



**DASNY**

**ANDREW M. CUOMO**  
Governor

**ALFONSO L. CARNEY, JR.**  
Chair

**REUBEN R. MCDANIEL, III**  
Acting President & CEO

# SECTION A

**ALBANY (HEADQUARTERS):** 515 Broadway, Albany, NY 12207 | 518-257-3000

**NEW YORK CITY:** One Penn Plaza, 52nd Floor, New York, NY 10119 | 212-273-5000

**BUFFALO:** 539 Franklin Street, Buffalo, NY 14202 | 716-884-9780

**ROCHESTER:** 3495 Winton Place, Building C, Suite 1, Rochester, NY 14623 | 585-461-8400

**DORMITORY AUTHORITY STATE OF NEW YORK**

**WE FINANCE, DESIGN & BUILD  
NEW YORK'S FUTURE.**

[www.dasny.org](http://www.dasny.org)



**DASNY**

**RE- BID NO** 660

**PROJECT NAME & LOCATION:**

CUNY Queens College  
65-30 Kissena Blvd.  
Flushing, NY 11367

**Description:** Furnish and deliver a Lab Exhaust Fan

**Re-Bid Open Location:** DASNY

515 Broadway, Albany, NY 12207

**Re-Bid Open Date:** March 25, 2020

**Contact:** Theresa Graffeo

**Re-Bid Open Time:** 2:30 p.m.

## **NOTICE TO BIDDERS**

### **MAIL BIDS EARLY**

Sealed bids will be received by DASNY at the above address for the items listed in the attached Bid Breakdown and Schedule. When submitting your bid you must:

1. Prepare your bid on the attached Bid Breakdown and Schedule. Return one signed original of the Bid Breakdown and Schedule
2. If your bid deviates from Specifications, explain such deviations or qualifications on your letterhead, setting forth therein such explanations, and attach them to the Bid Breakdown and Schedule.
3. Submission of a bid constitutes full knowledge and acceptance of all provisions of the Notice to Bidders, all information referenced in the Purchasing General Conditions, Supplemental and Detailed Specifications, the Bid Submission and any Supplemental General Requirements contained herein, as well as any addenda issued in relation to the Invitation for Bids.
4. Each bid shall bear on the outside of the envelope the name of the bidder, address, telephone number and designated as a bid for the following:

DASNY Re-Bid No. 660

Re-Bid Opening Date: 03/25/2020 @ 2:30PM

Return to:

DASNY

Attn: Purchasing Unit

515 Broadway

Albany, NY 12207-2964



Re-Bid No.: 660

When a sealed bid is placed inside another delivery jacket, the bid delivery jacket must be clearly marked on the outside **"BID ENCLOSED"** and **"ATTENTION: PURCHASING UNIT"**. The Dormitory Authority will not be responsible for receipt of bids which do not comply with these instructions.

5. Mail bid responses early in order for them to be received before the time of the bid opening. **Late bids will be automatically rejected.** Individuals submitting bids in person or by private delivery services should allow sufficient time for processing through building security to assure that the bids are received prior to the deadline for submitting bids. All individuals who plan to attend bid openings will be required to present government-issued picture identification to building security officials and obtain a visitor's pass prior to attending the bid opening.
6. In accordance with State Finance Law § 139-j and 139-k, this solicitation includes and imposes certain restrictions on communications between Dormitory Authority personnel and an Offerer during this procurement process. Designated contact for this solicitation is:  
Theresa Graffeo, Purchasing Coordinator, at Dormitory Authority – State of New York, 515 Broadway, Albany, NY 12207, (518) 257-3583. Contacts made to other Dormitory Authority Personnel regarding this procurement may disqualify the Offerer and affect future procurements with governmental entities in the State of New York. Please refer to the Authority's website [www.dasny.org](http://www.dasny.org) for Authority policy and procedures regarding this law, or the NYS office of General Services website [www.ogs.ny.gov/BU/PC/](http://www.ogs.ny.gov/BU/PC/) for more information about this law.



Re-Bid No.: 660

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**If you are not submitting a bid it is requested that you complete and return the lower portion of this form**

*(Please check all that apply and provide comments in the space provided, if necessary)*

☐ We are not Submitting a bid.

☐ We Request removal of our name from the mailing list.

☐ Location of the job site.

☐ Commodity is not carried by our company.

☐ Scope is too large.

Other/Additional Explanation: \_\_\_\_\_

NAME OF  
BIDDER: \_\_\_\_\_

ADDRESS  
:

Street  
Telephone

City

State

Zip

\_\_\_\_\_  
Signature of Bidder

\_\_\_\_\_  
Official Title

## GENERAL SPECIFICATIONS

- (1) The enclosed Purchasing General Conditions are hereby incorporated by reference. Submission of a bid response shall constitute acceptance of such conditions. Any exceptions/clarifications/qualifications to these conditions or other specifications and/or requirements contained herein must be clearly stated in the bid response and, depending upon the nature of such, may be grounds for rejection of your bid.
- (2) Bids must be submitted in the bidder's full legal name, or the bidder's full legal name plus a registered assumed name, if any.
- (3) All NYS bidders are required to be registered to do business with the NYS Department of State or their local County Clerk, whichever is applicable.
- (4) All out-of-state bidders will be required to provide proof of registration to do business in their state. All out-of-state bidders that "do business in New York State" **MUST BE REGISTERED WITH THE NYS DEPARTMENT OF STATE**. Please contact the NYS Department of State at (518) 473-2492. Information is available at the DOS website: [www.dos.ny.gov](http://www.dos.ny.gov)
- (5) DASNY is required by law to notify the Empire State Development of any procurement contract for one million dollars or more that is to be awarded to an out-of-state vendor. This notice must be done simultaneous to the notification of award provided to the vendor. A purchase order or contract cannot be issued until fifteen (15) days after such notification is provided.
- (6) Empire State Development is required by law to identify states and other jurisdictions that impose preferences or other penalties against New York bidders. DASNY is precluded from soliciting bids or entering into procurement contracts with companies that have their principal place of business located in one of the listed jurisdictions, unless the procurement is for a product that is substantially manufactured in New York State or the services are to be performed in New York State. Currently, this list of jurisdictions includes the states of Alaska, Hawaii, Louisiana, South Carolina, West Virginia and Wyoming.
- (7) Unless otherwise indicated, any reference to brands or model numbers is intended to establish a standard. Items of all manufacturers will be considered, provided the item is determined to meet or exceed the required specification. DASNY's decision as to whether a substitute item meets specification will be final. Your attention is directed to Article II-7, Page 5 of the General Conditions. In order to evaluate substitute items, detailed specifications must be submitted for any product that is other than the one(s) specified in the bid.

## GENERAL SPECIFICATIONS CONTINUED

- (8) Unless otherwise noted, guarantee on all items is to be one year as detailed in Article XVI of the General Conditions
- (9) All upholstered furniture and drapery panels and lining must meet strict flammability requirements. Standards applicable to this bid, if any, will be delineated in the Detailed Specifications.
- (10) **LABOR/TRADES** - Any labor, materials or means whose employment, or utilization during the course of this contract, shall not in any way cause or result in strike, work stoppages, delays, suspension of work; or similar troubles by workers employed by this contractor or his subcontractors, or by any of the trades working in or about the buildings and premises where work is being performed. Any violation by the contractor of this requirement may in the sole judgment of DASNY be considered as proper and sufficient cause for declaring the contractor to be in default, and for the owner to take action against him as set forth in the Purchasing General Conditions, Article VIII, "Termination", or such other action as DASNY may deem proper.
- (11) Bid results are available on the DASNY website ([www.DASNY.org](http://www.DASNY.org)). Bid results will not be given over the phone.
- (12) If you are a NYS Certified Minority or Women Owned Business, please include a copy of your certification with the bid.



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## SUPPLEMENTAL SPECIFICATIONS

**The following items are attached for informational purposes. Referenced documents need not be returned with the proposal.** These documents are only applicable to the successful bidder and the ensuing procurement contract. Documents are only applicable to the successful bidder and the ensuing procurement contract. Documents applicable to the procurement that will result from this Invitation for Bids are designated by a check box (☒). Unless otherwise indicated, the referenced documents are located at the end of this Invitation for Bids.

