

# SECTION 01 31 13 – PROJECT COORDINATION VIA BIM

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

### 1.2 SUMMARY

- A. Section includes special procedures for coordinating and preplanning construction operations on Project including, but not limited to, the following:
  - 1. 3D MEPFP coordination procedures.
  - 2. Production of and maintenance of construction model.
  - 3. Coordination drawings.
  - 4. As-built model turn over.
- B. Related Sections:
  - 1. Division 01 Section "Construction Progress Documentation" for preparing and submitting Contractor's construction schedule.
  - 2. Division 01 Section "Project Management and Coordination" for general coordination provisions.
  - 3. Division 01 Section "Execution" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
  - 4. Division 01 Section "Closeout Procedures" for coordinating closeout of the Contract.
  - 5. Division 05 and 21-32 Sections for scopes of work which are required to be incorporated into the construction model for coordination purposes.

### 1.3 DEFINITIONS

- A. BIM: Building Information Model, a database of construction project information which is most commonly expressed in 3D geometrical information, but can include schedule, cost loading, and maintenance and operation data, as well as wholly textual or numeric information.
- B. Level of Development (LOD): Articulated in AIA G202, general levels of detail and information richness of model elements corresponding to intended use and stage of planning, design, or pre-fabrication. LOD refers to the development of elements which are indicated to be included.
- C. Design Model: The 3D model sometimes provided by the Architect and/or consultants from which the Contract Documents have been rendered. Disposition of the model is purely to create the Architect's Instruments of Service and is not a Contract Document.
- D. Construction Model: The Contractor's living BIM model, usually founded on the design model but including more detailed systems information, additional modeling of elements not included, modification of elements to align with Contractor's means and methods, and generally being more complete and

detailed to support Contractor's operation. When submitted for demonstration of contractual obligation to coordinate, this model is referred to as the coordination model.

- E. Coordination Deliverables: Digital data which demonstrate that the required coordination has been undertaken, usually including both a BIM model of all required systems and coordination drawings, which consist of 2D drawings of overlaid systems and penetration drawings and other important interfaces between required systems drawn from the coordination model.

## 1.4 SUBMITTALS

- A. Major Clash Coordination Model.
- B. Clash Free Coordination Model.
- C. Coordination Drawings: Digital or paper prints with overlaid services and regular section cuts in the densest areas, including slab penetration and structural member penetration drawings.
- D. As-built Model: Digital submission of upgraded and enhanced detail design model, comprising the BIM representation of all constructed physical elements.

## 1.5 COORDINATION, GENERAL

- A. Coordination: Coordinate construction operations included in different Sections of the specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections, that depend on each other for proper installation, connection, and operation.
  - 1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
  - 2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
  - 3. Make adequate provisions to accommodate items scheduled for later installation.

## 1.6 COORDINATION MODEL AND DRAWINGS

- A. Coordination Deliverables, General: The construction model is to be created, updated, and detailed for preparation of coordination drawings and for submittal itself when indicated by individual Sections, and under the following circumstances:
  - 1. Where installation is not completely shown on Shop Drawings
  - 2. Where limited space availability necessitates coordination
  - 3. If coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity.
- B. Construction Model Organization: Contractor shall produce a BIM model in sufficient detail to adequately explore and document conditions in the building to avoid interference between structural framing, ceilings and wall partitions, major equipment, mechanical, electrical, conveying systems, and other engineer service systems. The following elements must be included in the Construction Model at the time of its initial submittal for coordination, and to the following levels of development as a minimum for each segment of construction indicated, as generally interpreted in the industry and below:

