|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Rev. No.** | **Date** | **Description** | **Author** | **Reviewed By** | **Approved By** |
|  |  |  |  |  |  |
|  |  |  |  |  |  |

# GENERAL

## Summary

### This BIM Execution Plan (BEP) defines the use of BIM for the CIP Program. The BEP defines the uses for BIM on this project, design authoring, design platforms, design coordination, design deliverables, information management, construction record modeling, and post construction model life cycle requirements.

## Reference to Other CIP Documents

### This BEP has been developed to meet the requirements of Cincinnati MSD BIM Standard

### The processes, procedures and plans defined in this BEP shall take precedence over and supersede any conflicting requirements in the CIP Program CAD Standard

# Project Information

## Project Name: TBA

## Contract Type: TBA

## Project Description: TBA

## Project Schedule milestones:

|  |  |  |  |
| --- | --- | --- | --- |
| Preliminary | 30% | 60% | 90% |
| August 31, 2016 |  |  |  |

# DESIGN ENGINEER/Contractor BIM Contacts / Roles and Responsibilities

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Role | Name | Organization | Location | E-Mail | Phone |
| Project Manager |  |  |  |  |  |
| Design Manager |  |  |  |  |  |
| Engineering Lead |  |  |  |  |  |
| **Arch/Eng** |  |  |  |
| Architect Lead |  |  |  |  |  |
| Structural Lead |  |  |  |  |  |
| HVAC Lead |  |  |  |  |  |
| Plumbing Lead |  |  |  |  |  |
| Process Lead |  |  |  |  |  |
| Electrical Lead |  |  |  |  |  |
| I&C Lead |  |  |  |  |  |
| Civil Lead |  |  |  |  |  |
| **BIM/CAD** |  |  |  |
| BIM Manager |  |  |  |  |  |
| CAD Coordinator |  |  |  |  |  |
| Architect Lead |  |  |  |  |  |
| Structural Lead |  |  |  |  |  |
| HVAC Lead |  |  |  |  |  |
| Plumbing Lead |  |  |  |  |  |
| Process Lead |  |  |  |  |  |
| Electrical Lead |  |  |  |  |  |
| I&C Lead |  |  |  |  |  |
| Civil Lead |  |  |  |  |  |

# 3.1 BIM Uses

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Task | Preliminary Design (PD) | 30% Design | 60% Design | 90% Design | Post Construction |
| Site Analysis |  |  |  |  |  |
| Space Planning |  |  |  |  |  |
| Sustainability |  |  |  |  |  |
| Model Existing Conditions |  |  |  |  |  |
| Structural -Analytical |  |  |  |  |  |
| Electrical -Analytical |  |  |  |  |  |
| Process -Analytical |  |  |  |  |  |
| Mechanical -Analytical |  |  |  |  |  |
| P&ID Integration |  |  |  |  |  |
| MWH Spec |  |  |  |  |  |
| I&C – PID WEB |  |  |  |  |  |
| 3D Hazop review |  |  |  |  |  |
| 3D Design Review |  |  |  |  |  |
| 3D Construction Review |  |  |  |  |  |
| Clash Detection |  |  |  |  |  |
| Scheduling (4D) |  |  |  |  |  |
| Cost Estimating (5D) |  |  |  |  |  |
| O&M/FM |  |  |  |  |  |
| Visualization/Animation |  |  |  |  |  |
| CSI Master Spec No. |  |  |  |  |  |
| COBie |  |  |  |  |  |
| OmniClass No. |  |  |  |  |  |

* 1. BIM Platforms

|  |  |  |
| --- | --- | --- |
| Software | Version | Discipline(s) |
| Revit MEP | 2021 | Process Mechanical |
| Revit MEP | 2021 | Civil Yard Piping |
| Revit MEP | 2021 | Building Mechanical (Plumbing & HVAC) |
| Revit MEP | 2021 | Process Mechanical |
| Revit MEP | 2021 | Process Yard Piping |
| Revit MEP | 2021 | Electrical general arrangement |
| Revit Structure | 2021 | Structural |
| Revit Architecture | 2021 | Architectural |
| Autocad Electrical | 2021 | Electrical 2D single lines & schedules |
| Autocad PID | 2021 | I&C 2D P&ID’s and schedules |
| Autocad Civil 3D | 2021 | Civil Grading, Paving, Drainage, Process Conveyance, Irrigation, & Landscaping |
| Autocad  | 2021 | All discipline 2D sheet files for standard details and general sheets. |
| Navisworks | 2021 | All disciplines – Coordination & Clash Detection |
| 3D Studio Max or Fuzor | 2021 | All disciplines – Visualization (optional) |
| InfraWorks | 2021 | All disciplines – Site Planning & Visualization (optional) |

