

2.7 WARNING TAGS

- A. Warning Tags: Preprinted or partially preprinted, accident-prevention tags, of plasticized card stock with matte finish suitable for writing.
 - 1. Size: 3 by 5-1/4 inches minimum.
 - 2. Fasteners: Brass grommet and wire.
 - 3. Nomenclature: Large-size primary caption such as "DANGER," "CAUTION," or "DO NOT OPERATE."

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4. Color: Yellow background with black lettering.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean piping and equipment surfaces of substances that could impair bond of identification devices, including dirt, oil, grease, release agents, and incompatible primers, paints, and encapsulants.

3.2 EQUIPMENT LABEL INSTALLATION

- A. Install or permanently fasten labels on each major item of mechanical equipment.
- B. Locate equipment labels where accessible and visible.

3.3 PIPE LABEL INSTALLATION

- A. Piping Color-Coding: Painting of piping is specified in Section 099123 "Interior Painting"
- B. Stenciled Pipe Label Option: Stenciled labels may be provided instead of manufactured pipe labels, at Installer's option. Install stenciled pipe labels with painted, color-coded bands or rectangles, complying with ASME A13.1, on each piping system.
 - 1. Identification Paint: Use for contrasting background.
 - 2. Stencil Paint: Use for pipe marking.
- C. Locate pipe labels where piping is exposed or above accessible ceilings in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior exposed locations as follows:
 - 1. Near each valve and control device.
 - 2. Near each branch connection, excluding short takeoffs for fixtures and terminal units. Where flow pattern is not obvious, mark each pipe at branch.
 - 3. Near penetrations through walls, floors, ceilings, and inaccessible enclosures.
 - 4. At access doors, manholes, and similar access points that permit view of concealed piping.
 - 5. Near major equipment items and other points of origination and termination.
 - 6. Spaced at maximum intervals of 50 feet along each run. Reduce intervals to 25 feet in areas of congested piping and equipment.

D. Pipe Label Color Schedule:

For anything not listed below, use the ASME (ANSI) A13.1-2007 for labeling requirements, locations, letter size, flow direction etc

Steam Yellow
Condensate Orange
Municipal Water Supply Green
Natural gas Blue
Standpipes/Sprinkler Lines
Compressed air White

3.4 DUCT LABEL INSTALLATION

- A. Install self-adhesive duct labels with permanent adhesive on air ducts in the following color codes:
 - 1. Blue: For supply ducts.
 - 2. Yellow: For exhaust-, outside-, relief-, return-, and mixed-air ducts.
 - 3. ASME A13.1 Colors and Designs: For hazardous material exhaust.
- B. Stenciled Duct Label Option: Stenciled labels, showing service and flow direction, may be provided instead of plastic-laminated duct labels, at Installer's option, if lettering larger than 1 inch high is needed for proper identification because of distance from normal location of required identification.
- C. Locate labels near points where ducts enter into concealed spaces and at maximum intervals of 50 feet in each space where ducts are exposed or concealed by removable ceiling system.

3.5 VALVE-TAG INSTALLATION

- A. Install tags on valves and control devices in piping systems, except check valves; valves within factory-fabricated equipment units; shutoff valves; faucets; convenience and lawn-watering hose connections; and HVAC terminal devices and similar roughing-in connections of end-use fixtures and units. List tagged valves in a valve schedule.
- B. Valve-Tag Application Schedule: Tag valves according to size, shape, and color scheme and with captions similar to those indicated in the following subparagraphs:
 - 1. Valve-Tag Size and Shape: 1-1/2 inches, square.
 - 2. Valve-Tag Color: Match piping color.

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- 3.6 WARNING-TAG INSTALLATION
 - A. Write required message on, and attach warning tags to, equipment and other items where required.

END OF SECTION 230553

TESTING, ADJUSTING, AND BALANCING FOR HVAC - 230593

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TESTING, ADJUSTING, AND BALANCING FOR HVAC SECTION 230593

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Balancing Air Systems:
 - a. Constant-volume air systems.
 - b. Variable-volume air systems.
 - 2. Balancing Hydronic Piping Systems:
 - a. Variable-flow hydronic systems.
 - b. Primary-secondary hydronic systems.

1.3 DEFINITIONS

- A. AABC: Associated Air Balance Council.
- B. NEBB: National Environmental Balancing Bureau.
- C. TAB: Testing, adjusting, and balancing.
- D. TABB: Testing, Adjusting, and Balancing Bureau.
- E. TAB Specialist: An entity engaged to perform TAB Work.

1.4 ACTION SUBMITTALS

A. TAB Report: Documentation indicating that Work complies with ASHRAE/IES 90.1, Section 6.7.2.3 - "System Balancing."

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: Within 45 days of Contractor's Notice to Proceed, submit documentation that the TAB contractor and this Project's TAB team members meet the qualifications specified in "Quality Assurance" Article.
- B. Contract Documents Examination Report: Within 45 days of Contractor's Notice to Proceed, submit the Contract Documents review report as specified in Part 3.
- C. Strategies and Procedures Plan: Within 60 days of Contractor's Notice to Proceed, submit TAB strategies and step-by-step procedures as specified in "Preparation" Article.
- D. Certified TAB reports.
- E. Instrument calibration reports, to include the following:
 - 1. Instrument type and make.
 - 2. Dates of calibration.

1.6 QUALITY ASSURANCE

- A. TAB Contractor Qualifications: Engage a TAB entity certified by NEBB.
 - 1. TAB Field Supervisor: Employee of the TAB contractor and certified by NEBB.
 - 2. TAB Technician: Employee of the TAB contractor and who is certified by NEBB as a TAB technician.
- B. TAB Conference: Comply with requirements listed in specification section 019113, "General Commissioning Requirements."
- C. Certify TAB field data reports and perform the following:
 - 1. Review field data reports to validate accuracy of data and to prepare certified TAB reports.
 - 2. Certify that the TAB team complied with the approved TAB plan and the procedures specified and referenced in this Specification.
- D. TAB Report Forms: Use standard TAB contractor's forms.
 - 1. Commissioning Authority to review TAB plan.
- E. Instrumentation Type, Quantity, Accuracy, and Calibration: As described in ASHRAE 111, Section 5, "Instrumentation."
- F. ASHRAE/IES 90.1 Compliance: Applicable requirements in ASHRAE/IES 90.1, Section 6.7.2.3 "System Balancing."

1.7 COORDINATION

- A. Notice: Provide seven days' advance notice for each test. Include scheduled test dates and times.
- B. Perform TAB after leakage and pressure tests on air and water distribution systems have been satisfactorily completed.
- C. Construction is phased. Coordinate testing for each system to occur after all work associated with system or phase of construction is complete.
 - 1. Phased construction may require several scheduled site visits by TAB subcontractor, throughout construction.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 SCOPE OF TESTING

- A. The following systems and equipment shall be included in the scope:
 - 1. Condensers.
 - 2. Hydronic Pumps: Hydronic Heating Water and Condenser Water.
 - 3. Exhaust Fans.
 - 4. Air Distribution systems including terminal devices:
 - a. Include all apparatus testing.
 - b. Also include setpoint and space temperature sensor calibration.
 - 5. Energy Recovery Ventilation Equipment.
 - 6. Duct main traverse for all mains and branch ducts of entire supply and exhaust distribution ductwork of the Energy Recovery Ventilation System.
 - a. Provide terminal testing and balancing of all supply diffusers, registers, and exhaust grilles connected to the Energy Recovery Ventilation System.
 - b. Intake and exhaust control dampers.
 - 7. Duct main traverse for all mains and branch ducts of all dedicated exhaust systems.

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 - a. Provide terminal testing and balancing of all exhaust grilles connected to each exhaust fan system.
 - 8. Provide terminal testing and balancing of all supply diffusers / registers / grilles.
 - 9. Balancing of all hydronic systems, hot water and condenser water:
 - a. Include pump speed adjustment based on differential pressure transducers.
 - B. Metering and systems integration to single web-enabled front-end.
 - C. In addition to the scope specifically listed in this article, any system, equipment, or sub-system included in the project scope of work, as documented on the contract drawings or as discussed in another specification section shall also be included in the scope of testing and balancing services.
 - D. Complete all testing and reporting in accordance with the procedures herein.

3.2 EXAMINATION

- A. Examine the Contract Documents to become familiar with Project requirements and to discover conditions in systems' designs that may preclude proper TAB of systems and equipment.
- B. Examine systems for installed balancing devices, such as test ports, gage cocks, thermometer wells, flow-control devices, balancing valves and fittings, and manual volume dampers. Verify that locations of these balancing devices are accessible.
- C. Examine the approved submittals for HVAC systems and equipment.
- D. Examine design data including HVAC system descriptions, statements of design assumptions for environmental conditions and systems' output, and statements of philosophies and assumptions about HVAC system and equipment controls.
- E. Examine air plenums used for supply, return, or relief air to verify that they meet the leakage class of connected ducts as specified in Section 233113 "Metal Ducts". Verify that penetrations in plenum walls are sealed and fire-stopped if required.
- F. Examine equipment performance data including fan and pump curves.
 - 1. Relate performance data to Project conditions and requirements, including system effects that can create undesired or unpredicted conditions that cause reduced capacities in all or part of a system.
 - 2. Calculate system-effect factors to reduce performance ratings of HVAC equipment when installed under conditions different from the conditions used to rate equipment performance. To calculate system effects for air systems, use tables and charts found in

AMCA 201, "Fans and Systems," or in SMACNA's "HVAC Systems - Duct Design." Compare results with the design data and installed conditions.

- Examine system and equipment installations and verify that field quality-control testing. G. cleaning, and adjusting specified in individual Sections have been performed.
- H. Examine test reports specified in individual system and equipment Sections.
- I Examine system air filters and verify that equipment with functioning controls are ready for operation.
- Examine strainers. Verify that startup screens are replaced by permanent screens with indicated J. perforations.
- K. Examine equipment for correct piping connections and for clean and straight fins.
- L. Examine system pumps to ensure absence of entrained air in the suction piping.
- Examine operating safety interlocks and controls on HVAC equipment. M.
- Report deficiencies discovered before and during performance of TAB procedures. Observe N. and record system reactions to changes in conditions. Record default set points if different from indicated values.

3.3 **PREPARATION**

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- A. Prepare a TAB plan that includes strategies and step-by-step procedures.
- В. Complete system-readiness checks and prepare reports. Verify the following:
 - 1. Permanent electrical-power wiring is complete.
 - 2 Hydronic systems are filled, clean, and free of air.
 - 3. Automatic temperature-control systems are operational.
 - 4. Equipment and duct access doors are securely closed.
 - 5. Balance dampers are open.
 - 6. Isolating and balancing valves are open and control valves are operational.

3.4 GENERAL PROCEDURES FOR TESTING AND BALANCING

Perform testing and balancing procedures on each system according to the procedures contained A. in NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems" and in this Section.

- B. Cut insulation, ducts and equipment cabinets for installation of test probes to the minimum extent necessary for TAB procedures.
 - 1. After testing and balancing, patch probe holes in ducts with same material and thickness as used to construct ducts and insulation.
 - 2. After testing and balancing, install test ports and duct access doors that comply with requirements in Section 233300 "Air Duct Accessories."
 - 3. Install and join new insulation that matches removed materials. Restore insulation, coverings, vapor barrier, and finish according to Section 230713 "Duct Insulation," Section 230716 "HVAC Equipment Insulation," and Section 230719 "HVAC Piping Insulation."
- C. Mark equipment and balancing devices, including damper-control positions, valve position indicators, fan-speed-control levers, and similar controls and devices, with paint or other suitable, permanent identification material to show final settings.
- D. Take and report testing and balancing measurements in inch-pound (IP) units.
- E. Prepare test reports for both fans and outlets. Obtain manufacturer's outlet factors and recommended testing procedures. Crosscheck the summation of required outlet volumes with required fan volumes.
- F. Prepare schematic diagrams of systems' "as-built" duct layouts.
- G. Determine the best locations in main and branch ducts for accurate duct-airflow measurements.
- H. Locate start-stop and disconnect switches, electrical interlocks, and motor starters.
- I. Verify that motor starters are equipped with properly sized thermal protection.
- J. Check dampers for proper position to achieve desired airflow path.
- K. Check for airflow blockages.
- L. Check condensate drains for proper connections and functioning.
- M. Check for proper sealing of air-handling-unit components.
- N. Verify that air duct system is sealed as specified in Section 233113 "Metal Ducts."

3.5 AIR BALANCING – GENERAL REQUIREMENTS

A. Place systems in operation with filters installed and control systems complete and operating. Temporarily block filters to simulate dirty filter pressure drop (obtain dirty filter pressure drop from drawing schedules. If not stated, contact equipment supplier to obtain). Balance systems

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- to design ratings. Adjust each air terminal unit, inlet, and outlet within plus or minus 10 percent of design requirements, but total air for each system shall be not less than shown.
- B. Check flow rates for all factory set air terminal units and reset if not correct.
- C. Adjust fan speeds by adjusting control settings.
- Record pressure drop readings across all major system components and significant drops within D. duct systems.
- E. Verify the calibration of air flow measuring stations by taking traverse readings across associated ducts
- F. Label all diffusers, registers, and grilles with clear plastic adhesive labels indicating air flow rate, terminal unit number, and outlet number corresponding to the balance report.

3.6 PROCEDURES FOR AIR SYSTEMS

- Adjust fans to deliver total indicated airflows within the maximum allowable fan speed listed by A. fan manufacturer
 - 1. Measure total airflow.
 - Where sufficient space in ducts is unavailable for Pitot-tube traverse; measure airflow at terminal outlets and inlets, and then calculate the total airflow.
 - 2. Measure fan static pressures as follows to determine actual static pressure:
 - Measure outlet static pressure as far downstream from the fan as practical and a. upstream from restrictions in ducts such as elbows and transitions.
 - b. Measure static pressure directly at the fan outlet or through the flexible connection.
 - Measure inlet static pressure of single-inlet fans in the inlet duct as near the fan as c. possible, upstream from the flexible connection, and downstream from duct restrictions.
 - 3. Review Record Documents to determine variations in design static pressures versus actual static pressures. Calculate actual system-effect factors. Recommend adjustments to accommodate actual conditions.
 - 4. Obtain approval from Engineer for adjustment of fan speed higher or lower than indicated speed.
 - 5. Do not make fan-speed adjustments that result in motor overload. Consult equipment manufacturers about fan-speed safety factors. Modulate dampers and measure fan-motor amperage to ensure that no overload will occur. Measure amperage in full-cooling, full-

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heating, economizer, and any other operating mode to determine the maximum required brake horsepower.

- B. Adjust volume dampers for main duct, submain ducts, and major branch ducts to indicated airflows within specified tolerances.
 - 1. Measure airflow of submain and branch ducts.
 - a. Where sufficient space in submain and branch ducts is unavailable for Pitot-tube traverse measurements, measure airflow at terminal outlets and inlets and calculate the total airflow for that zone.
 - 2. Measure static pressure at a point downstream from the balancing damper, and adjust volume dampers until the proper static pressure is achieved.
 - 3. Re-measure each submain and branch duct after all have been adjusted. Continue to adjust submain and branch ducts to indicated airflows within specified tolerances.

3.7 GENERAL PROCEDURES FOR HYDRONIC SYSTEMS

- A. Prepare test reports with pertinent design data, and number in sequence starting at pump to end of system. Check the sum of branch-circuit flows against the approved pump flow rate. Correct variations that exceed plus or minus 10 percent.
- B. Prepare schematic diagrams of systems' "as-built" piping layouts.
- C. Prepare hydronic systems for testing and balancing according to the following, in addition to the general preparation procedures specified above:
 - 1. Open all manual valves for maximum flow.
 - 2. Check liquid level in expansion tank.
 - 3. Check makeup water-station pressure gage for adequate pressure for highest vent.
 - 4. Check flow-control valves for specified sequence of operation, and set at indicated flow.
 - 5. Set differential-pressure control valves at the specified differential pressure. Do not set at fully closed position when pump is positive-displacement type unless several terminal valves are kept open.
 - 6. Set system controls so automatic valves are wide open to heat exchangers.
 - 7. Check pump-motor load. If motor is overloaded, throttle main flow-balancing device so motor nameplate rating is not exceeded.
 - 8. Check air vents for a forceful liquid flow exiting from vents when manually operated.

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3.8 PROCEDURES FOR VARIABLE-FLOW HYDRONIC SYSTEMS

- A. In general, balance variable flow systems to achieve design flow at all units simultaneously. Where the sum of the loads exceeds system capacity, the ratio of capacity/loads is defined as the system diversity factor. Calculate diversity factor and indicate calculated diversity factor in the balance report. Balance variable flow systems to minimize throttling loses and to optimize (reduce to lowest possible) EOL differential pressure setpoints. Follow NEBB guidelines and procedures for EOL, static pressure balancing.
 - 1. Set static pressure setpoints to ensure the most hydraulically remote load can achieve design flow. Measure flow at each load individually to verify scheduled design flow is achieved at the lowest possible differential pressure setpoint. Reset and re-measure flow at each load until the lowest differential pressure setpoint is achieved. Verify that no control valve "lifts" at the final differential pressure setpoint, by closing all other control valves, allowing the controls to settle to the differential pressure setpoint, and then verifying the valve remains fully closed. Record the final differential pressure setpoint in the TAB report. Throttle balance valves at loads only as required to obtain accurate flow data; generally balance valves should otherwise be left fully open.
- B. Balance systems with automatic two- and three-way control valves by setting systems at maximum flow through heat-exchange terminals and proceed as specified above for hydronic systems.
- C. Balancer shall adjust pump minimum drive frequency to produce the minimum pressure for the most remote control valve to function, plus 5% margin of safety.
 - 1. Most remote valve minimum pressure shall be based on manufacturer's minimum pressure, as noted on the approved control valve submittal.

3.9 PROCEDURES FOR PRIMARY-SECONDARY HYDRONIC SYSTEMS

A. Balance the primary circuit flow first and then balance the secondary circuits.

3.10 PROCEDURES FOR MOTORS

- A. Motors, 1/2 HP and Larger: Test at final balanced conditions and record the following data:
 - 1. Manufacturer's name, model number, and serial number.
 - 2. Motor horsepower rating.
 - 3. Motor rpm.
 - 4. Efficiency rating.
 - 5. Nameplate and measured voltage, each phase.

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 - 6. Nameplate and measured amperage, each phase.
 - 7. Starter thermal-protection-element rating.
 - B. Motors Driven by Variable-Frequency Controllers: Test for proper operation at speeds varying from minimum to maximum. Test the manual bypass of the controller to prove proper operation. Record observations including name of controller manufacturer, model number, serial number, and nameplate data.

3.11 PROCEDURES FOR HEAT-TRANSFER COILS

- A. Measure, adjust, and record the following data for each water coil:
 - 1. Entering- and leaving-water temperature.
 - 2. Water flow rate.
 - 3. Water pressure drop.
 - 4. Dry-bulb temperature of entering and leaving air.
 - 5. Wet-bulb temperature of entering and leaving air for cooling coils.
 - 6. Airflow.
 - 7. Air pressure drop.

3.12 PROCEDURES FOR ENERGY RECOVERY DEVICES

- A. Measure, adjust, and record the following data for each water coil:
 - 1. Dry-bulb temperature of entering and leaving air.
 - a. Both Supply and Exhaust.
 - 2. Wet-bulb temperature of entering and leaving air for cooling coils.
 - 3. Airflow.
 - 4. Air pressure drop.

3.13 TOLERANCES

- A. Set HVAC system's air flow rates and water flow rates within the following tolerances:
 - 1. Supply and Exhaust Fans and Equipment with Fans: Plus or minus 10 percent.

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- 2. Air Outlets and Inlets: Plus or minus 10 percent.
- 3. Heating-Water Flow Rate: Plus or minus 10 percent.
- 4. Cooling-Water Flow Rate: Plus or minus 10 percent.

3.14 REPORTING

- A. Initial Construction-Phase Report: Based on examination of the Contract Documents as specified in "Examination" Article, prepare a report on the adequacy of design for systems' balancing devices. Recommend changes and additions to systems' balancing devices to facilitate proper performance measuring and balancing. Recommend changes and additions to HVAC systems and general construction to allow access for performance measuring and balancing devices.
- B. Status Reports: Prepare biweekly progress reports to describe completed procedures, procedures in progress, and scheduled procedures. Include a list of deficiencies and problems found in systems being tested and balanced. Prepare a separate report for each system and each building floor for systems serving multiple floors.
- C. Final report per NEBB requirements with additional requirements as follows in "FINAL REPORT" Article.

3.15 FINAL REPORT

- A. General: Prepare a certified written report; tabulate and divide the report into separate sections for tested systems and balanced systems.
 - 1. Include a certification sheet at the front of the report's binder, signed and sealed by the certified testing and balancing engineer.
 - 2. Include a list of instruments used for procedures, along with proof of calibration.
- B. Final Report Contents: In addition to certified field-report data, include the following:
 - 1. Pump curves.
 - 2. Fan curves.
 - 3. Manufacturers' test data.
 - 4. Field test reports prepared by system and equipment installers.
 - 5. Other information relative to equipment performance; do not include Shop Drawings and product data.
- C. General Report Data: In addition to form titles and entries, include the following data:

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- 1. Title page.
- 2. Name and address of the TAB contractor.
- 3. Project name.
- 4. Project location.
- 5. Architect's name and address.
- 6. Engineer's name and address.
- 7. Contractor's name and address.
- 8. Report date.
- 9. Signature of TAB supervisor who certifies the report.
- 10. Table of Contents with the total number of pages defined for each section of the report. Number each page in the report.
- 11. Summary of contents including the following:
 - a. Indicated versus final performance.
 - b. Notable characteristics of systems.
 - c. Description of system operation sequence if it varies from the Contract Documents.
- 12. Nomenclature sheets for each item of equipment.
- 13. Data for terminal units, including manufacturer's name, type, size, and fittings.
- 14. Notes to explain why certain final data in the body of reports vary from indicated values.
- 15. Test conditions for fans and pump performance forms including the following:
 - a. Settings for outdoor-, return-, and exhaust-air dampers.
 - b. Conditions of filters.
 - c. Cooling coil, wet- and dry-bulb conditions.
 - d. Other system operating conditions that affect performance.
- D. System Diagrams: Include schematic layouts of air and hydronic distribution systems. Present each system with single-line diagram and include the following:
 - 1. Quantities of outdoor, supply, return, and exhaust airflows.
 - 2. Water and steam flow rates.
 - 3. Duct, outlet, and inlet sizes.

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- 4. Pipe and valve sizes and locations.
 - 5. Terminal units.

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- 6. Balancing stations.
- 7. Position of balancing devices.
- E. Apparatus-Coil Test Reports:
 - 1. Coil Data:
 - a. System identification.
 - b. Location.
 - c. Coil type.
 - d. Number of rows.
 - e. Fin spacing in fins per inch o.c.
 - f. Make and model number.
 - g. Face area in sq. ft.
 - h. Tube size in NPS.
 - i. Tube and fin materials.
 - j. Circuiting arrangement.
 - 2. Test Data (Indicated and Actual Values):
 - a. Air flow rate in cfm.
 - b. Average face velocity in fpm.
 - c. Air pressure drop in inches w.g.
 - d. Outdoor-air, wet- and dry-bulb temperatures in deg F.
 - e. Return-air, wet- and dry-bulb temperatures in deg F.
 - f. Entering-air, wet- and dry-bulb temperatures in deg F.
 - g. Leaving-air, wet- and dry-bulb temperatures in deg F.
 - h. Water flow rate in gpm.
 - i. Water pressure differential in feet of head or psig.
 - j. Entering-water temperature in deg F.
 - k. Leaving-water temperature in deg F.
 - 1. Refrigerant expansion valve and refrigerant types.
 - m. Refrigerant suction pressure in psig.
 - n. Refrigerant suction temperature in deg F.
 - o. Inlet steam pressure in psig.
- F. Fan Test Reports: For supply and exhaust fans, include the following:
 - 1. Fan Data:
 - a. System identification.
 - b. Location.
 - c. Make and type.

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 - d. Model number and size.
 - e. Manufacturer's serial number.
 - f. Arrangement and class.
 - g. Sheave make, size in inches, and bore.
 - h. Center-to-center dimensions of sheave, and amount of adjustments in inches.
 - 2. Motor Data:
 - a. Motor make, and frame type and size.
 - b. Horsepower and rpm.
 - c. Volts, phase, and hertz.
 - d. Full-load amperage and service factor.
 - e. Sheave make, size in inches, and bore.
 - f. Center-to-center dimensions of sheave, and amount of adjustments in inches .
 - g. Number, make, and size of belts.
 - 3. Test Data (Indicated and Actual Values):
 - a. Total airflow rate in cfm.
 - b. Total system static pressure in inches w.g.
 - c. Fan rpm.
 - d. Discharge static pressure in inches w.g.
 - e. Suction static pressure in inches w.g.
 - G. Round and Rectangular Duct Traverse Reports: Include a diagram with a grid representing the duct cross-section and record the following:
 - 1. Report Data:
 - a. System and air-handling-unit number.
 - b. Location and zone.
 - c. Traverse air temperature in deg F.
 - d. Duct static pressure in inches wg.
 - e. Duct size in inches.
 - f. Duct area in sq. ft.
 - g. Indicated air flow rate in cfm.
 - h. Indicated velocity in fpm.
 - i. Actual air flow rate in cfm.
 - j. Actual average velocity in fpm.
 - k. Barometric pressure in psig.
 - H. Air-Terminal-Device Reports:
 - 1. Unit Data:
 - a. System and air-handling unit identification.

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- b. Location and zone.
- c. Apparatus used for test.
- d. Area served.
- e. Make.
- f. Number from system diagram.
- g. Type and model number.
- h. Size.
- i. Effective area in sq. ft.
- 2. Test Data (Indicated and Actual Values):
 - a. Air flow rate in cfm.
 - b. Air velocity in fpm.
 - c. Preliminary air flow rate as needed in cfm.
 - d. Preliminary velocity as needed in fpm.
 - e. Final air flow rate in cfm.
 - f. Final velocity in fpm.
 - g. Space temperature in deg F.
- I. Pump Test Reports: Include the following:
 - 1. Unit Data:
 - a. Unit identification.
 - b Location
 - c. Service.
 - d. Make and size.
 - e. Model number and serial number.
 - f. Water flow rate in gpm.
 - g. Water pressure differential in feet of head or psig.
 - h. Required net positive suction head in feet of head or psig.
 - i. Pump rpm.
 - j. Impeller diameter in inches.
 - k. Motor make and frame size.
 - 1. Motor horsepower and rpm.
 - m. Voltage at each connection.
 - n. Amperage for each phase.
 - o. Full-load amperage and service factor.
 - p. Seal type.
 - 2. Test Data (Indicated and Actual Values):
 - a. Static head in feet of head or psig.
 - b. Pump shutoff pressure in feet of head or psig.
 - c. Actual impeller size in inches.
 - d. Full-open flow rate in gpm.
 - e. Full-open pressure in feet of head or psig.

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- f. Final discharge pressure in feet of head or psig.
- g. Final suction pressure in feet of head or psig.
- h. Final total pressure in feet of head or psig.
- i. Final water flow rate in gpm.
- j. Hertz at final balance point.
- k. Voltage at each connection.
- 1. Amperage for each phase.

J. Instrument Calibration Reports:

1. Report Data:

- a. Instrument type and make.
- b. Serial number.
- c. Application.
- d. Dates of use.
- e. Dates of calibration.

3.16 INSPECTIONS

A. Initial Inspection:

1. After testing and balancing are complete, operate each system and randomly check measurements to verify that the system is operating according to the final test and balance readings documented in the final report.

B. Final Inspection:

- 1. After initial inspection is complete and documentation by random checks verifies that testing and balancing are complete and accurately documented in the final report, submit report for approval by engineer of record.
 - a. Refer to specification 019113 for commissioning requirements.
 - b. After receipt of Engineer Approved Balance Report contact Commissioning Authority for final verification of a minimum of 10% of all systems.
- 2. The TAB contractor's test and balance engineer shall conduct the final verification in the presence of Commissioning Authority.
 - a. The same instrumentation and procedures utilized in balancing shall be reproduced in presence of the Commissioning Authority.
- 3. If rechecks yield measurements that differ from the measurements documented in the final report by more than the tolerances allowed, the measurements shall be noted as "FAILED."

considered incomplete and shall be rejected.

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4. If the number of "FAILED" measurements is greater than 10 percent of the total measurements checked during the final inspection, the testing and balancing shall be

- C. TAB Work will be considered defective if it does not pass final inspections. If TAB Work fails, proceed as follows:
 - 1. Recheck all measurements and make adjustments. Revise the final report and balancing device settings to include all changes; resubmit the final report and request a second final inspection.
 - 2. If the second final inspection also fails, Owner may contract the services of another TAB contractor to complete TAB Work according to the Contract Documents and deduct the cost of the services from the original TAB contractor's final payment.
- D. Prepare test and inspection reports.

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DUCT INSULATION SECTION 230713

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes insulating the following duct services:
 - 1. Indoor, concealed supply and outdoor air.
 - 2. Indoor, exhaust between isolation damper and penetration of building exterior.

B. Related Sections:

- 1. Section 230719, "HVAC Piping Insulation."
- 2. Section 233113, "Metal Ducts."

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include thermal conductivity, water-vapor permanence thickness, and jackets (both factory- and field-applied if any).
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
 - 1. Detail application of protective shields, saddles, and inserts at hangers for each type of insulation and hanger.
 - 2. Detail insulation application at elbows, fittings, dampers, specialties and flanges for each type of insulation.
 - 3. Detail application at linkages of control devices.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer.
- B. Material Test Reports: From a qualified testing agency acceptable to authorities having jurisdiction indicating, interpreting, and certifying test results for compliance of insulation

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materials, sealers, attachments, cements, and jackets, with requirements indicated. Include dates of tests and test methods employed.

C. Field quality-control reports.

1.5 OUALITY ASSURANCE

- A. Installer Qualifications: Skilled mechanics who have successfully completed an apprenticeship program or another craft training program certified by the Department of Labor, Bureau of Apprenticeship and Training.
- B. Surface-Burning Characteristics: For insulation and related materials, as determined by testing identical products according to ASTM E 84, by a testing agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing agency.
 - 1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.
 - 2. Insulation Installed Outdoors: Flame-spread index of 75 or less, and smoke-developed index of 150 or less.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Packaging: Insulation material containers shall be marked by manufacturer with appropriate ASTM standard designation, type and grade, and maximum use temperature.

1.7 COORDINATION

- A. Coordinate sizes and locations of supports, hangers, and insulation shields specified in Section 230529 "Hangers and Supports for HVAC Piping and Equipment."
- B. Coordinate clearance requirements with duct Installer for duct insulation application. Before preparing ductwork Shop Drawings, establish and maintain clearance requirements for installation of insulation and field-applied jackets and finishes and for space required for maintenance

1.8 SCHEDULING

- A. Schedule insulation application after pressure testing systems and, where required, after installing and testing heat tracing. Insulation application may begin on segments that have satisfactory test results.
- B. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

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PART 2 - PRODUCTS

2.1 INSULATION MATERIALS

- A. Comply with requirements in "Duct Insulation Schedule, General," and "Indoor Duct and Plenum Insulation Schedule," articles for where insulating materials shall be applied.
- B. Products shall not contain asbestos, lead, mercury, or mercury compounds.
- C. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871.
- D. Mineral-Fiber Blanket Insulation: Mineral or glass fibers bonded with a thermosetting resin (2.3 pcf). Comply with ASTM C 553, Type II and ASTM C 1290, Type III with factory-applied FSK jacket. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.
 - 1. <u>Products</u>: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. <u>CertainTeed Corp.</u>; <u>SoftTouch Duct Wrap</u>.
 - b. Johns Manville; Microlite.
 - c. Knauf Insulation; Friendly Feel Duct Wrap.
 - d. Owens Corning; SOFTR All-Service Duct Wrap.

2.2 ADHESIVES

- A. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated unless otherwise indicated.
- B. Mineral-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.
 - 1. <u>Products</u>: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. <u>Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-127.Eagle Bridges Marathon Industries; 225.</u>
 - b. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 85-60/85-70.Mon-Eco Industries, Inc.; 22-25.
 - 2. For indoor applications, adhesive shall have a VOC content of 80 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

- C. ASJ Adhesive, and FSK Jacket Adhesive: Comply with MIL-A-3316C, Class 2, Grade A for bonding insulation jacket lap seams and joints.
 - 1. <u>Products</u>: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. <u>Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-82.</u>
 - b. Eagle Bridges Marathon Industries; 225.
 - c. <u>Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company;</u> 85-50.Mon-Eco Industries, Inc.; 22-25.
 - 2. For indoor applications, adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.3 MASTICS

- A. Materials shall be compatible with insulation materials, jackets, and substrates; comply with MIL-PRF-19565C, Type II.
 - 1. For indoor applications, use mastics that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- B. Vapor-Barrier Mastic: Water based; suitable for indoor use on below ambient services.
 - 1. <u>Products</u>: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. <u>Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 30-80/30-90.</u>
 - b. Vimasco Corporation; 749.
 - 2. Water-Vapor Permeance: ASTM E 96/E 96M, Procedure B, 0.013 perm at 43-mil dry film thickness.
 - 3. Service Temperature Range: Minus 20 to plus 180 deg F.
 - 4. Solids Content: ASTM D 1644, 58 percent by volume and 70 percent by weight.
 - 5. Color: White.
- C. Breather Mastic: Water based; suitable for indoor and outdoor use on above ambient services.
 - 1. <u>Products</u>: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

- a. <u>Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-10.</u>
- b. <u>Eagle Bridges Marathon Industries; 550.</u>
- c. <u>Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company</u>; 46-50.
- d. Mon-Eco Industries, Inc.; 55-50.
- e. <u>Vimasco Corporation; WC-1/WC-5</u>.
- 2. Water-Vapor Permeance: ASTM F 1249, 1.8 perms at 0.0625-inch dry film thickness.
- 3. Service Temperature Range: Minus 20 to plus 180 deg F.
- 4. Solids Content: 60 percent by volume and 66 percent by weight.
- 5. Color: White.

2.4 SEALANTS

- A. FSK and Metal Jacket Flashing Sealants:
 - 1. <u>Products</u>: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. <u>Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-76.Eagle Bridges Marathon Industries; 405.</u>
 - b. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 95-44.
 - c. Mon-Eco Industries, Inc.; 44-05.
 - 2. Materials shall be compatible with insulation materials, jackets, and substrates.
 - 3. Fire- and water-resistant, flexible, elastomeric sealant.
 - 4. Service Temperature Range: Minus 40 to plus 250 deg F.
 - 5. Color: Aluminum.
 - 6. For indoor applications, sealants shall have a VOC content of 420 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - 7. Sealants shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

- B. ASJ Flashing Sealants, and Vinyl and PVC Jacket Flashing Sealants:
 - 1. <u>Products</u>: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. <u>Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-76.</u>
 - 2. Materials shall be compatible with insulation materials, jackets, and substrates.
 - 3. Fire- and water-resistant, flexible, elastomeric sealant.
 - 4. Service Temperature Range: Minus 40 to plus 250 deg F.
 - 5. Color: White.
 - 6. For indoor applications, sealants shall have a VOC content of 420 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - 7. Sealants shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.5 FACTORY-APPLIED JACKETS

- A. Insulation system schedules indicate factory-applied jackets on various applications. When factory-applied jackets are indicated, comply with the following:
 - 1. ASJ-SSL: ASJ with self-sealing, pressure-sensitive, acrylic-based adhesive covered by a removable protective strip; complying with ASTM C 1136, Type I.
 - 2. FSK Jacket: Aluminum-foil, fiberglass-reinforced scrim with kraft-paper backing; complying with ASTM C 1136, Type II.

2.6 TAPES

- A. ASJ Tape: White vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C 1136.
 - 1. <u>Products</u>: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. ABI, Ideal Tape Division; 428 AWF ASJ.
 - b. <u>Avery Dennison Corporation</u>, Specialty Tapes Division; Fasson 0836.
 - c. <u>Compac Corporation</u>; 104 and 105.

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- d. Venture Tape; 1540 CW Plus, 1542 CW Plus, and 1542 CW Plus/SQ.
- 2. Width: 3 inches.
- 3. Thickness: 11.5 mils.
- 4. Adhesion: 90 ounces force/inch in width.
- 5. Elongation: 2 percent.
- 6. Tensile Strength: 40 lbf/inch in width.
- 7. ASJ Tape Disks and Squares: Precut disks or squares of ASJ tape.
- B. FSK Tape: Foil-face, vapor-retarder tape matching factory-applied jacket with acrylic adhesive; complying with ASTM C 1136.
 - 1. <u>Products</u>: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. ABI, Ideal Tape Division; 491 AWF FSK.
 - b. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0827.
 - c. Compac Corporation; 110 and 111.
 - d. <u>Venture Tape</u>; 1525 CW NT, 1528 CW, and 1528 CW/SQ.
 - 2. Width: 3 inches.
 - 3. Thickness: 6.5 mils.
 - 4. Adhesion: 90 ounces force/inch in width.
 - 5. Elongation: 2 percent.
 - 6. Tensile Strength: 40 lbf/inch in width.
 - 7. FSK Tape Disks and Squares: Precut disks or squares of FSK tape.

2.7 SECUREMENTS

A. Bands:

- 1. <u>Products</u>: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. <u>ITW Insulation Systems</u>; Gerrard Strapping and Seals.

- b. RPR Products, Inc.; Insul-Mate Strapping, Seals, and Springs.
- 2. Stainless Steel: ASTM A 167 or ASTM A 240/A 240M, Type 304 or Type 316; 0.015 inch thick, 1/2 inch wide with wing seal or closed seal.
- B. Insulation Pins and Hangers:
 - 1. Cupped-Head, Capacitor-Discharge-Weld Pins: Copper- or zinc-coated steel pin, fully annealed for capacitor-discharge welding, 0.135-inch- diameter shank, length to suit depth of insulation indicated with integral 1-1/2-inch galvanized carbon-steel washer.
 - a. <u>Products</u>: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - 1) AGM Industries, Inc.; CHP-1.
 - 2) GEMCO; Cupped Head Weld Pin.
 - 3) Midwest Fasteners, Inc.; Cupped Head.
 - 4) Nelson Stud Welding; CHP.
 - 2. Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch-thick, aluminum stainless-steel sheet, with beveled edge sized as required to hold insulation securely in place but not less than 1-1/2 inches in diameter.
 - a. <u>Products</u>: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - 1) AGM Industries, Inc.; RC-150.
 - 2) GEMCO; R-150.
 - 3) Midwest Fasteners, Inc.; WA-150.
 - 4) Nelson Stud Welding; Speed Clips.
 - b. Protect ends with capped self-locking washers incorporating a spring steel insert to ensure permanent retention of cap in exposed locations.
- C. Staples: Outward-clinching insulation staples, nominal 3/4-inch-wide, stainless steel or Monel.
- D. Wire: 0.080-inch nickel-copper alloy.
 - 1. <u>Manufacturers</u>: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. C & F Wire.

2.8 CORNER ANGLES

A. Aluminum Corner Angles: 0.040 inch thick, minimum 1 by 1 inch, aluminum according to ASTM B 209, Alloy 3003, 3005, 3105, or 5005; Temper H-14.

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B. Stainless-Steel Corner Angles: 0.024 inch thick, minimum 1 by 1 inch, stainless steel according to ASTM A 167 or ASTM A 240/A 240M, Type 304 or Type 316.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of insulation application.
 - 1. Verify that systems to be insulated have been tested and are free of defects.
 - 2. Verify that surfaces to be insulated are clean and dry.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

3.3 GENERAL INSTALLATION REQUIREMENTS

- A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of ducts and fittings.
- B. Install insulation materials, vapor barriers or retarders, jackets, and thicknesses required for each item of duct system as specified in insulation system schedules.
- C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.
- D. Install insulation with longitudinal seams at top and bottom of horizontal runs.
- E. Install multiple layers of insulation with longitudinal and end seams staggered.
- F. Keep insulation materials dry during application and finishing.
- G. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.
- H. Install insulation with least number of joints practical.
- I. Where vapor barrier is indicated, use trapeze hangers. Do not penetrate vapor barrier with hangers.

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- J. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.
- K. Install insulation with factory-applied jackets as follows:
 - 1. Draw jacket tight and smooth.
 - 2. Cover circumferential joints with 3-inch-wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches o.c.
 - 3. Overlap jacket longitudinal seams at least 1-1/2 inches. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 2 inches o.c.
 - a. For below ambient services, apply vapor-barrier mastic over staples.
 - 4. Cover joints and seams with tape, according to insulation material manufacturer's written instructions, to maintain vapor seal.
 - 5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to duct flanges and fittings.
- L. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.
- M. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.
- N. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.

3.4 INSTALLATION OF MINERAL-FIBER INSULATION

- A. Blanket Insulation Installation on Ducts and Plenums: Secure with adhesive and insulation pins.
 - 1. Apply adhesives according to manufacturer's recommended coverage rates per unit area, for 100 percent coverage of duct and plenum surfaces.
 - 2. Apply adhesive to entire circumference of ducts and to all surfaces of fittings and transitions.
 - 3. Install either capacitor-discharge-weld pins and speed washers or cupped-head, capacitor-discharge-weld pins on sides and bottom of horizontal ducts and sides of vertical ducts as follows:

- a. On duct sides with dimensions 18 inches and smaller, place pins along longitudinal centerline of duct. Space 3 inches maximum from insulation end joints, and 16 inches o.c.
- b. On duct sides with dimensions larger than 18 inches, place pins 16 inches o.c. each way, and 3 inches maximum from insulation joints. Install additional pins to hold insulation tightly against surface at cross bracing.
- c. Pins may be omitted from top surface of horizontal, rectangular ducts and plenums.
- d. Do not over-compress insulation during installation.
- e. Impale insulation over pins and attach speed washers.
- f. Cut excess portion of pins extending beyond speed washers or bend parallel with insulation surface. Cover exposed pins and washers with tape matching insulation facing.
- 4. For ducts and plenums with surface temperatures below ambient, install a continuous unbroken vapor barrier. Create a facing lap for longitudinal seams and end joints with insulation by removing 2 inches from one edge and one end of insulation segment. Secure laps to adjacent insulation section with 1/2-inch outward-clinching staples, 1-inch o.c. Install vapor barrier consisting of factory- or field-applied jacket, adhesive, vapor-barrier mastic, and sealant at joints, seams, and protrusions.
 - a. Repair punctures, tears, and penetrations with tape or mastic to maintain vaporbarrier seal.
 - b. Install vapor stops for ductwork and plenums operating below 50 deg F at 18-foot intervals. Vapor stops shall consist of vapor-barrier mastic applied in a Z-shaped pattern over insulation face, along butt end of insulation, and over the surface. Cover insulation face and surface to be insulated a width equal to two times the insulation thickness, but not less than 3 inches.
- 5. Overlap unfaced blankets a minimum of 2 inches on longitudinal seams and end joints. At end joints, secure with steel bands spaced a maximum of 18 inches o.c.
- 6. Install insulation on rectangular duct elbows and transitions with a full insulation section for each surface. Install insulation on round and flat-oval duct elbows with individually mitered gores cut to fit the elbow.
- 7. Insulate duct stiffeners, hangers, and flanges that protrude beyond insulation surface with 6-inch-wide strips of same material used to insulate duct. Secure on alternating sides of stiffener, hanger, and flange with pins spaced 6 inches o.c.

3.5 FIELD OUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

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- B. Perform tests and inspections.
- C. Tests and Inspections:
 - 1. Inspect ductwork, randomly selected by Architect, by removing field-applied jacket and insulation in layers in reverse order of their installation.
- D. All insulation applications will be considered defective Work if sample inspection reveals noncompliance with requirements.
- 3.6 DUCT INSULATION SCHEDULE, GENERAL
 - A. Plenums and Ducts Requiring Insulation:
 - 1. Indoor, concealed supply and outdoor air: R6.
 - 2. Indoor, exposed exhaust between isolation damper and penetration of building exterior: R12.
 - 3. HRU supply air ductwork: R12.
 - B. Items Not Insulated:
 - 1. Factory-insulated flexible ducts.
 - 2. Flexible connectors.
 - 3. Vibration-control devices.
 - 4. Factory-insulated access panels and doors.
- 3.7 INDOOR DUCT AND PLENUM INSULATION SCHEDULE
 - A. Concealed, rectangular, supply-air duct insulation shall be the following:
 - 1. Mineral-Fiber Blanket: 1-1/2 inches thick and 3-lb/cu. ft. nominal density.
 - B. Exhaust-air duct, between isolation damper and exterior building penetration, insulation shall be the following:
 - 1. Mineral-Fiber Blanket: 3 inches thick and 3-lb/cu. ft. nominal density.
- 3.8 INDOOR, FIELD-APPLIED JACKET SCHEDULE
 - A. Install jacket over insulation material. For insulation with factory-applied jacket, install the field-applied jacket over the factory-applied jacket.
 - B. If more than one material is listed, selection from materials listed is Contractor's option.

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- C. Ducts and Plenums, Concealed:
 - 1. None.

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HVAC EQUIPMENT INSULATION SECTION 230716

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes insulating the following HVAC equipment that is not factory insulated:
 - 1. Heat exchangers.
 - 2. Chilled-water pumps.
 - 3. Heating, hot-water pumps.
 - 4. Expansion/compression tanks.
 - 5. Air separators.

B. Related Sections:

- 1. Section 230713 "Duct Insulation."
- 2. Section 230719 "HVAC Piping Insulation."

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
 - 1. Detail application of protective shields, saddles, and inserts at hangers for each type of insulation and hanger.
 - 2. Detail removable insulation at equipment connections.
 - 3. Detail application of field-applied jackets.
 - 4. Detail application at linkages of control devices.
 - 5. Detail field application for each equipment type.

1.3 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.4 QUALITY ASSURANCE

- A. Surface-Burning Characteristics: For insulation and related materials, as determined by testing identical products according to ASTM E84, by a testing agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing agency.
 - 1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.

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2. Insulation Installed Outdoors: Flame-spread index of 75 or less, and smoke-developed index of 150 or less.

PART 2 - PRODUCTS

2.1 INSULATION MATERIALS

- A. Products shall not contain asbestos, lead, mercury, or mercury compounds.
- B. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C871.
- C. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable according to ASTM C795.
- D. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.
- E. Cellular Glass: Inorganic, incombustible, foamed or cellulated glass with annealed, rigid, hermetically sealed cells. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.
 - 1. Block Insulation: ASTM C552, Type I.
 - 2. Special-Shaped Insulation: ASTM C552, Type III.
 - 3. Board Insulation: ASTM C552, Type IV.
 - 4. Factory fabricate shapes according to ASTM C450 and ASTM C585.
- F. Flexible Elastomeric Insulation: Closed-cell, sponge- or expanded-rubber materials. Comply with ASTM C534, Type I for tubular materials and Type II for sheet materials.
- G. Mineral-Fiber Blanket Insulation: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C553, Type II and ASTM C1290, Type II with factory-applied vinyl jacket. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.
- H. High-Temperature, Mineral-Fiber Blanket Insulation: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C553, Type V, without factory-applied jacket.
- I. Mineral-Fiber Board Insulation: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C612, Type IA or Type IB. Provide insulation without factory-applied jacket. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.
- J. High-Temperature, Mineral-Fiber Board Insulation: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C612, Type III, without factory-applied jacket.
- K. Mineral-Fiber, Pipe and Tank Insulation: Mineral or glass fibers bonded with a thermosetting resin. Semirigid board material with factory-applied FSK jacket complying with ASTM C1393, Type II or Type IIIA Category 2, or with properties similar to ASTM C612, Type IB. Nominal density is 2.5 lb/cu. ft. or more. Thermal conductivity (k-value) at 100 deg F is 0.29 Btu x in./h

x sq. ft. x deg F or less. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

2.2 INSULATING CEMENTS

A. Mineral-Fiber, Hydraulic-Setting Insulating and Finishing Cement: Comply with ASTM C449.

2.3 ADHESIVES

- A. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated unless otherwise indicated.
- B. Cellular-Glass Adhesive: Two-component, thermosetting urethane adhesive containing no flammable solvents, with a service temperature range of minus 100 to plus 200 deg F.
- C. Flexible Elastomeric and Polyolefin Adhesive: Comply with MIL-A-24179A, Type II, Class I.
- D. Mineral-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.
- E. ASJ Adhesive, and FSK and PVDC Jacket Adhesive: Comply with MIL-A-3316C, Class 2, Grade A for bonding insulation jacket lap seams and joints.
- F. PVC Jacket Adhesive: Compatible with PVC jacket.

2.4 MASTICS AND COATINGS

- A. Materials shall be compatible with insulation materials, jackets, and substrates.
- B. Vapor-Retarder Mastic: Water based; suitable for indoor and outdoor use on below ambient services.
 - 1. Water-Vapor Permeance: Comply with ASTM C755, Section 7.2.2, Table 2, for insulation type and service conditions.
 - 2. Service Temperature Range: Minus 20 to plus 180 deg F.
 - 3. Comply with MIL-PRF-19565C, Type II, for permeance requirements.
 - 4. Color: White.

2.5 SEALANTS

A. Joint Sealants:

- 1. Materials shall be compatible with insulation materials, jackets, and substrates.
- 2. Permanently flexible, elastomeric sealant.
- 3. Service Temperature Range: Minus 100 to plus 300 deg F.
- 4. Color: White or gray.
- B. FSK and Metal Jacket Flashing Sealants:

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- 1. Materials shall be compatible with insulation materials, jackets, and substrates.
- 2. Fire- and water-resistant, flexible, elastomeric sealant.
- 3. Service Temperature Range: Minus 40 to plus 250 deg F.
- 4. Color: Aluminum.
- C. ASJ Flashing Sealants, and Vinyl, PVDC, and PVC Jacket Flashing Sealants:
 - 1. Materials shall be compatible with insulation materials, jackets, and substrates.
 - 2. Fire- and water-resistant, flexible, elastomeric sealant.
 - 3. Service Temperature Range: Minus 40 to plus 250 deg F.
 - 4. Color: White.

2.6 FACTORY-APPLIED JACKETS

- A. Insulation system schedules indicate factory-applied jackets on various applications. When factory-applied jackets are indicated, comply with the following:
 - 1. ASJ: White, kraft-paper, fiberglass-reinforced scrim with aluminum-foil backing; complying with ASTM C1136, Type I.
 - 2. ASJ-SSL: ASJ with self-sealing, pressure-sensitive, acrylic-based adhesive covered by a removable protective strip; complying with ASTM C1136, Type I.
 - 3. PVDC Jacket for Indoor Applications: 4-mil-thick, white PVDC biaxially oriented barrier film with a permeance at 0.02 perm when tested according to ASTM E96/E96M and with a flame-spread index of 5 and a smoke-developed index of 20 when tested according to ASTM E84.
 - 4. PVDC Jacket for Outdoor Applications: 6-mil-thick, white PVDC biaxially oriented barrier film with a permeance at 0.01 perm when tested according to ASTM E96/E96M and with a flame-spread index of 5 and a smoke-developed index of 25 when tested according to ASTM E84.
 - 5. PVDC-SSL Jacket: PVDC jacket with a self-sealing, pressure-sensitive, acrylic-based adhesive covered by a removable protective strip.
 - 6. Vinyl Jacket: White vinyl with a permeance of 1.3 perms when tested according to ASTM E96/E96M, Procedure A, and complying with NFPA 90A and NFPA 90B.

2.7 FIELD-APPLIED JACKETS

- A. Field-applied jackets shall comply with ASTM C921, Type I, unless otherwise indicated.
- B. FSK Jacket: Aluminum-foil-face, fiberglass-reinforced scrim with kraft-paper backing.
- C. PVC Jacket: High-impact-resistant, UV-resistant PVC complying with ASTM D1784, Class 16354-C; thickness as scheduled; roll stock ready for shop or field cutting and forming. Thickness is indicated in field-applied jacket schedules.
 - 1. Adhesive: As recommended by jacket material manufacturer.
 - 2. Color: White.

- 3. Factory-fabricated tank heads and tank side panels.
- D. Aluminum Jacket: Comply with ASTM B209 (ASTM B209M), Alloy 3003, 3005, 3105, or 5005, Temper H-14.
- E. PVC Jacket: High-impact-resistant, UV-resistant PVC complying with ASTM D1784, Class 16354-C; thickness as scheduled; roll stock ready for shop or field cutting and forming. Thickness is indicated PVC Jacket: High-impact-resistant, UV-resistant PVC complying with ASTM D1784, Class 16354-C; thickness as scheduled; roll stock ready for shop or field cutting and forming. Thickness is indicated PVDC and PVDC-SSL jackets in three paragraphs below are proprietary products offered by Dow Chemical under the product names "Saran 540 Vapor Retarder Film" and "Saran 560 Vapor Retarder Film."
- F. PVDC Jacket for Indoor Applications: 4-mil-thick, white PVDC biaxially oriented barrier film with a permeance at 0.02 perm when tested according to ASTM E96/E96M and with a flame-spread index of 5 and a smoke-developed index of 20 when tested according to ASTM E84.
- G. PVDC Jacket for Outdoor Applications: 6-mil-thick, white PVDC biaxially oriented barrier film with a permeance at 0.01 perm when tested according to ASTM E96/E96M and with a flame-spread index of 5 and a smoke-developed index of 25 when tested according to ASTM E84.
- H. PVDC-SSL Jacket: PVDC jacket with a self-sealing, pressure-sensitive, acrylic-based adhesive covered by a removable protective strip.

2.8 TAPES

- A. ASJ Tape: White vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C1136.
 - 1. Width: 3 inches.
 - 2. Thickness: 11.5 mils.
 - 3. Adhesion: 90 ounces force/inch in width.
 - 4. Elongation: 2 percent.
 - 5. Tensile Strength: 40 lbf/inch in width.
 - 6. ASJ Tape Disks and Squares: Precut disks or squares of ASJ tape.
- B. PVC Tape: White vapor-retarder tape matching field-applied PVC jacket with acrylic adhesive; suitable for indoor and outdoor applications.
 - 1. Width: 2 inches.
 - 2. Thickness: 6 mils.
 - 3. Adhesion: 64 ounces force/inch in width.
 - 4. Elongation: 500 percent.
 - 5. Tensile Strength: 18 lbf/inch in width.
- C. PVDC Tape for Indoor Applications: White vapor-retarder PVDC tape with acrylic adhesive.
 - 1. Width: 3 inches.
 - 2. Film Thickness: 4 mils.
 - 3. Adhesive Thickness: 1.5 mils.

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- 4. Elongation at Break: 145 percent.
- 5. Tensile Strength: 55 lbf/inch in width.
- D. PVDC Tape for Outdoor Applications: White vapor-retarder PVDC tape with acrylic adhesive.
 - 1. Width: 3 inches.
 - 2. Film Thickness: 6 mils.
 - 3. Adhesive Thickness: 1.5 mils.
 - 4. Elongation at Break: 145 percent.
 - 5. Tensile Strength: 55 lbf/inch in width.

2.9 SECUREMENTS

- A. Aluminum Bands: ASTM B209, Alloy 3003, 3005, 3105, or 5005; Temper H-14, 0.020 inch thick, 3/4 inch wide with closed seal.
- B. Insulation Pins and Hangers:
 - 1. Metal, Adhesively Attached, Perforated-Base Insulation Hangers: Baseplate welded to projecting spindle that is capable of holding insulation, of thickness indicated, securely in position indicated when self-locking washer is in place.
 - a. Baseplate: Perforated, galvanized carbon-steel sheet, 0.030 inch thick by 2 inches square.
 - b. Spindle: Copper- or zinc-coated, low-carbon steel, fully annealed, 0.106-inch-diameter shank, length to suit depth of insulation indicated.
 - c. Adhesive: Recommended by hanger manufacturer. Product with demonstrated capability to bond insulation hanger securely to substrates indicated without damaging insulation, hangers, and substrates.
 - 2. Nonmetal Insulation-Retaining Washers: Self-locking washers formed from 0.016-inchthick nylon sheet, with beveled edge sized as required to hold insulation securely in place but not less than 1-1/2 inches in diameter.
- C. Staples: Outward-clinching insulation staples, nominal 3/4-inch-wide, stainless steel or Monel.
- D. Wire: 0.062-inch soft-annealed, galvanized steel.

2.10 CORNER ANGLES

A. Aluminum Corner Angles: 0.040 inch thick, minimum 1 by 1 inch, aluminum according to ASTM B209, Alloy 3003, 3005, 3105, or 5005; Temper H-14.

3.1 PREPARATION

- A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.
- B. Mix insulating cements with clean potable water; if insulating cements are to be in contact with stainless-steel surfaces, use demineralized water.

3.2 GENERAL INSTALLATION REQUIREMENTS

- A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of equipment.
- B. Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of equipment as specified in insulation system schedules.
- C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.
- D. Install insulation with longitudinal seams at top and bottom of horizontal runs.
- E. Install multiple layers of insulation with longitudinal and end seams staggered.
- F. Keep insulation materials dry during application and finishing.
- G. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.
- H. Install insulation with least number of joints practical.
- I. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.
 - 1. Install insulation continuously through hangers and around anchor attachments.
 - 2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.
 - 3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
 - 4. Cover inserts with jacket material matching adjacent insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.
- J. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.
- K. Install insulation with factory-applied jackets as follows:

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- 1. Draw jacket tight and smooth.
- 2. Cover circumferential joints with 3-inch-wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches o.c.
- 3. Overlap jacket longitudinal seams at least 1-1/2 inches. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 4 inches o.c.
 - a. For below ambient services, apply vapor-barrier mastic over staples.
- 4. Cover joints and seams with tape, according to insulation material manufacturer's written instructions, to maintain vapor seal.
- 5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints.
- L. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.
- M. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.
- N. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.
- O. For above ambient services, do not install insulation to the following:
 - 1. Vibration-control devices.
 - 2. Testing agency labels and stamps.
 - 3. Nameplates and data plates.
 - 4 Manholes
 - 5. Handholes.
 - 6. Cleanouts.

3.3 INSTALLATION OF EQUIPMENT, TANK, AND VESSEL INSULATION

- A. Mineral-Fiber, Pipe and Tank Insulation Installation for Tanks and Vessels: Secure insulation with adhesive and anchor pins and speed washers.
 - 1. Apply adhesives according to manufacturer's recommended coverage rates per unit area, for 100 percent coverage of tank and vessel surfaces.
 - 2. Groove and score insulation materials to fit as closely as possible to equipment, including contours. Bevel insulation edges for cylindrical surfaces for tight joints. Stagger end joints.
 - 3. Protect exposed corners with secured corner angles.
 - 4. Install adhesively attached or self-sticking insulation hangers and speed washers on sides of tanks and vessels as follows:
 - a. Do not weld anchor pins to ASME-labeled pressure vessels.
 - b. Select insulation hangers and adhesive that are compatible with service temperature and with substrate.

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- c. On tanks and vessels, maximum anchor-pin spacing is 3 inches from insulation end joints, and 16 inches o.c. in both directions.
- d. Do not overcompress insulation during installation.
- e. Cut and miter insulation segments to fit curved sides and domed heads of tanks and vessels.
- f. Impale insulation over anchor pins and attach speed washers.
- g. Cut excess portion of pins extending beyond speed washers or bend parallel with insulation surface. Cover exposed pins and washers with tape matching insulation facing.
- 5. Secure each layer of insulation with stainless-steel or aluminum bands. Select band material compatible with insulation materials.
- 6. Where insulation hangers on equipment and vessels are not permitted or practical and where insulation support rings are not provided, install a girdle network for securing insulation. Stretch prestressed aircraft cable around the diameter of vessel and make taut with clamps, turnbuckles, or breather springs. Place one circumferential girdle around equipment approximately 6 inches (150 mm) from each end. Install wire or cable between two circumferential girdles 12 inches (300 mm) o.c. Install a wire ring around each end and around outer periphery of center openings, and stretch prestressed aircraft cable radially from the wire ring to nearest circumferential girdle. Install additional circumferential girdles along the body of equipment or tank at a minimum spacing of 48 inches (1200 mm) o.c. Use this network for securing insulation with tie wire or bands.
- 7. Stagger joints between insulation layers at least 3 inches (75 mm).
- 8. Install insulation in removable segments on equipment access doors, manholes, handholes, and other elements that require frequent removal for service and inspection.
- 9. Bevel and seal insulation ends around manholes, handholes, ASME stamps, and nameplates.
- 10. For equipment with surface temperatures below ambient, apply mastic to open ends, joints, seams, breaks, and punctures in insulation.
- B. Flexible Elastomeric Thermal Insulation Installation for Tanks and Vessels: Install insulation over entire surface of tanks and vessels
 - 1. Apply 100 percent coverage of adhesive to surface with manufacturer's recommended adhesive.
 - 2. Seal longitudinal seams and end joints.
- C. Insulation Installation on Pumps:
 - 1. Fabricate metal boxes lined with insulation. Fit boxes around pumps and coincide box joints with splits in pump casings. Fabricate joints with outward bolted flanges. Bolt flanges on 6-inch (150-mm) centers, starting at corners. Install 3/8-inch- (10-mm-) diameter fasteners with wing nuts. Alternatively, secure the box sections together using a latching mechanism.
 - 2. Fabricate boxes from aluminum, at least 0.060 inch thick.
 - 3. For below ambient services, install a vapor barrier at seams, joints, and penetrations. Seal between flanges with replaceable gasket material to form a vapor barrier.

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- 3.4 FIELD-APPLIED JACKET INSTALLATION
 - A. Where FSK jackets are indicated, install as follows:
 - 1. Draw jacket material smooth and tight.
 - 2. Install lap or joint strips with same material as jacket.
 - 3. Secure jacket to insulation with manufacturer's recommended adhesive.
 - 4. Install jacket with 1-1/2-inch (38-mm) laps at longitudinal seams and 3-inch- (75-mm-) wide joint strips at end joints.
 - 5. Seal openings, punctures, and breaks in vapor-retarder jackets and exposed insulation with vapor-barrier mastic.
 - B. Where PVC jackets are indicated, install with 1-inch (25-mm) overlap at longitudinal seams and end joints; for horizontal applications, install with longitudinal seams along top and bottom of tanks and vessels. Seal with manufacturer's recommended adhesive.
 - 1. Apply two continuous beads of adhesive to seams and joints, one bead under lap and the finish bead along seam and joint edge.
 - C. Where metal jackets are indicated, install with 2-inch (50-mm) overlap at longitudinal seams and end joints. Overlap longitudinal seams arranged to shed water. Seal end joints with weatherproof sealant recommended by insulation manufacturer. Secure jacket with stainless-steel bands 12 inches (300 mm) o.c. and at end joints.
 - D. Where PVDC jackets are indicated, install as follows:
 - 1. Jacket can be wrapped in cigarette fashion along length of roll for insulation systems with an outer circumference of 33-1/2 inches (850 mm) or less. 33-1/2-inch- (850-mm-) circumference limit allows for 2-inch- (50-mm-) overlap seal. Using the length of roll allows for longer sections of jacket to be installed at one time. Use adhesive on the lap seal. Visually inspect lap seal for "fishmouthing," and use PVDC tape along lap seal to secure joint.
 - 2. Repair holes or tears in PVDC jacket by placing PVDC tape over the hole or tear and wrapping a minimum of 1-1/4 circumferences to avoid damage to tape edges.

3.5 FINISHES

- A. Equipment Insulation with ASJ, Glass-Cloth, or Other Paintable Jacket Material: Paint jacket with paint system identified below and as specified in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."
 - 1. Flat Acrylic Finish: Two finish coats over a primer that is compatible with jacket material and finish coat paint. Add fungicidal agent to render fabric mildew proof.
 - a. Finish Coat Material: Interior, flat, latex-emulsion size.
- B. Flexible Elastomeric Thermal Insulation: After adhesive has fully cured, apply two coats of insulation manufacturer's recommended protective coating.

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- C. Color: Final color as selected by Architect. Vary first and second coats to allow visual inspection of the completed Work.
- D. Do not field paint aluminum or stainless-steel jackets.

3.6 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
- B. Tests and Inspections: Inspect field-insulated equipment, randomly selected by Architect, by removing field-applied jacket and insulation in layers in reverse order of their installation. Extent of inspection shall be limited to one location(s) for each type of equipment defined in the "Equipment Insulation Schedule" Article. For large equipment, remove only a portion adequate to determine compliance.
- C. All insulation applications will be considered defective Work if sample inspection reveals noncompliance with requirements.

3.7 EQUIPMENT INSULATION SCHEDULE

- A. Insulation materials and thicknesses are identified below. If more than one material is listed for a type of equipment, selection from materials listed is Contractor's option.
- B. Insulate indoor and outdoor equipment that is not factory insulated.
- C. Chilled-water pump insulation shall be the following:
 - 1. Mineral-Fiber Board: 2 inches thick and 3-lb/cu. ft. nominal density.
- D. Heat-Exchanger (Steam-to-Water for Heating Service) Insulation: Mineral-fiber pipe and tank, 2 inches thick
- E. Condenser-water expansion/compression tank insulation shall be one of the following:
 - 1. Flexible Elastomeric: 1 inch thick.
 - 2. Mineral-Fiber Pipe and Tank: 1 inch thick.
- F. Heating-Hot-Water Expansion/Compression Tank Insulation: Mineral-Fiber Pipe and Tank: 1 inch thick.
- G. Condenser-water air-separator insulation shall be one of the following:
 - 1. Flexible Elastomeric: 1 inch thick.
 - 2. Mineral-Fiber Pipe and Tank: 1 inch thick.
- H. Heating-Hot-Water Air-Separator Insulation: Mineral-Fiber Pipe and Tank: 2 inches thick.

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- 3.8 INDOOR, FIELD-APPLIED JACKET SCHEDULE
 - A. Install jacket over insulation material. For insulation with factory-applied jacket, install the field-applied jacket over the factory-applied jacket.
 - B. If more than one material is listed, selection from materials listed is Contractor's option.
 - C. Equipment, Concealed:
 - 1. None.
 - D. Equipment, Exposed, up to 48 Inches in Diameter or with Flat Surfaces up to 72 Inches:
 - 1. Aluminum, Stucco Embossed with 1-1/4-Inch-Deep Corrugations: 0.032 inch thick.
 - E. Equipment, Exposed, Larger Than 48 Inches in Diameter or with Flat Surfaces Larger Than 72 Inches:
 - 1. Aluminum, Stucco Embossed with 1-1/4-Inch-Deep Corrugations: 0.032 inch thick.

END OF SECTION 230716

HVAC PIPING INSULATION SECTION 230719

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes insulating the following HVAC piping systems:
 - 1. Chilled-water and brine piping, indoors and outdoors.
 - 2. Condenser-water and brine piping, indoors and outdoors.
 - 3. Heating hot-water piping, indoors.
 - 4. Steam and steam condensate piping, indoors.

B. Related Sections:

- 1. Section 230713 "Duct Insulation."
- 2. Section 230716 "HVAC Equipment Insulation."

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include thermal conductivity, water-vapor permeance thickness, and jackets (both factory and field applied if any).
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
 - 1. Detail application of protective shields, saddles, and inserts at hangers for each type of insulation and hanger.
 - 2. Detail attachment and covering of heat tracing inside insulation.
 - 3. Detail insulation application at pipe expansion joints for each type of insulation.
 - 4. Detail insulation application at elbows, fittings, flanges, valves, and specialties for each type of insulation.
 - 5. Detail removable insulation at piping specialties.
 - 6. Detail application of field-applied jackets.
 - 7. Detail application at linkages of control devices.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified Installer.

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- B. Material Test Reports: From a qualified testing agency acceptable to authorities having jurisdiction indicating, interpreting, and certifying test results for compliance of insulation materials, sealers, attachments, cements, and jackets, with requirements indicated. Include dates of tests and test methods employed.
- C. Field quality-control reports.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Skilled mechanics who have successfully completed an apprenticeship program or another craft training program certified by the Department of Labor, Bureau of Apprenticeship and Training.
- B. Surface-Burning Characteristics: For insulation and related materials, as determined by testing identical products according to ASTM E 84, by a testing and inspecting agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing agency.
 - 1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.
 - 2. Insulation Installed Outdoors: Flame-spread index of 75 or less, and smoke-developed index of 150 or less.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Packaging: Insulation material containers shall be marked by manufacturer with appropriate ASTM standard designation, type and grade, and maximum use temperature.

1.7 COORDINATION

- A. Coordinate sizes and locations of supports, hangers, and insulation shields specified in Section 230529 "Hangers and Supports for HVAC Piping and Equipment."
- B. Coordinate clearance requirements with piping Installer for piping insulation application. Before preparing piping Shop Drawings, establish and maintain clearance requirements for installation of insulation and field-applied jackets and finishes and for space required for maintenance.

1.8 SCHEDULING

- A. Schedule insulation application after pressure testing systems and, where required, after installing and testing heat tracing. Insulation application may begin on segments that have satisfactory test results.
- B. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

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PART 2 - PRODUCTS

2.1 INSULATION MATERIALS

- A. Comply with requirements in "Piping Insulation Schedule, General," "Indoor Piping Insulation Schedule," and "Outdoor, Aboveground Piping Insulation Schedule" articles for where insulating materials shall be applied.
- B. Products shall not contain asbestos, lead, mercury, or mercury compounds.
- C. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871.
- D. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable according to ASTM C 795.
- E. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.

F. Calcium Silicate:

- 1. <u>Products</u>: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Industrial Insulation Group (IIG); Thermo-12 Gold.
- 2. Preformed Pipe Sections: Flat-, curved-, and grooved-block sections of noncombustible, inorganic, hydrous calcium silicate with a non-asbestos fibrous reinforcement. Comply with ASTM C 533, Type I.
- 3. Flat-, curved-, and grooved-block sections of noncombustible, inorganic, hydrous calcium silicate with a non-asbestos fibrous reinforcement. Comply with ASTM C 533, Type I.
- 4. Prefabricated Fitting Covers: Comply with ASTM C 450 and ASTM C 585 for dimensions used in preforming insulation to cover valves, elbows, tees, and flanges.
- G. Cellular Glass: Inorganic, incombustible, foamed or cellulated glass with annealed, rigid, hermetically sealed cells. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.
 - 1. <u>Products</u>: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. <u>Pittsburgh Corning Corporation; Foamglas</u>.
 - 2. Block Insulation: ASTM C 552, Type I.
 - 3. Special-Shaped Insulation: ASTM C 552, Type III.
 - 4. Board Insulation: ASTM C 552, Type IV.
 - 5. Preformed Pipe Insulation without Jacket: Comply with ASTM C 552, Type II, Class 1.
 - 6. Preformed Pipe Insulation with Factory-Applied ASJ: Comply with ASTM C 552, Type II, Class 2.

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- 7. Factory fabricate shapes according to ASTM C 450 and ASTM C 585.
- H. Flexible Elastomeric Insulation: Closed-cell, sponge- or expanded-rubber materials. Comply with ASTM C 534, Type I for tubular materials.
 - 1. <u>Products</u>: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Aeroflex USA, Inc.; Aerocel.
 - b. Armacell LLC; AP Armaflex.
 - c. K-Flex USA; Insul-Lock, Insul-Tube, and K-FLEX LS.
- I. Mineral-Fiber, Preformed Pipe Insulation:
 - 1. <u>Products</u>: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Fibrex Insulations Inc.; Coreplus 1200.
 - b. Johns Manville; Micro-Lok.
 - c. <u>Knauf Insulation</u>; 1000-Degree Pipe Insulation.
 - d. Manson Insulation Inc.; Alley-K.
 - e. Owens Corning; Fiberglas Pipe Insulation.
 - 2. Type I, 850 deg F (454 deg C) Materials: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 547, Type I, Grade A, with factory-applied ASJ. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.
- J. Mineral-Fiber, Pipe and Tank Insulation: Mineral or glass fibers bonded with a thermosetting resin. Semirigid board material with factory-applied ASJ complying with ASTM C 1393, Type II or Type IIIA Category 2, or with properties similar to ASTM C 612, Type IB. Nominal density is 2.5 lb/cu. ft. or more. Thermal conductivity (k-value) at 100 deg F is 0.29 Btu x in./h x sq. ft. x deg F or less. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.
 - 1. <u>Products</u>: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. <u>CertainTeed Corp.</u>; CrimpWrap.
 - b. Johns Manville; MicroFlex.
 - c. Knauf Insulation; Pipe and Tank Insulation.
 - d. Manson Insulation Inc.; AK Flex.
 - e. Owens Corning; Fiberglas Pipe and Tank Insulation.

