



Consigli Supplemental Attachment G - BIM/Coordination Supplemental Instructions

Part 1 – General

1.1 Summary

- A. Models will be prepared by each individual trade and design-assist subcontractor for coordination with other work. All relevant models will be incorporated into one review file for use during coordination meetings; similarly the 2D trade coordination drawings will be compiled into one set of review drawings by the mechanical subcontractor.
- B. Autodesk BIM 360 Glue will be used to expedite the coordination process, review clashes and reach consensus on solutions. Each trade subcontractor will be provided one username to access the project, and is required to use BIM 360 Glue to update and review the coordination model regularly.
- C. It is understood that drawings, models and specifications are scope documents which indicate the work and intent of the project and, as such, the drawings and specifications do not necessarily indicate or describe all work required for the full performance and completion of the work. This Subcontract is awarded on the basis of such scope documents with the understanding that the Subcontractor is to furnish and install all items required for the proper completion of his work without adjustment to the Subcontractor price.
- D. If the subcontractor does not have the in-house capability/capacity to produce the required model(s) they may utilize the services of a 3rd party modelling service subject to Consigli's approval, or be assigned a modelling company by Consigli to provide said services.

Part 2 – Products

2.1 Software

- A. Subcontractor shall provide the team with 3D .dwg and/or Revit files, as well as 2D dwg files (AutoCAD v. 2014 or newer) for their scope of work.
- B. Revit files shall be created in the same Revit software version as used by the Design Team for the project.
- C. The coordination program will be Autodesk BIM 360 Glue. Subcontractors are required to download and install at free plugin for compatibility with BIM 360 Glue. Autodesk Navisworks 2015 may also be used.

2.2 Drawings and Models

- A. Base Drawings
 - 1. 2D CAD base drawings (architecture and structure) will be provided from the Design Documents.
 - 2. These base drawings shall be used by all subcontractors for the coordination effort.
 - 3. All trades are responsible for verifying all field conditions depicted in the Design Documents that would affect their work.
 - 4. Where applicable, if a laser scan of existing conditions has been performed, it will be provided or included in the Coordination model.
- B. Coordination/Shop Drawings
 - 1. 2D coordination drawings shall be produced by each trade and will be compiled and printed by the mechanical subcontractor for the coordination meetings and final sign-off.
 - 2. 3D coordination models will also be produced by each trade, to be combined into one coordination model by the mechanical subcontractor or Consigli for the coordination meetings.

C. Record/As-Built Drawings

1. Subcontractors shall maintain their model(s) during construction to match the 'as-built' condition of their installed work.
2. Subcontractors shall provide as-built updates to Consigli on a monthly basis as part of the requisition process.
3. Subcontractors shall provide as-built updates via 3D model, 2D dwg, and PDF (no hard copies).

Part 3 – Execution

3.1 Coordination Process

A. Kickoff Meeting

1. Consigli will schedule, prior to the start of coordination, a kickoff meeting to discuss coordination specifics.
2. Each subcontractor shall attend with their Project Manager, Foreman and modeler.

B. Coordination Meetings

1. Each trade contractor is required to take part in regular coordination review meetings. The time and place for these meetings will be established by Consigli.
2. 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.
3. 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 in advance.
4. 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 unless another timeframe is agreed upon.

C. Co-Location

1. Consigli may elect to co-locate the coordination team at the project site for discrete 2-3 day sessions, up to 5 times during the coordination process.
2. Co-location is defined as the coordination team (subcontractors, Consigli staff, design team designates) working on site in a common space. Subcontractors will actively produce/develop their coordination drawings and coordinate with the other responsible subcontractors to resolve conflicts while on site.
3. Each entity will bring their own hardware/software, Consigli will be responsible for providing a common platform/methodology to share files and assist in identifying conflicts.
4. The co-located team shall meet daily to plan and monitor the progress of the work, and shall document decisions and questions through the established project processes.