- ☒ **Purchasing General Conditions** – The DASNY Purchasing General Conditions contains terms and conditions of purchases made by DASNY. It is recommended that this document be reviewed fully.
- ☐ **M/WBE Utilization Plan and Request for Waiver** - Minority and Women-Owned Business Enterprise (M/WBE) goals for this project are 0% and 0%, respectively. The successful bidder shall be required to complete a Utilization Plan or Request for Waiver, to be approved by DASNY's Opportunity Programs Group. Reference Purchasing General Conditions, Article XIX, Affirmative Action for Contracts Mr. Michael Clay, DASNY Opportunity Programs Group at (518) 257-3464, is available to assist all bidders in attaining these goals. *Reference the enclosed "Good Faith Efforts Guidelines".*
- ☒ **Supplemental General Requirements** – Attached (if applicable) are the Supplemental General Requirements (SGRs) which provide important logistical information and additional conditions which govern this procurement. Please read these SGRs carefully.
- ☐ **Form of DASNY Contract** – The procurement resulting from the Invitation for Bids will be executed through a DASNY purchase order and a related contract. The contract executed with the successful bidder will be in the same substantial form as the attached "Form of Contract". Note that this Invitation for Bids and any response to such will be annexed as binding terms of the purchase agreement.
- ☐ **Certificate of Insurance** (*sample enclosed*) – The successful bidder will be required to provide a Certificate of Insurance pursuant to Article XIV of the enclosed Purchasing General Conditions. The certificate shall name DASNY and other designated parties as additional insureds.

## SUPPLEMENTAL SPECIFICATIONS CONTINUED

- ☐ **Worker's Compensation / Disability Insurance** – The successful proposer will be required to provide specific documentation with respect to Worker's Compensation and Disability Insurance pursuant to Article XIV of the enclosed Purchasing General Conditions. Requirements are detailed in the enclosed "Workers' Compensation and Disability Benefits Requirements" document.
- ☐ **Prevailing Wage Schedule** – NYS Labor Law requires all wages paid by contractors and subcontractors on public work projects be paid at the prevailing wage rates. Enclosed is the current rate schedule for the appropriate county. Contractors and Subcontractors are responsible for obtaining current rates throughout the course of the project. The NYS Department of Labor (NYS DOL) updates these rates on July 1st of each year. Current rates can be obtained on the NYS DOL website ([www.labor.state.ny.us](http://www.labor.state.ny.us)) or by fax at (518) 485-1870. Note that an executed Contractor and Subcontractor Certification and certified payrolls, which include the hours and days worked by each workman, laborer or mechanic, the occupation at which he worked, the hourly wage rate paid and the supplements paid or provided, must be submitted with each and every payment requisition. **DASNY will not process an invoice without this information.** Forms are available on the DASNY website:  
<http://www.dasny.org/construc/forms2/vendors.php>
- ☐ **Labor and Material Payment Bond** – The successful bidder must be prepared to provide surety bonds prior to award in accordance with Article XIV of the DASNY Purchasing General Conditions. The costs of these bonds are to be separately stated in the total bid price as indicated on the Bid Breakdown and Schedule.
- ☐ **Performance Bond** – The Successful bidder must be prepared to provide surety bonds prior to award in accordance with Article XIV of DASNY Purchasing General Conditions. The costs of these bonds are to be separately stated in the total bid price as indicated on the Bid Breakdown and Schedule.
- ☒ **Standard Vendor Responsibility Questionnaire (SVRQ)** – The successful proposer, in accordance with Article XXII of DASNY Purchasing General Conditions, will be required to complete the enclosed SVRQ. The award of a contract will be subject to a review of the information contained in these forms.



**SUPPLEMENTAL SPECIFICATIONS CONTINUED**

- ☐ **NYS Uniform Contracting Questionnaire (UCQ)** – The successful proposer will be required to complete the enclosed UCQ. The award of a contract will be subject to a review of the information contained in these forms.
  
- ☐ **DASNY Contractor and Consultant Questionnaire (CCQ)** – The successful proposer will be required to complete the enclosed CCQ. The award of a contract will be subject to a review of the information contained in these



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### Supplemental General Requirements

#### Requests for Information:

All questions pertaining to Re-Bid No. 660 – Furnish and Deliver an Air Handling Unit are due no later than 4:00 P.M. on March 12, 2020 to [tgraffeo@dasny.org](mailto:tgraffeo@dasny.org). RFI Responses will be posted via Addenda to DASNY's Website in the Attachments Section of the Bid Opportunity Page for Re-Bid No. 660.

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## **Detailed Specifications**

## SECTION 233417- LABORATORY EXHAUST FANS

## PART 1-GENERAL

## 1.1 References:

1. Performance ratings: Conform to AMCA standard 210 and 300. Fans must be tested in accordance with AMCA 210 and 300 in an AMCA accredited laboratory and certified for air and sound performance. Fan shall be licensed to bear the AMCA ratings seal for air performance (AMCA 210), and sound performance (AMCA 300).
2. Fans shall be UL and CUL listed per UL 705 safety standard.
3. Fans shall meet the criteria of NFPA-45.
4. Classification for Spark Resistant Construction shall conform to AMCA 99. Fan manufacturer to ensure compliance with the American National Standards Institute Z9.5 (2012), "Standard for Laboratory Ventilation". All scheduled performance requirements to be supplied by the owner's representative.

## 1.2 Acceptable Manufacturers

Basis of Design: Strobic Air Corporation  
Other Manufacturer: Greenheck

## 1.3 Submittals:

1. Submit shop drawings and product data sheets including performance data, fan curves, and sound power levels.
2. Fan manufacturer shall furnish a certificate of guarantee stating that the fan, mixing plenum, outlet nozzle, inline silencer, stack extension if any, and all related accessories specified herein have been pre-tested at the factory and that the curves supplied in 1.2.1 have been de-rated for any and all system effects created by the accessories.
3. Fan manufacturer shall furnish an additional certificate of guarantee stating that the exhaust system will discharge the scheduled total system flow at the stack/windband exit, at the scheduled horsepower, and achieve the scheduled effective stack height with a minimum nozzle velocity of 3,000 FPM.

## 1.4 Warranty

1. Fan manufacturer shall provide a 7-year parts warranty from date of acceptance by CUNY to include fan, motor and all drive mechanisms including pillow blocks, sheaves, shafts, couplings and belts. This warranty shall be held solely by the fan manufacturer. It is unacceptable to extend the warranty of a provided component supplier (i.e. motors, dampers, actuators). All warranty claims shall be the sole responsibility of the fan manufacturer.

## 1.5 Factory Support

1. The fan manufacturer shall include 3 days start-up assistance by a factory trained technician.
2. The fan manufacturer shall include 1 day owner training.

## PART 2 – PRODUCTS

### 2.1 Mixed-flow induced dilution fans:

1. Impellers shall be mounted directly to the motor shaft to provide Arrangement 4 Direct Drive. Motors shall be isolated from the primary exhaust air stream and shall be visible and accessible from the fan exterior for inspection and service. Models that are not Arrangement #4 will be rejected.
2. Mixed flow impellers shall consist of combination axial/backward curved blades and shall be of welded steel construction. The impellers shall have non-stall and non-overloading performance characteristics with aerodynamically stable operation at any point on the fan curves.
3. Fan Performance shall be as stated on the schedule. The Static Pressure stated on the schedule shall be at the inlet to the “Fan System” and does not include any losses of equipment provided by the fan manufacturer (ie: HRU, Filters, Silencers, etc...). All losses for the equipment provided by the fan manufacturer shall be detailed in the fan manufacturers technical proposal and or submittal.
4. Fan and all drive components shall have a combined bearing life of a minimum of  $L_{10} = 150,000$  hours.
5. Maintenance shall only be required on a minimum of 18 month intervals. This maintenance shall be limited to re-greasing of the motor bearings.
6. Stationary discharge guide vane sections shall be provided to increase fan efficiencies.
7. Fan dynamic balance not to exceed 0.5 mil, peak-to-peak for nominal 900RPM, 1200RPM, and 1800RPM fans, or 0.055 in/sec -peak for 1800 RPM, 0.035 in/sec — peak for 1200 RPM, and 0.030 in/sec-peak for 900 RPM fans measured at the blade pass area when operating at fan frequency. Vibration isolation shall be limited to rubber-in-shear pad type isolators unless otherwise specified.
8. Factory test reports detailing vibration levels at the blade pass area shall be provided. Vibration levels shall be reported in both the axial and radial direction. If fan vibration is greater than 0.5 mils peak-to-peak at the blade pass area, fan manufacturer shall be responsible for providing vibration isolators on each fan and flexible connection at each duct inlet. Manufacturer shall add 0.5" additional static pressure to the fan system to compensate for losses through the flexible connection. Vibration isolators, 2" deflection seismic rated spring, must be installed on each individual fan with a minimum of four per fan. In addition, fan manufacturer shall be responsible for providing a method to repair or replace flexible connection or vibration isolators without shut down of the fan system. This includes any engineering, additional ductwork, and isolation dampers required to perform repairs while the system is still fully operational. Fan manufacturer shall also provide labor to change out or repair flexible connection and vibration isolators for a seven (7) year period from shipment.
9. If a belt drive fan is supplied the fan manufacturer shall include a seven (7) year service contract for maintaining the belts, sheaves and drive mechanism. This is to include monthly inspections as noted in the ANSI Z9.5, 4.14.7.2 and any