1. LOD 500: The Model Element is a field verified representation in terms of size, shape, location, quantity, and orientation. Non-graphic information may also be attached to the Model Elements.
2. LOD 400: The Model Element is graphically represented within the Model as a specific system, object or assembly in terms of size, shape, location, quantity, and orientation with detailing, fabrication, assembly, and installation information. Non-graphic information may also be attached to the Model Element.
  - a. Steel structure system including:
    - 1) Major columns and beams and associated connection materials.
    - 2) Braces and frames, including turnbuckles.
    - 3) Gusset plates, pour stops,
3. LOD 350: The Model Element is graphically represented within the Model as a specific system, object, or assembly in terms of quantity, size, shape, orientation, and interfaces with other building systems. Repetitive elements are modeled in their actual positions. Non-graphic information may also be attached to the Model Element.
  - a. Plumbing system including:
    - 1) Domestic water piping for service, sanitary, storm and vent.
    - 2) Plumbing fixtures.
    - 3) Water storage tanks.
    - 4) Sewerage and storm-water equipment and drains.
    - 5) Compressed air systems.
  - b. HVAC system including:
    - 1) All Ductwork.
    - 2) Registers and Grilles.
    - 3) Air handling units, chillers, fan coil units, VAVS, and all major equipment.
    - 4) Fire and smoker dampers.
    - 5) Hangers associated with required equipment.
    - 6) Fuel piping and storage tanks.
    - 7) Heat generating equipment.
  - c. Electrical system including:
    - 1) All conduit above  $\frac{3}{4}$ " in diameter
    - 2) Service panels, meters, substations, transformers, switchgear and protective devices.
    - 3) Light fixtures.
    - 4) Receptacles and switches.
    - 5) Generators and other equipment.
    - 6) Lightning protection.
  - d. Special systems.
  - e. Fire protection systems including:
    - 1) Sprinkler mains, branches, drops and heads.
    - 2) Pumps, risers, valves.
    - 3) Fire protection cabinets and specialties..

4. LOD 300: The Model Element is graphically represented within the Model as a specific system, object or assembly in terms of quantity, size, shape, location, and orientation. Non-graphic information may also be attached to the Model Element.
    - a. Conveying systems including:
      - 1) Elevator cabs, support rails, hoist beams and doors.
      - 2) Escalators.
      - 3) Service systems including electrical and mechanical.
      - 4) Mechanical room equipment.
      - 5) Special foundation elements, including pits and anchoring.
    - b. Site systems including:
      - 1) Site utilities.
      - 2) Storm drainage piping and structures.
      - 3) Sanitary drainage piping and structures.
      - 4) Services to building, such as electric mains, water and sprinkler services, gas lines etc.
    - c. Communication systems including:
      - 1) Panels and equipment.
      - 2) Cable trays, grouped wiring runs, and conduit runs.
      - 3) Receptacles.
  5. LOD 200: The Model Element is graphically represented within the Model as a generic system, object, or assembly with approximate quantities, size, shape, location, and orientation. Non-graphic information may also be attached to the Model Element.
    - a. All construction model elements not otherwise provided for.
  6. LOD 100: The Model Element may be graphically represented in the Model with a symbol or other generic representation, but does not satisfy the requirements for LOD 200. Information related to the Model Element (i.e. cost per square foot, tonnage of HVAC, etc.) can be derived from other Model Elements.
- C. File Format and Software: Submitted models should be in Autodesk Revit file format. Individual trades may model in other software at their choice provided that their geometry can be converted into Revit format. Major equipment should be included as a native Revit family for future virtual facilities management purposes.
1. Clash resolution may be performed via any suitable software program, provided it generally matches Autodesk Navisworks in performance of physical interference between geometries.
- D. Coordination Drawings: Construction model-derived 2D drawings, drawn accurately to a scale large enough to indicate and demonstrate the resolution of conflicts. Do not base coordination drawings on standard printed data that has not been incorporated into the model. Include the following information, as applicable:
- a. Use applicable Drawings as a basis for preparation of coordination drawings. Prepare sections, elevations, and details as needed to describe relationship of various systems and components.