2.2 ADHESIVES

A. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated unless otherwise indicated.

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- B. Calcium Silicate Adhesive: Fibrous, sodium-silicate-based adhesive with a service temperature range of 50 to 800 deg F.
 - 1. <u>Products</u>: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. <u>Childers Brand</u>, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-97.
 - b. <u>Eagle Bridges</u> Marathon Industries; 290.
 - c. <u>Foster Brand</u>, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 81-27.
 - d. Mon-Eco Industries, Inc.; 22-30.
 - e. <u>Vimasco Corporation</u>; 760.
 - 2. For indoor applications, adhesive shall have a VOC content of 80 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - 3. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- C. Cellular-Glass Adhesive: Two-component, thermosetting urethane adhesive containing no flammable solvents, with a service temperature range of minus 100 to plus 200 deg F.
 - 1. <u>Products</u>: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. <u>Foster Brand</u>, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 81-84.
 - 2. For indoor applications, adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - 3. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

4.

- D. Flexible Elastomeric Adhesive: Comply with MIL-A-24179A, Type II, Class I.
 - 1. <u>Products</u>: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Aeroflex USA, Inc.; Aeroseal.
 - b. Armacell LLC; Armaflex 520 Adhesive.
 - c. <u>Foster Brand</u>, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 85-75.
 - d. <u>K-Flex USA</u>; R-373 Contact Adhesive.
 - 2. For indoor applications, adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

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- 3. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- E. Mineral-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.
 - 1. <u>Products</u>: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. <u>Childers Brand</u>, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-127.
 - b. <u>Eagle Bridges</u> Marathon Industries; 225.
 - c. <u>Foster Brand</u>, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 85-60/85-70.
 - d. Mon-Eco Industries, Inc.; 22-25.
 - 2. For indoor applications, adhesive shall have a VOC content of 80 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - 3. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- F. ASJ Adhesive, and FSK and PVDC Jacket Adhesive: Comply with MIL-A-3316C, Class 2, Grade A for bonding insulation jacket lap seams and joints.
 - 1. <u>Products</u>: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. <u>Childers Brand</u>, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-82.
 - b. Eagle Bridges Marathon Industries; 225.
 - c. <u>Foster Brand</u>, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 85-50.
 - d. Mon-Eco Industries, Inc.; 22-25.
 - 2. For indoor applications, adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - 3. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- G. PVC Jacket Adhesive: Compatible with PVC jacket.
 - 1. <u>Products</u>: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. <u>Dow Corning Corporation</u>; 739, Dow Silicone.
 - b. <u>Johns Manville</u>; Zeston Perma-Weld, CEEL-TITE Solvent Welding Adhesive.
 - c. P.I.C. Plastics, Inc.; Welding Adhesive.
 - d. <u>Speedline Corporation</u>; Polyco VP Adhesive.

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- 2. For indoor applications, adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- 3. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.3 MASTICS

- A. Materials shall be compatible with insulation materials, jackets, and substrates; comply with MIL-PRF-19565C, Type II.
 - 1. For indoor applications, use mastics that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- B. Vapor-Barrier Mastic: Water based; suitable for indoor use on below-ambient services.
 - 1. <u>Products</u>: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. <u>Foster Brand</u>, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 30-80/30-90.
 - b. <u>Vimasco Corporation</u>; 749.
 - 2. Water-Vapor Permeance: ASTM E 96/E 96M, Procedure B, 0.013 perm at 43-mil dry film thickness.
 - 3. Service Temperature Range: Minus 20 to plus 180 deg F.
 - 4. Solids Content: ASTM D 1644, 58 percent by volume and 70 percent by weight.
 - 5. Color: White.
- C. Vapor-Barrier Mastic: Solvent based; suitable for outdoor use on below-ambient services.
 - 1. <u>Products</u>: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. <u>Childers Brand</u>, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; Encacel.
 - b. <u>Eagle Bridges</u> Marathon Industries; 570.
 - c. <u>Foster Brand</u>, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 60-95/60-96.
 - 2. Water-Vapor Permeance: ASTM F 1249, 0.05 perm at 30-mil dry film thickness.
 - 3. Service Temperature Range: Minus 50 to plus 220 deg F.
 - 4. Solids Content: ASTM D 1644, 33 percent by volume and 46 percent by weight.
 - 5. Color: White.

2.4 FACTORY-APPLIED JACKETS

A. Insulation system schedules indicate factory-applied jackets on various applications. When factory-applied jackets are indicated, comply with the following:

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- 1. ASJ: White, kraft-paper, fiberglass-reinforced scrim with aluminum-foil backing; complying with ASTM C 1136, Type I.
- 2. FSK Jacket: Aluminum-foil, fiberglass-reinforced scrim with kraft-paper backing; complying with ASTM C 1136, Type II.
- 3. PVDC Jacket for Indoor Applications: 4-mil-thick, white PVDC biaxially oriented barrier film with a permeance at 0.02 perm when tested according to ASTM E 96/E 96M and with a flame-spread index of 5 and a smoke-developed index of 20 when tested according to ASTM E 84.
 - a. <u>Products</u>: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - 1) <u>Dow Chemical Company (The)</u>; Saran 540 Vapor Retarder Film and Saran 560 Vapor Retarder Film.
- 4. PVDC Jacket for Outdoor Applications: 6-mil-thick, white PVDC biaxially oriented barrier film with a permeance at 0.01 perm when tested according to ASTM E 96/E 96M and with a flame-spread index of 5 and a smoke-developed index of 25 when tested according to ASTM E 84.
 - a. <u>Products</u>: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - 1) <u>Dow Chemical Company (The)</u>; Saran 540 Vapor Retarder Film and Saran 560 Vapor Retarder Film.

2.5 FIELD-APPLIED JACKETS

- A. Field-applied jackets shall comply with ASTM C 921, Type I, unless otherwise indicated.
- B. FSK Jacket: Aluminum-foil-face, fiberglass-reinforced scrim with kraft-paper backing.
- C. PVC Jacket: High-impact-resistant, UV-resistant PVC complying with ASTM D 1784, Class 16354-C; thickness as scheduled; roll stock ready for shop or field cutting and forming. Thickness is indicated in field-applied jacket schedules.
 - 1. <u>Products</u>: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. <u>Johns Manville</u>; Zeston.
 - b. <u>P.I.C. Plastics, Inc.</u>; FG Series.
 - c. <u>Proto Corporation</u>; LoSmoke.
 - d. Speedline Corporation; SmokeSafe.
 - 2. Adhesive: As recommended by jacket material manufacturer.
 - 3. Color: Color-code jackets based on system. Color as selected by Architect.
 - 4. Factory-fabricated fitting covers to match jacket if available; otherwise, field fabricate.

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a. Shapes: 45- and 90-degree, short- and long-radius elbows, tees, valves, flanges, unions, reducers, end caps, soil-pipe hubs, traps, mechanical joints, and P-trap and supply covers for lavatories.

D. Metal Jacket:

- 1. <u>Products</u>: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. <u>Childers Brand</u>, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; Metal Jacketing Systems.
 - b. ITW Insulation Systems; Aluminum and Stainless Steel Jacketing.
 - c. <u>RPR Products, Inc.</u>; Insul-Mate.
- 2. Aluminum Jacket: Comply with ASTM B 209, Alloy 3003, 3005, 3105, or 5005, Temper H-14.
 - a. Factory cut and rolled to size.
 - b. Finish and thickness are indicated in field-applied jacket schedules.
 - c. Moisture Barrier for Indoor Applications: 3-mil- (0.075-mm-) thick, heat-bonded polyethylene and kraft paper.
 - d. Moisture Barrier for Outdoor Applications: 3-mil- (0.075-mm-) thick, heat-bonded polyethylene and kraft paper.
 - e. Factory-Fabricated Fitting Covers:
 - 1) Same material, finish, and thickness as jacket.
 - 2) Preformed 2-piece or gore, 45- and 90-degree, short- and long-radius elbows.
 - 3) Tee covers.
 - 4) Flange and union covers.
 - 5) End caps.
 - 6) Beveled collars.
 - 7) Valve covers.
 - 8) Field fabricate fitting covers only if factory-fabricated fitting covers are not available.
- E. PVDC Jacket for Outdoor Applications: 6-mil-thick, white PVDC biaxially oriented barrier film with a permeance at 0.01 perms when tested according to ASTM E 96/E 96M and with a flame-spread index of 5 and a smoke-developed index of 25 when tested according to ASTM E 84.
 - 1. <u>Products</u>: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. <u>Dow Chemical Company (The)</u>; Saran 560 Vapor Retarder Film.

2.6 TAPES

A. ASJ Tape: White vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C 1136.

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- 1. <u>Products</u>: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. ABI, Ideal Tape Division; 428 AWF ASJ.
 - b. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0836.
 - c. Compac Corporation; 104 and 105.
 - d. Venture Tape; 1540 CW Plus, 1542 CW Plus, and 1542 CW Plus/SQ.
- 2. Width: 3 inches.
- 3. Thickness: 11.5 mils.
- 4. Adhesion: 90 ounces force/inch in width.
- 5. Elongation: 2 percent.
- 6. Tensile Strength: 40 lbf/inch in width.
- 7. ASJ Tape Disks and Squares: Precut disks or squares of ASJ tape.
- B. PVC Tape: White vapor-retarder tape matching field-applied PVC jacket with acrylic adhesive; suitable for indoor and outdoor applications.
 - 1. <u>Products</u>: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. ABI, Ideal Tape Division; 370 White PVC tape.
 - b. <u>Compac Corporation</u>; 130.
 - c. Venture Tape; 1506 CW NS.
 - 2. Width: 2 inches.
 - 3. Thickness: 6 mils.
 - 4. Adhesion: 64 ounces force/inch in width.
 - 5. Elongation: 500 percent.
 - 6. Tensile Strength: 18 lbf/inch in width.
- C. PVDC Tape for Outdoor Applications: White vapor-retarder PVDC tape with acrylic adhesive.
 - 1. <u>Products</u>: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. <u>Dow Chemical Company (The)</u>; Saran 560 Vapor Retarder Tape.
 - 2. Width: 3 inches.
 - 3. Film Thickness: 6 mils.
 - 4. Adhesive Thickness: 1.5 mils.
 - 5. Elongation at Break: 145 percent.
 - 6. Tensile Strength: 55 lbf/inch in width.

2.7 SECUREMENTS

A. Bands:

1. <u>Products</u>: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

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- a. ITW Insulation Systems; Gerrard Strapping and Seals.
- b. RPR Products, Inc.; Insul-Mate Strapping, Seals, and Springs.
- 2. Stainless Steel: ASTM A 167 or ASTM A 240/A 240M, Type 316; 0.015 inch thick, 1/2 inch wide with closed seal.
- 3. Springs: Twin spring set constructed of stainless steel with ends flat and slotted to accept metal bands. Spring size determined by manufacturer for application.
- B. Staples: Outward-clinching insulation staples, nominal 3/4-inch-wide, stainless steel or Monel.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of insulation application.
 - 1. Verify that systems to be insulated have been tested and are free of defects.
 - 2. Verify that surfaces to be insulated are clean and dry.
 - 3. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.
- B. Mix insulating cements with clean potable water; if insulating cements are to be in contact with stainless-steel surfaces, use demineralized water.

3.3 GENERAL INSTALLATION REQUIREMENTS

- A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of piping including fittings, valves, and specialties.
- B. Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of pipe system as specified in insulation system schedules.
- C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.
- D. Install insulation with longitudinal seams at top and bottom of horizontal runs.
- E. Install multiple layers of insulation with longitudinal and end seams staggered.
- F. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.
- G. Keep insulation materials dry during application and finishing.

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- H. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.
- I. Install insulation with least number of joints practical.
- J. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.
 - 1. Install insulation continuously through hangers and around anchor attachments.
 - 2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.
 - 3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
 - 4. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.
- K. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.
- L. Install insulation with factory-applied jackets as follows:
 - 1. Draw jacket tight and smooth.
 - 2. Cover circumferential joints with 3-inch-wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches o.c.
 - 3. Overlap jacket longitudinal seams at least 1-1/2 inches. Install insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 4 inches o.c.
 - a. For below-ambient services, apply vapor-barrier mastic over staples.
 - 4. Cover joints and seams with tape, according to insulation material manufacturer's written instructions, to maintain vapor seal.
 - 5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to pipe flanges and fittings.
- M. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.
- N. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.
- O. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.
- P. For above-ambient services, do not install insulation to the following:
 - 1. Vibration-control devices.

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- 2. Testing agency labels and stamps.
- 3. Nameplates and data plates.
- 4. Manholes.
- 5. Handholes.
- 6. Cleanouts.

3.4 PENETRATIONS

- A. Insulation Installation at Roof Penetrations: Install insulation continuously through roof penetrations.
 - 1. Seal penetrations with flashing sealant.
 - 2. For applications requiring only indoor insulation, terminate insulation above roof surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
 - 3. Extend jacket of outdoor insulation outside roof flashing at least 2 inches below top of roof flashing.
 - 4. Seal jacket to roof flashing with flashing sealant.
- B. Insulation Installation at Aboveground Exterior Wall Penetrations: Install insulation continuously through wall penetrations.
 - 1. Seal penetrations with flashing sealant.
 - 2. For applications requiring only indoor insulation, terminate insulation inside wall surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
 - 3. Extend jacket of outdoor insulation outside wall flashing and overlap wall flashing at least 2 inches.
 - 4. Seal jacket to wall flashing with flashing sealant.
- C. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.
- D. Insulation Installation at Fire-Rated Wall and Partition Penetrations: Install insulation continuously through penetrations of fire-rated walls and partitions.
 - 1. Comply with requirements in Section 078413 "Penetration Firestopping" for firestopping and fire-resistive joint sealers.
- E. Insulation Installation at Floor Penetrations:
 - 1. Pipe: Install insulation continuously through floor penetrations.
 - 2. Seal penetrations through fire-rated assemblies. Comply with requirements in Section 078413 "Penetration Firestopping."

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- 3.5 GENERAL PIPE INSULATION INSTALLATION
 - A. Requirements in this article generally apply to all insulation materials except where more specific requirements are specified in various pipe insulation material installation articles.
 - B. Insulation Installation on Fittings, Valves, Strainers, Flanges, and Unions:
 - 1. Install insulation over fittings, valves, strainers, flanges, unions, and other specialties with continuous thermal and vapor-retarder integrity unless otherwise indicated.
 - 2. Insulate pipe elbows using preformed fitting insulation or mitered fittings made from same material and density as adjacent pipe insulation. Each piece shall be butted tightly against adjoining piece and bonded with adhesive. Fill joints, seams, voids, and irregular surfaces with insulating cement finished to a smooth, hard, and uniform contour that is uniform with adjoining pipe insulation.
 - 3. Insulate tee fittings with preformed fitting insulation or sectional pipe insulation of same material and thickness as used for adjacent pipe. Cut sectional pipe insulation to fit. Butt each section closely to the next and hold in place with tie wire. Bond pieces with adhesive.
 - 4. Insulate valves using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. For valves, insulate up to and including the bonnets, valve stuffing-box studs, bolts, and nuts. Fill joints, seams, and irregular surfaces with insulating cement.
 - 5. Insulate strainers using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. Fill joints, seams, and irregular surfaces with insulating cement. Insulate strainers so strainer basket flange or plug can be easily removed and replaced without damaging the insulation and jacket. Provide a removable reusable insulation cover. For below-ambient services, provide a design that maintains vapor barrier.
 - 6. Insulate flanges and unions using a section of oversized preformed pipe insulation. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker.
 - 7. Cover segmented insulated surfaces with a layer of finishing cement and coat with a mastic. Install vapor-barrier mastic for below-ambient services and a breather mastic for above-ambient services. Reinforce the mastic with fabric-reinforcing mesh. Trowel the mastic to a smooth and well-shaped contour.
 - 8. For services not specified to receive a field-applied jacket except for flexible elastomeric and polyolefin, install fitted PVC cover over elbows, tees, strainers, valves, flanges, and unions. Terminate ends with PVC end caps. Tape PVC covers to adjoining insulation facing using PVC tape.
 - 9. Stencil or label the outside insulation jacket of each union with the word "union." Match size and color of pipe labels.
 - C. Insulate instrument connections for thermometers, pressure gages, pressure temperature taps, test connections, flow meters, sensors, switches, and transmitters on insulated pipes. Shape insulation at these connections by tapering it to and around the connection with insulating cement and finish with finishing cement, mastic, and flashing sealant.

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- D. Install removable insulation covers at locations indicated. Installation shall conform to the following:
 - 1. Make removable flange and union insulation from sectional pipe insulation of same thickness as that on adjoining pipe. Install same insulation jacket as adjoining pipe insulation.
 - 2. When flange and union covers are made from sectional pipe insulation, extend insulation from flanges or union long at least two times the insulation thickness over adjacent pipe insulation on each side of flange or union. Secure flange cover in place with stainless-steel or aluminum bands. Select band material compatible with insulation and jacket.
 - 3. Construct removable valve insulation covers in same manner as for flanges, except divide the two-part section on the vertical center line of valve body.
 - 4. When covers are made from block insulation, make two halves, each consisting of mitered blocks wired to stainless-steel fabric. Secure this wire frame, with its attached insulation, to flanges with tie wire. Extend insulation at least 2 inches over adjacent pipe insulation on each side of valve. Fill space between flange or union cover and pipe insulation with insulating cement. Finish cover assembly with insulating cement applied in two coats. After first coat is dry, apply and trowel second coat to a smooth finish.
 - 5. Unless a PVC jacket is indicated in field-applied jacket schedules, finish exposed surfaces with a metal jacket.

3.6 INSTALLATION OF CALCIUM SILICATE INSULATION

- A. Insulation Installation on Straight Pipes and Tubes:
 - 1. Secure single-layer insulation with stainless-steel bands at 12-inch intervals and tighten bands without deforming insulation materials.
 - 2. Install two-layer insulation with joints tightly butted and staggered at least 3 inches. Secure inner layer with wire spaced at 12-inch intervals. Secure outer layer with stainless-steel bands at 12-inch intervals.
 - 3. Apply a skim coat of mineral-fiber, hydraulic-setting cement to insulation surface. When cement is dry, apply flood coat of lagging adhesive and press on one layer of glass cloth or tape. Overlap edges at least 1 inch. Apply finish coat of lagging adhesive over glass cloth or tape. Thin finish coat to achieve smooth, uniform finish.
- B. Insulation Installation on Pipe Flanges:
 - 1. Install preformed pipe insulation to outer diameter of pipe flange.
 - 2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
 - 3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of block insulation of same material and thickness as pipe insulation.
 - 4. Finish flange insulation same as pipe insulation.
- C. Insulation Installation on Pipe Fittings and Elbows:
 - 1. Install preformed sections of same material as straight segments of pipe insulation when available. Secure according to manufacturer's written instructions.

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- 2. When preformed insulation sections of insulation are not available, install mitered sections of calcium silicate insulation. Secure insulation materials with wire or bands.
- 3. Finish fittings insulation same as pipe insulation.

D. Insulation Installation on Valves and Pipe Specialties:

- 1. Install mitered segments of calcium silicate insulation to valve body. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
- 2. Install insulation to flanges as specified for flange insulation application.
- 3. Finish valve and specialty insulation same as pipe insulation.

3.7 INSTALLATION OF CELLULAR-GLASS INSULATION

A. Insulation Installation on Straight Pipes and Tubes:

- 1. Secure each layer of insulation to pipe with wire or bands and tighten bands without deforming insulation materials.
- 2. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.
- 3. For insulation with factory-applied jackets on above-ambient services, secure laps with outward-clinched staples at 6 inches o.c.
- 4. For insulation with factory-applied jackets on below-ambient services, do not staple longitudinal tabs. Instead, secure tabs with additional adhesive as recommended by insulation material manufacturer and seal with vapor-barrier mastic and flashing sealant.

B. Insulation Installation on Pipe Flanges:

- 1. Install preformed pipe insulation to outer diameter of pipe flange.
- 2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
- 3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of cellular-glass block insulation of same thickness as pipe insulation.
- 4. Install jacket material with manufacturer's recommended adhesive, overlap seams at least 1 inch, and seal joints with flashing sealant.

C. Insulation Installation on Pipe Fittings and Elbows:

- 1. Install preformed sections of same material as straight segments of pipe insulation when available. Secure according to manufacturer's written instructions.
- 2. When preformed sections of insulation are not available, install mitered sections of cellular-glass insulation. Secure insulation materials with wire or bands.

D. Insulation Installation on Valves and Pipe Specialties:

- 1. Install preformed sections of cellular-glass insulation to valve body.
- 2. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
- 3. Install insulation to flanges as specified for flange insulation application.

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3.8 INSTALLATION OF FLEXIBLE ELASTOMERIC INSULATION

- A. Seal longitudinal seams and end joints with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.
- B. Insulation Installation on Pipe Flanges:
 - 1. Install pipe insulation to outer diameter of pipe flange.
 - 2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
 - 3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of sheet insulation of same thickness as pipe insulation.
 - 4. Secure insulation to flanges and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.
- C. Insulation Installation on Pipe Fittings and Elbows:
 - 1. Install mitered sections of pipe insulation.
 - 2. Secure insulation materials and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.
- D. Insulation Installation on Valves and Pipe Specialties:
 - 1. Install preformed valve covers manufactured of same material as pipe insulation when available.
 - 2. When preformed valve covers are not available, install cut sections of pipe and sheet insulation to valve body. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
 - 3. Install insulation to flanges as specified for flange insulation application.
 - 4. Secure insulation to valves and specialties and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

3.9 INSTALLATION OF MINERAL-FIBER INSULATION

- A. Insulation Installation on Straight Pipes and Tubes:
 - 1. Secure each layer of preformed pipe insulation to pipe with wire or bands and tighten bands without deforming insulation materials.
 - 2. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.
 - 3. For insulation with factory-applied jackets on above-ambient surfaces, secure laps with outward-clinched staples at 6 inches o.c.
 - 4. For insulation with factory-applied jackets on below-ambient surfaces, do not staple longitudinal tabs. Instead, secure tabs with additional adhesive as recommended by insulation material manufacturer and seal with vapor-barrier mastic and flashing sealant.
- B. Insulation Installation on Pipe Flanges:

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- 1. Install preformed pipe insulation to outer diameter of pipe flange.
- 2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
- 3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with mineral-fiber blanket insulation.
- 4. Install jacket material with manufacturer's recommended adhesive, overlap seams at least 1 inch, and seal joints with flashing sealant.

C. Insulation Installation on Pipe Fittings and Elbows:

- 1. Install preformed sections of same material as straight segments of pipe insulation when available.
- 2. When preformed insulation elbows and fittings are not available, install mitered sections of pipe insulation, to a thickness equal to adjoining pipe insulation. Secure insulation materials with wire or bands.

D. Insulation Installation on Valves and Pipe Specialties:

- 1. Install preformed sections of same material as straight segments of pipe insulation when available.
- 2. When preformed sections are not available, install mitered sections of pipe insulation to valve body.
- 3. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
- 4. Install insulation to flanges as specified for flange insulation application.

3.10 FIELD-APPLIED JACKET INSTALLATION

- A. Where glass-cloth jackets are indicated, install directly over bare insulation or insulation with factory-applied jackets.
 - 1. Draw jacket smooth and tight to surface with 2-inch overlap at seams and joints.
 - 2. Embed glass cloth between two 0.062-inch-thick coats of lagging adhesive.
 - 3. Completely encapsulate insulation with coating, leaving no exposed insulation.
- B. Where PVC jackets are indicated, install with 1-inch overlap at longitudinal seams and end joints; for horizontal applications. Seal with manufacturer's recommended adhesive.
 - 1. Apply two continuous beads of adhesive to seams and joints, one bead under lap and the finish bead along seam and joint edge.
- C. Where metal jackets are indicated, install with 2-inch overlap at longitudinal seams and end joints. Overlap longitudinal seams arranged to shed water. Seal end joints with weatherproof sealant recommended by insulation manufacturer. Secure jacket with stainless-steel bands 12 inches o.c. and at end joints.
- D. Where PVDC jackets are indicated, install as follows:
 - 1. Apply three separate wraps of filament tape per insulation section to secure pipe insulation to pipe prior to installation of PVDC jacket.

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- 2. Wrap factory-presized jackets around individual pipe insulation sections with one end overlapping the previously installed sheet. Install presized jacket with an approximate overlap at butt joint of 2 inches over the previous section. Adhere lap seal using adhesive or SSL, and then apply 1-1/4 circumferences of appropriate PVDC tape around overlapped butt joint.
- 3. Continuous jacket can be spiral-wrapped around a length of pipe insulation. Apply adhesive or PVDC tape at overlapped spiral edge. When electing to use adhesives, refer to manufacturer's written instructions for application of adhesives along this spiral edge to maintain a permanent bond.
- 4. Jacket can be wrapped in cigarette fashion along length of roll for insulation systems with an outer circumference of 33-1/2 inches or less. The 33-1/2-inch-circumference limit allows for 2-inch-overlap seal. Using the length of roll allows for longer sections of jacket to be installed at one time. Use adhesive on the lap seal. Visually inspect lap seal for "fishmouthing," and use PVDC tape along lap seal to secure joint.
- 5. Repair holes or tears in PVDC jacket by placing PVDC tape over the hole or tear and wrapping a minimum of 1-1/4 circumferences to avoid damage to tape edges.

3.11 FINISHES

- A. Pipe Insulation with ASJ, Glass-Cloth, or Other Paintable Jacket Material: Paint jacket with paint system identified below and as specified in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."
 - 1. Flat Acrylic Finish: Two finish coats over a primer that is compatible with jacket material and finish coat paint. Add fungicidal agent to render fabric mildew proof.
 - a. Finish Coat Material: Interior, flat, latex-emulsion size.
- B. Flexible Elastomeric Thermal Insulation: After adhesive has fully cured, apply two coats of insulation manufacturer's recommended protective coating.
- C. Color: Final color as selected by Architect. Vary first and second coats to allow visual inspection of the completed Work.
- D. Do not field paint aluminum or stainless-steel jackets.

3.12 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Perform tests and inspections.
- C. All insulation applications will be considered defective Work if sample inspection reveals noncompliance with requirements.

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- 3.13 PIPING INSULATION SCHEDULE, GENERAL
 - A. Acceptable preformed pipe and tubular insulation materials and thicknesses are identified for each piping system and pipe size range. If more than one material is listed for a piping system, selection from materials listed is Contractor's option.
 - B. Items Not Insulated: Unless otherwise indicated, do not install insulation on the following:
 - 1. Chrome-plated pipes and fittings unless there is a potential for personnel injury.

3.14 INDOOR PIPING INSULATION SCHEDULE

- A. Condensate and Equipment Drain Water below 60 Deg F:
 - 1. All Pipe Sizes: Insulation shall be one of the following:
 - a. Flexible Elastomeric: 1 inch thick.
 - b. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch thick.
- B. Chilled and Condenser Water and Brine, 50 Deg F and below:
 - 1. NPS 3 and Smaller: Insulation shall be the following:
 - a. Mineral-Fiber, Preformed Pipe, Type I: 2 inches thick.
 - 2. NPS 4 to NPS 12: Insulation shall be the following:
 - a. Mineral-Fiber, Preformed Pipe, Type I: 2 inches thick.
- C. Heating-Hot-Water Supply and Return, 200 Deg F and Below:
 - 1. NPS 12 and Smaller: Insulation shall be the following:
 - a. Mineral-Fiber, Preformed Pipe, Type I: 2 inches thick.
- D. Steam and Steam Condensate, 350 Deg F and Below:
 - 1. NPS 3/4 and Smaller: Insulation shall be one of the following:
 - a. Calcium Silicate: 3 inches thick.
 - b. Cellular Glass: 3 inches thick.
 - 2. NPS 1 and Larger: Insulation shall be one of the following:
 - a. Calcium Silicate: 4 inches thick.
 - b. Cellular Glass: 4 inches thick.

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3.15 OUTDOOR, ABOVEGROUND PIPING INSULATION SCHEDULE

- A. Chilled and Condenser Water and Brine:
 - 1. All Pipe Sizes: Insulation shall be the following:
 - a. Flexible Elastomeric: 3 inches thick.

3.16 INDOOR, FIELD-APPLIED JACKET SCHEDULE

- A. Install jacket over insulation material. For insulation with factory-applied jacket, install the field-applied jacket over the factory-applied jacket.
- B. If more than one material is listed, selection from materials listed is Contractor's option.
- C. Piping, Concealed:
 - 1. None.
- D. Piping, Exposed:
 - 1. PVC: 30 mils (0.8 mm) thick.

3.17 OUTDOOR, FIELD-APPLIED JACKET SCHEDULE

- A. Install jacket over insulation material. For insulation with factory-applied jacket, install the field-applied jacket over the factory-applied jacket.
- B. If more than one material is listed, selection from materials listed is Contractor's option.
- C. Piping, Concealed:
 - 1. None.
- D. Piping, Exposed:
 - 1. Chilled Water and Brine: Stainless Steel, Type 304 or 316, Smooth 2B Finish with Z-Shaped Locking Seam: 0.024 inch thick.
 - 2. Refrigerant Suction and Hot-Gas Piping: PVC.

END OF SECTION 230719

BUILDING AUTOMATION SYSTEM SECTION 230900

PART 1 GENERAL

1.0 RELATED SECTIONS

A. The General Conditions of the Contract, Supplementary Conditions, and General Requirements are part of this specification and shall be used in conjunction with this section as part of the contract documents. Consult the above for further instructions pertaining to this work. The Contractor is bound by the provisions of Division 0 and Division 1.

1.1 CONNECTION TO EXISTING CONTROL SYSTEM

- A. The BAS is an open source/BACnet compatible Trane ES as manufactured by Trane. The intent of this project is to extend the existing Trane BAS system that is currently installed on the campus.
- B. All controls products, control equipment, software, hardware, programming, graphics, wiring and conduit specified in this section shall be provided by Trane. All control system requirements specified in this section shall connect to the existing Trane Controls network
- C. All new control equipment must integrate seamlessly with existing Trane DDC system. All new digital controllers are required to communicate fully with the existing Trane temperature control network.
- D. All new controllers provided under this project must be connected to the existing Trane BAS System. Extend network (including software) as required to provide a fully integrated control system.
- E. All software and graphics to be modified on existing Trane web server for all newly installed or modified equipment for this project. All new equipment shall be compatible with the existing system

1.2 CONTROL SYSTEM DESCRIPTION

A. Provide labor, controls materials, controls equipment and services as required for a complete BACnet Building Automation System (BAS), to perform the functions described in this Section. Controls System shall be Web-based and accessible either directly connected and/or through the owners IP LAN network.

- B. It is the BAS manufacturer's responsibility to provide all the design, engineering, and field coordination required to ensure all equipment sequence of operations are met as specified and the designated BAS operators have the capability of managing the building mechanical system.
- C. The BAS shall meet BACnet communication standards to ensure the system maintains "interoperability" to avoid proprietary arrangements that will make it difficult for the Owner to consider other BAS manufacturers in future projects.
- D. BAS controllers shall be listed by BACnet Testing Laboratories (BTL) with appropriate classification.
- E. Direct Digital Control (DDC) technology shall be used to provide the functions necessary for control of mechanical systems and equipment on this project.
- F. The BAS manufacturer shall provide all hardware and software necessary to implement the functions and sequence of operations specified.

1.3 PRODUCTS FURNISHED BUT NOT INSTALLED UNDER THIS SECTION

- A. Hydronic Piping
 - 1. Control Valves
 - 2. Flow Switches
 - 3. Temperature Sensor Wells and Sockets
 - 4. Hydronic Pressure Taps
 - 5. Hydronic Flow meters
- B. Ductwork Accessories
 - 1. Automatic Dampers

1.4 APPROVED CONTROL SYSTEM MANUFACTURER

A. Manufacturer: Trane.

1.5 CODES AND STANDARDS

- A. Codes and Standards: Meet requirements of all applicable standards and codes, except when more detailed or stringent requirements are indicated by the Contract Documents, including requirements of this Section.
 - 1. Underwriters Laboratories: Products shall be UL-916-PAZX listed.
 - 2. National Electrical Code -- NFPA 70.
 - 3. Federal Communications Commission -- Part J.

- 4. ASHRAE/ANSI 135-2012 (BACnet) (System Level Devices) Building Controllers shall conform to the listed version of the BACnet specification in order to improve interoperability with various building system manufacturers' control systems and devices.
- 5. ASHRAE/ANSI 135-2012 (BACnet) (Unit Level Devices) Unit Controllers shall conform to the listed version of the BACnet specification in order to improve interoperability with various building system manufacturers' control systems and devices.

1.6 SYSTEM PERFORMANCE

- A. Performance Standards. The BAS system shall conform to the following:
 - 1. Graphic Display. The system shall display a graphic with a minimum of 20 dynamic points. All current data shall be displayed within 10 seconds of the operator's request.
 - 2. Graphic Refresh. The system shall update all dynamic points with current data within 10 seconds.
 - 3. Object Command. The maximum time between the command of a binary object by the operator and the reaction by the device shall be 5 seconds. Analog objects shall start to adjust within 5 seconds.
 - 4. Object Scan. All changes of state and change of analog values shall be transmitted over the high-speed network such that any data used or displayed at a controller or workstation will be current within the prior 10 seconds.
 - 5. Alarm Response Time. The maximum time from when an object goes into alarm to when it is annunciated at the workstation shall not exceed 10 seconds.
 - 6. Program Execution Frequency. Custom and standard applications shall be capable of running as often as once every 5 seconds. The Contractor shall be responsible for selecting execution times consistent with the mechanical process under control.
 - 7. Programmable Controllers shall be able to execute DDC PID control loops at a selectable frequency from at least once every 5 seconds. The controller shall scan and update the process value and output generated by this calculation at this same frequency.
 - 8. Reporting Accuracy. Table 1 lists minimum acceptable reporting accuracies for all values reported by the specified system.

a. Table 1: Reporting Accuracy

Measured Variable	Reported Accuracy
Space Temperature	±0.5°C [±1°F]
Ducted Air	±1.0°C [±2°F]
Outside Air	±1.0°C [±2°F]
Water Temperature	±0.5°C [±1°F]
Delta –T	±0.15°C[±0.25°F]
Relative Humidity	±5% RH
Water Flow	±5% of full scale
Air Flow (terminal)	±10% of reading *Note 1

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Air Flow (measuring stations)	±5% of reading
Air Pressure (ducts)	±25 Pa [±0.1 "W.G.]
Air Pressure (space)	±3 Pa [±0.01 "W.G.]
Water Pressure	±2% of full scale *Note 2
Electrical Power	5% of reading *Note 3
Carbon Monoxide (CO)	± 50 PPM
Carbon Dioxide (CO2)	± 50 PPM

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Note 1: (10%-100% of scale) (cannot read accurately below 10%)

Note 2: for both absolute and differential pressure Note 3: * not including utility supplied meters

1.7 SUBMITTAL REQUIREMENTS

- A. BAS manufacturer shall provide shop drawings and manufacturers' standard specification data sheets on all hardware and software being provided for this project. No work may begin on any segment of this project until the Engineer and Owner have reviewed submittals for conformity with the plan and specifications. Six (6) copies are required. All shop drawings shall be provided to the Owner electronically once they have been approved and as-built drawings have been completed.
- B. Quantities of items submitted shall be reviewed by the Engineer and Owner. Such review shall not relieve the BAS manufacturer of furnishing quantities required based upon contract documents.
- C. Provide the Engineer and Owner, any additional information or data which is deemed necessary to determine compliance with the specifications or which is deemed valuable in documenting and understanding the system to be installed.
- D. Submit the following within 90 days of contract award:
 - 1. A complete bill of materials of equipment to be used indicating quantities, manufacturers and model numbers.
 - 2. A schedule of all control valves including the valve size, pressure drop, model number (including pattern and connections), flow, CV, body pressure rating, and location.
 - 3. A schedule of all control dampers including damper size, pressure drop, manufacturer, and model number.
 - 4. Provide all manufacturers' technical cut sheets for major system components.
 - 5. Provide proposed Building Automation System architectural diagram depicting various controller types, workstations, device locations, addresses, and communication cable requirements
 - 6. Provide detailed termination drawings showing all required field and factory terminations, as well as terminal tie-ins to DDC controls provided by mechanical equipment manufacturers. Terminal numbers shall be clearly labeled.
 - 7. Provide points list showing all system objects and the proposed English language object names.

- 8. Provide a sequence of operation for each controlled mechanical system and terminal enddevices.
- 9. Provide a BACnet Protocol Implementation Conformance Statement (PICS) for each BACnet system level device (i.e. Building Controller & Operator Workstations) type. This defines the points list for proper coordination of interoperability with other building systems if applicable for this project.

1.8 WARRANTY REQUIREMENTS

A. Warrant all work as follows:

- 1. BAS system labor and materials shall be warranted free from defects for a period of twelve (12) months after final completion acceptance by the Owner. BAS failures during the warranty period shall be adjusted, repaired, or replaced at no charge to the Owner. The BAS manufacturer shall respond to the Owner's request for warranty service within 24 hours of the initiated call and will occur during normal business hours (8AM-5PM).
- 2. At the end of the final start-up/testing, if equipment and systems are operating satisfactorily to the Owner and Engineer, the Owner shall sign certificates certifying that the BAS is operational, and has been tested and accepted in accordance with the terms of this specification. The date of Owner's acceptance shall be the start of the warranty period.

1.9 SYSTEM MAINTENANCE

- A. Perform Building Automation System preventative maintenance and support for a period of 1 year (beginning the date of substantial completion).
 - 1. Make a minimum of 2 complete Building Automation System inspections, in addition to normal warranty requirements. Inspections to include:
 - a. System Review Review the BAS to correct programming errors, failed points, points in alarm, and points that have been overridden manually.
 - b. Seasonal Control Loop Tuning Control loops are reviewed to reflect changing seasonal conditions and / or facility heating and cooling loads.
 - c. Sequence of operation verification Systems all verified to be operating as designed and in automatic operation. Scheduling and setpoints are reviewed and modified.
 - d. Database back-up
 - e. Operator coaching
 - 2. Technician shall review critical alarm log and advise owner of additional services that may be required.
 - 3. Technician shall provide a written report to owner after each inspection.

1.10 OWNERSHIP OF BAS MATERIAL

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- A. Project specific software and documantation shall become the owner's property upon project completion. This includes the following:
 - 1. Operator Graphic files
 - 2. As-built hardware design drawings
 - 3. Operating & Maintenance Manuals
 - 4. BAS System software database
 - 5. Controller application programming databases
 - 6. Application Specific Controller configuration files
 - 7. Required Licensed software

PART 2 PRODUCTS

21 MATERIALS

A. Use new products that the manufacturer is currently manufacturing and that have been installed in a minimum of 25 installations. Do not use this installation as a product test site unless explicitly approved in writing by the owner or the owner's representative. Spare parts shall be available for at least five years after completion of this contract.

2.2 COMMUNICATION

- A. This project shall be comprised of a high speed Ethernet network utilizing BACnet/IP communications between System Controllers and Workstations. Each System Controller shall function as a BACnet Router to each unit controller providing a unique BACnet Device ID for all controllers within the system.
- B. Communications between System Controllers and sub-networks of Custom Application Controllers and/or Application Specific Controllers shall meet the ASHRAE 135 Standard either via BACnet MS/TP

2.3 OPERATOR INTERFACE

Use Existing Site server and workstations for operator interface

2.4 OPERATOR INTERFACE

- A. Operator Web Interface shall conform to following:
 - 1. System Security
 - i. Each operator shall be required to login to the system with a user name and password in order to view, edit, add, or delete data.
 - ii. User Profiles shall restrict the user to only the objects, applications, and system functions as assigned by the system administrator.
 - iii. Each operator shall be allowed to change their user password.

- iv. The System Administrator shall be able to manage the security for all other users
- v. The system shall include pre-defined "roles" that allow a system administrator to quickly assign permissions to a user.
- vi. User logon/logoff attempts shall be recorded.
- vii. The system shall track and record all user log-in activity and all changes done at the enterprise level including who made the change, when, what was changed, pervious value and new value.

2. Customizable Navigation Tree

- i. The operator web interface shall include a fully customizable navigation tree that shall allow an operator to do the following:
 - (a) Move and edit any of the nodes of the tree.
 - (b) Move entire groups to any area of the tree
 - (c) Change the name of any node in the tree
 - (d) Create custom nodes for any page in the web interface including: graphics, data log views, schedules, and dashboards
 - (e) Support navigation from multi-building to single building view
 - (f) Ability to create folders and assign and change hierarchy of nodes of the tree

3. Standard Equipment Pages

- i. The operator web interface shall include standard pages for all major equipment.
- ii. These pages shall allow an operator to obtain information relevant to the operation of the equipment, including:
 - (a) Animated Equipment Graphics for each major piece of equipment and floor plan in the System.
 - (b) Alarms relevant to the equipment or application without requiring a user to navigate to an alarm page and perform a filter.
 - (c) Data Logs for the equipment without requiring a user to navigate to a Data Log page and perform a filter.

4. System Graphics Package

- i. The operator web interface shall be graphically based and shall include at least one 3-D color graphic per piece of equipment, graphics for each hydronic system, and graphics that summarize conditions on each floor of each building included in this contract.
- ii. Graphics Package shall include at a minimum:
 - (a) 3-D Color Site Map (for multiple building campus projects) or 3-D Building Rendering (for single building projects)
 - (b) 3-D Color Custom Floor Plans
 - (i) Floor Plan Graphics to show accurate ductwork of system

- (ii) Toggle Switch to turn ductwork on/off per each floor plan
- (iii) Indicate thermal comfort on floor plan graphics using colors to represent zone temperature relative to zone set point
- (c) 3-D Color Hydronic System Graphics with Animations
 - (i) Example Animation: Pump Flashing when On
- (d) 3-D Color Major Equipment Graphics with Animations
 - (i) Example Animation: Fan Spinning when On

5. Manual Control and Override

- i. Point Control. Provide a method for a user to view, override, and edit if applicable, the status of any object and property in the system. The point status shall be available by menu, on graphics or through custom programs.
- ii. Temporary Overrides. The user shall be able to perform a temporary override wherever an override is allowed, automatically removing the override after a specified period of time.

6. Engineering Units

i. Allow for selection of the desired engineering units (i.e. Inch pound or SI) in the system.

7. Scheduling

- i. A user shall be able to perform the following tasks utilizing the operator web interface:
- ii. Create a new schedule, defining the default values, events and membership.
- iii. Create exceptions to a schedule for any given day.
- iv. Apply an exception that spans a single day or multiple days.
- v. View a schedule by day, week and month.
- vi. Exception schedules and holidays shall be shown clearly on the calendar.
- vii. Modify the schedule events, members and exceptions.
- viii. Create schedules and exceptions for multiple buildings
- ix. Apply emergency schedule to multiple buildings
- x. Drag and drop scheduling editing
- xi. Global schedule and exceptions across multiple buildings

8. Data Logs

- i. Data Logs Definition.
 - (a) The operator web interface shall allow a user with the appropriate security permissions to define a Data Log for any data in the system.
- ii. Data Log Viewer.
 - (a) The operator web interface shall allow Data Log data to be viewed and printed.
 - (b) The operator web interface shall allow a user to view Data Log data in a text-based format (time –stamp/value).

- (c) The operator shall be able to view the data collected by a Data Log in a graphical chart in the operator web interface.
- (d) Data Log viewing capabilities shall include the ability to show a minimum of five points on a chart.
- (e) Each data point data line shall be displayed as a unique color.
- (f) Data points can be hidden on the display view by clicking on the point
- (g) The operator shall be able to specify the duration of historical data to view by scrolling, zooming, or selecting from a pull down list.
- (h) The system shall provide a graphical trace display of the associated time stamp and value for any selected point along the xaxis.

iii. Export Data Logs.

(a) The Enterprise operator web interface shall allow a user to export Data Log data in CSV, xlsx or text format for use by other industry standard word processing and spreadsheet packages.

9. Alarm/Event Notification

- i. An operator shall be notified of new alarms/events as they occur while navigating through any part of the system via an alarm icon.
- ii. The operator will have the option of selecting an audible alarm notification for all alarm classes they subscribe to.
- iii. The system operator will have the option of setting specific times and days that that they will receive alarm notifications.
- iv. Alarm/Event Log. The operator shall be able to view all logged system alarms/events from any operator web interface.
 - (a) The operator shall be able to sort and filter alarms from events. Alarms shall be sorted in categories based on severity.
 - (b) The alarm/event log shall include a comment field for each alarm/event that allows a user to add specific comments associated with any alarm.

10. User Change Log

- i. The operator shall be able to view all logged user changes in the system from any operator web interface.
 - (a) An operator shall be able to group user changes by: date, affected, date & affected, user, date & user, transaction type, date & transaction type, or sort only.
 - (b) The operator will have the option of additional filtering capability of: date, transaction, type, user, affected, and details that can be used individually or in conjunction with other filters.

11. Reports

i. The operator web interface shall provide a reporting package that allows the operator to select reports to run.

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- ii. The operator web interface shall provide the ability to schedule reports to run at specified intervals of time.
- iii. The Enterprise operator web interface shall provide the ability to email schedule reports at specified intervals of time.
- iv. The following standard reports shall be available without requiring a user to manually design the report:
 - (a) All Points in Alarm Report: Provide an on demand report showing all current alarms.
 - (b) All Points in Override Report: Provide an on demand report showing all overrides in effect.
 - (c) Schedules Report: List of all weekly events for all schedules in selected buildings
 - (d) Space Comfort Analysis Report: List of spaces that meet selected criteria for potential comfort issues (temp variance, high, low, unoccupied)
- 12. Operator Web Interface must meet the following Agency Compliance:
 - i. BACnet Testing Laboratory (BTL) Listed
- 13. General Lighting Control Panel Interface
- i. BAS shall interface with the new lighting control panel being installed via BACnet MSTP to monitor light status and levels. See Div 26 for locations of panels, interface wiring to be provided as part of 26 to existing Trane BAS.

2.

2.5 PROGRAMMING TOOLS

- A. Provide Custom Application Programming Tools to create, modify, and debug custom application programming shall be provided under license for a period of at least (1) year. The operator shall be able to create, edit, and download custom programs at the same time that all other system applications are operating. The system shall be fully operable while custom routines are edited, compiled, and downloaded. Upon expiration of software license the building owner may choose to renew the license at their discretion.
- B. Custom Graphic Editor. Provide the tools to create, modify, and debug custom graphics. The operator shall be able to create, edit, and download custom graphics at the same time that all other system applications are operating. The system shall be fully operable while custom graphics are edited, compiled, and downloaded.

2.6 BUILDING CONTROLLERS

- A. There shall be one or more independent, standalone microprocessor based System Controllers to manage the global strategies described in Application and Control Software section.
- B. The System Controller shall have sufficient memory to support its operating system, database, and programming requirements.
- C. The operating system of the Controller shall manage the input and output communications signals to allow distributed controllers to share real and virtual point information and allow central monitoring and alarms.
- D. All System Controllers shall have a real time clock.
- E. Data shall be shared between networked System Controllers.
- F. The System Controller shall continually check the status of its processor and memory circuits. If an abnormal operation is detected, the controller shall:
 - 1. Assume a predetermined failure mode.
 - 2. Generate an alarm notification.
 - 3. Create a retrievable file of the state of all applicable memory locations at the time of the failure.
 - 4. Automatically reset the System Controller to return to a normal operating mode.
- G. Environment. Controller hardware shall be suitable for the anticipated ambient conditions. Controller used in conditioned ambient shall be mounted in an enclosure, and shall be rated for operation at -40° C to 50° C [-40° F to 122° F].
- H. Clock Synchronization.

- 1. All System Controllers shall be able to synchronize with a NTP server for automatic time synchronization.
- 2. All System Controllers shall be able to accept a BACnet time synchronization command for automatic time synchronization.
- 3. All System Controllers shall automatically adjust for daylight savings time if applicable.

I. Serviceability

- 1. Provide diagnostic LEDs for power, communications, and processor
- J. Memory. The System Controller shall maintain all BIOS and programming information indefinitely without power to the System controller.
- K. BACnet Test Labs (BTL) Listing. Each System Controller shall be listed as a Building Controller (B-BC) by the BACnet Test Labs with a minimum BACnet Protocol Revision of 14.

2.7 ADVANCED APPLICATION CONTROLLERS

- A. Advance Application Controllers shall be used to control all equipment or applications of medium and high complexity, including but not limited to Air Handlers, Boiler Plants and Chiller Plants.
- B. To meet the sequence of operation for each application, the Controller shall use programs provided by the controller manufacturer that are either factory loaded or downloaded with service tool to the Controller.
- C. Stand-Alone Operation: In case of communications failure stand-alone operation shall use default values or last values for remote sensors read over the network such as outdoor air temperature.
- D. Environment. Controller hardware shall be suitable for the anticipated ambient conditions.
- E. Input/Output: The Controller shall have on board or through expansion module all I/O capable of performing all functionality needed for the application. Controls provided by the equipment manufacture must supply the required I/O for the equipment.
- F. Input/Output Expandability For the application flexibility, the Controller shall be capable of expanding to a total of at least 100 hardware I/O terminations.
- G. Serviceability The Controller shall provide the following in order to improve serviceability of the Controller.

- 1. Diagnostic LEDs for power/normal operation/status, BACnet communications, sensor bus communications, and binary outputs. All wiring connections shall be clearly labeled and made to be field removable.
- 2. To aid in service replacement, the Controller shall allow for setting its BACnet address via controller mounted rotary switches that correspond to the numerical value of the address. (DIP switch methodologies are not allowed). Setting of the address shall be accomplished without the need of a service tool or power applied to the controller.
- 3. Controller data shall be maintained through a power failure.
- H. Transformer for the Controller must be rated at minimum of 115% of ASC power consumption, and shall be fused or current limiting type. 24 VAC, +/- 15% nominal, 50-60 Hz, 24 VA plus binary output loads for a maximum of 12 VA for each binary output.
- I. Controller must meet the following Agency Compliance:
 - 1. UL916 PAZX, Open Energy Management Equipment
 - 2. UL94-5V, Flammability
 - 3. FCC Part 15, Subpart B, Class B Limit
 - 4. BACnet Testing Laboratory (BTL) Listed

2.8 APPLICATION-SPECIFIC CONTROLLERS

- A. Application Specific Controllers (ASC) shall be microprocessor-based DDC controller, The controller shall use programs provided by the controller manufacturer that are either factory loaded or downloaded with service tool to the Controller.
- B. Zone Controllers are controllers that operate equipment that control the space temperature of single zone. Examples are controllers for VAV, Fan coil, Blower Coils, Unit Ventilators, Heat Pumps, and Water Source Heat Pumps.
- C. Stand-Alone Operation: In case of communications failure stand-alone operation shall use default values or last values for remote sensors read over the network such as outdoor air temperature.
- D. Environment: Controller hardware shall be suitable for the anticipated ambient conditions.
- E. Input/Output: The Controller shall have on board or through expansion module all I/O capable of performing all functionality needed for the application. Controls provided by the equipment manufacture must supply the required I/O for the equipment.
- F. Input/Output Expandability For the application flexibility, the Controller shall be capable of expanding to a total of at least 100 hardware I/O terminations.
- G. Serviceability The Controller shall provide the following in order to improve serviceability of the Controller.

- 1. Diagnostic LEDs for power/normal operation/status, BACnet communications, sensor bus communications, and binary outputs. All wiring connections shall be clearly labeled and made to be field removable.
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- 3. Controller data shall be maintained through a power failure.
- H. Transformer for the Controller must be rated at minimum of 115% of ASC power consumption, and shall be fused or current limiting type. 24 VAC, +/- 15% nominal, 50-60 Hz, 24 VA plus binary output loads for a maximum of 12 VA for each binary output.
- I. Controller must meet the following Agency Compliance:
 - 1. UL916 PAZX, Open Energy Management Equipment
 - 2. UL94-5V, Flammability
 - 3. FCC Part 15, Subpart B, Class B Limit
 - 4. BACnet Testing Laboratory (BTL) Listed

2.9 FIELD HARDWARE/INSTRUMENTATION

- A. Temperature Sensing Devices
 - 1. Type & Accuracy. Temperature sensors shall be of the type and accuracy indicated for the application. Sensors shall have an accuracy rating within 1% of the intended use temperature range.
 - 2. Outside Air Temperature Sensors. Outside air temperature sensors' accuracy shall be within +1degF in the range of -52degF to 152degF.
 - 3. Room Temperature Sensors. Room temperature sensors shall have an accuracy of +0.36degF in the range of 32degF to 96degF.
 - 4. Chilled Water and Condenser Water Sensors. Chilled water and condenser water sensors shall have an accuracy of +0.25degF in their range of application.
 - 5. Hot Water Temperature Sensors. Hot water temperature sensors shall have an accuracy of +0.75degF over the range of their application.

B Pressure Instruments

1. Differential Pressure and Pressure Sensors: Sensors shall have a 4-20 MA output proportional signal with provisions for field checking. Sensors shall withstand up to 150% of rated pressure, without damaging the device. Accuracy shall be within +2% of full scale. Sensors shall be manufactured by Leeds & Northrup, Setra, Robertshaw, Dwyer Instruments, Rosemont, or be approved equal.

2. Pressure Switches: Pressure switches shall have a repetitive accuracy of +2% of range and withstand up to 150% of rated pressure. Sensors shall be diaphragm or bourdon tube design. Switch operation shall be adjustable over the operating pressure range. The switch shall have an application rated Form C, snap-acting, self-wiping contact of platinum alloy, silver alloy, or gold plating.

C. Flow Switches:

1. Flow switches shall have a repetitive accuracy of +1% of their operating range. Switch actuation shall be adjustable over the operating flow range. Switches shall have snapacting Form C contacts rated for the specific electrical application.

D. Humidity Sensors:

1. Sensors shall have an accuracy of +2.5% over a range of 20% to 95% RH.

E. Current Sensing Relays

1. Relays shall monitor status of motor loads. Switch shall have self-wiping, snap-acting Form C contacts rated for the application. The setpoint of the contact operation shall be field adjustable.

F. Output Relays

1. Control relay contacts shall be rated for 150% of the loading application, with self-wiping, snap-acting Form C contacts, enclosed in dustproof enclosure. Relays shall have silver cadmium contacts with a minimum life span rating of one million operations. Relays shall be equipped with coil transient suppression devices.

G. Solid State Relays

1. Input/output isolation shall be greater than 10 billion ohms with a breakdown voltage of 15 V root mean square, or greater, at 60 Hz. The contact operating life shall be 10 million operations or greater. The ambient temperature range of SSRs shall be 20F-140F. Input impedance shall be greater than 500 ohms. Relays shall be rated for the application. Operating and release time shall be 10 milliseconds or less. Transient suppression shall be provided as an integral part of the relays.

H. Valve and Damper Actuators

1. Electronic Direct-Coupled: Electronic direct-coupled actuation shall be provided.

- 2. Actuator Mounting: The actuator shall be direct-coupled over the shaft, enabling it to be mounted directly to the damper shaft without the need for connecting linkage. The fastening clamp assemble shall be of a 'V' bolt design with associated 'V' shaped toothed cradle attaching to the shaft for maximum strength and eliminating slippage. Spring return actuators shall have a 'V' clamp assembly of sufficient size to be directly mounted to an integral jackshaft of up to 1.05 inches when the damper is constructed in this manner. Single bolt or screw type fasteners are not acceptable
- 3. Electronic Overload Sensing: The actuator shall have electronic overload or digital rotation sensing circuitry to prevent damage to the actuator throughout the entire rotation of the actuator. Mechanical end switches or magnetic clutch to deactivate the actuator at the end of rotation are not acceptable.
- 4. Power Failure/Safety Applications: For power failure/safety applications, an internal mechanical spring return mechanism shall be built into the actuator housing. Non-mechanical forms of fail-safe operation are not acceptable.
- 5. Spring Return Actuators: All spring return actuators shall be capable of both clockwise or counterclockwise spring return operation by simply changing the mounting orientation.
- 6. Proportional Actuators: Proportional actuators shall accept a 0 to 10VDC or 0 to 20mA control input and provide a 2 to 10VDC or 4 to 20mA operating range. An actuator capable of accepting a pulse width modulating control signal and providing full proportional operation of the damper is acceptable. All actuators shall provide a 2 to 10VDC position feedback signal.
- 7. 24 Volts (AC/DC) actuators: All 24VAC/DC actuators shall operate on Class 2 wiring and shall not require more than 10VA for AC or more than 8 watts for DC applications. Actuators operating on 120VAC power shall not require more than 10VA. Actuators operating on 230VAC shall not require more than 11VA.
- 8. Non-Spring Return Actuators: All non-spring return actuators shall have an external manual gear release to allow manual positioning of the damper when the actuator is not powered. Spring return actuators with more than 60 in-lb torque shall have a manual crank for this purpose.
- 9. Modulating Actuators: All modulating actuators shall have an external, built-in switch to allow reversing direction of rotation.
- 10. Conduit Fitting & Pre-Wiring: Actuators shall be provided with a conduit fitting and a minimum 3ft electrical cable, and shall be pre-wired to eliminate the necessity of opening the actuator housing to make electrical connections.
- 11. U.L. Listing: Actuators shall be Underwriters Laboratories Standard 873 listed and Canadian Standards Association Class 4813 02 certified as meeting correct safety requirements and recognized industry standards.
- 12. Warranty: Actuators shall be designed for a minimum of 60,000 full stroke cycles at the actuator's rated torque and shall have a 2-year manufacturer's warranty, starting from the date of installation. Manufacturer shall be ISO9001 certified.

- I. Control Valves: Provide factory fabricated U.S. forged and assembled electric control valves of type, body material, and pressure class indicated. Where type or body material is not indicated, provide selection as determined by manufacturer for installation requirements and pressure class, based on maximum pressure and temperature in piping system. Provide valve size in accordance with scheduled or specified maximum pressure drop across control valve. Except as otherwise indicated, provide valves which mate and match material of connecting piping. Equip control valves with control valve motor actuators, with proper shutoff rating for each individual application.
 - 1. Water Service Valves: Equal percentage characteristics with rangeability of 50 to 1, Class 150 at 250°F and maximum full flow pressure drop 5 psig. Globe type with replaceable plugs and seats of stainless steel or brass. Select operators to close valves against pump shutoff head.
 - 2. Double Seated Valves: Balanced plug type, with caged type trim providing seating and guiding surfaces on "top and bottom" guided plugs.
 - 3. Valve Trim and Stems: Polished stainless steel.
 - 4. Packing: Spring-loaded teflon, self-adjusting.
 - 5. Terminal Unit Control Valves: Provide control ball valves for control of terminal units including, but not necessarily limited to, convectors, thinned tube radiation, and fan coil units that are of integral motor type. Provide 2-position or modulating type valves, electrically actuated by line voltage or by 24VAC.
- J. Dampers: Provide automatic control low leakage, opposed blade dampers, with damper frames not less than formed 13-gauged galvanized steel. Provide mounting holes for enclosed duct mounting. Provide damper blades not less than formed 16-gauged galvanized steel, with maximum blade width of 8-inch. Equip dampers with motors of proper rating of each application.
 - 1. Secure blades to ½ inch diameter zinc-plated axles using zinc-plated hardware. Seal off against spring stainless steel blade bearings. Provide blade bearings Nylon and provide thrust bearings at each end of every blade. Construct blade linkage hardware of zinc-plated steel and brass. Submit leakage and flow characteristics plus size schedule for controlled dampers.
 - 2. Operating Temperature Range: From -20° to 200°F (-29° to 93°C).
 - 3. For low leakage application or opposed blade design (as selected by manufacturers sizing techniques) with inflatable steel blade edging or replaceable rubber seals, rated for leakage less than 10 cfm per square foot of damper area, AR differential pressure of 4-inch w.g. when damper is being held by torque 50 inch-pounds.

PART 3 EXECUTION

3.1 COORDINATION

A. Provide power from existing electrical distribution system as necessary for the controls system. Must comply with the National Electrical Code.

B. Test and Balance

- 1. The contractor shall furnish a single set of all tools necessary to interface to the control system for test and balance purposes.
- 2. The tools used during the test and balance process shall be returned to the contractor at the completion of the testing and balancing.

3.2 INSTALLATION

- A. Connect and configure equipment and software to achieve sequences of operations specified
- B. Verify location of exposed control sensors with arhitect prior to installation. Install devices 60 inches above the floor.
- C. Install damper moters on outside of duct in warm areas, not tin locations exposed to outdoor temperatures.

3.3 ELECTRICAL WIRING AND CONNECTION INSTALLATION

- A. Install raceways, boxes, and cabinets according to Section 260533 "Raceways and Boxes for Electrical Systems."
- B. Install building wire and cable according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."
- C. Install signal and communication cable accroding to Section 271500 "Communications Horizontal Cabling."
- D. Where Class 2 wires are in concealed and accessible locations; including ceiling return air plenums, approved cables outside of electrical raceway can be used provided that the following conditions are met:
 - 1. Circuits meet NEC Class 2 (current-limited) requirements. (Low-voltage power circuits shall be sub-fused when required to meet Class 2 current-limit.)
 - 2. All cables shall be UL listed for application (i.e., cables used in ceiling plenums shall be UL listed specifically for that purpose).
- E. Do not install Class 2 wiring in conduits containing Class 1 wiring. Boxes and panels containing high voltage may not be used for low voltage wiring except for the purpose of interfacing the two via control relays and transformers.
- F. Where Class 2 wiring is run exposed, wiring shall be run parallel along a surface or perpendicular to it, and bundled, using approved wire ties at no greater than 3 m (10 ft.) intervals. Such bundled cable shall be fastened to the structure, using industry approved fasteners, at 1.5 m (5 ft.) intervals or more often to achieve a neat and workmanlike result.

- G. Maximum allowable voltage for control wiring shall be 120Vac. If only higher voltages are available for use, the BAS manufacturer shall provide step-down transformers to achieve the desired control voltages.
- H. All control wiring shall be installed as continuous lengths, where possible. Any required splices shall be made only within an approved junction box or other approved protective device
- I. Install wire and cable with sufficient slack and flexible connections to allow for vibration of piping and equipment
- J. Install plenum wiring in sleeves where it passes through walls and floors. Maintain fire rating at all penetrations in accordance with Contract Documents and National and/or Local Codes.
- K. Control and status relays are to be located in pre-fabricated enclosures that meet the application. These relays may also be located within packaged equipment control panel enclosures as coordinated. These relays shall not be located within Class 1 starter enclosures.
- L. Follow manufacturer's installation recommendations for all communication and network bus cabling. Network or communication cabling shall be run separately from all control power wiring.
- M. BAS manufacturer shall terminate all control and/or interlock wiring and shall maintain updated (as-built) wiring diagrams with terminations identified at the job site.
- N. Flexible metal conduits and liquid-tight flexible metal conduits shall not exceed 3' in length and shall be supported at each end. Flexible metal conduit less than 1/2" electrical trade size shall not be used. In areas exposed to moisture, including chiller and boiler rooms, liquid-tight, flexible metal conduits shall be used.

3.4 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust field-assembled components and equipment installation, including connections, and to assist in field testing. Report results in writing.
- B. Perform the following field tests and inspections and prepare test reports:
 - 1. Operational Test: After electrical circuitry has been energized, start units to confirm proper unit operation. Remove and replace malfunctioning units and retest.
 - 2. Test and adjust controls and safeties.
 - 3. Test each point through its full operating range to verify that safety and operating control setpoints are as required.
 - 4. Test each control loop to verify stable mode of operation and compliance with sequence of operation. Adjust PID actions.
 - 5. Test each system for compliance with sequence of operation.

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6. Test software and hardware interlocks.

C. DDC Verification:

- 1. Verify that instruments are installed before calibration, testing, and loop or leak checks.
- 2. Check instruments for proper location and accessibility.
- 3. Check instrument installation for direction of flow, elevation, orientation, insertion depth, and other applicable considerations.
- 4. Check flow instruments. Inspect tag number and line and bore size, and verify that inlet side is identified and that meters are installed correctly.
- 5. Check control valves. Verify that they are in correct direction.
- 6. Check DDC system as follows:
 - i. a. Verify that wires at control panels are tagged with their service designation and approved tagging system.
 - ii. b. Verify that DDC controllers are protected from power supply surges.
- D. Replace damaged or malfunctioning controls and equipment and repeat testing procedures.

3.5 CONTROL SYSTEM DEMONSTRATION AND ACCEPTANCE

- A. Demonstration: A complete demonstration of the capabilities of the BAS system shall be performed by the BAS manufacturer's field personnel. The BAS manufacturer shall dedicate a minimum of (16) hours on-site with the Owner representatives, and Engineer to demonstrate a complete functional test of all the BAS system requirements. This BAS demonstration shall constitute an acceptance inspection, and will represent the process of approving the BAS as designed and specified. Functional testing shall include, but is not limited to, the following system level components where installed:
- B. Acceptance: The BAS will not be accepted as meeting the requirements of Completion until all tests described in this specification have been performed to the satisfaction of both the Engineer and Owner. Any tests that cannot be performed due to circumstances beyond the control of the Contractor may be exempt from the Completion requirements if stated as such in writing by the Owner's representative.

3.6 TRAINING

- A. Provide two training sessions of four (4) hours minimum per session, with sessions on separate days for the facility maintenance staff. The training shall review accessing the web based building automation system (BAS) by password, show how to navigate through each of the system's graphic screens to identify each of the parameters which are just monitored and what parameters can be adjusted (setpoints and schedules), review each of the alarms which can be sent to the BAS and how the maintenance staff should address each, and proper logging out of the system.
 - 1. Review with the maintenance staff current setpoints and instruct them how to adjust the setpoints. Instruct the staff in how to adjust equipment schedules and assist them in setting up each applicable schedule.
 - 2. Instruct the staff in system troubleshooting. Instruct them in setup of trending / data logging and how to review the resulting data.
 - 3. Instruct the staff how to do seasonal system startups and shutdowns.
 - 4. Provide a walk-through of the building and review the location of room sensors and unit controllers.

END OF SECTION

HYDRONIC PIPING SECTION 232113

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes pipe and fitting materials and joining methods for the following:
 - 1. Hot-water heating piping.
 - 2. Glycol cooling-water piping.
 - 3. Makeup-water piping.
 - 4. Condensate-drain piping.
 - 5. Air-vent piping.
 - 6. Safety-valve-inlet and -outlet piping.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of the following:
 - 1. Plastic pipe and fittings with solvent cement.
 - 2. RTRP and RTRF with adhesive.
 - 3. Pressure-seal fittings.
 - 4. Chemical treatment.

1.4 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Piping layout, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
 - 1. Suspended ceiling components.
 - 2. Other building services.
 - 3. Structural members.
- B. Qualification Data: For Installer.
- C. Welding certificates.
- D. Field quality-control reports.

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E. Water Analysis: Submit a copy of the water analysis to illustrate water quality available at Project site.

1.5 QUALITY ASSURANCE

A. Installer Qualifications:

- 1. Installers of Pressure-Sealed Joints: Installers shall be certified by pressure-seal joint manufacturer as having been trained and qualified to join piping with pressure-seal pipe couplings and fittings.
- 2. Fiberglass Pipe and Fitting Installers: Installers of RTRF and RTRP shall be certified by manufacturer of pipes and fittings as having been trained and qualified to join fiberglass piping with manufacturer-recommended adhesive.
- B. Steel Support Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code Steel."
- C. Pipe Welding: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code: Section IX.
 - 1. Comply with ASME B31.9, "Building Services Piping," for materials, products, and installation.
 - 2. Certify that each welder has passed AWS qualification tests for welding processes involved and that certification is current.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Hydronic piping components and installation shall be capable of withstanding the following minimum working pressure and temperature unless otherwise indicated:
 - 1. Hot-Water Heating Piping: 150 psig at 200 deg F.
 - 2. Glycol Cooling-Water Piping: 150 psig at 150 deg F.
 - 3. Makeup-Water Piping: 80 psig at 150 deg F.
 - 4. Condensate-Drain Piping: 150 deg F.
 - 5. Air-Vent Piping: 200 deg F.
 - 6. Safety-Valve-Inlet and -Outlet Piping: Equal to the pressure of the piping system to which it is attached.

2.2 COPPER TUBE AND FITTINGS

- A. Drawn-Temper Copper Tubing: ASTM B 88, Type L.
- B. Annealed-Temper Copper Tubing: ASTM B 88, Type K.
- C. DWV Copper Tubing: ASTM B 306, Type DWV.

- D. Grooved, Mechanical-Joint, Wrought-Copper Fittings: ASME B16.22.
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Anvil International, Inc.
 - b. Star Pipe Products.
 - c. <u>Victaulic Company</u>.
 - 2. Grooved-End Copper Fittings: ASTM B 75, copper tube or ASTM B 584, bronze casting.
 - 3. Grooved-End-Tube Couplings: Rigid pattern unless otherwise indicated; gasketed fitting. Ductile-iron housing with keys matching pipe and fitting grooves, prelubricated EPDM gasket rated for minimum 230 deg F for use with housing, and steel bolts and nuts.
- E. Copper or Bronze Pressure-Seal Fittings:
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. NIBCO INC.
 - b. <u>Viega</u>.
 - 2. Housing: Copper.
 - 3. O-Rings and Pipe Stops: EPDM.
 - 4. Tools: Manufacturer's special tools.
 - 5. Minimum 200-psig working-pressure rating at 250 deg F.
- F. Wrought-Copper Unions: ASME B16.22.

2.3 STEEL PIPE AND FITTINGS

- A. Steel Pipe: ASTM A 53/A 53M, black steel with plain ends; welded and seamless, Grade B, and wall thickness as indicated in "Piping Applications" Article.
- B. Cast-Iron Threaded Fittings: ASME B16.4; Classes 125 and 250 as indicated in "Piping Applications" Article.
- C. Malleable-Iron Threaded Fittings: ASME B16.3, Classes 150 and 300 as indicated in "Piping Applications" Article.
- D. Malleable-Iron Unions: ASME B16.39; Classes 150, 250, and 300 as indicated in "Piping Applications" Article.
- E. Cast-Iron Pipe Flanges and Flanged Fittings: ASME B16.1, Classes 25, 125, and 250; raised ground face, and bolt holes spot faced as indicated in "Piping Applications" Article.
- F. Wrought-Steel Fittings: ASTM A 234/A 234M, wall thickness to match adjoining pipe.

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- G. Wrought Cast- and Forged-Steel Flanges and Flanged Fittings: ASME B16.5, including bolts, nuts, and gaskets of the following material group, end connections, and facings:
 - 1. Material Group: 1.1.
 - 2. End Connections: Butt welding.
 - 3. Facings: Raised face.
- H. Grooved Mechanical-Joint Fittings and Couplings:
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Anvil International, Inc.
 - b. <u>Central Sprinkler Company</u>.
 - c. Star Pipe Products.
 - d. Victaulic Company.
 - 2. Joint Fittings: ASTM A 536, Grade 65-45-12 ductile iron; ASTM A 47/A 47M, Grade 32510 malleable iron; ASTM A 53/A 53M, Type F, E, or S, Grade B fabricated steel; or ASTM A 106/A 106M, Grade B steel fittings with grooves or shoulders constructed to accept grooved-end couplings; with nuts, bolts, locking pin, locking toggle, or lugs to secure grooved pipe and fittings.
 - 3. Couplings: Ductile- or malleable-iron housing and EPDM gasket of central cavity pressure-responsive design; with nuts, bolts, locking pin, locking toggle, or lugs to secure grooved pipe and fittings.
- I. Steel Pressure-Seal Fittings:
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. <u>Victaulic Company</u>.
 - 2. Housing: Steel.
 - 3. O-Rings and Pipe Stop: EPDM.
 - 4. Tools: Manufacturer's special tool.
 - 5. Minimum 300-psig working-pressure rating at 230 deg F.
- J. Steel Pipe Nipples: ASTM A 733, made of same materials and wall thicknesses as pipe in which they are installed.

