CONSIGLI
Est. 1905

7/1/2020

3D MEP COORDINATION MODELING SPECIFICATION
[PROJECT NUMBER, NAME]

PART 1 – GENERAL

A. Summary

1) Each trade is responsible for creating and maintaining 3D files for use in coordination, shop drawing creation and as-built documentation.
2) Consigli will incorporate all relevant files into one federated model for use during coordination meetings. Each trade will provide a 2D annotated layer to the mechanical contractor, who will compile and align all other trade's layers and generate a coordination composite PDF file
3) The coordination team will utilize cloud modeling software to expedite the drawing review process, identify clashes and reach consensus on solutions.
4) If the subcontractor does not have the in-house capability/capacity to produce the required model(s), they may utilize a 3rd party modeling service, subject to Consigli and Owner's approval.
5) Coordination is an iterative process. Subcontractors to work collaboratively with each other, Consigli and the designers to draw multiple configurations as required to achieve designer acceptance at no additional cost to the owner.

PART 2 – PRODUCTS & SOFTWARE

A. File Types

6) Subcontractors shall provide the team with 2D and 3D .dwg files for their scope of work. Subcontractors are responsible for providing Consigli with 2D and 3D .dwg files for use in the federated coordination model. Subcontractors may elect to model in Revit or other software but are required to export 2D and 3D .dwg files.
7) Subcontractors modeling in Revit are to use the same version as the design team's models unless noted otherwise. Subcontractors are responsible for licensing/upgrade costs as required
8) The coordination modeling software will be NavisWorks Manage. Subcontractors are responsible for licensing costs
9) All subcontractors are required to download and install Revizto. Consigli will provide a Revizto license for each subcontractor at no expense.
10) Consigli will utilize a file share system to post and share model files. Subcontractors are not responsible for licensing costs for this system.
11) All Autodesk files are to be compatible with version 2016 or newer unless noted otherwise. Subcontractors are responsible for licensing/upgrade costs as required

B. Drawings and Models

(1) Base Drawings

(a) If made available by the design team, 2D CAD and/or 3D REVIT base drawings (architecture and structure) may be provided from the Design Documents.
(b) 2D CAD MEP floor plans may not be available. Trades to assume that all CAD drawings and models will need to be built from scratch.

(2) Subcontractors are responsible for field condition and existing condition verification. All models and laser scans provided to subcontractors are for convenience only. No change orders will be entertained to relocate systems that conflict with items that are not shown correctly in the base models or laser scans

(3) Coordination Composite Drawings

(a) The mechanical subcontractor is responsible for establishing sheet size and layout. Post CAD file layouts at scale for all trades to use as backgrounds for shop drawing and coordination composite drawing files within 2 weeks of the MEP Kickoff meeting. Sheets to be full size (Arch D) and include scale, title block, etc. Overhead floors to include Architectural RCP underlay, underground files to include structural footing underlay, and Roof drawings to include architectural roof plan underlay. All underlays to be in light grey

(b) 2D annotated coordination drawing layers shall be produced by each trade by level/area. The mechanical subcontractor will be responsible for compiling a composite drawing for sign-off by level/area. Drawing scale and requirements are to be per project specifications or 1/4”=1’-0”, whichever is finer resolution.

(i) Multiple composite drawings may need to be produced for each area. The mechanical subcontractor shall overlay composites and produce 2D CAD files for all revisions and areas regardless of whether there is associated mechanical scope.

(c) Each trade to produce annotated signoff drawings within 2 days of completion of final clash detection or as directed by Consigli

(d) 2D Composite drawings to be in PDF and DWG format

(e) 2D Coordination Composite deliverables will include but are not limited to:

(i) Overhead by floor
(ii) Ceiling devices and access panels
(iii) Roof layout
(iv) Underground
(v) Slab penetrations
(vi) Structural penetration elevation drawings

(f) Drawing Signoff will occur Electronically. Each trade must review and sign coordination composite layers within one working day of receipt

(g) Refer to project specific BEP or coordination guide if available for delineation of floors/areas, matchline locations, etc.

(h) Include clouds or callouts on coordination drawings and shop drawings indicating unresolved conflicts or open RFIs. Cloud or call out any specific changes to systems or finishes relative to the design documents such as relocated ceiling devices, re-sized systems and exposed systems

(4) Record/As-Built Drawings

a) Subcontractors shall maintain their models during construction to match the 'as-built' condition of their installed work.

b) Subcontractors shall provide updated redline drawings to Consigli on a monthly basis as part of the requisition process.

c) Subcontractors shall provide as-built documentation via 3D model, 2D CAD and PDF

PART 3 – EXECUTION

A. Coordination Process

(1) Kickoff Meeting

a) Consigli will schedule, prior to the start of coordination, a kickoff meeting with all trades to review the coordination process and schedule.

