DASNY | WE FINANCE, BUILD AND DELIVER.
DORMITORY AUTHORITY STATE OF NEW YORK

CONSTRUCTION DIVISION

Building Information Model (BIM)

Standards Manual

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Acknowledgements

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Part One   General Information

1.1   Construction Division - Background

DASNY oversees a portfolio of more than 750 construction projects, worth more than $6 billion. During fiscal year 2011-2012, DASNY spent more than $990.2 million on construction projects.

DASNY offers a full range of construction services, acting as the customer's agent to protect the customer's interests during both design and construction phases. Beginning with the evaluation and selection of an architect, DASNY assists the customer by reviewing documents for ease of construction, code compliance, and life-safety issues. We review plans and specifications, solicit and evaluate bids, and hold contracts on behalf of the customer. Once construction starts, DASNY handles day-to-day construction coordination issues and interpretations of contract documents. From design to completion of construction, DASNY manages the project to ensure that it is built on time and within budget.

The coordination and completeness of contract documents prepared for our customer's projects, the volatile nature of the economy, and DASNY's requirement of LEED® Silver buildings are just a few factors that affects deliver of DASNY's construction projects to its customers. DASNY is committed "to deliver exceptional service and professional expertise on every financing and construction project for our clients and the public, in a cost-effective manner, while advancing the policy goals of New York State," as stated in its mission statement. As a result, DASNY sees the use of BIM on its construction projects as a significant step in improving and enhancing buildings that DASNY constructs for our customers and the people of the State of New York.

1.2   Standards Manual

The Dormitory Authority of the State of New York (DASNY) Building Information Model (BIM) Standards Manual describes the processes, procedures, and requirements that should be followed for the preparation and submission of BIM on all projects. If conflicts or discrepancies arise between this manual and the Contract, the information within the Contract will prevail and be considered as definitive.

1.3   Building Information Modeling (BIM)

BIM is a growing industry trend that is changing the way that planning, design, construction, and facility operations are conducted and, as such, changing the

face of the industry as a whole. BIM uses computer-based simulations to study and validate project design and construction before they actually take place.

BIM is far more than basic 3D modeling; BIM is a business approach that integrates multiple streams of project-related information. BIM moves users away from the traditional "document-centric" approach, which only addresses the capital construction side of a facility, toward a "data-centric" approach, which supports the facility lifecycle operation. The result is more effective and efficient design, estimating, scheduling, and construction phases.

BIM breaks down traditional barriers related to interdisciplinary collaboration, facilitates off-site prefabrication, improves design options, and reduces risk, rework, and cost. BIM also allows for the integration of construction phasing through project scheduling software, automated quantity takeoffs, automated costing based on the integration of materials pricing software packages, and green building analysis, among others.

1.4 The Purpose of this Standard

DASNY BIM Standards Manual will provide guidelines that ensure Design Professionals will produce, release, and receive data in a consistent format, for multiple building types and customers, throughout New York State. This will maintain an efficient exchange of data between disciplines and the compatibility of each discipline's model(s).

Currently DASNY's BIM practice is comprised of several Autodesk products. DASNY BIM Standards Manual will generally use terminology and references that are unique to the Autodesk-based software applications.

DASNY BIM Standard provides a structure for the organization of BIM projects. The primary goals of this structure are to improve coordination among all functional groups within DASNY and their Design Professionals, as well as to develop BIM projects in a way that will facilitate the further use of this electronic information beyond the initial contract.

1.5 Applicability

BIM can be used to progressively build and update comprehensive models of any DASNY client facility, regardless of size. This benefits DASNY by leveraging smaller projects that Design Professionals and contractors are otherwise unable to justify on an individual project basis. The BIM repositories of each facility would contain new and updated information supplied via design/construction projects, significant renovations, and routine maintenance and operations systems, offering a valuable life cycle tool to operate DASNY client facilities.

1.6 DASNY's BIM Vision

As BIM and its use in the marketplace continue to evolve, so too will DASNY continue to review and update its requirements of BIM. The ultimate vision for the use of BIM on DASNY construction projects is to have a digital representation of physical and functional characteristics of a facility that accurately represent the actual physical construction, so that it can be turned over to the customer for their lifecycle use of the building. As a result, the ability to manage and communicate the electronic project data of a building will be required to be interoperable, as the software that produces the initial project data will most likely be different or changed at the end-of-life of a building.

Initially, DASNY's requirement of BIM on its construction projects will be limited to leveraging a "virtual building" of its systems and analysis, through bid documents (Level 300 Model). As the construction industry continues its adoption of BIM and the legal precedents surrounding the BIM in construction become clear, so too will DASNY's requirement of BIM in the construction phase and beyond will occur.

1.7 Software Requirements

DASNY currently has adopted Autodesk Revit as its standard BIM software. The Autodesk Revit products currently in use by DASNY are:

- Autodesk Revit Architecture
- Autodesk Revit MEP
- Autodesk Revit Structure
- Autodesk Navisworks Manage
- Autodesk Design Review

Based on the non-backwards compatibility of the Revit-based applications, versioning of the software shall be managed by the Design Professionals throughout the project lifecycle.

It is the responsibility of all parties (Design Professionals and contractors) to have or obtain, at their own cost, the trained personnel, hardware, and software needed to successfully use BIM for the project. Equipment used by the subcontractors during the on-site coordination meetings shall meet the minimum requirements of the software being implemented so as not to cause delays in modeling and redrawing. All technical disciplines shall be responsible for their data integration and data reliability of their work and coordinated BIMs.

In order to maintain the data of the Building Information Model for future use, all submissions through bidding documents, shall require submission of an Industry Foundation Class (IFC) data model, that is neutral and an open specification file format, not controlled by a single vendor or group of vendors, of the data submitted in Autodesk format.

1.8   Model Ownership

DASNY holds ownership of all the contents within the models including all inventions, ideas, designs, and methods contained within. This includes, but is not limited to, any content submitted as part of the BIMs itself.

Outside resources, such as Design Professionals and/or Contractors, using the BIMs, are granted temporary use of it for the duration of the project. All copies of the BIMs must be returned to DASNY at the completion of the project.