- tensioning, and belt replacement during the seven (7) year period. This contract shall be detailed in the proposal and included in its total value.
10. Fan assemblies shall be designed for mounting on conventional roof curb without the need for guy wire supports.
  11. Discharges shall include twin FRP nozzles with passive third central stacks that are capable of generating aspiration. The FRP shall be chemically and UV resistant.
  12. Entrainment windbands shall provide secondary induction of outside air. Induction shall take place downstream of the fan impeller and shall not influence BHP or static pressure requirements. Windbands shall discharge up to 270% of the design flow rates. The manufacturer shall publish discharge volumes for all fans at specified primary exhaust flow.
  13. Fan shall be constructed to AMCA "C" standards per AMCA 99 with a non-ferrous inlet bell provided in order to reduce sparking in the event of a motor bearing failure.
  14. Fans shall be modular construction and capable of being assembled on the roof.
  15. Chemical resistant gaskets shall be provided at all companion flanged joints.
  16. Fasteners shall be 316 stainless steel.
  17. A bolted access door shall be provided for impeller inspection on each fan.
  18. Fans and accessories shall have internal drain systems to prevent rain water from entering building duct system.
  19. Electric motors shall be TEFC Mill & Chemical duty with a 1.15 service factor and an L<sub>10</sub> bearing life of 150,000 hours. Premium Efficient motors shall have regreasable bearings with grease relief fittings in every NEMA frame. Fan motors shall be C-Face and foot mounted.
  20. Extended motor lube lines of Teflon tubing covered with braided stainless steel shall be provided. Extended lube lines shall be mounted to a bracket located on the fan housing with grease relief fittings on each line.
  21. A NEMA 3R non-fused disconnect switch shall be provided, mounted on the fan housing and wired to the motor.
  22. All steel and aluminum surfaces components within the airstream that are not stainless steel or fiberglass must be surface prepped by abrasive blast clean to SSPC-SP10. Chemically cleaning of these components as a form of surface preparation is not acceptable. These components must be coated with a high solids epoxy with low VOC chemical resistant barrier coating epoxy. The coating system, a total thickness of up to 12 mils, is not affected by the UV component of sunlight (does not chalk), and has superior corrosion resistance to acid, alkali, and solvents. Coating system shall exceed 7000 hour ASTM B117 Salt Spray Resistance. Standard finish color to be gray. All coatings that include a zinc rich epoxy primer are strictly prohibited. Zinc coatings react with alkalis and acids, thus causing premature failure of the coating system and should never be used for laboratory applications.
  23. The fan supplied must meet the system exhaust CFM and the motor BHP shall not be larger than that shown on the fan schedule. If the BHP is larger than that shown then the fan manufacturer shall provide money for the additional energy cost for a seven (7) year period. The cost shall be \$7,530.00 per BHP greater than

that shown in the schedule. The fan manufacturer shall also provide any additional money required for wiring changes or any other changes required for installation of the equipment. These additional charges shall be detailed on the proposal and include in its total value.

24. Fan and Mixing Box systems supplied by the manufacturer must have a foot print as shown on the drawings / schedule. Exhaust systems with larger footprints shall not be acceptable.
25. The static pressure shown on the schedule is based on the static pressure requirements at the inlet to the mixing box. Any system deviating from the basis of design shall include and detail in their proposal additional losses for flexible connectors, fan losses, elbows, mixing box, etc. that are not included in their fan curves. In addition any deviation from the basis of design shall be subject to requirements stated in sections 1.3.2, 2.1.8 and 2.1.23.

## PART 3 –ACCESSORIES

### 3.1 Accessories

1. Inlet mixing plenums shall be provided by the fan manufacturer. Each plenum shall be sized to support the weight and performance requirement of the number of fans listed on the schedule. Multiple fan plenums shall be insulated double wall construction with structural stiffeners. Double wall plenums, except for fans over 3hp shall have an overall minimum wall thickness of 1.5", and the insulation shall have a minimum R value of 4.34. Outer skin of double wall plenums shall be coated 12Ga Galvaneal steel. Inner skin shall be uncoated 18Ga 304 stainless steel. Multiple fan plenums shall be able to withstand a minimum of 12 in. w.g. of negative pressure. Single fan plenums shall be of continuously welded, heavy gauge steel construction. For single thickness plenums, coatings shall be the same as specified for the fans. All plenums shall be capable of supporting the fan(s) without guy wires or supports. The plenums shall include hinged access doors. The primary air inlets shall be located on the bottom or side as noted on construction drawings. Unless otherwise specified, plenums shall be suitable for mounting on roof curbs. Safety screens shall be supplied over inlet of fan.
2. Bypass dampers shall be provided with all mixing plenums for outside air with primary exhaust. Bypass damper(s) shall be sized to bypass the airflow capacity of one fan at the required static pressure of the system. Dampers will be opposed blade low leakage air foil control dampers with extended shaft for connection to an operator. The dampers shall be all aluminum construction. Rain hoods shall be provided with each damper. The dampers shall be controlled by a 24v electric proportional control damper actuators shall be electronic direct-coupled type, which require no crankarm and linkage. Actuators must provide proportional damper control in response to a 2 to 10 VDC or, with the addition of a 500Ω resistor, a 4 to 20 mA control input from an electronic controller or positioner. Actuators shall have Brushless DC motor technology and be protected from overload at all angles of rotation. Actuators shall have reversing switch and

- manual override on the cover. Run time shall be constant and independent of torque. A 2 to 10 VDC feedback signal shall be provided for position indication.
3. An acoustic louver shall be provided at the inlet to the bypass dampers on systems requiring sound attenuation.
  4. Low leakage isolation dampers shall be constructed of aluminum air foil extrusions and epoxy coated. Operators shall be 2 position, spring return and shall have On-off spring return damper actuators that are direct coupled type which require no crankarm and linkage and be capable of direct mounting to a jackshaft. The actuators must be designed so that they may be used for either clockwise or counterclockwise fail-safe operation. Actuators shall have a manual positioning mechanism accessible on its cover. Actuators shall use a brushless DC motor and be protected from overload at all angles of rotation. Run time shall be constant and independent of torque. Auxiliary switches, 2 SPDT, shall be provided with one switch having the capability of being adjustable.
  5. Vortex breakers shall be provided on all side inlet and multiple fan plenums.
  6. A galvanized steel roof curb shall be provided to support the fans/plenums. The curb shall be minimum 14 gauge and canted for rigidity in wind loads. The curb shall include a rigid fiberglass liner and a wood nailer.
  7. Acoustical Silencer Nozzle shall be designed as an integral component of the exhaust fan discharge nozzle and shall not increase the height of the overall assembly. Integral Acoustical Silencer Nozzle with a minimum of 12dBA insertion loss. Lining the interior of the windband is not an acceptable method of attenuation due to line of site sound in the free area between the nozzle and windband.
    - a. The Acoustical Silencer Nozzle shall provide the attenuation values as specified in the following schedule. The published insertion loss values shall be obtained from an AMCA 300 test with the silencer installed on the fan specified. Ratings based on separate silencer and fan testing is not acceptable.

| OCTAVE BAND CENTER FREQUENCY (Hz) |        |    |     |     |     |      |      |      |      |
|-----------------------------------|--------|----|-----|-----|-----|------|------|------|------|
| FAN SIZE /<br>SILENCER<br>MODEL   | LENGTH | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 |
| TS-2                              | 64"    | 0  | 4   | 9   | 11  | 12   | 13   | 9    | 4    |
| TS-3                              | 88"    | 0  | 6   | 7   | 10  | 11   | 7    | 11   | 2    |
| TS-4                              | 89"    | 5  | 8   | 9   | 11  | 12   | 12   | 10   | 6    |
| TS-5                              | 93"    | 3  | 14  | 15  | 17  | 18   | 13   | 8    | 6    |

- b. The silencer shall be constructed with an outer shell of fiber reinforced plastic. The inner liner shall be perforated corrosion resistant steel. The silencer shall match the color of the fans. Acoustic media shall be isolated from the air stream by a non fibrous acoustical media.