2.4 JOINING MATERIALS

- A. Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.
 - 1. ASME B16.21, nonmetallic, flat, asbestos free, 1/8-inch maximum thickness unless otherwise indicated.

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- a. Full-Face Type: For flat-face, Class 125, cast-iron and cast-bronze flanges.
- b. Narrow-Face Type: For raised-face, Class 250, cast-iron and steel flanges.
- B. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.
- C. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.
- D. Brazing Filler Metals: AWS A5.8/A5.8M, BCuP Series, copper-phosphorus alloys for joining copper with copper; or BAg-1, silver alloy for joining copper with bronze or steel.
- E. Welding Filler Metals: Comply with AWS D10.12M/D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.
- F. Gasket Material: Thickness, material, and type suitable for fluid to be handled and working temperatures and pressures.

2.5 DIELECTRIC FITTINGS

- A. General Requirements: Assembly of copper alloy and ferrous materials with separating nonconductive insulating material. Include end connections compatible with pipes to be joined.
- B. Dielectric Unions:
 - 1. <u>Manufacturers</u>: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. A.Y. McDonald Mfg. Co.
 - b. Capitol Manufacturing Company.
 - c. Central Plastics Company.
 - d. Hart Industries International, Inc.
 - e. Jomar International Ltd.
 - f. Matco-Norca.
 - g. Watts Regulator Co.
 - h. Zurn Industries, LLC.
 - 2. Description:
 - a. Standard: ASSE 1079.
 - b. Pressure Rating: 125 psig minimum at 180 deg F.
 - c. End Connections: Solder-joint copper alloy and threaded ferrous.

C. Dielectric Flanges:

- 1. <u>Manufacturers</u>: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. <u>Capitol Manufacturing Company</u>.
 - b. <u>Central Plastics Company</u>.

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- c. Matco-Norca.
- d. Watts Regulator Co.
- e. Zurn Industries, LLC.

2. Description:

- a. Standard: ASSE 1079.
- b. Factory-fabricated, bolted, companion-flange assembly.
- c. Pressure Rating: 125 psig minimum at 180 deg F.
- d. End Connections: Solder-joint copper alloy and threaded ferrous; threaded solder-joint copper alloy and threaded ferrous.

D. Dielectric-Flange Insulating Kits:

- 1. <u>Manufacturers</u>: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Advance Products & Systems, Inc.
 - b. Calpico, Inc.
 - c. Central Plastics Company.
 - d. Pipeline Seal and Insulator, Inc.

2. Description:

- a. Nonconducting materials for field assembly of companion flanges.
- b. Pressure Rating: 150 psig.
- c. Gasket: Neoprene or phenolic.
- d. Bolt Sleeves: Phenolic or polyethylene.
- e. Washers: Phenolic with steel backing washers.

E. Dielectric Nipples:

- 1. <u>Manufacturers</u>: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following]:
 - a. <u>Elster Perfection</u>.
 - b. Grinnell Mechanical Products.
 - c. Matco-Norca.
 - d. Precision Plumbing Products, Inc.
 - e. Victaulic Company.

2. Description:

- a. Standard: IAPMO PS 66.
- b. Electroplated steel nipple, complying with ASTM F 1545.
- c. Pressure Rating: 300 psig at 225 deg F.
- d. End Connections: Male threaded or grooved.
- e. Lining: Inert and noncorrosive, propylene.

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2.6 BYPASS CHEMICAL FEEDER

- A. Description: Welded steel construction; 125-psig working pressure; 5-gal. capacity; with fill funnel and inlet, outlet, and drain valves.
 - 1. Chemicals: Specially formulated, based on analysis of makeup water, to prevent accumulation of scale and corrosion in piping and connected equipment.

PART 3 - EXECUTION

3.1 PIPING APPLICATIONS

- A. Hot-water heating piping, aboveground, NPS 2 and smaller, shall be any of the following:
 - 1. Type L, drawn-temper copper tubing, wrought-copper fittings, pressure seal fittings or soldered joints.
 - 2. Schedule 40, Grade B, Type 96 steel pipe; Class 150, malleable-iron fittings; cast-iron flanges and flange fittings; threaded joints; pressure seal fittings or welded.
- B. Hot-water heating piping, aboveground, NPS 2-1/2 and larger, shall be any of the following:
 - 1. Type L, drawn-temper copper tubing, wrought-copper fittings, and soldered joints.
 - 2. Schedule 40, Grade B, Type 96 steel pipe; Class 150, malleable-iron fittings; cast-iron flanges and flange fittings; or welded joints.
- C. Glycol/chilled cooling-water piping, aboveground, NPS 2 and smaller, shall be any of the following:
 - 1. Type L, drawn-temper copper tubing, wrought-copper fittings, pressure seal fittings or soldered joints.
 - 2. Schedule 40, Grade B, Type 96 steel pipe; Class 150, malleable-iron fittings; cast-iron flanges and flange fittings; threaded joints; pressure seal fittings or welded.
- D. Glycol/chilled cooling-water piping, aboveground, NPS 2-1/2 and larger, shall be any of the following:
 - 1. Type L, drawn-temper copper tubing, wrought-copper fittings, and soldered joints.
 - 2. Schedule 40, Grade B, Type 96 steel pipe; Class 150, malleable-iron fittings; cast-iron flanges and flange fittings; grooved mechanical-ioints or welded joints.
- E. Makeup-water piping installed aboveground shall be either of the following:
 - 1. Type L, drawn-temper copper tubing, wrought-copper fittings, pressure seal fittings or soldered joints.
 - 2. Schedule 80 CPVC plastic pipe and fittings, and solvent-welded joints.
- F. Condensate-Drain Piping: Type M, drawn-temper copper tubing, wrought-copper fittings, pressure seal fittings, soldered joints or Schedule 40 PVC plastic pipe and fittings and solvent-welded joints.

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G. Blowdown-Drain Piping: Same materials and joining methods as for piping specified for the service in which blowdown drain is installed.

H. Air-Vent Piping:

- 1. Inlet: Same as service where installed with metal-to-plastic transition fittings for plastic piping systems according to piping manufacturer's written instructions.
- 2. Outlet: Type K, annealed-temper copper tubing with soldered or flared joints.
- I. Safety-Valve-Inlet and -Outlet Piping for Hot-Water Piping: Same materials and joining methods as for piping specified for the service in which safety valve is installed with metal-to-plastic transition fittings for plastic piping systems according to piping manufacturer's written instructions.

3.2 PIPING INSTALLATIONS

- A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.
- B. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.
- C. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
- D. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.
- E. Install piping to permit valve servicing.
- F. Install piping at indicated slopes.
- G. Install piping free of sags and bends.
- H. Install fittings for changes in direction and branch connections.
- I. Install piping to allow application of insulation.
- J. Select system components with pressure rating equal to or greater than system operating pressure.
- K. Install groups of pipes parallel to each other, spaced to permit applying insulation and servicing of valves.
- L. Install drains, consisting of a tee fitting, NPS 3/4 ball valve, and short NPS 3/4 threaded nipple with cap, at low points in piping system mains and elsewhere as required for system drainage.
- M. Install piping at a uniform grade of 0.2 percent upward in direction of flow.
- N. Reduce pipe sizes using eccentric reducer fitting installed with level side up.

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- O. Install branch connections to mains using tee fittings in main pipe, with the branch connected to the bottom of the main pipe. For up-feed risers, connect the branch to the top of the main pipe.
- P. Install valves according to Section 230523 "General-Duty Valves for HVAC Piping."
- Q. Install unions in piping, NPS 2 and smaller, adjacent to valves, at final connections of equipment, and elsewhere as indicated.
- R. Install flanges in piping, NPS 2-1/2 and larger, at final connections of equipment and elsewhere as indicated.
- S. Install shutoff valve immediately upstream of each dielectric fitting.
- T. Comply with requirements in Section 230516 "Expansion Fittings and Loops for HVAC Piping" for installation of expansion loops, expansion joints, anchors, and pipe alignment guides.
- U. Comply with requirements in Section 230553 "Identification for HVAC Piping and Equipment" for identifying piping.
- V. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 230517 "Sleeves and Sleeve Seals for HVAC Piping."
- W. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Section 230517 "Sleeves and Sleeve Seals for HVAC Piping."
- X. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Section 230518 "Escutcheons for HVAC Piping."

3.3 DIELECTRIC FITTING INSTALLATION

- A. Install dielectric fittings in piping at connections of dissimilar metal piping and tubing.
- B. Dielectric Fittings for NPS 2 and Smaller: Use dielectric unions.
- C. Dielectric Fittings for NPS 2-1/2 to NPS 4: Use dielectric flange kits.
- D. Dielectric Fittings for NPS 5 and Larger: Use dielectric flange kits.

3.4 HANGERS AND SUPPORTS

- A. Comply with requirements in Section 230529 "Hangers and Supports for HVAC Piping and Equipment" for hanger, support, and anchor devices. Comply with the following requirements for maximum spacing of supports.
- B. Comply with requirements in Section 230548 "Vibration and Seismic Controls for HVAC Piping and Equipment" for seismic restraints.
- C. Install the following pipe attachments:

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- 1. Adjustable steel clevis hangers for individual horizontal piping less than 20 feet long.
- 2. Adjustable roller hangers and spring hangers for individual horizontal piping 20 feet or longer.
- 3. Pipe Roller: MSS SP-58, Type 44 for multiple horizontal piping 20 feet or longer, supported on a trapeze.
- 4. Spring hangers to support vertical runs.
- 5. Provide copper-clad hangers and supports for hangers and supports in direct contact with copper pipe.
- 6. On plastic pipe, install pads or cushions on bearing surfaces to prevent hanger from scratching pipe.
- D. Install hangers for steel piping with the following maximum spacing and minimum rod sizes:
 - 1. NPS 3/4: Maximum span, 7 feet.
 - 2. NPS 1: Maximum span, 7 feet.
 - 3. NPS 1-1/2: Maximum span, 9 feet.
 - 4. NPS 2: Maximum span, 10 feet.
 - 5. NPS 2-1/2: Maximum span, 11 feet.
 - 6. NPS 3 and Larger: Maximum span, 12 feet.
- E. Install hangers for drawn-temper copper piping with the following maximum spacing and minimum rod sizes:
 - 1. NPS 3/4: Maximum span, 5 feet; minimum rod size, 1/4 inch.
 - 2. NPS 1: Maximum span, 6 feet; minimum rod size, 1/4 inch.
 - 3. NPS 1-1/4: Maximum span, 6 feet; minimum rod size, 3/8 inch.
 - 4. NPS 1-1/2: Maximum span, 8 feet; minimum rod size, 3/8 inch.
 - 5. NPS 2: Maximum span, 8 feet; minimum rod size, 3/8 inch.
 - 6. NPS 2-1/2: Maximum span, 9 feet; minimum rod size, 3/8 inch.
 - 7. NPS 3 and Larger: Maximum span, 10 feet; minimum rod size, 3/8 inch.
- F. Plastic Piping Hanger Spacing: Space hangers according to pipe manufacturer's written instructions for service conditions. Avoid point loading. Space and install hangers with the fewest practical rigid anchor points.
- G. Support vertical runs at roof, at each floor, and at 10-foot intervals between floors.

3.5 PIPE JOINT CONSTRUCTION

- A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
- B. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
- C. Soldered Joints: Apply ASTM B 813, water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy complying with ASTM B 32.
- D. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter, using copper-phosphorus brazing filler metal complying with AWS A5.8/A5.8M.

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- E. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
 - 1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
 - 2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.
- F. Welded Joints: Construct joints according to AWS D10.12M/D10.12, using qualified processes and welding operators according to "Quality Assurance" Article.
- G. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.
- H. Grooved Joints: Assemble joints with coupling and gasket, lubricant, and bolts. Cut or roll grooves in ends of pipe based on pipe and coupling manufacturer's written instructions for pipe wall thickness. Use grooved-end fittings and rigid, grooved-end-pipe couplings.
- I. Mechanically Formed, Copper-Tube-Outlet Joints: Use manufacturer-recommended tool and procedure, and brazed joints.
- J. Pressure-Sealed Joints: Use manufacturer-recommended tool and procedure. Leave insertion marks on pipe after assembly.

3.6 TERMINAL EQUIPMENT CONNECTIONS

- A. Sizes for supply and return piping connections shall be the same as or larger than equipment connections.
- B. Install control valves in accessible locations close to connected equipment.
- C. Install bypass piping with globe valve around control valve. If parallel control valves are installed, only one bypass is required.
- D. Install ports for pressure gages and thermometers at coil inlet and outlet connections. Comply with requirements in Section 230519 "Meters and Gages for HVAC Piping."

3.7 CHEMICAL TREATMENT

- A. Perform an analysis of makeup water to determine type and quantities of chemical treatment needed to keep system free of scale, corrosion, and fouling, and to sustain the following water characteristics:
 - 1. pH: 9.0 to 10.5.
 - 2. "P" Alkalinity: 100 to 500 ppm.
 - 3. Boron: 100 to 200 ppm.
 - 4. Chemical Oxygen Demand: Maximum of 100 ppm. Revise this value if closed system contains glycol.
 - 5. Corrosion Inhibitor:

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- a. Sodium Nitrate: 1000 to 1500 ppm.
- b. Molybdate: 200 to 300 ppm.
- c. Chromate: 200 to 300 ppm.
- d. Sodium Nitrate Plus Molybdate: 100 to 200 ppm each.
- e. Chromate Plus Molybdate: 50 to 100 ppm each.
- 6. Soluble Copper: Maximum of 0.20 ppm.
- 7. Tolyiriazole Copper and Yellow Metal Corrosion Inhibitor: Minimum of 10 ppm.
- 8. Total Suspended Solids: Maximum of 10 ppm.
- 9. Ammonia: Maximum of 20 ppm.
- 10. Free Caustic Alkalinity: Maximum of 20 ppm.
- 11. Microbiological Limits:
 - a. Total Aerobic Plate Count: Maximum of 1000 organisms/mL.
 - b. Total Anaerobic Plate Count: Maximum of 100 organisms/mL.
 - c. Nitrate Reducers: 100 organisms/mL.
 - d. Sulfate Reducers: Maximum of zero organisms/mL.
 - e. Iron Bacteria: Maximum of zero organisms/mL.
- B. Install bypass chemical feeders in each hydronic system where indicated.
 - 1. Install in upright position with top of funnel not more than 48 inches above the floor.
 - 2. Install feeder in minimum NPS 3/4 bypass line, from main with full-size, full-port, ball valve in the main between bypass connections.
 - 3. Install NPS 3/4 pipe from chemical feeder drain to nearest equipment drain and include a full-size, full-port, ball valve.
- C. Fill system with fresh water and add liquid alkaline compound with emulsifying agents and detergents to remove grease and petroleum products from piping. Circulate solution for a minimum of 24 hours, drain, clean strainer screens, and refill with fresh water.
- D. Add initial chemical treatment and maintain water quality in ranges noted above for the first year of operation.
- E. Fill systems that have antifreeze or glycol solutions with the following concentrations:
 - 1. Hot-Water Heating Piping: Minimum of 40 percent propylene glycol.
 - 2. Glycol Cooling-Water Piping: Minimum of 40 percent propylene glycol.

3.8 FIELD QUALITY CONTROL

- A. Prepare hydronic piping according to ASME B31.9 and as follows:
 - 1. Leave joints, including welds, uninsulated and exposed for examination during test.
 - 2. Provide temporary restraints for expansion joints that cannot sustain reactions due to test pressure. If temporary restraints are impractical, isolate expansion joints from testing.
 - 3. Flush hydronic piping systems with clean water; then remove and clean or replace strainer screens.

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- 4. Isolate equipment from piping. If a valve is used to isolate equipment, its closure shall be capable of sealing against test pressure without damage to valve. Install blinds in flanged joints to isolate equipment.
- 5. Install safety valve, set at a pressure no more than one-third higher than test pressure, to protect against damage by expanding liquid or other source of overpressure during test.
- B. Perform the following tests on hydronic piping:
 - 1. Use ambient temperature water as a testing medium unless there is risk of damage due to freezing. Another liquid that is safe for workers and compatible with piping may be used.
 - 2. While filling system, use vents installed at high points of system to release air. Use drains installed at low points for complete draining of test liquid.
 - 3. Isolate expansion tanks and determine that hydronic system is full of water.
 - 4. Subject piping system to hydrostatic test pressure that is not less than 1.5 times the system's working pressure. Test pressure shall not exceed maximum pressure for any vessel, pump, valve, or other component in system under test. Verify that stress due to pressure at bottom of vertical runs does not exceed 90 percent of specified minimum yield strength or 1.7 times the "SE" value in Appendix A in ASME B31.9, "Building Services Piping."
 - 5. After hydrostatic test pressure has been applied for at least 10 minutes, examine piping, joints, and connections for leakage. Eliminate leaks by tightening, repairing, or replacing components, and repeat hydrostatic test until there are no leaks.
 - 6. Prepare written report of testing.
- C. Perform the following before operating the system:
 - 1. Open manual valves fully.
 - 2. Inspect pumps for proper rotation.
 - 3. Set makeup pressure-reducing valves for required system pressure.
 - 4. Inspect air vents at high points of system and determine if all are installed and operating freely (automatic type), or bleed air completely (manual type).
 - 5. Set temperature controls so all coils are calling for full flow.
 - 6. Inspect and set operating temperatures of hydronic equipment to specified values.
 - 7. Verify lubrication of motors and bearings.

END OF SECTION 232113

HYDRONIC PIPING SPECIALTIES SECTION 232116

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

- 1. Hydronic specialty valves.
- 2. Air-control devices.
- 3. Strainers.
- 4. Connectors.

B. Related Requirements:

1. Section 230516 "Expansion Fittings and Loops for HVAC Piping" for expansion fittings and loops.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product:
 - 1. Include construction details and material descriptions for hydronic piping specialties.
 - 2. Include rated capacities, operating characteristics, and furnished specialties and accessories.
 - 3. Include flow and pressure drop curves based on manufacturer's testing for calibrated-orifice balancing valves and automatic flow-control valves.

1.3 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1.4 QUALITY ASSURANCE

- A. Pipe Welding: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code: Section IX.
- B. Safety Valves and Pressure Vessels: Shall bear the appropriate ASME label. Fabricate and stamp air separators and expansion tanks to comply with ASME Boiler and Pressure Vessel Code: Section VIII, Division 1.

2.1 HYDRONIC SPECIALTY VALVES

A. Bronze, Calibrated-Orifice, Balancing Valves:

- 1. Body: Bronze, ball or plug type with calibrated orifice or venturi.
- 2. Ball: Brass or stainless steel.
- 3. Plug: Resin.
- 4. Seat: PTFE.
- 5. End Connections: Threaded or socket.
- 6. Pressure Gage Connections: Integral seals for portable differential pressure meter.
- 7. Handle Style: Lever, with memory stop to retain set position.
- 8. CWP Rating: Minimum 125 psig.
- 9. Maximum Operating Temperature: 250 deg F.

B. Diaphragm-Operated, Pressure-Reducing Valves: ASME labeled.

- 1. Body: Bronze or brass.
- 2. Disc: Glass and carbon-filled PTFE.
- 3. Seat: Brass.
- 4. Stem Seals: EPDM O-rings.
- 5. Diaphragm: EPT.
- 6. Low inlet-pressure check valve.
- 7. Inlet Strainer: Removable without system shutdown.
- 8. Valve Seat and Stem: Noncorrosive.
- 9. Valve Size, Capacity, and Operating Pressure: Selected to suit system in which installed, with operating pressure and capacity factory set and field adjustable.

C. Diaphragm-Operated Safety Valves: ASME labeled.

- 1. Body: Bronze or brass.
- 2. Disc: Glass and carbon-filled PTFE.
- 3. Seat: Brass.
- 4. Stem Seals: EPDM O-rings.
- 5. Diaphragm: EPT.
- 6. Wetted, Internal Work Parts: Brass and rubber.
- 7. Inlet Strainer: Removable without system shutdown.
- 8. Valve Seat and Stem: Noncorrosive.
- 9. Valve Size, Capacity, and Operating Pressure: Comply with ASME Boiler and Pressure Vessel Code: Section IV, and selected to suit system in which installed, with operating pressure and capacity factory set and field adjustable.

D. Automatic Flow-Control Valves:

- 1. Body: Brass or ferrous metal.
- 2. Flow Control Assembly, provide either of the following:
 - a. Piston and Spring Assembly: Stainless steel, tamper proof, self-cleaning, and removable.

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- b. Elastomeric Diaphragm and Polyphenylsulfone Orifice Plate: Operating ranges within 2- to 80-psig differential pressure.
- 3. Combination Assemblies: Include bonze or brass-alloy ball valve.
- 4. Identification Tag: Marked with zone identification, valve number, and flow rate.
- 5. Size: Same as pipe in which installed.
- 6. Performance: Maintain constant flow within plus or minus 10 percent regardless of system pressure fluctuations.
- 7. Minimum CWP Rating: 175 psig.
- 8. Maximum Operating Temperature: 200 deg F.

2.2 AIR-CONTROL DEVICES

A. Manual Air Vents:

- 1. Body: Bronze.
- 2. Internal Parts: Nonferrous.
- 3. Operator: Screwdriver or thumbscrew.
- 4. Inlet Connection: NPS 1/2.
- 5. Discharge Connection: NPS 1/8.
- 6. CWP Rating: 150 psig.
- 7. Maximum Operating Temperature: 225 deg F.

B. Expansion Tanks:

- 1. Tank: Welded steel, rated for 125-psig working pressure and 375 deg F maximum operating temperature, with taps in bottom of tank for tank fitting and taps in end of tank for gage glass. Tanks shall be factory tested after taps are fabricated and shall be labeled according to ASME Boiler and Pressure Vessel Code: Section VIII, Division 1.
- 2. Air-Control Tank Fitting: Cast-iron body, copper-plated tube, brass vent tube plug, and stainless-steel ball check, 100-gal. unit only; sized for compression-tank diameter. Provide tank fittings for 125-psig working pressure and 250 deg F maximum operating temperature.
- 3. Tank Drain Fitting: Brass body, nonferrous internal parts; 125-psig working pressure and 240 deg F maximum operating temperature; constructed to admit air to compression tank, drain water, and close off system.
- 4. Gage Glass: Full height with dual manual shutoff valves, 3/4-inch- diameter gage glass, and slotted-metal glass guard.

C. Buffer Tanks:

- 1. Tank: Welded steel, rated for 125-psig (860-kPa) working pressure and 375 deg F (191 deg C) maximum operating temperature, with taps in the side of tank for chilled water piping connections. Tanks shall be factory tested after taps are fabricated and shall be labeled according to ASME Boiler and Pressure Vessel Code: Section VIII, Division 1.
- 2. Air-Control Tank Fitting: Cast-iron body, copper-plated tube, brass vent tube plug. Provide tank fittings for 125-psig working pressure and 240 deg F maximum operating temperature.

3. Tank Drain Fitting: Brass body, nonferrous internal parts; 125-psig (860-kPa) working pressure and 240 deg F (116 deg C) maximum operating temperature; constructed to drain water from tank.

D. In-Line Air Separators:

- 1. Tank: One-piece cast iron with an integral weir constructed to decelerate system flow to maximize air separation.
- 2. Maximum Working Pressure: Up to 175 psig.
- 3. Maximum Operating Temperature: Up to 300 deg F.

2.3 STRAINERS

A. Y-Pattern Strainers:

- 1. Body: ASTM A126, Class B, cast iron with bolted cover and bottom drain connection.
- 2. End Connections: Threaded ends for NPS 2 and smaller; flanged ends for NPS 2-1/2 and larger.
- 3. Strainer Screen: Stainless-steel, 60-mesh strainer, or perforated stainless-steel basket.
- 4. CWP Rating: 125 psig.

2.4 CONNECTORS

- A. Stainless-Steel Bellow, Flexible Connectors:
 - 1. Body: Stainless-steel bellows with woven, flexible, bronze, wire-reinforcing protective jacket.
 - 2. End Connections: Threaded or flanged to match equipment connected.
 - 3. Performance: Capable of 3/4-inch misalignment.
 - 4. CWP Rating: 150 psig.
 - 5. Maximum Operating Temperature: 250 deg F.

PART 3 - EXECUTION

3.1 VALVE APPLICATIONS

- A. Install shutoff-duty valves at each branch connection to supply mains and at supply connection to each piece of equipment.
- B. Install calibrated-orifice, balancing valves at each branch connection to return main.
- C. Install calibrated-orifice, balancing valves in the return pipe of each heating or cooling terminal.
- D. Install check valves at each pump discharge and elsewhere as required to control flow direction.
- E. Install safety valves at hot-water generators and elsewhere as required by ASME Boiler and Pressure Vessel Code. Install drip-pan elbow on safety-valve outlet and pipe without valves to

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the outdoors; pipe drain to nearest floor drain or as indicated on Drawings. Comply with ASME Boiler and Pressure Vessel Code: Section VIII, Division 1, for installation requirements.

F. Install pressure-reducing valves at makeup-water connection to regulate system fill pressure.

3.2 HYDRONIC SPECIALTIES INSTALLATION

- A. Install manual air vents at high points in piping, at heat-transfer coils, and elsewhere as required for system air venting.
- B. Install piping from air separator, or air purger to expansion tank with a 2 percent upward slope toward tank.
- C. Install in-line air separators in pump suction. Install drain valve on air separators NPS 2 and larger.
- D. Install expansion tanks on the floor. Vent and purge air from hydronic system, and ensure that tank is properly charged with air to suit system Project requirements.

END OF SECTION 232116

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HYDRONIC PUMPS SECTION 232123

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

- 1. Close-coupled, in-line centrifugal pumps.
- 2. Split-coupled, vertical, in-line centrifugal pumps.
- 3. Close-coupled, end-suction centrifugal pumps.
- 4. Automatic condensate pump units.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of pump.
- B. Shop Drawings: For each pump.
 - 1. Show pump layout and connections.
 - 2. Include setting drawings with templates for installing foundation and anchor bolts and other anchorages.
 - 3. Include diagrams for power, signal, and control wiring.

1.3 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

PART 2 - PRODUCTS

2.1 CLOSE-COUPLED, IN-LINE CENTRIFUGAL PUMPS

- A. Description: Factory-assembled and -tested, centrifugal, overhung-impeller, close-coupled, inline pump as defined in HI 1.1-1.2 and HI 1.3; designed for installation with pump and motor shafts mounted horizontally or vertically.
- B. Capacities and Characteristics:
 - 1. Refer to drawings.
- C. Pump Construction:
 - 1. Casing: Radially split, cast iron, with threaded gage tappings at inlet and outlet, replaceable bronze wear rings, and threaded companion-flange connections.

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- 2. Impeller: ASTM B584, cast bronze; statically and dynamically balanced, keyed to shaft, and secured with a locking cap screw. For constant-speed pumps, trim impeller to match specified performance.
- 3. Pump Shaft: Stainless steel.
- 4. Seal: Mechanical seal consisting of carbon rotating ring against a ceramic seat held by a stainless-steel spring, and Viton bellows and gasket. Include water slinger on shaft between motor and seal.
- 5. Seal: Packing seal consisting of stuffing box with a minimum of four rings of graphite-impregnated braided yarn with bronze lantern ring between center two graphite rings, and bronze packing gland.
- 6. Pump Bearings: Oil lubricated; bronze-journal or thrust type.
- D. Motor: VFD compatible and rigidly mounted to pump casing.
 - 1. Comply with NEMA designation, temperature rating, service factor, and efficiency requirements for motors specified in Section 230513 "Common Motor Requirements for HVAC Equipment."
 - 2. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
 - a. Enclosure: Totally enclosed, fan cooled.
 - b. Enclosure Materials: Rolled steel.
 - c. Motor Bearings: Permanently lubricated ball bearings.
 - d. Efficiency: Premium efficient.
 - e. Service Factor: 1.15.

2.2 SPLIT-COUPLED, VERTICAL, IN-LINE CENTRIFUGAL PUMPS

- A. Description: Factory-assembled and -tested, centrifugal, overhung-impeller, close-coupled, inline pump as defined in HI 1.1-1.2 and HI 1.3; designed for installation with pump and motor shafts mounted vertically.
- B. Variable Frequency Drive (VFD):
 - 1. VFD mounted directly to motor with sensorless control.
- C. Capacities and Characteristics:
 - 1. Refer to drawings.
- D. Pump Construction:
 - 1. Casing: Radially split, cast iron, with threaded gage tappings at inlet and outlet, replaceable bronze wear rings, and threaded companion-flange connections.
 - 2. Impeller: ASTM B584, cast bronze; statically and dynamically balanced, keyed to shaft, and secured with a locking cap screw. For constant-speed pumps, trim impeller to match specified performance.
 - 3. Pump Shaft: Stainless steel.

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- 4. Seal: Mechanical seal consisting of carbon rotating ring against a ceramic seat held by a stainless-steel spring, and Viton bellows and gasket. Include water slinger on shaft between motor and seal.
- 5. Seal: Packing seal consisting of stuffing box with a minimum of four rings of graphite-impregnated braided yarn with bronze lantern ring between center two graphite rings, and bronze packing gland.
- 6. Pump Bearings: Oil lubricated; bronze-journal or thrust type.
- E. Motor: VFD compatible and rigidly mounted to pump casing.
 - 1. Comply with NEMA designation, temperature rating, service factor, and efficiency requirements for motors specified in Section 230513 "Common Motor Requirements for HVAC Equipment."
 - 2. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
 - a. Enclosure: Totally enclosed, fan cooled.
 - b. Enclosure Materials: Rolled steel.
 - c. Motor Bearings: Permanently lubricated ball bearings.
 - d. Efficiency: Premium efficient.
 - e. Service Factor: 1.15.

2.3 CLOSE-COUPLED, END-SUCTION CENTRIFUGAL PUMPS

- A. Description: Factory-assembled and -tested, centrifugal, overhung-impeller, close-coupled, end-suction pump as defined in HI 1.1-1.2 and HI 1.3; designed for installation with pump and motor shafts mounted horizontally.
- B. Capacities and Characteristics:
 - 1. Refer to drawings.
- C. Pump Construction:
 - 1. Casing: Radially split, cast iron, with replaceable bronze wear rings, drain plug at bottom and air vent at top of volute, threaded gage tappings at inlet and outlet, and flanged connections
 - 2. Impeller: ASTM B584, cast bronze; statically and dynamically balanced, keyed to shaft, and secured with a locking cap screw. For constant-speed pumps, trim impeller to match specified performance.
 - 3. Pump Shaft: Stainless steel.
 - 4. Mechanical Seal: Carbon rotating ring against a ceramic seat held by a stainless-steel spring, and Buna-N bellows and gasket. Include water slinger on shaft between motor and seal.
 - 5. Pump Bearings: Oil lubricated; bronze-journal or thrust type.
- D. Motor: VFD compatible and rigidly mounted to pump casing.

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- 1. Comply with NEMA designation, temperature rating, service factor, and efficiency requirements for motors specified in Section 230513 "Common Motor Requirements for HVAC Equipment."
- 2. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
 - a. Enclosure: Totally enclosed, fan cooled.
 - b. Enclosure Materials: Rolled steel.
 - c. Motor Bearings: Permanently lubricated ball bearings.
 - d. Efficiency: Premium efficient.
 - e. Service Factor: 1.15.

2.4 AUTOMATIC CONDENSATE PUMP UNITS

- A. Description: Packaged units with corrosion-resistant pump, plastic tank with cover, and automatic controls. Include factory- or field-installed check valve and a 72-inch minimum, electrical power cord with plug.
- B. Capacities and Characteristics:
 - 1. Refer to drawings

2.5 PUMP SPECIALTY FITTINGS

- A. Suction Diffuser:
 - 1. Angle pattern.
 - 2. 175-psig pressure rating, ductile-iron body and end cap, pump-inlet fitting.
 - 3. Bronze startup and bronze or stainless-steel permanent strainers.
 - 4. Bronze or stainless-steel straightening vanes.
 - 5. Drain plug.
 - 6. Factory-fabricated support.
- B. Triple-Duty Valve:
 - 1. Angle or straight pattern.
 - 2. 175-psig pressure rating, ductile-iron body, pump-discharge fitting.
 - 3. Drain plug and bronze-fitted shutoff, balancing, and check valve features.
 - 4. Brass gage ports with integral check valve and orifice for flow measurement.

PART 3 - EXECUTION

3.1 PUMP INSTALLATION

A. Comply with HI 1.4.

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- B. Install pumps to provide access for periodic maintenance including removing motors, impellers, couplings, and accessories.
- C. Independently support pumps and piping so weight of piping is not supported by pumps and weight of pumps is not supported by piping.
- D. Automatic Condensate Pump Units: Install units for collecting condensate and extend to open drain.

E. Equipment Mounting:

- 1. Install base-mounted pumps on cast-in-place concrete equipment base(s). Comply with requirements for equipment bases and foundations specified in Section 033000 "Cast-in-Place Concrete."
- 2. Comply with requirements for vibration isolation devices specified in Section 230548.13 "Vibration Controls for HVAC."
- F. Equipment Mounting: Install in-line pumps with continuous-thread hanger rods and elastomeric hangers of size required to support weight of in-line pumps.
 - 1. Comply with requirements for seismic-restraint devices.
 - 2. Comply with requirements for hangers and supports specified in Section 230529 "Hangers and Supports for HVAC Piping and Equipment."

3.2 ALIGNMENT

- A. Engage a factory-authorized service representative to perform alignment service.
- B. Comply with requirements in Hydronics Institute standards for alignment of pump and motor shaft. Add shims to the motor feet and bolt motor to base frame. Do not use grout between motor feet and base frame.
- C. Comply with pump and coupling manufacturers' written instructions.
- D. After alignment is correct, tighten foundation bolts evenly but not too firmly. Completely fill baseplate with nonshrink, nonmetallic grout while metal blocks and shims or wedges are in place. After grout has cured, fully tighten foundation bolts.

3.3 CONNECTIONS

- A. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Where installing piping adjacent to pump, allow space for service and maintenance.
- C. Connect piping to pumps. Install valves that are same size as piping connected to pumps.
- D. Install suction and discharge pipe sizes equal to or greater than diameter of pump nozzles.
- E. Install check valve and throttling valve with memory stop or triple-duty valve on discharge side of pumps.

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- F. Install Y-type strainer and shutoff valve on suction side of pumps.
- G. Install flexible connectors on suction and discharge sides of base-mounted pumps between pump casing and valves.
- H. Install pressure gages on pump suction and discharge or at integral pressure-gage tapping, or install single gage with multiple-input selector valve.
- I. Install check valve and gate or ball valve on each condensate pump unit discharge.
- J. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."
- K. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

END OF SECTION 232123

STEAM AND CONDENSATE HEATING PIPING - 232213 PAGE -1-

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STEAM AND CONDENSATE HEATING PIPING SECTION 23 22 13

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Low pressure steam piping.
 - 2. Low pressure steam condensate piping.
 - 3. Unions and flanges.
 - 4. Pipe hangers and supports.
 - 5. Valves.

B. Related Sections:

- 1. Section 23 07 19 HVAC Piping Insulation: Product requirements for Piping Insulation for placement by this section.
- 2. Section 23 22 16 Steam and Condensate Piping Specialties: Product and execution requirements for piping specialties used in steam piping systems.

1.2 SYSTEM DESCRIPTION

- A. Where more than one piping system material is specified, provide compatible system components and joints. Use non-conducting dielectric connections whenever jointing dissimilar metals in open systems.
- B. Provide flanges, union, and couplings at locations requiring servicing. Use unions, flanges, and couplings downstream of valves and at equipment or apparatus connections. Do not use direct welded or threaded connections to valves, equipment or other apparatus.
- C. Provide pipe hangers and supports in accordance with ASME B31.1, MSS SP 58, MSS SP 69, and MSS SP 89.
- D. Use gate valves for shut-off and to isolate equipment, part of systems, or vertical risers.
- E. Use globe valves for throttling services.
- F. Use horizontal swing check valves for vacuum breakers and for discharge of steam traps.
- G. Use 3/4 inch gate valves with cap for blow downs at strainers.
- H. Use 3/4 inch gate valves with cap for drains at main shut-off valves, low points of piping, bases of vertical risers, and at equipment.

1.3 SUBMITTALS

- A. Shop Drawings: Indicate schematic layout of steam piping system, including equipment, critical dimensions, and sizes.
- B. Product Data:

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- **SUNY OSWEGO**
 - 1. Piping: Submit data on pipe materials, fittings, and accessories. Submit manufacturers catalog information.
 - 2. Valves: Submit manufacturers catalog information with valve data and ratings for each service.
 - 3. Hangers and Supports: Submit manufacturers catalog information including load capacity.
 - C. Design Data: Indicate pipe size. Indicate load carrying capacity of trapeze, multiple pipe, and riser support hangers.
 - D. Test Reports: Indicate results of steam piping system pressure test.
 - E. Welders' Certificate: Include welders' certification of compliance with ASME Section IX.

1.4 CLOSEOUT SUBMITTALS

- A. Project Record Documents: Record actual locations of valves, heat exchangers, and accessories.
- B. Operation and Maintenance Data: Submit instructions for installation and changing components, spare parts lists, exploded assembly views.

1.5 QUALITY ASSURANCE

A. Perform Work in accordance with ASME B31.1 code for installation of piping systems and ASME Section IX for welding materials and procedures.

1.6 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum five years documented experience.
- B. Fabricator or Installer: Company specializing in performing Work of this section with minimum five years documented experience.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Accept valves on site in shipping containers with labeling in place. Inspect for damage.
- B. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
- C. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the Work, and isolating parts of completed system.

1.8 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

1.9 WARRANTY

A. Furnish five year manufacturer warranty for valves excluding packing.

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1.10 EXTRA MATERIALS

A. Furnish two packing kits for each size and valve type.

PART 2 PRODUCTS

2.1 LOW PRESSURE STEAM PIPING, ABOVE GROUND (15 PSIG MAXIMUM)

- A. Steel Pipe: ASTM A53/A53M, Schedule 40, black.
 - 1. Fittings: ASME B16.3 malleable iron Class 125, or ASTM A234/A234M forged steel Class 125.
 - 2. Joints: Threaded for pipe 2 inch and smaller; welded for pipe 2-1/2 inches and larger.

2.2 LOW PRESSURE STEAM CONDENSATE PIPING, ABOVE GROUND

- A. Steel Pipe: ASTM A53/A53M, Schedule 80, black.
 - 1. Fittings: ASME B16.3 malleable iron Class 125, or ASTM A234/A234M forged steel Class 125.
 - 2. Joints: Threaded for pipe 2 inch and smaller; welded for pipe 2-1/2 inches and larger.

2.3 UNIONS AND FLANGES

- A. Unions for Pipe 2 inches and Smaller:
 - 1. Ferrous Piping: Class 150, malleable iron, threaded.
 - 2. Dielectric Connections: Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.
- B. Flanges for Pipe 2-1/2 inches and Larger:
 - 1. Ferrous Piping: Class 250, forged steel, slip-on flanges.
 - 2. Gaskets: 1/16 inch thick preformed neoprene gaskets.

2.4 GATE VALVES

A. <u>Manufacturers:</u>

- 1. Mueller valve.
- 2. Milwaukee Valve Company.
- 3. Hammond Valve.
- 4. Nibco.
- 5. Watts Water Technologies.
- 6. Apollo valves.
- B. 2 inches, and Smaller: MSS SP 80, Class 125, bronze body, bronze trim, rising stem, threaded ends.
- C. 2-1/2 inches, and Larger: MSS SP 70, Class 125, cast iron body, bronze trim, bolted bonnet, rising stem, hand-wheel, outside screw and yoke, solid wedge disc with bronze seat rings, flanged ends. Furnish chain-wheel operators for valves 6 inches and larger mounted over 8 feet above floor.

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2.5 GLOBE VALVES

- A. Manufacturers:
 - 1. Mueller valve.
 - 2. Milwaukee Valve Company.
 - 3. Hammond Valve.
- B. 2 inches, and Smaller: MSS SP 80, Class 125, bronze body, bronze trim, hand wheel, composition disc, threaded ends.
- C. 2-1/2 inches, and Larger: MSS SP 85, Class 150, cast iron body, bronze trim, bolted bonnet, rising stem hand wheel, outside screw and yoke, flanged ends. Furnish chain-wheel operators for valves 6 inches and larger mounted over 8 feet above floor.

2.6 CHECK VALVES

- A. Horizontal Swing Check Valves:
 - 1. <u>Manufacturers:</u>
 - 1) Nibco.
 - 2) Milwaukee Valve Company.
 - 3) Hammond Valve.
 - 2. 2 inches, and Smaller: MSS SP 80, Class 150, bronze body and cap, bronze seat, teflon disc, threaded ends.
 - 3. 2-1/2 inches, and Larger: MSS SP 71, Class 250, cast iron body, bolted cap, bronze or cast iron disc, flanged ends.
- B. Spring Loaded Check Valves:
 - 1. <u>Manufacturers:</u>
 - 1) Nibco.
 - 2) Hammond Valve.
 - 2. 2 inches, and Smaller: MSS SP 80, Class 250, bronze body, in-line spring lift check, silent closing, teflon disc, integral seat, threaded ends.

2.7 PIPE HANGERS AND SUPPORTS

- A. Conform to ASME B31.1, MSS SP 58, MSS SP 69, and MSS SP 89.
- B. Hangers for Pipe Sizes 1/2 to 1-1/2 inch: Carbon steel, adjustable swivel, split ring.
- C. Hangers for Hot Pipe Sizes 2 to 4 inches: Carbon steel, adjustable, clevis.
- D. Hangers for Hot Pipe Sizes 6 inches and Larger: Adjustable steel yoke, cast iron roll, double hanger.
- E. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
- F. Multiple or Trapeze Hangers for Hot Pipe Sizes 6 inches and Larger: Steel channels with welded spacers and hanger rods, cast iron roll.

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- G. Vertical Support: Steel riser clamp.
 - H. Floor Support for Hot Pipe 4 inches and Smaller: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
 - I. Floor Support for Hot Pipe Sizes 6 inches and Larger: Adjustable cast iron roll and stand, steel screws, and concrete pier or steel support.
 - J. Copper Pipe Support: Carbon steel rings, adjustable, copper plated.
 - K. Hanger Rods: Mild steel threaded both ends, threaded one end, or continuous threaded.
 - L. Inserts: Malleable iron case of galvanized steel shell and expander plug for threaded connection with lateral adjustment, top slot for reinforcing rods, lugs for attaching to forms; size inserts to suit threaded hanger rods.

PART 3 EXECUTION

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3.1 PREPARATION

- A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
- B. Remove scale and dirt on inside and outside before assembly.
- C. Prepare piping connections to equipment with flanges or unions.
- D. Keep open ends of pipe free from scale and dirt. Protect open ends with temporary plugs or caps.
- E. After completion, fill, clean, and treat systems.

3.2 INSTALLATION - INSERTS

- A. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
- B. Provide hooked rod to concrete reinforcement section for inserts carrying pipe 4 inches and larger.

3.3 INSTALLATION - PIPE HANGERS AND SUPPORTS

- A. Install in accordance with ASME B31.9.
- B. Support horizontal piping as scheduled.
- C. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
- D. Place hangers within 12 inches of each horizontal elbow.

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- E. Use hangers with 1-1/2 inch minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
 - F. Support vertical piping at every floor. Support riser piping independently of connected horizontal piping.
 - G. Where installing several pipes in parallel and at same elevation, provide multiple pipe hangers or trapeze hangers.
 - H. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings.
 - I. Install pipe hangers and supports in accordance with Section 23 05 29.

3.4 INSTALLATION - ABOVE GROUND PIPING SYSTEMS

- A. Install steam supply and steam condensate return piping in accordance with ASME B31.1.
- B. Route piping parallel to building structure and maintain gradient.
- C. Install piping to conserve building space, and not interfere with use of space.
- D. Group piping whenever practical at common elevations.
- E. Sleeve pipe passing through partitions, walls, and floors. Refer to Section 23 05 29.
- F. Install firestopping at fire rated construction perimeters and openings containing penetrating sleeves and piping. Refer to Section 23 05 10.
- G. Install pipe identification in accordance with Section 23 05 53.
- H. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- I. Provide access where valves and fittings are not exposed.
- J. Slope steam supply piping one inch in 40 feet in direction of flow. Use eccentric reducers to maintain bottom of pipe aligned.
- K. Slope steam condensate piping one inch in 40 feet. Use eccentric reducers to maintain bottom of pipe aligned.
- L. Provide drip trap assembly at low points, risers, changes in elevation and before control valves.
- M. Run condensate lines from trap to nearest condensate receiver. Provide loop vents over trapped sections.
- N. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welds.

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- O. Prepare unfinished pipe, fittings, supports, and accessories, ready for finish painting. Refer to Section 09 91 23
 - P. Install valves with stems upright or horizontal, not inverted.
 - Q. Insulate piping; refer to Section 23 07 19.

3.5 FIELD QUALITY CONTROL

- A. Section 01 40 00 Quality Requirements: Field inspecting, testing, adjusting, and balancing.
- B. Test low pressure steam supply piping, low pressure steam condensate piping, medium and high pressure steam supply piping, medium and high pressure steam condensate piping in accordance with ASME B31.9.

3.6 SCHEDULES

A. Valve Service:

SYSTEM DESCRIPTION	SHUTOFF	THROTTLING	CHECK
Low Pressure Steam Supply and Condensate Return	Gate Valves;	Globe Valves	Horizontal Swing
	OS&Y, on 2 1/2"	OS&Y, on 2 1/2"	Check Valves, on
	and larger.	and larger.	2 1/2" and larger.

B. Pipe Hanger Spacing:

PIPE SIZE Inches	COPPER TUBING MAXIMUM HANGER SPACING Feet	STEEL PIPE MAXIMUM HANGER SPACING Feet	COPPER TUBING HANGER ROD DIAMETER Inches	STEEL PIPE HANGER ROD DIAMETER Inches
1/2	5	7	3/8	3/8
3/4	5	7	3/8	3/8
1	6	7	3/8	3/8
1-1/4	7	7	3/8	3/8
1-1/2	8	9	3/8	3/8
2	8	10	3/8	3/8
2-1/2 (Note 1)	9	11	1/2	1/2
3	10	12	1/2	1/2
4	12	14	1/2	5/8
5	13	16	1/2	5/8
6	14	17	5/8	3/4

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END OF SECTION 232213

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STEAM AND CONDENSATE PIPING SPECIALTIES SECTION 23 22 16

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

- 1. Pressure gages.
- 2. Pressure gage taps.
- 3. Strainers.
- 4. Pressure reducing valves.
- 5. Steam traps.
- 6. Steam air vents.

B. Related Sections:

1. Section 23 22 13 - Steam and Condensate Heating Piping: Execution requirements for piping connections to products specified by this section.

1.2 PERFORMANCE REQUIREMENTS

A. Steam Traps:

- 1. Select to handle minimum of two times maximum condensate load of apparatus served.
- 2. Pressure Differentials:
 - a. Low Pressure Systems (5 psi and less): 1/2 psi.
 - b. Low Pressure Systems (15 psi maximum): 2 psi.

1.3 SUBMITTALS

- A. Product Data: Submit for manufactured products and assemblies used in this Project.
 - 1. Manufacturer's data and list indicating use, operating range, total range, accuracy, and location for manufactured components.
 - 2. Submit product description, model, dimensions, component sizes, rough-in requirements, service sizes, and finishes.
 - 3. Submit schedule indicating manufacturer, model number, size, location, rated capacity, load served, and features for each piping specialty.
 - 4. Submit electrical characteristics and connection requirements.
- B. Manufacturer's Installation Instructions: Submit hanging and support methods, joining procedures, application, selection, and hookup configuration. Include pipe and accessory elevations.
- C. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.4 CLOSEOUT SUBMITTALS

- A. Project Record Documents: Record actual locations of actual locations of components and instrumentation.
- B. Operation and Maintenance Data: Submit instructions for calibrating instruments, installation instructions, assembly views, servicing requirements, lubrication instruction, and replacement parts list.

1.5 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum five years documented experience.
- B. Installer: Company specializing in performing Work of this section with minimum five years documented experience.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Accept piping specialties on site in shipping containers with labeling in place. Inspect for damage.
- B. Provide temporary protective coating on cast iron and steel valves.
- C. Protect systems from entry of foreign materials by temporary covers, caps and closures, completing sections of the work, and isolating parts of completed system until installation.

1.7 ENVIRONMENTAL REQUIREMENTS

A. Do not install instruments when areas are under construction, except rough in, taps, supports and test plugs.

1.8 FIELD MEASUREMENTS

A. Verify field measurements before fabrication.

1.9 WARRANTY

A. Furnish five year manufacturer warranty for piping specialties.

PART 2 PRODUCTS

2.1 PRESSURE GAGES

A. Manufacturers:

- 1. Trerice, Hayward, Watta, Zurn.
- 2. Substitutions: Section 01 60 00 Product Requirements.

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- B. Gage: ASME B40.1, UL 393 with bourdon tube, rotary brass movement, brass socket, front calibration adjustment, black scale on white background.
 - 1. Case: Stainless steel.
 - 2. Bourdon Tube: Type 316 stainless steel.
 - 3. Dial Size: 4 inch diameter.
 - 4. Mid-Scale Accuracy: One percent.
 - 5. Scale: Psi.

2.2 PRESSURE GAGE TAPS

A. <u>Manufacturers</u>:

- 1. Trerice, Hayward, Watta, Zurn.
- 2. Substitutions: Section 01 60 00 Product Requirements.
- B. Ball Valve: Brass 1/4 inch NPT for 250 psi.
- C. Pulsation Damper: Pressure snubber, brass with 1/4 inch NPT connections.
- D. Siphon: Stainless Steel, 1/4 inch NPT angle or straight pattern.

2.3 STRAINERS

A. Manufacturers:

- 1. NIBCO, Hayward, Keckley, Matco.
- 2. Substitutions: Section 01 60 00 Product Requirements.
- B. Size 2 inch and Smaller:
 - 1. Screwed brass or iron body for 175 psig working pressure, Y pattern with 1/32 inch stainless steel perforated screen.
- C. Size 2-1/2 inch to 4 inch:
 - 1. Flanged iron body for 175 psig working pressure, Y pattern with 3/64 inch stainless steel perforated screen.
- D. Size 5 inch and Larger:
 - 1. Flanged iron body for 175 psig working pressure, basket pattern with 1/8 inch stainless steel perforated screen.

2.4 PRESSURE REDUCING VALVES

A. Manufacturers:

- 1. Armstrong, Spirax Sarco, Spence.
- 2. Substitutions: Section 01 60 00 Product Requirements.

B. Capacities and Characteristics:

- 1. PRV-1 Steam Flow Rate: 6500 pph.
- 2. PRV-2 Steam Flow Rate: 3300 pph.
- 3. Inlet Pressure: 50 psig.
- 4. Outlet Pressure: 25 psig.

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- C. ASME labeled.
- D. Description: Pilot-actuated diaphragm type, with adjustable pressure range and positive shutoff.
- E. Body: Cast iron.
- F. End Connections: Threaded connections for valves NPS 2 (DN 50) and smaller and flanged connections for valves NPS 2-1/2 (DN 65) and larger.
- G. Trim: Hardened stainless steel.
- H. Head and Seat: Replaceable, main head stem guide fitted with flushing and pressure-arresting device cover over pilot diaphragm.
- I. Gaskets: Non-asbestos materials.

2.5 FLOAT AND THERMOSTATIC TRAPS

A. Manufacturers:

- 1. Armstrong, Spirax Sarco, Watts.
- 2. Substitutions: Section 01 60 00 Product Requirements.

B. Trap:

- 1. Construction: ASTM A126, cast iron body and bolted cover, stainless steel or bronze bellows type air vent, stainless steel or copper float, stainless steel lever and valve assembly
- 2. Rating: same as system pressure.
- 3. Features: Access to internal parts without disturbing piping, bottom drain plug.
- 4. Accessories: Gage glass with shut-off cocks.

2.6 STEAM AIR VENTS

A. Manufacturers:

- 1. Armstrong, Spirax Sarco, Watts.
- 2. Substitutions: Section 01 60 00 Product Requirements.

B. 125 psig WSP:

1. Balanced Pressure Type: Cast brass body and cover; access to internal parts without disturbing piping; stainless steel bellows, stainless steel valve and seat.

C. 225 psig WSP:

 Balanced Pressure Type: ASTM A126 cast iron body and cover; access to internal parts without disturbing piping; phosphor bronze bellows, stainless steel valve and seat. **SUNY OSWEGO**

PART 3 EXECUTION

3.1 INSTALLATION - GAGES

- A. Install pressure gages with pulsation dampers. Provide ball valve to isolate each gage. Install siphon on gages in steam systems. Extend nipples and siphons to allow clearance from insulation.
- B. Provide instruments with scale ranges selected according to service with largest appropriate scale.
- C. Install gages in locations where they are easily read from normal operating level. Install vertical to 45 degrees off vertical.
- D. Adjust gages to final angle, clean windows and lenses, and calibrate to zero.

3.2 INSTALLATION - STEAM SYSTEM SPECIALTIES

- A. Steam Traps:
 - 1. Provide minimum 3/4 inch size on steam mains and branches.
 - 2. Install with union or flanged connections at both ends.
 - 3. Provide gate valve and strainer at inlet, and gate valve and check valve at discharge.
 - 4. Provide minimum 10 inch long, line size dirt pocket between apparatus and trap.
- B. Install float and thermostatic steam traps on the following pieces of equipment:
 - 1. Heat exchangers.
 - 2. Main headers.
 - 3. Branch lines.
- C. Install pressure-reducing valves in accessible location for maintenance and inspection:
 - 1. Install bypass piping around pressure-reducing valves, with globe valve equal in size to area of pressure-reducing valve seat ring, unless otherwise indicated.
 - 2. Install gate valves on both sides of pressure-reducing valves.
 - 3. Install unions or flanges on both sides of pressure-reducing valves having threaded-or flanged-end connections, respectively.
 - 4. Install pressure gages on low-pressure side of pressure-reducing valves after the bypass connection according to Section 230519 "Meters and Gages for HVAC Piping."
 - 5. Install strainers upstream for pressure-reducing valve.
 - 6. Install safety valve downstream from pressure-reducing valve station.

3.3 PROTECTION OF INSTALLED CONSTRUCTION

- A. Section 01 77 00 Execution and Closeout Requirements: Requirements for protecting installed construction.
- B. Remove thermostatic elements from steam traps during temporary and trial usage, and until system has been operated and dirt pockets cleaned of sediment and scale.
- C. Do not install steam pressure gauges until after systems are pressure tested.

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METAL DUCTS SECTION 233113

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

- 1. Single-wall rectangular ducts and fittings.
- 2. Single-wall round ducts and fittings.
- 3. Sheet metal materials.
- 4. Sealants and gaskets.
- 5. Hangers and supports.

B. Related Sections:

- 1. Section 230593, "Testing, Adjusting, and Balancing for HVAC" for testing, adjusting, and balancing requirements for metal ducts.
- 2. Section 233300, "Air Duct Accessories" for dampers, sound-control devices, duct-mounting access doors and panels, turning vanes, and flexible ducts.

1.3 DUCT DIMENSIONS

- A. Duct dimensions shown on the drawings are nominal sizes. Where duct liners are utilized, the total duct liner thickness shall be added to the nominal duct size such that the inner duct opening dimension is no less than the nominal duct dimension shown on the drawings.
 - 1. Example: A 36 x 24 duct shown on the drawings, scheduled with a 2" thick insulation liner would need to be furnished as a 40 x 28 inch duct to account for the thickness of the liner.

1.4 PERFORMANCE REQUIREMENTS

- A. Duct Design: Duct construction, including sheet metal thicknesses, seam and joint construction, reinforcements, and hangers and supports, shall comply with SMACNA's "HVAC Duct Construction Standards Metal and Flexible" and performance requirements and design criteria indicated in "Duct Schedule" Article.
- B. Structural Performance: Duct hangers and supports shall withstand the effects of gravity loads and stresses within limits and under conditions described in SMACNA's "HVAC Duct Construction Standards Metal and Flexible".

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of the following products:
 - 1. Liners and adhesives.
 - 2. Sealants and gaskets.

B. Shop Drawings:

- 1. Fabrication, assembly, and installation, including plans, elevations, sections, components, and attachments to other work.
- 2. Factory- and shop-fabricated ducts and fittings.
- 3. Duct layout indicating sizes, configuration, liner material, and static-pressure classes. Indicate where actual duct size is increased to accommodate liner.
- 4. Elevation of top of ducts.
- 5. Dimensions of main duct runs from building grid lines.
- 6. Fittings.
- 7. Reinforcement and spacing.
- 8. Seam and joint construction.
- 9. Penetrations through fire-rated and other partitions.
- 10. Equipment installation based on equipment being used on Project.
- 11. Locations for duct accessories, including dampers, turning vanes, and access doors and panels.
- 12. Hangers and supports, including methods for duct and building attachment and vibration isolation.

1.6 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
 - 1. Duct installation in congested spaces, indicating coordination with general construction, building components, and other building services. Indicate proposed changes to duct layout.
 - 2. Suspended ceiling components.
 - 3 Structural members to which duct will be attached
 - 4. Size and location of initial access modules for acoustical tile.
 - 5. Items penetrating finished ceiling including the following:
 - a. Lighting fixtures.
 - b. Air outlets and inlets.
 - c. Speakers.
 - d. Sprinklers.
 - e. Access panels.
 - f. Perimeter moldings.

1.7 QUALITY ASSURANCE.

A. Provide Duct leakage testing, where specified in PART 2.

PART 2 - PRODUCTS

2.1 SINGLE-WALL RECTANGULAR DUCTS AND FITTINGS

- A. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards Metal and Flexible" based on indicated static-pressure class unless otherwise indicated.
- B. Transverse Joints: Select joint types and fabricate according to SMACNA's "HVAC Duct Construction Standards Metal and Flexible," Figure 2-1, "Rectangular Duct/Transverse Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards Metal and Flexible."

- C. Longitudinal Seams: Select seam types and fabricate according to SMACNA's "HVAC Duct Construction Standards Metal and Flexible," Figure 2-2, "Rectangular Duct/Longitudinal Seams," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards Metal and Flexible."
- D. Elbows, Transitions, Offsets, Branch Connections, and Other Duct Construction: Select types and fabricate according to SMACNA's "HVAC Duct Construction Standards Metal and Flexible," Chapter 4, "Fittings and Other Construction," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards Metal and Flexible."
 - 1. All mitered elbows shall be provided with double-wall airfoil style turning vanes as specified in section 233300,"Air Duct Accessories".

2.2 SINGLE-WALL ROUND DUCTS AND FITTINGS

- A. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards Metal and Flexible," Chapter 3, "Round, Oval, and Flexible Duct," based on indicated static-pressure class unless otherwise indicated.
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Lindab Inc.
 - b. SEMCO Incorporated.
 - c. Sheet Metal Connectors, Inc.
- B. Transverse Joints: Select joint types and fabricate according to SMACNA's "HVAC Duct Construction Standards Metal and Flexible," Figure 3-1, "Round Duct Transverse Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards Metal and Flexible."
 - 1. Transverse Joints in Ducts Larger Than 60 Inches in Diameter: Flanged.
- C. Longitudinal Seams: Select seam types and fabricate according to SMACNA's "HVAC Duct Construction Standards Metal and Flexible," Figure 3-2, "Round Duct Longitudinal Seams," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards Metal and Flexible."
 - 1. Fabricate round ducts larger than 90 inches in diameter with butt-welded longitudinal seams.

- 2. Fabricate flat-oval ducts larger than 72 inches in width (major dimension) with butt-welded longitudinal seams.
- D. Tees and Laterals: Select types and fabricate according to SMACNA's "HVAC Duct Construction Standards Metal and Flexible," Figure 3-5, "90 Degree Tees and Laterals," and Figure 3-6, "Conical Tees," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards Metal and Flexible."

2.3 SHEET METAL MATERIALS

- A. General Material Requirements: Comply with SMACNA's "HVAC Duct Construction Standards Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.
- B. Supply Ductwork Galvanized Sheet Steel: Comply with ASTM A 653/A 653M.
 - 1. Galvanized Coating Designation: G90.
 - 2. Finishes for Surfaces Exposed to View: Mill phosphatized.
- C. Exhaust Ductwork Aluminum sheets: Comply with ASTM B 209. Alloy 3003, H14 temper with mill finish for concealed ducts.
- D. Reinforcement Shapes and Plates: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.
 - 1. Where black- and galvanized-steel shapes and plates are used to reinforce aluminum ducts, isolate the different metals with butyl rubber, neoprene, or EPDM gasket materials.
- E. Tie Rods: Galvanized steel, 1/4-inch minimum diameter for lengths 36 inches or less; 3/8-inch minimum diameter for lengths longer than 36 inches.

2.4 SEALANT AND GASKETS

- A. General Sealant and Gasket Requirements: Surface-burning characteristics for sealants and gaskets shall be a maximum flame-spread index of 25 and a maximum smoke-developed index of 50 when tested according to UL 723; certified by an NRTL.
- B. Water-Based Joint and Seam Sealant:
 - 1. Application Method: Brush on.
 - 2. Solids Content: Minimum 65 percent.
 - 3. Shore A Hardness: Minimum 20.

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- 4. Water resistant.
- 5. Mold and mildew resistant.
- 6. VOC: Maximum 75 g/L (less water).
- 7. Maximum Static-Pressure Class: 10-inch wg, positive and negative.
- 8. Service: Indoor or outdoor.
- 9. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum sheets.
- C. Flanged Joint Sealant: Comply with ASTM C 920.
 - 1. General: Single-component, acid-curing, silicone, elastomeric.
 - 2. Type: S.
 - 3. Grade: NS.
 - 4. Class: 25.
 - 5. Use: O.
- D. Flange Gaskets: Butyl rubber, neoprene, or EPDM polymer with polyisobutylene plasticizer.

2.5 HANGERS AND SUPPORTS

- A. Hanger Rods for Noncorrosive Environments: Cadmium-plated steel rods and nuts.
- B. Hanger Rods for Corrosive Environments: Electro-galvanized, all-thread rods or galvanized rods with threads painted with zinc-chromate primer after installation.
- C. Strap and Rod Sizes: Comply with SMACNA's "HVAC Duct Construction Standards Metal and Flexible," Table 5-1, "Rectangular Duct Hangers Minimum Size," and Table 5-2, "Minimum Hanger Sizes for Round Duct."
- D. Steel Cables for Galvanized-Steel Ducts: Galvanized steel complying with ASTM A 603.
- E. Steel Cables for Stainless-Steel Ducts: Stainless steel complying with ASTM A 492.
- F. Steel Cable End Connections: Cadmium-plated steel assemblies with brackets, swivel, and bolts designed for duct hanger service; with an automatic-locking and clamping device.
- G. Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.

- H. Trapeze and Riser Supports:
 - 1. Supports for Galvanized-Steel Ducts: Galvanized-steel shapes and plates.
 - 2. Supports for Stainless-Steel Ducts: Stainless-steel shapes and plates.

PART 3 - EXECUTION

3.1 DUCT INSTALLATION

- A. Drawing plans, schematics, and diagrams indicate general location and arrangement of duct system. Indicated duct locations, configurations, and arrangements were used to size ducts and calculate friction loss for air-handling equipment sizing and for other design considerations. Install duct systems as indicated unless deviations to layout are approved on Shop Drawings and Coordination Drawings.
- B. Install ducts according to SMACNA's "HVAC Duct Construction Standards Metal and Flexible" unless otherwise indicated.
- C. Install ducts with fewest possible joints.
- D. Install factory- or shop-fabricated fittings for changes in direction, size, and shape and for branch connections.
- E. Unless otherwise indicated, install ducts vertically and horizontally, and parallel and perpendicular to building lines.
- F. Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.
- G. Install ducts with a clearance of 1 inch, plus allowance for insulation thickness.
- H. Route ducts to avoid passing through transformer vaults and electrical equipment rooms and enclosures.
- I. Where ducts pass through non-fire-rated interior partitions and exterior walls and are exposed to view, cover the opening between the partition and duct or duct insulation with sheet metal flanges of same metal thickness as the duct. Overlap openings on four sides by at least 1-1/2 inches.
- J. Protect duct interiors from moisture, construction debris and dust, and other foreign materials. Comply with SMACNA's "IAQ Guidelines for Occupied Buildings Under Construction," Appendix G, "Duct Cleanliness for New Construction Guidelines."

3.2 DUCT SEALING

- A. Seal ducts for duct static-pressure, seal classes, and leakage classes specified in "Duct Schedule" Article according to SMACNA's "HVAC Duct Construction Standards Metal and Flexible."
- B. Provide Ductwork leakage testing after sealing is completed.
 - 1. Comply with testing requirements in the 2015 International Energy Code.
 - 2. Test entire system to 1 1/2 times the duct pressure class, listed in PART 3, and measure leakage.
 - 3. Any ductwork found to leak in excess of the requirement of the specified seal class, shall be re-sealed or repaired and re-tested.

3.3 HANGER AND SUPPORT INSTALLATION

- A. Comply with SMACNA's "HVAC Duct Construction Standards Metal and Flexible," Chapter 5, "Hangers and Supports."
- B. Building Attachments: Concrete inserts, powder-actuated fasteners, or structural-steel fasteners appropriate for construction materials to which hangers are being attached.
 - 1. Where practical, install concrete inserts before placing concrete.
- C. Hanger Spacing: Comply with SMACNA's "HVAC Duct Construction Standards Metal and Flexible," Table 5-1, "Rectangular Duct Hangers Minimum Size," and Table 5-2, "Minimum Hanger Sizes for Round Duct," for maximum hanger spacing; install hangers and supports within 24 inches of each elbow and within 48 inches of each branch intersection.
- D. Hangers Exposed to View: Threaded rod and angle or channel supports.
- E. Support vertical ducts with steel angles or channel secured to the sides of the duct with welds, bolts, sheet metal screws, or blind rivets; support at each floor and at maximum intervals of 16 feet.
- F. Install upper attachments to structures. Select and size upper attachments with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

3.4 CONNECTIONS

A. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for branch, outlet and inlet, and terminal unit connections.

3.5 PAINTING

A. Paint interior of metal ducts that are visible through registers and grilles and that do not have duct liner. Apply one coat of flat, black, latex paint over a compatible galvanized-steel primer.

3.6 DUCT CLEANING

- A. Refer to Specification 018121 for additional requirements for IAQ and duct cleaning.
- B. Clean new and existing duct system(s) before testing, adjusting, and balancing.
- C. Use service openings for entry and inspection.
 - 1. Create new openings and install access panels appropriate for duct static-pressure class if required for cleaning access. Provide insulated panels for insulated or lined duct. Patch insulation and liner as recommended by duct liner manufacturer. Comply with Section 233300 "Air Duct Accessories" for access panels and doors.
 - 2. Disconnect and reconnect flexible ducts as needed for cleaning and inspection.
 - 3. Remove and reinstall ceiling to gain access during the cleaning process.

D. Particulate Collection and Odor Control:

- 1. When venting vacuuming system inside the building, use HEPA filtration with 99.97 percent collection efficiency for 0.3-micron-size (or larger) particles.
- 2. When venting vacuuming system to outdoors, use filter to collect debris removed from HVAC system, and locate exhaust downwind and away from air intakes and other points of entry into building.
- E. Clean the following components by removing surface contaminants and deposits:
 - 1. Air outlets and inlets (registers, grilles, and diffusers).
 - 2. Supply, return, and exhaust fans including fan housings, plenums (except ceiling supply and return plenums), scrolls, blades or vanes, shafts, baffles, dampers, and drive assemblies.
 - 3. Air-handling unit internal surfaces and components including mixing box, coil section, air wash systems, spray eliminators, condensate drain pans, humidifiers and dehumidifiers, filters and filter sections, and condensate collectors and drains.
 - 4. Coils and related components.
 - 5. Return-air ducts, dampers, actuators, and turning vanes except in ceiling plenums and mechanical equipment rooms.
 - 6. Supply-air ducts, dampers, actuators, and turning vanes.

7. Dedicated exhaust and ventilation components and makeup air systems.

F. Mechanical Cleaning Methodology:

- 1. Clean metal duct systems using mechanical cleaning methods that extract contaminants from within duct systems and remove contaminants from building.
- 2. Use vacuum-collection devices that are operated continuously during cleaning. Connect vacuum device to downstream end of duct sections so areas being cleaned are under negative pressure.
- 3. Use mechanical agitation to dislodge debris adhered to interior duct surfaces without damaging integrity of metal ducts, duct liner, or duct accessories.
- 4. Clean fibrous-glass duct liner with HEPA vacuuming equipment; do not permit duct liner to get wet. Replace fibrous-glass duct liner that is damaged, deteriorated, or delaminated or that has friable material, mold, or fungus growth.
- 5. Clean coils and coil drain pans according to NADCA 1992. Keep drain pan operational. Rinse coils with clean water to remove latent residues and cleaning materials; comb and straighten fins.
- 6. Provide drainage and cleanup for wash-down procedures.
- G. Antimicrobial Agents and Coatings: Apply EPA-registered anti-microbial agents to all ductwork, after cleaning is completed. Apply antimicrobial agents according to manufacturer's written instructions after removal of surface deposits and debris.
- H. Verification of System Cleanliness:
 - 1. The contractor shall demonstrate to the owner's representative that all surfaces that have been cleaned are free from non-adhered substances and debris.
 - a. This shall be demonstrated by attaching a brush to a contact vacuum and running the brush over cleaned surfaces a minimum of four times using light to moderate pressure.
 - b. If there is no significant visible difference of the surface, as determined by the owner's representative, the surface shall be considered to be clean.
 - 2. Test locations will be selected at random locations by the owner. Quantity of test locations shall be one location per 4,000 square feet of project area or five locations, whichever is greater.

3.7 START UP

A. Air Balance: Comply with requirements in Section 230593 "Testing, Adjusting, and Balancing for HVAC."

3.8 DUCT SCHEDULE

- A. Supply Ducts (Above Ceilings or in Mechanical Spaces):
 - 1. Ducts Connected to Energy Recovery Ventilators (ERV) or Heat Pumps:
 - a. Pressure Class: Positive 2-inch wg.
 - b. Minimum SMACNA Seal Class: A.
 - c. SMACNA Leakage Class for Rectangular: 6.
 - d. SMACNA Leakage Class for Round: 3.
- B. Return and Exhaust Ducts (Above Ceilings or located in Mechanical Spaces):
 - 1. Return Air and Exhaust Air Ducts (ASHRAE 62.1, Class 1 and 2) Air:
 - a. Pressure Class: Negative 4-inch wg.
 - b. Minimum SMACNA Seal Class: A.
 - c. SMACNA Leakage Class for Rectangular: 6.
 - d. SMACNA Leakage Class for Round: 6.
- C. Intermediate Reinforcement:
 - 1. Galvanized-Steel Ducts: Galvanized steel or carbon steel coated with zinc-chromate primer.

3.9 DUCT FITTINGS:

- A. Elbow Configuration:
 - 1. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards Metal and Flexible," Figure 4-2, "Rectangular Elbows."
 - a. Velocity 1,000 fpm or Lower:
 - 1) Radius Type RE 1 with minimum 0.5 radius-to-diameter ratio.
 - 2) Mitered Type RE 4 without vanes.
 - b. Velocity 1,000 to 1,500 fpm:
 - 1) Radius Type RE 1 with minimum 1.0 radius-to-diameter ratio.