D. Order of Modeling

1. Unless otherwise noted in the bid packages and subcontract agreement, the sheet metal contractor shall model first and shall publish their model with major trunk lines and risers shown which will serve as the basis for the other trades to begin their individual models.
2. The order of subcontractors modeling efforts shall be: sheet metal, mechanical piping, plumbing, fire protection and electrical. Modeling/drawing shall be in sequence by trade once sheet metal has posted their initial files unless agreed upon by all parties. Any subcontractor who draws out of sequence will re-coordinate their scope at their own cost should there be conflicts.

E. Sign-off drawings

1. Upon completion of coordination activities for a floor or area as deemed appropriate by Consigli, a 2D drawing or series of drawings (extracted from the models) representing the floor or area will be compiled and plotted by the assigned subcontractor and signed by all members participating in the coordination. This will become the record coordination document.
2. Digital or model sign-offs may be implemented if agreed upon by the project team.
3. Note: the intent of a coordination model is to ensure that building systems have adequate space to be installed, operated and maintained. A coordination model may contain clashes but still be ready for sign-off; these clashes

may be within construction tolerances or be able to be resolved in the field. They shall be identified and agreed upon by the project team or Consigli prior to proceeding.

F. Information Sharing

1. In addition to BIM 360 Field, coordination files will be saved to the project file sharing site (FTP, Gateway or other) for access by all trades, Consigli and the owner's representative. It will be the subcontractor's responsibility to maintain the appropriate models in the correct file at all times.
2. Model updates shall be posted regularly at the end of each working session so other trades have up to date models as they progress, but minimally as determined by the team. 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.

G. Change Conditions

1. 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 in conjunction with the design team.
2. The trade contractor may include the cost of modeling and coordination if warranted into their request for change authorization.

3.2 3D Modeling

A. Overall content and conventions:

1. Each trade contractor will be responsible for producing the 2D drawings and 3D models necessary to represent their complete scope of work.
2. All elements must be drawn to scale and shall be a true representation of what is to be installed in the field in all three dimensions.
3. One common file origin or project insertion point (x,y,z) 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.
4. Posted trade coordination and design-assist drawings/models should contain only the scope for that trade plus the agreed upon insertion point.
5. File naming convention: file names shall be descriptive to include trade, date and floor level.
6. Working units, unless otherwise specified, shall be in inches.
7. All trades must use a separate color as follows or as agreed upon for each trade:
 - a. Ductwork – Blue
 - b. Fire Protection – Red
 - c. Plumbing – Green
 - d. Process piping – Cyan
 - e. Mechanical Piping – Magenta
 - f. Electric/Data – Orange
 - g. Architectural/ Backgrounds – Grey

B. Stratification

1. Each trade will be assigned specific work zone elevations (top and bottom) to run racks and mains. The assigned trades will take precedence in these areas, when traveling outside of these areas the following rules apply. (Additional rules may be instituted at the first coordination meeting).
 - a. Immovable objects (equipment pads, hoods, shafts)
 - b. Graded piping routed throughout floors (waste, storm drainage, high purity)
 - c. Item coordinated with structure (duct penetrations shown on structural)
 - d. Items located in their designated area (piping zone, pipe rack, cable tray)
 - e. Items that require access (VAV's, shut off valves, fire/smoke dampers, etc.)

C. System Models and Level of Detail (LOD)

1. The minimum level of detail required for all design-assist and trade subcontractor models is LOD 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 section below (Modeling Standards). 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.
2. 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.
3. Each trade contractor is responsible for modeling protected access zones. Access zones should be drawn at less than 100% shading or transparency as not to obscure the main fixture or element being protected, or shall have another similar identifying characteristic.
4. 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.