- b. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
  - c. Indicate space requirements for routine maintenance and for anticipated replacement of components during the life of the installation.
  - d. Show location and size of access doors required for access to concealed dampers, valves, and other controls.
  - e. Indicate required installation sequences.
  - f. Indicate dimensions shown on the Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternate sketches to Architect indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.
- E. Coordination Drawing Organization: Organize coordination drawings as follows, as required to demonstrate coordination process.
- 1. Floor Plans and Reflected Ceiling Plans: Show architectural and structural elements, and mechanical, plumbing, fire protection, fire alarm, and electrical Work. Show locations of visible ceiling-mounted devices relative to acoustical ceiling grid. Supplement plan drawings with section drawings where required to adequately represent the Work.
  - 2. Plenum Space: Indicate subframing for support of ceiling and wall systems, mechanical and electrical equipment, and related Work. Locate components within ceiling plenum to accommodate layout of light fixtures indicated on Drawings. Indicate areas of conflict between light fixtures and other components.
  - 3. Mechanical Rooms: Provide coordination drawings for mechanical rooms showing plans and elevations of mechanical, plumbing, fire protection, fire alarm, and electrical equipment.
  - 4. Structural Penetrations: Indicate penetrations and openings required for all disciplines.
  - 5. Slab Edge and Embedded Items: Indicate slab edge locations and sizes and locations of embedded items for metal fabrications, sleeves, anchor bolts, bearing plates, angles, door floor closers, slab depressions for floor finishes, curbs and housekeeping pads, and similar items.
  - 6. Review: Architect will review submitted construction model and coordination drawings to confirm that the Work is being coordinated, but not for the details of the coordination, which are the Contractor's responsibility. If the Architect determines that the coordination drawings are not being prepared in sufficient scope or detail, or are otherwise deficient, the Architect will so inform the Contractor, who shall make changes as directed and resubmit.
    - a. Submittal: Coordination Drawings must be submitted concurrently with the first set of shop drawings of any trade or Section which is to be coordinated by the individual drawings.
  - 7. Coordination Drawing Prints: Prepare coordination drawing prints in accordance with requirements of Division 01 Section "Submittal Procedures."

## 1.7 COORDINATION MEETINGS

- A. General: Schedule and conduct meetings and conferences at Project site, unless otherwise indicated, with provisions for non-local participants to observe via suitable web-meeting software or service.
- 1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times.
  - 2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.

3. Minutes: Entity responsible for conducting meeting will record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner, Construction Manager, and Architect, within five days of the meeting.
- B. Coordination Conferences: Schedule and conduct conferences to resolve clashes between services for each subdivision of the documents.
1. Attendees: Contractor's Project Manager and/or superintendent, BIM manager/MEPFP coordinator, major subcontractors; suppliers;; shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to their respective scope of the Work.
  2. Major clash conferences: Develop and adopt major coordination strategies at multi-trade or significant systemic clash groups.
  3. Round-out Clash conferences: Resolve outstanding clash issues and review all issues preventing creation of a clash-free model.
- C. Initial Coordination Review Conference: Schedule and conduct a major-clash coordination conference to review the initial model submission not more than 90 days from the Notice to Proceed.
1. Conduct the conference to review major coordination issues and RFI issues for the construction team to resolve.
  2. Attendees: Authorized representatives of Owner, Construction Manager, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference.

## 1.8 SPECIAL EQUIPMENT AND PERSONNEL

- A. Computer Hardware and Display: Maintain onsite one computer of capability sufficient to handle model viewing program and monitor display for use to examine and analyze current state of construction model.
- B. BIM Manager/MEPFP Coordinator: Provide one member of staff or subcontracted entity to manage BIM model and facilitate clash resolution.
1. Manager/Coordinator to be primarily dedicated towards resolution of MEPFP coordination issues and examination of model for potential mutually-disadvantageous situations requiring clarification from the Architect until final coordination model is accepted without exception by the Architect. BIM Manager should not have other high-priority or overriding role on site which would prevent the performance of these duties.

## 1.9 CONSTRUCTION MODEL AND AS-BUILT SUBMITTAL

- A. Construction Model Modifications: Following acceptance of a clash-free model submission for coordination, The construction model shall be maintained and updated not less than weekly with any modifications incorporated into the Work and maintained online or at project site for access by the Contractor, Architect, Program Manager, or Owner during meetings for reference.
1. Contractor produce complete construction model to LOD 200 to comprise the as-built model, though may use the design model and infill model elements which are lacking. Contractor shall have no claim in case of omission of model/building components in the design model which would be reasonably required to represent completed construction, and the design model is provided as a convenience for the Contractor.

2. Contractor and all subcontractors to receive and utilize design model must execute a hold-harmless agreement acknowledging their understanding of the design model as exterior to the contract, delivered as is with no representation of accuracy or completion, and to be reasonably cross referenced with the Contract.
- B. Close-out Submission: Concurrent with other close-out submissions, contractor shall turn over full construction model. Refer to Section "Close-out Procedures" for more details.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

**END OF SECTION 01 31 13**