- 2) Radius Type RE 3 with minimum 0.5 radius-to-diameter ratio and two vanes.
- 3) Mitered Type RE 2 with vanes complying with SMACNA's "HVAC Duct Construction Standards Metal and Flexible," Figure 4-3, "Vanes and Vane Runners," and Figure 4-4, "Vane Support in Elbows."
- c. Velocity 1,500 fpm or Higher:
 - 1) Radius Type RE 1 with minimum 1.5 radius-to-diameter ratio.
 - 2) Radius Type RE 3 with minimum 1.0 radius-to-diameter ratio and two vanes.
 - 3) Mitered Type RE 2 with vanes complying with SMACNA's "HVAC Duct Construction Standards Metal and Flexible," Figure 4-3, "Vanes and Vane Runners," and Figure 4-4, "Vane Support in Elbows."
- 2. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards Metal and Flexible," Figure 4-2, "Rectangular Elbows."
 - a. Radius Type RE 1 with minimum 1.5 radius-to-diameter ratio.
 - b. Radius Type RE 3 with minimum 1.0 radius-to-diameter ratio and two vanes.
 - c. Mitered Type RE 2 with vanes complying with SMACNA's "HVAC Duct Construction Standards Metal and Flexible," Figure 4-3, "Vanes and Vane Runners," and Figure 4-4, "Vane Support in Elbows."
- 3. Round Duct: Comply with SMACNA's "HVAC Duct Construction Standards Metal and Flexible," Figure 3-4, "Round Duct Elbows."
 - Minimum Radius-to-Diameter Ratio and Elbow Segments: Comply with SMACNA's "HVAC Duct Construction Standards Metal and Flexible," Table 3-1, "Mitered Elbows." Elbows with less than 90-degree change of direction have proportionately fewer segments.
 - 1) Velocity 1,000 fpm or Lower: 0.5 radius-to-diameter ratio and three segments for 90-degree elbow.
 - 2) Velocity 1,000 to 1,500 fpm: 1.0 radius-to-diameter ratio and four segments for 90-degree elbow.
 - 3) Velocity 1,500 fpm or Higher: 1.5 radius-to-diameter ratio and five segments for 90-degree elbow.
 - 4) Radius-to Diameter Ratio: 1.5.
 - b. Round Elbows, 12 Inches and Smaller in Diameter: Stamped or pleated.

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c. Round Elbows, 14 Inches and Larger in Diameter: Standing seam.

B. Branch Configuration:

- 1. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards Metal and Flexible," Figure 4-6, "Branch Connection."
 - a. Rectangular Main to Rectangular Branch: 45-degree entry.
 - b. Rectangular Main to Round Branch: Spin in.
- 2. Round and Flat Oval: Comply with SMACNA's "HVAC Duct Construction Standards Metal and Flexible," Figure 3-5, "90 Degree Tees and Laterals," and Figure 3-6, "Conical Tees." Saddle taps are permitted in existing duct.
 - a. Velocity 1,000 fpm or Lower: 90-degree tap.
 - b. Velocity 1,000 to 1,500 fpm: Conical tap.
 - c. Velocity 1,500 fpm or Higher: 45-degree lateral.

END OF SECTION 233113

AIR DUCT ACCESSORIES SECTION 233300

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

- 1. Manual volume dampers.
- 2. Flange connectors.
- 3. Turning vanes.
- 4. Duct-mounted access doors.
- 5. Flexible connectors.
- 6. Flexible ducts.
- 7. Duct accessory hardware.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. For duct silencers, include pressure drop and dynamic insertion loss data. Include breakout noise calculations for high transmission loss casings.
- B. Shop Drawings: For duct accessories. Include plans, elevations, sections, details and attachments to other work.
 - 1. Detail duct accessories fabrication and installation in ducts and other construction. Include dimensions, weights, loads, and required clearances; and method of field assembly into duct systems and other construction. Include the following:
 - a. Special fittings.
 - b. Manual volume damper installations.
 - c. Control-damper installations.
 - d. Wiring Diagrams: For power, signal, and control wiring.

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1.4 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which ceiling-mounted access panels and access doors required for access to duct accessories are shown and coordinated with each other, using input from Installers of the items involved.
- B. Source quality-control reports.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For air duct accessories to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 ASSEMBLY DESCRIPTION

- A. Comply with NFPA 90A, "Installation of Air Conditioning and Ventilating Systems," and with NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems."
- B. Comply with SMACNA's "HVAC Duct Construction Standards Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.

2.2 MATERIALS

- A. Galvanized Sheet Steel: Comply with ASTM A 653/A 653M.
 - 1. Galvanized Coating Designation: G90.
 - 2. Exposed-Surface Finish: Mill phosphatized.
- B. Reinforcement Shapes and Plates: Galvanized-steel reinforcement where installed on galvanized sheet metal ducts; compatible materials for aluminum and stainless-steel ducts.
- C. Tie Rods: Galvanized steel, 1/4-inch minimum diameter for lengths 36 inches or less; 3/8-inch minimum diameter for lengths longer than 36 inches.

2.3 MANUAL VOLUME DAMPERS

A. Low-Leakage, Steel, Manual Volume Dampers:

- 1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. Nailor Industries Inc.
 - b. Pottorff.
 - c. Ruskin Company.
- 2. Comply with AMCA 500-D testing for damper rating.
- 3. Low-leakage rating, with linkage outside airstream, and bearing AMCA's Certified Ratings Seal for both air performance and air leakage.
- 4. Suitable for horizontal or vertical applications.
- 5. Frames:
 - a. Hat shaped.
 - b. 0.094-inch-thick, galvanized sheet steel.
 - c. Mitered and welded corners.
 - d. Flanges for attaching to walls and flangeless frames for installing in ducts.
- 6. Blades:
 - a. Multiple or single blade.
 - b. Parallel- or opposed-blade design.
 - c. Stiffen damper blades for stability.
 - d. Galvanized, roll-formed steel, 0.064 inch thick.
- 7. Blade Axles: Stainless steel.
- 8. Bearings:
 - a. Oil-impregnated bronze.
 - b. Dampers in ducts with pressure classes of 3-inch wg or less shall have axles full length of damper blades and bearings at both ends of operating shaft.
- 9. Blade Seals: Neoprene.
- 10. Jamb Seals: Cambered stainless steel.
- 11. Tie Bars and Brackets: Galvanized steel.

12. Accessories:

a. Include locking device to hold single-blade dampers in a fixed position without vibration.

2.4 FLANGE CONNECTORS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
- B. Description: roll-formed, factory-fabricated, slide-on transverse flange connectors, gaskets, and components.
- C. Material: Galvanized steel.
- D. Gage and Shape: Match connecting ductwork.

2.5 TURNING VANES

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Ductmate Industries, Inc.
 - 2. METALAIRE, Inc.
 - 3. SEMCO Incorporated.
 - 4. Ward Industries, Inc.; a division of Hart & Cooley, Inc.
- B. Manufactured Turning Vanes for Metal Ducts: Curved blades of galvanized sheet steel; support with bars perpendicular to blades set; set into vane runners suitable for duct mounting.
 - 1. Acoustic Turning Vanes: Fabricate airfoil-shaped aluminum extrusions with perforated faces and fibrous-glass fill.
- C. General Requirements: Comply with SMACNA's "HVAC Duct Construction Standards Metal and Flexible"; Figures 4-3, "Vanes and Vane Runners," and 4-4, "Vane Support in Elbows."
- D. Vane Construction: Double wall.

2.6 DUCT-MOUNTED ACCESS DOORS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Ductmate Industries, Inc.
 - 2 Nailor Industries Inc

- 3. Pottorff.
- 4. Ward Industries, Inc.; a division of Hart & Cooley, Inc.
- B. Duct-Mounted Access Doors: Fabricate access panels according to SMACNA's "HVAC Duct Construction Standards Metal and Flexible"; Figures 7-2, "Duct Access Doors and Panels," and 7-3, "Access Doors Round Duct."
 - 1. Door:
 - a. Double wall, rectangular.
 - b. Galvanized sheet metal with insulation fill and thickness as indicated for duct pressure class.
 - c. Vision panel.
 - d. Hinges and Latches: 1-by-1-inchbutt or piano hinge and cam latches.
 - e. Fabricate doors airtight and suitable for duct pressure class.
 - 2. Frame: Galvanized sheet steel, with bend-over tabs and foam gaskets.
 - 3. Number of Hinges and Locks:
 - a. Access Doors Less Than 12 Inches Square: No hinges and two sash locks.
 - b. Access Doors up to 18 Inches Square: Two hinges and two sash locks.
 - c. Access Doors up to 24 by 48 Inches: Continuous and two compression latches.
 - d. Access Doors Larger Than 24 by 48 Inches: Four hinges and two compression latches with outside and inside handles.

2.7 FLEXIBLE CONNECTORS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Ductmate Industries, Inc.
 - 2. Ventfabrics, Inc.
 - 3. Ward Industries, Inc.; a division of Hart & Cooley, Inc.
- B. Materials: Flame-retardant or noncombustible fabrics.
- C. Coatings and Adhesives: Comply with UL 181, Class 1.

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- D. Metal-Edged Connectors: Factory fabricated with a fabric strip 3-1/2 inches wide attached to two strips of 2-3/4-inch-wide, 0.028-inch-thick, galvanized sheet steel sheets. Provide metal compatible with connected ducts.
- E. Indoor System, Flexible Connector Fabric: Glass fabric double coated with neoprene.
 - 1. Minimum Weight: 26 oz./sq. yd..
 - 2. Tensile Strength: 480 lbf/inch in the warp and 360 lbf/inch in the filling.
 - 3. Service Temperature: Minus 40 to plus 200 deg F.
- F. Thrust Limits: Combination coil spring and elastomeric insert with spring and insert in compression, and with a load stop. Include rod and angle-iron brackets for attaching to fan discharge and duct.
 - 1. Frame: Steel, fabricated for connection to threaded rods and to allow for a maximum of 30 degrees of angular rod misalignment without binding or reducing isolation efficiency.
 - 2. Outdoor Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
 - 3. Minimum Additional Travel: 50 percent of the required deflection at rated load.
 - 4. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
 - 5. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
 - 6. Elastomeric Element: Molded, oil-resistant rubber or neoprene.
 - 7. Coil Spring: Factory set and field adjustable for a maximum of 1/4-inch movement at start and stop.

2.8 FLEXIBLE DUCTS

- A. <u>Basis-of-Design Product</u>: Subject to compliance with requirements, provide Flexmaster, Model 6M-R6, or comparable product by one of the following:
 - 1. Flexmaster U.S.A., Inc.
 - 2. Novaflex.
 - 3. Buckley.
- B. Insulated, Flexible Duct: UL 181, Class 1 and complying with NFPA 90A and 90B.

- 1. Core Material: Spun-bound nylon, supported by helically wound, galvanized steel wire; with non-fibrous (100% porous) acoustical insulation.
 - a. The fabric shall be mechanically fastened to the steel helix without the use of adhesive.
 - b. The core shall maintain its free area and a center line radius of 1.0 or better.
- 2. Pressure Rating: 6-inch wg positive and 4-inch wg negative.
- 3. Maximum Air Velocity: 5,000 fpm.
- 4. Temperature Range: Minus 10 to plus 180 deg F.
- 5. Thermal Insulation:
 - a. Type: Flexible fiberglass.
 - b. R-value: Comply with ASHRAE/IESNA 90.1; Provide minimum R-8.
 - c. Jacket: Aluminized vapor-barrier film having a permeance of not greater than 0.05 perms when tested in accordance with ASTM E 96, procedure A.
- 6. Minimum Acoustic Performance:
 - a. The insertion loss (dB) of a 6 foot, straight length of duct when tested in accordance with ASTM E 477 at a velocity of 1000 feet per minute shall be at least:

Size	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	dBA
6" Dia.	19	25	28	30	31	26	20	28
8" Dia.	26	27	27	31	32	27	21	30
10" Dia.	21	27	25	32	39	24	23	29
12" Dia.	2	26	24	31	31	20	21	26

C. Flexible Duct Connectors:

1. Clamps: Stainless-steel band with cadmium-plated hex screw to tighten band with a worm-gear action in sizes3 through 18 inches, to suit duct size.

2.9 DUCT ACCESSORY HARDWARE

A. Instrument Test Holes: Cast iron or cast aluminum to suit duct material, including screw cap and gasket. Size to allow insertion of pitot tube and other testing instruments and of length to suit duct-insulation thickness.

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B. Adhesives: High strength, quick setting, neoprene based, waterproof, and resistant to gasoline and grease.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install duct accessories according to applicable details in SMACNA's "HVAC Duct Construction Standards Metal and Flexible."
- B. Install duct accessories of materials suited to duct materials; use galvanized-steel accessories in galvanized-steel ducts, and stainless-steel accessories in stainless-steel ducts.
- C. Install control dampers at inlet of exhaust fans or exhaust ducts as close as possible to exhaust fan unless otherwise indicated.
- D. Install volume dampers at points on supply, return, and exhaust systems where branches extend from larger ducts.
 - 1. Install steel volume dampers in steel ducts.
- E. Set dampers to fully open position before testing, adjusting, and balancing.
- F. Install test holes at fan inlets and outlets and elsewhere as indicated.
- G. Install duct access doors on sides of ducts to allow for inspecting, adjusting, and maintaining accessories and equipment at the following locations:
 - 1. On both sides of duct coils.
 - 2. Upstream and downstream from duct filters.
 - 3. At outdoor-air intakes and mixed-air plenums.
 - 4. At drain pans and seals.
 - 5. Downstream from manual volume dampers, control dampers, backdraft dampers, and equipment.
 - 6. At each change in direction and at maximum 50-foot spacing.
 - 7. Upstream and downstream from turning vanes.
 - 8. Control devices requiring inspection.
 - 9. Elsewhere as indicated.
- H. Install access doors with swing against duct static pressure.

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- I. Access Door Sizes:
 - 1. One-Hand or Inspection Access: 8 by 5 inches.
 - 2. Two-Hand Access: 12 by 6 inches.
 - 3. Head and Hand Access: 18 by 10 inches.
 - 4. Head and Shoulders Access: 21 by 14 inches.
 - 5. Body Access: 25 by 14 inches.
 - 6. Body plus Ladder Access (for air intake plenums): 25 by 17 inches.
- J. Label access doors according to Section 230553 "Identification for HVAC Piping and Equipment" to indicate the purpose of access door.
- K. Install flexible connectors to connect ducts to equipment. Use Asbestos-free materials.
- L. Connect terminal units to supply ducts with flexible connector.
- M. Connect diffusers to ducts with 5'-0" length of flexible duct, meeting the acoustical and thermal performance, specified herein.
- N. In areas where plenum return is shown, all return grilles shall be provided with an acoustical return air kit consisting of a flexible duct, fastened to the ceiling, as detailed on the drawings.
- O. Install duct test holes where required for testing and balancing purposes.

3.2 FIELD QUALITY CONTROL

- A. Tests and Inspections:
 - 1. Operate dampers to verify full range of movement.
 - 2. Inspect locations of access doors and verify that purpose of access door can be performed.
 - 3. Inspect turning vanes for proper and secure installation.
 - 4. Operate remote damper operators to verify full range of movement of operator and damper.

END OF SECTION 233300

SECTION 233423 - HVAC POWER VENTILATORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

- 1. Utility set fans.
- 2. Centrifugal ventilators roof downblast.
- 3. Centrifugal ventilators roof upblast and sidewall.
- 4. Sidewall propeller fans.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings:
 - 1. Include plans, elevations, sections, and attachment details.
 - 2. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 - 3. Include diagrams for power, signal, and control wiring.
 - 4. Design Calculations: Calculate requirements for selecting vibration isolators [and seismic restraints].
- C. Delegated-Design Submittal: For unit hangars and supports indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
 - 1. Design Calculations: Calculate requirements for selecting vibration isolators[and seismic restraints] and for designing vibration isolation bases.

1.4 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Floor plans, reflected ceiling plans, and other details, or BIM model, drawn to scale and coordinated with all building trades.
- B. Seismic Qualification Data: For fans, accessories, and components, from manufacturer.

C. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Unusual Service Conditions
 - 1. Base fan-performance ratings on the following:
 - a. Ambient Temperature: <Insert deg F (deg C)>.
 - b. Altitude: < Insert feet (m)> above sea level.
 - c. Humidity: <Insert wet bulb deg F (deg C)>.
 - d. <Insert conditions>.
- B. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design vibration isolation[and seismic restraints], including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
- C. Seismic Performance: HVAC power ventilators shall withstand the effects of earthquake motions determined according to [ASCE/SEI 7] < Insert requirement>.
 - 1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified[and the unit will be fully operational after the seismic event]."
 - 2. Component Importance Factor: [1.5] [1.0].
 - 3. < Insert requirements for Component Amplification Factor and Component Response Modification Factor>.
- D. Capacities and Characteristics:
 - 1. Airflow: <**Insert cfm (L/s)**>.
 - 2. External Static Pressure: < Insert inches wg (Pa)>.
 - 3. Fan Diameter: < Insert inches (mm)>.
 - 4. Drive Type: [Direct] [Belt].
 - 5. Fan rpm: <**Insert number**>.
 - 6. Tip Speed: <Insert fpm (m/s)>.
 - 7. Sound: **Insert number**> sones.
 - 8. Curb Height: <Insert inches (mm)>.
 - 9. Damper: [Backdraft] [Motorized] [None].
 - 10. Brake Horsepower: <**Insert number**>.
 - 11. Motor Size: <Insert number> hp.
 - 12. Motor rpm: <**Insert number**>.

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- 13. Motor Enclosure: [Open dripproof] [Totally enclosed, fan cooled] [Explosion-proof].
- 14. Electrical Characteristics:
 - a. Volts: <Insert number> V.
 - b. Phase: [Single] [Poly].
 - c. Hertz: [60] < Insert number >.
- 15. Accessories: < Insert accessory description >.

2.2 UTILITY SET FANS

- A. Manufacturers: Subject to compliance with requirements, [provide products by one of the following] [available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following]:
- B. <u>Basis-of-Design Product</u>: Subject to compliance with requirements, provide [product indicated on Drawings] <Insert manufacturer's name; product name or designation> or comparable product by one of the following:
 - 1. Aerovent; a division of Twin City Fan Companies, Ltd.
 - 2. American Coolair Corporation.
 - 3. Ammerman; Millennium Equipment.
 - 4. Breidert Air Products.
 - 5. <u>Carnes Company</u>.
 - 6. Delhi Industries Inc.
 - 7. Hartzell Fan Incorporated.
 - 8. JencoFan.
 - 9. Loren Cook Company.
 - 10. Madison Manufacturing.
 - 11. New York Blower Company (The).
 - 12. PennBarry.
 - 13. Quietaire Inc.
 - 14. Trane; a business of American Standard Companies.
 - 15. <Insert manufacturer's name>.
- C. Housing: Fabricated of [galvanized] steel with side sheets fastened with a deep lock seam or welded to scroll sheets.
 - 1. Housing Discharge Arrangement: Adjustable to eight standard positions.
- D. Fan Wheels: Single-width, single inlet; welded to cast-iron or cast-steel hub and spun-steel inlet cone, with hub keyed to shaft.
 - 1. Blade Materials: [Steel] [Aluminum].
 - 2. Blade Type: [Backward inclined] [Forward curved] [Airfoil].
 - 3. Spark-Resistant Construction: AMCA 99, Type [A] [B] [C].
- E. Fan Shaft: Turned, ground, and polished steel; keyed to wheel hub.

- F. Shaft Bearings: Prelubricated and sealed, self-aligning, pillow-block-type ball bearings with ABMA 9, [L_{50} of 200,000 hours] [L_{10} of 80,000 hours] <Insert life>.
 - 1. Extend grease fitting to accessible location outside of unit.

G. Belt Drives:

- 1. Factory mounted, with final alignment and belt adjustment made after installation
- 2. Service Factor Based on Fan Motor Size: [1.5] [1.4] [1.3] [1.2].
- 3. Motor Pulleys: Adjustable pitch for use with motors through [5] < Insert value > hp; fixed pitch for use with larger motors. Select pulley so pitch adjustment is at the middle of adjustment range at fan design conditions.
- 4. Belts: Oil resistant, nonsparking, and nonstatic; matched sets for multiple belt drives.
- 5. Belt Guards: Fabricate of steel for motors mounted on outside of fan cabinet.

H. Accessories:

- 1. Inlet and Outlet: Flanged.
- 2. Companion Flanges: Rolled flanges for duct connections of same material as housing.
- 3. Backdraft Dampers: Gravity actuated with counterweight and interlocking aluminum blades with felt edges in steel frame installed on fan discharge.
- 4. Access Door: Gasketed door in scroll with latch-type handles.
- 5. Scroll Dampers: Single-blade damper installed at fan scroll top with adjustable linkage.
- 6. Inlet Screens: Removable wire mesh.
- 7. Drain Connections: NPS 3/4 (DN 20) threaded coupling drain connection installed at lowest point of housing.
- 8. Weather Hoods: Weather resistant with stamped vents over motor and drive compartment.
- 9. Discharge Dampers: Assembly with [parallel] [opposed] blades constructed of two plates formed around and to shaft, channel frame, sealed ball bearings, with blades linked outside of airstream to single control lever of same material as housing.
- 10. Variable Inlet Vanes: With blades supported at both ends with two permanently lubricated bearings of same material as housing. Variable mechanism terminating in single control lever with control shaft for double-width fans.
- 11. Speed Controller: Solid-state control to reduce speed from 100 to less than 50 percent.

I. Capacities and Characteristics:

- 1. Airflow: <Insert cfm (L/s)>.
- 2. External Static Pressure: < Insert inches wg (Pa)>.
- 3. Fan Diameter: <Insert inches (mm)>.
- 4. Wheel Type: [Backward inclined] [Forward curved] [Airfoil].
- 5. Class: [I] [II] [III].
- 6. Drive Arrangement: [Direct] [Belt].
- 7. Fan rpm: <**Insert value**>.
- 8. Outlet Velocity: <Insert fpm (m/s)>.
- 9. Brake Horsepower: <**Insert value**>.
- 10. Motor Size: <Insert value> hp.
- 11. Electrical Characteristics:

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- a. Volts: <Insert value>.
- b. Phase: <**Insert value**>.
- c. Hertz: <Insert value>.
- 12 Vibration Isolators:
 - a. Type: [Spring isolators] [Restrained spring isolators] <Insert type>.
 - b. Static Deflection: < Insert inches (mm)>.
- 13. Spark Arrestance Class: [A] [B] [C].

2.3 CEILING-MOUNTED VENTILATORS

- A. < Double click here to find, evaluate, and insert list of manufacturers and products. >
- B. Housing: Steel, lined with acoustical insulation.
- C. Fan Wheel: Centrifugal wheels directly mounted on motor shaft. Fan shrouds, motor, and fan wheel removable for service.
- D. Back-draft damper: Integral.
- E. Grille: [Plastic] [Stainless steel] [Aluminum] [Painted aluminum], louvered grille with flange on intake and thumbscrew or spring retainer attachment to fan housing.
- F. Electrical Requirements: Junction box for electrical connection on housing and receptacle for motor plug-in.
- G. Accessories:
 - 1. Variable-Frequency Motor Controller: Solid-state control to reduce speed from 100 to less than 50 percent.
 - 2. Manual Starter Switch: Single-pole rocker switch assembly with cover and pilot light.
 - 3. Time-Delay Switch: Assembly with single-pole rocker switch, timer, and cover plate.
 - 4. Motion Sensor: Motion detector with adjustable shutoff timer.
 - 5. Ceiling Radiation Damper: Fire-rated assembly with ceramic blanket, stainless steel springs, and fusible link.
 - 6. Filter: Washable aluminum to fit between fan and grille.
 - 7. Isolation: Rubber-in-shear vibration isolators.
 - 8. Manufacturer's standard roof jack or wall cap, and transition fittings.

2.4 CENTRIFUGAL VENTILATORS - ROOF DOWNBLAST

- A. Housing: Downblast; removable [spun-aluminum dome top and outlet baffle] [extruded-aluminum rectangular top] [galvanized-steel, mushroom-domed top] [spun aluminum]; square, one-piece aluminum base with venturi inlet cone.
- B. Fan Wheels: Aluminum hub and wheel with backward-inclined blades[; sparkproof construction].

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C. Belt Drives:

- 1. Resiliently mounted to housing.
- 2. Fan Shaft: Turned, ground, and polished steel; keyed to wheel hub.
- 3. Shaft Bearings: Permanently lubricated, permanently sealed, self-aligning ball bearings.
- 4. Fan Pulleys: Cast iron or cast steel with split, tapered bushing; dynamically balanced at factory.
- 5. Motor Pulleys: Adjustable pitch for use with motors through [5] < Insert number > hp. Select pulley so pitch adjustment is at the middle of adjustment range at fan design conditions. Provide fixed pitch for use with motors larger than [5] < Insert number > hp.
- 6. Fan and motor isolated from exhaust airstream.

D. Accessories:

- 1. Variable-Frequency Motor Controller: Solid-state control to reduce speed from 100 to less than 50 percent.
- 2. Disconnect Switch: Nonfusible type, with thermal-overload protection mounted [inside] [outside] fan housing, factory wired through an internal aluminum conduit.
- 3. Bird Screens: Removable, 1/2-inch (13-mm) mesh, aluminum or brass wire.
- 4. Dampers: Counterbalanced, parallel-blade, backdraft dampers mounted in curb base; factory set to close when fan stops.
- 5. Motorized Dampers: Parallel-blade dampers mounted in curb base with electric actuator; wired to close when fan stops.
- 6. Spark-resistant, all-aluminum wheel construction.
- 7. Mounting Pedestal: Galvanized steel with removable access panel.
- E. Prefabricated Roof Curbs: Galvanized steel; mitered and welded corners; 1-1/2-inch- (40-mm-) thick, rigid, fiberglass insulation adhered to inside walls; and 1-1/2-inch (40-mm) wood nailer. Size as required to suit roof opening and fan base.
 - 1. Configuration: [Self-flashing without a cant strip, with mounting flange] [Built-in cant and mounting flange] [Built-in raised cant and mounting flange] [Manufactured to accommodate roof slope].
 - 2. Overall Height: [8 inches (200 mm)] [9-1/2 inches (240 mm)] [12 inches (300 mm)] [16 inches (400 mm)] [18 inches (450 mm)].
 - 3. Sound Curb: Curb with sound-absorbing insulation.
 - 4. Hinged sub-base to provide access to damper or as cleanout for grease applications.
 - 5. Burglar Bars: [1/2-inch- (13-mm-)] [5/8-inch- (16-mm-)] [3/4-inch- (19-mm-)] thick steel bars welded in place to form 6-inch (150-mm) squares.
 - 6. Pitch Mounting: Manufacture curb for roof slope.
 - 7. Metal Liner: Galvanized steel.
 - 8. Mounting Pedestal: Galvanized steel with removable access panel.

2.5 CENTRIFUGAL VENTILATORS - ROOF UPBLAST OR SIDEWALL

A. Configuration: Centrifugal [roof upblast] [roof upblast, kitchen] [sidewall] ventilator.

- B. Housing: Removable [spun-aluminum dome top and outlet baffle] [extruded-aluminum rectangular top] [galvanized-steel, mushroom-domed top] [spun aluminum]; square, one-piece aluminum base with venturi inlet cone.
 - 1. Upblast Units: Provide spun-aluminum discharge baffle to direct discharge air upward, with rain and snow drains.
 - 2. [Provide grease collector.]
- C. Fan Wheels: Aluminum hub and wheel with backward-inclined blades[; sparkproof construction].
- D. Belt Drives:
 - 1. Resiliently mounted to housing.
 - 2. Fan Shaft: Turned, ground, and polished steel; keyed to wheel hub.
 - 3. Shaft Bearings: Permanently lubricated, permanently sealed, self-aligning ball bearings; minimum ABMA9, [L(10) of 100,000 hours] < Insert life >.
 - 4. Fan Pulleys: Cast iron or cast steel with split, tapered bushing; dynamically balanced at factory.
 - 5. Motor Pulleys: Adjustable pitch for use with motors through [5] <Insert number> hp. Select pulley so pitch adjustment is at the middle of adjustment range at fan design conditions. Provide fixed pitch for use with motors larger than [5] <Insert number> hp.
 - 6. Fan and motor isolated from exhaust airstream.

E. Accessories:

- 1. Variable-Frequency Motor Controller: Solid-state control to reduce speed from 100 to less than 50 percent.
- 2. Disconnect Switch: Nonfusible type, with thermal-overload protection mounted [inside] [outside] fan housing, factory wired through an internal aluminum conduit.
- 3. Bird Screens: Removable, 1/2-inch (13-mm) mesh, aluminum or brass wire.
- 4. Dampers: Counterbalanced, parallel-blade, backdraft dampers mounted in curb base; factory set to close when fan stops.
- 5. Motorized Dampers: Parallel-blade dampers mounted in curb base with electric actuator; wired to close when fan stops.
- 6. Spark-resistant, all-aluminum wheel construction.
- 7. Mounting Pedestal: Galvanized steel with removable access panel.
- 8. Wall Mount Adapter: Attach wall-mounted fan to wall.
- 9. Grease Hood Kitchen Exhaust: UL 762 listed for grease-laden air exhaust.
- F. Prefabricated Roof Curbs: Galvanized steel; mitered and welded corners; 1-1/2-inch- (40-mm-) thick, rigid, fiberglass insulation adhered to inside walls; and 1-1/2-inch (40-mm) wood nailer. Size as required to suit roof opening and fan base.
 - 1. Configuration: [Self-flashing without a cant strip, with mounting flange] [Built-in cant and mounting flange] [Built-in raised cant and mounting flange] [Manufactured to accommodate roof slope].

- G. Prefabricated Kitchen Exhaust Roof Curbs: Galvanized steel; mitered and welded corners; ventilation openings on all sides to ventilate curb interstitial space. Size as required to suit roof opening and fan base.
 - 1. Configuration: [Self-flashing without a cant strip, with mounting flange] [Built-in cant and mounting flange] [Built-in raised cant and mounting flange] [manufactured to accommodate roof slope].
 - 2. Overall Height: [8 inches (200 mm)] [9-1/2 inches (240 mm)] [12 inches (300 mm)] [16 inches (400 mm)] [18 inches (450 mm)].
 - 3. Sound Curb: Curb with sound-absorbing insulation[and galvanized metal liner].
 - 4. Hinged sub-base to provide access to damper or as cleanout for grease applications.
 - 5. Burglar Bars: [1/2-inch- (13-mm-)] [5/8-inch- (16-mm-)] [3/4-inch- (19-mm-)] thick steel bars welded in place to form 6-inch (150-mm) squares.
 - 6. Pitch Mounting: Manufacture curb for roof slope.
 - 7. Metal Liner: Galvanized steel.
 - 8. Mounting Pedestal: Galvanized steel with removable access panel.
 - 9. Vented Curb: For kitchen exhaust; 12-inch- (300-mm-) high galvanized steel; unlined, with louvered vents in vertical sides.
 - 10. NFPA 96 code requirements for commercial cooking operations.
 - 11. Kitchen Hood Exhaust: UL 762 listed for grease-laden air.

2.6 SIDEWALL PROPELLER FANS

- A. Housing: Galvanized-steel sheet with flanged edges and integral orifice ring, with baked-enamel finish coat applied after assembly.
- B. Fan Wheels: Formed-steel blades riveted to heavy-gauge steel spider bolted to cast-iron hub.
- C. Fan Wheel: Replaceable, [cast] [extruded]-aluminum, airfoil blades fastened to cast-aluminum hub; factory set pitch angle of blades.
- D. Fan Drive: Direct-drive motor mounted in airstream, factory wired to disconnect switch located on outside of fan housing.
- E. Fan Drive:
 - 1 Belt drive
 - 2. Resiliently mounted to housing.
 - 3. Statically and dynamically balanced.
 - 4. Selected for continuous operation at maximum rated fan speed and motor horsepower, with final alignment and belt adjustment made after installation.
 - 5. Extend grease fitting to accessible location outside of unit.
 - 6. Service Factor Based on Fan Motor Size: 1.4.
 - 7. Fan Shaft: Turned, ground, and polished steel; keyed to wheel hub.
 - 8. Shaft Bearings: Permanently lubricated, permanently sealed, self-aligning ball bearings.
 - a. Ball-Bearing Rating Life: ABMA 9, [L(10) of 100,000 hours] < Insert life>.
 - 9. Pulleys: Cast iron with split, tapered bushing; dynamically balanced at factory.

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- 10. Motor Pulleys: Adjustable pitch for use with motors through [5] <insert value> hp; fixed pitch for use with larger motors. Select pulley so pitch adjustment is at the middle of adjustment range at fan design conditions.
- 11. Belts: Oil resistant, nonsparking, and nonstatic; matched sets for multiple belt drives.
- 12. Belt Guards: Fabricate of steel for motors mounted on outside of fan cabinet.

F. Accessories:

- 1. Disconnect Switch: Nonfusible type, with thermal-overload protection mounted inside fan housing, factory wired through an internal aluminum conduit.
- 2. Dampers: Counterbalanced, parallel-blade, backdraft dampers factory set to close when fan stops.
- 3. Motorized Dampers: Parallel-blade dampers with electric actuator wired to close when fan stops.
- 4. Motor-Side Back Guard: Galvanized steel, complying with OSHA specifications, removable for maintenance.
- 5. Wall Sleeve: Galvanized steel to match fan and accessory size.
- 6. Weathershield Hood: Galvanized steel to match fan and accessory size.
- 7. Weathershield Front Guard: Galvanized steel with expanded metal screen.

2.7 MOTORS

- A. Comply with NEMA designation, temperature rating, service factor, and efficiency requirements for motors specified in Section 230513 "Common Motor Requirements for HVAC Equipment."
 - 1. Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.

2.8 SOURCE QUALITY CONTROL

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by an NRTL, and marked for intended location and application.
- B. AMCA Certification: Fans shall comply with AMCA 11 and bear the AMCA-Certified Ratings Seal.
- C. Fan Sound Ratings: Comply with AMCA 311, and label fans with the AMCA-Certified Ratings Seal. Sound ratings shall comply with AMCA 301. The fans shall be tested according to AMCA 300.
- D. Fan Performance Ratings: Comply with AMCA 211 and label fans with AMCA-Certified Rating Seal. The fans shall be tested for air performance flow rate, fan pressure, power, fan efficiency, air density, speed of rotation, and fan efficiency according to AMCA 210/ASHRAE 51.
- E. Operating Limits: Classify according to AMCA 99.

F. UL Standards: Power ventilators shall comply with UL 705. Power ventilators for use for restaurant kitchen exhaust shall also comply with UL 762.

PART 3 - EXECUTION

3.1 INSTALLATION OF HVAC POWER VENTILATORS

- A. Install power ventilators level and plumb.
- B. Equipment Mounting:
 - 1. Install power ventilators on cast-in-place concrete equipment base(s). Comply with requirements for equipment bases and foundations specified in [Section 033000 "Cast-in-Place Concrete."] [Section 033053 "Miscellaneous Cast-in-Place Concrete."]
 - 2. Comply with requirements for vibration isolation and seismic-control devices specified in Section 230548 "Vibration and Seismic Controls for HVAC."
 - 3. Comply with requirements for vibration isolation devices specified in Section 230548.13 "Vibration Controls for HVAC."
- C. Secure roof-mounted fans to roof curbs with zinc-plated hardware. See Section 077200 "Roof Accessories" for installation of roof curbs.
- D. Ceiling Units: Suspend units from structure; use steel wire or metal straps.
- E. Support suspended units from structure using threaded steel rods and [elastomeric hangers] [spring hangers] [spring hangers with vertical-limit stops] <Insert device> having a static deflection of [1 inch (25 mm)] <Insert value>. Vibration-control devices are specified in [Section 230548 "Vibration and Seismic Controls for HVAC."] [Section 230548.13 "Vibration Controls for HVAC."]
- F. Install units with clearances for service and maintenance.
- G. Label units according to requirements specified in Section 230553 "Identification for HVAC Piping and Equipment."

3.2 DUCTWORK CONNECTIONS

A. Drawings indicate general arrangement of ducts and duct accessories. Make final duct connections with flexible connectors. Flexible connectors are specified in Section 233300 "Air Duct Accessories."

3.3 ELECTRICAL CONNECTIONS

A. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

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- B. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."
- C. Install electrical devices furnished by manufacturer, but not factory mounted, according to NFPA 70 and NECA 1.
 - 1. Nameplate shall be laminated acrylic or melamine plastic signs, as specified in Section 260553 "Identification for Electrical Systems."
 - 2. Nameplate shall be laminated acrylic or melamine plastic signs with a black background and engraved white letters at least 1/2 inch (13 mm) high.

3.4 CONTROL CONNECTIONS

- A. Install control and electrical power wiring to field-mounted control devices.
- B. Connect control wiring according to Section 260523 "Control-Voltage Electrical Power Cables."

3.5 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- B. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- C. Perform tests and inspections [with the assistance of a factory-authorized service representative].
- D. Tests and Inspections:
 - 1. Verify that shipping, blocking, and bracing are removed.
 - 2. Verify that unit is secure on mountings and supporting devices and that connections to ducts and electrical components are complete. Verify that proper thermal-overload protection is installed in motors, starters, and disconnect switches.
 - 3. Verify that there is adequate maintenance and access space.
 - 4. Verify that cleaning and adjusting are complete.
 - 5. Disconnect fan drive from motor, verify proper motor rotation direction, and verify fan wheel free rotation and smooth bearing operation. Reconnect fan drive system, align and adjust belts, and install belt guards.
 - 6. Adjust belt tension.
 - 7. Adjust damper linkages for proper damper operation.
 - 8. Verify lubrication for bearings and other moving parts.
 - 9. Verify that manual and automatic volume control and fire and smoke dampers in connected ductwork systems are in fully open position.
 - 10. Disable automatic temperature-control operators, energize motor and adjust fan to indicated rpm, and measure and record motor voltage and amperage.
 - 11. Shut unit down and reconnect automatic temperature-control operators.
 - 12. Remove and replace malfunctioning units and retest as specified above.

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- E. Test and adjust controls and safeties. Controls and equipment will be considered defective if they do not pass tests and inspections.
- F. Prepare test and inspection reports.

3.6 ADJUSTING

- A. Adjust damper linkages for proper damper operation.
- B. Adjust belt tension.
- C. Comply with requirements in Section 230593 "Testing, Adjusting, and Balancing for HVAC" for testing, adjusting, and balancing procedures.
- D. Replace fan and motor pulleys as required to achieve design airflow.
- E. Lubricate bearings.

3.7 DEMONSTRATION

A. [Engage a factory-authorized service representative to train] [Train] Owner's maintenance personnel to adjust, operate, and maintain centrifugal fans.

END OF SECTION 233423

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SECTION 233713.23 - REGISTERS AND GRILLES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

- 1. Adjustable blade face registers.
- 2. Fixed face registers.

B. Related Requirements:

- 1. Section 233300 "Air Duct Accessories" for fire and smoke dampers and volume-control dampers not integral to registers and grilles.
- 2. Section 233713.13 "Air Diffusers" for various types of air diffusers.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 REGISTERS

- A. Adjustable Blade Face Register (Refer to drawings):
 - 1. Material: Steel or Aluminum, as scheduled on drawings.
 - 2. Finish: Baked enamel, white.
 - 3. Face Blade Arrangement: Horizontal; spaced 1/2 inch apart.
 - 4. Core Construction: Removable.
 - 5. Rear-Blade Arrangement: Vertical spaced 1/2 inch apart.
 - 6. Frame: 1 inch wide.
 - 7. Mounting: As scheduled on drawings.
 - 8. Damper Type: Adjustable opposed blade
 - 9. Accessories: Rear-blade gang operator.

B. Fixed Face Register (Refer to drawings):

- 1. Material: Steel or Aluminum, as scheduled on drawings.
- 2. Finish: Baked enamel, white.
- 3. Face Blade Arrangement: Horizontal; spaced 1/2 inch apart.
- 4. Core Construction: Removable.
- 5. Frame: 1 inch wide.
- Mounting: As scheduled on drawings.

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- 7. Damper Type: Adjustable opposed blade8. Accessories: Rear-blade gang operator.
- **PART 3 EXECUTION**

3.1 INSTALLATION

- A. Install registers level and plumb.
- B. Outlets and Inlets Locations: Drawings indicate general arrangement of ducts, fittings, and accessories. Air outlet and inlet locations have been indicated to achieve design requirements for air volume, noise criteria, airflow pattern, throw, and pressure drop. Make final locations where indicated, as much as practical. For units installed in lay-in ceiling panels, locate units in the center of panel. Where architectural features or other items conflict with installation, notify Architect for a determination of final location.
- C. Install registers with airtight connections to ducts and to allow service and maintenance of dampers, air extractors, and fire dampers.

3.2 ADJUSTING

A. After installation, adjust registers to air patterns indicated, or as directed, before starting air balancing.

END OF SECTION 233713.23

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HEAT EXCHANGERS FOR HVAC SECTION 235700

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes shell-and-tube heat exchangers.

1.3 DEFINITIONS

A. TEMA: Tubular Exchanger Manufacturers Association.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include rated capacities, operating characteristics, and furnished specialties and accessories.
- B. Shop Drawings: Signed and sealed by a qualified professional engineer. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 - 1. Design Calculations: Calculate requirements for selecting seismic restraints and for designing bases.
 - 2. Base Details: Detail fabrication including anchorages and attachments to structure and to supported equipment.
- C. Delegated-Design Submittal: Details and design calculations for seismic restraints for heat exchangers.

1.5 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Equipment room, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
 - 1. Tube-removal space.
 - 2. Structural members to which heat exchangers will be attached.

- B. Seismic Qualification Certificates: For heat exchanger, accessories, and components, from manufacturer.
- C. Product Certificates: For each type of shell-and-tube heat exchanger. Documentation that shell-and-tube heat exchangers comply with "TEMA Standards."
- D. Source quality-control reports.
- E. Field quality-control reports.
- F. Sample Warranty: For manufacturer's warranty.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For heat exchangers to include in emergency, operation, and maintenance manuals.

1.7 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of domestic-water heat exchangers that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures including heat exchanger, storage tank, and supports.
 - b. Faulty operation of controls.
 - c. Deterioration of metals, metal finishes, and other materials beyond normal use.
 - 2. Warranty Periods: From date of Substantial Completion.
 - a. Shell-and-Tube, Domestic-Water Heat Exchangers:
 - 1) Tube Coil: One year.
 - 2) Other Components: One year.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design seismic restraints for heat exchangers.
- B. Seismic Performance: Heat exchangers shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

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- 1. The term "withstand" means "the unit will remain in place without separation of any parts when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."
- 2. Component Importance Factor is 1.0.

2.2 SHELL-AND-TUBE HEAT EXCHANGERS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Armstrong Pumps, Inc.
 - 2. <u>ITT Corporation; Bell & Gossett.</u>
 - 3. <u>TACO Incorporated.</u>
- B. Description: Packaged assembly of tank, heat-exchanger coils, and specialties.
- C. Construction:
 - 1. Fabricate and label heat exchangers to comply with ASME Boiler and Pressure Vessel Code, Section VIII, "Pressure Vessels," Division 1.
 - 2. Fabricate and label shell-and-tube heat exchangers to comply with "TEMA Standards."
- D. Configuration: U-tube with removable bundle.
- E. Shell Materials: Steel.
- F. Head:
 - 1. Materials: Fabricated steel with removable cover.
 - 2. Flanged and bolted to shell.
- G. Tube:
 - 1. Copper tubes.
 - 2. Tube diameter is determined by manufacturer based on service.
- H. Baffles: Steel.
- I. Piping Connections: Factory fabricated of materials compatible with heat-exchanger shell. Attach tappings to shell before testing and labeling.
 - 1. NPS 2 and Smaller: Threaded ends according to ASME B1.20.1.
 - 2. NPS 2-1/2 and Larger: Flanged ends according to ASME B16.5 for steel and stainless-steel flanges and according to ASME B16.24 for copper and copper-alloy flanges.
- J. Support Saddles:
 - 1. Fabricated of material similar to shell.
 - 2. Fabricate foot mount with provision for anchoring to support.

DORMITORY AUTHORITY OF THE STATE OF NEW YORK FUNNELLE HALL BATHROOM RENOVATIONS HEAT EXCHANGERS FOR HVAC - 235700 SUNY OSWEGO PAGE -4-

- 3. Fabricate attachment of saddle supports to pressure vessel with reinforcement strong enough to resist heat-exchanger movement during seismic event when heat-exchanger saddles are anchored to building structure.
- K. Capacities and Characteristics:
 - a. Refer to Drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas for compliance with requirements for installation tolerances and for structural rigidity, strength, anchors, and other conditions affecting performance of heat exchangers.
- B. Examine roughing-in for heat-exchanger piping to verify actual locations of piping connections before equipment installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 SHELL-AND-TUBE HEAT-EXCHANGER INSTALLATION

- A. Equipment Mounting: Install heat exchangers on cast-in-place concrete equipment base(s). Comply with requirements for equipment bases specified in Section 033000 "Cast-in-Place Concrete."
 - 1. Coordinate sizes and locations of concrete bases with actual equipment provided.
 - 2. Construct bases to withstand, without damage to equipment, seismic force required by code.
 - 3. Construct concrete bases 4 inches high and extend base not less than 6 inches in all directions beyond the maximum dimensions of heat exchangers unless otherwise indicated or unless required for seismic anchor support.
 - 4. Minimum Compressive Strength: 5000 psi at 28 days.
 - 5. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of concrete base.
 - 6. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base, and anchor into structural concrete floor.
 - 7. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - 8. Install anchor bolts to elevations required for proper attachment to supported equipment.
- B. Install heat exchangers on saddle supports.
- C. Heat-Exchanger Supports: Use factory-fabricated steel cradles and supports specifically designed for each heat exchanger.

DORMITORY AUTHORITY OF THE STATE OF NEW YORK FUNNELLE HALL BATHROOM RENOVATIONS HEAT EXCHANGERS FOR HVAC - 235700 SUNY OSWEGO PAGE -5-

- 3.3 FIELD QUALITY CONTROL
 - A. Perform the following tests and inspections with the assistance of a factory-authorized service representative:
 - 1. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
 - 2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
 - B. Heat exchanger will be considered defective if it does not pass tests and inspections.
 - C. Prepare test and inspection reports.

3.4 CLEANING

A. After completing system installation, including outlet fitting and devices, inspect exposed finish. Remove burrs, dirt, and construction debris and repair damaged finishes.

3.5 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain heat exchangers.

END OF SECTION 235700

AIR-COOLED, SCROLL WATER CHILLERS - 23642313

AIR-COOLED, SCROLL WATER CHILLERS SECTION 236423 1

PART 1 - GENERAL

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1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes packaged, air-cooled, electric-motor-driven, scroll water chillers.

1.3 DEFINITIONS

- A. BAS: Building automation system.
- B. COP: Coefficient of performance. The ratio of the rate of heat removal to the rate of energy input using consistent units for any given set of rating conditions.
- C. DDC: Direct digital control.
- D. EER: Energy-efficiency ratio. The ratio of the cooling capacity given in Btu/h to the total power input given in watts at any given set of rating conditions.
- E. IPLV: Integrated part-load value. A single-number part-load efficiency figure of merit for a single chiller calculated per the method defined by AHRI 550/590 and referenced to AHRI standard rating conditions.
- F. I/O: Input/output.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Complete set of manufacturer's prints of water chiller assemblies, control panels, sections and elevations, and unit isolation. Include the following:
 - 1. Assembled unit dimensions.
 - 2. Weight and load distribution.
 - 3. Required clearances for maintenance and operation.
 - 4. Size and location of piping and wiring connections.
 - 5. Diagrams for power, signal, and control wiring.

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SUNY OSWEGO1.5 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings.
- B. Certificates: For certification required in "Quality Assurance" Article.
- C. Seismic Qualification Data: Certificates, for water chillers, accessories, and components, from manufacturers.
- D. Installation instructions.
- E. Source quality-control reports.
- F. Startup service reports.
- G. Sample Warranty: For special warranty.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For each water chiller to include in emergency, operation, and maintenance manuals.

1.7 QUALITY ASSURANCE

A. AHRI Certification: Certify chiller according to AHRI 590 certification program.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Ship water chillers from the factory fully charged with refrigerant and filled with oil.
- B. Package water chiller for export shipping.

1.9 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of water chillers that fail in materials or workmanship within specified warranty period.
 - 1. Extended warranties include, but are not limited to, the following:
 - a. Complete compressor and drive assembly including refrigerant and oil charge.
 - b. Parts only.
 - 2. Warranty Period: Five years from date of Substantial Completion.

AIR-COOLED, SCROLL WATER CHILLERS - 23642313 PAGE -3-

SUNY OSWEGO

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Scroll water chillers shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
 - 1. The term "withstand" means "the unit will remain in place without separation of any parts when subjected to the seismic forces specified.
 - 2. Component Importance Factor: 1.0.
- B. Site Altitude: Chiller shall be suitable for altitude at which installed without affecting performance indicated. Make adjustments to affected chiller components to account for site altitude.
- C. AHRI Rating: Rate water chiller performance according to requirements in AHRI 550/590.
- D. ASHRAE Compliance: ASHRAE 15 for safety code for mechanical refrigeration.
- E. ASHRAE/IES 90.1 Compliance: Applicable requirements in ASHRAE/IES 90.1, Section 6 "Heating, Ventilating, and Air-Conditioning."
- F. ASME Compliance: Fabricate and stamp water chiller heat exchangers to comply with ASME Boiler and Pressure Vessel Code.
- G. Comply with NFPA 70.
- H. Comply with requirements of UL 1995, "Heating and Cooling Equipment," and include label by a qualified testing agency showing compliance.
- I. Operation Following Loss of Normal Power:
 - 1. Equipment, associated factory- and field-installed controls, and associated electrical equipment and power supply connected to backup power system shall automatically return equipment and associated controls to the operating state occurring immediately before loss of normal power without need for manual intervention by an operator when power is restored either through a backup power source, or through normal power if restored before backup power is brought on-line.
 - 2. See drawings for equipment served by backup power systems.
 - 3. Provide means and methods required to satisfy requirement even if not explicitly indicated.

J. Outdoor Installations:

- 1. Chiller shall be suitable for outdoor installation indicated. Provide adequate weather protection to ensure reliable service life over a 25-year period with minimal degradation due to exposure to outdoor ambient conditions.
- 2. Chillers equipped to provide safe and stable operation while achieving performance indicated when operating at extreme outdoor temperatures encountered by the

AIR-COOLED, SCROLL WATER CHILLERS - 23642313

SUNY OSWEGOinstallation. Review historical weather database and provide equipment that can operate at extreme outdoor temperatures recorded over past 20 year period.

2.2 MANUFACTURERS

A. Motivair, Carrier, Daikin, Trane.

2.3 MANUFACTURED UNITS

- A. Description: Factory-assembled and run-tested water chiller complete with compressor(s), compressor motors and motor controllers, evaporator, condenser with fans, electrical power, controls, pump package and indicated accessories.
- B. Fabricate water chiller mounting base with reinforcement strong enough to resist water chiller movement during a seismic event when water chiller is anchored to field support structure.
- C. Sound-reduction package shall have the following:
 - 1. Acoustic enclosure around compressors.
 - 2. Reduced-speed fans with acoustic treatment.
 - 3. Designed to reduce sound level without affecting performance.

2.4 CABINET

- A. Base: Galvanized-steel base extending the perimeter of water chiller. Secure frame, compressors, and evaporator to base to provide a single-piece unit.
- B. Frame: Rigid galvanized-steel frame secured to base and designed to support cabinet, condenser, control panel, and other chiller components not directly supported from base.
- C. Casing: Galvanized steel.
- D. Finish: Baked epoxy scratch resistant finish.

2.5 COMPRESSOR-DRIVE ASSEMBLIES

A. Compressors:

- 1. Description: Positive-displacement direct drive with hermetically sealed casing.
- 2. Each compressor provided with suction and discharge service valves, crankcase oil heater, and suction strainer.
 - a. For multiple compressor assemblies, it is acceptable to isolate each compressor assembly in lieu of each compressor.
- 3. Operating Speed: Nominal 3600 rpm for 60-Hz applications.
- 4. Capacity Control: On-off compressor cycling.

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- a. Digital compressor unloading is an acceptable alternative to achieve capacity control.
- 5. Oil Lubrication System: Automatic pump with strainer, sight glass, filling connection, filter with magnetic plug or removable magnet in sump, and initial oil charge.
 - a. Manufacturer's other standard methods of providing positive lubrication are acceptable in lieu of an automatic pump.
- 6. Vibration Isolation: Mount individual compressors on in-shear vibration isolators.

B. Compressor Motors:

- 1. Hermetically sealed and cooled by refrigerant suction gas.
- 2. High-torque, two-pole induction type with inherent thermal-overload protection on each phase.

C. Compressor Motor Controllers:

1. Across the Line: NEMA ICS 2, Class A, full voltage, nonreversing.

2.6 REFRIGERATION

- A. Refrigerant: R-410A. Classified as Safety Group A1 according to ASHRAE 34.
- B. Refrigerant Compatibility: Parts exposed to refrigerants shall be fully compatible with refrigerants, and pressure components shall be rated for refrigerant pressures.
- C. Refrigerant Circuit: Each circuit shall include a thermal-expansion valve, refrigerant charging connections, a hot-gas muffler, compressor suction and discharge shutoff valves, a liquid-line shutoff valve, a replaceable-core filter-dryer, a sight glass with moisture indicator, a liquid-line solenoid valve, and an insulated suction line.
- D. Refrigerant Isolation: Factory install positive shutoff isolation valves in the compressor discharge line and the refrigerant liquid-line to allow the isolation and storage of the refrigerant charge in the chiller condenser.
 - 1. For multiple compressor assemblies, it is acceptable to isolate each compressor assembly in each circuit in lieu of each compressor.

E. Pressure Relief Device:

- 1. Comply with requirements in ASHRAE 15, ASHRAE 147, and applicable portions of ASME Boiler and Pressure Vessel Code: Section VIII, Division 1.
- 2. Select and configure pressure relief devices to protect against corrosion and inadvertent release of refrigerant.
- 3. ASME-rated, spring-loaded, pressure relief valve; single- or multiple-reseating type. Pressure relief valve(s) shall be provided for each heat exchanger.

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2.7 EVAPORATOR

- A. Stainless steel, brazed-plate design.
- B. Brazed Plate:
 - 1. Direct-expansion, single-pass, brazed-plate design.
 - 2. Type stainless-steel construction.
 - 3. Code Compliance: Tested according to ASME Boiler and Pressure Vessel Code.
 - 4. Fluid Nozzles: Terminate with mechanical-coupling end connections for connection to field piping. Furnish flange adapters to mate to flanged piping.
 - 5. Inlet Strainer: Factory-furnished strainer for field installation in supply piping to evaporator. Manufacturer has option to factory install strainer.
- C. Flow Switch: Factory-furnished and -installed, flow switch wired to chiller operating controls.
- D. Heater: Factory-installed and -wired electric heater with integral controls designed to protect the evaporator to minus 20 deg.

2.8 AIR-COOLED CONDENSER

- A. Coil(s) with integral subcooling on each circuit.
- B. Integrated economizer coil for free cooing.
 - 1. PLC control.
 - 2. Motorized 3-way valve for proportional switching between coils.
 - 3. Ambient temperature monitoring.
 - 4. Inlet and outlet water temperature monitoring.
- C. Copper Tube with Plate Fin Coils:
 - 1. Construct coils of copper tubes mechanically bonded to aluminum fins.
- D. Aluminum Microchannel Coils:
 - 1. Series of flat tubes containing a series of multiple, parallel-flow microchannels layered between refrigerant header manifolds.
 - 2. Single- or multiple-pass arrangement.
 - 3. Construct fins, tubes, and header manifolds of aluminum alloy treated with a corrosion-resistant coating.
- E. Corrosion-Resistant Coating: Coat coils with corrosion-resistant coating after fabrication.
- F. Hail Protection: Provide condenser coils with louvers, baffles, or hoods to protect against hail damage.

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- G. Fans: Direct-drive propeller type with statically and dynamically balanced fan blades, arranged for vertical air discharge.
- H. Fan Motors: ECM motors with sealed and permanently lubricated bearings, and having built-in overcurrent- and thermal-overload protection.
 - 1. Overcurrent- and thermal-overload protection not integral to motor is acceptable if provided with chiller electrical power package.
- I. Fan Guards: Removable steel safety guards with corrosion-resistant PVC coating.

2.9 CHILLED-WATER HYDRONIC PACKAGE

- A. Factory-furnished and installed hydronic package consisting of the following:
 - 1. Expansion Tank: Replaceable bladder type.
 - 2. Storage Tank: Insulated stainless-steel tank with drain and vent connections; with capacity indicated.
 - 3. Piping: Copper tube or carbon-steel pipe.
 - 4. Strainers: Y-type at suction side of each pump.
 - 5. Valves:

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- a. Ball- or butterfly-style valves for isolation and balancing.
- b. Drain valves to be positioned to drain isolated sections of pipe and equipment.
- c. Option to use combination valves.
- 6. Hydronic Specialties:
 - a. Air Vents: Manual air vents located and arranged to vent air from high points and locations capable of trapping air.
 - b. Test Plugs: Located to measure pressure difference across each pump and strainer.
 - c. Pump Package: In-Line centrifugal pumps, shut-off valves, check valves and balancing valves sized to provide flow and pressure required for entire chilled water loop serving IT Closet fan-coil units.
- B. Hydronic package rated for same pressure as evaporator.
- C. Pressure and leak tested before apply insulation.
- D. Insulation on hydronic package shall match evaporator.
- E. Heater: Factory-installed and -wired electric heater with integral controls designed to protect the condenser to minus 20 deg F.

2.10 INSULATION

A. Closed-cell, flexible, elastomeric thermal insulation complying with ASTM C 534/C 534M, Type I for tubular materials and Type II for sheet materials.

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- 1. Thickness: 5/8 inch.
- B. Adhesive: As recommended by insulation manufacturer.
- C. Factory-applied insulation over all cold surfaces of chiller capable of forming condensation. Components shall include, but not be limited to, evaporator, evaporator water boxes including nozzles, refrigerant suction pipe from evaporator to compressor, cold surfaces of compressor, refrigerant-cooled motor, and auxiliary piping.

2.11 ELECTRICAL

- A. Factory installed and wired, and functionally tested at factory before shipment.
- B. Factory-installed and -wired switches, motor controllers, transformers, disconnect and other electrical devices necessary shall provide a single-point field power connection to water chiller.
- C. House in a unit-mounted, NEMA 250, Type 3R enclosure with hinged access door with lock and key or padlock and key.
- D. Wiring shall be numbered and color-coded to match wiring diagram.
- E. Factory wiring shall be located outside of an enclosure in a metal raceway. Terminal connections shall be made with not more than a 24-inch length of liquidtight conduit.
- F. Field power interface shall be to NEMA KS 1, heavy-duty, nonfused disconnect switch. Minimum SCCR according to UL 508 shall be as required by electrical power distribution system.
- G. Each motor shall have branch power circuit and controls with one of the following disconnecting means having SCCR to match main disconnecting means:
 - 1. NEMA KS 1, heavy-duty, fusible switch with rejection-type fuse clips rated for fuses. Select and size fuses to provide Type 2 protection according to IEC 60947-4-1.
 - 2. NEMA KS 1, heavy-duty, nonfusible switch.
 - 3. UL 489, motor-circuit protector (circuit breaker) with field-adjustable, short-circuit trip coordinated with motor locked-rotor amperes.
- H. Each motor shall have overcurrent protection.
- I. Overload relay sized according to UL 1995, or an integral component of water chiller control microprocessor.
- J. Phase-Failure and Undervoltage: Solid-state sensing with adjustable settings.
- K. Power Factor Correction: Capacitors to correct power factor to [0.90] [0.95] < Insert value > at full load.
- L. Controls Transformer: Unit-mounted transformer with primary and secondary fuses and sized with enough capacity to operate electrical load plus spare capacity.

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M. Control Relays: Auxiliary and adjustable time-delay relays, or an integral to water chiller microprocessor.

N. Service Receptacle:

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- 1. Unit-mounted, 120-V GFI duplex receptacle.
- 2. Power receptacle from chiller internal electrical power wiring.
- O. Indicate the following for water chiller electrical power supply:
 - 1. Current, phase to phase, for all three phases.
 - 2. Voltage, phase to phase and phase to neutral for all three phases.
 - 3. Three-phase real power (kilowatts).
 - 4. Three-phase reactive power (kilovolt amperes reactive).
 - 5. Power factor.
 - 6. Running log of total power versus time (kilowatt hours).
 - 7. Fault log, with time and date of each.

2.12 CONTROLS

- A. Factory installed and wired, and functionally tested at factory before shipment.
- B. Standalone, microprocessor based, with all memory stored in nonvolatile memory so that reprogramming is not required on loss of electrical power.
- C. Enclosure: Share enclosure with electrical power devices or provide a separate enclosure of matching construction.
- D. Operator Interface: Keypad or pressure-sensitive touch screen. Multiple-character, digital display. Display the following:
 - 1. Date and time.
 - 2. Operating or alarm status.
 - 3. Operating hours.
 - 4. Outside-air temperature if required for chilled-water reset.
 - 5. Temperature and pressure of operating set points.
 - 6. Chilled-water entering and leaving temperatures.
 - 7. Refrigerant pressures in evaporator and condenser.
 - 8. Saturation temperature in evaporator and condenser.
 - 9. No cooling load condition.
 - 10. Elapsed time meter (compressor run status).
 - 11. Pump status.
 - 12. Antirecycling timer status.
 - 13. Percent of maximum motor amperage.
 - 14. Current-limit set point.
 - 15. Number of compressor starts.
 - 16. Alarm history with retention of operational data before unit shutdown.
 - 17. Superheat.
- E. Control Functions:

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 1. Manual or automatic startup and shutdown time schedule.
 - 2. Capacity control based on evaporator leaving-fluid temperature.
 - 3. Capacity control compensated by rate of change of evaporator entering-fluid temperature.
 - 4. Chilled-water entering and leaving temperatures, control set points, and motor load limit. Chilled-water leaving temperature shall be reset based on return-water temperature.
 - 5. Current limit and demand limit.
 - 6. External water chiller emergency stop.
 - 7. Antirecycling timer.
 - 8. Automatic lead-lag switching.
 - 9. General alarm.
 - 10. Anti-freeze alarm.
 - 11. Compressor overload alarm.
 - 12. Probe failure alarm.
 - F. Manual-Reset Safety Controls: The following conditions shall shut down water chiller and require manual reset:
 - 1. Low evaporator pressure or high condenser pressure.
 - 2. Low chilled-water temperature.
 - 3. Refrigerant high pressure.
 - 4. High or low oil pressure.
 - 5. High oil temperature.
 - 6. Loss of chilled-water flow.
 - 7. Control device failure.
 - G. BAS System Interface: Factory-install hardware and software to enable system to monitor, control, and display chiller status and alarms.
 - 1. Hardwired I/O Points:
 - a. Monitoring: On/off status, common trouble alarm, electrical power demand (kilowatts), electrical power consumption (kilowatt hours), return water temperature, supply water temperature.
 - b. Control: On/off operation, chilled-water discharge temperature set-point adjustment.
 - 2. Communication Interface: ASHRAE 135 (BACnet) communication interface shall enable control system operator to remotely control and monitor the water chiller from an operator workstation. Control features and monitoring points displayed locally at water chiller control panel shall be available through DDC system for HVAC.
 - H. Factory-installed wiring outside of enclosures shall be in NFPA 70-complaint raceway. Make terminal connections with liquidtight conduit.

2 13 ACCESSORIES

- A. Factory-furnished spring isolators with seismic restraints for field installation.
 - 1. Spring Deflection: 1 inch.

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- 2.14 SOURCE QUALITY CONTROL
 - A. Perform functional test of water chillers before shipping.
 - B. Factory performance test water chillers, before shipping, according to AHRI 550/590.
 - 1. Test the following conditions:
 - a. Design conditions indicated.
 - b. AHRI 550/590 part-load points.
 - 2. Notify Owner 7 days in advance of testing.
 - C. Factory test and inspect evaporator according to ASME Boiler and Pressure Vessel Code: Section VIII, Division 1. Stamp with ASME label.
 - D. For water chillers located outdoors, rate sound power level according to AHRI 370 procedure.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Before water chiller installation, examine roughing-in for equipment support, anchor-bolt sizes and locations, piping, controls, and electrical connections to verify actual locations, sizes, and other conditions affecting water chiller performance, maintenance, and operations.
 - 1. Water chiller locations indicated on Drawings are approximate. Determine exact locations before roughing-in for piping, controls, and electrical connections.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 WATER CHILLER INSTALLATION

- A. Install water chillers on support structure indicated.
- B. Equipment Mounting:
 - 1. Comply with requirements for vibration isolation and seismic-control devices specified in Section 230548 "Vibration and Seismic Controls for HVAC."
- C. Maintain manufacturer's recommended clearances for service and maintenance.
- D. Chiller manufacturer's factory-trained service personnel shall charge water chiller with refrigerant if not factory charged and fill with oil if not factory installed.
- E. Install separate devices furnished by manufacturer and not factory installed.

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3.3 PIPING CONNECTIONS

- A. Comply with requirements in Section 232113 "Hydronic Piping" and Section 232116 "Hydronic Piping Specialties." Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Where installing piping adjacent to chillers, allow space for service and maintenance.

3.4 ELECTRICAL POWER CONNECTIONS

- A. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."
- B. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."
- C. Provide nameplate for each electrical connection indicating electrical equipment designation and circuit number feeding connection. Nameplate shall be laminated phenolic layers of black with engraved white letters at least 1/2 inch high. Locate nameplate where easily visible.

3.5 CONTROLS CONNECTIONS

- A. Install control and electrical power wiring to field-mounted control devices.
- B. Connect control wiring between chillers and other equipment to interlock operation as required to provide a complete and functioning system.
- C. Connect control wiring between chiller control interface and DDC system for remote monitoring and control of chillers. Comply with requirements in Section 230923 "Direct Digital Control (DDC) System for HVAC."
- D. Provide nameplate on face of chiller control panel indicating control equipment designation serving chiller and the I/O point designation for each control connection. Nameplate shall be laminated phenolic layers of black with engraved white letters at least 1/2 inch high.

3.6 STARTUP SERVICE

- A. Engage a factory-authorized service representative to perform startup service.
- B. Inspect field-assembled components, equipment installation, and piping and electrical connections for proper assemblies, installations, and connections.
- C. Complete installation and startup checks according to manufacturer's written instructions and perform the following:
 - 1. Verify that refrigerant charge is sufficient and water chiller has been leak tested.
 - 2. Verify that pumps are installed and functional.
 - 3. Verify that thermometers and gages are installed.
 - 4. Operate water chiller for run-in period.

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- 5. Check bearing lubrication and oil levels.
 - 6. Verify that refrigerant pressure relief device for chillers installed indoors is vented outside.
 - 7. Verify proper motor rotation.
 - 8. Verify static deflection of vibration isolators, including deflection during water chiller startup and shutdown.
 - 9. Verify and record performance of chilled water flow and low-temperature interlocks.
 - 10. Verify and record performance of water chiller protection devices.
 - 11. Test and adjust controls and safeties. Replace damaged or malfunctioning controls and equipment.
- D. Visually inspect chiller for damage before starting. Repair or replace damaged components, including insulation. Do not start chiller until damage that is detrimental to operation has been corrected.
- E. Prepare a written startup report that records results of tests and inspections.

3.7 DEMONSTRATION

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A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain water chillers. Video record the training sessions and provide electronic copy to Owner.

END OF SECTION 236423.13

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PACKAGED, OUTDOOR, FIXED PLATE ENERGY RECOVERY UNITS SECTION 237223.29

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Fixed-plate, sensible heat exchangers in packaged, outdoor, energy-recovery units.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For packaged, outdoor, fixed-plate, energy-recovery units.
 - 1. Include plans, elevations, sections, details, and mounting details.
 - 2. Include details of equipment assemblies. Indicate dimensions, weights, loads, lifting requirements, required clearances, method of field assembly, components, and location and size of each field connection.
 - 3. Include diagrams for power, signal, and control wiring.

1.3 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Floor plans, roof plans elevations, and other details, drawn to scale. and coordinated with each other, using input from installers of items involved.
- B. Seismic Qualification Data: Certificates, for packaged, outdoor, fixed-plate, energy-recovery units, accessories, and components, from manufacturer.
- C. Field quality-control reports.

1.4 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1.5 COORDINATION

A. Coordinate sizes and locations of building openings and duct connections with actual equipment provided.

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1.6 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of packaged, outdoor, fixed-plate, energy-recovery units that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period for Packaged Energy-Recovery Units: One years from date of Substantial Completion.
 - 2. Warranty Period for Fixed-Plate Heat Exchangers: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. NFPA Compliance: Comply with NFPA 90A for design, fabrication, and installation of airhandling units and components.
- B. ASHRAE Compliance:
 - 1. Applicable requirements in ASHRAE 62.1.
 - 2. Capacity ratings for fixed-plate energy-recovery units shall comply with ASHRAE 84.
- C. ASHRAE/IES 90.1 Compliance: Applicable requirements in ASHRAE/IES 90.1.
- D. UL Compliance:
 - 1. Packaged heat-recovery ventilators shall comply with requirements in UL 1815 or UL 1812
 - 2. Electric coils shall comply with requirements in UL 1995.
- E. Comply with ASTM E84 or UL 723.
- F. Delegated Design: Engage registered professional engineer, as defined in Section 014000 "Quality Requirements," to design vibration-isolation controls and seismic restraints, including comprehensive engineering analysis using performance requirements and design criteria indicated.
- G. Seismic Performance: Packaged, outdoor, fixed-plate, energy-recovery units shall withstand the effects of earthquake motions determined in accordance with ASCE/SEI 7.
 - 1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified."
 - 2. Component Importance Factor: 1.0.

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- 2.2 PACKAGED, OUTDOOR, FIXED-PLATE, SENSIBLE HEAT, ENERGY-RECOVERY UNITS
 - A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. <u>Trane Valent VPRP</u>
 - 2. Price PMI
 - B. Source Limitations: Obtain packaged, outdoor, fixed-plate, energy-recovery units from single manufacturer.
 - C. Surfaces in Contact with Airstream: Comply with requirements in ASHRAE 62.1.
 - D. Housing: Manufacturer's standard galvanized construction with corrosion-protection coating and exterior finish, gasketed, hinged access doors with neoprene gaskets for inspection and access to internal parts, minimum 2-inch thick, R-12 thermal insulation, knockouts for electrical and piping connections, exterior drain connection, and lifting lugs.
 - E. Fixed-Plate, Sensible Heat Exchanger:
 - 1. Casing: Aluminum.
 - 2. Drain Pan: Same material as casing, with drain connections on exhaust and supply side.
 - a. Comply with requirements in ASHRAE 62.1.
 - 3. Plates: Evenly spaced, sealed, and arranged for cross flow.
 - a. Plate Material: Embossed aluminum.
 - 4. Bypass Plenum: Within casing, with gasketed face-and-bypass dampers having operating rods extended outside casing.
 - F. Supply and Exhaust Fans: Backward-curved centrifugal fan with spring isolators of 1-inch static deflection.
 - 1. Motors and Drives: Direct driven.
 - a. Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements for motors specified in Section 230513 "Common Motor Requirements for HVAC Equipment."
 - b. Motor Sizes: Minimum size as indicated. If size is not indicated, provide motor large enough so driven load will not require motor to operate in service factor range above 1.0.
 - c. Each fan shall be provided with VFD.
 - G. Gas Heat Section:
 - 1. The heat exchanger shall be 409 stainless steel construction, convoluted style tubes with in shot 90 percent efficient burners

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- 2. The heat exchanger shall be power vented with negative pressure with respect to the supply airstream
- 3. The heat exchanger shall include condensate connections for a field installed trap.
- 4. The gas burner shall be a modulating type mounted outside of the airstream
- 5. Units with multiple heat exchangers shall have on/off type for all subsequent (second, third, etc) heat exchangers.
- 6. Furnace controls shall include:
 - a. Spark ignition system with flam rod sensor;
 - b. Preset high temperature limit switch;
 - c. Air proving switch
- 7. Ninety percent (90%) efficient burners shall include:
 - a. Factory provided condensate lines with heat trace from the burner to the pipe chase;
 - b. Heat trace, field wired to dedicated 120 volt circuit;
 - c. Field provided and installed condensate drains from the unit condensate drains into the conditioned building space;
 - d. Factory provided condensate neutralizer kits for field installation inside the conditioned building space.
- 8. The gas train shall include:
 - a. Main manual shut off valve;
 - b. Main line appliance regulator;
 - c. Motorized electric main gas valve;
 - d. Modulating gas valve;
 - e. Manual pilot gas shut off valve;
 - f. Manual pilot gas pressure regulator;
 - g. Pilot gas valve designed to operate to (-40°F).
- 9. 5:1 turn down modulating gas valve.
- 10. Discharge air thermostat with adjustable setpoint and hi limit controls.