# Project Goals/ BIM Uses

## Project Goals

# This section describes how the BIM model and facility data will be developed to meet the contract requirements.

# BIM Process

# A brief discussion of the BIM design process is included in the BIM Standards

# BIM Data and Modeling Requirements

As noted within this document, federated models utilizing BIM as defined by this document are developed to provide the design intent, engineering reference, trade coordination, spatial facilities placement, and for as-built reference and is used as a reference source for communication and collaboration throughout each phase of the project.

The federated model may vary in level of detail for individual elements, but at a minimum must include sufficient data to support use and analysis of:

* Functional and visual representation of spaces.
* HAZZOP review
* Constructability review of Designer’s documents.
* Clash detection and correction of all major systems.
* Construction scheduling.
* Cost estimating.
* As-built documentation and modeling.
* Label and identify all major components and equipment.

The BIM Project Manager has created this plan to define which of these are included in this project based on the contract.

The construction documents (drawings and specifications) will be derived using information
from the federated model and based on Level of Development (LOD) as described below for this project:

## Level of Development (LOD)

As previously noted a level of development (LOD) shall be defined for each phase involved in a BIM modeling effort. It is important to manage BIM model development based on your specific contract obligations. With a defined LOD, you can prevent overdesign which results in potential cost overruns or under design which can also result in potential cost impacts to recover at a late stage development.

The following LOD’s are based on a similar LOD system developed by the BIMForum entitled “Level of Development Specification 2020” and can be downloaded from this site: <https://bimforum.org/lod/>

* + 1. **LOD 100**

Completed Pre-Design or Basis of Design Report, 75% to 85% PID’s, hydraulic profile established, BIM models developed by process mechanical using elements from other similar projects or libraries. Buildings/structures modeled as 3D elements indicative of area, height, volume, spatial location and orientation. Drawings/views/sheet files developed to single plan and one section general arrangement views only with a site development plan.

* + 1. **LOD 200**

PID’s, floor plans, structural concepts complete, BIM originating models progressed to a 60% development stage, preliminary engineering completed, sheet files started for 2D drawings with minimal annotation. Civil references originating models and begin site development for preliminary paving, drainage, grading, and yard piping and minimal annotation.

* + 1. **LOD 300**

Originating BIM models progressed to 100% development stage, all major engineering completed. All other disciplines released and federated to same level of completeness. Drawings and specifications issued to allow for complete BID. This information can be expressed through the Drawings and through extraction of BIM information from the intelligent PID’s and models.

* + 1. **LOD 350**

This LOD was added to define the amount of information in all discipline models to ensure potential conflicts are resolved. Model elements are graphically represented to the true definition of the design but not to the detail of LOD 400.

* + 1. **LOD 400**

Models are progressed to include detailed equipment, elements, to a level of accuracy that allow for field or shop fabrication of desired constructions.

* + 1. **LOD 500**

Post construction models incorporate actual project equipment and elements creating a true reflection of As-Built conditions.

# Discipline Model Requirements

## Civil Models

## The civil models may be divided depending on the size and type of the project, i.e. yard piping separate from grading, paving and drainage. The minimum LOD for the 100% model shall be LOD 350 and contain the detail as follows:

|  |  |  |
| --- | --- | --- |
| LOD | Modeled Pipeline Size Range | Item |
|  |  | Existing natural and/or graded contours. |
|  |  | New grades and finish contours. |
|  |  | Major landscaped areas, existing trees to remain, new landscaped areas, new trees |
|  |  | Existing pavements, curbs and gutters, retaining walls, fences, exterior non-building structures such as shade structures, and pole foundations. |
|  |  | New pavements, curbs and gutters, retaining walls, fences, exterior non-building structures such as shade structures, and pole foundations. |
|  |  | Existing facilities within the design project area intended to remain, and structures/facilities intended to be demolished (all existing structures may be modeled exterior surface only; interior elements are not required). |
|  |  | Existing Storm water and sanitary sewer lines, boxes and structures within design project area, and existing public lines, boxes and structures beyond the design project area but serving as points of connection for the design project. |
|  |  | New storm water and sanitary lines, boxes and structures |
|  |  | Existing domestic and fire water mains.  |
|  |  | New domestic and fire water mains. |
|  |  | Existing facility piping systems (process). |
|  |  | New facility piping systems (process). |
|  |  | Existing electrical ductbanks. |
|  |  | New electrical ductbanks. |
|  |  | New individual conduit. |
|  |  | Existing electrical overhead power lines, telephone lines. |
|  |  | New electrical overhead power lines, telephone lines. |
|  |  | Existing gas lines. |
|  |  |  New gas lines. |

## Note 1: Critical lines shall be modeled regardless of size for the 100% for construction model. Critical lines are defined as any line that would cause an interruption in Treatment if removed from service.

## Architectural Model

The architectural model provides the following LOD within the model.

|  |  |  |
| --- | --- | --- |
| LOD |  | Item |
|  |  | Net square footage of all occupied spaces, gross constructed floor area, room names and numbers, and floor, base, wall, and ceiling finishes. |
|  |  | Exterior walls including type and composition, height, length, and width, and thermal, acoustic, fire, and security ratings. |
|  |  | Partitions including type and composition, height, length, and width, and thermal, acoustic, fire, and security ratings. |
|  |  | Floors including type and material, thickness, and finishes.  |
|  |  | Ceilings including type and composition, height, length, and width, and thermal, acoustic, fire, and security ratings. |
|  |  | Roof coverings and openings including configuration, drainage system, and penetrations for modeled building components. |
|  |  | Exterior doors, windows, and louvers including type and material, height, width, and thickness; thermal, acoustic, fire, and security rating; location, and hardware elements or group. |
|  |  | Interior doors, windows, and louvers including type and material, height, width, and thickness; thermal, acoustic, fire, and security rating; location, and hardware elements or group. |
|  |  | Stairs and railings, ramps and railings, and handrails and guardrails. |
|  |  | Casework and counters including type and material, height, width, and depth, location, and hardware. |
|  |  | Soffits, Openings and Accessories. |
|  |  | Plumbing fixtures including type and material, location, trim, and finishes. Link fixtures and trim to the mechanical systems model. |
|  |  | HVAC grills and registers including type and material, location, trim, and finishes. Link fixtures and trim to the mechanical systems model. |
|  |  | Electrical fixtures and equipment including type and material, bulb type and wattage, location, trim, and finishes.  |
|  |  | Toilet partitions, toilet room accessories, grab bars, personal storage lockers, display cases, and other surface applied quasi-permanent items such as mirrors. |

## Structural Model

The structural model provides the following LOD within the model.

|  |  |  |
| --- | --- | --- |
| LOD |  | Item |
|  |  | Foundations and footings including type and configuration, and depth, length, width and areas of influence zones. |
|  |  | Slab(s) On-Grade: Type and configuration, under-slab base and waterproofing, recesses, curbs, equipment pads, closure pours, and major penetrations. |
|  |  | Basement Walls: Type and composition, height, length, and width, and thermal, acoustic, fire, and security ratings. |
|  |  | Hydraulic structures: Type and composition, height, length, and width, moisture protection, water stop, and special surface treatments. |
|  |  | Elevated Floors: Columns and beams, primary and secondary framing members, bracing, connections, and framed, composite, and/or slab decks. |
|  |  | Roofs: Columns and beams, primary and secondary framing members, trusses, bracing, connections, and framed, composite, and/or slab decks. |
|  |  | Lifting Devices: Bridge cranes, monorails, davit cranes, lifting eyes, etc. including the associate travel path and clear space required. |
|  |  | Joints: Expansion and/or contraction, and seismic. |
|  |  | Stairs and Ramps: Openings and framing, and railing supports. |
|  |  | Shafts and Pits: Openings and framing, and railing supports. |
|  |  | Penetrations for modeled subsystems. |
|  |  | Pipe Hangers, Supports and Seismic Bracing. |
|  |  | Area(s) of influence zones under foundations and footings. |
|  |  | Color code structural steel from other elements. |