D. Modeling Standards

1. HVAC Sheet Metal Standards
 - a. All ducts, related accessories (including but not limited to standard dampers, fire dampers, VAV boxes, diffusers, turning vanes, etc.) and HVAC equipment will be modeled.
 - b. Ducts will be modeled to the outside face dimension of duct or duct insulation.
 - c. Hangers and inserts/embeds must be modeled where necessary to coordinate with the work of other trades.
 - d. Access zones shall be modeled for all elements requiring access including but not limited to equipment, fixtures, standard dampers, fire dampers, VAV boxes, diffusers, turning vanes, etc.
 - e. All equipment shall be modeled to its overall height, width and depth.
 - f. All access panels shall be modeled, including access zones above and below.
 - g. In the event that seismic bracing for suspended elements is required by code, such bracing shall be included in the model.
2. HVAC Piping Standards
 - a. All piping, related accessories (valves, air vents, drain valves, flow meters, etc.) and HVAC equipment will be modeled.
 - b. Pipes will be modeled to the outside diameter of the pipe; pipe insulation shall be modeled if present.
 - c. Hangers and inserts/embeds must be modeled where necessary to coordinate with the work of other trades.
 - d. Equipment will be modeled to its overall height, width and depth.
 - e. Access zones shall be modeled for all elements requiring access including but not limited to equipment, fixtures and valves.
 - f. All access panels shall be modeled, including access zones above and below.
 - g. In the event that seismic bracing for suspended elements is required by code, such bracing shall be included in the model.
3. Plumbing and Specialty Piping Standards
 - a. All plumbing, specialty and process piping, related accessories (valves, air vents, drain valves, flow meters etc.) and equipment shall be modeled.
 - b. Pipes will be modeled to the outside diameter of the pipe; pipe insulation shall be modeled if present. Pipe slope will be incorporated in the model.
 - c. Hangers and inserts/embeds must be modeled where necessary to coordinate with the work of other trades.
 - d. Equipment will be modeled to its overall height, width and depth.

- e. Access zones shall be modeled for all elements requiring access including but not limited to equipment, fixtures, valves and cleanouts.
 - f. All access panels shall be modeled, including access zones above and below.
 - g. In the event that seismic bracing for suspended elements is required by code, such bracing shall be included in the model.
4. Electrical Standards
- a. All conduit/MC cabling (3/4" dia. and larger), power feeds to equipment, switch gear, panels, junction box, floor box and pull station locations will be modeled. Where groups of smaller conduit are run together, a graphic representation of the overall dimension of the grouped conduit must be substituted.
 - b. Light fixtures with above-ceiling space requirements are to be included in the model and coordinated with reflected ceiling plan. All access zones or clearances to maintain light fixtures will also be modeled.
 - c. Equipment and cable tray with access zones to be included in the model. Equipment will be modeled to its overall height, width and depth.
 - d. Equipment and junction box access zones per specification and code (whichever is greater) shall be modeled.
 - e. All access panels shall be modeled, including access zones above and below.
 - f. In the event that seismic bracing for suspended elements is required by code, such bracing shall be included in the model.
5. Fire Protection (Sprinkler, Fire Alarm)
- a. All components of the fire protection system will be modeled.
 - b. Access zones shall be modeled for all elements requiring access including but not limited to equipment, fixtures, valves and controllers.
 - c. Locate all piping, valves, fire pump, and sprinkler heads.
 - d. Hangers and inserts/embeds must be modeled where necessary to coordinate with the work of other trades.
 - e. All access panels shall be modeled, including access zones above and below.
 - f. In the event that seismic bracing for suspended elements is required by code, such bracing shall be included in the model.
6. Structure
- a. All structural steel shall be modeled, including but not limited to columns, beams, braces, gusset plates, connections, reinforcing plates and angles, pour stops, metal grating, seismic or secondary supports and beam penetrations.
 - b. All concrete structural elements shall be modeled, including but not limited to structural walls, columns and beams.
 - c. The model elements shall contain non-graphic information that associates each element with its erection sequence as appropriate, and identifies the size of the structural element.
7. Miscellaneous Additional Disciplines/Trades
- a. All components of the system/ assembly will be modeled to their true outside profile and dimensions, including all accessories, supports, etc.
 - b. Required clearances and access zones, where applicable, shall be modeled.

E. Embedded Data

- 1. All design-assist and trade subcontractor models shall include embedded data that can be read by other software, such as Navisworks. At a minimum, this data should include all model elements sizes (e.g. duct size, pipe diameter, etc.), material and system type.
- 2. Additional embedded data may be required by other contract documents.