H. DX Coil Section:

- 1. Provide DX Coil only, to allow for future cooling capability.
- 2. DX Coil capacity shall be as scheduled on drawings.

I. Filters:

- 1. Description: 4" thick, MERV 14 and 2" thick, MERV 8, pleated, factory-fabricated, self-supported, disposable air filters with holding frames.
- 2. UL Compliance: Comply with UL 900.
- 3. Media: Interlaced glass fibers sprayed with nonflammable adhesive.
- 4. Filter-Mounting Frames: Arranged with access doors or panels on both sides of unit. Filters shall be removable from one side or lift out from access plenum.

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2.3 **CONTROLS**

- Control Panel: Solid-state, programmable, microprocessor-based control unit. Integrate to A. BACnet, as specified in Section 230923 "Direct Digital Control (DDC) System for HVAC".
- Starting relay, factory mounted and wired, and manual motor starter/disconnect for field wiring. B.
- C. Provide for a single point of contact, with disconnect, for electric power for the unit.
- D. GFCI outlet.
- E. Frost Control: Electric preheat.
- Economizer Control: Fixed-plate airflow bypass. See Section 230923 "Direct Digital Control F. (DDC) System for HVAC" for control sequence.
- G. Dry-bulb temperature sensor.
- H. Dirty filter switch.
- I. Low-Voltage Transformer: Integral transformer to provide control voltage to unit from primary incoming electrical service.
- J. Electric Strip Heater to maintain electrical component ambient temperature requirements.
- K. Electric Coil Controls:
 - 1. Factory-mounted sensor in outside-air intake with sensor adjustment located in control panel to control electric coil and maintain minimum entering temperature, to avoid frost formation.

2.4 SOURCE QUALITY CONTROL

- Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by A. NRTL, and marked for intended location and application.
- AHRI Compliance: Capacity ratings for air-to-air energy-recovery equipment certified as В. complying with AHRI 1060.
- C. Fan Performance Rating: Comply with AMCA 211, and label fans with AMCA-certified rating seal. Factory test fan performance for airflow, pressure, power, air density, rotation speed, and efficiency in accordance with AMCA 210 and ASHRAE 51.
- D. Fan Sound Ratings: Comply with AMCA 301.
- E. **UL** Compliance:
 - 1. Packaged, Fixed-Plate, Energy-Recovery Units: Comply with requirements in UL 1812.
 - Electric Coils: Comply with UL 1995. 2.

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PART 3 - EXECUTION

3.1 INSTALLATION OF PACKAGED, OUTDOOR, FIXED-PLATE, ENERGY-RECOVERY UNITS

- A. Examine casing insulation materials and filter media before packaged, outdoor, fixed-plate, energy-recovery unit installation. Replace insulation materials and filter media that are wet, moisture damaged, or mold damaged.
- B. Install packaged, outdoor, fixed-plate, energy-recovery units, so supply and exhaust airstreams flow in opposite directions.

C. Equipment Roof Mounting:

- 1. Install roof-mounted packaged, outdoor, fixed-plate, energy-recovery units on field fabricated, structural equipment support curbs, provided by GC. Energy recover units shall be provided with optional structural frame, mounted to bottom of unit, to connect to structural equipment support curb.
- 2. Comply with requirements for vibration-isolation devices specified in Section 230548.13 "Vibration Controls for HVAC."
- D. Install units with clearances for service and maintenance.
- E. Do not operate equipment fans until temporary or permanent filters are in place. Replace temporary filters used during construction and testing with new, clean filters prior to final inspection.

3.2 DUCTWORK CONNECTIONS

- A. Comply with requirements for ductwork in accordance with Section 233113 "Metal Ducts."
- B. Connect duct to units with flexible connections. Comply with requirements in Section 233300 "Air Duct Accessories."

3.3 PIPING CONNECTIONS

- A. Comply with requirements for piping specified in Section 232113 "Hydronic Piping" and Section 232116 "Hydronic Piping Specialties." Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Where installing piping adjacent to unit, allow for service and maintenance.
- C. Connect piping to units mounted on vibration isolators with flexible connectors.
- D. Condensate Drain Piping: See Section 232113 "Hydronic Piping" for pipe type. Install condensate drain piping from drain pans to nearest floor drain, same size as condensate drain connection.

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1. Construct deep trap at connection to drain pan, and install cleanouts at changes in direction.

3.4 ELECTRICAL CONNECTIONS

- A. Install electrical devices furnished by manufacturer, but not factory mounted, in accordance with NFPA 70 and NECA 1.
- B. Connect wiring in accordance with Section 260519 "Low-Voltage Electrical Power Conductors and Cables."
- C. Ground equipment in accordance with Section 260526 "Grounding and Bonding for Electrical Systems."
- D. Install nameplate for each electrical connection, indicating electrical equipment designation and circuit number feeding connection.
 - 1. Nameplate shall be laminated acrylic or melamine plastic signs with a black background and engraved white letters at least 1/2 inch high.

3.5 CONTROL CONNECTIONS

- A. Install control and electrical power wiring to field-mounted control devices.
- B. Connect control wiring in accordance with Section 260523 "Control-Voltage Electrical Power Cables."

3.6 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- B. Testing Agency: Engage qualified testing agency to perform tests and inspections.
- C. Perform tests and inspections with assistance of factory-authorized service representative.
- D. Tests and Inspections:
 - 1. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
 - 2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- E. Packaged, outdoor, fixed-plate, energy-recovery units will be considered defective if it does not pass tests and inspections.
- F. Prepare test and inspection reports.

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3.7 DEMONSTRATION

A. Engage factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain air-to-air energy-recovery units.

END OF SECTION 237223.29

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SECTION 260500 - COMMON WORK RESULTS FOR ELECTRICAL WORK

PART 1 GENERAL

1.1 CONDITIONS

- A. Where ever the reference to "contractor" or "this contractor" appears in these Specifications, it shall mean the Electrical Contractor that is responsible for the electrical work of the project as indicated in the Scope of Work.
- B. Specific items of electrical work for this project are indicated on the Contract Drawings.

1.2 WORK INCLUDED

- A. This Contractor shall furnish all labor, tools, equipment and materials necessary to complete the Electrical Work as shown.
- B. Contractor is responsible for all Bidding Requirements, General Conditions and Division I General Requirements.
- C. Contractor is responsible to review and understand all drawings and all work of all trades to ensure a complete and thorough project. The Contractor shall become familiar with all drawings relating to this project in order to layout the work so as not to interfere with the work of other trades.
- D. Provide all labor, tools, materials, equipment, coordination, and plans necessary for installation, adjustment, and proper operation of the electrical systems for this project.
- E. Provide continuous maintenance of appropriate electrical service to any and all existing structures or areas to remain in operation during the course of the project. Required outages or shutdowns shall be performed only after coordinating and scheduling the outage or shutdown with the Owner. Any premium labor costs associated with nonstandard working hours must be included in the contract cost of the project.
- F. Contract drawings and specifications are complementary and must be so used to ascertain all requirements of the work. When the contract drawings and specifications appear to be in conflict, these specifications shall take precedence and shall supersede the contract drawings, however the opinion of the Architect/Engineer shall supersede this precedence.
- G. Contract drawings are in part diagrammatic, and they are intended to convey the scope of work and indicated general arrangements of equipment. Due to the small scale of the drawings, exact locations of equipment, devices, piping, etc. cannot be shown. The Contractor shall, therefore, make allowances for actual conditions when installing his work (i.e., offsets, actual equipment sizes, and connection points) at no additional cost to the Owner or Architect/Engineer.
- H. The following work is specifically included without limiting the generality implied by these specifications and the associated drawings.
 - 1. Fees and coordination for all required inspections and permits.
 - 2. Demolition as required and indicated.
 - 3. Service and branch circuit wiring and wiring devices for all systems.
 - 4. Working devices and functional systems for all affected systems including power distribution, lighting and special systems as indicated on plans and specifications.

- 5. Boxes, raceways, supports, devices and wiring for all power, lighting and special systems including fire alarm systems, data, telephone and other systems affected by the contract.
- 6. Overcurrent devices installed and operational.
- 7. Cutting and patching.
- 8. Firestopping as required.

1.3 CODES AND STANDARDS

- A. Electrical equipment and installation shall be in compliance with the National Electrical Code, the most current edition and the most recent versions of the National Fire Protection Association ("NFPA"), American National Standards Institute Code ("ANSI"), The American with Disabilities Act ("ADA"), International Conference of Building Officials Codes ("ICBO"), State of New York Codes, Rules, & Regulations ("NYCRR"), Illuminating Engineering Society of North America Standards ("IESNA"), The Institute of Electrical and Electronics Engineers standards ("IEEE"), The International Organization for Standardization ("ISO"), Facility Guidelines Institute, and state, municipal or other codes, rules or regulations applicable to the work shall be followed.
- B. Electrical equipment, components, and accessories shall be UL certified for the purpose for which the equipment, components, and accessories are used. Healthcare label or rating for applicable equipment.

1.4 INSPECTIONS

- A. Permits: The Contractor shall apply for and pay the cost for any local permits necessary for the work of this contract.
- B. Inspections: The Contractor shall be responsible for obtaining inspection of and the certificate by the approved inspection agency for the **entire** electrical system. The Contractor shall apply for and pay the cost for this inspection and any other fees that apply which are required by the local authorities related to the work of this contract. It will be the Contractor's responsibility to make necessary corrections, and submit a Certificate of Approval from the local authority having jurisdiction.
- C. The undertaking of periodic inspections by the Owner or Architect/Engineer shall not be construed as supervision of actual construction. The Owner or Architect/Engineer is not responsible for providing a safe place of work for the Contractor, Contractor's employees, suppliers or subcontractors for access, visits, use, work, travel or occupancy by any person.

1.5 SUBMITTALS

A. Submit manufacturers' shop drawings for proposed equipment, components, and accessories. Submittals to be accurately marked to indicate specific makes and model numbers for the equipment being provided for the project as well as relevant specific

- wiring diagrams, controls and other features needed for the installation and operation of the equipment. Submittals not fully marked in this fashion will be rejected.
- B. Submit names, addresses, telephone numbers, sales and technical contacts, and other details for each of the proposed equipment, components, and accessories manufacturers ("Manufacturers") and the proposed manufacturers' local representatives ("Manufacturers' Representatives"). Provide Uniform Resource Locator ("URL") addresses (i.e., web-site addresses) when available.
- C. Submit delivery lead times for proposed equipment, components, and accessories with the manufacturers' shop drawings.
- D. Submit instructional and operations manuals where required for approved equipment, components and accessories.
- E. Submit submittals, shop drawings, schematics, documents, requests for authorization, asbuilt drawings, and instructional manuals. as indicated in Division I.

1.6 DEFINITIONS

- A. Provide, furnish, and furnish and install shall have the same meaning as they pertain to this contract. That is, the Contractor shall purchase, transport to the site and install all required components of the work unless specifically stated otherwise in the contract documents.
- B. Wiring pertains to raceway, fittings, conductors, terminations, hangers, supports, etc. as required to form a complete system.
- C. Unless otherwise stated, the following standard designations shall be:
 - 1. Standard Voltage Designations less than 600 volts:
 - a. 480VAC refers to 480VAC 3 Phase 3 wire systems.
 - b. 480/277VAC refers to 480/277VAC 3 Phase 4 wire systems.
 - c. 240VAC or 240/120VAC refers to 240VAC, 3 Phase 4 wire delta configurations (with "wild leg").
 - d. 208VAC refers to 208VAC 3 Phase 3 wire systems.
 - e. 208/120VAC refers to 208/120VAC 3 Phase 4 wire systems.
 - f. 120/240VAC refers to 120/240VAC single phase 3 wire systems.
 - 2. Voltages greater than 600 VAC are as listed and shown on the contract documents. Voltages greater than 600 Volts and less than 35,000 Volts (35 kV) are considered Medium Voltage.
 - 3. Standard frequency for AC voltage sources is 60 Hertz.
 - 4. Reduced energy voltage is defined as less than 50 volts, either alternating current or direct current.

1.7 LOCAL CONDITIONS

A. This Contractor shall visit the site of the proposed Project to ascertain existing conditions pertaining to the work of this Contract. Failure to do so shall in no way relieve this Contractor of the responsibility to relocate, remove or otherwise effect a change to the existing which may be necessary to complete the work of this Contract.

B. Any discrepancies noted shall be reported to the Architect prior to the bid date and in time for an addendum to be issued.

1.8 RECORD DRAWINGS (As-Builts)

- A. This Contractor shall provide record drawings as required by Division 1.
- B. The contractor shall provide all survey work required for the location and construction and documentation of record information necessary.
- C. A complete set of red marked contract drawings shall be submitted, at one time, as the "Record" set. If no changes are made to a specific drawing, the contractor shall write "NO CHANGES" on that drawing. All drawings shall be included in the "Record" set.

1.9 BASIC MATERIALS AND METHODS

A. Materials:

- 1. Install new and unused materials of latest style and as specified free of all defects which impair the appearance and operation.
- 2. Provide materials and equipment to meet design and capacity as specified by description and manufacturers catalog number.
- 3. Include all necessary auxiliary components to form a complete, operating and approved installation.
- B. Provide all necessary sleeves, inserts, fasteners, hangers, supports, connectors, etc., for a complete electrical system.

1.10 INSTALLATION REQUIREMENTS

- A. Provide labor, materials, equipment, and services to perform the operations required for complete removal and installation of Electrical work as shown and called for, including fittings, supports and abandoned cable, etc., that may not be indicated on the plans.
- B. Plans show the general design arrangement. Install work as indicated and field verify exact locations and elevations prior to installation or fabrication of any electrical work.
- C. Make all necessary changes in existing circuitry, devices, equipment, wiring, controls, etc., as required to accommodate the new work. Include all offsets, changes in elevations to avoid interferences, etc., encountered in the field. Field measure all work locations.
- D. Install all work to maintain proper clearances and space for maintenance of equipment.
- E. Materials shall be handled and stored in a clean, dry location protected from damage and in accordance with Manufacturer's recommendation.

1.11 MATERIALS

- A. All materials and equipment shall be new and as specified or of equal or better quality unless otherwise noted. This will be decided by the Architect/Engineer. Alternate materials or equipment not originally specified must be submitted for approval prior to construction.
- B. Basic hardware and miscellaneous unspecified items shall meet existing trade standards of quality and shall carry UL or FM listing or certification where applicable.

- C. All equipment supplied shall, unless specified otherwise in the contract documents, be the standard equipment of the manufacturer in order that repair or replacement parts may be readily available.
- D. Multiple items such as panelboards, wiring devices, switches, breakers, speakers, raceways, etc., shall be from the same manufacturer to insure uniform appearance and operation and to assist owner maintenance.
- E. Drawings and specifications are based on specific manufacturer's equipment. Therefore, the Contractor shall assume all responsibility, cost, and coordination involved in making any necessary revisions to apply or install another manufacturer's equipment, even though it may be approved as an "equal" item by the Architect/Engineer.
- F. The Contractor shall provide supports and hangers for the proper support of all apparatus, materials and equipment from ceiling and/or wall construction using all necessary plates, bridging, inserts and expansion shields as required.
- G. Enclosure and race way locations as listed in the specifications:
 - 1. Dry interior locations include conditioned (heated and ventilated) areas of Group A, B, E, F, I, M, R and S Occupancy Groups per the current building code. Dry Interior Locations also include those areas as indicated in NFPA 70 (NEC), unless indicated otherwise below.
 - 2. Damp interior locations include unconditioned (with heat and/or ventilation) areas of Group A, B, E, F, I, M, R and S Occupancy Groups per the current building code. Damp interior locations also include those areas as indicated in NFPA 70 (NEC), unless indicated otherwise below.
 - 3. Wet interior locations are those areas where there is, either from regular use or from regular maintenance, the existence of open fluids including but not limited to trenches, drains, containers, tanks, troughs, or similar. All conditioned (heated and ventilated) Group U (Utility) occupancy or non-listed occupancies shall be considered Wet Interior Locations. Wet interior locations also include those areas as indicated in NFPA 70 (NEC), unless indicated otherwise below.
 - 4. Corrosive areas shall be indoor areas that have or have the potential of corrosive vapors in it including areas of corrosive gas storage and/or corrosive liquid mixing and/or pumping. Corrosive vapors include, but are not limited to, hypochlorite or other water or wastewater treatment chemicals. Corrosive areas will also include areas where treated water (potable or non-potable) and/or treated or untreated wastewater may be released or are in open tanks or containers. These areas may also be High Hazard or Hazardous areas and, if so, must satisfy those requirements as well. Areas outside of a structure are not considered to be corrosive.
 - 5. Outdoor locations are those areas which are not contained inside an occupancy or structure and those areas in any of the Group U (Utility) occupancy or non-listed occupancies which are not conditioned (with heat and/or ventilation).
 - 6. Hazardous Locations are those areas per NEC (NFPA 70) Article 500. Unless indicated otherwise on the contract drawings or in the specifications, Equipment, enclosures and raceways shall be rated for Class 1 Division 1 locations.
 - 7. For locations or for enclosure and/or raceway types indicated on the contract drawings or elsewhere in the specifications, the more stringent ratings (as determined by the Architect/Engineer) shall apply.

1.12 COORDINATION OF WORK

- A. The Contractor shall exchange information with other Contractor's and Owner's representatives in order to insure orderly progress of the work for this project.
- B. The Contractor must contact the Owner's representative and schedule all work. This must be done at least 10 days prior to work, unless otherwise specified. Every project start must be handled in this manner.
- C. The Contractor shall refer to all contract documents before installing any items, and shall check for possible interference. If any work is installed, and later develops interference with other features of the design, the Contractor will be responsible to make such changes to eliminate the interference.
- D. The primary Electrical Contractor shall provide and maintain all temporary power to all trades for all construction locations of this contract including all required power outlets. This will include but not be limited to all required power outlets.
- E. The primary Electrical Contractor shall provide and maintain all fixtures, lamps and switching necessary to provide industry standard temporary lighting levels as set by IES and OSHA.

1.13 ARCHITECTURAL CUTTING AND PATCHING

- A. The Contractor shall be responsible for any damage to his work or the work of others caused by his forces and shall repair any damage done to the work, and leave the building premises in approved order at the termination of the project.
- B. Cuts and openings shall be no larger than absolutely required.
- C. The Contractor shall be responsible for his own cutting and patching as part of his material and installation price. Patching shall be performed by mechanics skilled with the material being patched, shall match existing surroundings, and shall be equal to or better than original conditions.

1.14 ANCHORS, HANGERS, AND SUPPORTS

A. Provide all necessary hangers, equipment, racks, and anchors as required for the work of this contract.

1.15 DEMOLITION

- A. All items that are indicated for removal must have all electrical circuits disconnected and removed prior to demolition of items by other contractors. Removal includes all controls, conduit, wiring/cabling, supports, piping and related appurtenances and intake and exhaust items. Motors, pumps and generators (with associated transfer switches) with related and associated appurtenances will be removed as indicated on the contract drawings as removal, demolition or replacement.
- B. Items to be removed include all items and areas indicated on the contract drawings. Removal of items include removal from the site and disposal of such, including all fees

- and permits. If items are indicated as being delivered to owner after removal or demolition, the contractor will coordinate the location and method with the owner prior to removal. If not indicated in the Contract Documents, verify if any or all equipment is to be delivered to the owner.
- C. Contractor shall dispose of, recycle or otherwise remove all equipment and items indicated, including lubricants, insulators and insulating liquids, coolants and fuels in accordance with all current State, Federal and local laws and codes.
- D. Examination of work:
 - 1. Verify that abandon wiring and equipment to be disconnected and removed service only abandoned facilities and devices.
 - 2. Any demolition drawings and notes that are part of this set of Contract Documents are based on casual field observation and existing record documents. The contractor is responsible for verifying all items to be disconnect and/or removed.
 - 3. Any discrepancies shall be identified by the contractor and reported to the Architect/Engineer prior to the start of work.
 - 4. Beginning of demolition means that the contractor accepts all existing conditions.
- E. Scope of demolition work:
 - 1. Disconnect all electrical systems in walls, floors, ceilings and areas to be removed. Remove, relocate and/or extend existing installations to accommodate new construction.
 - 2. Coordinate any utility service and site or area service outages with the utility and owner. This includes all utilities including power, telephone, data, fire alarm and other existing special systems.
 - 3. Provide temporary wiring and connections to maintain existing systems in service during construction. When work must be performed on energized equipment or circuits, use personnel experienced in such operations and follow all safety operations.
 - 4. For modifications or removal of existing electrical service or power to a site or area, contractor will maintain the existing system/service until the new system is complete and ready for service. Disable system only to make switchovers and connections and minimize outage durations. Obtain permission from the owner and Architect/Engineer at least 48 hours before disabling or disconnecting any part or all of the system. Make temporary connections, as approved by the Architect/Engineer, to maintain service in areas adjacent to work area.
 - 5. For modifications or removal of existing special systems including Fire Alarm, Data, Telephone and other special systems, maintain any existing system in service until the new system is accepted and operational. Disable system only to make switchovers and connections and minimize outage durations. Obtain permission from the owner and Architect/Engineer at least 48 hours before disabling or disconnecting any part or all of the system. Make temporary connections, as approved by the Architect/Engineer, to maintain service in areas adjacent to work area.
 - 6. Abandoned conductors are to be removed to source of supply. Abandoned conductors, made so under previous work, will also be removed if in areas of demolition.

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- 7. Removed all exposed abandoned conduit, including abandoned conduit above accessible ceilings. Removal includes all conduit indicated in areas affected, including conduit abandoned under previous work. Cut all conduit flush with walls and floors that are not to be affected and patch surfaces.
- 8. Disconnect and remove all abandon outlets, wiring devices, panelboards, distribution equipment, luminaries, including all brackets and supporting hardware including all equipment and devices made inoperable by other related work.
- 9. Repair and patch adjacent construction and finishers damaged during demolition and/or extension work.
- 10. Maintain access to all existing electrical equipment that remain active during construction and after completion of work.
- 11. Clean and repair existing materials and equipment that remain or that are to be reused. Clean all exposed surfaces of equipment and check for tightness of electrical connections of all. Replace circuit breakers, wiring devices and control items damaged or not functional. Provide closure plates, plugs and devices to cover all openings. Provide corrected and/or modified labels and typed circuit schedules for all panelboards and service equipment affected.
- 12. Clean all existing luminaries, removing and reinstalling as needed. Replace all nonfunctioning or broken lamps, ballasts, power supplies/drivers and electrical parts.

END OF SECTION

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SECTION 260515 - FIRESTOPPING FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - Sleeves.
 - 2. Mechanical sleeve seals.
 - 3. Firestopping relating to electrical work.
 - 4. Firestopping accessories.

1.2 REFERENCES

- A. ASTM International:
 - 1. ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials.
 - 2. ASTM E119 Standard Test Methods for Fire Tests of Building Construction and Materials.
 - 3. ASTM E814 Standard Test Method for Fire Tests of Through-Penetration Fire Stops.
 - 4. ASTM E1966 Standard Test Method for Fire-Resistive Joint Systems.
- B. National Fire Protection Association:
 - 1. NFPA 70 National Electrical Code.
- C. Underwriters Laboratories Inc.:
 - 1. UL 263 Fire Tests of Building Construction and Materials.
 - 2. UL 723 Tests for Surface Burning Characteristics of Building Materials.
 - 3. UL 1479 Fire Tests of Through-Penetration Firestops.
 - 4. UL 2079 Tests for Fire Resistance of Building Joint Systems.
 - 5. UL Fire Resistance Directory.
- D. Intertek Testing Services (Warnock Hersey Listed):
 - 1. WH Certification Listings.

1.3 DEFINITIONS

A. Firestopping (Through-Penetration Protection System): Sealing or stuffing material or assembly placed in spaces between and penetrations through building materials to arrest movement of fire, smoke, heat, and hot gases through fire rated construction.

1.4 SYSTEM DESCRIPTION

- A. Firestopping Materials: ASTM E119, ASTM E814, UL 263, UL 1479 to achieve fire ratings as noted on Drawings for adjacent construction, but not less than 1-hour fire rating.
 - 1. Ratings may be 3-hours for firestopping in through-penetrations of 4-hour fire rated assemblies unless otherwise required by applicable codes.

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- B. For those portions of the contract drawings where FM, UL or other Design Numbers are noted, provide materials to achieve ratings indicated according to ASTM E119, ASTM E814, UL 263 and UL 1479.
- C. Firestop interruptions to fire rated assemblies, materials, and components.

1.5 PERFORMANCE REQUIREMENTS

A. Firestopping: Conform to UL for fire resistance ratings and surface burning characteristics.

1.6 SUBMITTALS

- A. Division 1 Submittal Procedures: Requirements for submittals.
- B. Product Data:
 - 1. Firestopping: Submit data on product characteristics, performance and limitation criteria.
- C. Firestopping Schedule: Submit schedule of opening locations and sizes, penetrating items, and required listed design numbers to seal openings to maintain fire resistance rating of adjacent assembly.
- D. Manufacturer's Installation Instructions:
 - 1. Firestopping: Submit preparation and installation instructions.
- E. Manufacturer's Certificate: Certify products meet or exceed specified requirements.
- F. Firestopping Engineering Judgments: For conditions not covered by UL or WH listed designs, submit judgments by licensed professional engineer suitable for presentation to authority having jurisdiction for acceptance as meeting code fire protection requirements.

1.7 QUALITY ASSURANCE

- A. Through Penetration Firestopping of Fire Rated Assemblies: UL 1479 or ASTM E814 with 0.10-inch water gage minimum positive pressure differential to achieve fire F-Ratings and temperature T-Ratings as indicated on Drawings, but not less than 1-hour.
 - 1. Wall Penetrations: Fire F-Ratings as indicated on Drawings, but not less than 1-hour.
 - 2. Floor and/or Roof Penetrations: Fire F-Ratings and temperature T-Ratings as indicated on Drawings, but not less than 1-hour.
 - a. Floor Penetrations Within Wall Cavities: T-Rating is not required.
- B. Through Penetration Firestopping of Non-Fire Rated Floor and/or Roof Assemblies: Materials to resist free passage of flame and products of combustion.
 - 1. Noncombustible Penetrating Items: Noncombustible materials for penetrating items connecting maximum of three stories.
 - 2. Penetrating Items: Materials approved by authorities having jurisdiction for penetrating items connecting maximum of two stories.

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- C. Fire Resistant Joints in Fire Rated Floor, Roof, and Wall Assemblies: ASTM E1966 or UL 2079 to achieve fire resistant rating as indicated on Drawings for assembly in which joint is installed.
- D. Fire Resistant Joints Between Floor Slabs and Exterior Walls: ASTM E119 with 0.10-inch water gage minimum positive pressure differential to achieve fire resistant rating as indicated on Drawings for floor assembly.
- E. Surface Burning Characteristics: Maximum 25/450 flame spread/smoke developed index when tested in accordance with ASTM E84.
- F. Perform Work in accordance with State of New York standard.

1.8 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum three years documented experience.
- B. Installer: Company specializing in performing work of this section with minimum 3 years documented experience.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Division 1 Product Requirements: Requirements for transporting, handling, storing, and protecting products.
- B. Accept materials on site in original factory packaging, labeled with manufacturer's identification.
- C. Protect from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original packaging.

1.10 ENVIRONMENTAL REQUIREMENTS

- A. Division 1 Product Requirements: Environmental conditions affecting products on site.
- B. Do not apply firestopping materials when temperature of substrate material and ambient air is below 60 degrees F.
- C. Maintain this minimum temperature before, during, and for minimum 3 days after installation of firestopping materials.
- D. Provide ventilation in areas to receive solvent cured materials.

PART 2 PRODUCTS

2.1 SLEEVES

A. Furnish materials in accordance with State of New York standards.

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- B. Sleeves for Penetrations through Non-Fire Rated Floors: 18 gage thick galvanized steel.
- C. Sleeves for Penetrations through Non-Fire Rated Beams, Walls, Footings, and Potentially Wet Floors: Steel pipe or 18 gage thick galvanized steel.
- D. Sleeves for Penetrations through Fire Rated and Fire Resistive Floors and Walls, and Fire Proofing: Prefabricated fire rated sleeves including seals, UL listed.
- E. Fire-stopping Insulation: Glass fiber type, non-combustible.

2.2 MECHANICAL SLEEVE SEALS

- A. Manufacturers:
 - 1. Pipeline Seal and Insulator, Inc.
 - 2. Substitutions: Division 1 Product Requirements.
- B. Furnish materials in accordance with State of New York standards.
- C. Product Description: Modular mechanical type, consisting of interlocking synthetic rubber links shaped to continuously fill annular space between object and sleeve, connected with bolts and pressure plates causing rubber sealing elements to expand when tightened, providing watertight seal and electrical insulation.

2.3 FIRESTOPPING

- A. Manufacturers:
 - 1. 3M Fire Protection Products.
 - 2. Hilti, Inc.
 - 3. Nelson Firestop; a brand of Emerson Industrial Automation.
 - 4. Substitutions: Division 1 Product Requirements.
- B. Furnish materials in accordance with State of New York standards.
- C. Product Description: Different types of products by multiple manufacturers are acceptable as required to meet specified system description and performance requirements; provide only one type for each similar application.
 - 1. Silicone Firestopping Elastomeric Firestopping: Single component silicone elastomeric compound and compatible silicone sealant.
 - 2. Foam Firestopping Compounds: Single component foam compound.
 - 3. Formulated Firestopping Compound of Incombustible Fibers: Formulated compound mixed with incombustible non-asbestos fibers.
 - 4. Fiber Stuffing and Sealant Firestopping: Composite of mineral fiber stuffing insulation with silicone elastomer for smoke stopping.
 - 5. Mechanical Firestopping Device with Fillers: Mechanical device with incombustible fillers and silicone elastomer, covered with sheet stainless steel jacket, joined with collars, penetration sealed with flanged stops.

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- 6. Intumescent Firestopping: Intumescent putty compound which expands on exposure to surface heat gain.
- 7. Firestop Pillows: Formed mineral fiber pillows.

2.4 FIRESTOPPING ACCESSORIES

- A. Primer: Type recommended by firestopping manufacturer for specific substrate surfaces and suitable for required fire ratings.
- B. Installation Accessories: Provide clips, collars, fasteners, temporary stops or dams, and other devices required to position and retain materials in place.

C. General:

- 1. Furnish UL listed products or products tested by independent testing laboratory.
- 2. Select products with rating not less than rating of wall or floor being penetrated.

D. Non-Rated Surfaces:

- 1. Stamped steel, chrome plated, hinged, split ring escutcheons or floor plates or ceiling plates for covering openings in occupied areas where conduit is exposed.
- 2. For exterior wall openings below grade, furnish modular mechanical type seal consisting of interlocking synthetic rubber links shaped to continuously fill annular space between conduit and cored opening or water-stop type wall sleeve.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Division 1 Administrative Requirements: Verification of existing conditions before starting work.
- B. Verify openings are ready to receive sleeves.

3.2 PREPARATION

- A. Clean substrate surfaces of dirt, dust, grease, oil, loose material, or other matter affecting bond of firestopping material.
- B. Remove incompatible materials affecting bond.

3.3 INSTALLATION - FIRESTOPPING

A. Install material at fire rated construction perimeters and openings containing penetrating sleeves, piping, ductwork, conduit and other items, requiring firestopping.

3.4 INSTALLATION - SLEEVES

A. Exterior watertight entries: Seal with adjustable interlocking rubber links.

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- B. Conduit penetrations not required to be watertight: Sleeve and fill with silicon foam.
- C. Set sleeves in position in forms. Provide reinforcing around sleeves.
- D. Size sleeves large enough to allow for movement due to expansion and contraction. Provide for continuous insulation wrapping.
- E. Extend sleeves through floors 1 inch above finished floor level. Caulk sleeves.
- F. Where conduit or raceway penetrates floor, ceiling, or wall, close off space between conduit or raceway and adjacent work with fire stopping insulation and caulk airtight. Provide close fitting metal collar or escutcheon covers at both sides of penetration.
- G. Install chrome plated steel escutcheons at finished surfaces.

3.5 FIELD QUALITY CONTROL

- A. Division 1 Quality Requirements and Execution and Closeout Requirements: Field inspecting, testing, adjusting, and balancing.
- B. Inspect installed firestopping for compliance with specifications.

3.6 CLEANING

- A. Division 1 Execution and Closeout Requirements: Requirements for cleaning.
- B. Clean adjacent surfaces of firestopping materials.

3.7 PROTECTION OF FINISHED WORK

- A. Division 1 Execution and Closeout Requirements: Requirements for protecting finished Work.
- B. Protect adjacent surfaces from damage by material installation.

END OF SECTION

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SECTION 260519 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 GENERAL

1.1 SUMMARY

A. Section includes building wire and cable; nonmetallic-sheathed cable; direct burial cable; service entrance cable; armored cable; metal clad cable; and wiring connectors and connections.

B. Related Sections:

- 1. Division 1 Administrative Requirements, Submittal Procedures: Submittal procedures, Product Requirements, Execution and Closeout Requirements
- 2. Common Work Results for Electrical Systems.
- 3. Grounding and Bonding for Electrical Systems
- 4. Identification for Electrical Systems

1.2 REFERENCES

- A. International Electrical Testing Association:
 - 1. NETA ATS Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.
- B. National Fire Protection Association:
 - 1. NFPA 70 National Electrical Code.
 - 2. NFPA 262 Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces.
- C. Underwriters Laboratories, Inc.:
 - 1. UL44 Rubber Insulated Wires and Cables
 - 2. UL 83 Thermoplastic Insulated Wires and Cables
 - 3. UL 493 Thermoplastic Insulated Underground Feeder and Branch Circuit Wires and Cables
 - 4. UL 1093 Machine Tool Wires and Cables
 - 5. UL 1277 Standard for Safety for Electrical Power and Control Tray Cables with Optional Optical-Fiber Members.
 - 6. UL 1569 Metal Clad Cable

D. ASTM:

1. B5 - International Annealed Copper Standard

1.3 SYSTEM DESCRIPTION

- A. Product Requirements: Provide products as follows:
 - 1. Solid conductor for feeders and branch circuits 12 AWG and smaller.
 - 2. Stranded conductors for control circuits.
 - 3. Conductor not smaller than 12 AWG for power and lighting circuits protected at 20A or less.

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- 4. Conductor not smaller than 14 AWG for control circuits protected at 15A or less.
- 5. Increase wire size in branch circuits
 - a. To limit voltage, drop to a maximum of 3 percent.
 - b. Upsized to next larger size conductor for conductor lengths greater than 150 feet or as noted on the contract drawings.
- B. Wiring Methods: Provide the following wiring methods:
 - 1. Use only building wire, Type THHN/THWN-2 or XHHW-2 insulation, in raceway, armored cable or metal clad cable.
 - 2. Do not use conductors and/or cables for applications other than as permitted by NFPA 70 and product listing.
 - 3. Metal Clad cable is permitted only in areas and applications that meet all of the following:
 - a. Where NOT otherwise restricted or noted as not to be used
 - b. Where NOT prohibited by the Authority Having Jurisdiction (AHJ).
 - c. Where NOT exposed to environmental damage.
 - d. Only in areas that are concealed.
 - e. Only in Dry Interior Locations as indicated in Section 26 05 00. Do not use in other locations.
 - f. Only for either:
 - 1) Final connections from junction boxes to luminaries or between luminaries up to a maximum of 5-feet.
 - 2) In concealed walls and above accessible ceilings for branch circuits up to 20A at 120VAC (only) up to a maximum of 5 feet.

1.4 DESIGN REQUIREMENTS

A. Conductor sizes are based on copper unless indicated as aluminum or "AL".

1.5 SUBMITTALS

- A. Division 1 Submittal Procedures: Requirements for submittals.
 - 1. Submit Product Data and catalog information on all items to be used.
 - 2. Submit Manufacturer's installation instructions. Indicate application conditions and limitations of use stipulated by product testing agency specified under Regulatory Requirements.
 - 3. Submit proposed conductor insulation test method (if required), testing equipment to be used and conductors to be tested.
- B. Product Data: Submit for building wire and each cable assembly type.
- C. Test Reports: Indicate procedures and values obtained.

1.6 CLOSEOUT SUBMITTALS

- A. Division 1 Execution and Closeout Requirements: Requirements for submittals.
- B. Project Record Documents: Record actual locations of components and circuits.

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1.7 QUALITY ASSURANCE

- A. Perform to requirements of NFPA 70.
- B. Must meet UL VW-1 ratings.

1.8 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

1.9 FIELD MEASUREMENTS

A. Verify field measurements are as indicated on Drawings and submit actual conductor lengths.

1.10 COORDINATION

- A. Division 1 Administrative Requirements: Requirements for coordination.
- B. Where wire and cable destination is indicated and routing is not shown, determine routing and lengths required.
- C. Wire and cable routing indicated is approximate unless dimensioned. Include wire and cable lengths within 10 feet of length shown.

PART 2 PRODUCTS

2.1 BUILDING WIRE

- A. Manufacturers:
 - 1. Cerro Wire & Cable Co.,
 - 2. Industrial Wire & Cable Inc.
 - 3. Southwire Co.
 - 4. Substitutions: Division 1 Product Requirements.
 - B. Product Description: Single conductor insulated wire.
 - C. Conductor: Copper only Aluminum is not allowed unless specifically indicated.
 - D. Insulation Rating: 600 volts 90 degree C Thermoplastic THHN/THWN-2 or XHHW-2.
 - E. All conductors shall be UL listed, be labeled with the UL seal and contain the manufacturer's name, wire size and insulation type.

2.2 METAL CLAD OR ARMORED CABLE

A. Manufacturers:

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- 1. Cerro Wire & Cable Co.,
- 2. Industrial Wire & Cable Inc.
- 3. Southwire Co.
- 4. Encore Wire Corporation
- 5. Substitutions: Division 1 Product Requirements.
- B. Conductor: Copper only Aluminum not allowed unless specifically indicated.
- C. Grounding: Provide full size integral insulated equipment grounding conductor.
- D. Insulation Temperature Rating: 90 degrees C.
- E. Insulation Material: Thermoplastic THHN/THWN 90 degree C 600 volts
- F. Armor Material: Steel interlocking metal tape style only. Must meet the requirement to be used as a suitable electrical grounding conductor.
- G. Jacket: Provide PVC jacket applied over cable armor.

2.3 WIRING CONNECTORS

- A. Manufacturers; Spring Wire Connectors:
 - 1. 3M,
 - 2. Ideal,
 - 3. Thomas & Betts.
 - 4. AMP.
 - 5. Substitutions: Division 1 Product Requirements.
- B. Manufacturers; Compression Connectors:
 - 1. Raco,
 - 2. Ideal.
 - 3. Blackburn.
 - 4. Substitutions: Division 1 Product Requirements.
- C. Manufacturers; Multitap Insulated Connectors, 600V, 90C, Insulated, Copper rated:
 - 1. Ilsco.
 - 2. Burndy,
 - 3. Thomas & Betts.
 - 4. NSI.
 - 5. Substitutions: Division 1 Product Requirements.

2.4 TERMINATIONS

- A. Terminal Lugs for Wires 6 AWG and Smaller: Solderless, compression type copper.
- B. Lugs for Wires 4 AWG and Larger: Color keyed, compression type copper, with insulating sealing collars.

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PART 3 EXECUTION

3.1 EXAMINATION

- A. Division 1 Administrative Requirements: Coordination and project conditions.
- B. Verify interior of building has been protected from weather.
- C. Verify mechanical work likely to damage wire and cable has been completed.
- D. Verify raceway installation is complete and supported.

3.2 PREPARATION

A. Completely and thoroughly swab raceway before installing wire.

3.3 EXISTING WORK

- A. Remove exposed abandoned wire and cable, including abandoned wire and cable above accessible ceiling finishes. Patch surfaces where removed cables pass through building finishes.
- B. Disconnect abandoned circuits and remove circuit wire and cable. Remove abandoned boxes when wire and cable servicing boxes is abandoned and removed. Install blank cover for abandoned boxes not removed.
- C. Provide access to existing wiring connections remaining active and requiring access. Modify installation or install access panel.
- D. Extend existing circuits using materials and methods compatible with existing electrical installations, or as specified.
- E. Clean and repair existing wire and cable remaining or wire and cable to be reinstalled.

3.4 INSTALLATION

- A. Route wire and cable to meet Project conditions.
- B. Neatly train and lace wiring inside boxes, equipment, and panelboards.
- C. Special Techniques--Building Wire in Raceway:
 - 1. Pull conductors into raceway at same time.
 - 2. Install building wire 4 AWG and larger with pulling equipment.

D. Special Techniques - Cable:

- 1. Protect exposed cable from damage.
- 2. Support cables above accessible ceiling, using spring metal clips or plastic cable ties to support cables from structure or ceiling suspension system. Do not rest cable on ceiling panels.

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3. Use suitable cable fittings and connectors.

E. Special Techniques - Wiring Connections:

- 1. Clean conductor surfaces before installing lugs and connectors.
- 2. Make splices, taps, and terminations to carry full ampacity of conductors with no perceptible temperature rise.
- 3. Tape uninsulated conductors and connectors with electrical tape to 150 percent of insulation rating of conductor.
- 4. Install multitap connectors for copper conductor splices and taps, 6 AWG and larger.
- 5. Install solder less pressure connectors with insulating covers for copper conductor splices and taps, 8 AWG and smaller. Connections for 250MCM and larger shall be long barrel type allowing for double indentation. Terminating connectors for conductor sizes larger than 250MCM shall have two (2) holes in the tongue for termination.
- 6. Install insulated spring wire connectors with plastic caps for copper conductor splices and taps, 10 AWG through 18 AWG.
- 7. Install suitable reducing connectors or mechanical connector adaptors for connecting aluminum conductors to copper conductors.
- F. Install stranded conductors for branch circuits 10 AWG and smaller. Install crimp on fork terminals for device terminations. Do not place bare stranded conductors directly under screws.
- G. Install terminal lugs on ends of 600 volt wires unless lugs are furnished on connected device, such as circuit breakers. Use specified wiring connectors.
- H. Size lugs in accordance with manufacturer's recommendations terminating wire sizes. Install 2-hole type lugs to connect wires 4 AWG and larger to copper bus bars. Utilize manufacturer's recommended tools or dies.
- I. For terminal lugs fastened together such as on motors, transformers, and other apparatus, or when space between studs is small enough that lugs can turn and touch each other, insulate for dielectric strength of 2-1/2 times normal potential of circuit.
- J. Make splices and taps only in accessible boxes. Do not pull splices into raceways of make splices in conduit bodies or wiring gutters. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors. Do not remove conductor strands to facilitate insertion into connectors.
- K. Secure and support conductors and cables in accordance with NFPA 70.
- L. Install conductors with a minimum of 12 inches of slack/excess at each outlet or termination point.

3.5 WIRE COLOR

A. Identify and color code wire and cable under provisions of Section 26 05 53. Identify each conductor with its circuit number or other designation indicated.

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B. General:

- 1. For wire sizes 10 AWG and smaller, install wire colors in accordance with the following:
 - a. Black and red for single phase circuits at 120/240 volts with white conductors.
 - b. Black, red, and blue for circuits at 208/120 volts single or three phase with white neutral conductors.
 - c. Orange, brown, and yellow for circuits at 480/277 volts single or three phase with white or grey neutral conductors.
- 2. For wire sizes 8 AWG and larger, identify wire with colored tape at terminals, splices and boxes. Colors are as follows:
 - a. Black and red for single phase circuits at 120/240 volts with white conductors.
 - b. Black, red, and blue for circuits at 208/120 volts single or three phase with white neutral conductors.
 - c. Orange, brown, and yellow for circuits at 480/277 volts single or three phase with white or grey neutral conductors.
- C. Neutral Conductors: When two or more neutrals are located in one conduit, individually identify each with proper circuit number.
- D. Uniquely color code each phase throughout.

E. Ground Conductors:

- 1. For 10 AWG and smaller: Green.
- 2. For 8 AWG and larger: Use green conductor or identify with green tape at both ends and visible points including junction boxes.
- 3. For isolated grounds, utilize green with yellow stripe.
- 4. For circuits that may remain energized when main disconnect is in the OFF position, utilize yellow color and identify each conductor at both ends and at visible points including junction boxes

3.6 FIELD QUALITY CONTROL

- A. Division 1 Quality Requirements and Execution and Closeout Requirements: Field inspecting, testing, adjusting, and balancing.
- B. Inspect and test all conductors in accordance with NETA ATS, except Section 4.
- C. Measure tightness of bolted connections and compare torque measurements with manufacturer's recommended values.
- D. Verify insulation continuity of each feeder circuit conductor, after installation, by MEGGER® (high voltage) insulation testing.
 - 1. Feeder circuit conductors are defined as any conductors between the primary utility supply point (usually a pole or transformer) and the first customer supplied item (either a meter enclosure or primary distribution panel) and/or any supply conductors greater than 50 feet in length and greater than 4 AWG.
 - 2. If splices are to be used, testing should be performed after spices are installed.
 - 3. Grounding conductors need not be tested.

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- 4. Testing shall be done with over-current and distribution devices connected but in a deenergized condition.
- 5. If any test value is found to be lower than the calculated or specified minimum accepted value, the Contractor shall be responsible for replacement and/or repair of the cable until it meets the minimum accepted value.
- 6. Final reports for each test shall include results as well as the specifications of the testing device used, environmental temperature and humidity. The test results shall present the test values compared to the minimum accepted value. All tests shall show the voltage used, the current obtained and a graph of current and resistance values versus time until the values have stabilized. This data and data from all retesting shall be submitted to the Architect/Engineer. No values below the minimum accepted value will be accepted.
- 7. Insulation testing shall be performed as indicated below:
 - a. For circuits of 600 VAC (VDC) or less, perform the Insulation Resistance Test as follows:
 - 1) MEGGER® testing shall be conducted for each conductor in a bundle or conduit, with all other conductors grounded. Grounding conductors need not be tested.
 - 2) Make measurements at 1000 Volts (VDC). MEGGER® testing shall be performed with a solid state (battery powered) instrument. Hand or motor cranked devices are not acceptable.
 - 3) Measurement devices shall be able to measure at least 20 G Ω (20,000,000 Ω).
 - 4) Acceptable values of "Infinity" or values greater than 50 G Ω (50,000,000) are acceptable as steady state values.

END OF SECTION

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SECTION 260523 - CONTROL-VOLTAGE ELECTRICAL POWER CABLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Multimode optical-fiber cabling.
 - 2. UTP cabling.
 - 3. Low-voltage control cabling.
 - 4. Control-circuit conductors.
 - 5. Identification products for above.

1.3 RELATED SECTIONS

- A. Raceways and Boxes for Electrical Systems
- B. Grounding and Bonding for Electrical Systems
- C. Cable Trays for Electrical Systems

1.4 DEFINITIONS

- A. EMI: Electromagnetic interference.
- B. Low Voltage: As defined in NFPA 70 for circuits and equipment operating at less than 50 V or for remote-control and signaling power-limited circuits.
- C. Plenum: A space forming part of the air distribution system to which one or more air ducts are connected. An air duct is a passageway, other than a plenum, for transporting air to or from heating, ventilating, or air-conditioning equipment.
- D. RCDD: BICSI Registered Communications Distribution Designer.
- E. RCIT: BICSI Registered Cabling Installation Technician

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F. UTP: Unshielded twisted pair.

G. RACK DEFINITIONS:

- 1. MDF Main Distribution Frame: One centrally located support structure for terminating horizontal cables that extend to telecommunications outlets, and Backbones to other Intermediate Distribution Frames, if present. The MDF functions as a point of connection to an external service provider. This is usually noted on the Contract Drawings and has a capacity of at least 25 percent space and connection capability more than the anticipated or designed criteria.
- 2. IDF Intermediate Distribution Frames: Support structures for terminating horizontal cables that extend to telecommunications outlets. In some instances, as noted, IDFs may be connected to other IDFs to maintain the star topology where distance or functionality dictates.
- H. BACKBONE CABLING: Cabling, pathways and terminal hardware connecting Intermediate Distribution Frames (IDFs) with the Main Distribution Frame (MDF). These are wired in a star topology with the Main Distribution Frame and, unless indicated otherwise, are either copper cable or fiber optic cable within a single structure and fiber optic between structures of for distances greater than 500 feet.

1.5 ACTION SUBMITTALS

- A. See Division 1 Administrative Requirements, for submittal procedures
- B. Product Data: For each type of product. Provide manufacturer's standard catalog pages and data sheets for each product including storage and handling requirements and recommendations and installation methods and requirements.
- C. Evidence of qualifications of installer.
 - 1. Qualifier must, at a minimum, be factory certified by manufacturer of products to be installed.
- D. Test Plan: Complete and detailed plan, with list of test equipment, procedures for inspection and testing. Submit with intended test dates at least 60 days prior to intended test date.
- E. Project Record Documents:
 - 1. Actual locations of outlet boxes and distribution frames. Identify distribution frames and equipment rooms by room number on contract drawings.
 - 2. Color coding, pair assignment, polarization and cross-connect layout as installed.
 - 3. Operation and Maintenance Data including a list of all components with part numbers, sources of supply and operation and maintenance instructions.
 - 4. Provide factory reel tests on cabling provided and installed. Record and provide identification numbers (lot numbers) for reels used.

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1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified layout technician, installation supervisor, and field inspector.
- B. Source quality-control reports as required.
- C. Field quality-control reports including field test reports.

1.7 QUALITY ASSURANCE

- A. All items to be UL listed.
- B. Testing Agency Qualifications: Member company of NETA or an NRTL.
 - 1. Testing Agency's Field Supervisor: Currently certified by BICSI as an RCDD to supervise on-site testing.

1.8 REFERENCE DOCUMENTS

- A. EIA/ECA-310 Cabinets, Racks, Panels, and Associated Equipment; Electronic Industries Alliance/Electrical Components Association; Revision E, 2005.
- B. ICEA 5-83-596 Indoor Optical Fiber Cables; Insulated Cable Engineers Association; 2011 (ANSI/ICEA S-83-596).
- C. ICEA S-90-661 Individually Unshielded Twisted Pair Indoor Cables (With or Without An Overall Shield) For Use in General Purpose and LAN Communications Wiring Systems Technical Requirements; Insulated Cable Engineers Association; 2012. (ANSI/ICEA 5-90-661)
- D. NECA/BICSI 568 Standard for Installing Building Telecommunications Cabling; National Electrical Contractors Association; 2006. (ANSI/NECA/BICSI 568)
- E. TIA-568-C Commercial Building Telecommunications Cabling Standard; Telecommunications Industry Association.

1.9 WARRANTY

- A. Division 1 Closeout Submittals
- B. Correct defective work or nonworking items within a 2 year period after Date of Substantial Completion.

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PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. If interconnection is provided and/or designed:
 - 1. Building Entrance Cable to be as provided by the Service Provider.
 - 2. Backbones Fiber: Fiber Optic Cable between data rooms as indicated
 - 3. Horizontal cabling Shall be copper as indicate below.
- C. Provide all cabling in conduit unless specifically indicated otherwise in these specifications or on Contract Drawings. Refer to conduit section for requirements of type of conduit.

2.2 PERFORMANCE REQUIREMENTS

- A. Provide devices connection devices that operate under conditions or 32 degrees F to 140 degrees F at relative humidity of 0 to 95 percent.
- B. Flame Travel and Smoke Density in Plenums: As determined by testing identical products according to NFPA 262 by a qualified testing agency. Identify products for installation in plenums with appropriate markings of applicable testing agency.
 - 1. Flame Travel Distance: 60 inches (1520 mm) or less.
 - 2. Peak Optical Smoke Density: 0.5 or less.
 - 3. Average Optical Smoke Density: 0.15 or less.
- C. Flame Travel and Smoke Density for Riser Cables in Non-Plenum Building Spaces: As determined by testing identical products according to UL 1666.
- D. Flame Travel and Smoke Density for Cables in Non-Riser Applications and Non-Plenum Building Spaces: As determined by testing identical products according to UL 1685.

2.3 ENCLOSURES AND RACKS

- A. Equipment Racks and Cabinets shall be CEA-310 19 wide component racks.
 - 1. Floor mounted racks shall be 16 gauge steel construction with corrosion resistant finish with vertical and horizontal cable management channels and top and bottom cable troughs.

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2.4 OPTICAL-FIBER CABLE

- A. Manufacturers: Subject to campus consistency and compatibility, provide the following:
 - 1. Corning Incorporated 12/12 SM/MM Hybrid Cable.
- B. Description: Single Mode/Multimode, 62.5/125-micrometer
 - 1. 24 fiber, non-conductive, tight-buffer, optical-fiber cable
 - a. 12 fiber Single Mode SME (OS2)
 - b. 12 fiber Multi-Mode 62.5 um (OM1)
 - 2. Tight Buffered (TB2)
 - 3. Comply with ICEA S-83-596 for mechanical properties.
 - 4. Comply with TIA-568-C.3 for performance specifications.
 - 5. RoHS Compliant
 - 6. Listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with UL 444, UL 1651, and NFPA 70 for Plenum Rated, Nonconductive: Type OFNP, complying with NFPA 262
 - 7. Maximum Attenuation:
 - a. OM1 Multi-Mode: 3.5 dB/km at 850 nm; 1.5 dB/km at 1300 nm.
 - b. OS2 Single Mode: 0.4 dB/km at 1310 nm/1550 nm

C. Jacket:

- 1. Jacket Color: Orange.
- 2. Cable cordage jacket, fiber, unit, and group color shall be according to TIA-598-C.
- 3. Imprinted with fiber count, fiber type, manufacture date and aggregate length at regular intervals not to exceed 40 inches (1000 mm).

2.5 OPTICAL-FIBER CABLE HARDWARE

- 1. All termination and connections provided by campus personnel.
- 2. Coordinate with campus on exact location and length of cable in each room.

2.6 UTP CABLE – HORIZONTAL DATA CABLING

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. ADC
 - 2. Alpha Wire Company; a division of Belden Inc.
 - 3. Belden Inc.
 - 4. CommScope, Inc.
 - 5. Draka Cableteq USA.
 - 6. Genesis Cable Products; Honeywell International, Inc.
 - 7. Mohawk; a division of Belden Inc.

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- 8. Nexans; Berk-Tek Products.
- 9. Siemon Company (The).
- 10. Superior Essex Inc.
- 11. SYSTIMAX Solutions; a CommScope, Inc. brand.
- 12. 3M.
- 13. Tyco Electronics/AMP Netconnect; Tyco International Ltd.
- 14. Substitutions: Division 1 Product Requirements.
- B. Provide 24 Solid AWG Category 6a per TIA-568 unless otherwise noted.
- C. Description: 100-ohm, four (4) pair UTP.
 - 1. Comply with ICEA S-90-661 for mechanical properties of Category 5e cables.
 - 2. Comply with ICEA S-102-700 for mechanical properties of Category 6 cables.
 - 3. Comply with TIA-568-C.1 for performance specifications.
 - 4. Comply with TIA-568-C.2, Category 5e, Category 6 or Category 6A.
 - 5. Listed and labeled by an NRTL organization acceptable to authorities having jurisdiction as complying with NFPA 70 for the following types:
 - a. Communications, Plenum Rated: Type CMP complying with UL 1685.

2.7 UTP DATA CABLE HARDWARE

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. ADC.
 - 2. American Technology Systems Industries, Inc.
 - 3. Belden Inc.
 - 4. Dynacom Inc.
 - 5. Hubbell Incorporated.
 - 6. Leviton Commercial Networks Division.
 - 7. Molex Premise Networks: a division of Molex, Inc.
 - 8. Panduit Corp.
 - 9. Siemon Company (The).
 - 10. Tyco Electronics/AMP Netconnect; Tyco International Ltd.
 - 11. Substitutions: Division 1 Product Requirements
- B. General Requirements for Cable Connecting Hardware: Comply with TIA/EIA-568-C.2, IDC type, with modules designed for punch-down caps or tools. Cables shall be terminated with connecting hardware of same category or higher. Utilize 110 style insulation displacement connectors (IDC).
- C. Cross-Connect: Modular array of connecting blocks arranged to terminate building cables and permit interconnection between cables.

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- 1. Number of Terminals per Field: One for each conductor in assigned cables.
- D. Patch Panel: Provided by campus personnel.
 - 1. Number of Jacks per Field: One for each four-pair UTP cable indicated.
- E. Jacks and Jack Assemblies: 100-ohm, balanced, twisted-pair connector; four-pair, eight-position modular RJ-45 style capable of 500 mating cycles minimum. Comply with TIA/EIA-568-C.1.
- F. Patch Cords: Provided by campus personnel.
- G. Workstation Outlets: Two -port-connector assemblies mounted in single faceplate. Provide individual cables, 6 feet in length, for each faceplate.
 - 1. Patch cords shall have bend-relief-compliant boots and color-coded icons to ensure Category 6a or better performance. Patch cords shall have latch guards to protect against snagging.

H. Outlet Boxes:

- 1. Provide depth as required to accommodate cable manufacturer's recommended minimum conductor bend radius.
- 2. Copper RJ-45 jacks: 4 inch by 2 inch by 2.125 inch (100 by 50 by 54 mm) trade size minimum unless indicated otherwise.

I. Faceplates:

- 1. Faceplate: Coordinate type, material and color with Section "Wiring Devices."
- 2. For use with snap-in jacks accommodating any combination of UTP, optical-fiber, and coaxial work area cords. Use Flush-mounted jacks, positioning the cord at a 45-degree angle.

J. Legend:

- 1. Machine printed, in the field, using adhesive-tape label.
- 2. Snap-in, clear-label covers and machine-printed paper inserts.

2.8 LOW-VOLTAGE CONTROL CABLE

- A. This includes all control cabling not specified in other locations of these specifications and used for lighting, access control, security, mechanical and plumbing applications and all other control cable uses. When not specified, contractor will use Plenum-Rated cable.
- B. Plenum-Rated, Paired Cable: NFPA 70, Type CMP.
 - 1. Multi-pair, twisted, No. 16 AWG, stranded (19x29) tinned-copper conductors.
 - 2. PVC insulation.
 - 3. Unshielded.

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- 4. PVC jacket.
- 5. Flame Resistance: Comply with NFPA 262.

2.9 CONTROL-CIRCUIT CONDUCTORS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Encore Wire Corporation.
 - 2. General Cable Technologies Corporation.
 - 3. Southwire Company.
 - 4. Substitutions: Division 1 Product Requirements.
- B. Class 1 Control Circuits: Stranded copper, Type THHN-2-THWN-2, in raceway, complying with UL 83.
- C. Class 2 Control Circuits: Stranded copper, Type THHN-2-THWN-2, complying with UL 83.
- D. Class 3 Remote-Control and Signal Circuits: Stranded copper, Type THHN-2-THWN-2, in raceway, complying with UL 83.

2.10 DMX/DMX512 CABLES

- A. Plenum-Rated Cable: NFPA 70, Type CMP.
 - 1. Five conductor, No. 24 AWG, stranded (7x32) tinned-copper conductors.
 - 2. Fluorinated ethylene propylene insulation.
 - 3. Unshielded
 - 4. Fluorinated ethylene propylene jacket.
 - 5. Flame Resistance: NFPA 262.
- B. Standard EIA-485 communication protocol.
- C. Connectors
 - 1. Verify connector requirement of equipment
 - 2. 100 ohm, balanced XLR-5 5 pin connector as required by equipment
 - 3. 100-ohm, balanced, twisted-pair connector; four-pair, eight-position modular RJ-45 style capable of 500 mating cycles minimum. Comply with TIA/EIA-568-C.1. Provide as required by equipment
- D. Provider terminator connector with 120 ohm resistor at end of each data cable network.
- E. Network: Daisy Chain topology. Provide no more than 32 unit loads per bus.

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- F. Network booster/splitter: Provide as indicated.
 - 1. Provide buffered splitter with booster
 - 2. 120VAC only
 - 3. Include buffered splitter as required for greater that allowable channels on a single bus.
 - 4. Provide bus/universe layout drawing to show network.

2.11 CABLE IDENTIFICATION AND USAGE

- A. Provide jacket colors as follows unless indicated on Contract Drawings:
 - 1. Data: Blue
 - 2. BACNET MS/TP: Purple
 - 3. CCTV/Video: Black
 - 4. Lighting: Green
 - 5. Optical Fiber: Orange
 - 6. Equipment Controls: White

2.12 SOURCE QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to evaluate cables.
- B. Factory test UTP cables according to TIA-568-C.2.
- C. Factory test optical-fiber cables according to TIA-568-C.3.
- D. Cable will be considered defective if it does not pass tests and inspections.
- E. Prepare test and inspection reports.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Test cables on receipt at Project site.
 - 1. Test optical-fiber cable to determine the continuity of the strand end to end. Use optical loss test set.
 - 2. Test optical-fiber cable on reels. Use an optical time domain reflectometer to verify the cable length and locate cable defects, splices, and connector; include the loss value of each. Retain test data and include the record in maintenance data.
 - 3. Test each pair of UTP cable for open and short circuits.

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3.2 INSTALLATION OF RACEWAYS AND BOXES

- A. Comply with requirements in Section "Raceways and Boxes for Electrical Systems" for raceway selection and installation requirements for boxes, conduits, and wireways as supplemented or modified in this Section.
 - 1. Outlet boxes shall be no smaller than 2 inches (50 mm) wide, 3 inches (75 mm) high, and 2-1/2 inches (64 mm) deep.
 - 2. Outlet boxes for optical-fiber cables shall be no smaller than 4 inches (102 mm) square by 2-1/8 inches (53 mm) deep with extension ring sized to bring edge of ring to within 1/8 inch (3.1 mm) of the finished wall surface.
 - 3. Flexible metal conduit shall not be used.
- B. Comply with TIA-569-B for pull-box sizing and length of conduit and number of bends between pull points.
- C. Install manufactured conduit sweeps and long-radius elbows if possible.
- D. Raceway Installation in Equipment Rooms:
 - 1. Position conduit ends adjacent to a corner on backboard if a single piece of plywood is installed, or in the corner of the room if multiple sheets of plywood are installed around perimeter walls of the room.
 - 2. Install cable trays to route cables if conduits cannot be located in these positions.
 - 3. Secure conduits to backboard if entering the room from overhead.
 - 4. Extend conduits 3 inches (75 mm) above finished floor.
 - 5. Install metal conduits with grounding bushings and connect with grounding conductor to grounding system.
- E. Backboards: Install backboards with 96-inch (2440-mm) dimension vertical. Butt adjacent sheets tightly and form smooth gap-free corners and joints.

3.3 INSTALLATION OF CONDUCTORS AND CABLES

- A. Comply with NECA 1 and NFPA 70.
- B. General Requirements for Cabling:
 - 1. Comply with TIA-568-C Series of standards.
 - 2. Comply with BICSI ITSIMM, Ch. 5, "Copper Structured Cabling Systems" and Ch. 6, "Optical Fiber Structured Cabling Systems."
 - 3. Terminate all conductors and optical fibers; no cable shall contain unterminated elements. Make terminations only at indicated outlets, terminals, and cross-connect and patch panels.
 - 4. Cables may not be spliced.

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- 5. Secure and support cables at intervals not exceeding 30 inches (760 mm) and not more than 6 inches (150 mm) from cabinets, boxes, fittings, outlets, racks, frames, and terminals.
- 6. Bundle, lace, and train conductors to terminal points without exceeding manufacturer's limitations on bending radii, but not less than radii specified in BICSI ITSIMM, Ch. 5, "Copper Structured Cabling Systems" and Ch. 6, "Optical Fiber Structured Cabling Systems." Install lacing bars and distribution spools.
- 7. Do not install bruised, kinked, scored, deformed, or abraded cable. Do not splice cable between termination, tap, or junction points. Remove and discard cable if damaged during installation and replace it with new cable.
- 8. Cold-Weather Installation: Bring cable to room temperature before removing from reel. Do not use heat lamps for heating.
- 9. Pulling Cable: Comply with BICSI ITSIMM, Ch. 5, "Copper Structured Cabling Systems" and Ch. 6, "Optical Fiber Structured Cabling Systems." Monitor cable pull tensions
- 10. Support: Do not allow cables to lay on removable ceiling tiles.
- 11. Secure: Fasten securely in place with hardware specifically designed and installed so as to not damage cables.

C. UTP Cable Installation:

- 1. Comply with TIA-568-C.2.
- 2. Install termination hardware as specified in Section "Communications Horizontal Cabling" unless otherwise indicated.
- 3. Do not untwist UTP cables more than 1/2 inch (12 mm) at the point of termination to maintain cable geometry.

D. Installation of Control-Circuit Conductors:

1. Install wiring in raceways. Comply with requirements specified in Section "Raceways and Boxes for Electrical Systems."

E. Optical-Fiber Cable Installation:

- 1. Comply with TIA-568-C.3.
- 2. Terminate cable at location as coordinated with campus personnel.

F. Open-Cable Installation:

- 1. Install cabling with horizontal and vertical cable guides in telecommunications spaces.
- 2. Suspend copper cable not in a wireway or pathway a minimum of 8 inches (200 mm) above ceilings by cable supports not more than 30 inches (760 mm) apart.
- 3. Cable shall not be run through or on structural members or in contact with pipes, ducts, or other potentially damaging items. Do not run cables between structural members and corrugated panels.

G. Separation from EMI Sources:

- 1. Comply with BICSI TDMM and TIA-569-B recommendations for separating unshielded copper voice and data communications cable from potential EMI sources including electrical power lines and equipment.
- 2. Separation between open communications cables or cables in nonmetallic raceways and unshielded power conductors and electrical equipment shall be as follows:
 - a. Electrical Equipment or Circuit Rating Less Than 2 kVA: A minimum of 5 inches (127 mm).
 - b. Electrical Equipment or Circuit Rating between 2 and 5 kVA: A minimum of 12 inches (305 mm).
 - c. Electrical Equipment or Circuit Rating More Than 5 kVA: A minimum of 24 inches (600 mm).
- 3. Separation between communications cables in grounded metallic raceways and unshielded power lines or electrical equipment shall be as follows:
 - a. Electrical Equipment or Circuit Rating Less Than 2 kVA: A minimum of 2-1/2 inches (64 mm).
 - b. Electrical Equipment or Circuit Rating between 2 and 5 kVA: A minimum of 6 inches (150 mm).
 - c. Electrical Equipment or Circuit Rating More Than 5 kVA: A minimum of 12 inches (305 mm).
- 4. Separation between communications cables in grounded metallic raceways and power lines and electrical equipment located in grounded metallic conduits or enclosures shall be as follows:
 - a. Electrical Equipment or Circuit Rating Less Than 2 kVA: No requirement.
 - b. Electrical Equipment or Circuit Rating between 2 and 5 kVA: A minimum of 3 inches (75 mm).
 - c. Electrical Equipment or Circuit Rating More Than 5 kVA: A minimum of 6 inches (150 mm).
- 5. Separation between Communications Cables and Electrical Motors and Transformers, 5 kVA or 5 HP and Larger: A minimum of 48 inches (1200 mm).
- 6. Separation between Communications Cables and Fluorescent Fixtures: A minimum of 5 inches (127 mm).

3.4 REMOVAL OF CONDUCTORS AND CABLES

A. Remove abandoned conductors and cables. Abandoned conductors and cables are those installed that are not terminated at equipment and are not identified for future use with a tag.

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3.5 CONTROL-CIRCUIT CONDUCTORS

A. Minimum Conductor Sizes:

- 1. Class 1 remote-control and signal circuits; No 14 AWG.
- 2. Class 2 low-energy, remote-control, and signal circuits; No. 16 AWG.
- 3. Class 3 low-energy, remote-control, alarm, and signal circuits; No 12 AWG.

3.6 FIRESTOPPING

- A. Comply with requirements in Section "Firestopping for Electrical Systems"
- B. Comply with TIA-569-B, Annex A, "Firestopping."
- C. Comply with BICSI TDMM, "Firestopping" Chapter.

3.7 GROUNDING

- A. For data communication wiring, comply with ANSI-J-STD-607-A and with BICSI TDMM, "Bonding and Grounding (Earthing)" Chapter.
- B. For low-voltage control wiring and cabling, comply with requirements in Section "Grounding and Bonding for Electrical Systems."

3.8 IDENTIFICATION

- A. Comply with requirements for identification specified in Section "Identification for Electrical Systems."
- B. Identify data and communications system components, wiring, and cabling according to TIA-606-A; label printers shall use label stocks, laminating adhesives, and inks complying with UL 969.

3.9 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- B. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.
- C. Perform the following tests and inspections:

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- 1. Visually inspect UTP and optical-fiber cable jacket materials for UL or third-party certification markings. Inspect cabling terminations to confirm color-coding for pin assignments, and inspect cabling connections to confirm compliance with TIA-568-C.1.
- 2. Visually inspect cable placement, cable termination, grounding and bonding, equipment and patch cords, and labeling of all components.
- 3. Inspect and test in accordance with NETA ATS, except Section 4. Test ALL cabling for direct-current loop resistance, shorts, opens, intermittent faults, and polarity between conductors. Test operation of shorting bars in connection blocks. Test cables after termination but not after cross-connection.
 - a. Test instruments shall meet or exceed applicable requirements in TIA-568-C.2. Perform tests with a tester that complies with performance requirements in "Test Instruments (Normative)" Annex, complying with measurement accuracy specified in "Measurement Accuracy (Informative)" Annex. Use only test cords and adapters that are qualified by test equipment manufacturer for channel or link test configuration.

4. Optical-Fiber Cable Tests:

- a. Test instruments shall meet or exceed applicable requirements in TIA-568-C.0. Use only test cords and adapters that are qualified by test equipment manufacturer for channel or link test configuration.
- b. Link End-to-End Attenuation Tests:
 - 1) Multimode Link Measurements: Test at 850 or 1300 nm in one direction according to TIA/EIA-526-14-A, Method B, One Reference Jumper.
 - 2) Attenuation test results for links shall be less than [2.0 dB] [that calculated according to equation in TIA-568-C.0].
- D. Document data for each measurement. Print data for submittals in a summary report that is formatted using Table 10.1 in BICSI TDMM as a guide, or transfer the data from the instrument to the computer, save as text files, print, and submit.
- E. End-to-end cabling will be considered defective if it does not pass tests and inspections.
- F. Prepare test and inspection reports.

END OF SECTION

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SECTION 260526 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Wire for Grounding.
 - 2. Mechanical connectors.
- B. Related Sections:
 - 1. Division 1 Administrative Requirements, Submittal Procedures: Submittal procedures, Product Requirements, Execution and Closeout Requirements
 - 2. Common Work Results for Electrical Systems.

1.2 REFERENCES

- A. Institute of Electrical and Electronics Engineers:
 - 1. IEEE 81 Guide for Measuring Earth Resistivity, Ground Impedance and Earth Surface Potentials of a Ground Systems
 - 2. IEEE 142 Recommended Practice for Grounding of Industrial and Commercial Power Systems.
 - 3. IEEE 1100 Recommended Practice for Powering and Grounding Electronic Equipment.
- B. International Electrical Testing Association:
 - 1. NETA ATS Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.
- C. National Fire Protection Association:
 - 1. NFPA 70 National Electrical Code.
 - 2. NFPA 99 Standard for Health Care Facilities.
 - 3. NFPA 780 Standard for Installation of Lightning Protection Systems

1.3 SYSTEM DESCRIPTION

- A. Grounding systems use the following elements as grounding electrodes:
 - 1. Metal underground water pipe.
 - 2. Metal building frame.
 - 3. Concrete-encased electrode.
 - 4. Ground ring specified.
 - 5. Rod electrode.
 - 6. Plate electrode.