* 1. Process Mechanical Model

The process mechanical system model must be a shared primary model and provide the following LOD.

|  |  |  |
| --- | --- | --- |
| LOD | Modeled Pipeline Size Range | Item |
|  |  | Piping, fittings, and pipe in-line devices. |
|  |  | Pipe insulation and containment. |
|  |  | Valves, valve actuators and operators. |
|  |  | Flow measurement and monitoring devices. |
|  |  | Equipment (tag) numbering and coding per the Clients approved requirements. |
|  |  | Process equipment, including tanks. (see note 2) |
|  |  | Miscellaneous mechanical equipment. |
|  |  | Utility stations. |
|  |  | Health and safety systems related to process elements (i.e. eyewash and shower units). |
|  |  | Color system per the Client’s or MWH approved Piping Coating System. |
|  |  | Clearances and access to equipment, valves, required by code or for the purposes of operations and maintenance. Maintenance clearance requirements as required by manufacturer and approved by Client’s operation staff. |

* 1. Building or Structure Mechanical Model

The building mechanical model provides the following LOD within the model.

|  |  |  |
| --- | --- | --- |
| LOD | Modeled Pipeline Size Range | Item |
|  |  | **Heating, Ventilating, and Air Conditioning**: All heating, ventilating, air-conditioning, exhaust fans, and specialty equipment, air supply, return, ventilation and exhaust ducts, including space-consuming elbows and transitions, fire dampers with ratings, mechanical piping, and registers, diffusers, grills and hydronic baseboards.  |
|  | 2 | **Plumbing:** Domestic plumbing and Fire Suppression piping and fixtures, floor and area drains, valves and related equipment.  |
|  |  | Emergency Eyewash and Shower Stations. |
|  | 2 | Piping. |
|  |  | Equipment (tag) numbering and coding per the Clients approved requirements. |
|  |  | Transmitters, switches, detectors, motors and thermostats. |
|  |  | Roof Drainage: All piping and fixtures, and related equipment. |
|  |  | Clearances and access to equipment, valves, required by code or for the purposes of operations and maintenance. Maintenance clearance requirements as required by manufacturer and Client’s operation staff requirements. |
|  |  | Color system per the Client’s approved Piping Coating System document. |
|  |  |  |

* 1. Electrical / Controls Model

The electrical systems model must be a sub-system model and provide the following LOD.

|  |  |  |
| --- | --- | --- |
| LOD | Modeled Conduit Size Range | Item |
|  |  | **Interior Electrical Power and Lighting:** Interior electrical components, lighting, receptacles, special and general purpose power receptacles, lighting fixtures, panel- boards and control systems, and conduit and cable trays. |
|  |  | Individual conduits. |
|  |  | Groups or clusters runs, and cable trays of conduit. |
|  |  | **Exterior Building Lighting:** Exterior electrical components, lighting, receptacles, special and general purpose power receptacles, lighting fixtures, panel-boards and control systems, and transformers, and utility connection and equipment. |
|  |  | **Telephone, Data, Television, and Other Low Voltage**: Interior low voltage components, outlets, receptacles, special and controls, fixtures, panelboards, equipment racks, and control systems, and conduit and cable trays. |
|  |  | Equipment (tag) numbering and coding per the Clients approved requirements. |
|  |  | **Clearances and Access.** Clearances and access to equipment, valves, required by code or for the purposes of operations and maintenance. Maintenance clearance requirements as required by manufacturer and Client’s operation staff requirements. |
|  |  | Color system per the Client’s approved Piping Coating System document. |
|  |  | **Fire Suppression Model** |
|  |  | Fire Alarms: (1) alarm and notification devices, and (2) detection systems. |
|  |  | Fire Suppression System: (1) valves and risers, (2) all main, branch, and drain lines, (3) sprinkler heads, and fittings and (4) pumps. |
|  |  | Equipment Clearances: Clearances for major equipment as model objects for conflict detection and maintenance access requirements and Client’s operation staff requirements. |
|  |  | Color system per the Client’s approved Piping Coating System document. |
|  |  |  |

#  Collaboration Procedures

* 1. Collaboration Strategy:

Describe how the project team will collaborate. Include items such as communication methods, document management and transfer, and record storage.