1.9   BIM Execution Plan

DASNY requires the Professional for a project to execute a detailed and comprehensive planning exercise, called a BIM Project Execution Plan (BIM PxP), describing the successful implementation of BIM for the project. This well documented plan will help to define the opportunities and outline the responsibilities of project team members, for the life of the project.

A BIM Project Execution Plan should record the following:

- Identify the key members responsible for BIM coordination.
    - Indicate the Discipline or Trade, the consultant and the contact person for each.
- Define the method of file sharing for the project information.
    - Determine the project's site location and the administrator.
- Determine the coordination of the model.
    - Define the model's origin point and coordinate system.
- Define the project's phases and schedule.
    - Identify the project phases, the start and ending of each phase, and the percentage of the total project of each phase.
- Determine project milestones.
    - For each project phase, determine deliverables, format and naming conventions.
- Define the project objectives.
    - Identify the primary objectives along with the project specific objectives along with a description of each.

Part Two   Technical Criteria

2.1   General

This section establishes the technical criteria required to develop a project using BIM technology for DASNY.

2.1.1 Model Requirements

All BIMs shall be developed in accordance with the most current version of the BIM Standards Manual. Versioning of the software shall be managed by the Design Professionals and DASNY personnel, throughout the project's lifecycle.

2.1.2 Model Granularity

This document assumes that not all items shall be modeled within the BIM files. The BIM Model itself may not represent the exact design intent of real life elements. Refer to the Contract and Design Professional's Submission Requirements for more information, located on *www.DASNY.org*

The Model Level of Development (LOD) describes the level of detail to which a Model is developed. These levels are cumulative from LOD 100 to LOD 400 models. DASNY's LOD has been developed to be aligned with AIA-Exhibit E202 Document, as described in the following way:

- **LOD 100**
  Level 100 Models include elements such as Masses and are used for preliminary studies, such as Conceptual Design and Overall Project Phasing. Analysis based on their Location and Orientation can be performed. Quantities based on Overall Area and Overall Volume can be obtained.

- **LOD 200**
  Level 200 Models include elements in which Masses have been replaced with Generic Components. Analysis based on Overall Systems can be performed. Quantities based on specific Elements can be obtained.

- **LOD 300**
  Level 300 Models include elements in which Generic Components have been replaced with fully defined Assemblies. Analysis based on Specific Systems can be performed. Quantities based on Materials can be obtained.

  At LOD 300, the model can be leveraged for the generation of traditional Construction Documents and Shop Drawings. The model can be used for analysis such as: Energy Performance, Clash and Cost.

- **LOD 400**

    Level 400 Models include elements that are accurate in terms of size, shape, location, quantity and orientation with complete fabrication, assembly and detailing information. At this Level, the Model may also have non-geometric (3D) information such as text, dimensions, notes, 2D details, etc.

    At LOD 400, the model is a representation of the proposed elements. Analysis can be performed such as: Energy Performance, Clash Detection, and Sequencing and Cost.

2.1.3   Model Conflicts

When conflicts exist between the contents of a BIM model(s) and the "Contract Documents" (Drawings and Specifications), the information contained within the Contract Set will prevail and will be considered as definitive.

2.2   Submission Requirements

All submissions through bidding documents shall require, in addition to the required REVIT modes submission, an IFC format of the same data as the submitted Autodesk format. The level of the design submission (LOD 100 through LOD 300 models) is described within this document and is in concert with Design Submission requirements, as outlined in DASNY's Design Professional's contract with the Design Professional.

It is DASNY's future intention to deliver LOD 400 BIMs to the owner for Facilities Management upon Occupancy. Information that is redefined during the construction process shall be updated in the appropriate As-Built models on an on-going basis. The uses of the BIM are a dynamic methodology, and currently, multiple formats of information are required.

All submitted electronic files must be compatible with the version of the Autodesk Revit software currently being used by DASNY and must conform and comply with the latest version of DASNY BIM Standard as outlined in this Manual. The Design Professional should refer to their Contract for project-specific submission requirements of each phase.

2.2.1   File Formats

The following formats are required:

- RVT   :   Autodesk Revit files
- DWG   :   Autodesk Drawing files
- DWF   :   Autodesk Design Review files
- LandXML   :   Autodesk Civil 3D Data files
- TIFF   :   Tagged Image File Format
- NWC   :   Navisworks Cache Format

- IFC : IFC Object-Based Neutral File Format

2.2.2 Coordinate Systems

The Survey Point of the site model (SM) shall be set at the beginning of the project. Once the design coordinate system is established, all discipline model(s) shall share this geo-reference to accurately locate them on site plans for surveying and future GIS use in accordance with the New York State Plane Coordinate System where the project is located.

The Project Base Point shall be located at the SW corner of the structural grid or as coordinated with DASNY, the Design Professionals and DASNY's Customer.

In an effort to organize, consolidate, and standardize the information generated and leveraged by all divisions within DASNY, all DASNY BIM projects shall use NAD83 (North American Datum 1983) as the Coordinate System.

- NAD83 : New York State Plane NAD83

2.2.3 Media and Identification

All project-related files must be submitted on media DVDs, delivered virus free, and labeled with the following information:

- Company Name and Address
- Contact Name, E-mail Address and Phone Number
- Client Name
- JDE Project Number
- Project Name
- Discipline
- Design Phase
- Submission Date
- Software and Version(s)

2.3 Deliverables

Digital and hardcopy deliverables are required at each milestone throughout the project. Hard copies of drawings in full size 24x36 must be submitted as bond plots using DASNY Standard Title Sheets identified in this Manual. Before every submission, BIMs should be purged of all unused information.