END OF SECTION 233417



| SPLIT-AIR HANDLING UNIT SCHEDULE |                    |                     |           |             |          |                  |                  |      |     |                                           |             |      |               |         |         |               |                             |                          |              |              |              |              |               |                  |                  |                  |             |              | BASIS OF DESIGN: TRANE |                    |  |  |  |
|----------------------------------|--------------------|---------------------|-----------|-------------|----------|------------------|------------------|------|-----|-------------------------------------------|-------------|------|---------------|---------|---------|---------------|-----------------------------|--------------------------|--------------|--------------|--------------|--------------|---------------|------------------|------------------|------------------|-------------|--------------|------------------------|--------------------|--|--|--|
| UNIT No.                         | LOCATION           | AREA SERVED         | TOTAL CFM | FAN DATA    |          |                  |                  |      |     | ELECTRIC DATA PER SUPPLY FAN MOTOR (EACH) |             |      |               |         |         |               | DX-COOLING COIL             |                          |              |              |              |              |               |                  |                  | STEAM-HUMIDIFIER |             |              |                        |                    |  |  |  |
|                                  |                    |                     |           | NO. OF FANS | FAN TYPE | E.S.P. (IN. H2O) | T.S.P. (IN. H2O) | RPM  | BHP | HP                                        | VOLT/ Hz/PH | RPM  | NO OF CIRCUIT | FLA (A) | MCA (A) | FUSE SIZE (A) | SENSIBLE CAPACITY (MBTU/HR) | TOTAL CAPACITY (MBTU/HR) | EAT. DB (°F) | EAT. WB (°F) | LAT. DB (°F) | LAT. WB (°F) | F.V. (FT/MIN) | A.P.D. (IN. H2O) | REFRIGERANT TYPE | EAT. RH (%)      | LAT. RH (%) | EAT. DB (°F) | STEAM FLOW (LB/HR)     | COND. LOSS (LB/HR) |  |  |  |
| AHU-1                            | 2ND FLOOR LOW ROOF | 200-A,B&C, 201& 207 | 12,000    | 4           | FEG75    | 3                | 5.17             | 2740 | 16  | 5                                         | 460/60/3    | 1800 | 1             | 32.8    | 34.85   | 40            | 487                         | 886                      | 92           | 76           | 55           | 54.9         | 452           | 0.64             | R-410            | 25               | 50          | 78           | 287                    | 19.16              |  |  |  |

| SPLIT-AIR HANDLING UNIT SCHEDULE (CONTINUED) |              |              |               |                    |                  |               |                       |                         |              |              |               |                  |                  |               |                  |                   |    |      |   | BASIS OF DESIGN: TRANE |                        |       |         |
|----------------------------------------------|--------------|--------------|---------------|--------------------|------------------|---------------|-----------------------|-------------------------|--------------|--------------|---------------|------------------|------------------|---------------|------------------|-------------------|----|------|---|------------------------|------------------------|-------|---------|
| STEAM PRE-HEAT COIL                          |              |              |               |                    |                  |               |                       | STEAM HEAT COIL         |              |              |               |                  |                  |               |                  | PANEL FILTER      |    |      |   |                        | OPERATING WEIGHT (LBS) | MODEL | REMARKS |
| TOTAL CAPCITY (MBTU/HR)                      | EAT. DB (°F) | LAT. DB (°F) | F.V. (FT/MIN) | AIR P.D. (IN. H2O) | PRESSURE (°PSIG) | COND. (LB/HR) | STEAM .P.D. (IN. H2O) | TOTAL CAPCITY (MBTU/HR) | EAT. DB (°F) | LAT. DB (°F) | F.V. (FT/MIN) | A.P.D. (IN. H2O) | PRESSURE (°PSIG) | COND. (LB/HR) | S.P.D. (IN. H2O) |                   |    |      |   |                        |                        |       |         |
| 650                                          | 0            | 50           | 474           | 0.09               | 5                | 677           | 8.581                 | 585                     | 50           | 95           | 474           | 0.106            | 5                | 609           | 6.9              | PLEATED (MERV 13) | 80 | 0.18 | 1 | 0.59                   | 8500                   | PSCA  | 1-8     |

- REMARKS:
- EXTERNAL PIPE CABINET FOR STEAM VALVE.
  - SUPPLY FAN MOTOR: DIRECT DRIVE W/VFD.
  - BACNET I/P INTERFACE.
  - STAINLESS STEEL DRIP PAN.
  - SMOKE DETECTOR.
  - VFD PER FAN.
  - HUMIDIFIERS SHALL BE PROVIDED WITH A CONTROL VALVE, INVERTED BUCKET STEAM TRAP, WYE STRAINER, AND TWO FLOAT AND THERMOSTATIC STEAM TRAPS SHIPPED LOOSE FOR FIELD INSTALLATION.
  - STANDARD MANUFACTURER WARRANTY FROM DATE OF ACCEPTANCE BY CUNY.

| PACKAGED AIR-COOLED CONDENSING UNIT |            |                                |                |            |     |                   |                   |                             |              |                |          |          |                         |              |         |         |         |                  |                | BASIS OF DESIGN: TRANE |             |           |         |
|-------------------------------------|------------|--------------------------------|----------------|------------|-----|-------------------|-------------------|-----------------------------|--------------|----------------|----------|----------|-------------------------|--------------|---------|---------|---------|------------------|----------------|------------------------|-------------|-----------|---------|
| UNIT NO.                            | UNIT SERVE | REFRIGERATION EFFECT (MBTU/HR) | CAPACITY (TON) | POWER (KW) | EER | SUCTION TEMP (°F) | AMBIENT TEMP (°F) | CONDENSER                   |              |                |          |          | ELECTRICAL DATA         |              |         |         |         |                  |                | WEIGHT (LBS)           | REFRIGERANT | MODEL NO. | REMARKS |
|                                     |            |                                |                |            |     |                   |                   | COIL TYPE                   | FINS PER IN. | NO. OF CIRCUIT | FAN TYPE | QUANTITY | EMER. POWER (YES OR NO) | VOLT /PH/HZ. | MCA (A) | MOP (A) | RDE (A) | COMP. POWER (KW) | FAN POWER (KW) |                        |             |           |         |
| ACC-1                               | AHU-1      | 1121.31                        | 80             | 102        | 11  | 44.0              | 95.0              | ALUMINUM TUBE MICRO-CHANNEL | 18           | 2              | STANDARD | 1        | NO                      | 460/3/60     | 174     | 200     | 175     | 95               | 7.04           | 5800                   | R410A       | RCAUC80-1 | 1-3     |

- REMARKS:
- SPRING VIBRATION ISOLATORS
  - SUCTION SERVICE VALVE
  - BLEED THERMAL EXPANSION VALVE
  - STANDARD MANUFACTURER WARRANTY FROM DATE OF ACCEPTANCE BY CUNY.