* 1. Meeting Procedures:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Meeting type | Project stage | Frequency | Participants | Location |
| BIM Requirements Kick-Off |  |  |  |  |
| BIM Execution Plan Demonstration |  |  |  |  |
| Design Coordination |  |  |  |  |
| Construction Over-The-Shoulder Progress Reviews |  |  |  |  |
| Others |  |  |  |  |

* 1. Interactive Workspace

Project Team will use the following for sharing files and document management

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Software |  | Document Management | Sharing Files | Comments |
| Autodesk | Civil 3D | BIM360 | BIM360 |  |
| Autodesk | Revit | BIM360 | BIM360 |  |
| Autodesk | Navisworks | BIM360 | BIM360 | .nwc, .nwf, .nwd files |
| Autodesk | AutoCAD | BIM360 | BIM360 |  |
| Autodesk | Plant 3D PID | BIM360 | BIM360 |  |

# Quality Control

* 1. Overall Strategy for Quality Control:

Describe the QC strategy to control the quality of the model

* 1. Quality Control Checks:

The following QA checks should be performed to assure quality.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Checks | Definition | Reviewer | Software program(s) | Frequency |
| Visual Check (see note 1) | Ensure there are no unintended model components and the design intent has been followed |  | Revit, C3D | weekly |
| Interference Check (see note 2) | Detect problems in the model where two building components are clashing including soft and hard |  | Navisworks/Oculus | Bi weekly and major milestones |
| Standards Check | Ensure that the project BIM and CAD Standard have been followed. |  | Revit and Autocad | weekly |
| Model Integrity Checks | Describe the QC validation process used to ensure that the Project Facility Data set has no undefined, incorrectly defined or duplicated elements and the reporting process on non-compliant elements and corrective action plans  |  | Revit | Bi weekly and major milestones |

Note 1: Visual checks shall be performed for each discipline model via native platform. The visual check shall confirm model locations are maintained, links are established and maintained, and modeling protocol is being followed.

Note 2: Interference Checks shall be performed with a federated model to be maintained by the BIM manager. Checks shall be performed with the following criteria:



Reports:

The BIM Manager shall generate reports for each discipline with corrective actions noted through a Navisworks Clash Report (see example below). The reports shall be distributed to the respective disciplines for action/correction along with .nwd (Navisworks Models. Designers responsible for corrections shall use the switchback function with Navisworks Manage to make and acknowledge the corrections. The BIM Manager shall be notified once the corrections have been made for substantiation.



The following rules shall apply when conducting interference checks:

Hard Clash – A clash in which the geometry of element A intersects element B by a distance of more than a set tolerance of 1/4 inch.

Clearance Clash - A clash in which the geometry of element A intersects element B by a distance of more than a set tolerance required by code. Examples include working room around mechanical equipment and electrical panels and equipment. These tolerance shall be set by code compliance and reported to the Model Manager.

Duplicate Clash - A clash in which the geometry of element A is the same as that of element B located within a distance of between zero and the set tolerance indicating duplicate geometery in the exact same location.

Approved Clashes – These clashes include but are not limited to intentional wall pipe, duct, raceway penetrations, pipe nozzels and structural elements.

# Project Deliverables

# BIM deliverables for the project and the format in which the information will be delivered shall be in accordance with the contract and this BEP.