- Pre-Schematic Design
- Schematic Design (30%)
- Design Development (60%)
- Construction Document (100%)
- Bid Set
- Record Drawings

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2.4 BIM Standard Compliance

DASNY will monitor all BIM projects for standard compliance. At minimum, The BIM Standard Compliance checks for adherence in the following fields:

- Project Location
- File Naming Convention
- Views Naming Convention
- Duplicate Elements
- Cover Sheet
- Contract Border
- Text Font/Size
- Dimension Font/Size
- Template Content (Shared Parameters, Callouts, View Titles, etc.)
- Compliance with the requirements of this manual

2.5 BIM Standard Support Files

Information for the purposes of assembling a printed set of contract documents shall be derived from the BIMs to the fullest extent possible. The National CAD Standards shall be applied so printed 2D documents reflect the graphic intent of industry standards.

Maintaining consistent folder structure and file naming is critical for linked models to function properly across multiple disciplines and for end users such as Contractors and Facility Managers.

DASNY BIM Standard includes a series of support files that are stored in a folder named "DASNY_BIM Standards". Support files are accessible from the following location for all Design Professionals, *www.DASNY.org*

2.5.1 Using the Support Files

All support files contain support files that affect all the Revit-based applications.

Following is a brief description of the contents of each sub-folder.

SUPPORT FILES	
FOLDER	**DESCRIPTION**
Manual	Includes the PDF version of this document.
Support	Includes support files for importing and exporting AutoCAD files to and from Revit, a CTB used when plotting AutoCAD files created from Revit, and an XML file for importing Revit settings into Navisworks.

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2.6 BIM Project Workflow

The BIM Project Workflow, defined in this section, should be used to simplify the exchange of information among DASNY departments, customers, Design Professionals, and contractors over the project lifecycle.

2.6.1 Project Folder Structure

Every discipline is provided with a folder in which all design-related data is to be stored. Design Professionals are required to use this folder structure when defining their project directory.

- The letters "JDE" shall be replaced with the JDE Project Number. The six-digit JDE Number is a unique identifier assigned by DASNY for all DASNY BIM projects. Design Professionals are required to get this number from DASNY at the project initiation.
  - *Example: 123456*

- The term "Discipline" shall be replaced with the Design Professional's specific discipline.
  - Architecture
  - Electrical
  - Mechanical
  - Plumbing
  - Structure
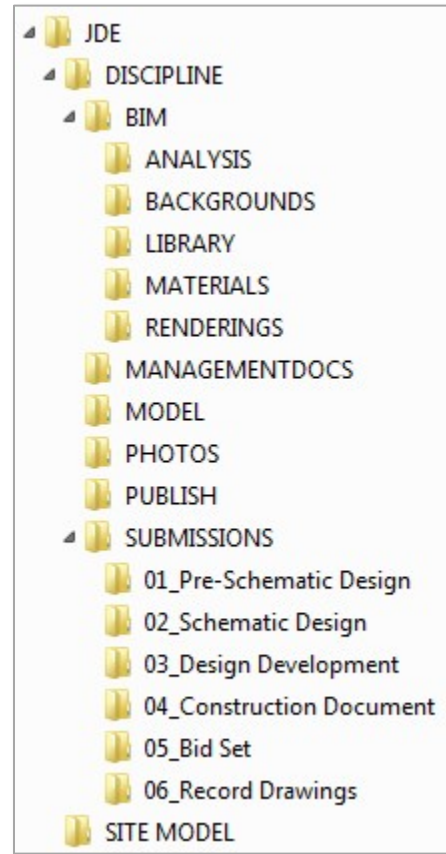
2.6.2 Project Folder Description

Following is a brief description of the contents of each sub-folder within the project folder.

PROJECT FILES	
FOLDER	**DESCRIPTION**
Discipline	This folder is used to share files among the disciplines. Each Discipline folder has a series of standardized sub-folders in which all design related data is to be stored.

PROJECT FILES	
FOLDER	**DESCRIPTION**
BIM	This folder stores Revit-related information files that do not need to be shared outside each discipline. The BIM Folder will be archived with the project.
Analysis	This folder stores the results from different types of data and energy analysis performed in the BIM Model.
Backgrounds	This folder stores AutoCAD and/or Image files that will be referenced into the BIM Model and will become part of the Contract Set.
Library	This folder stores project-specific Revit Family files. Sub-folders may be created in the LIBRARY folder similar to the one provided by the Revit Imperial Library.
Materials	This folder stores custom and/or project-specific materials (.MLIB files) along with the associated bitmaps used within the BIM model(s). Sub-folders may be created in the MATERIALS folder similar to the one provided by the Revit Imperial Library.
Renderings	This folder stores data such as images and walkthroughs generated from the BIM Model.
ManagementDocs	This folder stores non-drawing project-related data such as e-mails, memos, spreadsheets, documents, estimates, specs, etc.
Model	This folder stores the Revit Model file.
Photos	This folder stores digital photographs relevant to the project.
Publish	This folder stores files between disciplines. BIM Models will be exported as DWF and TIFF file formats and saved within this folder at each submission milestone.
Submissions	This folder stores several sub-folders of project information as it appears at each milestone of the project; Pre-Schematic, Schematic (30%), Design Development (60%), Construction Document (100%), Bid Set, and Record Drawings.
Site Model	This folder stores two files, an AutoCAD file in DWG format and a Revit file in RVT format, which holds the project

PROJECT FILES	
FOLDER	**DESCRIPTION**
	coordinate system and controls the location, rotation, and elevation of all Revit-based Models.

2.7   File Naming Convention

All electronic project information shall be named following DASNY BIM Standard Naming Conventions outlined below. Discipline Codes shall reference the National CAD Standards.

FILE NAMING CONVENTIONS		
TYPE	**FORMAT**	**DESCRIPTION**
	DJDE_CENTRAL.rvt	The Revit Central file shall be named with the prefix Discipline Code, followed by the six-digit JDE Number, and the word "CENTRAL". Once defined, the Central File name should not change through the life of the project.
	DJDE_DT_001_999.pdf	Publish files in PDF format should be named with the prefix Discipline Code, followed by the six-digit JDE Number, and the Sheet Number range.
	DJDE_Description.dwg	AutoCAD files linked to the Revit BIM model(s) shall be named beginning with the Discipline Code, followed by the six-digit JDE Number, and an optional User Description. Once defined, the AutoCAD file name shall not change for the life of the project.
	DJDE_Description.jpg	Image files linked to or created from the Revit BIM model(s) shall be named beginning with the Discipline Code, followed by the six-digit JDE Number, and an optional User Description. If Image files are referenced into the Revit BIM model(s), once defined, the Image file name shall not change through the life of the project.
	DJDE_Description.avi	Animation files created from the Revit BIM model(s) shall be named beginning with the Discipline Code, followed by the six-digit JDE Number, and an optional User Description.