| SPLIT AIR COOLED HEAT PUMP SYSTEM SCHEDULE |           |             |           |                |      |             |     |           |      |                  |                  |               |           |            |   |    |              |                      |             |             |                     |                     |                 |           | BASIS OF DESIGN: MITSUBISHI |                   |                           |                      |           |              |
|--------------------------------------------|-----------|-------------|-----------|----------------|------|-------------|-----|-----------|------|------------------|------------------|---------------|-----------|------------|---|----|--------------|----------------------|-------------|-------------|---------------------|---------------------|-----------------|-----------|-----------------------------|-------------------|---------------------------|----------------------|-----------|--------------|
| UNIT No.                                   | LOCATION  | AREA SERVED | CFM RANGE | TOTAL CAPACITY |      | POWER INPUT |     | CONDENSER |      |                  |                  |               |           |            |   |    |              | EVAPORATOR           |             |             |                     |                     |                 |           | DIMENSION WDXH (IN.)        | EFFICIENCY (SEER) | CONDENSING UNIT MODEL No. | EVAPORATOR MODEL No. | REMARKS   |              |
|                                            |           |             |           |                |      |             |     | MARK No.  | CFM  | OUTDOOR AIR D.B. | MIN. OPER. TEMP. | CONDENSER FAN |           | COMPRESSOR |   |    |              | DIMENSION WDXH (IN.) | E.A.T. D.B. | E.A.T. W.B. | COOLING L.A.T. D.B. | HEATING L.A.T. D.B. | MOTOR OUTPUT KW | MOTOR FLA |                             |                   |                           |                      |           | VOLT /PH/HZ. |
|                                            |           |             |           | MCA.           | MOCF | TYPE        | RLA |           |      |                  |                  | LRA           | MODEL No. |            |   |    |              |                      |             |             |                     |                     |                 |           |                             |                   |                           |                      |           |              |
| AC-R1                                      | 1ST FLOOR | RM 104      | 700       | 34.2           | 38   | 3.3         | 3.7 | ACC-R1    | 3880 | 95°F             | 0°F              | 25            | 31        | INVERTER   | 8 | 13 | MNB33FBRMC-L | 42X17X56             | 95          | 76          | 75                  | 70                  | 0.56            | 0.57      | 208/1/60                    | 51X19X15          | 18.8                      | PUZ-A36NHA (BS)      | PKA-A36FA | 1-5          |

- REMARKS:
- LINESET-TWIN TUBE-INSULATION
  - HEAVY DUTY WALL MOUNTING BRACKET FOR OUTDOOR UNIT-COATED STEEL. MODEL-QSWB200M-1
  - BACKNET AND MODBUS INTERFACE
  - FLARED CONNECTION
  - WARRANTY- 5 YEARS FROM THE DATE OF ACCEPTANCE FROM CUNY.

| EXHAUST FAN SCHEDULE |          |                                     |          |           |                          |                       |           |                       |                   |                      |          |                         | BASIS OF DESIGN: STROBIC AIR |     |                     |                       |                       |                    |            |                  |          |
|----------------------|----------|-------------------------------------|----------|-----------|--------------------------|-----------------------|-----------|-----------------------|-------------------|----------------------|----------|-------------------------|------------------------------|-----|---------------------|-----------------------|-----------------------|--------------------|------------|------------------|----------|
| ITEM NO.             | UNIT NO. | AREA SERVED                         | LOCATION | NO OF FAN | LABORATORY EXHAUST (CFM) | STATIC PRESSURE IN WG | FAN (RPM) | INLET FLOW RATE (CFM) | BYPASS FLOW (CFM) | ENTRAINED FLOW (CFM) | POWER    | EMER. POWER (YES OR NO) | SINGLE FAN PERFORMANCE       |     |                     |                       |                       |                    |            |                  |          |
|                      |          |                                     |          |           |                          |                       |           |                       |                   |                      |          |                         | BHP                          | HP  | FAN FLOW RATE (CFM) | TOTAL FLOW RATE (CFM) | NOZZLE VELOCITY (CFM) | DILUTION RATIO (%) | MODEL NO.  | OPERATING WEIGHT | REMARKS  |
| 1                    | EF-1A&1B | 200-A,B&C, 201, 207 000, 000A, 000B | ROOF     | 2         | 15,000                   | 2.5                   | 1200      | 15,000                | 1818              | 10090                | 460/3/60 | NO                      | 7                            | 7.5 | 8400                | 13454                 | 4426                  | 179                | TS2S075A12 | 5088             | 1 THRU 8 |

- REMARKS:
- FAN SHALL BE SPARK RESISTANT AND EXPLOSION PROOF CONSTRUCTION.
  - ISOLATION MOTORIZED DAMPER.
  - BYPASS MOTORIZED DAMPER.
  - BYPASS RAIN HOOD.
  - MIXING PLENUM.
  - DISCONNECT SWITCH/FAN.
  - OUTLET NOZZLE SILENCER.
  - STANDARD MANUFACTURER WARRANTY FROM DATE OF ACCEPTANCE BY CUNY.

| DUCT SILENCER |         |            |    |                 |                       |          |                       |                     |     |     |     |      |      |      |      |                 | BASIS OF DESIGN: VIBRO-ACOUSTICS |                  |          |  |
|---------------|---------|------------|----|-----------------|-----------------------|----------|-----------------------|---------------------|-----|-----|-----|------|------|------|------|-----------------|----------------------------------|------------------|----------|--|
| UNIT NO.      | AHU TAG | LOCATION   | NO | FLOW RATE (CFM) | STATIC PRESSURE IN WG | PD IN WG | DIMENSION LXWXH (IN.) | MIN. INSERTION LOSS |     |     |     |      |      |      |      | MANUFACTURER    | MODEL NO.                        | OPERATING WEIGHT | REMARKS  |  |
|               |         |            |    |                 |                       |          |                       | 63                  | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 |                 |                                  |                  |          |  |
| S-1           | AHU-1   | LOWER ROOF | 1  | 12,000          | 0.29                  | 0.26     | 84X36X30              | 9                   | 14  | 19  | 22  | 31   | 28   | 23   | 20   | VIBRO-ACOUSTICS | TS2S075A12                       | 325              | 1 THRU 5 |  |

- REMARKS:
- FOR NON BASIS OF DESIGN, PROVIDE P.E STAMP CALS TO PROVIDE 20 DB REDUCTION IN THE VIVARIUM LAGS.
  - FOR NON BASIS OF DESIGN, PROVIDE P.E STAMP CALS TO PROVIDE PRESSURE DROP WITH SYSTEM EFFECTS.
  - REFL - RECTANGULAR ELBOW FILM LINED SILENCER WITH G90, 18 GA. CASING AND 22 GA. PERF MATERIAL CONSTRUCTION.
  - VIBAR FILM LINING INCLUDED. VIBAR FILM IS FIRE/SMOKE RATED AND MEETS NFPA 90A AND ASTM E84 STANDARDS.
  - FOR NON BASIS OF DESIGN, CONTRACTOR IS RESPONSBILE FOR MEETING THE REQUIRED DB REDUCTION.

| ELECTRIC AIR HANDLING UNIT SCHEDULE |             |             |           |                   |              |              |              |                       |                      |                        |                     |          |          |                         |          |     |      |     |                  |                         |     |              |         |         | BASIS OF DESIGN: TRANE |         |                       |              |             |      |         |      |
|-------------------------------------|-------------|-------------|-----------|-------------------|--------------|--------------|--------------|-----------------------|----------------------|------------------------|---------------------|----------|----------|-------------------------|----------|-----|------|-----|------------------|-------------------------|-----|--------------|---------|---------|------------------------|---------|-----------------------|--------------|-------------|------|---------|------|
| UNIT No.                            | LOCATION    | AREA SERVED | TOTAL CFM | COOLING COIL DATA |              |              |              |                       |                      |                        | HEATING COIL DATA   |          |          |                         | FAN DATA |     |      |     |                  | ELECTRICAL DATA         |     |              |         |         |                        | MODEL   | DIMENSION LXWXH (FT.) | WEIGHT (LBS) | SOUND (dBA) | EER  | REMARKS |      |
|                                     |             |             |           | ENT. DB (°F)      | ENT. WB (°F) | LAT. DB (°F) | LAT. WB (°F) | TOTAL COOLING MBTU/HR | SEN. COOLING MBTU/HR | MIN. ROWSCAPACITY DEEP | HEATING CAPACITY KW | EAT (°F) | LAT (°F) | STATIC PRESS. (IN.W.G.) | RPM      | HP  | RPM  | BHP | DISCHARGE CONFI. | EMER. POWER (YES OR NO) | HP  | VOLT /PH/HZ. | MCA (A) | MFS (A) | FLA (A)                |         |                       |              |             |      |         |      |
| AHU-3                               | FIRST FLOOR | CAGE AREA   | 2000      | 92                | 76           | 55           | 54.9         | 138                   | 79                   | 6                      | 48                  | 0        | 83       | 2.24                    | 1944     | 1.5 | 1800 | 1   | VERTICAL         | NO                      | 1.5 | 460/3/60     | 84.8    | 90      | 67.8                   | HORIZON | OADG010A3             | 14X5X6       | 3050        | 88.7 | 13.1    | 1-13 |