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1.4 PERFORMANCE REQUIREMENTS

- A. Grounding System Resistance
 - 1. Less than 1 ohm for Intrinsically Safe, instrumentation or isolated computer grounds.
 - 2. Less than 5 ohms for electrical system ground.
 - 3. Less than 25 ohms for structural system ground.

1.5 SUBMITTALS

- A. Division 1 Submittal Procedures: Requirements for submittals.
 - 1. Prior to construction:
 - a. Submit Product Data for grounding electrodes and connections.
 - b. Submit Product data for all bonding devices.
 - c. Submit Product data for ground enhancement material if used.
 - d. Submit Product Data on exothermic connections and molds.
 - e. Submit Manufacturer's Instructions. Include instructions for storage, handling, protection, examination, preparation and installation of exothermic connectors.

2. After construction:

- a. Submit Test Reports. Indicate overall resistance to ground for various ground systems. Include information on test instruments and method used including instrument make and model and calibration status. Indicate exact locations where test values were measured and electrodes were placed during tests.
- b. Submit accurate record documents showing actual locations of grounding electrodes.

1.6 CLOSEOUT SUBMITTALS

- A. Division 1 Execution and Closeout Requirements: Requirements for submittals.
- B. Project Record Documents: Record actual locations of components and grounding electrodes.

1.7 QUALITY ASSURANCE

- A. Provide grounding materials conforming to requirements of NEC, IEEE 142, and UL labeled.
- B. Maintain one copy of each document on site.

1.8 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum three years documented experience.

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B. Installer: Company specializing in performing work of this section with minimum 3 years documented experience approved by manufacturer.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Division 1 Product Requirements: Requirements for transporting, handling, storing, and protecting products.
- B. Accept materials on site in original factory packaging, labeled with manufacturer's identification.
- C. Protect from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original packaging.
- D. Do not deliver items to project before time of installation. Limit shipment of bulk and multiple-use materials to quantities needed for immediate installation.

1.10 COORDINATION

- A. Division 1 Administrative Requirements: Requirements for coordination.
- B. Complete grounding and bonding of building reinforcing steel prior concrete placement.

PART 2 PRODUCTS

2.1 MECHANICAL CONNECTORS

- A. Manufacturers:
 - 1. Cooper Power Systems,
 - 2. Framatome Connectors International (FCI)
 - 3. Burndy,
 - 4. Ilsco Corp.
 - 5. Substitutions: Division 1 Product Requirements.
- B. Furnish materials in accordance with State of New York standards.
- C. Description: Bronze connectors, suitable for grounding and bonding applications, in configurations required for particular installation.
 - 1. Connectors, clamps and terminals mechanical connectors and clamps made of copper allow or silicon bronze.
 - 2. Pipe clamp for bonding to pipe type electrodes (water pipe, etc.) made of copper alloy.
 - 3. Flexible grounding strap shall be of braided conductivity copper with two-hole connector. Ampacity equal to or greater than ampacity of the system of device connected to.

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2.2 WIRE AND CONDUCTORS

- A. Material: Stranded copper, ASTM B3. Provide insulated conductors except:
 - 1. Use bare copper where conductor is installed underground in direct contact with earth.
 - 2. Use bare copper where conductor is directly encased in concrete and not indicated to be in raceway.
- B. Foundation Electrodes: #2/0 AWG.
- C. Equipment Ground Conductors:
 - 1. Provide insulated ground conductor as indicated on the contract documents.
 - 2. When not specifically indicated on the contract documents and associated with a feeder or branch circuit, use the same size conductor as the feeder or branch circuit.
 - 3. Provide #6 insulated ground conductor to cable trays, equipment racks, etc. unless indicated otherwise.

D. Bonding Conductors:

- 1. Provide bonding of neutral to ground at PCC location noted on the Contract Drawings
- 2. Provide bonding to ground of all neutral points of the secondary of all transformers using dedicated insulated ground conductors and at locations noted on the Contract Drawings.
- 3. Unless indicated otherwise, provide #4/0 ground conductors from generator to transfer switches or distribution panels.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Division 1 Administrative Requirements: Verification of existing conditions before starting work.
- B. Verify final backfill and compaction has been completed before driving rod electrodes.

3.2 PREPARATION

A. Remove paint, rust, mill oils and surface contaminants at connection points.

3.3 EXISTING WORK

- A. Modify existing grounding system to maintain continuity to accommodate renovations.
- B. Extend existing grounding system using materials and methods compatible with existing electrical installations, or as specified.

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3.4 INSTALLATION

- A. Install in accordance with IEEE 142.
- B. Conductor connections below grade shall be a minimum of 24 inches below finished grade and shall be exothermic welds.
- C. Install rod electrodes at locations as indicated on Drawings. Install additional rod electrodes to achieve specified resistance to ground. Make all connections to rods with exothermic welds.
- D. Install grounding and bonding conductors concealed from view.
- E. Install grounding well pipe with cover at each rod location. Install well pipe top flush with finished grade.
- F. Install grounding electrode conductor and connect to reinforcing steel in foundation footing. Electrically bond steel together.
- G. Bond together discontinuous or potentially discontinuous sections of metal fencing, including gates, locations where directed by Architect/Engineer and locations as shown on drawings using exothermic connections. Provide grounding electrode conductor from fence near discontinuity to ground rod. Locate ground rod within ten (10) feet of discontinuity. Connect to fence with pipe or ground connectors listed for application. Bond grounding electrode conductors to ground rods with exothermic connections.
- H. Install grounding and bonding in patient care areas to meet requirements of NFPA 99.
- I. Equipment Grounding Conductor: Install separate, insulated conductor within each feeder and branch circuit raceway. Terminate each end on suitable lug, bus, or bushing. Use flexible straps for vibrating/moveable equipment.
- J. Connect to site grounding system as indicated on the contract drawings.
- K. Permanently ground entire light and power system in accordance with NEC, including service equipment, distribution panels, lighting panelboards, switch and starter enclosures, motor frames, grounding type receptacles, and other exposed non-current carrying metal parts of electrical equipment.
- L. Install branch circuits feeding isolated ground receptacles with separate insulated grounding conductor, connected only at isolated ground receptacle, ground terminals, and at ground bus of serving panel.
- M. Accomplish grounding of electrical system by using insulated grounding conductor installed with feeders and branch circuit conductors in conduits. Size grounding conductors in accordance with NEC. Install from grounding bus of serving panel to

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ground bus of served panel, grounding screw of receptacles, lighting fixture housing, light switch outlet boxes or metal enclosures of service equipment. Ground conduits by means of grounding bushings on terminations at panelboards with installed #12 insulated conductor to grounding bus.

- N. Grounding electrical system using continuous metal raceway system enclosing circuit conductors in accordance with NEC.
- O. Permanently attach equipment and grounding conductors prior to energizing equipment.

3.5 FIELD QUALITY CONTROL

- A. Inspect and test in accordance with NETA ATS, except Section 4.
- B. Grounding and Bonding: Perform inspections and tests listed in NETA ATS, Section 7.13.
- C. Perform leakage current tests in accordance with NFPA 99.
- D. Perform continuity testing on all grounds in accordance with IEEE 142.
- E. When improper grounding is found on receptacles, check receptacles in entire project and correct. Perform retest.

END OF SECTION

SECTION 260529 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Hangers and supports for electrical equipment and systems.
 - 2. Construction requirements for concrete bases.

B. Related Sections:

- 1. Division 1 Administrative Requirements, Submittal Procedures, Product Requirements, Execution and Closeout Requirements
- 2. Common Work Results for Electrical Systems.

1.3 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Design supports for multiple raceways, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
- B. Design supports for multiple raceways capable of supporting combined weight of supported systems and its contents.
- C. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.
- D. Rated Strength: Adequate in tension, shear, and pullout force to resist maximum loads calculated or imposed for this Project, with a minimum structural safety factor of five times the applied force.

1.4 ACTION SUBMITTALS

- A. Product Data: For the following:
 - 1. Steel slotted support systems.

- 2. Nonmetallic slotted support systems.
- B. Shop Drawings: Show fabrication and installation details and include calculations for the following:
 - 1. Trapeze hangers. Include Product Data for components.
 - 2. Steel slotted channel systems. Include Product Data for components.
 - 3. Nonmetallic slotted channel systems. Include Product Data for components.
 - 4. Equipment supports.

1.5 INFORMATIONAL SUBMITTALS

A. Welding certificates.

1.6 QUALITY ASSURANCE

- A. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code Steel."
- B. Comply with NFPA 70.

1.7 COORDINATION

- A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified with concrete. Unless indicated otherwise, ensure concrete bases are 3500 PSI (minimum), six (6) inches to flush top with chamfer edges, trowel finish and securely bonded to floor below.
- B. Coordinate installation of wall-mounting and structure-hanging supports with actual transformer provided. Provide manufacturer's standard brackets with external seismic supports.

PART 2 - PRODUCTS

2.1 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

- A. Steel Slotted Support Systems: Comply with MFMA-4, factory-fabricated components for field assembly.
 - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

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- a. Allied Tube & Conduit.
- b. Cooper B-Line, Inc.; a division of Cooper Industries.
- c. ERICO International Corporation.
- d. GS Metals Corp.
- e. Thomas & Betts Corporation.
- f. Unistrut; Tyco International, Ltd.
- g. Wesanco, Inc.
- h. Substitutions: Division 1 Product Requirements.
- 3. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.
 - a. Finish to be ASTM B5633-78 Type LS coating electrogalvanized on steel to 0.0005 inch with gold zinc dichromate barrier. Coating to be applied afer factory fabrication and punching.
- 4. Channel Dimensions: Selected for applicable load criteria.
 - a. Provide 1.5" cross sectional width unless indicated or approved otherwise.
 - b. Channels smaller than 1.5" depth to be 14 gauge minimum thickness.
 - c. Channels larger than 1.25" depth to be 12 gauge minimum thickness.
- B. Raceway and Cable Supports: As described in NECA 1 and NECA 101.
- C. Conduit and Cable Support Devices: Steel hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.
- D. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for non-armored electrical conductors or cables in riser conduits. Plugs shall have number, size, and shape of conductor gripping pieces as required to suit individual conductors or cables supported. Body shall be malleable iron.
- E. Structural Steel for Fabricated Supports and Restraints: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.
- F. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:
 - 1. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened Portland cement concrete, steel, or wood, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.
 - a. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - b. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) Hilti Inc.
 - 2) ITW Ramset/Red Head; a division of Illinois Tool Works, Inc.

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- 3) MKT Fastening, LLC.
- 4) Simpson Strong-Tie Co., Inc.; Masterset Fastening Systems Unit.
- 5) Division 1 Product Requirements.
- 2. Mechanical-Expansion Anchors: Insert-wedge-type, stainless steel, for use in hardened Portland cement concrete with tension, shear, and pullout capacities appropriate for supported loads and building materials in which used.
 - a. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - b. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) Cooper B-Line, Inc.; a division of Cooper Industries.
 - 2) Empire Tool and Manufacturing Co., Inc.
 - 3) Hilti Inc.
 - 4) ITW Ramset/Red Head; a division of Illinois Tool Works, Inc.
 - 5) MKT Fastening, LLC.
 - 6) Substitutions: Division 1 Product Requirements.
- 3. Concrete Inserts: Steel or malleable-iron, slotted support system units similar to MSS Type 18; complying with MFMA-4 or MSS SP-58.
- 4. Clamps for Attachment to Steel Structural Elements: MSS SP-58, type suitable for attached structural element.
- 5. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM A 325.
- 6. Toggle Bolts: All-steel springhead type.
- 7. Hanger Rods: Threaded steel.

2.2 FABRICATED METAL EQUIPMENT SUPPORT ASSEMBLIES

- A. Description: Welded or bolted, structural-steel shapes, shop or field fabricated to fit dimensions of supported equipment.
- B. Materials: Comply with requirements for steel shapes and plates.

PART 3 - EXECUTION

3.1 APPLICATION

A. Comply with NECA 1 and NECA 101 for application of hangers and supports for electrical equipment and systems except if requirements in this Section are stricter.

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- B. Maximum Support Spacing and Minimum Hanger Rod Size for Raceway: Space supports for EMT, IMC, and RMC as required by NFPA 70. Minimum rod size shall be 3/8 inch in diameter.
- C. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted support system, sized so capacity can be increased by at least 25 percent in future without exceeding specified design load limits.
 - 1. Secure raceways and cables to these supports with single-bolt conduit clamps.
- D. Spring-steel clamps designed for supporting single conduits without bolts may be used for 1-1/2-inch (38-mm) and smaller raceways serving branch circuits and communication systems above suspended ceilings and for fastening raceways to trapeze supports.

3.2 SUPPORT INSTALLATION

- A. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this Article.
- B. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb (90 kg).
- C. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:
 - 1. To Wood: Fasten with lag screws or through bolts.
 - 2. To New Concrete: Bolt to concrete inserts.
 - 3. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
 - 4. To Existing Concrete: Expansion anchor fasteners.
 - 5. Instead of expansion anchors, powder-actuated driven threaded studs provided with lock washers and nuts may be used in existing standard-weight concrete 4 inches (100 mm) thick or greater. Do not use for anchorage to lightweight-aggregate concrete or for slabs less than 4 inches (100 mm) thick.
 - 6. To Steel: Welded threaded studs complying with AWS D1.1/D1.1M, with lock washers and nuts or Beam clamps (MSS Type 19, 21, 23, 25, or 27) complying with MSS SP-69.
 - 7. To Light Steel: Sheet metal screws.
 - 8. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slotted-channel racks attached to substrate by means that meet seismic-restraint strength and anchorage requirements.
- D. Drill holes for expansion anchors in concrete at locations and to depths that avoid reinforcing bars.

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3.3 INSTALLATION OF FABRICATED METAL SUPPORTS

- A. Comply with installation requirements in Section "Metal Fabrications" for site-fabricated metal supports.
- B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.
- C. Field Welding: Comply with AWS D1.1/D1.1M.

3.4 PAINTING

- A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.
 - 1. Apply paint by brush or spray to provide minimum dry film thickness of 2.0 mils (0.05 mm).
- B. Touchup: Comply with requirements in "Exterior Painting", "Interior Painting" or "High Performance Coatings" for cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal.
- C. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

END OF SECTION

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SECTION 260533 - RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

SUMMARY 1.1

A. Section includes conduit and tubing, surface raceways, wire-way, outlet boxes, pull and junction boxes and nonmetallic non-concrete hand holes and manholes.

B. Related Sections:

- 1. Division 1 Administrative Requirements, Submittal Procedures: Submittal procedures, Product Requirements, Execution and Closeout Requirements
- Common Work Results for Electrical Systems.
- Grounding and Bonding for Electrical Systems.
- 4. Hangers and Supports for Electrical Systems.

1.2 REFERENCES

- A. American National Standards Institute:
 - 1. ANSI C80.1 Rigid Steel Conduit, Zinc Coated.
 - 2. ANSI C80.3 Specification for Electrical Metallic Tubing, Zinc Coated.
 - 3. ANSI/UL 913 Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II. and III Division 1 Hazardous Locations
- B. National Electrical Manufacturers Association:
 - 1. NEMA 250 Enclosures for Electrical Equipment (1000 Volts Maximum).
 - 2. NEMA FB 1 Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit and Cable Assemblies.
 - 3. NEMA RN 1 Polyvinyl Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit.
 - 4. NEMA TC 2 Electrical Polyvinyl Chloride (PVC) Tubing and Conduit.
 - 5. NEMA TC 3 PVC Fittings for Use with Rigid PVC Conduit and Tubing.
- C. National Fire Protection Administration
 - 1. NFPA 70 National Electric Code
- D. National Electrical Contractors Association
 - 1. NECA Standard of Installation

SYSTEM DESCRIPTION 1.3

- A. Raceways and boxes located as indicated on Drawings and at other locations required for wire pulling and compliance with regulatory requirements. Raceways and boxes are shown in approximate locations unless dimensioned. Provide raceway to complete wiring system.
- B. Minimum Conduit Raceway Size: 1/2 inch for individual branch circuits or single cable applications and 3/4 inch all other locations unless otherwise specified.

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- C. No metal connectors, fittings or sections of metal conduit (Rigid Steel Conduit, Electrical Metallic Tubing or PVC coated Rigid Steel Conduit) or Flexible Conduit or metal encased cable with metal components, will be allowed in continuous runs of any Non-Metallic Conduit including those with Flexible Conduit.
- D. Outdoor Locations, Above Grade: Provide Schedule 80 nonmetallic conduit or PVC coated Rigid Steel Conduit. Provide nonmetallic or PVC coated cast outlet, pull or junction boxes to match conduit.
- E. Wet and Damp Locations: Schedule 80 nonmetallic conduit or PVC coated Rigid Steel Conduit. When mounted in areas or locations of possible mechanical damage such as along exposed in-ground tanks or as indicated on contract drawings, use only PVC coated Rigid Steel Conduit. Provide PVC Coated cast metal or nonmetallic outlet, junction, and pull boxes. Provide flush mounting outlet box in finished areas.
- F. Concealed Dry Locations: Provide in locations such as above ceilings and/or in gypsum wall applications, use Rigid Steel Conduit or Electrical Metallic Tubing (EMT). Provide sheetmetal boxes to match conduit. Provide flush mounting outlet box in finished areas. Provide hinged enclosure for large pull boxes. For installations in masonry or concrete walls, or conduit containing conductors at greater than 600V, use Rigid Steel Conduit only.
- G. Exposed Dry Locations: Provide Rigid Steel Conduit, Electrical Metallic Tubing (EMT) or Schedule 80 nonmetallic conduit. Provide nonmetallic, cast or sheet-metal boxes to match conduit. Provide surface mounting outlet box in finished areas. Provide hinged enclosure for large pull boxes.
- H. Use flexible conduit to connect rigid conduit to instruments, lights, motors and other electrical devices where direct connection with rigid conduit is not practical or device is prone to vibration. Flexible conduit is not to be installed taut. Length of connection made with flexible conduit is not to exceed five (5) feet in length from rigid conduit to device. Rigid conduits are to be supported within 6 inches of connection to flexible conduit. Do not install flexible conduit longer than five (5) feet in length.

1.4 SUBMITTALS

- A. Division 1 Submittal Procedures: Submittal procedures.
- B. Product Data: Submit for the following:
 - 1. Flexible metal conduit.
 - 2. Liquidtight flexible metal conduit.
 - 3. Raceway fittings.
 - 4. Conduit bodies.
- C. Manufacturer's Installation Instructions: Submit application conditions and limitations of use stipulated by Product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, and installation of Product.

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- D. For surface raceway and wireway, provide:
 - 1. Three 6 inch lengths of surface raceways with required color and finish.
 - 2. Provide raceway layouts with each system component required for complete system, raceway lengths, device types, locations, elevations, details, sections and attachment to other work and raceways.

1.5 CLOSEOUT SUBMITTALS

- A. Division 1 Execution and Closeout Requirements: Closeout procedures.
- B. Project Record Documents:
 - 1. Record actual routing of conduits larger than 2 inches.
 - 2. Record actual locations and mounting heights of outlet, pull, and junction boxes.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Division 1 Product Requirements: Product storage and handling requirements.
- B. Protect conduit from corrosion and entrance of debris by storing above grade. Provide appropriate covering.
- C. Protect nonmetallic conduit from sunlight. For all nonmetallic conduit, provide appropriate end cap covers to prevent air flow through sections and spools during storage.

1.7 COORDINATION

- A. Division 1 Administrative Requirements: Coordination and project conditions.
- B. Coordinate installation of outlet boxes for equipment connected under related sections.
- C. Verify that field measurements are as shown on Drawings.
- D. Coordinate mounting heights, orientation and locations of outlets mounted above counters, benches, and backsplashes.
- E. Verify routing and termination locations of conduit prior to rough-in.
- F. Conduit routing shown on Drawings is approximate unless dimensioned. Route as required to complete wiring system.

PART 2 PRODUCTS

2.1 RIGID METAL CONDUIT (RMC)

- A. Manufacturers:
 - 1. Allied Tube & Conduit; a part of Atkore International.
 - 2. Western Tube and Conduit Corporation.

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- 3. Wheatland Tube Company.
- 4. Steel Duct.
- 5. Triangle.
- 6. Substitutions: Division 1 Product Requirements.
- B. Rigid Galvanized Steel Conduit (RGS): UL listed ANSI C80.1.
 - 1. All Rigid Metal Conduit shall be Hot Dip Galvanized Steel. No other material will be allowed.
 - 2. All threads, whether manufactured or field threaded, shall be galvanized prior to assembly.
 - 3. Use insulated sealing conduit hubs to fasten Rigid Metallic Conduit to boxes and panels. Do not use insulated locknuts or other devices to terminate Rigid Metallic Conduit.
- C. Fittings and Conduit Bodies: NEMA FB 1; galvanized steel.

2.2 FLEXIBLE METAL CONDUIT (FMC)

- A. Manufacturers:
 - 1. AFC Cable Systems, Inc.
 - 2. EGS/Appleton Electric.
 - 3. Southwire Company.
 - 4. Substitutions: Division 1 Product Requirements.
- B. Product Description: UL listed interlocked steel construction.
- C. Fittings: NEMA FB 1.

2.3 LIQUIDTIGHT FLEXIBLE METAL CONDUIT (LFMC)

- A. Manufacturers:
 - 1. AFC Cable Systems, Inc.
 - 2. Carlon; a brand of Thomas & Betts Corporation.
 - 3. Southwire Company.
 - 4. Substitutions: Division 1 Product Requirements.
- B. Product Description: UL listed interlocked galvanized steel construction with PVC jacket.
- C. Fittings: NEMA FB 1.

2.4 ELECTRICAL METALLIC TUBING (EMT)

- A. Manufacturers:
 - 1. Carlon; a brand of Thomas & Betts Corporation.
 - 2. Western Tube and Conduit Corporation.
 - 3. Wheatland Tube Company.
 - 4. Substitutions: Division 1 Product Requirements.
- B. Product Description: ANSI C80.3; galvanized steel tubing.

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C. Fittings and Conduit Bodies: NEMA FB 1; steel or zinc, compression or set screw with combination hex head and Phillips head type only.

2.5 WIREWAY

- A. Manufacturers:
 - 1. Carlon; a brand of Thomas & Betts Corporation.
 - 2. Cooper B-Line, Inc.; a division of Cooper Industries.
 - 3. Square D; by Schneider Electric.
 - 4. Substitutions: Division 1 Product Requirements.
- B. Product Description: General purpose (NEMA 12) or Raintight (NEMA 3R or 4) type wireway per plans and per area classification and consistent with raceway or conduit attached.
- C. Knockouts: Manufacturer's standard.
- D. Connector: Flanged.
- E. Fittings: Lay-in type with removable top, bottom, and side; captive screws.
- F. Finish: Rust inhibiting primer coating with gray enamel finish.

2.6 OUTLET BOXES

- A. Manufacturers:
 - 1. Carlon; a brand of Thomas & Betts Corporation.
 - 2. RACO; Hubbell.
 - 3. Pass & Seymour; Legrand.
 - 4. Substitutions: Division 1 Product Requirements.
- B. Sheet Metal Outlet Boxes: NEMA OS 1, galvanized steel.
 - 1. Luminaire and Equipment Supporting Boxes: Rated for weight of equipment supported; furnish 1/2 inch male fixture studs where required.
 - 2. Concrete Ceiling Boxes: Concrete type.
- C. Nonmetallic Outlet Boxes: NEMA OS 2.
- D. Cast Boxes: NEMA FB 1, Type FD, cast feralloy. Furnish gasketed cover by box manufacturer.
- E. Wall Plates for Finished Areas: As specified in Section 26 27 26.
- F. Wall Plates for Unfinished Areas: Furnish gasketed cover.

2.7 PULL AND JUNCTION BOXES

- A. Manufacturers:
 - 1. Hoffman; a brand of Pentair Equipment Protection.

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- 2. RACO; Hubbell.
- 3. Steel City.
- 4. Substitutions: Division 1 Product Requirements.
- B. Sheet Metal Boxes: NEMA OS 1, galvanized steel.
- C. Hinged Enclosures:
 - 1. Comply with UL 50 and NEMA 250, Type 12 with continuous-hinge cover with flush latch unless otherwise indicated.
 - a. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
 - b. Interior Panels: Steel; all sides finished with manufacturer's standard enamel.
- D. Surface Mounted PVC Box: NEMA 250, Type 4X; flat-flanged, surface mounted junction box:
 - 1. Material: PVC.
- E. Surface Mounted Cast Metal Box: NEMA 250, Type 4; flat-flanged, surface mounted junction box:
 - 1. Material: Galvanized cast iron.
 - 2. Cover: Furnish with ground flange, neoprene gasket, and stainless steel cover screws.
- F. In-Ground Cast Metal Box: NEMA 250, Type 6, outside flanged, recessed cover box for flush mounting:
 - 1. Material: Galvanized cast iron.
 - 2. Cover: Nonskid cover with neoprene gasket and stainless-steel cover screws.
 - 3. Cover Legend: "ELECTRIC".
- G. Fiberglass Handholes: Die-molded, glass-fiber hand holes:
 - 1. Cable Entrance: Pre-cut 6 inch x 6-inch cable entrance at center bottom of each side.
 - 2. Cover: Glass-fiber, weatherproof cover with nonskid finish.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Division 1 Administrative Requirements: Coordination and project conditions.
- B. Verify outlet locations and routing and termination locations of raceway prior to rough-in.

3.2 EXISTING WORK

- A. Remove exposed abandoned raceway, including abandoned raceway above accessible ceiling finishes. Cut raceway flush with walls and floors, and patch surfaces.
- B. Remove concealed abandoned raceway to its source.

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- C. Disconnect abandoned outlets and remove devices. Remove abandoned outlets when raceway is abandoned and removed. Install blank cover for abandoned outlets not removed.
- D. Maintain access to existing boxes and other installations remaining active and requiring access. Modify installation or provide access panel.
- E. Extend existing raceway and box installations using materials and methods compatible with existing electrical installations, or as specified.
- F. Clean and repair existing raceway and boxes to remain or to be reinstalled.

3.3 INSTALLATION

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- A. Install Work in accordance with State of New York standards.
- B. Ground and bond raceway and boxes in accordance with Section 26 05 26.
- C. Fasten raceway and box supports to structure and finishes in accordance with Section 26 05 29.
- D. Identify raceway and boxes in accordance with Section 26 05 53.
- E. Arrange raceway and boxes to maintain headroom and present neat appearance.

3.4 INSTALLATION - RACEWAY

- A. Raceway routing is shown in approximate locations unless dimensioned. Route to complete wiring system.
- B. Arrange raceway supports to prevent misalignment during wiring installation.
- C. Support raceway using coated steel or malleable iron straps, lay-in adjustable hangers, clevis hangers, and split hangers.
- D. Group related raceway; support using conduit rack. Construct rack using steel channel specified in Section 26 05 29; provide space on each for 25 percent additional raceways.
- E. Do not support raceway with wire or perforated pipe straps. Remove wire used for temporary supports
- F. Do not attach raceway to ceiling support wires or other piping systems.
- G. Construct raceway supports from steel channel specified in Section 26 05 29.
- H. Route exposed raceway parallel and perpendicular to walls.
- I. Route raceway installed above accessible ceilings parallel and perpendicular to walls.

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- J. Route conduit in and under slab from point-to-point.
- K. Do not cross conduits in slab.

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- L. Maintain clearance between raceway and piping for maintenance purposes.
- M. Maintain 12-inch clearance between raceway and surfaces with temperatures exceeding 104 degrees F.
- N. Cut conduit square using saw or pipe cutter; de-burr cut ends.
- O. Bring conduit to shoulder of fittings; fasten securely.
- P. Join nonmetallic conduit using cement as recommended by manufacturer. Wipe nonmetallic conduit dry and clean before joining. Apply full even coat of cement to entire area inserted in fitting. Allow joint to cure for minimum 20 minutes.
- Q. Install conduit hubs to fasten conduit to sheet metal and cast boxes in all locations.
- R. Install no more than equivalent of three 90-degree bends between boxes. Install conduit bodies to make sharp changes in direction, as around beams. Install factory elbows for bends in metal conduit larger than 2-inch size.
- S. Avoid moisture traps; install junction box with drain fitting at low points in conduit system.
- T. Install fittings to accommodate expansion and deflection where raceway crosses seismic, control and expansion joints.
- U. Install suitable pull string or cord in each empty raceway except sleeves and nipples.
- V. Install suitable caps to protect installed conduit against entrance of dirt and moisture. Use caps during installation to protect ends prior to connection to additional conduit, fittings, boxes, raceway or enclosures.
- W. Panel, enclosure, cabinet and box terminations:
 - 1. Use insulated bushings on hubs and terminations to terminate metallic conduits and ground to bonding or ground conductor. Install insulating bushings and connectors prior to wiring pulling, do not split insulating bushings. Use insulated grounding bushings to ground metallic conduit and EMT to bonding or ground conductor.
 - 2. Use threaded connectors/terminations to terminate non-metallic conduits to boxes and panels. Prepare all openings with approved sealant prior to placing and tightening connectors/terminations.
 - 3. Use anti-oxidant compound to prepare aluminum contact surfaces for bonding/ground cable tray and metallic surfaces.
- X. Surface Raceway: Install flat-head screws, clips, and straps to fasten raceway channel to surfaces; mount plumb and level. Install insulating bushings and inserts at connections to outlets and corner fittings.

Y. Close ends and unused openings in raceway.

3.5 INSTALLATION - BOXES

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- A. Install wall mounted boxes at elevations to accommodate mounting heights as indicated on Drawings or as specified in section for outlet device.
- B. Adjust box location up to 10 feet prior to rough-in to accommodate intended purpose.
- C. Orient boxes to accommodate wiring devices oriented as specified in Section 26 27 26.
- D. Install pull boxes and junction boxes above accessible ceilings and in unfinished areas only.
- E. In Accessible Ceiling Areas: Install outlet and junction boxes no more than 6 inches from ceiling access panel or from removable recessed luminaire.
- F. Locate flush mounting box in masonry wall to require cutting of masonry unit corner only. Coordinate masonry cutting to achieve neat opening.
- G. Do not install flush mounting box back-to-back in walls; install with minimum 6 inches separation. Install with minimum 24 inches separation in acoustic rated walls.
- H. Secure flush mounting box to interior wall and partition studs. Accurately position to allow for surface finish thickness.
- I. Install stamped steel bridges to fasten flush mounting outlet box between studs.
- J. Install flush mounting box without damaging wall insulation or reducing its effectiveness.
- K. Install adjustable steel channel fasteners for hung ceiling outlet box.
- L. Do not fasten boxes to ceiling support wires or other piping systems.
- M. Support boxes independently of conduit.
- N. Install gang box where more than one device is mounted together. Do not use sectional box.
- O. Install gang box with plaster ring for single device outlets.

3.6 INTERFACE WITH OTHER PRODUCTS

- A. Install conduit to preserve fire resistance rating of partitions and other elements, using materials and methods in accordance with these specifications.
- B. Route conduit through roof openings for piping and ductwork or through suitable roof jack with pitch pocket.

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- C. Locate outlet boxes to allow luminaries positioned as indicated on Drawings and/or reflected ceiling plan.
- D. Align adjacent wall mounted outlet boxes for switches, thermostats, and similar devices.

3.7 ADJUSTING

- A. Division 1 Execution and Closeout Requirements: Testing, adjusting, and balancing.
- B. Adjust flush-mounting outlets to make front flush with finished wall material.
- C. Install knockout closures in unused openings in boxes.

3.8 CLEANING

- A. Division 1 Execution and Closeout Requirements: Final cleaning.
- B. Clean interior of boxes, enclosures and raceways to remove dust, debris, and other material.
- C. Clean exposed surfaces and restore finish.
- D. Clean interior of new and existing conduits using mandrel and wire brush for all conduit lengths where interior condition is unknown or cannot be verified.

END OF SECTION

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SECTION 260553 - IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

- 1. Identification for raceways.
- 2. Identification of power and control cables.
- 3. Identification for conductors.
- 4. Underground-line warning tape.
- 5. Warning labels and signs.
- 6. Instruction signs.
- 7. Equipment identification labels.
- 8. Miscellaneous identification products.

1.3 SUBMITTALS

- A. Product Data: For each electrical identification product indicated.
- B. Samples: For each type of label and sign to illustrate size, colors, lettering style, mounting provisions, and graphic features of identification products.
- C. Identification Schedule: An index of nomenclature of electrical equipment and system components used in identification signs and labels.

1.4 QUALITY ASSURANCE

- A. Comply with ANSI A13.1.
- B. Comply with NFPA 70.
- C. Comply with 29 CFR 1910.144 and 29 CFR 1910.145.
- D. Comply with ANSI Z535.4 for safety signs and labels.

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E. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969.

1.5 COORDINATION

- A. Coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings, Shop Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual; and with those required by codes, standards, and 29 CFR 1910.145. Use consistent designations throughout Project.
- B. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.
- C. Coordinate installation of identifying devices with location of access panels and doors.
- D. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 - PRODUCTS

2.1 POWER AND CONTROL RACEWAY IDENTIFICATION MATERIALS

- A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway size.
- B. Colors for Raceways Carrying Circuits at 600 V or Less:
 - 1. Black letters on an orange field.
 - 2. Legend: Indicate voltage and system or service type.
- C. Colors for Raceways Carrying Circuits at More Than 600 V:
 - 1. Black letters on an orange field.
 - 2. Legend: "DANGER CONCEALED HIGH VOLTAGE WIRING."
- D. Vinyl Labels for Raceways Carrying Circuits at 600 V or Less: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound clear adhesive tape for securing ends of legend label.
- E. Snap-Around Labels for Raceways Carrying Circuits at 600 V or Less: Slit, pre-tensioned, flexible, preprinted, color-coded acrylic sleeve, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.
- F. Snap-Around, Color-Coding Bands for Raceways Carrying Circuits at 600 V or Less: Slit, pretensioned, flexible, solid-colored acrylic sleeve, 2 inches (50 mm) long, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.

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- G. Tape and Stencil for Raceways Carrying Circuits More Than 600 V: 4-inch- (100-mm-) wide black stripes on 10-inch (250-mm) centers diagonally over orange background that extends full length of raceway or duct and is 12 inches (300 mm) wide. Stop stripes at legends.
- H. Metal Tags: Brass or aluminum, 2 by 2 by 0.05 inch (50 by 50 by 1.3 mm), with stamped legend, punched for use with self-locking cable tie fastener.
 - 1. Marker for Tags: Machine-printed, permanent, waterproof, black ink marker recommended by printer manufacturer.

2.2 ARMORED AND METAL-CLAD CABLE IDENTIFICATION MATERIALS

- A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each cable size.
- B. Colors for Cables Carrying Circuits at 600 V and Less:
 - 1. Black letters on an orange field.
 - 2. Legend: Indicate voltage and system or service type.
- C. Colors for Cables Carrying Circuits at More Than 600 V:
 - 1. Black letters on an orange field.
 - 2. Legend: "DANGER HIGH VOLTAGE WIRING."
- D. Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound clear adhesive tape for securing ends of legend label.
- E. Self-Adhesive Vinyl Tape: Colored, heavy duty, waterproof, fade resistant; 2 inches (50 mm) wide; compounded for outdoor use.
- F. Heat-Shrink Preprinted Tubes: Flame-retardant polyolefin tube with machine-printed identification label. Sized to suit diameter of and shrinks to fit firmly around cable it identifies. Full shrink recovery at a maximum of 200 deg F (93 deg C). Comply with UL 224.

2.3 POWER AND CONTROL CABLE IDENTIFICATION MATERIALS

- A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each cable size.
- B. Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound clear adhesive tape for securing ends of legend label.
- C. Self-Adhesive, Self-Laminating Polyester Labels: Preprinted, 3-mil- (0.08-mm-) thick flexible label with acrylic pressure-sensitive adhesive that provides a clear, weather- and chemical-resistant, self-laminating, protective shield over the legend. Labels sized to fit the cable diameter such that the clear shield overlaps the entire printed legend.

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- D. Heat-Shrink Preprinted Tubes: Flame-retardant polyolefin tube with machine-printed identification label. Sized to suit diameter of and shrinks to fit firmly around cable it identifies. Full shrink recovery at a maximum of 200 deg F (93 deg C). Comply with UL 224.
- E. Metal Tags: Brass or aluminum, 2 by 2 by 0.05 inch (50 by 50 by 1.3 mm), with stamped legend, punched for use with self-locking cable tie fastener.
- F. Write-On Tags: Polyester tag, 0.010 inch (0.25 mm) thick, with corrosion-resistant grommet and cable tie for attachment to conductor or cable.
 - 1. Marker for Tags: Permanent, waterproof, black ink marker recommended by tag manufacturer.
 - 2. Marker for Tags: Machine-printed, permanent, waterproof, black ink marker recommended by printer manufacturer.
- G. Snap-Around Labels: Slit, pre-tensioned, flexible, preprinted, color-coded acrylic sleeve, with diameter sized to suit diameter of cable it identifies and to stay in place by gripping action.
- H. Snap-Around, Color-Coding Bands: Slit, pre-tensioned, flexible, solid-colored acrylic sleeve, 2 inches (50 mm) long, with diameter sized to suit diameter of cable it identifies and to stay in place by gripping action.

2.4 CONDUCTOR IDENTIFICATION MATERIALS

- A. Color-Coding Conductor Tape: Colored, self-adhesive vinyl tape not less than 3 mils (0.08 mm) thick by 1 to 2 inches (25 to 50 mm) wide.
- B. Self-Adhesive, Self-Laminating Polyester Labels: Preprinted, 3-mil- (0.08-mm-) thick flexible label with acrylic pressure-sensitive adhesive that provides a clear, weather- and chemical-resistant, self-laminating, protective shield over the legend. Labels sized to fit the conductor diameter such that the clear shield overlaps the entire printed legend.
- C. Snap-Around Labels: Slit, pre-tensioned, flexible, preprinted, color-coded acrylic sleeve, with diameter sized to suit diameter of conductor it identifies and to stay in place by gripping action.
- D. Snap-Around, Color-Coding Bands: Slit, pre-tensioned, flexible, solid-colored acrylic sleeve with diameter sized to suit diameter of conductor it identifies and to stay in place by gripping action.
- E. Heat-Shrink Preprinted Tubes: Flame-retardant polyolefin tube with machine-printed identification label. Sized to suit diameter of and shrinks to fit firmly around conductor it identifies. Full shrink recovery at a maximum of 200 deg F (93 deg C). Comply with UL 224.
- F. Marker Tapes: Vinyl or vinyl-cloth, self-adhesive wraparound type, with circuit identification legend machine printed by thermal transfer or equivalent process.
- G. Write-On Tags: Polyester tag, 0.010 inch (0.25 mm) thick, with corrosion-resistant grommet and cable tie for attachment to conductor or cable.

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- 1. Marker for Tags: Permanent, waterproof, black ink marker recommended by tag manufacturer.
- 2. Labels for Tags: Self-adhesive label, machine-printed with permanent, waterproof, black ink recommended by printer manufacturer, sized for attachment to tag.

2.5 FLOOR MARKING TAPE

A. 2-inch- (50-mm-) wide, 5-mil (0.125-mm) pressure-sensitive vinyl tape, with yellow and black stripes and clear vinyl overlay.

2.6 UNDERGROUND-LINE WARNING TAPE

A. Tape:

- 1. Recommended by manufacturer for the method of installation and suitable to identify and locate underground electrical and communications utility lines.
- 2. Printing on tape shall be permanent and shall not be damaged by burial operations.
- 3. Tape material and ink shall be chemically inert, and not subject to degrading when exposed to acids, alkalis, and other destructive substances commonly found in soils.

B. Color and Printing:

- 1. Comply with ANSI Z535.1 through ANSI Z535.5.
- 2. Inscriptions for Red-Colored Tapes: ELECTRIC LINE or HIGH VOLTAGE.
- 3. Inscriptions for Orange-Colored Tapes: TELEPHONE CABLE, CATV CABLE, COMMUNICATIONS CABLE, CONTROL CABLE or OPTICAL FIBER CABLE.

C. Labeled per ASHTO guidelines:

- 1. Detectable three-layer laminate, consisting of a printed pigmented polyolefin film, a solid aluminum-foil core, and a clear protective film that allows inspection of the continuity of the conductive core, bright-colored, continuous-printed on one side with the inscription of the utility, compounded for direct-burial service.
- 2. Overall Thickness: 5 mils (0.125 mm).
- 3. Foil Core Thickness: 0.35 mil (0.00889 mm).
- 4. Weight: 28 lb/1000 sq. ft. (13.7 kg/100 sq. m).
- 5. 3-Inch (75-mm) Tensile According to ASTM D 882: 70 lbf (311.3 N), and 4600 psi (31.7 MPa).

2.7 WARNING LABELS AND SIGNS

- A. Comply with NFPA 70 and 29 CFR 1910.145.
- B. Self-Adhesive Warning Labels: Factory-printed, multicolor, pressure-sensitive adhesive labels, configured for display on front cover, door, or other access to equipment unless otherwise indicated.

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C. Baked-Enamel Warning Signs:

- 1. Preprinted aluminum signs, punched or drilled for fasteners, with colors, legend, and size required for application.
- 2. 1/4-inch (6.4-mm) grommets in corners for mounting.
- 3. Nominal size, 7 by 10 inches (180 by 250 mm).

D. Metal-Backed, Butyrate Warning Signs:

- 1. Weather-resistant, nonfading, preprinted, cellulose-acetate butyrate signs with 0.0396-inch (1-mm) galvanized-steel backing; and with colors, legend, and size required for application.
- 2. 1/4-inch (6.4-mm) grommets in corners for mounting.
- 3. Nominal size, 10 by 14 inches (250 by 360 mm).
- E. Warning label and sign shall include, but are not limited to, the following legends:
 - 1. Multiple Power Source Warning: "DANGER ELECTRICAL SHOCK HAZARD EQUIPMENT HAS MULTIPLE POWER SOURCES."
 - 2. Workspace Clearance Warning: "WARNING OSHA REGULATION AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 36 INCHES (915 MM)."

2.8 INSTRUCTION SIGNS

- A. Engraved, laminated acrylic or melamine plastic, minimum 1/16 inch (1.6 mm) thick for signs up to 20 sq. inches (129 sq. cm) and 1/8 inch (3.2 mm) thick for larger sizes.
 - 1. Engraved legend with black letters on white face.
 - 2. Punched or drilled for mechanical fasteners.
 - 3. Framed with mitered acrylic molding and arranged for attachment at applicable equipment.
- B. Adhesive Film Label: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch (10 mm).
- C. Adhesive Film Label with Clear Protective Overlay: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch (10 mm). Overlay shall provide a weatherproof and UV-resistant seal for label.

2.9 EQUIPMENT IDENTIFICATION LABELS

A. Adhesive Film Label: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch (10 mm).

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- B. Adhesive Film Label with Clear Protective Overlay: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch (10 mm). Overlay shall provide a weatherproof and UV-resistant seal for label.
- C. Self-Adhesive, Engraved, Laminated Acrylic or Melamine Label: Adhesive backed, with white letters on a dark-gray background. Minimum letter height shall be 3/8 inch (10 mm).
- D. Engraved, Laminated Acrylic or Melamine Label: Punched or drilled for screw mounting. White letters on a dark-gray background. Minimum letter height shall be 3/8 inch (10 mm).
- E. Stenciled Legend: In nonfading, waterproof, black ink or paint. Minimum letter height shall be 1 inch (25 mm).

2.10 CABLE TIES

- A. General-Purpose Cable Ties: Fungus inert, self extinguishing, one piece, self locking, Type 6/6 nylon.
 - 1. Minimum Width: 3/16 inch (5 mm).
 - 2. Tensile Strength at 73 deg F (23 deg C), According to ASTM D 638: 12,000 psi (82.7 MPa).
 - 3. Temperature Range: Minus 40 to plus 185 deg F (Minus 40 to plus 85 deg C).
 - 4. Color: Black except where used for color-coding.
- B. UV-Stabilized Cable Ties: Fungus inert, designed for continuous exposure to exterior sunlight, self extinguishing, one piece, self locking, Type 6/6 nylon.
 - 1. Minimum Width: 3/16 inch (5 mm).
 - 2. Tensile Strength at 73 deg F (23 deg C), According to ASTM D 638: 12,000 psi (82.7 MPa).
 - 3. Temperature Range: Minus 40 to plus 185 deg F (Minus 40 to plus 85 deg C).
 - 4. Color: Black.
- C. Plenum-Rated Cable Ties: Self extinguishing, UV stabilized, one piece, self locking.
 - 1. Minimum Width: 3/16 inch (5 mm).
 - 2. Tensile Strength at 73 deg F (23 deg C), According to ASTM D 638: 7000 psi (48.2 MPa).
 - 3. UL 94 Flame Rating: 94V-0.
 - 4. Temperature Range: Minus 50 to plus 284 deg F (Minus 46 to plus 140 deg C).
 - 5. Color: Black.

2.11 MISCELLANEOUS IDENTIFICATION PRODUCTS

A. Paint: Comply with requirements in painting Sections for paint materials and application requirements. Select paint system applicable for surface material and location (exterior or interior).

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B. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Verify identity of each item before installing identification products.
- B. Location: Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment.
- C. Apply identification devices to surfaces that require finish after completing finish work.
- D. Self-Adhesive Identification Products: Clean surfaces before application, using materials and methods recommended by manufacturer of identification device.
- E. Attach signs and plastic labels that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.
- F. Attach plastic raceway and cable labels that are not self-adhesive type with clear vinyl tape with adhesive appropriate to the location and substrate.
- G. System Identification Color-Coding Bands for Raceways and Cables: Each color-coding band shall completely encircle cable or conduit. Place adjacent bands of two-color markings in contact, side by side. Locate bands at changes in direction, at penetrations of walls and floors, at 50-foot (15-m) maximum intervals in straight runs, and at 25-foot (7.6-m) maximum intervals in congested areas.
- H. Aluminum Wraparound Marker Labels and Metal Tags: Secure tight to surface of conductor or cable at a location with high visibility and accessibility.
- I. Cable Ties: For attaching tags. Use general-purpose type, except as listed below:
 - 1. Outdoors: UV-stabilized nylon.
 - 2. In Spaces Handling Environmental Air: Plenum rated.
- J. Underground-Line Warning Tape: During backfilling of trenches install continuous underground-line warning tape directly above line at 6 to 8 inches (150 to 200 mm) below finished grade. Use multiple tapes where width of multiple lines installed in a common trench or concrete envelope exceeds 16 inches (400 mm) overall.
- K. Painted Identification: Comply with requirements in painting Sections for surface preparation and paint application.

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3.2 IDENTIFICATION SCHEDULE

- A. Concealed Raceways, Duct Banks, More Than 600 V, within Buildings: Tape and stencil 4-inch- (100-mm-) wide black stripes on 10-inch (250-mm) centers over orange background that extends full length of raceway or duct and is 12 inches (300 mm) wide. Stencil legend "DANGER CONCEALED HIGH VOLTAGE WIRING" with 3-inch- (75-mm-) high black letters on 20-inch (500-mm) centers. Stop stripes at legends. Apply to the following finished surfaces:
 - 1. Floor surface directly above conduits running beneath and within 12 inches (300 mm) of a floor that is in contact with earth or is framed above unexcavated space.
 - 2. Wall surfaces directly external to raceways concealed within wall.
 - 3. Accessible surfaces of concrete envelope around raceways in vertical shafts, exposed in the building, or concealed above suspended ceilings.
- B. Accessible Raceways, Armored and Metal-Clad Cables, More Than 600 V: Snap-around labels. Install labels at 10-foot (3-m) maximum intervals.
- C. Accessible Raceways and Metal-Clad Cables, 600 V or Less, for Service, Feeder, and Branch Circuits More Than 30A, and 120V to ground: Identify with self-adhesive vinyl label. Install labels at 30-foot (10-m) maximum intervals.
- D. Accessible Raceways and Cables within Buildings: Identify the covers of each junction and pull box of the following systems with self-adhesive vinyl labels with the wiring system legend and system voltage. System legends shall be as follows:
 - 1. Emergency Power.
 - 2. Power.
 - 3. UPS.
- E. Power-Circuit Conductor Identification, More than 600 V: For conductors in vaults, pull and junction boxes, manholes, and handholes, use nonmetallic plastic tag holder with adhesive-backed phase tags, and a separate tag with the circuit designation.
- F. Install instructional sign including the color-code for grounded and ungrounded conductors using adhesive-film-type labels.
- G. Control-Circuit Conductor Identification: For conductors and cables in pull and junction boxes, manholes, and handholes, use self-adhesive, self-laminating polyester labels with the conductor or cable designation, origin, and destination.
- H. Control-Circuit Conductor Termination Identification: For identification at terminations provide heat-shrink preprinted tubes or self-adhesive, self-laminating polyester labels with the conductor designation.
- I. Conductors to Be Extended in the Future: Attach marker tape to conductors and list source.
- J. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control, and signal connections.

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- Identify conductors, cables, and terminals in enclosures and at junctions, terminals, and 1. pull points. Identify by system and circuit designation.
- Use system of marker tape designations that is uniform and consistent with system used 2. by manufacturer for factory-installed connections.
- Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and the 3. Operation and Maintenance Manual.
- Locations of Underground Lines: Identify with underground-line warning tape for power, K. lighting, communication, and control wiring and optical fiber cable.
 - Limit use of underground-line warning tape to direct-buried cables. 1.
 - Install underground-line warning tape for both direct-buried cables and cables in 2. raceway.
- L. Workspace Indication: Install floor marking tape to show working clearances in the direction of access to live parts. Workspace shall be as required by NFPA 70 and 29 CFR 1926.403 unless otherwise indicated. Do not install at flush-mounted panelboards and similar equipment in finished spaces.
- Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Baked-M. enamel warning signs.
 - Comply with 29 CFR 1910.145. 1.
 - Identify system voltage with black letters on an orange background. 2.
 - Apply to exterior of door, cover, or other access. 3.
 - For equipment with multiple power or control sources, apply to door or cover of 4. equipment including, but not limited to, the following:
 - Power transfer switches.
 - Controls with external control power connections. b.
- N. Operating Instruction Signs: Install instruction signs to facilitate proper operation and maintenance of electrical systems and items to which they connect. Install instruction signs with approved legend where instructions are needed for system or equipment operation.
- Emergency Operating Instruction Signs: Install instruction signs with white legend on a red O. background with minimum 3/8-inch- (10-mm-) high letters for emergency instructions at equipment used for power transfer or load shedding.
- P. Equipment Identification Labels: On each unit of equipment, install unique designation label that is consistent with wiring diagrams, schedules, and the Operation and Maintenance Manual. Apply labels to disconnect switches and protection equipment, central or master units, control panels, control stations, terminal cabinets, and racks of each system. Systems include power, lighting, control, communication, signal, monitoring, and alarm systems unless equipment is provided with its own identification.
 - 1. Labeling Instructions:

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- a. Indoor Equipment: Engraved, laminated acrylic or melamine label. Unless otherwise indicated, provide a single line of text with 1/2-inch- (13-mm-) high letters on 1-1/2-inch- (38-mm-) high label; where two lines of text are required, use labels 2 inches (50 mm) high.
- b. Outdoor Equipment: Engraved, laminated acrylic or melamine label Stenciled legend 4 inches (100 mm) high.
- c. Elevated Components: Increase sizes of labels and letters to those appropriate for viewing from the floor.
- d. Unless provided with self-adhesive means of attachment, fasten labels with appropriate mechanical fasteners that do not change the NEMA or NRTL rating of the enclosure.

2. Equipment to Be Labeled:

- a. Panelboards: Typewritten directory of circuits in the location provided by panelboard manufacturer. Panelboard identification shall be engraved, laminated acrylic or melamine label.
- b. Enclosures and electrical cabinets.
- c. Access doors and panels for concealed electrical items.
- d. Substations.
- e. Emergency system boxes and enclosures.
- f. Variable-speed controllers.
- g. Power transfer equipment.
- h. Power-generating units.
- i. Monitoring and control equipment.
- j. UPS equipment.

END OF SECTION

SECTION 260923 - LIGHTING CONTROL DEVICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Digital Lighting Control System
 - 2. Indoor occupancy and vacancy sensors.
 - 3. Room Controllers
 - 4. Network Bridges
 - 5. Full Color Master DMX Lighting Controller Interface
 - 6. DMX Subcontroller
 - 7. Segment Manager

B. Related Requirements:

1. Section 262726 "Wiring Devices" for wall-box dimmers, wall-switch occupancy sensors, and manual light switches.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Show installation details for occupancy and light-level sensors.
 - 1. Interconnection diagrams showing field-installed wiring.
 - 2. Include diagrams for power, signal, and control wiring.

1.4 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For each type of lighting control device to include in emergency, operation, and maintenance manuals.

PART 2 - PRODUCTS

2.1 DISTRIBUTED DIGITAL LIGHTING CONTROL SYSTEM

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. WattStopper
 - 2. Legrand
- B. Operation and Function: The Digital Lighting Control System will function to maintain the color tunable internal corridor lighting of the bathrooms on at all times unless otherwise desired. This system will allow dimming and DMX protocol with control of the new color tunable lighting. The lighting control system will also allow schedule control of the existing corridor lighting and dimming of the future corridor lighting based on the desired time schedules and occupancy. The system will allow on and off controls, dimming, and color changing with zone control functionality
- C. Equipment Required: Lighting Control and Automation system as defined under this section covers the following equipment.
 - 1. Digital Lighting Management (DLM) local network: Free topology, plug-in wiring system (Cat 5e) for power and data to room devices.
 - 2. Digital Room Controllers: Self-configuring, digitally addressable one, two or three relay plenum-rated controllers for on/off control. Selected models include 0-10 volt or line voltage forward phase control dimming outputs and integral current monitoring capabilities.
 - 3. Digital Occupancy Sensors: Self-configuring, digitally addressable, calibrated occupancy sensors with LCD display and two-way active infrared (IR) communications.
 - 4. Digital Lighting Management (DLM) segment network: Linear topology, BACnet MS/TP network (1.5 twisted pair, shielded) to connect multiple DLM local networks for centralized control.
 - 5. Network Bridge: Provides BACnet MS/TP-compliant digital networked communication between rooms, panels and the Segment Manager or building automation system (BAS) and automatically creates BACnet objects representative of connected devices. General Requirements: Linear topology local network.
 - 6. Segment Manager: BACnet MS/TP-based controller with web browser-based user interface for system control, scheduling, power monitoring, room device parameter administration and reporting. General Requirements: For networked applications, the Digital Lighting Management system shall include at least one segment manager to manage network communication. It shall be capable of serving up a graphical user interface via a standard web browser utilizing either unencrypted TCP/IP traffic via a configurable port (default is 80) or 256 bit AES encrypted SSL TCP/IP via a configurable port (default is 443). Operational features shall include the following
 - a. Connection to PC or LAN via standard Ethernet TCP/IP with the option to use SSL encrypted connections for all traffic
 - b. Two main sets of interface screens those used to initially configure the unit and those used to allow users to dynamic monitor the performance of their system.
 - c. Support up to 200 network bridges and 1,100 digital in room devices, connected via network routers and switche

- D. Local Network: DLM local network is a free topology lighting control physical connection and communication protocol designed to control a small area of a building. Alternate systems will be considered.
 - 1. Features of the DLM local network include:
 - a. Plug n' Go automatic configuration and binding of occupancy sensors, switches and lighting loads to the most energy-efficient sequence of operation based upon the device attached.
 - b. Simple replacement of any device in the local DLM network with a standard off the shelf unit without requiring significant commissioning, configuration or setup.
 - c. Push n' Learn configuration to change the automatic configuration, including binding and load parameters without tools, using only the buttons on the digital devices in the local network.
 - d. Two-way infrared communications for control by handheld remotes, and configuration by a handheld tool including adjusting load parameters, sensor configuration and binding, within a line of sight of up to 30 feet from a sensor, wall switch or IR receiver.
 - 2. Digital room devices connect to the local network using pre-terminated cables with RJ-45 connectors, which provide both data and power to room devices.
 - 3. If manufacturer's pre-terminated cables are not used for the installation each cable must be individually tested and observed by authorized service representative following installation.

E. DMX Controller

- General Requirements for DMX Controllers: 1024 DMX channels, 10 zones, 500 scenes.
 500mA maximum power draw. Powered by 12VDC 48VDC. Graphical color touchscreen display.
- 2. Electromagnetic compatibility (EMC) Part 3-2: limits: limits for harmonic current emissions (equipment input current no more than 16A per phase.
- 3. Operation: Full color lighting control simultaneous information processing to and from one or more DMX devices. Control minimum of 340 RGB fixtures. USB and Ethernet connectivity.
- 4. Installation:
 - a. Power supply: (1) 120V circuit input to the power supply that may be supplied separately.
- 5. Indicator: LEDs for Ethernet and Bus 1, Bus 2, Bus 3, communication status.
- 6. Reboot and factor default button

2.2 INDOOR OCCUPANCY/VACANCY SENSORS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. WattStopper/Legrand

- B. General Requirements for Sensors: Wall- or ceiling-mounted, solid-state indoor occupancy sensors with a separate power pack unless the use of line voltage wiring eliminates the need for a power pack.
 - 1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
 - 2. Operation: Unless otherwise indicated, turn lights on when coverage area is occupied, and turn them off when unoccupied; with a time delay for turning lights off, adjustable over a minimum range of 1 to 15 minutes.
- C. Sensor Output: Contacts rated to operate the connected relay, complying with UL 773A. Sensor is powered from the power pack unless the use of line voltage wiring eliminates the need for a power pack.
 - 1. Power Pack: Dry contacts rated for 20-A ballast load at 120- and 277-V ac, for 13-A tungsten at 120-V ac, and for 1 hp at 120-V ac. Sensor has 24-V dc, 150-mA, Class 2 power source, as defined by NFPA 70.
 - 2. Mounting:
 - a. Sensor: Suitable for mounting in any position on a standard outlet box.
 - b. Relay: Externally mounted through a 1/2-inch (13-mm) knockout in a standard electrical enclosure.
 - c. Time-Delay and Sensitivity Adjustments: Recessed and concealed behind hinged door.
 - 3. Indicator: Digital display, to show when motion is detected during testing and normal operation of sensor.
 - 4. Bypass Switch: Override the "on" function in case of sensor failure.
 - 5. Automatic Light-Level Sensor: Adjustable from 2 to 200 fc (21.5 to 2152 lux); turn lights off when selected lighting level is present.
- D. Dual-Technology Type: Ceiling mounted; detect occupants in coverage area using PIR and ultrasonic detection methods. The particular technology or combination of technologies that control on-off functions is selectable in the field by operating controls on unit.
 - 1. Sensitivity Adjustment: Separate for each sensing technology.
 - 2. Detector Sensitivity: Detect occurrences of 6-inch- (150-mm-) minimum movement of any portion of a human body that presents a target of not less than 36 sq. in. (232 sq. cm), and detect a person of average size and weight moving not less than 12 inches (305 mm) in either a horizontal or a vertical manner at an approximate speed of 12 inches/s (305 mm/s).
 - 3. Detection Coverage (Standard Room): Detect occupancy anywhere within a circular area of 1000 sq. ft. (93 sq. m) when mounted on a 96-inch- (2440-mm-) high ceiling.

2.3 SWITCHBOX-MOUNTED OCCUPANCY SENSORS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Watt Stopper/Legrand

- B. General Requirements for Sensors: Automatic-wall-switch occupancy sensor, suitable for mounting in a single gang switchbox.
 - 1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
 - 2. Operating Ambient Conditions: Dry interior conditions, 32 to 120 deg F (0 to 49 deg C).
 - 3. Switch Rating: Not less than 800-VA fluorescent at 120 V, 1200-VA fluorescent at 277 V, and 800-W incandescent.

C. Wall-Switch Sensor:

- 1. Standard Range: 180-degree field of view, field adjustable from 180 to 40 degrees; with a minimum coverage area of 900 sq. ft. (84 sq. m).
- 2. Sensing Technology: Dual technology PIR and ultrasonic.
- 3. Switch Type: SP, field selectable automatic "on," or manual "on" automatic "off."
- 4. Voltage: Match the circuit voltage Dual voltage, 120 and 277 V; dual-technology type.
- 5. Ambient-Light Override: Concealed, field-adjustable, light-level sensor from 10 to 150 fc (108 to 1600 lux). The switch prevents the lights from turning on when the light level is higher than the set point of the sensor.
- 6. Concealed "off" time-delay selector at 30 seconds, and 5, 10, and 20 minutes.
- 7. Adaptive Technology: Self-adjusting circuitry detects and memorizes usage patterns of the space and helps eliminate false "off" switching.

2.4 DIMMING ROOM CONTROLLERS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Wattstopper
 - 2. Legrand
- B. Description: Plenum rated controllers with line voltage relays and 0-10 volt dimming outputs.
 - 1. Class 2 dimming control signal: 0-10VDC, sinks up to 100mA per channel
 - 2. Voltage: Single Phase 120/230/240/277VAC
 - 3. Operating conditions: for indoor use only; @120/277V: 32-158 degrees F (0-70 degrees C)
 - 4. On/Off/Dim local override button for each load.

2.9 CONDUCTORS AND CABLES

A. Comply with requirements in "Low-Voltage Electrical Power Conductors and Cables."

PART 3 - EXECUTION

3.1 SENSOR INSTALLATION

- A. Coordinate layout and installation of ceiling-mounted devices with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, smoke detectors, fire-suppression systems, and partition assemblies.
- B. Install and aim sensors in locations to achieve not less than 90 percent coverage of areas indicated. Do not exceed coverage limits specified in manufacturer's written instructions.

3.2 WIRING INSTALLATION

- A. Wiring Method: Comply with "Low-Voltage Electrical Power Conductors and Cables." Minimum conduit size is 1/2 inch (13 mm).
- B. Wiring within Enclosures: Comply with NECA 1. Separate power-limited and nonpower-limited conductors according to conductor manufacturer's written instructions.
- C. Size conductors according to lighting control device manufacturer's written instructions unless otherwise indicated.
- D. Splices, Taps, and Terminations: Make connections only on numbered terminal strips in junction, pull, and outlet boxes; terminal cabinets; and equipment enclosures.

3.3 IDENTIFICATION

- A. Identify components and power and control wiring according to "Identification for Electrical Systems."
 - 1. Identify controlled circuits in lighting contactors.
 - 2. Identify circuits or luminaires controlled by photoelectric and occupancy sensors at each sensor.
- B. Label time switches and contactors with a unique designation.

3.4 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to evaluate lighting control devices and perform tests and inspections.
- B. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.
- C. Perform the following tests and inspections with the assistance of a factory-authorized service representative:

- 1. Operational Test: After installing time switches and sensors, and after electrical circuitry has been energized, start units to confirm proper unit operation.
- 2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- D. Lighting control devices will be considered defective if they do not pass tests and inspections.
- E. Prepare test and inspection reports.

3.5 ADJUSTING

A. Operation

- 1. Occupancy Sensor Operation: When occupancy sensor (OS) operation is shown, the lights will come on when there are perceived occupants in the space ("Automatic On") from any sensor in the space. The lights will be turned off when the entire space is perceived to be empty for a specified programmable length of time ("Automatic Off").
- 2. Occupancy/Vacancy Sensor Operation: When occupancy/vacancy sensor (OVS) operation is shown, the lights will come on when there are perceived occupants in the space ("Automatic On") from any sensor in the space. The lights will be turned off when the entire space is perceived to be empty for a specified programmable length of time ("Automatic Off"). In addition, the lights can be manually turned ON or OFF from a momentary switch (or switches) ("Manual Override"). However, the Manual Override will be reset to allow for Automatic On after a specified programmable period of time.
- B. Occupancy Adjustments: When requested within 12 months from date of Substantial Completion, provide on-site assistance in adjusting sensors to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.
 - 1. For occupancy and motion sensors, verify operation at outer limits of detector range. Set time delay to suit Owner's operations.

3.6 DEMONSTRATION

- A. Coordinate demonstration of products specified in this Section with demonstration requirements for low-voltage, programmable lighting control systems specified in "Addressable-Fixture Lighting Controls" and Section 260943.23 "Relay-Based Lighting Controls."
- B. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain lighting control devices.

END OF SECTION

SECTION 262416 - PANELBOARDS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Distribution and lighting panelboards.

B. Related Requirements:

- 1. Section 26 05 26 Grounding and Bonding for Electrical Systems
- 2. Section 26 05 53 Identification for Electrical Systems

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of panelboard, switching and overcurrent protective device, transient voltage suppression device, accessory, and component indicated. Include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes.
- B. Shop Drawings: For each panelboard and related equipment.
 - 1. Include dimensioned plans, elevations, sections, and details. Show tabulations of installed devices, equipment features, and ratings.
 - 2. Detail enclosure types and details for types other than NEMA 250, Type 1.
 - 3. Detail bus configuration, current, and voltage ratings.
 - 4. Short-circuit current rating of panelboards and overcurrent protective devices.
 - 5. If this is a Current Limiting device, then provide Current Limiting Let-Through ratings.
 - 6. Include evidence of NRTL listing for series rating of installed devices.
 - 7. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.
 - 8. Include wiring diagrams for power, signal, and control wiring.
 - 9. Include time-current coordination curves for each type and rating of overcurrent protective device included in panelboards.

1.3 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified testing agency.
- B. Seismic Qualification Certificates: Submit certification that panelboards, overcurrent protective devices, accessories, and components will withstand seismic forces defined in IEEE-693 (current edition). Include the following:

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- 1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
- 2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
- 3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

C. Field Quality-Control Reports:

- 1. Test procedures used.
- 2. Test results that comply with requirements.
- 3. Results of failed tests and corrective action taken to achieve test results that comply with requirements.
- D. Panelboard Schedules: Final Typed Panelboard Schedules in all Panelboards after Substantial Completion.

1.4 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For panelboards and components include in emergency, operation, and maintenance manuals. Include the following:
 - 1. Manufacturer's written instructions for testing and adjusting overcurrent protective devices.
 - 2. Time-current curves, including selectable ranges for each type of overcurrent protective device that allows adjustments.

1.5 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Keys: Two spares for each type of panelboard cabinet lock.
 - 2. Circuit Breakers Including GFCI and Ground Fault Equipment Protection (GFEP) Types: Three spares for each panelboard.
 - 3. Fuses for Fused Switches: Equal to 10 percent of quantity installed for each size and type, but no fewer than three of each size and type.
 - 4. Fuses for Fused Power-Circuit Devices: Equal to 10 percent of quantity installed for each size and type, but no fewer than three of each size and type.

1.6 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Member company of NETA or an NRTL.
 - 1. Testing Agency's Field Supervisor: Currently certified by NETA to supervise on-site testing.

- B. Source Limitations: Obtain panelboards, overcurrent protective devices, components, and accessories from single source from single manufacturer.
- C. Product Selection for Restricted Space: Drawings indicate maximum dimensions for panelboards including clearances between panelboards and adjacent surfaces and other items. Comply with indicated maximum dimensions.
- D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- E. Comply with NEMA PB 1.
- F. Comply with NFPA 70.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Remove loose packing and flammable materials from inside panelboards; install temporary electric heating (250 W per panelboard) to prevent condensation.
- B. Handle and prepare panelboards for installation according to NEMA PB 1.

1.8 PROJECT CONDITIONS

A. Environmental Limitations:

- 1. Do not deliver or install panelboards until spaces are enclosed and weathertight, wet work in spaces is complete and dry, work above panelboards is complete, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.
- 2. Rate equipment for continuous operation under the following conditions unless otherwise indicated:
 - a. Ambient Temperature: Not exceeding minus 22 deg F (minus 30 deg C) to plus 104 deg F (plus 40 deg C).
 - b. Altitude: Not exceeding 6600 feet (2000 m).
- B. Service Conditions: NEMA PB 1, usual service conditions, as follows:
 - 1. Ambient temperatures within limits specified.
 - 2. Altitude not exceeding 6600 feet (2000 m).

1.9 COORDINATION

A. Coordinate layout and installation of panelboards and components with other construction that penetrates walls or is supported by them, including electrical and other types of equipment, raceways, piping, encumbrances to workspace clearance requirements, and adjacent surfaces.

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Maintain required workspace clearances and required clearances for equipment access doors and panels.

B. Coordinate sizes and locations of concrete bases with actual equipment provided. Cast anchorbolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified with concrete.

1.10 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace transient voltage suppression devices that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR PANELBOARDS

- A. Fabricate and test panelboards according to IEEE 344 to withstand seismic forces defined in Section 260548 "Vibration and Seismic Controls for Electrical Systems."
- B. Enclosures: Flush- and surface-mounted cabinets.
 - 1. Rated for environmental conditions at installed location.
 - a. Indoor Dry Locations: NEMA 250, Type 1
 - b. Outdoor Locations: NEMA 250, Type 3R
 - c. Damp Indoor Locations: NEMA 250, Type 12.
 - d. Wet Interior Locations: NEMA 250, Type 3R.
 - 2. Front: Secured to box with concealed trim clamps. For surface-mounted fronts, match box dimensions; for flush-mounted fronts, overlap box. Finish in manufacturer's standard gray enamel. When multiple panels are provided for a single site, provide all panes with the same key configuration. For outside locations, provide panels that allow hasp style lock in either energized or de-energized condition.
 - 3. Hinged Front Cover: Entire front trim hinged to box and with standard door within hinged trim cover with flush lock.
 - 4. Skirt for Surface-Mounted Panelboards: Same gage and finish as panelboard front with flanges for attachment to panelboard, wall, and ceiling or floor.
 - 5. Gutter Extension and Barrier: Same gage and finish as panelboard enclosure; integral with enclosure body. Arrange to isolate individual panel sections.
 - 6. Finishes:

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- a. Panels and Trim: Steel and galvanized steel, factory finished immediately after cleaning and pretreating with manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat.
- b. Back Boxes: Same finish as panels and trim.
- c. Fungus Proofing: Permanent fungicidal treatment for overcurrent protective devices and other components.
- 7. Directory Card: Inside panelboard door, mounted in transparent card holder.
- C. Incoming Mains Location: Top and bottom as indicated on drawings.
- D. Phase, Neutral, and Ground Buses:
 - 1. Material: Hard-drawn copper, 98 percent conductivity.
 - 2. Equipment Ground Bus: Adequate for feeder and branch-circuit equipment grounding conductors; bonded to box. Copper plated.
 - 3. Isolated Ground Bus: Adequate for branch-circuit isolated ground conductors; insulated from box.
 - 4. Extra-Capacity Neutral Bus: Neutral bus rated 200 percent of phase bus and UL listed as suitable for nonlinear loads.
 - 5. Split Bus: Vertical buses divided into individual vertical sections.
- E. Conductor Connectors: Suitable for use with conductor material and sizes.
 - 1. Material: Hard-drawn copper, 98 percent conductivity.
 - 2. Main and Neutral Lugs: Compression type, copper plated.
 - 3. Ground Lugs and Bus-Configured Terminators: Compression type.
 - 4. Feed-Through Lugs: Compression type, suitable for use with conductor material. Locate at opposite end of bus from incoming lugs or main device.
 - 5. Subfeed (Double) Lugs: Compression type suitable for use with conductor material. Locate at same end of bus as incoming lugs or main device.
 - 6. Gutter-Tap Lugs: Compression type suitable for use with conductor material. Locate at same end of bus as incoming lugs or main device.
 - 7. Extra-Capacity Neutral Lugs: Rated 200 percent of phase lugs mounted on extracapacity neutral bus.
- F. Service Equipment Label: NRTL labeled for use as service equipment for panelboards or load centers with one or more main service disconnecting and overcurrent protective devices.
- G. Future Devices: Mounting brackets, bus connections, filler plates, and necessary appurtenances required for future installation of devices.
- H. Panelboard Short-Circuit Current Rating: Rated for series-connected system with integral or remote upstream overcurrent protective devices and labeled by an NRTL. Include size and type of allowable upstream and branch devices, listed and labeled for series-connected short-circuit rating by an NRTL.