FILE NAMING CONVENTIONS		
TYPE	FORMAT	DESCRIPTION
	DJDE_Description.format	Microsoft Office files created from the Revit BIM model(s) shall be named beginning with the Discipline Code, followed by the six-digit JDE Number, and an optional User Description.
	DJDE_000_999.dwf	Multi-sheet 2D DWF Files created from the Revit BIM model(s) shall be named beginning with the Discipline Code, followed by the six-digit JDE Number and the Sheet Number range.
	DJDE_3D.dwf	3D DWF Files created from the Revit BIM model(s) shall be named beginning with the Discipline Code, followed by the six-digit JDE Number and the characters "3D".
	DJDE_3D.nwc	NavisWorks Cache files shall be named beginning with the Discipline Code, followed by the six-digit JDE Number, and the characters "3D".
	DJDE_3D.nwf	NavisWorks Master files shall be named beginning with the Discipline Code, followed by the six-digit JDE Number and the characters "3D".
	DJDE_Description.format	Multiple applications will be used to perform data and energy analysis within the different Revit BIM model(s). Analysis files shall be named beginning with the Discipline Code, followed by the six-digit JDE Number, and an optional User Description.

2.8   Family Naming Convention

Model elements shall be derived from manufacturer's model elements or custom created utilizing the appropriate BIM authoring family template.

2.8.1 Family Names

Family files shall be named beginning with the Functional Type followed by the Subtype, the Manufacturer Name, and two optional User Description fields.

- <Functional Type>_<Subtype>_<Manufacturer>_<Description1>_ <Description2>.rfa
  - *Example: AHU_Vert_Trane_Packaged_Rooftop.rfa*

FAMILY FILES

ITEM	DESCRIPTION
Functional Type	Names the element that the family creates
Subtype	Names the part type
Manufacturer	Manufacturer Name or Generic Primary Characteristic or Shape
Description1/ Description2	Brief User Description

2.8.2   Family Types

Types within a Family file shall indicate the key differences or variations between the different Family options. Depending on the Family Component the Type names shall take one of the following forms:

- <Model> or <Series Number>
- <Value> or <Capacity>
- <Height>x<Width>x<Depth>
  - *Example: Sink_Oval_Generic_Undercounter.rfa*
    - *Standard_Height*
    - *ADA_Height*

2.8.3   Material Types

Materials shall be named beginning with the Finish Material followed by the Manufacturer Name, the Finish Code, and an optional User Description.

- <Finish>_<Manufacturer>_<Finish or Model Number>_<User Description>
  - *Example: Glass_Pilkington_Evergreen_Uncoated_Insulated*

2.8.4   Material Image Files (thumbnails)

Image file names, used to define Materials within the BIM model(s), shall match the corresponding Materials they represent and shall be in .JPG format.

- *Example: Glass_Pilkington_Evergreen_Uncoated_Insulated.jpg*

2.9   Worksets Naming Convention

DASNY BIM Standard adopts two different approaches when naming Worksets based on the size and complexity of the project.

Each discipline shall determine which of the two approaches best fits their design needs. The Worksets Naming Convention is discipline specific, not project specific; therefore, these two formats will be able to co-exist within the same project.

2.9.1 Worksets Based on Location

Worksets based on location shall be named according to where the elements are spatially located within the project.

- \<Location\>_\<Description\>
  - *Example: North Wing Structural Foundation Concrete, "N_Foundation_Concrete"*

2.9.2 Worksets Based on Model Element

Worksets based on model element shall be named according to what each element and component represent within the project.

- \<Element Type\>_\<Component\>
  - *Example: MEP HVAC Steam, "HVAC_Steam"*

2.9.2.1 Worksets Based on Model Element Including Object Requirements

Included in these matrices are object requirements based on the Model's Level of Development (LOD).

2.9.2.2 Revit Architecture including Object Req'ts.

2.9.2.2.1 Element Type: Building_Exterior

REVIT ARCHITECTURE		LOD			
Component Type/Name	**Requirements**	**100**	**200**	**300**	**400**
Landscape or Entourage	Type/Dimensions	N/A	*	*	*
	Level	N/A	*	*	*
	Material	N/A		*	*
	Mark	N/A		*	*
	Phase Created	N/A			*
	Phase Demolished	N/A			*
Roof	Type/Dims.	*	*	*	*
	Base Level	*	*	*	*
	Base Offset from Level	*	*	*	*
	Room Bounding	*	*	*	*
	Slope		*	*	*
	Thickness		*	*	*

	Material			*	*
	Mark			*	*
	Phase Created				*
	Phase Demolished				*
Walls or Curtain_Wall	Type/Dimensions	*	*	*	*
	Base Constraint	*	*	*	*
	Base Offset	*	*	*	*
	Top Constraint	*	*	*	*
	Top Offset	*	*	*	*
	Height	*	*	*	*
	Room Bounding	*	*	*	*
	Structural		*	*	*
	Structural Usage		*	*	*
	Material			*	*
	Mark			*	*
	Phase Created				*
	Phase Demolished				*