b) The Project Manager, Foreman and Modeler for each trade shall attend the kickoff meeting in-person on site, or at Consigli’s regional office

(2) Coordination Meetings

a) Each trade contractor is required to take part in regular coordination review meetings on site.

b) The purpose of the coordination meeting is to resolve interferences between building systems that could

not be resolved by the ongoing coordination efforts between subcontractors. The coordination meeting is NOT the primary venue for resolving conflicts; subcontractors must work collaboratively to coordinate their work outside of this meeting.

c) Subcontractors' foreman, modeler/draftsperson and/or person authorized to act and make decisions on behalf of their organization shall attend each coordination meeting. Virtual attendance via telephone and the web may be acceptable if approved by Consigli.

d) If conflicts are identified and a resolution is agreed upon it is the subcontractor's responsibility to make the necessary changes in their model and republish said model to the project file sharing site at least 24 hours prior to the next meeting.

(3) It is understood that the coordination effort will begin in advance of submittal approval of all products and equipment. Trades are to model all equipment using the basis of design dimensions at the onset of coordination. In cases where subcontractors elect to submit equipment other than basis of design, 3D models to be updated to show dimensions of approved equipment within 5 working days of submittal approval

(a) Proposed equipment substitutions must be modeled in advance of product data submission to confirm that equipment will fit in the space provided

(4) In resolving conflicts, priority will be given to systems in the following order unless otherwise identified in the project-specific BIM Execution Plan. Exceptions for specific cases are acceptable when all parties agree.

(a) Building structure, Ceilings, Light Fixtures
(b) Pitched storm and sanitary piping
(c) Ductwork Mains & Branches
(d) Piping Mains 2" and larger
(e) Rigid conduit racks, cable tray
(f) Branch piping 1-1/2" and smaller, flex duct
(g) Flexible piping and cabling

(5) Clash Identification and Resolution

(a) Each trade is responsible for coordinating their systems to avoid systems that were drawn prior.
(b) Each trade is to perform Clash Detection prior to posting new drawings to confirm that added and updated systems fit properly in the space and do not create any new clashes with other trades. Clash detection to be performed using Navisworks Manage. Consigli may request Navisworks clash report results in .xml format from individual trades, and clash report files should be saved and maintained throughout the coordination process
(c) When a clash is identified, drafters shall notify the other trade involved and work collaboratively to determine a resolution. Notify Consigli only if the two trades are not able to achieve resolution by relocating their systems, or when design or architectural modifications are required.
(d) Each trade is responsible for submitting RFIs for record in cases where conflict resolution requires design changes or incurs additional cost.
(e) Prior to coordination drawing submission, Consigli will produce a final clash report for all systems prior to signoff. Trades to review and address conflicts within 2 working days
(f) Consigli may produce additional clash reports throughout the coordination effort to identify problem areas.
(g) Consigli will navigate the 3D model during the coordination meetings. Subcontractors to review conflicts with other systems in advance of each Coordination meeting, and advise specific areas of concern for review during the meetings
    (i) Subcontractors are encouraged to send Consigli viewpoints of specific conflicts in advance of the weekly MEP Meeting

(6) Issue Tracking

(a) Consigli will save Navisworks viewpoints showing specific conflicts and include markups to document discussions/resolutions for each conflict.
(b) Items requiring Architect/Engineer/Owner input will be tracked through Revizto. Subcontractors to download (free) Revizto software and review/respond to A/E comments regarding individual conflicts
(c) Subcontractors are encouraged to add and update issue status directly in Revizto

(7) Information Sharing

a) Coordination files will be saved to the project file sharing site for access by all project stakeholders
b) All versions of files for the same trade/area should have the same file name to permit automatic updating. Trades are encouraged to store dated revisions of their coordination files locally.
c) Model updates will be posted daily at minimum for areas where trades are actively drawing. The subcontractor shall issue a notification via email to each of the other coordination team members notifying them that new information is available for upload unless the file share site provides notifications automatically. Email shall not be the primary method of delivering model files or drawing updates.

(8) Change Conditions

a) In the event the design changes are issued by approved bulletin, CCD or other method which will result in changes in the model/models, it is the responsibility of the subcontractor to make any and all changes required for coordination and compliance with the design.
b) Provide model updates resulting from design changes within 5 working days of receipt of design directives. Trades are to proceed with modeling of all proposed changes in advance of pricing approval.