I. Panelboard Short-Circuit Current Rating: Fully rated to interrupt symmetrical short-circuit current available at terminals.

2.2 PERFORMANCE REQUIREMENTS

A. Surge Suppression: Factory installed as an integral part of indicated panelboards, complying with UL 1449 SPD Type 1.

2.3 PANELBOARDS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
 - 2. General Electric Company; GE Consumer & Industrial Electrical Distribution.
 - 3. Square D; a brand of Schneider Electric.
 - 4. Substitutions: Division 1 Product Requirements
- B. Panelboards: NEMA PB 1, power and feeder distribution type.
- C. Doors: Secured with vault-type latch with tumbler lock; keyed alike. For doors more than 36 inches (914 mm) high, provide two latches, keyed alike.
- D. Mains: Circuit breaker or Lugs only as indicated.
- E. Branch Overcurrent Protective Devices for Circuit-Breaker Frame Sizes 125 A and Smaller: Bolt-on circuit breakers.
- F. Branch Overcurrent Protective Devices for Circuit-Breaker Frame Sizes Larger Than 125 A: Bolt-on circuit breakers; plug-in circuit breakers where individual positive-locking device requires mechanical release for removal.
- G. Doors: Concealed hinges; secured with flush latch with tumbler lock; keyed alike.
- H. Column-Type Panelboards: Narrow gutter extension, with cover, to overhead junction box equipped with ground and neutral terminal buses.

2.4 DISCONNECTING AND OVERCURRENT PROTECTIVE DEVICES

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
 - 2. General Electric Company; GE Consumer & Industrial Electrical Distribution.
 - 3. Square D; a brand of Schneider Electric.
 - 4. Substitutions: Section 01 60 00 Product Requirements

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- B. Interrupting Capacity provide ratings of panel and overcurrent protective devices as shown on the contract drawings and/or those indicated below, whichever is larger. Ratings will be for all busses, including power and neutral busses as well as disconnecting and over current protective devices.
 - 1. 15,000 amperes (15 KAIC) symmetrical for all Single Phase panelboards, including incoming service panel boards rated 150Volts or less and required bus capacity or incoming feed 150A or less and incoming service has an interrupting current available less than 15 KAIC.
 - 2. 22,000 amperes (22 KAIC) symmetrical for all panelboards, including incoming service panel boards rated 600Volts or less and for bus capacity or incoming feed 400A or less and the incoming service has a smaller interrupting current available than 22 KAIC unless panels satisfy the paragraph above.
 - 3. 42,000 amperes (42 KAIC) symmetrical for all panelboards, except incoming service panel boards, rated 600Volts or less and for bus capacity or incoming feed 400A or greater unless incoming service has a larger interrupting current available or panels satisfy the paragraph above.
 - 4. 65,000 amperes (65 KAIC) symmetrical for all incoming service panelboards, including rated 600Volts or less and for bus capacity or incoming feed 400A or greater unless incoming service has a larger interrupting current available or panels satisfy the paragraph above.
 - 5. For panelboards that are integral to switchgear and/or motor control centers, the panelboard shall have the same rating as the unit it is in and the above ratings, whichever are greater.
- C. Molded-Case Circuit Breaker (MCCB): Comply with UL 489, with interrupting capacity to meet available fault currents.
 - 1. Thermal-Magnetic Circuit Breakers: Provide this type unless indicated otherwise. Inverse time-current element for low-level overloads, and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.
 - 2. GFCI Circuit Breakers: Single- and two-pole configurations with Class A ground-fault protection (6-mA trip).
 - 3. Ground-Fault Equipment Protection (GFEP) Circuit Breakers: Class B ground-fault protection (30-mA trip).
 - 4. Arc-Fault Circuit Interrupter (AFCI) Circuit Breakers: Comply with UL 1699; 120/240-V, single-pole configuration.
 - 5. Molded-Case Circuit-Breaker (MCCB) Features and Accessories:
 - a. Standard frame sizes, trip ratings, and number of poles.
 - b. Lugs: Mechanical style, suitable for number, size, trip ratings, and conductor materials.
 - c. Provide circuit breakers with ability to accept 90 degree C rated cable at 75 degree C ampacity.
 - d. Breakers in/for panels with main breakers may be series rated only if the panels are factory assembled and a panel simulation is done by the manufacturer and submitted with the product submittal. Simulation must show documented "let through" currents for man breakers. In all cases, the main breaker, bus and panel

- enclosure shall be rated for the listed symmetrical interrupting current rating shown or indicated above. Series rating does not apply and will not be used where breakers are used to feed motor controllers. If series rating is used, the panel shall be labeled as such.
- e. Do not provide tandem breakers unless specifically shown on drawings or directed by Engineer.
- f. Ground-Fault Protection: Integrally mounted relay and trip unit with adjustable pickup and time-delay settings, push-to-test feature, and ground-fault indicator.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Receive, inspect, handle, and store panelboards according to NEMA PB 1.1.
- B. Examine panelboards before installation. Reject panelboards that are damaged or rusted or have been subjected to water saturation.
- C. Examine elements and surfaces to receive panelboards for compliance with installation tolerances and other conditions affecting performance of the Work.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install panelboards and accessories according to NEMA PB 1.1.
- B. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from panelboards.
- C. Comply with mounting and anchoring requirements specified in Section 260548 "Vibration and Seismic Controls for Electrical Systems."
- D. Mount top of trim 90 inches (2286 mm) above finished floor unless otherwise indicated.
- E. Mount panelboard cabinet plumb and rigid without distortion of box. Mount recessed panelboards with fronts uniformly flush with wall finish and mating with back box.
- F. Install overcurrent protective devices and controllers not already factory installed.
 - 1. Set field-adjustable, circuit-breaker trip ranges.
- G. Install filler plates in unused spaces.
- H. Arrange conductors in gutters into groups and bundle and wrap with wire ties after completing load balancing.

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I. Comply with NECA 1.

3.3 IDENTIFICATION

- A. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs complying with Section 260553 "Identification for Electrical Systems."
- B. Create a directory to indicate installed circuit loads after balancing panelboard loads; incorporate Owner's final room designations. Obtain approval before installing. Use a computer or typewriter to create directory; handwritten directories are not acceptable.
- C. Panelboard Nameplates: Label each panelboard with a nameplate complying with requirements for identification specified in Section 260553 "Identification for Electrical Systems."
- D. Device Nameplates: Label each branch circuit device in distribution panelboards with a nameplate complying with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

3.4 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections.
- B. Perform tests and inspections.
 - 1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
- C. Acceptance Testing Preparation:
 - 1. Test insulation resistance for each panelboard bus, component, connecting supply, feeder, and control circuit.
 - 2. Test continuity of each circuit.

D. Tests and Inspections:

- 1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
- 2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
- 3. Perform the following infrared scan tests and inspections and prepare reports:
 - a. Initial Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each panelboard. Remove front panels so joints and connections are accessible to portable scanner.

- b. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each panelboard 11 months after date of Substantial Completion.
- c. Instruments and Equipment:
 - 1) Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.
- E. Panelboards will be considered defective if they do not pass tests and inspections.
- F. Prepare test and inspection reports, including a certified report that identifies panelboards included and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

3.5 ADJUSTING

- A. Adjust moving parts and operable component to function smoothly, and lubricate as recommended by manufacturer.
- B. Set field-adjustable circuit-breaker trip ranges as indicated or as specified in Section 260573 "Overcurrent Protective Device Coordination Study." if required.
- C. Load Balancing: After Substantial Completion, but not more than 60 days after Final Acceptance, measure load balancing and make circuit changes.
 - 1. Measure as directed during period of normal system loading.
 - 2. Perform load-balancing circuit changes outside normal occupancy/working schedule of the facility and at time directed. Avoid disrupting critical 24-hour services such as fax machines and on-line data processing, computing, transmitting, and receiving equipment.
 - 3. After circuit changes, recheck loads during normal load period. Record all load readings before and after changes and submit test records.
 - 4. Tolerance: Difference exceeding 20 percent between phase loads, within a panelboard, is not acceptable. Rebalance and recheck as necessary to meet this minimum requirement.

3.6 PROTECTION

A. Temporary Heating: Apply temporary heat to maintain temperature according to manufacturer's written instructions.

END OF SECTION 262416

SECTION 262726 - WIRING DEVICES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

- 1. Receptacles, receptacles with integral GFCI, and associated device plates.
- 2. Weather-resistant receptacles.
- 3. Snap switches and wall-box dimmers.
- 4. Wall-switch.
- 5. Wall-switch occupancy sensors
- 6. Communications outlets.

1.2 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Receptacles for Owner-Furnished Equipment: Match plug configurations.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: List of legends and description of materials and process used for pre-marking wall plates.
- C. Samples: One for each type of device and wall plate specified, in each color specified.

1.4 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For wiring devices to include in all manufacturers' packing-label warnings and instruction manuals that include labeling conditions.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Service/Power Poles: One for every 10, but no fewer than one.
 - 2. Floor Service-Outlet Assemblies: One for every 10, but no fewer than one.
 - 3. Poke-Through, Fire-Rated Closure Plugs: One for every five floor service outlets installed, but no fewer than two.
 - 4. TVSS Receptacles: One for every 10 of each type installed, but no fewer than two of each type.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers' Names: Shortened versions (shown in parentheses) of the following manufacturers' names are used in other Part 2 articles.
 - 1. Cooper Wiring Devices; Division of Cooper Industries, Inc. (Cooper).
 - 2. Hubbell Incorporated; Wiring Device Kellems (Hubbell).
 - 3. Leviton Mfg. Company Inc. (Leviton).
 - 4. Pass & Seymour/Legrand (Pass & Seymour).
 - 5. Substitutions: Division 1 Product Requirements.
- B. Source Limitations: Obtain each type of wiring device and associated wall plate from single source from single manufacturer.

2.2 GENERAL WIRING-DEVICE REQUIREMENTS

- A. Wiring Devices, Components, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with NFPA 70.
- C. All devices to be UL listed.
- D. Devices that are manufactured for use with modular plug-in connectors may be substituted under the following conditions:
 - 1. Connectors shall comply with UL 2459 and shall be made with stranding building wire.
 - 2. Devices shall comply with the requirements in this Section.

2.3 STRAIGHT-BLADE RECEPTACLES

- A. All receptacles to be 125VAC, 20A and will comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 498, and FS W-C-596.
- B. Convenience Simplex or Duplex Receptacles.
- C. Hospital-Grade (H) Duplex Convenience Receptacles. Single-piece, rivetless, nickel-plated, all-brass grounding system. Nickel-plated, brass mounting strap.
- D. Isolated-Ground (IG) Duplex Convenience Receptacles. Straight blade; equipment grounding contacts shall be connected only to the green grounding screw terminal of the device and with inherent electrical isolation from mounting strap. Isolation shall be integral to receptacle construction and not dependent on removable parts.
- E. Tamper-Resistant (TR) Convenience Receptacles. Label and receptacle shall comply with NFPA 70, "Health Care Facilities" Article, "Pediatric Locations" Section.
- F. Weather Resistant (WR) Receptacle: Convenience specification grade rated and constructed to meet NFPA 70 (NEC) requirements for wet and damp locations. Use either WP or RT covers as indicated. Use WR receptacles in all locations where WP or RT covers are used.
- G. Plug Load (PL) Controlled Receptacle; Marked compliant with ASHRAE 90.1/IECC/NEC. Use split circuit configuration for two separate circuits and common neutral and ground connection. If not connected to control panel with integral relay, provide relay module and interconnection (with required interface) to occupancy/vacancy sensor circuit mounted in or on appropriate enclosure.
- H. Duplex Receptacle with Duplex USB Charger Connection; USB charging capability 3A minimum compatible with USB 2.0 and 3.0/3.1.

2.4 GFCI RECEPTACLES

- A. General Description:
 - 1. Straight blade, feed-through type.
 - 2. Comply with NEMA WD 1, NEMA WD 6, UL 498, UL 943 Class A, and FS W-C-596.
 - 3. Include indicator light that shows when the GFCI has malfunctioned and no longer provides proper GFCI protection.
- B. Duplex GFCI Convenience Receptacles, 125 V, 20 A:
- C. Tamper-Resistant GFCI Convenience Receptacles, 125 V, 20 A:
- D. Hospital-Grade, Duplex GFCI Convenience Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 498 Supplement, and FS W-C-596.

2.5 TOGGLE SWITCHES

- A. Comply with NEMA WD 1, UL 20, and FS W-S-896.
- B. Switches, 120/277 V, 20 A: Single Pole, Two Pole, Three Way, Four Way as indicated.
- C. Pilot-Light Switches, 20 A: Single pole, with LED-lighted handle, illuminated when switch is "off"
- D. Key-Operated Switches, 120/277 V, 20 A: Single pole, with factory-supplied key in lieu of switch handle.
- E. Single-Pole, Double-Throw, Momentary-Contact, Center-off Switches: 120/277 V, 20 A; for use with mechanically held lighting contactors.
- F. Key-Operated, Single-Pole, Double-Throw, Momentary-Contact, Center-off Switches: 120/277 V, 20 A; for use with mechanically held lighting contactors, with factory-supplied key in lieu of switch handle.

2.6 COPPER CABLE DATA TERMINATIONS

- A. Wall Plates: Accepts modular jacks/inserts, 2 ports (Duplex)
- B. 8-position modular jack, color coded for T568A and T568B wiring configurations Modular RJ-45, non-keyed, terminated with 110-style insulation displacement connectors (IDC); high impact thermoplastic housing, suitable for and complying with UL 1863.

2.7 WALL PLATES

- A. Single and combination types shall match corresponding wiring devices.
 - 1. Plate-Securing Screws: Metal with head color to match plate finish.
 - 2. For ganged adjacent boxes, provide gang type plate for entire ganged array.
 - 3. Dry Interior Locations:
 - a. Ivory smooth plastic, as approved by Architect/Engineer.
 - b. Use Brushed Aluminum with beveled edges in areas indicated.
 - 4. Outdoor Locations: Use Raintight (While in Use) covers (RT) in all locations unless indicated otherwise.
 - a. Use Weatherproof Cover Plate, Gasketed cast metal with hinged gasketed device cover where weatherproof (WP) cover plate is shown.
 - b. Use Weatherproof Cover Plate, Gasketed cast metal with hinged gasketed device cover or protected switch for switches.
 - 5. Damp Interior Locations:
 - a. Use Brushed Aluminum with beveled edges.
 - b. Use Weatherproof Cover Plate, Gasketed cast metal with hinged gasketed device cover where weatherproof (WP) cover plate is shown.

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- c. Use Raintight (While in Use) covers where While In Use (RT) is specified.
- 6. Wet Interior Locations:
 - a. Use Raintight (While in Use) covers (RT) in all locations unless indicated otherwise.
 - b. Use Weatherproof Cover Plate, Gasketed cast metal with hinged gasketed device cover where weatherproof (WP) cover plate is shown.
 - c. Use Weatherproof Cover Plate, Gasketed cast metal with hinged gasketed device cover or protected switch for switches.
- 7. Corrosive Locations: Use boxes and covers to match conduit used or as indicated on contract drawings. Items to be constructed by conduit supplier.
- 8. Hazardous Locations: Explosion proof covers as approved by Architect/Engineer.
- B. Acceptable manufacturers for other than RT or WP covers.
 - 1. Hubbell
 - 2. Pass & Seymour
 - 3. Arrow-Hart
 - 4. Substitutions: Division 1 Product Requirements
- C. Wet-Location, Rain Tite (RT) or While in Use Covers: NEMA 250, complying with Type 3R, weather-resistant, die-cast aluminum with lockable cover. Convenience rain tite covers, for receptacle or switches, marked as "Suitable for Wet Locations While In Use" as per NEC. Use recessed receptacles unless indicated otherwise on contract drawings.
 - 1. Recessed Boxes: Boxes to be installed recessed 2" into wall. Receptacle cover shall allow one (1) 3/8" diameter cord to pass through for each receptacle (two for duplex). Cover is not to extend more than 0.5" from flush wall surface. Recessed Enclosure must have a gasket between cover and sleeve and between the enclosure and mounting surface rated for NEMA 3R.
 - 2. Surface Mounted Boxes: Receptacle cover shall allow one (1) 3/8" diameter cord to pass through for each receptacle (two for duplex). Cover must provide at least 3.25" of clearance between closed cover and receptacle or switch and is not to extend more than 3.75" from flush wall surface. Enclosure must have a gasket between cover and sleeve and between the enclosure and mounting surface rated for NEMA 3R.
 - 3. Acceptable manufacturers:
 - (a) Taymac
 - (b) Thomas & Betts/Perfectline
 - (c) Hubbell
 - (d) Substitutions: Division 1 Product Requirements.

2.8 FINISHES

A. Device Color:

1. Wiring Devices Connected to Normal Power System: As selected by Architect unless otherwise indicated or required by NFPA 70 or device listing.

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B. Wall Plate Color: For plastic covers, match device color.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with NECA 1, including mounting heights listed in that standard, unless otherwise indicated.

B. Coordination with Other Trades:

- 1. Protect installed devices and their boxes. Do not place wall finish materials over device boxes and do not cut holes for boxes with routers that are guided by riding against outside of boxes.
- 2. Keep outlet boxes free of plaster, drywall joint compound, mortar, cement, concrete, dust, paint, and other material that may contaminate the raceway system, conductors, and cables.
- 3. Install device boxes in brick or block walls so that the cover plate does not cross a joint unless the joint is troweled flush with the face of the wall.
- 4. Install wiring devices after all wall preparation, including painting, is complete.

C. Conductors:

- 1. Do not strip insulation from conductors until right before they are spliced or terminated on devices.
- 2. Strip insulation evenly around the conductor using tools designed for the purpose. Avoid scoring or nicking of solid wire or cutting strands from stranded wire.
- 3. The length of free conductors at outlets for devices shall meet provisions of NFPA 70, Article 300, without pigtails.
- 4. Existing Conductors:
 - a. Cut back and pigtail, or replace all damaged conductors.
 - b. Straighten conductors that remain and remove corrosion and foreign matter.
 - c. Pigtailing existing conductors is permitted, provided the outlet box is large enough.

D. Device Installation:

- 1. Replace devices that have been in temporary use during construction and that were installed before building finishing operations were complete.
- 2. Keep each wiring device in its package or otherwise protected until it is time to connect conductors.
- 3. Do not remove surface protection, such as plastic film and smudge covers, until the last possible moment.
- 4. Connect devices to branch circuits using pigtails that are not less than 6 inches (152 mm) in length.

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- 5. When there is a choice, use side wiring with binding-head screw terminals. Wrap solid conductor tightly clockwise, two-thirds to three-fourths of the way around terminal screw.
- 6. Use a torque screwdriver when a torque is recommended or required by manufacturer.
- 7. When conductors larger than No. 12 AWG are installed on 15- or 20-A circuits, splice No. 12 AWG pigtails for device connections.
- 8. Tighten unused terminal screws on the device.
- 9. When mounting into metal boxes, remove the fiber or plastic washers used to hold device-mounting screws in yokes, allowing metal-to-metal contact.

E. Receptacle Orientation:

- 1. Install ground pin of vertically mounted receptacles up, and on horizontally mounted receptacles to the left with neutral up.
- 2. Install hospital-grade receptacles in patient-care areas with the ground pin or neutral blade at the top.
- F. Device Plates: Do not use oversized or extra-deep plates. Repair wall finishes and remount outlet boxes when standard device plates do not fit flush or do not cover rough wall opening.

G. Dimmers:

- 1. Install dimmers within terms of their listing.
- 2. Verify that dimmers used for fan speed control are listed for that application.
- 3. Install unshared neutral conductors on line and load side of dimmers according to manufacturers' device listing conditions in the written instructions.
- H. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical and with grounding terminal of receptacles on top. Group adjacent switches under single, multi-gang wall plates.
- I. Adjust locations of floor service outlets and service poles to suit arrangement of partitions and furnishings.

3.2 GFCI RECEPTACLES

A. Install non-feed-through-type GFCI receptacles where protection of downstream receptacles is not required.

3.3 IDENTIFICATION

- A. Comply with "Identification for Electrical Systems."
- B. Identify each receptacle with panelboard identification and circuit number. Use hot, stamped, or engraved machine printing with black-filled lettering on face of plate, and durable wire markers or tags inside outlet boxes.

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3.4 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections:
 - 1. In healthcare facilities, prepare reports that comply with recommendations in NFPA 99.
 - 2. Test Instruments: Use instruments that comply with UL 1436.
 - 3. Test Instrument for Convenience Receptacles: Digital wiring analyzer with digital readout or illuminated digital-display indicators of measurement.
- B. Tests for Convenience Receptacles:
 - 1. Line Voltage: Acceptable range is 105 to 132 V.
 - 2. Percent Voltage Drop under 15-A Load: A value of 6 percent or higher is unacceptable.
 - 3. Ground Impedance: Values of up to 2 ohms are acceptable.
 - 4. GFCI Trip: Test for tripping values specified in UL 1436 and UL 943.
 - 5. Using the test plug, verify that the device and its outlet box are securely mounted.
 - 6. Tests shall be diagnostic, indicating damaged conductors, high resistance at the circuit breaker, poor connections, inadequate fault current path, defective devices, or similar problems. Correct circuit conditions, remove malfunctioning units and replace with new ones, and retest as specified above.
- C. Test straight-blade convenience outlets in patient-care areas for the retention force of the grounding blade according to NFPA 99. Retention force shall be not less than 4 oz. (115 g).
- D. Wiring device will be considered defective if it does not pass tests and inspections.
- E. Prepare test and inspection reports.

END OF SECTION

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SECTION 262819 - ENCLOSED SWITCHES & CIRCUIT BREAKERS

PART 1 GENERAL

1.1 **SUMMARY**

- Α. Section Includes:
 - 1. Fusible.
 - 2. Non-fusible switches.
 - Molded-case and insulated-case circuit breakers in individual enclosures.
- B. Related Sections:
 - 1. Section 26 05 29 Hangers and Supports for Electrical Systems.
 - Section 26 05 53 Identification for Electrical Systems.
 - Section 26 28 13 Fuses. 3.
 - 4. Section 26 05 26 Grounding and Bonding for Electrical Systems.

1.2 REFERENCE STANDARDS

- A. National Electrical Manufacturers Association:
 - NEMA FU 1 Low Voltage Cartridge Fuses.
 - NEMA KS 1 Enclosed and Miscellaneous Distribution Equipment Switches (600 Volts Maximum).
- B. International Electrical Testing Association:
 - NETA ATS Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.
- C. Underwriters Laboratories Inc.:
 - UL 489 Molded-Case Circuit Breakers, Molded-Case Switches, and Circuit-Breaker Enclosures.

SUBMITTALS 1.3

- A. Section 01 33 00 Submittal Procedures: Submittal procedures.
- B. Product Data:
 - Submit switch ratings and enclosure dimensions.
 - Submit catalog sheets showing ratings (including voltages, currents, HP and short circuit withstand currents), trip units, time current curves, dimensions, and enclosure details.

CLOSEOUT SUBMITTALS 1.4

- A. Division 1 Execution and Closeout Requirements: Closeout procedures.
- B. Project Record Documents:
 - 1. Record actual locations of enclosed switches and ratings of installed fuses.

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Record actual locations and continuous current ratings of enclosed circuit breakers.

1.5 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

1.6 EXTRA MATERIALS

- A. Division 1 Execution and Closeout Requirements: Spare parts and maintenance products.
- B. Furnish three of each size and type of breaker current limiter.

PART 2 PRODUCTS

2.1 FUSIBLE SWITCH ASSEMBLIES

- A. Manufacturers:
 - 1. Eaton Electrical Sector; Eaton Corporation.
 - 2. General Electric Company.
 - 3. Siemens Power Transmission & Distribution, Inc.
 - 4. Square D; by Schneider Electric.
 - 5. Substitutions: Division 1 Product Requirements.
- B. Description: NEMA KS 1, Type HD, enclosed load interrupter knife switch. Handle lockable in OFF position.
- C. Operation:
 - 1. Switch Ratings
 - a. Switch Rating: Horsepower rated for AC or DC as indicated on Drawings.
 - b. Short Circuit Current Rating: UL listed for 10,000 rms symmetrical amperes when used with or protected by Class H or K fuses (30-600 ampere) 200,000 rms symmetrical amperes when used with or protected by Class R or Class J fuses (30-600 ampere switches employing appropriate fuse rejection schemes). 200,000 rms symmetrical amperes when used with or protected by Class L fuses (800-1200 ampere).

D. Materials:

- 1. Fuse clips: Designed to accommodate NEMA FU 1, Class R fuses.
- 2. Service Entrance: Switches identified for use as service equipment are to be labeled for this application. Furnish solid neutral assembly and equipment ground bar.
- 3. Furnish switches with entirely copper current carrying parts.

2.2 NONFUSIBLE SWITCH ASSEMBLIES

- A. Manufacturers:
 - 1. Eaton Electrical Sector; Eaton Corporation.
 - 2. General Electric Company.

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- 3. Siemens Power Transmission & Distribution, Inc.
- 4. Square D; by Schneider Electric.
- 5. Substitutions: Division 1 Product Requirements.
- B. Description: NEMA KS 1, Type HD enclosed load interrupter knife switch. Handle lockable in OFF position.

C. Operation:

- Switch Ratings
 - a. Switch Rating: Horsepower rated for AC or DC as indicated on Drawings.
 - b. Short Circuit Current Rating: UL listed for 10,000 rms symmetrical amperes when used with or protected by Class H or K fuses (30-600 ampere) 200,000 rms symmetrical amperes when used with or protected by Class R or Class J fuses (30-600 ampere switches employing appropriate fuse rejection schemes). 200,000 rms symmetrical amperes when used with or protected by Class L fuses (800-1200 ampere).

D. Materials:

- 1. Service Entrance: Switches identified for use as service equipment are to be labeled for this application. Furnish solid neutral assembly and equipment ground bar.
- 2. Furnish switches with entirely copper current carrying parts.

2.3 INSULATED CASE CIRCUIT BREAKER

A. Manufacturers:

- 1. Eaton Electrical Sector; Eaton Corporation.
- 2. General Electric Company.
- 3. Siemens Power Transmission & Distribution, Inc.
- 4. Square D; by Schneider Electric.
- 5. Substitutions: Division 1 Product Requirements.
- B. Product Description: Enclosed, insulated-case circuit breaker conforming to UL 489, suitable for use as service entrance equipment where applied.
- C. Accessories: As indicated on Drawings. Conform to UL 489.
- D. Service Entrance: Switches identified for use as service equipment are to be labeled for this application. Furnish solid neutral assembly and equipment ground bar.

2.4 ENCLOSURES

- A. Enclosure: UL 489, to meet conditions. Fabricate enclosure from steel finished with manufacturer's standard gray enamel.
 - a. Interior Dry Locations: Type 1.
 - b. Interior Damp Locations: Type 12
 - c. Exterior/Outdoor Locations: Type 3R.
 - d. Corrosive Locations: Type 4X.
 - e. Hazardous Locations: Type 7 or as indicated on drawings.

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B. Provide fully rated copper plated isolated neutral and bonded ground terminals.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install enclosed switches where indicated.
- B. Install enclosed switches and circuit breakers plumb. Provide supports in accordance with Section 26 05 29.
- C. Height: 5 feet to operating handle.
- D. Install fuses for fusible disconnect switches. Refer to Section 26 28 13 for product requirements.
- E. Install engraved plastic nameplates in accordance with Section 26 05 53. Engrave nameplates with the equipment served and the panel and circuit number supplying the switch.
- F. Apply adhesive tag on inside door of each fused switch indicating NEMA fuse class and size installed.
- G. Install grounding and bonding in accordance with requirements of Section 26 05 26.

3.2 FIELD QUALITY CONTROL

- A. Division 1 Quality Requirements for inspecting, testing, adjusting, and balancing and Execution and Closeout Requirements: Requirements for testing, adjusting, and balancing.
- B. Inspect and test in accordance with NETA ATS, except Section 4.
- C. Perform inspections and tests listed in NETA ATS, Section 7.5.

3.3 ADJUSTING

- A. Division 1 Execution and Closeout Requirements: Testing, adjusting, and balancing.
- B. Adjust trip settings to coordinate circuit breakers with other overcurrent protective devices in circuit.
- C. Adjust trip settings to provide adequate protection from overcurrent and fault currents.

3.4 CLEANING

- A. Division 1 Execution and Closeout Requirements: Requirements for cleaning.
- B. Clean existing enclosed switches to remain or to be reinstalled.

DORMITORY AUTHORITY OF THE STATE OF NEW YORK FUNNELLE HALL BATHROOM RENOVATIONS ENCLOSED SWITCHES & CIRCUIT **BREAKERS - 262819**

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END OF SECTION

SECTION 263600 - TRANSFER SWITCHES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes transfer switches rated 600 V and less, including the following:
 - 1. Automatic transfer switches.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include rated capacities, weights, operating characteristics, furnished specialties, and accessories.
- B. Shop Drawings: Dimensioned plans, elevations, sections, and details showing minimum clearances, conductor entry provisions, gutter space, installed features and devices, and material lists for each switch specified.

1.4 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For each type of product to include in emergency, operation, and maintenance manuals. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:
 - 1. Features and operating sequences, both automatic and manual.
 - 2. List of all factory settings of relays; provide relay-setting and calibration instructions, including software, where applicable.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Maintain a service center capable of providing training, parts, and emergency maintenance repairs within a response period of less than eight hours from time of notification.

- B. Testing Agency Qualifications: An independent agency, with the experience and capability to conduct the testing indicated, that is a member company of the InterNational Electrical Testing Association (IETS) or is a nationally recognized testing laboratory (NRTL) as defined by OSHA in 29 CFR 1910.7, and that is acceptable to authorities having jurisdiction.
 - 1. Testing Agency's Field Supervisor: Person currently certified by the InterNational Electrical Testing Association or the National Institute for Certification in Engineering Technologies to supervise on-site testing specified in Part 3.
- C. Source Limitations: Obtain automatic transfer switches and remote annunciators through one source from a single manufacturer.
- D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- E. Comply with NEMA ICS 1.
- F. Comply with NFPA 70.
- G. Comply with NFPA 99.
- H. Comply with NFPA 110.
- I. Comply with UL 1008 unless requirements of these Specifications are stricter.

1.6 FIELD CONDITIONS

- A. Interruption of Existing Electrical Service: Do not interrupt electrical service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary electrical service:
 - 1. Notify Owner no fewer than two days in advance of proposed interruption of electrical service.
 - 2. Do not proceed with interruption of electrical service without Owner's written permission.

1.7 COORDINATION

A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Section 033000 "Cast-in-Place Concrete."

PART 2 - PRODUCTS

2.1 MANUFACTURED UNITS

A. Contactor Transfer Switches:

- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Caterpillar; Engine Div.
 - b. Emerson; ASCO Power Technologies, LP.
 - c. Generac Power Systems, Inc.
 - d. GE Zenith Controls.
 - e. Kohler Power Systems; Generator Division.
 - f. Onan/Cummins Power Generation; Industrial Business Group.
 - g. Russelectric, Inc.
 - h. Substitutions: Product Requirements

2.2 GENERAL TRANSFER-SWITCH PRODUCT REQUIREMENTS

- A. Indicated Current Ratings: Apply as defined in UL 1008 for continuous loading and total system transfer, including tungsten filament lamp loads not exceeding 30 percent of switch ampere rating, unless otherwise indicated.
- B. Tested Fault-Current Closing and Withstand Ratings: Adequate for duty imposed by protective devices at installation locations in Project under the fault conditions indicated, based on testing according to UL 1008.
 - 1. Where transfer switch includes internal fault-current protection, rating of switch and trip unit combination shall exceed indicated fault-current value at installation location.
- C. Solid-State Controls: Repetitive accuracy of all settings shall be plus or minus 2 percent or better over an operating temperature range of minus 20 to plus 70 deg C.
- D. Resistance to Damage by Voltage Transients: Components shall meet or exceed voltage-surge withstand capability requirements when tested according to IEEE C62.41. Components shall meet or exceed voltage-impulse withstand test of NEMA ICS 1.
- E. Electrical Operation: Accomplish by a nonfused, momentarily energized solenoid or electric-motor-operated mechanism, mechanically and electrically interlocked in both directions.
- F. Switch Characteristics: Designed for continuous-duty repetitive transfer of full-rated current between active power sources.
 - 1. Limitation: Switches using molded-case switches or circuit breakers or insulated-case circuit-breaker components are not acceptable.
 - 2. Switch Action: Double throw; mechanically held in both directions.

- 3. Contacts: Silver composition or silver alloy for load-current switching. Conventional automatic transfer-switch units, rated 225 A and higher, shall have separate arcing contacts.
- G. Neutral Switching. Where four-pole switches are indicated, provide overlapping neutral contacts.
- H. Neutral Terminal: Solid and fully rated, unless otherwise indicated.
- I. Oversize Neutral: Ampacity and switch rating of neutral path through units indicated for oversize neutral shall be double the nominal rating of circuit in which switch is installed.
- J. Heater: Equip switches exposed to outdoor temperatures and humidity, and other units indicated, with an internal heater. Provide thermostat within enclosure to control heater.
- K. Battery Charger: For generator starting batteries.
 - 1. Float type rated 10 A.
 - 2. Ammeter to display charging current.
 - 3. Fused ac inputs and dc outputs.
- L. Annunciation, Control, and Programming Interface Components: Devices at transfer switches for communicating with remote programming devices, annunciators, or annunciator and control panels shall have communication capability matched with remote device.
- M. Factory Wiring: Train and bundle factory wiring and label, consistent with Shop Drawings, either by color-code or by numbered or lettered wire and cable tape markers at terminations. Color-coding and wire and cable tape markers are specified in Section 260553 "Identification for Electrical Systems."
 - 1. Designated Terminals: Pressure type, suitable for types and sizes of field wiring indicated.
 - 2. Power-Terminal Arrangement and Field-Wiring Space: Suitable for top, side, or bottom entrance of feeder conductors as indicated.
 - 3. Control Wiring: Equipped with lugs suitable for connection to terminal strips.
- N. Enclosures: General-purpose NEMA 250, Type 12, complying with NEMA ICS 6 and UL 508, unless otherwise indicated.

2.3 AUTOMATIC TRANSFER SWITCHES

- A. Comply with Level 1 equipment according to NFPA 110.
- B. Switching Arrangement: Double-throw type, incapable of pauses or intermediate position stops during normal functioning, unless otherwise indicated.

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- C. Manual Switch Operation: Under load, with door closed and with either or both sources energized. Transfer time is same as for electrical operation. Control circuit automatically disconnects from electrical operator during manual operation.
- D. Manual Switch Operation: Unloaded. Control circuit automatically disconnects from electrical operator during manual operation.
- E. Signal-Before-Transfer Contacts: A set of normally open/normally closed dry contacts operates in advance of retransfer to normal source. Interval is adjustable from 1 to 30 seconds.
- F. Digital Communication Interface: Matched to capability of remote annunciator or annunciator and control panel.
- G. In-Phase Monitor: Factory-wired, internal relay controls transfer so it occurs only when the two sources are synchronized in phase. Relay compares phase relationship and frequency difference between normal and emergency sources and initiates transfer when both sources are within 15 electrical degrees, and only if transfer can be completed within 60 electrical degrees. Transfer is initiated only if both sources are within 2 Hz of nominal frequency and 70 percent or more of nominal voltage.
- H. Programmed Neutral Switch Position: Switch operator has a programmed neutral position arranged to provide a midpoint between the two working switch positions, with an intentional, time-controlled pause at midpoint during transfer. Pause is adjustable from 0.5 to 30 seconds minimum and factory set for 0.5 second, unless otherwise indicated. Time delay occurs for both transfer directions. Pause is disabled unless both sources are live.

I. Automatic Transfer-Switch Features:

- 1. Undervoltage Sensing for Each Phase of Normal Source: Sense low phase-to-ground voltage on each phase. Pickup voltage shall be adjustable from 85 to 100 percent of nominal, and dropout voltage is adjustable from 75 to 98 percent of pickup value. Factory set for pickup at 90 percent and dropout at 85 percent.
- 2. Adjustable Time Delay: For override of normal-source voltage sensing to delay transfer and engine start signals. Adjustable from zero to six seconds, and factory set for one second.
- 3. Voltage/Frequency Lockout Relay: Prevent premature transfer to generator. Pickup voltage shall be adjustable from 85 to 100 percent of nominal. Factory set for pickup at 90 percent. Pickup frequency shall be adjustable from 90 to 100 percent of nominal. Factory set for pickup at 95 percent.
- 4. Time Delay for Retransfer to Normal Source: Adjustable from 0 to 30 minutes, and factory set for 10 minutes to automatically defeat delay on loss of voltage or sustained undervoltage of emergency source, provided normal supply has been restored.
- 5. Test Switch: Simulate normal-source failure.
- 6. Switch-Position Pilot Lights: Indicate source to which load is connected.
- 7. Source-Available Indicating Lights: Supervise sources via transfer-switch normal- and emergency-source sensing circuits.

- a. Normal Power Supervision: Green light with nameplate engraved "Normal Source Available."
- b. Emergency Power Supervision: Red light with nameplate engraved "Emergency Source Available."
- 8. Unassigned Auxiliary Contacts: Two normally open, single-pole, double-throw contacts for each switch position, rated 10 A at 240-V ac.
- 9. Transfer Override Switch: Overrides automatic retransfer control so automatic transfer switch will remain connected to emergency power source regardless of condition of normal source. Pilot light indicates override status.
- 10. Engine Starting Contacts: One isolated and normally closed, and one isolated and normally open; rated 10 A at 32-V dc minimum. This is for future installation of a fire pump.
- 11. Engine Shutdown Contacts: Instantaneous; shall initiate shutdown sequence at remote engine-generator controls after retransfer of load to normal source.
- 12. Engine Shutdown Contacts: Time delay adjustable from zero to five minutes, and factory set for five minutes. Contacts shall initiate shutdown at remote engine-generator controls after retransfer of load to normal source.
- 13. Engine-Generator Exerciser: Solid-state, programmable-time switch starts engine generator and transfers load to it from normal source for a preset time, then retransfers and shuts down engine after a preset cool-down period. Initiates exercise cycle at preset intervals adjustable from 7 to 30 days. Running periods are adjustable from 10 to 30 minutes. Factory settings are for 7-day exercise cycle, 20-minute running period, and 5-minute cool-down period. Exerciser features include the following:
 - a. Exerciser Transfer Selector Switch: Permits selection of exercise with and without load transfer.
 - b. Push-button programming control with digital display of settings.
 - c. Integral battery operation of time switch when normal control power is not available.

2.4 REMOTE ANNUNCIATOR SYSTEM

- A. Functional Description: Remote annunciator panel shall annunciate conditions for indicated transfer switches. Annunciation shall include the following:
 - 1. Sources available, as defined by actual pickup and dropout settings of transfer-switch controls.
 - 2. Switch position.
 - 3. Switch in test mode.
 - 4. Failure of communication link.
- B. Annunciator Panel: LED-lamp type with audible signal and silencing switch.
 - 1. Indicating Lights: Grouped for each transfer switch monitored.

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- 2. Label each group, indicating transfer switch it monitors, location of switch, and identity of load it serves.
- 3. Mounting: Flush, modular, steel cabinet, unless otherwise indicated.
- 4. Lamp Test: Push-to-test or lamp-test switch on front panel.

2.5 SOURCE QUALITY CONTROL

A. Factory test and inspect components, assembled switches, and associated equipment. Ensure proper operation. Check transfer time and voltage, frequency, and time-delay settings for compliance with specified requirements. Perform dielectric strength test complying with NEMA ICS 1.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Design each fastener and support to carry load indicated by seismic requirements and according to seismic-restraint details. See Section 260548 "Vibration and Seismic Controls for Electrical Systems."
- B. Floor-Mounting Switch: Anchor to floor by bolting.
 - 1. Concrete Bases: 4 inches (100 mm) high, reinforced, with chamfered edges. Extend base no more than 4 inches (100 mm) in all directions beyond the maximum dimensions of switch, unless otherwise indicated or unless required for seismic support. Construct concrete bases according to Section 260529 "Hangers and Supports for Electrical Systems."
- C. Annunciator Mounting: Flush in wall, unless otherwise indicated.
- D. Identify components according to Section 260553 "Identification for Electrical Systems."
- E. Set field-adjustable intervals and delays, relays, and engine exerciser clock.

3.2 CONNECTIONS

- A. Wiring to Remote Components: Match type and number of cables and conductors to control and communication requirements of transfer switches as recommended by manufacturer. Increase raceway sizes at no additional cost to Owner if necessary to accommodate required wiring.
- B. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."

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C. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

3.3 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.
- C. Perform the following tests and inspections with the assistance of a factory-authorized service representative:
 - 1. After installing equipment and after electrical circuitry has been energized, test for compliance with requirements.
 - 2. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
 - 3. Measure insulation resistance phase-to-phase and phase-to-ground with insulation-resistance tester. Include external annunciation and control circuits. Use test voltages and procedure recommended by manufacturer. Comply with manufacturer's specified minimum resistance.
 - a. Check for electrical continuity of circuits and for short circuits.
 - b. Inspect for physical damage, proper installation and connection, and integrity of barriers, covers, and safety features.
 - c. Verify that manual transfer warnings are properly placed.
 - d. Perform manual transfer operation.
 - 4. After energizing circuits, demonstrate interlocking sequence and operational function for each switch at least three times.
 - a. Simulate power failures of normal source to automatic transfer switches and of emergency source with normal source available.
 - b. Simulate loss of phase-to-ground voltage for each phase of normal source.
 - c. Verify time-delay settings.
 - d. Verify pickup and dropout voltages by data readout or inspection of control settings.
 - e. Test bypass/isolation unit functional modes and related automatic transfer-switch operations.
 - f. Perform contact-resistance test across main contacts and correct values exceeding 500 microhms and values for 1 pole deviating by more than 50 percent from other poles.
 - g. Verify proper sequence and correct timing of automatic engine starting, transfer time delay, retransfer time delay on restoration of normal power, and engine cooldown and shutdown.

- 5. Ground-Fault Tests: Coordinate with testing of ground-fault protective devices for power delivery from both sources.
 - a. Verify grounding connections and locations and ratings of sensors.
- D. Testing Agency's Tests and Inspections:
 - 1. After installing equipment and after electrical circuitry has been energized, test for compliance with requirements.
 - 2. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
 - 3. Measure insulation resistance phase-to-phase and phase-to-ground with insulation-resistance tester. Include external annunciation and control circuits. Use test voltages and procedure recommended by manufacturer. Comply with manufacturer's specified minimum resistance.
 - a. Check for electrical continuity of circuits and for short circuits.
 - b. Inspect for physical damage, proper installation and connection, and integrity of barriers, covers, and safety features.
 - c. Verify that manual transfer warnings are properly placed.
 - d. Perform manual transfer operation.
 - 4. After energizing circuits, demonstrate interlocking sequence and operational function for each switch at least three times.
 - a. Simulate power failures of normal source to automatic transfer switches and of emergency source with normal source available.
 - b. Simulate loss of phase-to-ground voltage for each phase of normal source.
 - c. Verify time-delay settings.
 - d. Verify pickup and dropout voltages by data readout or inspection of control settings.
 - e. Test bypass/isolation unit functional modes and related automatic transfer-switch operations.
 - f. Perform contact-resistance test across main contacts and correct values exceeding 500 microhms and values for 1 pole deviating by more than 50 percent from other poles.
 - g. Verify proper sequence and correct timing of automatic engine starting, transfer time delay, retransfer time delay on restoration of normal power, and engine cooldown and shutdown.
 - 5. Ground-Fault Tests: Coordinate with testing of ground-fault protective devices for power delivery from both sources.
 - a. Verify grounding connections and locations and ratings of sensors.
- E. Coordinate tests with tests of generator and run them concurrently.

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- F. Report results of tests and inspections in writing. Record adjustable relay settings and measured insulation and contact resistances and time delays. Attach a label or tag to each tested component indicating satisfactory completion of tests.
- G. Remove and replace malfunctioning units and retest as specified above.
- H. Prepare test and inspection reports.
- I. Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each switch. Remove all access panels so joints and connections are accessible to portable scanner.
 - 1. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each switch 11 months after date of Substantial Completion.
 - 2. Instrument: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.
 - 3. Record of Infrared Scanning: Prepare a certified report that identifies switches checked and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

3.4 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain transfer switches and related equipment as specified below. Refer to Section 017900 "Demonstration and Training."
- B. Coordinate this training with that for generator equipment.

END OF SECTION 263600

SECTION 264113 - LIGHTNING PROTECTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes lightning protection modification for structures and building site components.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For air terminals and mounting accessories.
 - 1. Details of the components to be used in the installation.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer and manufacturer. Include data on listing or certification by UL.
- B. Certification, signed by Contractor, that roof adhesive is approved by manufacturer of roofing material.
- C. Field quality-control reports.
- D. Comply with recommendations in NFPA 780, Annex D, "Inspection and Maintenance of Lightning Protection Systems," for maintenance of the lightning protection system.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Certified by UL, trained and approved for installation of units required for this Project.
- B. System Certificate:
 - 1. UL Master Label Recertification.

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C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 780, "Definitions" Article.

1.6 COORDINATION

- A. Coordinate installation of lightning protection with installation of other building systems and components, including electrical wiring, supporting structures and building materials, metal bodies requiring bonding to lightning protection components, and building finishes.
- B. Coordinate installation of air terminals attached to roof systems with roofing manufacturer and Installer.
- C. Flashings of through-roof assemblies shall comply with roofing manufacturers' specifications.

PART 2 - PRODUCTS

2.1 LIGHTNING PROTECTION SYSTEM COMPONENTS

- A. Comply with UL 96 and NFPA 780.
- B. Roof-Mounted Air Terminals: NFPA 780, Class II, copper unless otherwise indicated.
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. East Coast Lightning Equipment Inc.
 - b. ERICO International Corporation.
 - c. Harger.
 - d. Heary Bros. Lightning Protection Co. Inc.
 - e. Independent Protection Co.
 - f. Preferred Lightning Protection.
 - g. Robbins Lightning, Inc.
 - h. Thompson Lightning Protection, Inc.
 - i. Substitutions: Section 01 60 00 Product Requirements
 - 2. Air Terminals More than 24 Inches (600 mm) Long: With brace attached to the terminal at not less than half the height of the terminal.
 - 3. Single-Membrane, Roof-Mounted Air Terminals: Designed specifically for single-membrane roof system materials. Comply with requirements in roofing Sections.
- C. Main and Bonding Conductors: Copper.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install lightning protection components and systems according to [UL 96A] [and] [NFPA 780].
- B. Install conductors with direct paths from air terminals to ground connections. Avoid sharp bends.
- C. Cable Connections: Use crimped or bolted connections for all conductor splices and connections between conductors and other components. Use exothermic-welded connections in underground portions of the system.
- D. Cable Connections to devices and structural materials: Use exothermic-welded connections for all conductor splices and connections between conductors and other components.
 - 1. Exception: In single-ply membrane roofing, exothermic-welded connections may be used only below the roof level.
- E. Air Terminals on Single-Ply Membrane Roofing: Comply with roofing membrane and adhesive manufacturer's written instructions.
- F. Bond extremities of vertical metal bodies exceeding 60 feet (18 m) in length to lightning protection components.
- G. Bond lightning protection components with intermediate-level interconnection loop conductors to grounded metal bodies of building at 60-foot (18-m) intervals.

3.2 CORROSION PROTECTION

- A. Do not combine materials that can form an electrolytic couple that will accelerate corrosion in the presence of moisture unless moisture is permanently excluded from junction of such materials.
- B. Use conductors with protective coatings where conditions cause deterioration or corrosion of conductors.

3.3 FIELD QUALITY CONTROL

- A. Notify Architect at least 48 hours in advance of inspection before concealing lightning protection components.
- B. UL Inspection: Meet requirements to obtain a UL Master Label for system.

END OF SECTION 264113

SECTION 265119 - LED INTERIOR LIGHTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes the following types of LED luminaires:
 - 1. Downlight.
 - 2. Linear industrial.
 - 3. Recessed, linear.
 - 4. Strip light.
 - 5. Suspended, linear.
 - 6. Surface mount, nonlinear

B. Related Requirements:

- 1. "Lighting Control Devices" section for automatic control of lighting, including time switches, photoelectric relays, occupancy sensors, and multipole lighting relays and contactors.
- 2. "Central Dimming Controls" section or "Modular Dimming Controls" section for Architect/Engineer dimming systems and for fluorescent dimming controls with dimming ballasts specified in interior lighting Sections.
- 3. "Addressable-Luminaire Lighting Controls" section for manual or programmable control systems with low-voltage control wiring or data communication circuits.

1.3 DEFINITIONS

- A. CCT: Correlated color temperature.
- B. CRI: Color Rendering Index.
- C. Fixture: Same as Luminaire.
- D. IP: International Protection or Ingress Protection Rating.
- E. LED: Light-emitting diode.
- F. Lumen: Measured output of lamp and luminaire, or both.

G. Luminaire: Complete lighting unit, including lamp, reflector, and housing.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Arrange in order of luminaire designation.
 - 2. Include data on features, accessories, and finishes.
 - 3. Include physical description and dimensions of luminaires.
 - 4. Include emergency lighting units, including batteries and chargers.
 - 5. Include life, output (lumens, CCT, and CRI), and energy-efficiency data.
 - 6. Photometric data and adjustment factors based on laboratory tests IES LM-79 and IES LM-80.
 - a. Manufacturers' Certified Data: Photometric data certified by manufacturer's laboratory with a current accreditation under the National Voluntary Laboratory Accreditation Program for Energy Efficient Lighting Products.
 - b. Testing Agency Certified Data: For indicated luminaires, photometric data certified by a qualified independent testing agency. Photometric data for remaining luminaires shall be certified by manufacturer.
- B. Shop Drawings: For nonstandard or custom luminaires.
 - 1. Include plans, elevations, sections, and mounting and attachment details.
 - 2. Include details of luminaire assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 - 3. Include diagrams for power, signal, and control wiring.
- C. Samples: For each luminaire and for each color and texture with standard factory-applied finish.
- D. Samples for Initial Selection: For each type of luminaire with custom factory-applied finishes.
 - 1. Include Samples of luminaires and accessories involving color and finish selection.
- E. Samples for Verification: For each type of luminaire.
 - 1. Include Samples of luminaires and accessories to verify finish selection.
- F. Product Schedule: For luminaires and lamps. Use same designations and types indicated on Drawings.

1.5 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Reflected ceiling plan(s) and other details, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

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- 1. Luminaires.
- 2. Suspended ceiling components.
- 3. Partitions and millwork that penetrate the ceiling or extend to within 12 inches (300 mm) of the plane of the luminaires.
- 4. Structural members to which luminaires will be attached.
- 5. Initial access modules for acoustical tile, including size and locations.
- 6. Items penetrating finished ceiling, including the following:
 - a. Other luminaires.
 - b. Air outlets and inlets.
 - c. Speakers.
 - d. Sprinklers.
 - e. Access panels.
 - f. Fire Alarm devices.
- 7. Moldings.
- B. Qualification Data: For testing laboratory providing photometric data for luminaires.
- C. Seismic Qualification Data: For luminaires, accessories, and components, from manufacturer.
 - 1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
 - 2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
 - 3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
- D. Product Certificates: For each type of luminaire.
- E. Product Test Reports: For each type of luminaire, for tests performed by a qualified testing agency.
- F. Sample warranty.

1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For luminaires and lighting systems to include in operation and maintenance manuals.
 - 1. Provide a list of all lamp types used on Project; use ANSI and manufacturers' codes.

1.7 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

- 1. Lamps: Ten for every 100of each type and rating installed. Furnish at least one of each type.
- 2. Diffusers and Lenses: One for every 100 of each type and rating installed. Furnish at least one of each type.
- 3. Globes and Guards: One for every 20 of each type and rating installed. Furnish at least one of each type.

1.8 QUALITY ASSURANCE

- A. Luminaire Photometric Data Testing Laboratory Qualifications: Luminaire manufacturer's laboratory that is accredited under the NVLAP for Energy Efficient Lighting Products.
- B. Provide luminaires from a single manufacturer for each luminaire type.
- C. Mockups: For interior luminaires in room or module mockups, complete with power and control connections.
 - 1. Obtain Architect/Engineer's approval of luminaires in mockups before starting installations.
 - 2. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
 - 3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect/Engineer specifically approves such deviations in writing.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Protect finishes of exposed surfaces by applying a strippable, temporary protective covering before shipping.

1.10 WARRANTY

- A. Warranty: Manufacturer and Installer agree to repair or replace components of luminaires that fail in materials or workmanship within specified warranty period.
- B. Warranty Period: Five year(s) from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

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- A. Seismic Performance: Luminaires shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
 - 1. The term "withstand" means "the luminaire will remain in place without separation of any parts when subjected to the seismic forces specified and the luminaire will be fully operational during and after the seismic event."
- B. Ambient Temperature: 5 to 104 deg F (Minus 15 to plus 40 deg C.
 - 1. Relative Humidity: Zero to 95 percent.
- C. Altitude: Sea level to 1000 feet (300 m).

2.2 LUMINAIRE REQUIREMENTS

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Factory-Applied Labels: Comply with UL 1598. Include recommended lamps. Locate labels where they will be readily visible to service personnel, but not seen from normal viewing angles when lamps are in place.
 - 1. Label shall include the following lamp characteristics:
 - a. "USE ONLY" and include specific lamp type.
 - b. Lamp diameter, shape, size, wattage, and coating.
 - c. CCT and CRI.
- C. Recessed luminaires shall comply with NEMA LE 4.
- D. California Title 24 compliant.

2.3 BASIS OF DESIGN

- A. Provide luminaires indicated as Basis of Design for each luminaire type.
- B. If substitution product and/or Manufacturer is proposed, submittal needs to clearly indicate that luminaire is a substitution and must clearly show compliance with being equivalent with Basis of Design product. If exceptions are taken based on nonequivalence than all exceptions must be identified in product submittal.

2.4 DOWNLIGHT "D"

A. Basis of Design Manufacturer and Part Number: WAC Lighting: R3ARAT B CC24 WT

- B. Nominal Operating Voltage: 120 V ac.
- C. Lamp: LED
 - 1. Minimum 700 lm.
 - 2. CRI of minimum 80 CCT of 3000 K.
 - 3. Rated lamp life of 50,000 hours to L70.
 - 4. Dimmable from 100 percent to 0 percent of maximum light output.
 - 5. Color Changing

D. Housings:

- 1. Die cast trim with extruded aluminum housing and heat sink.
- 2. Universal mounting bracket.
- 3. Powder Coated finish
- E. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position.
- F. Standards:
 - 1. RoHS compliant.
 - 2. UL Listing: Listed for damp location.
 - 3. ETL listed

2.5 LINEAR STRIP "B"

- A. Basis of Design Manufacturer and Part Number: Holophane: EMS L48 3000LM IMAFL MD MVOLT GZ10 30K 90CRI SF MSI10NWL HC36
- B. Lamp:
 - 1. Minimum 3000 lm.
 - 2. CRI of minimum 80 . CCT of 3000 K .
 - 3. Rated lamp life of 60,000 hours to L80.
 - 4. Dimmable from 100 percent to 0 percent of maximum light output.
 - 5. Internal driver.
 - 6. Lens Thickness: At least 0.080-inch minimum unless otherwise indicated.
- C. Housings:
 - 1. Fiberglass housing and heat sink.
 - 2. Clear powder-coat finish.
- D. Housing and Heat Sink Rating:

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- 1. NEMA 4X.
- 2. IP 66.
- 3. Wet location listed
- E. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Components are designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position.
- F. Diffusers and Globes:
 - 1. UV-stabilized acrylic.
 - 2. Acrylic Diffusers: One hundred percent virgin acrylic plastic, with high resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
 - 3. Lens Thickness: At least 0.125-inch (3.175-mm) minimum unless otherwise indicated.
- G. With integral mounting provisions.
- H. Standards:
 - 1. ENERGY STAR certified.
 - 2. RoHS compliant.
- 2.6 WALL MOUNT, LINEAR "E"
 - A. Basis of Design Manufacturer and Part Number: LITHONIA LIGHTING: WL2 22L L840 N80 MSD7 SC
 - B. Nominal Operating Voltage: 120V AC.
 - C. Lamp:
 - 1. Minimum 2200 lm.
 - 2. CRI of minimum 80. CCT of 4000K.
 - 3. Rated lamp life of 60,000 hours to L90.
 - 4. Dimmable from 100 percent to 0 percent of maximum light output.
 - 5. Internal driver.
 - 6. Lens Thickness: At least 0.125-inch (3.175-mm) minimum unless otherwise indicated.
 - D. Housings:
 - 1. Extruded-aluminum housing and heat sink.
 - 2. Clear powder-coat finish.
 - 3. With integral mounting provisions.
 - E. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Components are

designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position.

F. Diffusers and Globes:

1. Cear, UV-stabilized acrylic.

Retain "Acrylic Diffusers" Subparagraph below if fifth or sixth option in "Diffusers and Globes" Paragraph above is retained.

2. Acrylic Diffusers: One hundred percent virgin acrylic plastic, with high resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.

Retain "Glass" Subparagraph below if first, second, third, or fourth option in "Diffusers and Globes" Paragraph above is retained.

3. Glass: Annealed crystal glass unless otherwise indicated.

Retain "Lens Thickness" Subparagraph below for all diffuser and globe types.

- 4. Lens Thickness: At least 0.125-inch (3.175-mm) minimum unless otherwise indicated.
- G. Standards:
 - 1. ENERGY STAR certified.
 - 2. RoHS compliant.
 - 3. UL Listing: Listed for damp location.
 - 4. NEMA LE 4.

2.7 RECESSED, LINEAR "A"

Retain this article for surface-mounted, linear-style luminaires with a housing, reflector, and/or lens in applications, such stairwell or passageway lighting.

- A. Basis of Design Manufacturer and Part Number: Lithonia Lighting, 2GTL 2 40L EZ1 LP850 N80
- B. Nominal Operating Voltage: 120 V ac /277 V ac.
- C. Lamp:
 - 1. Minimum 4000 lm.
 - 2. CCT of 5000K.
 - 3. Dimmable from 100 percent to 0 percent of maximum light output.
 - 4. Internal driver.
 - 5. User-Replaceable Lamps:
 - a. Bulb shape complying with ANSI C78.79.
 - b. Lamp base complying with ANSI C81.61 or IEC 60061-1.

Retain "Lens Thickness" Subparagraph below for all diffuser and globe types.

6. Lens Thickness: At least 0.125-inch (3.175-mm) minimum unless otherwise indicated.

D. Housings:

- 1. Extruded-aluminum housing and heat sink.
- 2. With integral mounting provisions.
- E. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Components are designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position.

F. Diffusers and Globes:

1. Clear, UV-stabilized acrylic.

Retain "Acrylic Diffusers" Subparagraph below if fifth or sixth option in "Diffusers and Globes" Paragraph above is retained.

2. Acrylic Diffusers: One hundred percent virgin acrylic plastic, with high resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.

Retain "Glass" Subparagraph below if first, second, third, or fourth option in "Diffusers and Globes" Paragraph above is retained.

3. Glass: Annealed crystal glass unless otherwise indicated.

Retain "Lens Thickness" Subparagraph below for all diffuser and globe types.

4. Lens Thickness: At least 0.125-inch (3.175-mm) minimum unless otherwise indicated.

G. Standards:

- 1. ENERGY STAR certified.
- 2. RoHS compliant.
- 3. UL Listing: Listed for damp location.

2.8 WALL MOUNT, LINEAR "F"

Retain this article for linear-style luminaires suspended from a structure used for general illumination. These luminaires may incorporate lenses, louvers, and multiple light distribution patterns for different applications, such as office lighting.

- A. Basis of Design Manufacturer and Part Number: Visa Lighting: CV1700 L40K-L MVOLT AG7038
- B. Nominal Operating Voltage: 120 V ac 277 V ac.
- C. Lamp:
 - 1. Minimum 500 lm.

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- 2. CCT of 4000K.
- 3. Dimmable from 100 percent to 0 percent of maximum light output.
- 4. Internal driver.
- 5. Lens Thickness: At least 0.125-inch (3.175-mm) minimum unless otherwise indicated.

D. Housings:

- 1. Traffic White powder-coat paintedfinish.
- 2. With integral mounting provisions.
- E. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Components are designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position.

F. Standards:

- 1. ADA Compliant
- 2. UL Listing: Listed for damp location.

2.9 RECESSED, LINEAR RGBW LED TAPE "L"

Retain this article for nonlinear luminaires, such as track lighting, pendant lighting, or a similar application used for accent or decorative lighting.

- A. Basis of Design Manufacturer and Part Number: TIVOLI Lighting WRNR-CHAN-SLV-6.5 WRNR-EC-02 TPL-RGBW-I-24
- B. Nominal Operating Voltage: 120 V ac 24 V dc.
- C. LED Tape
 - 1. Minimum 244 lm.
 - 2. Rated lamp life of 60,000 hours to L70.
 - 3. Dimming Option: Dimmable, DMX Control
 - 4. Max Continuous Run: 17 feet

Retain "Lens Thickness" Subparagraph below for all diffuser and globe types.

- 5. Cuttable 6.5".
- D. Housings:
 - 1. Mounting Channel: Anodized Aluminum Extrusion
 - 2. Minimum 6.5' lengths
 - 3. Powerfeed End Caps: WRNR-EC-02
 - 4. Solid End Caps: WRNR-EC-01

- E. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Components are designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position.
- F. Lens:
 - 1. WRNR-LNS-OP-6.5
 - 2. Opal Lens
 - 3. Length: 6.5'
- G. Standards:
 - 1. ENERGY STAR certified.
 - 2. RoHS compliant.
 - 3. UL Listing: Listed for damp location IP54
- 2.10 SURFACE MOUNT, LINEAR "S"
 - A. Basis of Design Manufacturer and Part Number: JUNO LIGHTING: 6RLS G2 07LM 30K 9CRI 120 FRPC WH
 - B. Nominal Operating Voltage: 120V AC.
 - C. Lamp:
 - 1. Minimum 700 lm.
 - 2. CRI of minimum 80. CCT of 3000K.
 - 3. Dimmable from 100 percent to 0 percent of maximum light output.
 - 4. Lens Thickness: At least 0.125-inch (3.175-mm) minimum unless otherwise indicated.
 - D. Housings:
 - 1. Decorative beveled aluminum trim frame.
 - 2. Clear powder-coat finish.
 - 3. With integral mounting provisions.
 - E. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Components are designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position.
 - F. Diffusers and Globes:
 - 1. Diffusing dome lens.
 - G. Standards:
 - 1. ENERGY STAR certified.

2. UL Listing: Listed for damp location. Suitable for wet locations

2.11 SURFACE MOUNT, LINEAR "T"

- A. Basis of Design Manufacturer and Part Number: EATON: DSI WS 2 L40 LD2 1 E UNV SU-JB 4 SR SWPD1 DC W
- B. Nominal Operating Voltage: 120V AC.
- C. Lamp:
 - 1. Minimum 3995 lm.
 - 2. CRI of minimum 80. CCT of 4000K.
 - 3. Dimmable from 100 percent to 0 percent of maximum light output.
 - 4. Lens Thickness: At least 0.125-inch (3.175-mm) minimum unless otherwise indicated.

D. Housings:

- 1. Nominal housing from extruded aluminum and die-formed cold rolled steel
- 2. Polyester powder-coat finish.
- 3. With integral mounting provisions.
- E. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Components are designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position.

F. Standards:

- 1. ENERGY STAR certified.
- 2. UL Listing: Damp location listed
- 3. DLC Listed

2.12 MATERIALS

A. Metal Parts:

- 1. Free of burrs and sharp corners and edges.
- 2. Sheet metal components shall be steel unless otherwise indicated.
- 3. Form and support to prevent warping and sagging.

B. Steel:

- 1. ASTM A 36/A 36M for carbon structural steel.
- 2. ASTM A 568/A 568M for sheet steel.

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C. Stainless Steel:

- 1. 1. Manufacturer's standard grade.
- 2. 2. Manufacturer's standard type, ASTM A 240/240 M.
- D. Galvanized Steel: ASTM A 653/A 653M.
- E. Aluminum: ASTM B 209.

2.13 METAL FINISHES

A. Variations in finishes are unacceptable in the same piece. Variations in finishes of adjoining components are acceptable if they are within the range of approved Samples and if they can be and are assembled or installed to minimize contrast.

2.14 LUMINAIRE SUPPORT

- A. Comply with requirements in "Hangers and Supports for Electrical Systems" section for channel and angle iron supports and nonmetallic channel and angle supports.
- B. Single-Stem Hangers: 1/2-inch (13-mm) steel tubing with swivel ball fittings and ceiling canopy. Finish same as luminaire.
- C. Wires: ASTM A 641/A 641 M, Class 3, soft temper, zinc-coated steel, 12 gage (2.68 mm).
- D. Rod Hangers: 3/16-inch (5-mm) minimum diameter, cadmium-plated, threaded steel rod.
- E. Hook Hangers: Integrated assembly matched to luminaire, line voltage, and equipment with threaded attachment, cord, and locking-type plug.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine roughing-in for luminaire to verify actual locations of luminaire and electrical connections before luminaire installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 TEMPORARY LIGHTING

A. If approved by the Architect/Engineer, use selected permanent luminaires for temporary lighting. When construction is sufficiently complete, clean luminaires used for temporary lighting and install new lamps.

3.3 INSTALLATION

- A. Comply with NECA 1.
- B. Install luminaires level, plumb, and square with ceilings and walls unless otherwise indicated.
- C. Install lamps in each luminaire.

D. Supports:

- 1. Sized and rated for luminaire weight.
- 2. Able to maintain luminaire position after cleaning and relamping.
- 3. Provide support for luminaire without causing deflection of ceiling or wall.
- 4. Luminaire-mounting devices shall be capable of supporting a horizontal force of 100 percent of luminaire weight and a vertical force of 400 percent of luminaire weight.

E. Flush-Mounted Luminaires:

- 1. Secured to outlet box.
- 2. Attached to ceiling structural members at four points equally spaced around circumference of luminaire.
- 3. Trim ring flush with finished surface.

F. Wall-Mounted Luminaires:

- 1. Attached using through bolts and backing plates on either side of wall.
- 2. Do not attach luminaires directly to gypsum board.

G. Suspended Luminaires:

1. Ceiling Mount:

Retain at least one of first three subparagraphs below for luminaires suspended from a ceiling. If retaining more than one subparagraph, indicate on Interior Lighting Fixture Schedule on Drawings.

- a. Two 5/32-inch- (4-mm-) diameter aircraft cable supports adjustable to 10 feet (3 m) in length.
- b. Pendant mount with 5/32-inch- (4-mm-) diameter aircraft cable supports adjustable to 10 feet (3 m) in length.
- c. Hook mount.

- 2. Pendants and Rods: Where longer than 48 inches (1200 mm), brace to limit swinging.
- 3. Stem-Mounted, Single-Unit Luminaires: Suspend with twin-stem hangers. Support with approved outlet box and accessories that hold stem and provide damping of luminaire oscillations. Support outlet box vertically to building structure using approved devices.
- 4. Continuous Rows of Luminaires: Use tubing or stem for wiring at one point and tubing or rod for suspension for each unit length of luminaire chassis, including one at each end.
- 5. Do not use ceiling grid as support for pendant luminaires. Connect support wires or rods to building structure.

H. Ceiling-Grid-Mounted Luminaires:

1. Secure to any required outlet box.

Retain first subparagraph below to require ceiling grid to be connected to building structure at four corners of luminaire opening.

2. Secure luminaire to the luminaire opening using approved fasteners in a minimum of four locations, spaced near corners of luminaire.

Retain subparagraph below if ceiling grid is not connected to building structure at four corners of the luminaire opening.

- 3. Use approved devices and support components to connect luminaire to ceiling grid and building structure in a minimum of four locations, spaced near corners of luminaire.
- I. Comply with requirements in Low-Voltage Electrical Power Conductors and Cables section for wiring connections.

3.4 IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in "Identification for Electrical Systems."

3.5 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

Coordinate "Operational Test" Subparagraph below with requirements in "Lighting Control Devices."

- 1. Operational Test: After installing luminaires, switches, and accessories, and after electrical circuitry has been energized, test units to confirm proper operation.
- 2. Test for Emergency Lighting: Interrupt power supply to demonstrate proper operation. Verify transfer from normal power to battery power and retransfer to normal.
- B. Luminaire will be considered defective if it does not pass operation tests and inspections.
- C. Prepare test and inspection reports.

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3.6 STARTUP SERVICE

Retain one of two paragraphs below if LED luminaires are connected to a lighting control system.

A. Comply with requirements for startup specified in any and all lighting control sections.

3.7 ADJUSTING

Verify with Owner that adjusting service is required for Project.

- A. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting the direction of aim of luminaires to suit occupied conditions. Make up to two visits to Project during other-than-normal hours for this purpose. Some of this work may be required during hours of darkness.
 - 1. During adjustment visits, inspect all luminaires. Replace lamps or luminaires that are defective.
 - 2. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.
 - 3. Adjust the aim of luminaires in the presence of the Architect/Engineer.

END OF SECTION 265119

SECTION 284620 - ADDRESSABLE FIRE-ALARM SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. This section includes both new systems and modifications and additions to existing systems.

1.2 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.3 SUMMARY

- A. Section Includes but is not limited to:
 - 1. Complete working fire and life safety alarm system.
 - 2. Fire-alarm control unit.
 - 3. Manual fire-alarm boxes.
 - 4. Heat detectors.
 - 5. Notification appliances.
 - 6. Remote annunciator.

1.4 DEFINITIONS

- A. EMT: Electrical Metallic Tubing.
- B. FACP: Fire Alarm Control Panel.
- C. HLI: High Level Interface.
- D. NICET: National Institute for Certification in Engineering Technologies.
- E. PC: Personal computer.
- F. VESDA: Very Early Smoke-Detection Apparatus.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product, including furnished options and accessories.
 - 1. Include construction details, material descriptions, dimensions, profiles, and finishes.

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2. Include rated capacities, operating characteristics, and electrical characteristics.

B. Shop Drawings: For fire-alarm system.

- 1. Comply with recommendations and requirements in the "Documentation" section of the "Fundamentals" chapter in NFPA 72.
- 2. Provide complete plans and drawings for new and existing to remain equipment.
- 3. Include plans, elevations, sections, details, and attachments to other work.
- 4. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and locations. Indicate conductor sizes, indicate termination locations and requirements, and distinguish between factory and field wiring.
- 5. Riser Wiring Diagram showing all equipment devices, device addresses, connections, control connections, remote notification connections and wire quantities and sizes.
- 6. Detail assembly and support requirements.
- 7. Include voltage drop calculations for notification-appliance circuits.
- 8. Include battery-size calculations.
- 9. Include input/output matrix.
- 10. Include statement from manufacturer that all equipment and components have been tested as a system and meet all requirements in this Specification and in NFPA 72.
- 11. Include performance parameters and installation details for each detector.
- 12. Verify that each duct detector is listed for complete range of air velocity, temperature, and humidity possible when air-handling system is operating.
- 13. Provide program report showing that air-sampling detector pipe layout balances pneumatically within the airflow range of the air-sampling detector.
- 14. Include plans, sections, and elevations of heating, ventilating, and air-conditioning ducts, drawn to scale; coordinate location of duct smoke detectors and access to them.
 - a. Show critical dimensions that relate to placement and support of sampling tubes, detector housing, and remote status and alarm indicators.
 - b. Locate detectors according to manufacturer's written recommendations.
 - c. Show field wiring required for HVAC unit shutdown on alarm.
 - d. Show field wiring required for elevator recall and power disconnect shunt trip on alarm.
- 15. Include voice/alarm signaling-service equipment rack or console layout, grounding schematic, amplifier power calculation, and single-line connection diagram.
- 16. Include floor plans to indicate final outlet locations showing address of each addressable device. Show size and route of cable and conduits and point-to-point wiring diagrams.