2.9.2.2.2 Element Type: Building_Interior

REVIT ARCHITECTURE		LOD			
Component Type/Name	Requirements	100	200	300	400
Ceilings or Light_Fixtures or Louvers	Type/Dimensions	N/A	*	*	*
	Level	N/A	*	*	*
	Height Offset from Level	N/A		*	*
	Room Bounding	N/A		*	*
	Material	N/A		*	*
	Mark	N/A		*	*
	Phase Created	N/A			*
	Phase Demolished	N/A			*
Furniture or Casework or Equipment	Type/Dimensions	N/A	*	*	*
	Level	N/A	*	*	*
	Material	N/A		*	*
	Mark	N/A		*	*
	Phase Created	N/A			*
	Phase Demolished	N/A			*
Doors or Windows	Type/Dimensions	N/A	*	*	*
	Level	N/A	*	*	*
	Sill Height	N/A	*	*	*
	Material	N/A		*	*
	Mark	N/A		*	*
	Phase Created	N/A			*
	Phase Demolished	N/A			*
Floors or Slabs	Type/Dimensions	*	*	*	*
	Level	*	*	*	*
	Height Offset from Level	*	*	*	*
	Room Bounding	*	*	*	*
	Structural		*	*	*
	Material			*	*
	Mark			*	*
	Phase Created				*
	Phase Demolished				*

2.9.2.2.2 Element Type: Building_Interior (cont'd)

REVIT ARCHITECTURE		LOD			
Component Type/Name	Requirements	100	200	300	400
Railings	Type/Dimensions	N/A	*	*	*
	Base Level	N/A	*	*	*
	Base Offset	N/A	*	*	*
	Material	N/A		*	*
	Mark	N/A		*	*
	Phase Created	N/A			*
	Phase Demolished	N/A			*
Rooms	Level	*	*	*	*
	Upper Limit	*	*	*	*
	Limit Offset	*	*	*	*
	Base Offset	*	*	*	*
	Number	*	*	*	*
	Name	*	*	*	*
	Occupancy		*	*	*
	Department		*	*	*
	Base Finish		*	*	*
	Ceiling Finish		*	*	*
	Wall Finish		*	*	*
	Floor Finish		*	*	*
	Occupant		*	*	*
	Material				*
	Mark				*
	Phase Created				*
	Phase Demolished				*

2.9.2.2.2 Element Type: Building_Interior (cont'd)

REVIT ARCHITECTURE		LOD			
Component Type/Name	Requirements	100	200	300	400
Vertical_Circulation	Type/Dimensions	*	*	*	*
	Base Level	*	*	*	*
	Base Offset	*	*	*	*
	Top Level	*	*	*	*
	Top Offset	*	*	*	*
	Width	*	*	*	*
	Number of Risers	*	*	*	*
	Riser Height	*	*	*	*
	Tread Depth	*	*	*	*
	Material			*	*
	Mark			*	*
	Phase Created				*
	Phase Demolished				*
Walls	Type/Dimensions	*	*	*	*
	Base Constraint	*	*	*	*
	Base Offset	*	*	*	*
	Top Constraint	*	*	*	*
	Top Offset	*	*	*	*
	Height	*	*	*	*
	Room Bounding	*	*	*	*
	Structural		*	*	*
	Structural Usage		*	*	*
	Material				*
	Mark			*	*
	Phase Created				*
	Phase Demolished				*

2.9.2.3 Revit MEP including Object Requirements

2.9.2.3.1 Element Type: HVAC

REVIT MEP		LOD			
Component Type/Name	Requirements	100	200	300	400
Chill_Water or Steam or Hot_Water	Type/Dimensions	*	*	*	*
	Level	*	*	*	*
	Start Offset		*	*	*
	End Offset		*	*	*
	Slope		*	*	*
	System Classification			*	*
	System Type			*	*
	System Name			*	*
	System Abbreviation			*	*
	Material			*	*
	Mark			*	*
	Phase Created				*
	Phase Demolished				*
Ductwork or Flex_Duct	Type/Dimensions	*	*	*	*
	Level	*	*	*	*
	Start Offset		*	*	*
	End Offset		*	*	*
	Slope		*	*	*
	System Classification			*	*
	System Type			*	*
	System Name			*	*
	System Abbreviation			*	*
	Material			*	*
	Mark			*	*
	Phase Created				*
	Phase Demolished				*

2.9.2.3.1 Element Type: HVAC (cont'd)

REVIT MEP		LOD			
Component Type/Name	Requirements	100	200	300	400
Equipment or Controls	Type/Dimensions	*	*	*	*
	Level	*	*	*	*
	Panel		*	*	*
	Circuit Number		*	*	*
	Air Flow				*
	Drain Flow		*	*	*
	Air Pressure Drop			*	*
	System Classification	N/A		*	*
	System Name	N/A		*	*
	Material	N/A			*
	Mark	N/A		*	*
	Phase Created	N/A			*
	Phase Demolished	N/A			*

2.9.2.3.2 Element Type: Plumbing

REVIT MEP		LOD			
Component Type/Name	Requirements	100	200	300	400
Compress_Air or Domestic_Cold_Water or Domestic_Hot_Water or Domestic_Hot_Water_Return or Sanitary_Sewer or Sanitary_Ventilation or Storm	Type/Dimensions	*	*	*	*
	Level	*	*	*	*
	Start Offset		*	*	*
	End Offset		*	*	*
	Slope		*	*	*
	System Classification			*	*
	System Type			*	*
	System Name			*	*
	System Abbreviation			*	*
	Material				*
	Mark			*	*
	Phase Created				*
	Phase Demolished				*

2.9.2.3.2 Element Type: Plumbing (cont'd)

REVIT MEP		LOD			
Component Type/Name	**Requirements**	**100**	**200**	**300**	**400**
Plumbing_Fixtures	Type/Dimensions	*	*	*	*
	Level	*	*	*	*
	Flow Pressure		*	*	*
	System Classification			*	*
	System Type			*	*
	System Name			*	*
	System Abbreviation			*	*
	Material				*
	Mark			*	*
	Phase Created				*
	Phase Demolished				*

2.9.2.3.3 Element Type: Fire Protection

REVIT MEP		LOD			
Component Type/Name	**Requirements**	**100**	**200**	**300**	**400**
Foam or FM200	Type/Dimensions	*	*	*	*
	Level	*	*	*	*
	Occupancy		*	*	*
	Ceiling Finish		*	*	*
	Wall Finish		*	*	*
	Floor Finish		*	*	*
	Material			*	*
	Mark			*	*
	Phase Created				*
	Phase Demolished				*