- REMARKS:
- HEAT: FIN & TUBE MODULATING HORH ELECTRIC.
  - ELECTRIC HEATING COIL WITH SCR(MODULATING CONTROL).
  - SUPPLY FAN MOTOR: DIRECT DRIVE W/VFD.
  - UNIT CONTROLLER- TRANE TD7- DISCHARGE AIR CONTROL.
  - W/BACNET W/DISPLAY.
  - COOLING CONTROL- RELIATEL.
  - STAINLESS STEEL DRIP PAN.
  - SMOKE DETECTOR.
  - SPACE TEMP THERMOSTAT.
  - HORIZONTAL DISCHARGE CURB-PRIMARY CABINET.
  - ADJUSTABLE DISCHARGE AIR TEMP. CONTROL.
  - FILTER- MERV-13.
  - SOUND ATTENUATION PACKAGE.
  - STANDARD MANUFACTURER WARRANTY FROM DATE OF ACCEPTANCE BY CUNY.

| CONDENSATE PUMP AND RECEIVER SCHEDULE |                    |         |            |                      |      |                  |              |           |                          | BASIS OF DESIGN: SHIPCO PUMPS |            |          |  |
|---------------------------------------|--------------------|---------|------------|----------------------|------|------------------|--------------|-----------|--------------------------|-------------------------------|------------|----------|--|
| UNIT No.                              | LOCATION           | SERVICE | PUMP DATA  |                      |      |                  | MOTOR DATA   |           | RECEIVER CAPACITY (GAL.) | MODEL                         | REMARKS    |          |  |
|                                       |                    |         | GPM (EACH) | DISCH. PRESS. (PSIG) | RPM  | OPER. TEMP. (°F) | No. OF PUMPS | HP (EACH) |                          |                               |            | VOLT/ PH |  |
| CP-1                                  | REMSEN PIPE TUNNEL | AHU-1   | 3          | 30                   | 3500 | 180              | 1            | 3/4       | 208/3                    | 16                            | 63 DSD-MU3 | 1-5      |  |

- REMARKS:
- STAINLESS STEEL CONSTRUCTION.
  - BASKET INLET STRAINER, GAUGE, GLASS ASSEMBLY, DIAL THERMOMETER, DISCHARGE PRESSURE GAUGE, HIGH WATER ALARM SWITCH.
  - ALL UNIT SHALL BE COMPLETELY ASSEMBLED, PIPED, WIRED AND TESTED BEFORE SHIPMENT.
  - UNIT WILL BE FURNISHED WITH REMOVABLE SUPPORT STAND WHICH WILL ELEVATE RECEIVER 12" FROM BASE.
  - STANDARD MANUFACTURER WARRANTY FROM DATE OF ACCEPTANCE BY CUNY.

| REGISTERS AND DIFFUSERS |           |           |                   |           |         | BASIS OF DESIGN: TITUS |  |  |  |  |
|-------------------------|-----------|-----------|-------------------|-----------|---------|------------------------|--|--|--|--|
| TYPE                    | CFM RANGE | NECK SIZE | NOMINAL FACE SIZE | MODEL No. | REMARKS |                        |  |  |  |  |
| CD-1                    | 100-180   | 7"        | 24"x24"           | TLF-SS    | 1       |                        |  |  |  |  |
| CD-2                    | 100-180   | 7"        | 24"x48"           | TLF-SS    | 1       |                        |  |  |  |  |
| CD-3                    | 190-300   | 10"       | 24"x48"           | TLF-SS    | 1       |                        |  |  |  |  |
| ER-1                    | 100-300   | 10"x10"   | 12"x12"           | PAR-SS    | 1       |                        |  |  |  |  |
| ER-2                    | 100-300   | 10"x10"   | 24"x24"           | PAR-SS    | 1       |                        |  |  |  |  |
| ER-3                    | 300-550   | 12"x12"   | 24"x24"           | PAR-SS    | 1       |                        |  |  |  |  |

- REMARKS:
- STAINLESS STEEL



NEW YORK  
STATE OF  
OPPORTUNITY



DASNY

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539 Franklin Street, Buffalo, NY 14202-1109  
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Consultants:

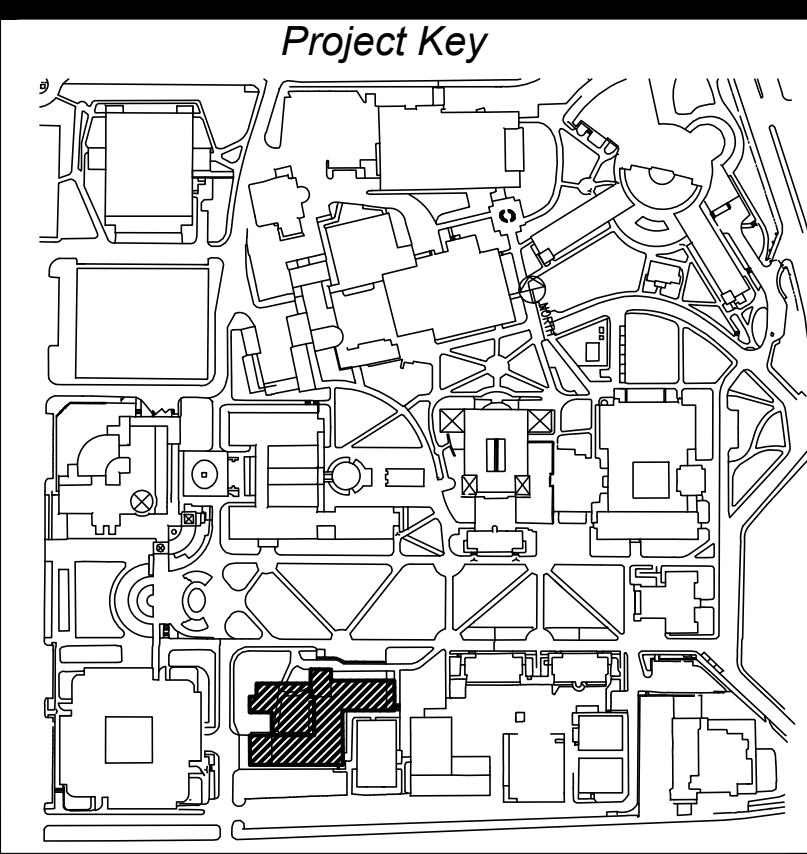


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| REVISIONS |                        |          |
|-----------|------------------------|----------|
| Rev       | Description            | Date     |
| 1         | CONSTRUCTION DOCUMENTS | 12-19-19 |
| 2         |                        |          |
| 3         |                        |          |

D08 JOB #

Client

CUNY  
THE CITY UNIVERSITY OF NEW YORK  
555 WEST 57th STREET  
NEW YORK, NEW YORK, 10019

Project Title

QUEENS COLLEGE  
RESIDENT HALL VIVARIUM SPRING & ARRESTOS WORK  
66-50 KISSENA BLVD.,  
FLUSHING, NY 11367

Drawing Title

SCHEDULE SHEET

Drawn By: E.S.    Checked By: G.S.    Approved By: G.S.    Date: 08/30/2019

Seal & Signature

Genesys Project No: 0361.22-100    DASNY Project No: 3066809999

Drawing Number

M-900.00

Drawing    ##    of    ##



**Strobic Air Corporation**  
**A Cincinnati Fan Company**  
140 W Orvilla Rd.  
Lansdale, PA 19446  
Phone: (215) 723-4700 | Fax: (215) 723-7401  
www.choosetrystack.com | www.strobicair.com