B. 3D Modeling

(9) Overall content and conventions:

a) One common file origin or project insertion point (column line intersect at 0 elevation) shall be agreed upon by the project team. Any conflicts that arise due to non-adherence with the insertion point shall be the responsibility of the non-compliant trade contractor. Any files that are submitted without a graphic insertion point or with an incorrectly placed insertion point will be rejected.
b) Posted trade coordination drawings/models should contain only the scope for that trade plus the agreed upon insertion point. Any notes, backgrounds or geometry that are not associated with a particular area should be removed from the 3D files prior to posting
c) Trades are required to review the scope of other disciplines and model systems to avoid any scope provided by non-MEP trades such as fireproofing, specialty equipment, framing members, etc. Do not run systems directly above and parallel to wall and soffit construction
d) Trades to use the file naming convention below unless specific file naming requirements are defined in the BEP or owner's specifications:
   AREA_TRADE ID
   - SM: Sheet Metal
   - MP: Mechanical Piping
   - PL: Plumbing
   - EP: Electrical Power
   - EL: Electrical Lights
   - FP: Fire Protection
   - TC: Telecommunications
e) CAD Files to contain multiple layers to differentiate different types of systems. Layers to use descriptive names to facilitate searching / grouping within the 3D model. At minimum, Separate layers should be used for each of the systems listed in item f) below. Also include separate layers for:
   a. Access Panels
   b. Access Zones / Clearances
   c. Equipment
   d. Drawing Notes
   e. Sizes, heights, annotations
f) Models to utilize the colors per GSA standards (link below) unless otherwise defined in the BEP or owner's specifications. Items not listed in the GSA document defined below. Each system listed in this section to be shown on a separate drawing layer:
   https://www.gsa.gov/real-estate/design-construction/3d4d-building-information-modeling/guidelines-for-bim-

software/guidelines/technical-standards/bim-technical-standards-mep-color-mapping

(i) All Trades
   1. Access Zones – 50% translucent in system color
   2. Hangers/Seismic – Light Grey

(ii) Ductwork
   1. Supply
   2. Return
   3. Outside Air
   4. Exhaust
   5. Transfer Air

(iii) Mechanical Piping
   1. Hot Water
   2. Chilled Water
   3. Refrigerant/Flexible Piping
   4. Condensate Drain

(iv) Plumbing
   1. Storm/Overflow
   2. Sanitary / Acid / Grease Waste
   3. Venting
   4. Domestic Water (Hot, Cold Recirc)
   5. Compressed gas / vacuum

(v) Fire Protection
   1. Wet Sprinkler
   2. Dry Sprinkler
   3. Standpipe

(vi) Electrical
   1. Power Conduit/Wiring
   2. Low Voltage Conduit/Wiring
   3. A/V systems
   4. Light Fixtures
   5. Panels/Transformers/Equipment

(vii) Project-specific systems as indicated on the Drawing Legend for each trade

(10) System Models and Level of Detail (LOD)

a) All trades are required to model to a minimum LOD of 350 as defined by BIM Forum Level of Development Specification, 2016 Version, and AIA Document G202-2013, Project Building Information Modeling Protocol Form, and as further specified in each trade in Section 5. Modeling Standards.

b) Record Models, if required must be LOD 500, signifying all elements represent the field-verified as-built conditions.

c) The level of detail defined in each section below (Modeling Standards) is the minimum level of detail required in the model. Greater detail than the minimum should be incorporated in the model whenever inclusion of such detail will improve spatial or sequencing coordination of the work.

d) Pre-purchased equipment shall be the responsibility of the contractor assigned to receive, install and coordinate the equipment. This subcontractor shall be fully responsible for layout, 3D drawings and coordination of the pre-purchased equipment.

e) Each trade contractor is responsible for modeling protected access and clearance zones. Access zones should be drawn at 50% transparency as not to obscure the main fixture or element being protected or shall have another similar identifying characteristic.

f) Individual model elements (such as VAV boxes, pumps etc.) described in further detail below shall each contain the specific and individual name/information assigned to it as per the design documents, following the approved naming conventions established by the Owner.

(11) Models to include the following geometry:

(a) Duct, piping and conduit 3/4" diameter and larger, modeled to the outside face dimension, including flanges, joints, pipe clamps
(b) Insulation and interior liner modeled as a separate element on a separate layer, conforming to the color of the system it's associated with
(c) Hangers, inserts, equipment supports and seismic restraints
(d) Sleeves and cores through concrete slabs, foundations, structural walls, roofs and exterior walls
(e) Access zones for all elements requiring access including but not limited to equipment, light fixtures, valves, junction/pull boxes. Include access required to install systems where applicable (welding clearance, light fixture lay-in clearance, etc.
(f) Plumbing vents, exhaust air, and hazardous exhaust terminations shall include radius showing minimum code-required clearance to air intakes
(g) Air intakes / combustion air shall be clearly identified
(h) All equipment shall be modeled to its overall height, width and depth. Use vendor-furnished models when available
(i) All access panels shall be modeled, including access zones above and below. Draw all Access doors in walls and ceilings on a separate layer to be overlaid on an architectural RCP for architect review.
(j) Where groupings of smaller systems require coordination (cable bundles, flexible tubing, etc), include a graphic representation of the grouped systems