# 3D BIM models will be delivered in native model format with intel file structure with linked files preserved.

# Glossary

|  |  |
| --- | --- |
| As-Built Model: | A Federated Model incorporating all construction phase modifications to an LOD 350 or better. |
| As-constructed: | A “record drawing” or a portion thereof provided by the contractor and field verified by Contract Documentation personnel at a given point in time (date shown), unless specified otherwise. |
| Attribute Value: | The alphanumeric information associated with an attribute tag. |
| Attribute: | An editable attribute value that is associated with an attribute tag that is embedded in a block. |
| BIM Execution Plans: | The BEP defines the uses for BIM on a project along with a detailed process for executing BIM. |
| Bid Model: | The Federated Model established by the Designer as part of the Construction Documents. |
| BIMF: | BIM Files. |
| BIM: | Building Information Modeling. The process of generating and managing building data (geometry, dimensions, nomenclature, element specifications, material, equipment type, etc.) during a defined life cycle. |
| BIM Manager: | The individual responsible for managing the Designer’s modeling and coordination process, including managing the Designer’s BIM staff and all other aspects of the Designer’s BIM requirements. |
| Clash Detection: | Clash detection allows for the effective identification, inspection and reporting of interferences in a 3D project model in Navisworks. |
| COBie: | Construction Operations Business Information Exchange. Collected data throughout the Designer’s project to include equipment lists, product data sheets, warranties, spare part lists, preventive maintenance schedules, and other pertinent information that the owner may require. |
| COBie Data: | Construction Operations Building Information Exchange. |
| Collaboration Model: | The Federated Model used during the trade coordination phase. The model is comprised of design input from all major designers and integrated according to spatial relationships, design intent, and means and methods. |
| Co‐Location: | The assembling of the entire BIM design and construction team in a single location to enable instant and direct communication and coordination. Co‐Location of all team members provides the environment and opportunity to build trust among teammates, while efficiently designing the project. Project issues are transparent and solutions evolve in real time because everyone is working in the same physical space. |
| Consolidated Model: | An assembled model containing all of the project models in one file. |
| DWG: | DWG ("drawing") is a binary file format used for storing two and three dimensional design data and metadata. It is the native format for several CAD packages. |
| Facility Model: | The 3D model that incorporates all major equipment and components that require service and maintenance. |
| Families: | A Revit family is a graphic representation of building objects and symbols |
| Family Parameters: | Are user-defined fields that you add to families. They are stored in the family file, and cannot be used in any other element or environment apart from the family it was created in. |
| Federated Model: | The Federated Model combines different modeled elements or assemblies through the process of linking files from their native platforms, maintaining their native properties. It is a virtual representation of the entire Design Project developed to a specified LOD. The Federated Model must consist of the primary disciplines for construction, for example, Civil, Architectural, Structural, Mechanical, Electrical, Fire Protection, and Special Equipment. |
| Fields: | Fields are “specialized text objects set up to display data that may change during the lifecycle of the drawing. When a Field is updated the latest value of the Field is displayed. |
| Geo‐referencing: | A system that links information to a position on the earth’s surface. That is, establishing its location in terms of map projections or coordinate systems. |
| IFC: | The Industry Foundations Classes is an open, neutral and standardized specification for Building Information Models. |
| Instance Parameters: | Are settings that control the appearance or behavior of an individual element in a project. The instance parameters and type parameters of an element combine to establish its element properties. Instance parameters can vary with the location of an element in a building or project. |
| Level 1 Designators: | Discipline Designator in a one letter identifier that defines “Agent Responsible”. |
| Level 2 Designators: | One letter modifier of the Discipline Designator, an optional modifier as needed. These designators vary by discipline. |
| Level of Development (LOD): | Term, based on the BIM Forum LOD Standard – 2015, used to describe the fullness and definitiveness of the Model; each Model can have a varying LOD depending on the phase of the Designer’s life-cycle, and agreed utilization of the Model. |
| Linking Files: | A process to externally reference a native file into the Federated Model. |
| MasterFormat: | MasterFormat, a publication of CSI and CSC, is a master list of numbers and titles classified by work results. It is primarily used to organize project manuals and detailed cost information, and to relate drawing notations to specifications. |
| MEA: | Model Element Author. The primary party who will develop the content of a specific Model Element to the LOD listed for a particular phase of the Design Project. |
| MEL: | Mechanical Equipment List. |
| MEP: | Mechanical, Electrical, and Plumbing. |
| MEPF: | Mechanical, Electrical, Plumbing, and Fire Protection systems. |