**Project: Queens College - Remsen Hall Animal Lab - Fan Reference: EF-1,2,3**  
**Fans: 2 (operating) / 0 (redundant)**

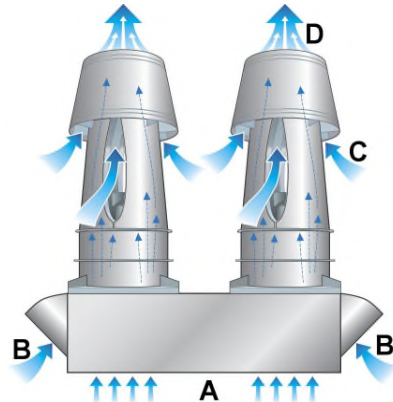
**Tri-Stack™**

A: Inlet Flow  
**15000 cfm**

B: Bypass Flow  
**1818 cfm**

C: Entrained Flow  
**10090 cfm**

D: Total System Flow  
**26908 cfm**

**Operating Conditions**

Inlet Static Pressure: **2.5 in w.g.**  
Inlet Air Temperature: **70 deg F**  
Inlet Air Density: **0.075 lb/cu ft**

Inlet Flow per Fan: **7500 cfm**  
Ambient Air Temp.: **70 deg F**  
Ambient Air Dens: **0.075 lb/cu ft**

Inlet Flow Total: **15000 cfm**  
Altitude at Site: **0 ft**  
Operating Frequency: **60 Hz**

**Fan Performance Data - (single fan)**

Fan Flow Rate: **8409 cfm**  
Total Flow: **13454 cfm**  
Operating Speed: **1200 rpm**  
Dilution Ratio: **179 %**

Fan Model: **TS2S075A12**  
Nozzle Velocity: **4426 fpm**  
Wind Band Area: **9.63 sq. ft**  
Min. Motor Hp: **7.5 hp**  
Corrected BHP: **7.07 hp**

Effective Stack Height:  
10 mph Wind: **48 ft**  
15 mph Wind: **35 ft**

**Altitude and Temperature Corrections**

Mixed Air Density:  
**0.075 lb/cu ft**

Mixed Air Temperature:  
**70 deg F**

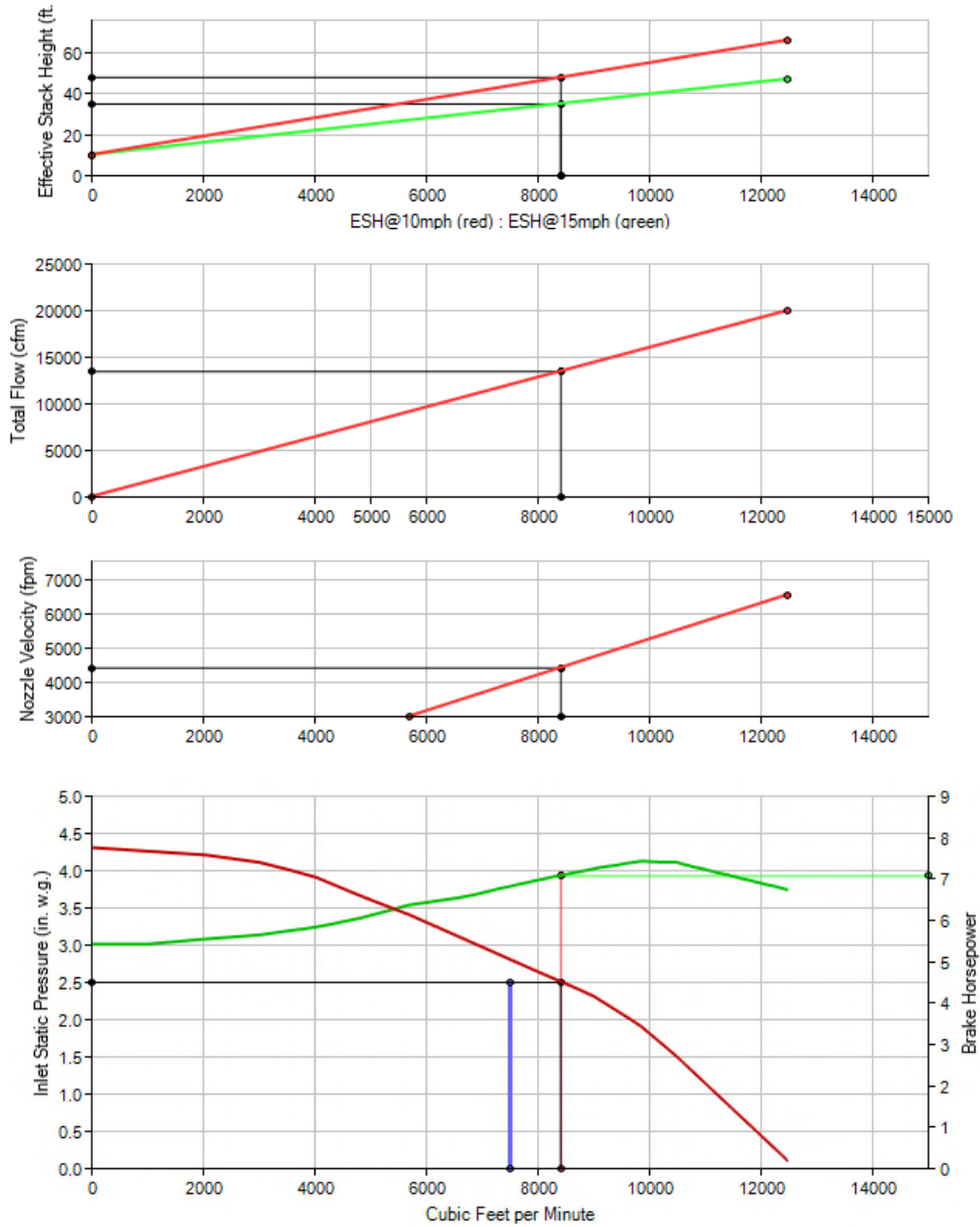
Corrected Static Pressure:  
**2.5 in w.g.**

**Comments**

1. Number of fans running does not include redundant fan.
2. Inlet static pressure had been derated for discharge nozzle, windband, airfoil isolation damper, and outlet silencer
3. Inlet static pressure had been derated for system effects through the mixing box, based on the factory-recommended duct configurations.
4. Consult factory for additional derations when duct configurations do not meet factory guidelines.
5. Add an additional 0.15 inches static pressure for gravity isolation dampers (usable on single fan mixing boxes only).
6. Effective stack height from roof line is given for fan without a mixing box, mounted on an 18 inch high curb.
7. Stack height calculated using Briggs equation, per ASHRAE Fundamentals (1997).

**Fan Model:** TS2S075A12  
**Reference:** EF-1,2,3

**Speed:** 1200 RPM  
**Mixed Air Density:** 0.075 lb/cu ft



Inlet Static Pressure has been Derated for Discharge Nozzle, Windband, Airfoil Isolation Damper, and Outlet Silencer, as well as System Effects Based on Factory-Recommended Duct Configurations. Add an additional 0.15 inches for Gravity Isolation Dampers (On Single Fan Plenums Only). Consult Factory for Additional Deration for Duct Configurations that do not meet Factory Guidelines.

Effective Stack Height at Stated Wind Speed from Roof Line for Fan w/o Mixing Box, mounted on an 18 inch high curb. Add height of mixing box.