C. General Submittal Requirements:

- 1. Submittals shall be approved by authorities having jurisdiction prior to submitting them to Engineer.
- 2. Shop Drawings shall be prepared by persons with the following qualifications:
 - a. Trained and certified by manufacturer in fire-alarm system design.
 - b. NICET-certified, fire-alarm technician; Level III minimum.
 - c. Licensed or certified by authorities having jurisdiction.

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- D. Delegated-Design Submittal: For notification appliances and smoke and heat detectors, in addition to submittals listed above, indicate compliance with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
 - 1. Drawings showing the location of each notification appliance and smoke and heat detector, ratings of each, and installation details as needed to comply with listing conditions of the device.
 - 2. Design Calculations: Calculate requirements for selecting the spacing and sensitivity of detection, complying with NFPA 72. Calculate spacing and intensities for strobe signals and sound-pressure levels for audible appliances.
 - 3. Indicate audible appliances required to produce square wave signal per NFPA 72.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Seismic Qualification Data: Certificates, for fire-alarm control unit, accessories, and components, from manufacturer.
 - 1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
 - 2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
 - 3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
- C. Field quality-control reports.

1.7 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For fire-alarm systems and components to include in emergency, operation, and maintenance manuals.
 - 1. In addition to items specified include the following and deliver copies to authorities having jurisdiction:
 - a. Comply with the "Records" section of the "Inspection, Testing and Maintenance" chapter in NFPA 72.
 - b. Provide "Fire Alarm and Emergency Communications System Record of Completion Documents" according to the "Completion Documents" Article in the "Documentation" section of the "Fundamentals" chapter in NFPA 72.
 - c. Complete wiring diagrams showing connections between all devices and equipment. Each conductor shall be numbered at every junction point with indication of origination and termination points.
 - d. Riser diagram.
 - e. Device addresses.

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- f. Air-sampling system sample port locations and modeling program report showing layout meets performance criteria.
- g. Record copy of site-specific software.
- h. Provide "Inspection and Testing Form" according to the "Inspection, Testing and Maintenance" chapter in NFPA 72, and include the following:
 - 1) Equipment tested.
 - 2) Frequency of testing of installed components.
 - 3) Frequency of inspection of installed components.
 - 4) Requirements and recommendations related to results of maintenance.
 - 5) Manufacturer's user training manuals.
- i. Manufacturer's required maintenance related to system warranty requirements.
- j. Abbreviated operating instructions for mounting at fire-alarm control unit and each annunciator unit.
- B. Software and Firmware Operational Documentation:
 - 1. Software operating manuals.
 - 2. Device address list.

1.8 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Lamps for Remote Indicating Lamp Units: Quantity equal to [10] percent of amount installed, but no fewer than one unit.
 - 2. Lamps for Strobe Units: Quantity equal to [10] percent of amount installed, but no fewer than one unit.
 - 3. Smoke Detectors, Fire Detectors
 - 4. Detector Bases: Quantity equal to two percent of amount of each type installed, but no fewer than one unit of each type.
 - 5. Keys and Tools: One extra set for access to locked or tamperproofed components.
 - 6. Audible and Visual Notification Appliances: One of each type installed.
 - 7. Fuses: Two of each type installed in the system. Provide in a box or cabinet with compartments marked with fuse types and sizes.
 - 8. Filters for Air-Sampling Detectors: Quantity equal to [two] percent of amount of each type installed, but no fewer than one unit of each type.
 - 9. Air-Sampling Fan: Quantity equal to one for every five detectors, but no fewer than one unit of each type.

1.9 QUALITY ASSURANCE

A. Installer Qualifications: Personnel shall be trained and certified by manufacturer for installation of units required for this Project.

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- B. Installer Qualifications: Installation shall be by personnel certified by NICET as fire-alarm Level III or Level IV technician.
- C. NFPA Certification: Obtain certification according to NFPA 72 by a UL-listed alarm company.

1.10 PROJECT CONDITIONS

- A. Perform a full test of the existing system prior to starting work. Document any equipment or components not functioning as designed.
- B. Interruption of Existing Fire-Alarm Service: Do not interrupt fire-alarm service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary guard service according to requirements indicated:
 - 1. Notify Owner no fewer than seven days in advance of proposed interruption of fire-alarm service.
 - 2. Do not proceed with interruption of fire-alarm service without Owner's written permission.
- C. Provide a temporary Fire Alarm system including smoke detectors, exit pull stations and horn/strobe notifications devices on temporary supports in exit paths, paths of egress and significant corridors. Temporary Fire Alarm system will have connection to. Temporary Fire Alarm system will remain in operation until new or modified system is certified and accepted by the Authority Having Jurisdiction. Connect to existing system if it will remain in operation during construction.
- D. Use of Devices during Construction: Protect devices during construction unless devices are placed in service to protect the facility during construction.

1.11 SEQUENCING AND SCHEDULING

- A. Existing Fire-Alarm Equipment: Maintain existing equipment fully operational until new equipment has been tested and accepted. As new equipment is installed, label it "NOT IN SERVICE" until it is accepted. Remove labels from new equipment when put into service, and label existing fire-alarm equipment "NOT IN SERVICE" until removed from the building.
- B. Equipment Removal: After acceptance of new fire-alarm system, remove existing disconnected fire-alarm equipment and wiring including any temporary components.

1.12 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace fire-alarm system equipment and components that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Extent: All equipment and components not covered in the Maintenance Service Agreement.
 - 2. Warranty Period: Five years minimum from date of Substantial Completion.

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PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

- A. Source Limitations for Fire-Alarm System and Components: Components shall be compatible with, and operate as an extension of, existing system. Provide system manufacturer's certification that all components provided have been tested as, and will operate as, a system.
- B. Noncoded, UL-certified addressable system, with multiplexed signal transmission and voice/strobe evacuation.
- C. Automatic sensitivity control of certain smoke detectors.
- D. All components provided shall be listed for use with the selected system.
- E. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.2 SYSTEMS OPERATIONAL DESCRIPTION

- A. Fire-alarm signal initiation shall be by one or more of the following devices and systems:
 - 1. Manual stations.
 - 2. Heat detectors.
 - 3. Flame detectors.
 - 4. Smoke detectors.
 - 5. Duct smoke detectors.
 - 6. Automatic sprinkler system water flow.
- B. Fire-alarm signal shall initiate the following actions:
 - 1. Continuously operate alarm notification appliances, including voice evacuation notices.
 - 2. Identify alarm and specific initiating device at fire-alarm control unit and remote annunciators.
 - 3. Transmit an alarm signal to the remote alarm receiving station.
 - 4. Activate voice/alarm communication system.
 - 5. Switch heating, ventilating, and air-conditioning equipment controls to fire-alarm mode.
 - 6. Activate smoke-control system (smoke management) at firefighters' smoke-control system panel.
 - 7. Recall elevators to primary or alternate recall floors.
 - 8. Activate elevator power shunt trip.
 - 9. Activate emergency shutoffs for gas and fuel supplies.
 - 10. Record events in the system memory.
- C. Supervisory signal initiation shall be by one or more of the following devices and actions:
 - 1. Valve supervisory switch.
 - 2. Elevator shunt-trip supervision.

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- 3. User disabling of zones or individual devices.
- 4. Loss of communication with any panel on the network.
- D. System trouble signal initiation shall be by one or more of the following devices and actions:
 - 1. Open circuits, shorts, and grounds in designated circuits.
 - 2. Opening, tampering with, or removing alarm-initiating and supervisory signal-initiating devices.
 - 3. Loss of communication with any addressable sensor, input module, relay, control module, remote annunciator, printer interface, or Ethernet module.
 - 4. Loss of primary power at fire-alarm control unit.
 - 5. Ground or a single break in internal circuits of fire-alarm control unit.
 - 6. Abnormal ac voltage at fire-alarm control unit.
 - 7. Break in standby battery circuitry.
 - 8. Failure of battery charging.
 - 9. Abnormal position of any switch at fire-alarm control unit or annunciator.
 - 10. Voice signal amplifier failure.
 - 11. Hose cabinet door open.

E. System Supervisory Signal Actions:

- 1. Initiate notification appliances.
- 2. Identify specific device initiating the event at fire-alarm control unit and remote annunciators.
- 3. Record the event on system printer.
- 4. After a time delay of 200 seconds, transmit a trouble or supervisory signal to the remote alarm receiving station.
- 5. Transmit system status to building management system.
- 6. Display system status on graphic annunciator.

2.3 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Fire-alarm control unit and raceways shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
 - 1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."

2.4 FIRE-ALARM CONDUIT AND CABLE

A. Conduit

- 1. All fire alarm cable shall be placed in conduit.
- 2. Conduit shall be in accordance with NFPA 70 (NEC) and the specifications of conduit.
- 3. Conduit fill shall not exceed 40 percent of interior cross sectional area.

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- 4. Cable must be separated from any open conductors of power and/or Class 1 circuits. Fire alarm cable shall not be placed in any conduit, junction box or raceway containing non-fire alarm conductors.
- 5. Conduit shall be 3/4 inch minimum.

B. Cable mounting

- 1. Cabling not indicated as required to be in conduit shall be routed in aluminum bridle rings, no more than 6 feet apart, or routed in specifically indicated cable trays, attached to structural members and shall not be draped or supported directly on mechanical, architectural or structural items.
- 2. Fire alarm cabling shall not be supported or draped over non-structural elements such as heating/ventilation devices.
- 3. All connections will be enclosed in metal junction boxes. All devices will be mounted using metal or plastic junction boxes consistent with the area of installation and routing used.

C. Wire/Cable:

- 1. All fire alarm system wiring shall be new except for existing devices.
- 2. Wiring shall be in accordance with all state, local, national or user codes and as recommended by the manufacturer of the fire alarm system. Number and size of conductors shall be as recommended by the fire alarm system manufacturer and as approved by the Architect/Engineer. Fire Alarm system cabling shall not be less than:
 - a. Fire Alarm wiring/cabling shall not be less than 18 AWG for Initialing Device Circuits (IDC).
 - b. Fire Alarm wiring/cabling shall not be less than 16 AWG for Notification Appliance Circuits (NAC).
 - c. Fire Alarm wiring/cabling shall not be less than 14 AWG for Relay, Power and Auxiliary Device Circuits.
 - d. Fire Alarm wiring/cabling shall not be less than 18 AWG for Voice Notification Appliance Circuits.
 - e. Cabling shall be shielded/twisted pair for both IDC and NAC circuit.
- 3. All wire and/or cable shall be listed and/or approved by a recognized testing agency for use with a protective signaling system.
- 4. Fire alarm cabling and wire shall be rated as FPLP (Plenum Rated) in all locations.
- 2.5 Cabling not indicated as required to be in conduit shall be routed in aluminum bridle rings, no more than 6 feet apart, or routed in specifically indicated cable trays, attached to structural members and shall not be draped or supported directly on mechanical, architectural or structural items.

2.6 FIRE-ALARM CONTROL UNIT

- A. The existing Fire Alarm Control Unit is: _Simplex 4100U
- B. The Fire Alarm Control Unit is to be replaced with a Simplex 4100ES in the same location.
- C. General Requirements for Fire-Alarm Control Unit:

- 1. Compatible with all existing devices.
- 2. Field-programmable, microprocessor-based, modular, power-limited design with electronic modules, complying with UL 864.
 - a. System software and programs shall be held in nonvolatile flash, electrically erasable, programmable, read-only memory, retaining the information through failure of primary and secondary power supplies.
 - b. Include a real-time clock for time annotation of events on the event recorder and printer.
 - c. Provide communication between the FACP and remote circuit interface panels (Fire Alarm Transponders-FAT), annunciators, and displays.
 - d. The FACP shall be listed for connection to a central-station signaling system service.
 - e. Provide nonvolatile memory for system database, logic, and operating system and event history. The system shall require no manual input to initialize in the event of a complete power down condition. The FACP shall provide a minimum 500-event history log.
- 3. Addressable Initiation Device Circuits: The FACP shall indicate which communication zones have been silenced and shall provide selective silencing of alarm notification appliance by building communication zone.
- 4. Addressable Control Circuits for Operation of Notification Appliances and Mechanical Equipment: The FACP shall be listed for releasing service.
- D. Alphanumeric Display and System Controls: Arranged for interface between human operator at fire-alarm control unit and addressable system components including annunciation and supervision. Display alarm, supervisory, and component status messages and the programming and control menu.
 - 1. Annunciator and Display: Liquid-crystal type, 80 characters, minimum.
 - 2. Keypad: Arranged to permit entry and execution of programming, display, and control commands.
- E. Alphanumeric Display and System Controls: Arranged for interface between human operator at fire-alarm control unit and addressable system components including annunciation and supervision. Display alarm, supervisory, and component status messages and the programming and control menu.
 - 1. Annunciator and Display: Liquid-crystal type, two line(s) of 40 characters, minimum.
 - 2. Keypad: Arranged to permit entry and execution of programming, display, and control commands.
- F. Initiating-Device, Notification-Appliance, and Signaling-Line Circuits:
 - 1. Pathway Class Designations: NFPA 72, Class B.
 - 2. Pathway Survivability: Level 0.
 - 3. Install no more than 50 addressable devices on each signaling-line circuit.
 - 4. Serial Interfaces:

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- a. One dedicated RS 485 port for central-station operation using point ID DACT.
- b. One RS 485 port for remote annunciators, Ethernet module, or multi-interface module (printer port).
- c. One USB port for PC configuration.
- d. One RS 232 port for voice evacuation interface.

G. Smoke-Alarm Verification:

- 1. Initiate audible and visible indication of an "alarm-verification" signal at fire-alarm control unit.
- 2. Activate an approved "alarm-verification" sequence at fire-alarm control unit and detector.
- 3. Record events by the system printer.
- 4. Sound general alarm if the alarm is verified.
- 5. Cancel fire-alarm control unit indication and system reset if the alarm is not verified.
- H. A "Walk Test" shall be available at the control panel and may be optionally programmed into remote annunciator panels. The actuation of the "Walk Test" mode shall cause:
 - 1. The remote central monitoring station connection shall be bypassed.
 - 2. Only audible and visual appliances shall be operated. Other alarm functions (elevator recall, HVAC shutdown, etc.) shall not be affected.
 - 3. Walk Test modes shall be selectable by entire system or by circuit, circuits or zones.
 - 4. Actual alarms received during a "Walk Test" shall cause the control panel to go into alarm and shall override the "Walk "Test" mode.
 - 5. The control panel shall show trouble and supervisory conditions.
 - 6. The "Walk Test" activation of any initiation device shall cause the audible signals to activate for two seconds or other Engineer approved sound.
 - 7. The panel shall automatically reset itself after signaling is complete.
 - 8. The control panel shall automatically return to normal condition if no activity on a "Walk Test" circuit occurs for a period of 30 minutes.

I. Notification-Appliance Circuit:

- 1. Audible appliances shall sound in a three-pulse temporal pattern, as defined in NFPA 72.
- 2. Where notification appliances provide signals to sleeping areas, the alarm signal shall be a 520-Hz square wave with an intensity 15 dB above the average ambient sound level or 5 dB above the maximum sound level, or at least 75 dBA, whichever is greater, measured at the pillow.
- 3. Visual alarm appliances shall flash in synchronization where multiple appliances are in the same field of view, as defined in NFPA 72.

J. Elevator Recall:

- 1. Elevator recall shall be initiated only by one of the following alarm-initiating devices:
 - a. Elevator lobby detectors except the lobby detector on the designated floor.

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- b. Smoke detector in elevator machine room.
- c. Smoke detectors in elevator hoistway.
- 2. Elevator controller shall be programmed to move the cars to the alternate recall floor if lobby detectors located on the designated recall floors are activated.
- 3. Water-flow alarm connected to sprinkler in an elevator shaft and elevator machine room shall shut down elevators associated with the location without time delay.
 - a. Water-flow switch associated with the sprinkler in the elevator pit may have a delay to allow elevators to move to the designated floor.
- K. Transmission to Remote Alarm Receiving Station: Automatically transmit alarm, supervisory, and trouble signals to a remote alarm station.
- L. Voice/Alarm Signaling Service: Central emergency communication system with redundant microphones, preamplifiers, amplifiers, and tone generators provided as a special module that is part of fire-alarm control unit.
 - 1. Indicate number of alarm channels for automatic, simultaneous transmission of different announcements to different zones or for manual transmission of announcements by use of the central-control microphone. Amplifiers shall comply with UL 1711.
 - a. Allow the application of, and evacuation signal to, indicated number of zones and, at the same time, allow voice paging to the other zones selectively or in any combination.
 - b. Programmable tone and message sequence selection.
 - c. Standard digitally recorded messages for "Evacuation" and "All Clear."
 - d. Generate tones to be sequenced with audio messages of type recommended by NFPA 72 and that are compatible with tone patterns of notification-appliance circuits of fire-alarm control unit
 - 2. Status Annunciator: Indicate the status of various voice/alarm speaker zones and the status of firefighters' two-way telephone communication zones.
 - 3. Preamplifiers, amplifiers, and tone generators shall automatically transfer to backup units, on primary equipment failure.
- M. Primary Power: 24-V dc obtained from 120-V ac service and a power-supply module. Initiating devices, notification appliances, signaling lines, trouble signals, supervisory and digital alarm communicator transmitters shall be powered by 24-V dc source.
 - 1. Alarm current draw of entire fire-alarm system shall not exceed 80 percent of the power-supply module rating.
- N. Secondary Power: 24-V dc supply system with batteries, automatic battery charger, and automatic transfer switch.
 - 1. Batteries: Sealed lead calcium.

O. Instructions: Computer printout or typewritten instruction card mounted behind a plastic or glass cover in a stainless-steel or aluminum frame. Include interpretation and describe appropriate response for displays and signals. Briefly describe the functional operation of the system under normal, alarm, and trouble conditions.

2.7 MANUAL FIRE-ALARM BOXES

- A. Ensure appliance is compatible with Fire Alarm Control Unit.
- B. General Requirements for Manual Fire-Alarm Boxes: Comply with UL 38. Boxes shall be finished in red with molded, raised-letter operating instructions in contrasting color; shall show visible indication of operation; and shall be mounted on recessed outlet box. If indicated as surface mounted, provide manufacturer's surface back box.
 - 1. Single-action mechanism, as existing to fire-alarm control unit.
 - 2. All new devices shall be double-action mechanism requiring two actions to initiate an alarm, pull-lever type; with integral addressable module arranged to communicate manual-station status (normal, alarm, or trouble) to fire-alarm control unit.
 - 3. Station Reset: Key- or wrench-operated switch.
 - 4. Indoor Protective Shield: Factory-fabricated, clear plastic enclosure hinged at the top to permit lifting for access to initiate an alarm. Lifting the cover actuates an integral battery-powered audible horn intended to discourage false-alarm operation.
 - 5. Weatherproof Protective Shield: Factory-fabricated, clear plastic enclosure hinged at the top to permit lifting for access to initiate an alarm.

2.8 SYSTEM SMOKE DETECTORS

- A. Ensure appliance is compatible with Fire Alarm Control Unit
- B. General Requirements for System Smoke Detectors:
 - 1. Comply with UL 268; operating at 24-V dc, nominal.
 - 2. Detectors shall be four-wire type.
 - 3. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to fire-alarm control unit.
 - 4. Base Mounting: Detector and associated electronic components shall be mounted in a twist-lock module that connects to a fixed base. Provide terminals in the fixed base for connection to building wiring.
 - 5. Self-Restoring: Detectors do not require resetting or readjustment after actuation to restore them to normal operation.
 - 6. Integral Visual-Indicating Light: LED type, indicating detector has operated and power-on status.
 - 7. Remote Control: Unless otherwise indicated, detectors shall be digital-addressable type, individually monitored at fire-alarm control unit for calibration, sensitivity, and alarm condition.
 - a. Multiple levels of detection sensitivity for each sensor.
 - b. Sensitivity levels based on time of day.

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C. Ionization Smoke Detector:

- 1. Detector address shall be accessible from fire-alarm control unit and shall be able to identify the detector's location within the system and its sensitivity setting.
- 2. An operator at fire-alarm control unit, having the designated access level, shall be able to manually access the following for each detector:
 - a. Primary status.
 - b. Device type.
 - c. Present average value.
 - d. Present sensitivity selected.
 - e. Sensor range (normal, dirty, etc.).

2.9 HEAT DETECTORS

- A. Ensure appliance is compatible with Fire Alarm Control Unit.
- B. General Requirements for Heat Detectors: Comply with UL 521.
 - 1. Temperature sensors shall test for and communicate the sensitivity range of the device.
- C. Heat Detector, Combination Type: Actuated by either a fixed temperature of 135 deg F (57 deg C) or a rate of rise that exceeds 15 deg F (8 deg C) per minute unless otherwise indicated.
 - 1. Mounting: Twist-lock base interchangeable with smoke-detector bases.
 - 2. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to fire-alarm control unit.
- D. Heat Detector, Fixed-Temperature Type: Actuated by temperature that exceeds a fixed temperature of 190 deg F (88 deg C).
 - 1. Mounting: Twist-lock base interchangeable with smoke-detector bases.
 - 2. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to fire-alarm control unit.

2.10 NOTIFICATION APPLIANCES

- A. Ensure notification appliances are compatible with Fire Alarm Control Unit.
- B. General Requirements for Notification Appliances: Individually addressed, connected to a signaling-line circuit, equipped for mounting as indicated, and with screw terminals for system connections.
- C. General Requirements for Notification Appliances: Connected to notification-appliance signal circuits, zoned as indicated, equipped for mounting as indicated, and with screw terminals for system connections.

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- 1. Combination Devices: Factory-integrated audible and visible devices in a single-mounting assembly, equipped for mounting as indicated, and with screw terminals for system connections.
- D. Visible Notification Appliances: Xenon strobe lights complying with UL 1971, with clear or nominal white polycarbonate lens mounted on an aluminum faceplate. The word "FIRE" is engraved in minimum 1-inch- (25-mm-) high letters on the lens.
 - 1. Rated Light Output:
 - a. 15/30/75/110 cd, selectable in the field.
 - 2. Mounting: Wall mounted unless otherwise indicated.
 - 3. For units with guards to prevent physical damage, light output ratings shall be determined with guards in place.
 - 4. Flashing shall be in a temporal pattern, synchronized with other units.
 - 5. Strobe Leads: Factory connected to screw terminals.
 - 6. Mounting Faceplate: Factory finished, red for Fire.
- E. Voice/Tone Notification Appliances:
 - 1. Comply with UL 1480.
 - 2. Speakers for Voice Notification: Locate speakers for voice notification to provide the intelligibility requirements of the "Notification Appliances" and "Emergency Communications Systems" chapters in NFPA 72.
 - 3. High-Range Units: Rated 2 to 15 W.
 - 4. Low-Range Units: Rated 1 to 2 W.
 - 5. Mounting: Flush.
 - 6. Matching Transformers: Tap range matched to acoustical environment of speaker location.

2.11 REMOTE ANNUNCIATOR

A. Description: No separate annunciator is required

2.12 ADDRESSABLE INTERFACE DEVICE

- A. Ensure interfaces are compatible with Fire Alarm Control Unit.
- B. General:
 - 1. Include address-setting means on the module.
 - 2. Store an internal identifying code for control panel use to identify the module type.
 - 3. Listed for controlling HVAC fan motor controllers.
- C. Monitor Module: Microelectronic module providing a system address for alarm-initiating devices for wired applications with normally open contacts.

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- D. Integral Relay: Capable of providing a direct signal to elevator controller to initiate elevator recall.
 - 1. Allow the control panel to switch the relay contacts on command.
 - 2. Have a minimum of two normally open and two normally closed contacts available for field wiring.

E. Control Module:

1. Operate notification devices.

2.13 DIGITAL ALARM COMMUNICATOR TRANSMITTER

A. Digital alarm communicator transmitter shall be acceptable to the remote central station and shall comply with UL 632 and will be existing or will match existing functionality.

2.14 NETWORK COMMUNICATIONS

- A. Provide network communications for fire-alarm system according to fire-alarm manufacturer's written requirements.
- B. Provide network communications pathway per manufacturer's written requirements and requirements in NFPA 72 and NFPA 70.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and conditions for compliance with requirements for ventilation, temperature, humidity, and other conditions affecting performance of the Work.
 - 1. Verify that manufacturer's written instructions for environmental conditions have been permanently established in spaces where equipment and wiring are installed, before installation begins.
- B. Examine roughing-in for electrical connections to verify actual locations of connections before installation
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

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3.2 EQUIPMENT INSTALLATION

- A. Comply with NFPA 72, NFPA 101, and requirements of authorities having jurisdiction for installation and testing of fire-alarm equipment. Install all electrical wiring to comply with requirements in NFPA 70 including, but not limited to, Article 760, "Fire Alarm Systems."
 - 1. Devices placed in service before all other trades have completed cleanup shall be replaced.
 - 2. Devices installed but not yet placed in service shall be protected from construction dust, debris, dirt, moisture, and damage according to manufacturer's written storage instructions.
- B. Connecting to Existing Equipment: Verify that existing fire-alarm system is operational before making changes or connections.
 - 1. Connect new equipment to existing control panel in existing part of the building.
 - 2. Connect new equipment to existing monitoring equipment at the supervising station.
 - 3. Expand, modify, and supplement existing [control] [monitoring] equipment as necessary to extend existing [control] [monitoring] functions to the new points. New components shall be capable of merging with existing configuration without degrading the performance of either system.
- C. Equipment Mounting: Install fire-alarm control unit on concrete base.
 - 1. Install seismic bracing.
 - 2. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch (460-mm) centers around the full perimeter of concrete base.
 - 3. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.
 - 4. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - 5. Install anchor bolts to elevations required for proper attachment to supported equipment.
- D. Equipment Mounting: Install fire-alarm control unit on finished floor or as indicated on contract drawings.
- E. Install wall-mounted equipment, with tops of cabinets not more than 78 inches (1980 mm) above the finished floor.
- F. Manual Fire-Alarm Boxes:
 - 1. Install manual fire-alarm box in the normal path of egress within 60 inches (1520 mm) of the exit doorway.
 - 2. Mount manual fire-alarm box on a background of a contrasting color.
 - 3. The operable part of manual fire-alarm box shall be between 42 inches (1060 mm) and 48 inches (1220 mm) above floor level. All devices shall be mounted at the same height unless otherwise indicated.

- G. Smoke- or Heat-Detector Spacing:
 - 1. Comply with the "Smoke-Sensing Fire Detectors" section in the "Initiating Devices" chapter in NFPA 72, for smoke-detector spacing.
 - 2. Comply with the "Heat-Sensing Fire Detectors" section in the "Initiating Devices" chapter in NFPA 72, for heat-detector spacing.
 - 3. Smooth ceiling spacing shall not exceed [30 feet (9 m)].
 - 4. Spacing of detectors for irregular areas, for irregular ceiling construction, and for high ceiling areas shall be determined according to Annex A or Annex B in NFPA 72.
 - 5. HVAC: Locate detectors not closer than [36 inches (910 mm)] [60 inches (1520 mm)] from air-supply diffuser or return-air opening.
 - 6. Lighting Fixtures: Locate detectors not closer than 12 inches (300 mm) from any part of a lighting fixture and not directly above pendant mounted or indirect lighting.
- H. Install a cover on each smoke detector that is not placed in service during construction. Cover shall remain in place except during system testing. Remove cover prior to system turnover.
- I. Duct Smoke Detectors: Comply with NFPA 72 and NFPA 90A. Install sampling tubes so they extend the full width of duct. Tubes more than 36 inches (9100 mm) long shall be supported at both ends.
 - 1. Do not install smoke detector in duct smoke-detector housing during construction. Install detector only during system testing and prior to system turnover.
- J. Air-Sampling Smoke Detectors: If using multiple pipe runs, the runs shall be pneumatically balanced.
- K. Elevator Shafts: Coordinate temperature rating and location with sprinkler rating and location. Do not install smoke detectors in sprinklered elevator shafts.
- L. Single-Station Smoke Detectors: Where more than one smoke alarm is installed within a dwelling or suite, they shall be connected so that the operation of any smoke alarm causes the alarm in all smoke alarms to sound.
- M. Remote Status and Alarm Indicators: Install in a visible location near each smoke detector, sprinkler water-flow switch, and valve-tamper switch that is not readily visible from normal viewing position.
- N. Audible Alarm-Indicating Devices: Install not less than 6 inches (150 mm) below the ceiling. Install bells and horns on flush-mounted back boxes with the device-operating mechanism concealed behind a grille. Install all devices at the same height unless otherwise indicated.
- O. Visible Alarm-Indicating Devices: Install adjacent to each alarm bell or alarm horn and at least 6 inches (150 mm) below the ceiling. Install all devices at the same height unless otherwise indicated.
- P. Device Location-Indicating Lights: Locate in public space near the device they monitor.

Q. Antenna for Radio Alarm Transmitter: Mount to building structure where indicated. Use mounting arrangement and substrate connection that resists [100-mph (160-km/h)] <Insert value> wind load with a gust factor of 1.3 without damage.

3.3 PATHWAYS

- A. Pathways above recessed ceilings and in nonaccessible locations may be routed exposed.
 - 1. Exposed pathways located less than 96 inches (2440 mm) above the floor shall be installed in EMT.
- B. Pathways shall be installed in EMT unless indicated otherwise.
- C. Exposed EMT shall be painted red enamel.

3.4 CONNECTIONS

- A. For fire-protection systems related to doors in fire-rated walls and partitions and to doors in smoke partitions, comply with requirements in Section 087100 "Door Hardware." Connect hardware and devices to fire-alarm system.
 - 1. Verify that hardware and devices are listed for use with installed fire-alarm system before making connections.
- B. Make addressable connections with a supervised interface device to the following devices and systems. Install the interface device less than 36 inches (910 mm) from the device controlled. Make an addressable confirmation connection when such feedback is available at the device or system being controlled.
 - 1. Alarm-initiating connection to smoke-control system (smoke management) at firefighters' smoke-control system panel.
 - 2. Alarm-initiating connection to stairwell and elevator-shaft pressurization systems.
 - 3. Smoke dampers in air ducts of designated HVAC duct systems.
 - 4. Magnetically held-open doors.
 - 5. Electronically locked doors and access gates.
 - 6. Alarm-initiating connection to elevator recall system and components.
 - 7. Alarm-initiating connection to activate emergency lighting control.
 - 8. Alarm-initiating connection to activate emergency shutoffs for gas and fuel supplies.
 - 9. Supervisory connections at valve supervisory switches.
 - 10. Supervisory connections at low-air-pressure switch of each dry-pipe sprinkler system.
 - 11. Supervisory connections at elevator shunt-trip breaker.
 - 12. Data communication circuits for connection to building management system.
 - 13. Data communication circuits for connection to mass notification system.
 - 14. Supervisory connections at fire-extinguisher locations.
 - 15. Supervisory connections at fire-pump power failure including a dead-phase or phase-reversal condition.
 - 16. Supervisory connections at fire-pump engine control panel.

17. **Insert connections**.

3.5 IDENTIFICATION

- A. Identify system components, wiring, cabling, and terminals.
- B. Install framed instructions in a location visible from fire-alarm control unit.

3.6 GROUNDING

- A. Ground fire-alarm control unit and associated circuits; comply with IEEE 1100. Install a ground wire from main service ground to fire-alarm control unit.
- B. Ground shielded cables at the control panel location only. Insulate shield at device location.

3.7 FIELD QUALITY CONTROL

- A. Field tests shall be witnessed by [Engineer] [authorities having jurisdiction] <Insert names or titles of witnesses>.
- B. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.
- C. Perform tests and inspections.
- D. Perform the following tests and inspections[with the assistance of a factory-authorized service representative]:
 - 1. Visual Inspection: Conduct visual inspection prior to testing.
 - a. Inspection shall be based on completed record Drawings and system documentation that is required by the "Completion Documents, Preparation" table in the "Documentation" section of the "Fundamentals" chapter in NFPA 72.
 - b. Comply with the "Visual Inspection Frequencies" table in the "Inspection" section of the "Inspection, Testing and Maintenance" chapter in NFPA 72; retain the "Initial/Reacceptance" column and list only the installed components.
 - 2. System Testing: Comply with the "Test Methods" table in the "Testing" section of the "Inspection, Testing and Maintenance" chapter in NFPA 72.
 - 3. Test audible appliances for the public operating mode according to manufacturer's written instructions. Perform the test using a portable sound-level meter complying with Type 2 requirements in ANSI S1.4.
 - 4. Test audible appliances for the private operating mode according to manufacturer's written instructions.
 - 5. Test visible appliances for the public operating mode according to manufacturer's written instructions.

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- 6. Factory-authorized service representative shall prepare the "Fire Alarm System Record of Completion" in the "Documentation" section of the "Fundamentals" chapter in NFPA 72 and the "Inspection and Testing Form" in the "Records" section of the "Inspection, Testing and Maintenance" chapter in NFPA 72.
- E. Reacceptance Testing: Perform reacceptance testing to verify the proper operation of added or replaced devices and appliances.
- F. Fire-alarm system will be considered defective if it does not pass tests and inspections.
- G. Prepare test and inspection reports.
- H. Maintenance Test and Inspection: Perform tests and inspections listed for weekly, monthly, quarterly, and semiannual periods. Use forms developed for initial tests and inspections.
- I. Annual Test and Inspection: One year after date of Substantial Completion, test fire-alarm system complying with visual and testing inspection requirements in NFPA 72. Use forms developed for initial tests and inspections.

3.8 MAINTENANCE SERVICE

- A. Initial Maintenance Service: Beginning at Substantial Completion, maintenance service shall include [12] <Insert number> months' full maintenance by skilled employees of manufacturer's designated service organization. Include preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper operation. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.
 - 1. Include visual inspections according to the "Visual Inspection Frequencies" table in the "Testing" paragraph of the "Inspection, Testing and Maintenance" chapter in NFPA 72.
 - 2. Perform tests in the "Test Methods" table in the "Testing" paragraph of the "Inspection, Testing and Maintenance" chapter in NFPA 72.
 - 3. Perform tests per the "Testing Frequencies" table in the "Testing" paragraph of the "Inspection, Testing and Maintenance" chapter in NFPA 72.

3.9 SOFTWARE SERVICE AGREEMENT

- A. Comply with UL 864.
- B. Technical Support: Beginning at Substantial Completion, service agreement shall include software support for [two] years.
- C. Upgrade Service: At Substantial Completion, update software to latest version. Install and program software upgrades that become available within [two] years from date of Substantial Completion. Upgrading software shall include operating system and new or revised licenses for using software.

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1. Upgrade Notice: At least [30] days to allow Owner to schedule access to system and to upgrade computer equipment if necessary.

3.10 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain fire-alarm system.

END OF SECTION

SECTION 284620 - ADDRESSABLE FIRE-ALARM SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. This section includes both new systems and modifications and additions to existing systems.

1.2 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.3 SUMMARY

- A. Section Includes but is not limited to:
 - 1. Complete working fire and life safety alarm system.
 - 2. Fire-alarm control unit.
 - 3. Manual fire-alarm boxes.
 - 4. Heat detectors.
 - 5. Notification appliances.
 - 6. Remote annunciator.

1.4 DEFINITIONS

- A. EMT: Electrical Metallic Tubing.
- B. FACP: Fire Alarm Control Panel.
- C. HLI: High Level Interface.
- D. NICET: National Institute for Certification in Engineering Technologies.
- E. PC: Personal computer.
- F. VESDA: Very Early Smoke-Detection Apparatus.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product, including furnished options and accessories.
 - 1. Include construction details, material descriptions, dimensions, profiles, and finishes.

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- 2. Include rated capacities, operating characteristics, and electrical characteristics.
- B. Shop Drawings: For fire-alarm system.
 - 1. Comply with recommendations and requirements in the "Documentation" section of the "Fundamentals" chapter in NFPA 72.
 - 2. Provide complete plans and drawings for new and existing to remain equipment.
 - 3. Include plans, elevations, sections, details, and attachments to other work.
 - 4. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and locations. Indicate conductor sizes, indicate termination locations and requirements, and distinguish between factory and field wiring.
 - 5. Riser Wiring Diagram showing all equipment devices, device addresses, connections, control connections, remote notification connections and wire quantities and sizes.
 - 6. Detail assembly and support requirements.
 - 7. Include voltage drop calculations for notification-appliance circuits.
 - 8. Include battery-size calculations.
 - 9. Include input/output matrix.
 - 10. Include statement from manufacturer that all equipment and components have been tested as a system and meet all requirements in this Specification and in NFPA 72.
 - 11. Include performance parameters and installation details for each detector.
 - 12. Verify that each duct detector is listed for complete range of air velocity, temperature, and humidity possible when air-handling system is operating.
 - 13. Provide program report showing that air-sampling detector pipe layout balances pneumatically within the airflow range of the air-sampling detector.
 - 14. Include plans, sections, and elevations of heating, ventilating, and air-conditioning ducts, drawn to scale; coordinate location of duct smoke detectors and access to them.
 - a. Show critical dimensions that relate to placement and support of sampling tubes, detector housing, and remote status and alarm indicators.
 - b. Locate detectors according to manufacturer's written recommendations.
 - c. Show field wiring required for HVAC unit shutdown on alarm.
 - d. Show field wiring required for elevator recall and power disconnect shunt trip on alarm.
 - 15. Include voice/alarm signaling-service equipment rack or console layout, grounding schematic, amplifier power calculation, and single-line connection diagram.
 - 16. Include floor plans to indicate final outlet locations showing address of each addressable device. Show size and route of cable and conduits and point-to-point wiring diagrams.

C. General Submittal Requirements:

- 1. Submittals shall be approved by authorities having jurisdiction prior to submitting them to Engineer.
- 2. Shop Drawings shall be prepared by persons with the following qualifications:
 - a. Trained and certified by manufacturer in fire-alarm system design.
 - b. NICET-certified, fire-alarm technician; Level III minimum.
 - c. Licensed or certified by authorities having jurisdiction.

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- D. Delegated-Design Submittal: For notification appliances and smoke and heat detectors, in addition to submittals listed above, indicate compliance with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
 - 1. Drawings showing the location of each notification appliance and smoke and heat detector, ratings of each, and installation details as needed to comply with listing conditions of the device.
 - 2. Design Calculations: Calculate requirements for selecting the spacing and sensitivity of detection, complying with NFPA 72. Calculate spacing and intensities for strobe signals and sound-pressure levels for audible appliances.
 - 3. Indicate audible appliances required to produce square wave signal per NFPA 72.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Seismic Qualification Data: Certificates, for fire-alarm control unit, accessories, and components, from manufacturer.
 - 1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
 - 2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
 - 3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
- C. Field quality-control reports.

1.7 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For fire-alarm systems and components to include in emergency, operation, and maintenance manuals.
 - 1. In addition to items specified include the following and deliver copies to authorities having jurisdiction:
 - a. Comply with the "Records" section of the "Inspection, Testing and Maintenance" chapter in NFPA 72.
 - b. Provide "Fire Alarm and Emergency Communications System Record of Completion Documents" according to the "Completion Documents" Article in the "Documentation" section of the "Fundamentals" chapter in NFPA 72.
 - c. Complete wiring diagrams showing connections between all devices and equipment. Each conductor shall be numbered at every junction point with indication of origination and termination points.
 - d. Riser diagram.
 - e. Device addresses.

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- f. Air-sampling system sample port locations and modeling program report showing layout meets performance criteria.
- g. Record copy of site-specific software.
- h. Provide "Inspection and Testing Form" according to the "Inspection, Testing and Maintenance" chapter in NFPA 72, and include the following:
 - 1) Equipment tested.
 - 2) Frequency of testing of installed components.
 - 3) Frequency of inspection of installed components.
 - 4) Requirements and recommendations related to results of maintenance.
 - 5) Manufacturer's user training manuals.
- i. Manufacturer's required maintenance related to system warranty requirements.
- j. Abbreviated operating instructions for mounting at fire-alarm control unit and each annunciator unit.
- B. Software and Firmware Operational Documentation:
 - 1. Software operating manuals.
 - 2. Device address list.

1.8 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Lamps for Remote Indicating Lamp Units: Quantity equal to [10] percent of amount installed, but no fewer than one unit.
 - 2. Lamps for Strobe Units: Quantity equal to [10] percent of amount installed, but no fewer than one unit.
 - 3. Smoke Detectors, Fire Detectors
 - 4. Detector Bases: Quantity equal to two percent of amount of each type installed, but no fewer than one unit of each type.
 - 5. Keys and Tools: One extra set for access to locked or tamperproofed components.
 - 6. Audible and Visual Notification Appliances: One of each type installed.
 - 7. Fuses: Two of each type installed in the system. Provide in a box or cabinet with compartments marked with fuse types and sizes.
 - 8. Filters for Air-Sampling Detectors: Quantity equal to [two] percent of amount of each type installed, but no fewer than one unit of each type.
 - 9. Air-Sampling Fan: Quantity equal to one for every five detectors, but no fewer than one unit of each type.

1.9 QUALITY ASSURANCE

A. Installer Qualifications: Personnel shall be trained and certified by manufacturer for installation of units required for this Project.

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- B. Installer Qualifications: Installation shall be by personnel certified by NICET as fire-alarm Level III or Level IV technician.
- C. NFPA Certification: Obtain certification according to NFPA 72 by a UL-listed alarm company.

1.10 PROJECT CONDITIONS

- A. Perform a full test of the existing system prior to starting work. Document any equipment or components not functioning as designed.
- B. Interruption of Existing Fire-Alarm Service: Do not interrupt fire-alarm service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary guard service according to requirements indicated:
 - 1. Notify Owner no fewer than seven days in advance of proposed interruption of fire-alarm service.
 - 2. Do not proceed with interruption of fire-alarm service without Owner's written permission.
- C. Provide a temporary Fire Alarm system including smoke detectors, exit pull stations and horn/strobe notifications devices on temporary supports in exit paths, paths of egress and significant corridors. Temporary Fire Alarm system will have connection to. Temporary Fire Alarm system will remain in operation until new or modified system is certified and accepted by the Authority Having Jurisdiction. Connect to existing system if it will remain in operation during construction.
- D. Use of Devices during Construction: Protect devices during construction unless devices are placed in service to protect the facility during construction.

1.11 SEQUENCING AND SCHEDULING

- A. Existing Fire-Alarm Equipment: Maintain existing equipment fully operational until new equipment has been tested and accepted. As new equipment is installed, label it "NOT IN SERVICE" until it is accepted. Remove labels from new equipment when put into service, and label existing fire-alarm equipment "NOT IN SERVICE" until removed from the building.
- B. Equipment Removal: After acceptance of new fire-alarm system, remove existing disconnected fire-alarm equipment and wiring including any temporary components.

1.12 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace fire-alarm system equipment and components that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Extent: All equipment and components not covered in the Maintenance Service Agreement.
 - 2. Warranty Period: Five years minimum from date of Substantial Completion.

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PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

- A. Source Limitations for Fire-Alarm System and Components: Components shall be compatible with, and operate as an extension of, existing system. Provide system manufacturer's certification that all components provided have been tested as, and will operate as, a system.
- B. Noncoded, UL-certified addressable system, with multiplexed signal transmission and voice/strobe evacuation.
- C. Automatic sensitivity control of certain smoke detectors.
- D. All components provided shall be listed for use with the selected system.
- E. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.2 SYSTEMS OPERATIONAL DESCRIPTION

- A. Fire-alarm signal initiation shall be by one or more of the following devices and systems:
 - 1. Manual stations.
 - 2. Heat detectors.
 - 3. Flame detectors.
 - 4. Smoke detectors.
 - 5. Duct smoke detectors.
 - 6. Automatic sprinkler system water flow.
- B. Fire-alarm signal shall initiate the following actions:
 - 1. Continuously operate alarm notification appliances, including voice evacuation notices.
 - 2. Identify alarm and specific initiating device at fire-alarm control unit and remote annunciators.
 - 3. Transmit an alarm signal to the remote alarm receiving station.
 - 4. Activate voice/alarm communication system.
 - 5. Switch heating, ventilating, and air-conditioning equipment controls to fire-alarm mode.
 - 6. Activate smoke-control system (smoke management) at firefighters' smoke-control system panel.
 - 7. Recall elevators to primary or alternate recall floors.
 - 8. Activate elevator power shunt trip.
 - 9. Activate emergency shutoffs for gas and fuel supplies.
 - 10. Record events in the system memory.
- C. Supervisory signal initiation shall be by one or more of the following devices and actions:
 - 1. Valve supervisory switch.
 - 2. Elevator shunt-trip supervision.

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- 3. User disabling of zones or individual devices.
- 4. Loss of communication with any panel on the network.
- D. System trouble signal initiation shall be by one or more of the following devices and actions:
 - 1. Open circuits, shorts, and grounds in designated circuits.
 - 2. Opening, tampering with, or removing alarm-initiating and supervisory signal-initiating devices.
 - 3. Loss of communication with any addressable sensor, input module, relay, control module, remote annunciator, printer interface, or Ethernet module.
 - 4. Loss of primary power at fire-alarm control unit.
 - 5. Ground or a single break in internal circuits of fire-alarm control unit.
 - 6. Abnormal ac voltage at fire-alarm control unit.
 - 7. Break in standby battery circuitry.
 - 8. Failure of battery charging.
 - 9. Abnormal position of any switch at fire-alarm control unit or annunciator.
 - 10. Voice signal amplifier failure.
 - 11. Hose cabinet door open.

E. System Supervisory Signal Actions:

- 1. Initiate notification appliances.
- 2. Identify specific device initiating the event at fire-alarm control unit and remote annunciators.
- 3. Record the event on system printer.
- 4. After a time delay of 200 seconds, transmit a trouble or supervisory signal to the remote alarm receiving station.
- 5. Transmit system status to building management system.
- 6. Display system status on graphic annunciator.

2.3 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Fire-alarm control unit and raceways shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
 - 1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."

2.4 FIRE-ALARM CONDUIT AND CABLE

A. Conduit

- 1. All fire alarm cable shall be placed in conduit.
- 2. Conduit shall be in accordance with NFPA 70 (NEC) and the specifications of conduit.
- 3. Conduit fill shall not exceed 40 percent of interior cross sectional area.

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- 4. Cable must be separated from any open conductors of power and/or Class 1 circuits. Fire alarm cable shall not be placed in any conduit, junction box or raceway containing non-fire alarm conductors.
- 5. Conduit shall be 3/4 inch minimum.

B. Cable mounting

- 1. Cabling not indicated as required to be in conduit shall be routed in aluminum bridle rings, no more than 6 feet apart, or routed in specifically indicated cable trays, attached to structural members and shall not be draped or supported directly on mechanical, architectural or structural items.
- 2. Fire alarm cabling shall not be supported or draped over non-structural elements such as heating/ventilation devices.
- 3. All connections will be enclosed in metal junction boxes. All devices will be mounted using metal or plastic junction boxes consistent with the area of installation and routing used.

C. Wire/Cable:

- 1. All fire alarm system wiring shall be new except for existing devices.
- 2. Wiring shall be in accordance with all state, local, national or user codes and as recommended by the manufacturer of the fire alarm system. Number and size of conductors shall be as recommended by the fire alarm system manufacturer and as approved by the Architect/Engineer. Fire Alarm system cabling shall not be less than:
 - a. Fire Alarm wiring/cabling shall not be less than 18 AWG for Initialing Device Circuits (IDC).
 - b. Fire Alarm wiring/cabling shall not be less than 16 AWG for Notification Appliance Circuits (NAC).
 - c. Fire Alarm wiring/cabling shall not be less than 14 AWG for Relay, Power and Auxiliary Device Circuits.
 - d. Fire Alarm wiring/cabling shall not be less than 18 AWG for Voice Notification Appliance Circuits.
 - e. Cabling shall be shielded/twisted pair for both IDC and NAC circuit.
- 3. All wire and/or cable shall be listed and/or approved by a recognized testing agency for use with a protective signaling system.
- 4. Fire alarm cabling and wire shall be rated as FPLP (Plenum Rated) in all locations.
- 2.5 Cabling not indicated as required to be in conduit shall be routed in aluminum bridle rings, no more than 6 feet apart, or routed in specifically indicated cable trays, attached to structural members and shall not be draped or supported directly on mechanical, architectural or structural items.

2.6 FIRE-ALARM CONTROL UNIT

- A. The existing Fire Alarm Control Unit is: _Simplex 4100U
- B. The Fire Alarm Control Unit is to be replaced with a Simplex 4100ES in the same location.
- C. General Requirements for Fire-Alarm Control Unit:

- 1. Compatible with all existing devices.
- 2. Field-programmable, microprocessor-based, modular, power-limited design with electronic modules, complying with UL 864.
 - a. System software and programs shall be held in nonvolatile flash, electrically erasable, programmable, read-only memory, retaining the information through failure of primary and secondary power supplies.
 - b. Include a real-time clock for time annotation of events on the event recorder and printer.
 - c. Provide communication between the FACP and remote circuit interface panels (Fire Alarm Transponders-FAT), annunciators, and displays.
 - d. The FACP shall be listed for connection to a central-station signaling system service.
 - e. Provide nonvolatile memory for system database, logic, and operating system and event history. The system shall require no manual input to initialize in the event of a complete power down condition. The FACP shall provide a minimum 500-event history log.
- 3. Addressable Initiation Device Circuits: The FACP shall indicate which communication zones have been silenced and shall provide selective silencing of alarm notification appliance by building communication zone.
- 4. Addressable Control Circuits for Operation of Notification Appliances and Mechanical Equipment: The FACP shall be listed for releasing service.
- D. Alphanumeric Display and System Controls: Arranged for interface between human operator at fire-alarm control unit and addressable system components including annunciation and supervision. Display alarm, supervisory, and component status messages and the programming and control menu.
 - 1. Annunciator and Display: Liquid-crystal type, 80 characters, minimum.
 - 2. Keypad: Arranged to permit entry and execution of programming, display, and control commands.
- E. Alphanumeric Display and System Controls: Arranged for interface between human operator at fire-alarm control unit and addressable system components including annunciation and supervision. Display alarm, supervisory, and component status messages and the programming and control menu.
 - 1. Annunciator and Display: Liquid-crystal type, two line(s) of 40 characters, minimum.
 - 2. Keypad: Arranged to permit entry and execution of programming, display, and control commands.
- F. Initiating-Device, Notification-Appliance, and Signaling-Line Circuits:
 - 1. Pathway Class Designations: NFPA 72, Class B.
 - 2. Pathway Survivability: Level 0.
 - 3. Install no more than 50 addressable devices on each signaling-line circuit.
 - 4. Serial Interfaces:

- a. One dedicated RS 485 port for central-station operation using point ID DACT.
- b. One RS 485 port for remote annunciators, Ethernet module, or multi-interface module (printer port).
- c. One USB port for PC configuration.
- d. One RS 232 port for voice evacuation interface.

G. Smoke-Alarm Verification:

- 1. Initiate audible and visible indication of an "alarm-verification" signal at fire-alarm control unit.
- 2. Activate an approved "alarm-verification" sequence at fire-alarm control unit and detector.
- 3. Record events by the system printer.
- 4. Sound general alarm if the alarm is verified.
- 5. Cancel fire-alarm control unit indication and system reset if the alarm is not verified.
- H. A "Walk Test" shall be available at the control panel and may be optionally programmed into remote annunciator panels. The actuation of the "Walk Test" mode shall cause:
 - 1. The remote central monitoring station connection shall be bypassed.
 - 2. Only audible and visual appliances shall be operated. Other alarm functions (elevator recall, HVAC shutdown, etc.) shall not be affected.
 - 3. Walk Test modes shall be selectable by entire system or by circuit, circuits or zones.
 - 4. Actual alarms received during a "Walk Test" shall cause the control panel to go into alarm and shall override the "Walk "Test" mode.
 - 5. The control panel shall show trouble and supervisory conditions.
 - 6. The "Walk Test" activation of any initiation device shall cause the audible signals to activate for two seconds or other Engineer approved sound.
 - 7. The panel shall automatically reset itself after signaling is complete.
 - 8. The control panel shall automatically return to normal condition if no activity on a "Walk Test" circuit occurs for a period of 30 minutes.

I. Notification-Appliance Circuit:

- 1. Audible appliances shall sound in a three-pulse temporal pattern, as defined in NFPA 72.
- 2. Where notification appliances provide signals to sleeping areas, the alarm signal shall be a 520-Hz square wave with an intensity 15 dB above the average ambient sound level or 5 dB above the maximum sound level, or at least 75 dBA, whichever is greater, measured at the pillow.
- 3. Visual alarm appliances shall flash in synchronization where multiple appliances are in the same field of view, as defined in NFPA 72.

J. Elevator Recall:

- 1. Elevator recall shall be initiated only by one of the following alarm-initiating devices:
 - a. Elevator lobby detectors except the lobby detector on the designated floor.

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- b. Smoke detector in elevator machine room.
- c. Smoke detectors in elevator hoistway.
- 2. Elevator controller shall be programmed to move the cars to the alternate recall floor if lobby detectors located on the designated recall floors are activated.
- 3. Water-flow alarm connected to sprinkler in an elevator shaft and elevator machine room shall shut down elevators associated with the location without time delay.
 - a. Water-flow switch associated with the sprinkler in the elevator pit may have a delay to allow elevators to move to the designated floor.
- K. Transmission to Remote Alarm Receiving Station: Automatically transmit alarm, supervisory, and trouble signals to a remote alarm station.
- L. Voice/Alarm Signaling Service: Central emergency communication system with redundant microphones, preamplifiers, amplifiers, and tone generators provided as a special module that is part of fire-alarm control unit.
 - 1. Indicate number of alarm channels for automatic, simultaneous transmission of different announcements to different zones or for manual transmission of announcements by use of the central-control microphone. Amplifiers shall comply with UL 1711.
 - a. Allow the application of, and evacuation signal to, indicated number of zones and, at the same time, allow voice paging to the other zones selectively or in any combination.
 - b. Programmable tone and message sequence selection.
 - c. Standard digitally recorded messages for "Evacuation" and "All Clear."
 - d. Generate tones to be sequenced with audio messages of type recommended by NFPA 72 and that are compatible with tone patterns of notification-appliance circuits of fire-alarm control unit
 - 2. Status Annunciator: Indicate the status of various voice/alarm speaker zones and the status of firefighters' two-way telephone communication zones.
 - 3. Preamplifiers, amplifiers, and tone generators shall automatically transfer to backup units, on primary equipment failure.
- M. Primary Power: 24-V dc obtained from 120-V ac service and a power-supply module. Initiating devices, notification appliances, signaling lines, trouble signals, supervisory and digital alarm communicator transmitters shall be powered by 24-V dc source.
 - 1. Alarm current draw of entire fire-alarm system shall not exceed 80 percent of the power-supply module rating.
- N. Secondary Power: 24-V dc supply system with batteries, automatic battery charger, and automatic transfer switch.
 - 1. Batteries: Sealed lead calcium.

O. Instructions: Computer printout or typewritten instruction card mounted behind a plastic or glass cover in a stainless-steel or aluminum frame. Include interpretation and describe appropriate response for displays and signals. Briefly describe the functional operation of the system under normal, alarm, and trouble conditions.

2.7 MANUAL FIRE-ALARM BOXES

- A. Ensure appliance is compatible with Fire Alarm Control Unit.
- B. General Requirements for Manual Fire-Alarm Boxes: Comply with UL 38. Boxes shall be finished in red with molded, raised-letter operating instructions in contrasting color; shall show visible indication of operation; and shall be mounted on recessed outlet box. If indicated as surface mounted, provide manufacturer's surface back box.
 - 1. Single-action mechanism, as existing to fire-alarm control unit.
 - 2. All new devices shall be double-action mechanism requiring two actions to initiate an alarm, pull-lever type; with integral addressable module arranged to communicate manual-station status (normal, alarm, or trouble) to fire-alarm control unit.
 - 3. Station Reset: Key- or wrench-operated switch.
 - 4. Indoor Protective Shield: Factory-fabricated, clear plastic enclosure hinged at the top to permit lifting for access to initiate an alarm. Lifting the cover actuates an integral battery-powered audible horn intended to discourage false-alarm operation.
 - 5. Weatherproof Protective Shield: Factory-fabricated, clear plastic enclosure hinged at the top to permit lifting for access to initiate an alarm.

2.8 SYSTEM SMOKE DETECTORS

- A. Ensure appliance is compatible with Fire Alarm Control Unit
- B. General Requirements for System Smoke Detectors:
 - 1. Comply with UL 268; operating at 24-V dc, nominal.
 - 2. Detectors shall be four-wire type.
 - 3. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to fire-alarm control unit.
 - 4. Base Mounting: Detector and associated electronic components shall be mounted in a twist-lock module that connects to a fixed base. Provide terminals in the fixed base for connection to building wiring.
 - 5. Self-Restoring: Detectors do not require resetting or readjustment after actuation to restore them to normal operation.
 - 6. Integral Visual-Indicating Light: LED type, indicating detector has operated and power-on status.
 - 7. Remote Control: Unless otherwise indicated, detectors shall be digital-addressable type, individually monitored at fire-alarm control unit for calibration, sensitivity, and alarm condition.
 - a. Multiple levels of detection sensitivity for each sensor.
 - b. Sensitivity levels based on time of day.

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C. Ionization Smoke Detector:

- 1. Detector address shall be accessible from fire-alarm control unit and shall be able to identify the detector's location within the system and its sensitivity setting.
- 2. An operator at fire-alarm control unit, having the designated access level, shall be able to manually access the following for each detector:
 - a. Primary status.
 - b. Device type.
 - c. Present average value.
 - d. Present sensitivity selected.
 - e. Sensor range (normal, dirty, etc.).

2.9 HEAT DETECTORS

- A. Ensure appliance is compatible with Fire Alarm Control Unit.
- B. General Requirements for Heat Detectors: Comply with UL 521.
 - 1. Temperature sensors shall test for and communicate the sensitivity range of the device.
- C. Heat Detector, Combination Type: Actuated by either a fixed temperature of 135 deg F (57 deg C) or a rate of rise that exceeds 15 deg F (8 deg C) per minute unless otherwise indicated.
 - 1. Mounting: Twist-lock base interchangeable with smoke-detector bases.
 - 2. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to fire-alarm control unit.
- D. Heat Detector, Fixed-Temperature Type: Actuated by temperature that exceeds a fixed temperature of 190 deg F (88 deg C).
 - 1. Mounting: Twist-lock base interchangeable with smoke-detector bases.
 - 2. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to fire-alarm control unit.

2.10 NOTIFICATION APPLIANCES

- A. Ensure notification appliances are compatible with Fire Alarm Control Unit.
- B. General Requirements for Notification Appliances: Individually addressed, connected to a signaling-line circuit, equipped for mounting as indicated, and with screw terminals for system connections.
- C. General Requirements for Notification Appliances: Connected to notification-appliance signal circuits, zoned as indicated, equipped for mounting as indicated, and with screw terminals for system connections.

- 1. Combination Devices: Factory-integrated audible and visible devices in a single-mounting assembly, equipped for mounting as indicated, and with screw terminals for system connections.
- D. Visible Notification Appliances: Xenon strobe lights complying with UL 1971, with clear or nominal white polycarbonate lens mounted on an aluminum faceplate. The word "FIRE" is engraved in minimum 1-inch- (25-mm-) high letters on the lens.
 - 1. Rated Light Output:
 - a. 15/30/75/110 cd, selectable in the field.
 - 2. Mounting: Wall mounted unless otherwise indicated.
 - 3. For units with guards to prevent physical damage, light output ratings shall be determined with guards in place.
 - 4. Flashing shall be in a temporal pattern, synchronized with other units.
 - 5. Strobe Leads: Factory connected to screw terminals.
 - 6. Mounting Faceplate: Factory finished, red for Fire.
- E. Voice/Tone Notification Appliances:
 - 1. Comply with UL 1480.
 - 2. Speakers for Voice Notification: Locate speakers for voice notification to provide the intelligibility requirements of the "Notification Appliances" and "Emergency Communications Systems" chapters in NFPA 72.
 - 3. High-Range Units: Rated 2 to 15 W.
 - 4. Low-Range Units: Rated 1 to 2 W.
 - 5. Mounting: Flush.
 - 6. Matching Transformers: Tap range matched to acoustical environment of speaker location.

2.11 REMOTE ANNUNCIATOR

A. Description: No separate annunciator is required

2.12 ADDRESSABLE INTERFACE DEVICE

- A. Ensure interfaces are compatible with Fire Alarm Control Unit.
- B. General:
 - 1. Include address-setting means on the module.
 - 2. Store an internal identifying code for control panel use to identify the module type.
 - 3. Listed for controlling HVAC fan motor controllers.
- C. Monitor Module: Microelectronic module providing a system address for alarm-initiating devices for wired applications with normally open contacts.

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- D. Integral Relay: Capable of providing a direct signal to elevator controller to initiate elevator recall.
 - 1. Allow the control panel to switch the relay contacts on command.
 - 2. Have a minimum of two normally open and two normally closed contacts available for field wiring.

E. Control Module:

1. Operate notification devices.

2.13 DIGITAL ALARM COMMUNICATOR TRANSMITTER

A. Digital alarm communicator transmitter shall be acceptable to the remote central station and shall comply with UL 632 and will be existing or will match existing functionality.

2.14 NETWORK COMMUNICATIONS

- A. Provide network communications for fire-alarm system according to fire-alarm manufacturer's written requirements.
- B. Provide network communications pathway per manufacturer's written requirements and requirements in NFPA 72 and NFPA 70.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and conditions for compliance with requirements for ventilation, temperature, humidity, and other conditions affecting performance of the Work.
 - 1. Verify that manufacturer's written instructions for environmental conditions have been permanently established in spaces where equipment and wiring are installed, before installation begins.
- B. Examine roughing-in for electrical connections to verify actual locations of connections before installation
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 EQUIPMENT INSTALLATION

- A. Comply with NFPA 72, NFPA 101, and requirements of authorities having jurisdiction for installation and testing of fire-alarm equipment. Install all electrical wiring to comply with requirements in NFPA 70 including, but not limited to, Article 760, "Fire Alarm Systems."
 - 1. Devices placed in service before all other trades have completed cleanup shall be replaced.
 - 2. Devices installed but not yet placed in service shall be protected from construction dust, debris, dirt, moisture, and damage according to manufacturer's written storage instructions.
- B. Connecting to Existing Equipment: Verify that existing fire-alarm system is operational before making changes or connections.
 - 1. Connect new equipment to existing control panel in existing part of the building.
 - 2. Connect new equipment to existing monitoring equipment at the supervising station.
 - 3. Expand, modify, and supplement existing [control] [monitoring] equipment as necessary to extend existing [control] [monitoring] functions to the new points. New components shall be capable of merging with existing configuration without degrading the performance of either system.
- C. Equipment Mounting: Install fire-alarm control unit on concrete base.
 - 1. Install seismic bracing.
 - 2. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch (460-mm) centers around the full perimeter of concrete base.
 - 3. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.
 - 4. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - 5. Install anchor bolts to elevations required for proper attachment to supported equipment.
- D. Equipment Mounting: Install fire-alarm control unit on finished floor or as indicated on contract drawings.
- E. Install wall-mounted equipment, with tops of cabinets not more than 78 inches (1980 mm) above the finished floor.
- F. Manual Fire-Alarm Boxes:
 - 1. Install manual fire-alarm box in the normal path of egress within 60 inches (1520 mm) of the exit doorway.
 - 2. Mount manual fire-alarm box on a background of a contrasting color.
 - 3. The operable part of manual fire-alarm box shall be between 42 inches (1060 mm) and 48 inches (1220 mm) above floor level. All devices shall be mounted at the same height unless otherwise indicated.

- G. Smoke- or Heat-Detector Spacing:
 - 1. Comply with the "Smoke-Sensing Fire Detectors" section in the "Initiating Devices" chapter in NFPA 72, for smoke-detector spacing.
 - 2. Comply with the "Heat-Sensing Fire Detectors" section in the "Initiating Devices" chapter in NFPA 72, for heat-detector spacing.
 - 3. Smooth ceiling spacing shall not exceed [30 feet (9 m)].
 - 4. Spacing of detectors for irregular areas, for irregular ceiling construction, and for high ceiling areas shall be determined according to Annex A or Annex B in NFPA 72.
 - 5. HVAC: Locate detectors not closer than [36 inches (910 mm)] [60 inches (1520 mm)] from air-supply diffuser or return-air opening.
 - 6. Lighting Fixtures: Locate detectors not closer than 12 inches (300 mm) from any part of a lighting fixture and not directly above pendant mounted or indirect lighting.
- H. Install a cover on each smoke detector that is not placed in service during construction. Cover shall remain in place except during system testing. Remove cover prior to system turnover.
- I. Duct Smoke Detectors: Comply with NFPA 72 and NFPA 90A. Install sampling tubes so they extend the full width of duct. Tubes more than 36 inches (9100 mm) long shall be supported at both ends.
 - 1. Do not install smoke detector in duct smoke-detector housing during construction. Install detector only during system testing and prior to system turnover.
- J. Air-Sampling Smoke Detectors: If using multiple pipe runs, the runs shall be pneumatically balanced.
- K. Elevator Shafts: Coordinate temperature rating and location with sprinkler rating and location. Do not install smoke detectors in sprinklered elevator shafts.
- L. Single-Station Smoke Detectors: Where more than one smoke alarm is installed within a dwelling or suite, they shall be connected so that the operation of any smoke alarm causes the alarm in all smoke alarms to sound.
- M. Remote Status and Alarm Indicators: Install in a visible location near each smoke detector, sprinkler water-flow switch, and valve-tamper switch that is not readily visible from normal viewing position.
- N. Audible Alarm-Indicating Devices: Install not less than 6 inches (150 mm) below the ceiling. Install bells and horns on flush-mounted back boxes with the device-operating mechanism concealed behind a grille. Install all devices at the same height unless otherwise indicated.
- O. Visible Alarm-Indicating Devices: Install adjacent to each alarm bell or alarm horn and at least 6 inches (150 mm) below the ceiling. Install all devices at the same height unless otherwise indicated.
- P. Device Location-Indicating Lights: Locate in public space near the device they monitor.

Q. Antenna for Radio Alarm Transmitter: Mount to building structure where indicated. Use mounting arrangement and substrate connection that resists [100-mph (160-km/h)] <Insert value> wind load with a gust factor of 1.3 without damage.

3.3 PATHWAYS

- A. Pathways above recessed ceilings and in nonaccessible locations may be routed exposed.
 - 1. Exposed pathways located less than 96 inches (2440 mm) above the floor shall be installed in EMT.
- B. Pathways shall be installed in EMT unless indicated otherwise.
- C. Exposed EMT shall be painted red enamel.

3.4 CONNECTIONS

- A. For fire-protection systems related to doors in fire-rated walls and partitions and to doors in smoke partitions, comply with requirements in Section 087100 "Door Hardware." Connect hardware and devices to fire-alarm system.
 - 1. Verify that hardware and devices are listed for use with installed fire-alarm system before making connections.
- B. Make addressable connections with a supervised interface device to the following devices and systems. Install the interface device less than 36 inches (910 mm) from the device controlled. Make an addressable confirmation connection when such feedback is available at the device or system being controlled.
 - 1. Alarm-initiating connection to smoke-control system (smoke management) at firefighters' smoke-control system panel.
 - 2. Alarm-initiating connection to stairwell and elevator-shaft pressurization systems.
 - 3. Smoke dampers in air ducts of designated HVAC duct systems.
 - 4. Magnetically held-open doors.
 - 5. Electronically locked doors and access gates.
 - 6. Alarm-initiating connection to elevator recall system and components.
 - 7. Alarm-initiating connection to activate emergency lighting control.
 - 8. Alarm-initiating connection to activate emergency shutoffs for gas and fuel supplies.
 - 9. Supervisory connections at valve supervisory switches.
 - 10. Supervisory connections at low-air-pressure switch of each dry-pipe sprinkler system.
 - 11. Supervisory connections at elevator shunt-trip breaker.
 - 12. Data communication circuits for connection to building management system.
 - 13. Data communication circuits for connection to mass notification system.
 - 14. Supervisory connections at fire-extinguisher locations.
 - 15. Supervisory connections at fire-pump power failure including a dead-phase or phase-reversal condition.
 - 16. Supervisory connections at fire-pump engine control panel.

17. **Insert connections**.

3.5 IDENTIFICATION

- A. Identify system components, wiring, cabling, and terminals.
- B. Install framed instructions in a location visible from fire-alarm control unit.

3.6 GROUNDING

- A. Ground fire-alarm control unit and associated circuits; comply with IEEE 1100. Install a ground wire from main service ground to fire-alarm control unit.
- B. Ground shielded cables at the control panel location only. Insulate shield at device location.

3.7 FIELD QUALITY CONTROL

- A. Field tests shall be witnessed by [Engineer] [authorities having jurisdiction] <Insert names or titles of witnesses>.
- B. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.
- C. Perform tests and inspections.
- D. Perform the following tests and inspections[with the assistance of a factory-authorized service representative]:
 - 1. Visual Inspection: Conduct visual inspection prior to testing.
 - a. Inspection shall be based on completed record Drawings and system documentation that is required by the "Completion Documents, Preparation" table in the "Documentation" section of the "Fundamentals" chapter in NFPA 72.
 - b. Comply with the "Visual Inspection Frequencies" table in the "Inspection" section of the "Inspection, Testing and Maintenance" chapter in NFPA 72; retain the "Initial/Reacceptance" column and list only the installed components.
 - 2. System Testing: Comply with the "Test Methods" table in the "Testing" section of the "Inspection, Testing and Maintenance" chapter in NFPA 72.
 - 3. Test audible appliances for the public operating mode according to manufacturer's written instructions. Perform the test using a portable sound-level meter complying with Type 2 requirements in ANSI S1.4.
 - 4. Test audible appliances for the private operating mode according to manufacturer's written instructions.
 - 5. Test visible appliances for the public operating mode according to manufacturer's written instructions.

- 6. Factory-authorized service representative shall prepare the "Fire Alarm System Record of Completion" in the "Documentation" section of the "Fundamentals" chapter in NFPA 72 and the "Inspection and Testing Form" in the "Records" section of the "Inspection, Testing and Maintenance" chapter in NFPA 72.
- E. Reacceptance Testing: Perform reacceptance testing to verify the proper operation of added or replaced devices and appliances.
- F. Fire-alarm system will be considered defective if it does not pass tests and inspections.
- G. Prepare test and inspection reports.
- H. Maintenance Test and Inspection: Perform tests and inspections listed for weekly, monthly, quarterly, and semiannual periods. Use forms developed for initial tests and inspections.
- I. Annual Test and Inspection: One year after date of Substantial Completion, test fire-alarm system complying with visual and testing inspection requirements in NFPA 72. Use forms developed for initial tests and inspections.

3.8 MAINTENANCE SERVICE

- A. Initial Maintenance Service: Beginning at Substantial Completion, maintenance service shall include [12] <Insert number> months' full maintenance by skilled employees of manufacturer's designated service organization. Include preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper operation. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.
 - 1. Include visual inspections according to the "Visual Inspection Frequencies" table in the "Testing" paragraph of the "Inspection, Testing and Maintenance" chapter in NFPA 72.
 - 2. Perform tests in the "Test Methods" table in the "Testing" paragraph of the "Inspection, Testing and Maintenance" chapter in NFPA 72.
 - 3. Perform tests per the "Testing Frequencies" table in the "Testing" paragraph of the "Inspection, Testing and Maintenance" chapter in NFPA 72.

3.9 SOFTWARE SERVICE AGREEMENT

- A. Comply with UL 864.
- B. Technical Support: Beginning at Substantial Completion, service agreement shall include software support for [two] years.
- C. Upgrade Service: At Substantial Completion, update software to latest version. Install and program software upgrades that become available within [two] years from date of Substantial Completion. Upgrading software shall include operating system and new or revised licenses for using software.

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1. Upgrade Notice: At least [30] days to allow Owner to schedule access to system and to upgrade computer equipment if necessary.

3.10 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain fire-alarm system.

END OF SECTION