2.9.2.3.3 Element Type: Fire Protection (cont'd)

REVIT MEP		LOD			
Component Type/Name	Requirements	100	200	300	400
Stand_Pipe or Sprinkler	Type/Dimensions	N/A	*	*	*
	Level	N/A	*	*	*
	Elevation	N/A	*	*	*
	System Classification	N/A		*	*
	System Type	N/A		*	*
	System Name	N/A		*	*
	System Abbreviation	N/A		*	*
	Edited by	N/A		*	*
	Pressure Drop	N/A		*	*
	Flow	N/A		*	*
	Material	N/A		*	*
	Mark	N/A		*	*
	Phase Created	N/A			*
	Phase Demolished	N/A			*

2.9.2.3.4 Element Type: Electrical

REVIT MEP		LOD			
Component Type/Name	Requirements	100	200	300	400
Fire_Alarm_Devices	Type/Dimensions	N/A	*	*	*
	Level	N/A	*	*	*
	Elevation	N/A	*	*	*
	Panel	N/A		*	*
	Circuit Number	N/A		*	*
	Electrical Data	N/A		*	*
	Material	N/A			*
	Mark	N/A		*	*
	Phase Created	N/A			*
	Phase Demolished	N/A			*

2.9.2.3.4 Element Type: Electrical (cont'd)

REVIT MEP		LOD			
Component Type/Name	Requirements	100	200	300	400
Lighting or Electrical_Fixtures	Type/Dimensions	N/A	*	*	*
	Level	N/A	*	*	*
	Elevation	N/A	*	*	*
	Switch ID	N/A		*	*
	Panel	N/A		*	*
	Circuit Number	N/A		*	*
	Material	N/A			*
	Mark	N/A		*	*
	Phase Created	N/A			*
	Phase Demolished	N/A			*
Electrical Equipment	Type/Dimensions	*	*	*	*
	Level	*	*	*	*
	Elevation		*	*	*
	Panel Name		*	*	*
	Mounting		*	*	*
	Enclosure		*	*	*
	Breakers		*	*	*
	Mains		*	*	*
	Circuit Naming			*	*
	Circuit Prefix Separator			*	*
	Circuit Prefix			*	*
	Short Circuit Rating			*	*
	Distribution System			*	*
	Feed			*	*
	Material			*	*
	Mark			*	*
	Phase Created				*
	Phase Demolished				*

2.9.2.3.4 Element Type: Electrical (cont'd)

REVIT MEP		LOD			
Component Type/Name	Requirements	100	200	300	400
Network or Public_Address or Security or Telecommunications	Type/Dimensions	N/A	*	*	*
	Level	N/A	*	*	*
	Elevation	N/A	*	*	*
	Material	N/A			*
	Mark	N/A		*	*
	Phase Created	N/A			*
	Phase Demolished	N/A			*

2.9.2.4 Revit Structure including Object Requirements

REVIT STRUCTURE		LOD			
Component Type/Name	Requirements	100	200	300	400
Foundation	Type/Dimensions	*	*	*	*
	Level	*	*	*	*
	Material				*
	Mark			*	*
	Phase Created				*
	Phase Demolished				*
Columns	Type/Dimensions	*	*	*	*
	Base Level	*	*	*	*
	Base Offset	*	*	*	*
	Top Level	*	*	*	*
	Top Offset	*	*	*	*
	Room Bounding		*	*	*
	Style		*	*	*
	Material				*
	Mark			*	*
	Phase Created				*
	Phase Demolished				*

2.9.2.4 Revit Structure (con't)

REVIT STRUCTURE		LOD			
Component Type/Name	**Requirements**	**100**	**200**	**300**	**400**
Trusses	Type/Dimensions	*	*	*	*
	Level	*	*	*	*
	Start Level Offset	*	*	*	*
	End Level Offset	*	*	*	*
	Top Chord		*	*	*
	Bottom Chord		*	*	*
	Bearing Chord		*	*	*
	Rotation Angle		*	*	*
	Bearing Vertical Justification		*	*	*
	Truss Height		*	*	*
	Non-bearing Offset		*	*	*
	Material				*
	Mark			*	*
	Phase Created				*
	Phase Demolished				*
Framing	Type/Dimensions	*	*	*	*
	Level	*	*	*	*
	Start Level Offset	*	*	*	*
	End Level Offset	*	*	*	*
	Lateral Justification	*	*	*	*
	Cross Section Rotation		*	*	*
	Structural Usage		*	*	*
	Material				*
	Mark			*	*
	Phase Created				*
	Phase Demolished				*

2.10   Views Naming Convention

Views within the Project Browser shall be named beginning with the View Type Code followed by an optional Level/Sequence Number and an optional User Description.

- <View>_<Level/Sequence>_<Description>
  - *Example: First Floor Plan View, "FP_01"*

VIEWS NAMING CONVENTION	
ITEM	**DESCRIPTION**
View	View Type Code (Refer to charts below)
Level/Sequence	Level Number or Sequence Number
Description	Brief User Description

2.10.1 All Disciplines

ALL DISCIPLINES	
VIEW TYPE CODE	**VIEW TYPE NAME**
3D	3D Views
AP	Area Plans
BS	Building Sections
CP	Ceiling Plans
CS	Construction Staging or Sequence
DL	Drawing List
DR	Drafting Views
DS	Detail Sections
DV	Detail Views
EE	Exterior Elevations
QP	Equipment Plan
FE	Framing Elevation
FP	Floor Plans
IE	Interior Elevations
KL	Keynote Legend
L	Landscape Plan
LG	Legends

LP	Location Plan
LS	Life Safety
ON	One Line Diagram Plan
NB	Note Block
MT	Material Takeoff
RD	Riser Diagram
RP	Reports
RO	Roof Plan
SC	Sections
SD	Schedules
SP	Site Plan
VL	View List
WT	Walkthroughs
X	Other

2.10.2 Architectural

ARCHITECTURAL	
VIEW TYPE CODE	VIEW TYPE NAME
FN	Furniture Plan
SG	Signage Plan
LS	Life Safety