**Fan Outlet Sound Data For Fan Model TS2S075A12.**  
**Number of Fans Running: 2 - No Silencer, at 60Hz**

| Frequency                           | 63 Hz | 125 Hz | 250 Hz | 500 Hz | 1000 Hz | 2000 Hz | 4000 Hz | 8000 Hz |
|-------------------------------------|-------|--------|--------|--------|---------|---------|---------|---------|
| Outlet Sound Power Levels           | 91    | 94     | 90     | 89     | 87      | 81      | 74      | 65      |
| Corrections for 2 Fans Running      | 3     | 3      | 3      | 3      | 3       | 3       | 3       | 3       |
| Corrected Outlet Sound Power Levels | 94    | 97     | 93     | 92     | 90      | 84      | 77      | 68      |

|                                |     |     |     |     |     |     |     |     |
|--------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|
| Corrections for 10 ft Distance | -17 | -17 | -17 | -17 | -17 | -17 | -17 | -17 |
| Sound Levels (10 ft)           | 77  | 80  | 76  | 75  | 73  | 67  | 60  | 51  |
| 'A' Scale Corrections          | -26 | -16 | -9  | -3  | 0   | 1   | 1   | -1  |
| dB'A' Spectrum (10 ft)         | 51  | 64  | 67  | 72  | 73  | 68  | 61  | 50  |

**Net Sound Level at 10 ft: 77dB'A' (at 60Hz)**

| Frequency                           | 63 Hz | 125 Hz | 250 Hz | 500 Hz | 1000 Hz | 2000 Hz | 4000 Hz | 8000 Hz |
|-------------------------------------|-------|--------|--------|--------|---------|---------|---------|---------|
| Outlet Sound Power Levels           | 91    | 94     | 90     | 89     | 87      | 81      | 74      | 65      |
| Corrections for 2 Fans Running      | 3     | 3      | 3      | 3      | 3       | 3       | 3       | 3       |
| Corrected Outlet Sound Power Levels | 94    | 97     | 93     | 92     | 90      | 84      | 77      | 68      |

|                                |     |     |     |     |     |     |     |     |
|--------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|
| Corrections for 50 ft Distance | -31 | -31 | -31 | -31 | -31 | -31 | -31 | -31 |
| Sound Levels (50 ft)           | 63  | 66  | 62  | 61  | 59  | 53  | 46  | 37  |
| 'A' Scale Corrections          | -26 | -16 | -9  | -3  | 0   | 1   | 1   | -1  |
| dB'A' Spectrum (50 ft)         | 37  | 50  | 53  | 58  | 59  | 54  | 47  | 36  |

**Net Sound Level at 50 ft: 63dB'A' (at 60Hz)**

**Fan Outlet Sound Data For Fan Model TS2S075A12.**  
**Number of Fans Running: 2 - With Silencer, at 60Hz**

| Frequency                                  | 63 Hz | 125 Hz | 250 Hz | 500 Hz | 1000 Hz | 2000 Hz | 4000 Hz | 8000 Hz |
|--------------------------------------------|-------|--------|--------|--------|---------|---------|---------|---------|
| Outlet Sound Power Levels                  | 91    | 94     | 90     | 89     | 87      | 81      | 74      | 65      |
| Corrections for 2 Fans Running             | 3     | 3      | 3      | 3      | 3       | 3       | 3       | 3       |
| Dynamic Insertion Loss for nozzle silencer | 0     | -4     | -9     | -11    | -12     | -13     | -9      | -4      |
| Corrected Outlet Sound Power Levels        | 94    | 93     | 84     | 81     | 78      | 71      | 68      | 64      |

|                                |     |     |     |     |     |     |     |     |
|--------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|
| Corrections for 10 ft Distance | -17 | -17 | -17 | -17 | -17 | -17 | -17 | -17 |
| Sound Levels (10 ft)           | 77  | 76  | 67  | 64  | 61  | 54  | 51  | 47  |
| 'A' Scale Corrections          | -26 | -16 | -9  | -3  | 0   | 1   | 1   | -1  |
| dB'A' Spectrum (10 ft)         | 51  | 60  | 58  | 61  | 61  | 55  | 52  | 46  |

**Net Sound Level at 10 ft: 67dB'A' (at 60Hz)**

| Frequency                                  | 63 Hz | 125 Hz | 250 Hz | 500 Hz | 1000 Hz | 2000 Hz | 4000 Hz | 8000 Hz |
|--------------------------------------------|-------|--------|--------|--------|---------|---------|---------|---------|
| Outlet Sound Power Levels                  | 91    | 94     | 90     | 89     | 87      | 81      | 74      | 65      |
| Corrections for 2 Fans Running             | 3     | 3      | 3      | 3      | 3       | 3       | 3       | 3       |
| Dynamic Insertion Loss for nozzle silencer | 0     | -4     | -9     | -11    | -12     | -13     | -9      | -4      |
| Corrected Outlet Sound Power Levels        | 94    | 93     | 84     | 81     | 78      | 71      | 68      | 64      |

|                                |     |     |     |     |     |     |     |     |
|--------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|
| Corrections for 50 ft Distance | -31 | -31 | -31 | -31 | -31 | -31 | -31 | -31 |
| Sound Levels (50 ft)           | 63  | 62  | 53  | 50  | 47  | 40  | 37  | 33  |
| 'A' Scale Corrections          | -26 | -16 | -9  | -3  | 0   | 1   | 1   | -1  |
| dB'A' Spectrum (50 ft)         | 37  | 46  | 44  | 47  | 47  | 41  | 38  | 32  |

**Net Sound Level at 50 ft: 53dB'A' (at 60Hz)**

Not all inline and silencer nozzle combinations have been tested in conjunction with each other for sound performance. The results of the additional attenuation of both sets of silencers in this arrangement is conservatively estimated based off of similar applications. Please contact Strobic Air for additional information regarding sound values.

Last revised date October, 2015

**Strobic Air Corporation**  
**A Cincinnati Fan Company**  
**140 W Orville Rd.**  
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## Queens College - Remsen Hall Animal Lab

### Strobic Air Energy Analysis and Comparison for EF-1,2,3

#### Fan Data

Model: **TS2S075A12**

Fans Running/Redundant: **2 / 0**

Motor HP: **7.5 hp (Premium Efficiency)**

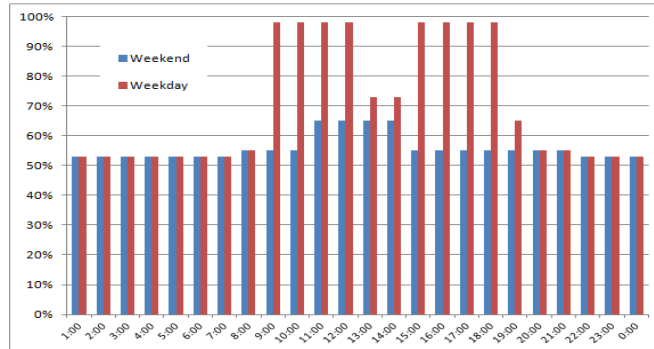
Motor Voltage: **460**

Motor RPM: **1200**

Design Flow Rate: **15000 cfm**

Design Static Pressure: **2.5 in. W.G.**

Electric rate: **0.15**



\*Fume Hood Diversity Schedule is the standard taken from ASHRAE 90.1-2007 App. G. Energy usage and cost are calculated using values which maintain the minimum safe nozzle velocity for the specified fans.

#### Annual Power Cost To Run the System

##### At Full Speed<sup>1</sup>

Fan Flow Rate: **16818 cfm**

Static Pressure: **2.5 in. W.G.**

Bypass Air: **1818 cfm**

Frequency: **60 Hz**

Bhp: **14.2 hp**

Est. Annual Kw used: **92,151.17 kw/year**

Est. Annual Operating Cost: **\$13,822.68**

##### With a Strobic Air Smart System & VFD(s)<sup>1, 2</sup>

Fan Flow Rate: **Varies by Demand**

Static Pressure: **Varies by Demand**

Bypass Air: **Varies by Demand**

Frequency: **Varies by Demand**

Bhp: **Varies by Demand**

Est. Annual Kw used: **54,592.37 kw/year**

Est. Annual Operating Cost: **\$8,188.86**

#### Annual Savings:

**\$5,633.83<sup>3</sup>**

**Strobic Air's Smart System continuously monitors system demand to optimize control of the fans and dampers to maintain the design nozzle velocity while minimizing energy consumption. The Smart System also allows for easy monitoring and control of fans, as well as secure remote access to fan controls. Option are available to monitor and account for other factors (e.g. atmospheric conditions).**

<sup>1</sup>Costs listed are estimated annual fan operating cost only, based on the fan(s) operating at standard atmospheric conditions.

<sup>2</sup>Savings calculated based on reduced demand percentages as specified by ASHRAE 90.1-2007 App. G. Actual demand may vary.

<sup>3</sup>Since the actual demand may vary from the ASHRAE 90.1-2007 App. G. standard, actual savings may vary.

\*\* Any additional equipment costs or savings from energy recovery systems are not factored in.