| Model: | The 3D virtual representation of the Design Project and its Objects. The Model is generally an assemblage of several Models produced by various disciplines, each of which is comprised of numerous smart Objects. |
| Model Element: | A portion of the BIM representing a component, system or assembly within a building or building site. |
| Native Model: | A Model created in a specific CAD platform, i.e., Revit. |
| NBIMS-US: | The National BIM Standard-United States provides consensus based standards through referencing existing standards, documenting information exchanges and delivering best business practices for the entire built environment. |
| NWC: | When you open a CAD file in Navisworks, by default, a corresponding cache file (NWC) is created, which contains all of the conversion details required by Navisworks. To open an NWC file, a Navisworks product is required, such as Review, Simulate, or Manage (not Freedom). Certain Applications, like Revit, will export the corresponding model to an NWC file. |
| NWD: | The published version of a Navisworks file with all loaded models and viewpoints saved to a single (NWD) file. This file type can be opened with any of the Navisworks products including Navisworks Freedom (the free viewer). |
| NWF: | Navisworks file where only a list with pointers to the files currently loaded is saved, along with the scene's environment, the current view, clash results, if available, and favorite viewpoints (including redlines and comments). To open an NWF file, a Navisworks product is required, such as Review, Simulate, or Manage (not Freedom), as well as access to the original CAD files. |
| Nomenclature: | A system of principles, procedures and terms related to assignment of a location, object or property. |
| OLE: | Object Linking and Embedding. |
| OmniClass: | The OmniClass Construction Classification System (known as OmniClass™ or OCCS) is a classification system for the construction industry. It incorporates other extant systems currently in use as the basis of many of its Tables – MasterFormat™ for work results and UniFormat for elements. |
| Originating Model | The originating model is defined as the first model developed by the primary discipline that determines the facility layout and space plan. |
| Owner Model: | The final Federated Model integrating the as-built model, collaboration model, and the facility model. |
| Parameters: | Is a setting that determines the appearance or behavior of an element, type, or view. |
| Project Parameters: | Are user-defined fields that you add to multiple categories of elements, sheets, or views in a project. These parameters are specific to the project and cannot be shared with other projects. |
| RDB Link: | Autodesk Revit DB Link allows you to maintain a relationship between a Revit project and a Microsoft Access, Microsoft Excel, or ODBC database. You can use Autodesk Revit DB Link to export Revit project data to the database, make changes to the data, and import it back into the project. The database displays Revit project information in a table view that you can edit before import. |
| Shared Parameters: | Are user-defined fields that you add to families or projects and then share with other families and projects. They are stored in a file independently of the family file or Revit project; this allows you to access the file from different families or projects. In addition, shared parameters can be used in tags for model elements, and they can display in schedules. |
| Sheet #: | This refers to text contained in the SHEET NUMBER area of the title block of a drawing. (In the drawing search form, this is a "Contains Field"). |
| Sheet Sequence Number: | The sheet sequence number is a two-digit number that identifies each sheet in a series of the same discipline and sheet type. Sequence numbering starts with 01. |
| Sheet Set Manager: | Sheet Set Manager organizes your drawing layouts into named sheet sets. The sheets in a sheet set can be transmitted, published, and archived as a unit. |
| Sheet Type Designators: | The sheet type designator is a single numerical character that identifies the sheet type. |
| Sheet Files: | A file in which views of the model file(s), including visible edges and sections are attached. |
| Smart Object: | The term used to describe the 3D virtual representation of separate sub-parts of the Model such as doors, walls, equipment, etc. |
| SQL Server: | SQL Server is a relational database management system developed by Microsoft. As a database, it is a software product whose primary function is to store and retrieve data as requested by other software applications, be it those on the same computer or those running on another computer across a network (including the Internet). |
| Type Parameters: | Are settings that control the appearance or behavior of all elements of a particular family type. Type parameters are common to many elements in a family. A type parameter affects all instances (individual elements) of that family in the project and any future instances that you place in the project. |
| UniFormat: | UniFormat, a publication of CSI and CSC, is a method of arranging construction information based on functional elements, or parts of a facility characterized by their functions, without regard to the materials and methods used to accomplish them. These elements are often referred to as systems or assemblies. |
| User Coordinate System (UCS): | A user defined coordinate system that defines the orientation of the X, Y, and Z axes in three-dimensional space. The UCS determines the default placement of geometry in a drawing. |
| Version Control: | To ensure that only one copy of any document is available within the system. |
| View: | A graphical representation of a 2D drawing or 3D model from a specific location (viewpoint) in space. |

**End of Section**