2.10.3 Electrical

ELECTRICAL	
VIEW TYPE CODE	VIEW TYPE NAME
AX	Auxiliary Power Plan
CM	Communication Plan
CO	Corrosion Protection Plan
EC	Energy Code Compliance
GP	Grounding Plan
LI	Lightening Plan
LT	Lightening Protection Plan
PP	Power Plan
WD	Wiring Diagram Plan

2.10.4 Mechanical

MECHANICAL	
VIEW TYPE CODE	**VIEW TYPE NAME**
CN	Control Plan
CC	Control Schematic Plan
HP	HVAC Ductwork Plan
MD	Machine Design Plan
MH	Material Handling Plan

2.10.5 Plumbing

PLUMBING	
VIEW TYPE CODE	**VIEW TYPE NAME**
FPP	Fire Protection Plan
FS	Fire Suppression Plan
PI	Piping Plan
PL	Plumbing Plan
SP	Sprinkler Plan
SD	Standpipe Plan
SI	Specialty Piping Plan

2.10.6 Structural

STRUCTURAL	
VIEW TYPE CODE	**VIEW TYPE NAME**
CF	Concrete Framing Plan
DP	Decking Plan
FD	Foundation Plan
FR	Framing Plan
GC	Graphical Column Schedule
JL	Joist Girder Load Diagram
PP	Precast Panel Plan
RE	Reinforcement Plan
SF	Stair Framing Plan
ST	Steel Framing Plan

TB	Truss Bracing Plan
XB	X Bracing Plan
WG	Wind Girt Plan

2.11 Clash Detection and Conflict Resolution

The Design Professional is responsible for setting up Inter-Disciplinary Interference checks as often as the project requires.   The Interference Check Tool within Revit-based applications can be used to coordinate major building elements and systems allowing the identification of interferences earlier in the design process.

It is the Design Professionals responsibility to conduct and manage a thorough Clash Detection process so that all major interferences between 3D model components have been detected and resolved before construction.

The Design Professionals shall review the model and the Clash Reports in coordination meetings on a regular basis throughout the design phases until all spatial and system coordination issues have been resolved. The Design Professionals are responsible for updating their models to reflect the coordinated resolution.

During the construction phase, the accuracy of fabrication models shall be verified. Prior to each fabrication submittal for approval, fabrication contractors shall submit their models to the Contractor for integration and clash detection/coordination and resolution.

2.11.1 Copy/Monitor

The Copy/Monitor tool helps to monitor and coordinate changes between teams from different disciplines, which reduce mistakes and expensive rework.

The copy functionality copies grids, levels, and other model elements from a linked project into a host project. Users can modify these copied elements, which are automatically related to the original elements. The monitoring functionality sets and maintains relationships for those elements in the host or linked project.

2.11.2 Coordination Review

Whenever users modify a monitored element, a coordination monitor warning displays. Users can review these warnings using the Coordination Review Tool and decide what action to take. By default, changes in the Revit-linked model will not change in the user's model. Revit wants to ensure that the user is aware of the change before taking any action.

2.11.3 Clash Report Settings

The Cross-Discipline Interference Check shall be performed using Autodesk NavisWorks. The Design Professional is responsible for compiling all the discipline-specific NavisWorks Cache files (NWC) into a single Master NavisWorks file (NWF) for coordination purposes.

All settings can be imported from "DASNY_NavisWorks Options.xml" located at www.dasny.org/construction/designandconstructiontools/designresources/ under "CAD Standards."

2.11.4 Clash Report Color Schemes

At a minimum, the following color schemes shall be set to promote consistency and easy identification across all Design Professionals when generating Clash Reports.

CLASH REPORT COLOR SCHEMES	
DISCIPLINE	**COLOR**
Architectural	Cyan
Electrical	Yellow
Mechanical	Green
Structural	Blue

2.11.5 Clash Detective

At a minimum, the following spatial coordination and clash detection shall be verified.

CLASH DETECTIVE	
SPATIAL COORDINATION	**DESCRIPTION**
Architectural + Structural	Below grade spaces, floor plates/thicknesses/loads, major penetrations, levels, structural clearances, vertical shafts, grids, caps, bracing.
Architectural + MEPFS	Space elements, flow and isolation requirements, fire containment, vertical and horizontal transportation.
MEPFS/HVAC + Structural	Main distribution and collection systems, configurations and sizes for piping/duct/conduit/wiring/blowers/

CLASH DETECTIVE	
SPATIAL COORDINATION	**DESCRIPTION**
	diffusers/intakes/compressors, equipment clearances.
Architectural + Life Safety Fire Protection	Safe zones and fire suppression pipe locations, egress paths, exit distance requirements, equipment, pipe penetrations.
Medical Equipment	Equipment location/clearances, gas distribution and waste collection, pneumatic tube systems, communications, adjacencies and shielding barriers.
Accessibility Compliance	ADA compliance
Security	Setbacks, structure, site.

Part Three   Appendix & Glossary

3.1   Best Practices and Procedures

The following section describes application-specific best practices as well as procedures used on all DASNY BIM projects.

3.2   General Guidelines

3.2.1   Project Templates

Project Templates provide initial conditions and predefined settings for a project, such as generic project information, unit settings, predefined views, and plotting settings.

All Revit projects must be created using the templates located at www.dasny.org/construction/designandconstructiontools/designresources/ .

3.2.2   AutoCAD Files

- Minimize the number of linked or imported DWG files.
- Avoid importing unnecessary data like hatching or line-work such as construction lines. Delete unnecessary parts and layers of the DWG file within AutoCAD and import only the cleaned, smaller DWG.
- Avoid exploding the geometry imported from DWG files. The exploding operation within a Revit-based application can change a DWG from a single-managed element to hundreds or thousands of additional elements depending on the number of entities in the imported DWG.
- Only link essential DWG files into necessary views.
- DWG files shall be saved using the World Coordinates System (WCS) before they are linked into Revit in order to be correctly aligned.
- Linked files should not contain External References.
- Elements within the DWG cannot be more than 2 miles apart from each other.
- In order to control the AutoCAD Lineweight from Revit, the Lineweight column within the Layer Properties Manager Dialog Box should be set to Default.

3.2.3   Importing and Linking Files

- Unload links of all types if not used.

3.2.4   Modeling

- Until component types are determined, use the generic version of elements which incorporate less geometry.
- Break up large models into 150MB-200MB each.

- Regularly review and fix warnings.

3.2.5 Model Elements

- Keep family file names as short as possible because they need to display in the Type Selector.
- Do not include the Family Name in the Type Name.
- Type Names should mirror actual usage.
- When Types are named by size, use dimensions only.
- Create a Type Catalog for Family files that contain five or more types or when the Family file exceeds 500 Kb of memory.
- If a Type Catalog is used, no predefined Types should exist in the Family file.
- Do not use spaces between words in the Type names. To separate words use the underscore "_" character.

3.2.6 Design Options

- Preserve Design Options only as long as they are useful to the project. Even though options may not be active and visible, when changes are made within the main model all Design Options will update to maintain the model's consistency.
- Consider whether options should be preserved long-term in separate models that can be linked as needed.

3.2.7 Saving

- Before closing a file, keep only the Drafting View: SAVE TO CENTRAL open to accelerate saving and subsequent opening of the file.

3.2.8 Third-Party Applications

DASNY recognizes that there are multiple third-party applications currently available on the market that is able to run simulations and/or analysis within the Revit-based applications. However, regardless of the software used to run simulations and/or analysis within the Revit-based applications, the results must be brought back into the Revit 3D Model(s). This will ensure that the Revit 3D Model has the latest and most current information.

3.2.9 Sheets

DASNY Cover Sheets and Contract Border Sheets sizes are as follows;

- 8.5x11
- 11x17
- 18x24
- 24x36
- 36x48

Sheets within DASNY BIM Standard have been preconfigured to work in conjunction with the discipline Templates file and with the DASNY Shared Parameters file. Verify the sheet size with the project requirements for any deviation at project initiation.

3.2.10 Revisions

Revision tracking is the process of recording changes made to a model after sheets have been issued. In the Revit-based applications revisions are displayed and tracked using revision clouds, tags, and schedules.

3.2.11 Printing

DASNY BIM Standard adopts the DWF format as the standard to be used when creating sheets for printing purposes. All Revit-based templates provided with DASNY BIM Standard have been preconfigured with these settings.

DWF files shall always be created as multi-sheet files, in full size, in black and white, and grouped together by Drawing Type.

3.2.12 Submissions

Before every Submission, each discipline is responsible for having all their team members save their changes to the Central File and to release any Worksets ownership.

At the completion of every milestone, each Design Professional shall copy their discipline's BIM, MANAGEMENTDOCS, MODEL, and PUBLISH folders into the appropriate milestone sub-folder within SUBMISSIONS.

3.2.13 Exporting Revit Views to AutoCAD

For Design Professionals not using Revit, this section describes the steps required to export Revit Views to AutoCAD files preserving the predefined Coordinates System (NAD83) used on all BIM projects so other disciplines using AutoCAD can use these files as backgrounds. This process will also map Revit categories into the appropriate National CAD Standards layer naming convention.

In the Export CAD Formats Dialog Box chose these settings as follows:

- Set the "Layers and Properties" option to "Category Properties BYLAYER, Overrides BYENTITY."
- Set the "Linetype scaling" option to "Modelspace (PSLTSCALE = 1)."
- Set the "Coordinate System Basis" option to "Shared."
- Set the "One DWG Unit Is" option to "Inch."
- Set the "Layer Settings" to "DASNY_Export Layers to AutoCAD.txt" exporter.

3.3   Updates and Revisions

The dynamic nature of BIM technology dictates that this document will change over time. Changes to this document shall be made following strict procedures and guidelines.

Changes may be made based on errors and omissions, as well as to enhance or update the standard based on changes in the BIM environment. When changes are approved by DASNY, they shall be incorporated into the next draft of this document and all support files shall be modified.

Updates to this document and the related support files shall be made as required and shall be posted on *www.dasny.org*

3.5   Acronyms

ACRONYMS	
ACRONYMS	**DESCRIPTION**
BIM	Building Information Model
C3D	Civil 3D
DASNY	Dormitory Authority State of New York
DWF	Design Web Format
IPD	Integrated Project Delivery
JDE	Project Number
SM	Site Model
WCS	World Coordinates System

3.6   Glossary of Terms

GLOSSARY OF TERMS	
TERM	**DESCRIPTION**
3D Model	A three-dimensional representation of a building and/or structure generated out of a CAD and/or BIM application
Building Information Model	A Building Information Model (BIM) is a digital representation of the physical and functional characteristics of a building and/or structure
Central File	The Master Project File that is saved to a network drive and acts as the distribution point for publishing work to the rest of the team. The Central File stores the current ownership information for all the elements of the

GLOSSARY OF TERMS	
TERM	**DESCRIPTION**
	project
Contract Drawing	A drawing sheet within the Contract Set
Contract Set	The legal set of Bond drawings originally signed and sealed by a PE or RA
Design Professional	Design Professional refers to each discipline's responsible team member. This person will be in charge of managing the 3D Model in terms of coordination
DWF	A highly compressed non-editable vector file format created out of CAD/BIM applications. A DWF file can represent sheets for plotting purposes (2D DWF) or the entire 3D Model (3D DWF) for visualization or estimating purposes
Revit Families	Revit Families are groups of elements with a common set of parameters, identical use, and similar graphical representation
Shared Parameters	Shared Parameters can be added to projects and then shared with other families or projects. They give the ability to add specific data that is not already predefined in the Revit-based applications
Site Model	The Site Model (SM) is the centralized Revit-based file where all models share coordinates with each other and at the same time will control true north, project north, and elevations
Traditional Project Delivery	Traditional Project Delivery (TPD), such as Conceptual Design, Design Development, and Final Design, creates well-defined workflow boundaries that do not align with a collaborative process
Worksets	Worksets create the ability to divide the project in functional areas allowing the propagation and coordination of changes between designers, enabling multiple members of a team the ability to simultaneously work on different portions of a project

End of BIM Standards Manual