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A. General

1. In keeping with Cleveland Clinic’s global goal to provide the very best in world class patient care from the time the idea for a healthcare facility is conceived through the time of each future procedure performed in that facility, and in developing a standard to utilize available technologies to improve the construction of this current facility and future facilities, Cleveland Clinic (hereinafter referred to as the “Owner”) has included this plan for using Building Information Modeling (BIM) technology as a tool to benefit the project by:

   a. Enabling an accurate 3D representation of work installed, so that the work may be visualized and thus better coordinated and tracked.

   b. Enabling more accurate spatial coordination of work elements prior to construction, building the project virtually before building it with bricks and mortar, to eliminate spatial conflicts and associated costly re-work and delays during field construction.

   c. Enabling the potential, where practical, for contractors to pre-fabricate elements to expedite the work and to increase contractor efficiency and productivity.

   d. Enabling contractors to, as a best practice, include value-added FM/COBIE information at Level of Detail (LOD) 500 within the contractors’ BIM-based models that may be useful to the Owner in its management of the facility throughout the facility’s post-construction lifecycle (such as, where applicable, serial numbers, warranty information, hyperlinks to Operations and Maintenance manuals, etc.)

2. To help clarify this plan, and to provide a higher level of definition for items such as the LOD required in the BIM Coordination and Project Controls processes, in addition to this plan outline, the following documents are to be referred to as a singular unit in conjunction with all other Contract Documents, and are to be considered complimentary rather than limiting to each other:


   b. Model Authoring Responsibility LOD Key: Release 1.1 – August 2013

   c. Design Team Model Sharing Agreement (if applicable)
3. DESIGN PHASE: BIM Program Requirements

a. The Owner requires the Architectural and Engineering Design Team to develop the contract drawings with the full utilization of Building Information Model software meeting the requirements as detailed within this document. The sharing of the native Architectural and Engineering Design Team BIM files with the entire Project Team will be required to facilitate successful completion of all pre-construction, construction, and post-construction phase project goals.

b. The Architectural and Engineering Design Team is required to use Autodesk Revit as the “Building Information Model software”.

c. The Design Phase BIM Program includes:

   i. A report noting any exceptions to the BIM Implementation Plan and the Model Authoring Responsibility Level of Development (LOD) Matrix shall be provided by the design team for owner review and approval prior to the start of the schematic design phase.
      a) Report to also include any exceptions to the minimum requirements as outlined in the Latest Version of National BIM Standard - US (buildingSMART alliance)

   ii. The Architect and Engineering Design Team shall hold BIM Program Overview Presentation Meetings with the Owner's BIM consultant representative within fifteen (15) calendar days of the start of the DD and CD phases. These Meetings shall cover a complete overview of the required BIM Implementation Plan submittals.

   iii. Monthly posting by the Architect and Engineering Design Team of all current working BIM files is required for the duration of the entire design process. These files must be posted to the required file sharing account, as outlined in Section F (General File Management / Infrastructure Considerations) of this document, to allow review access for both the Owner and the Owner's BIM consultant.

   iv. After review of submitted BIM models, Owner's BIM Consultant will provide review comments regarding compliance with this BIM Implementation Plan.

      a) The Design Team must address all review comments with a written response within 5 calendar days of receipt.

      b) Design Team shall resubmit BIM files, as applicable, within fifteen (15) calendar days of receipt of the Owner's feedback.
d. The Owner's BIM consultant will perform an independent and thorough assessment on a monthly basis of all posted working BIM files to ensure model data accuracy meets all requirements as specified within this document. The results of the assessment will be utilized to prepare for presentation a scorecard summary of the BIM Implementation Specification compliance each month to the Owner and Project Team. This monthly assessment will also include a clash review of the Design Teams pre-construction coordination efforts (if applicable).

e. All participating Design Team members outlined herein agree to participate in the BIM Implementation Plan outlined herein at no additional cost.

4. CONSTRUCTION PHASE: BIM Program Requirements

a. Each Participating Contractor shall provide and maintain digital BIM-based models to support the Project's BIM Coordination Plan as described herein, with BIM-based models updated on an ongoing basis throughout the duration of the project, such that final digital BIM-based model provided to the Owner through the Construction Manager at the end of the project shall constitute an accurate representation of the Participating Contractor's work and spatial reservations.

b. Participating Contractors shall actively participate in BIM coordination and review meetings as may be required by the Construction Manager, where active participation includes but is not limited to the modification of the BIM model and associated work as may be required to achieve coordination with other Project elements or spatial reservations, and where any such changes shall be made promptly and with no increase in the Contractor’s price or time required to complete its Work.

c. Participating Contractors agree that the use of this BIM Coordination Process does not relieve the Participating Contractor of its obligation to comply with its contractual obligations, including its contractual obligation to coordinate its Work.

d. Participating Contractors understand and agree that traditional shop drawings and coordination drawing submittals shall be required to be submitted by the Participating Contractor at the conclusion of the BIM Coordination Process for any given area or sub-area, and such traditional shop drawings and coordination drawings shall be sheets derived from (linked to) the contractor’s model (as opposed to being independently drawn).

e. The Owner and its Construction Manager and other consultants shall have the exclusive right to use all Participating Contractor submissions, including the BIM submissions, both during and after construction, at no additional cost to the Construction Manager or the Owner.
f. Participating Contractors understand and agree that participation in this plan does not waive the intellectual property rights of other participants or other parties providing information or other products to the project where the information or other products may be protected by patents, copyrights, trademarks, etc.

g. Each Participating Contractor agrees to immediately notify the Construction Manager in writing upon discovery of any error, omission, or other inconsistency or deficiency in the BIM-based models provided by any other participating party.

h. Each Participating Contractor understands and agrees that it is responsible for all direct and indirect costs associated with remediation of the BIM-based model and any and all of the Owner’s Work that requires remediation as the result of any error, omission, or other inconsistency or deficiency in the Participating Contractor’s BIM-based model submission.

i. Each Participating Contractor agrees to hold the Construction Manager harmless from any liability with respect to its use of the BIM-based models, including but not limited to any errors, omissions, inconsistencies or deficiencies in any BIM-based models or assemblage thereof.

j. Each Participating Contractor agrees to provide the number of draftspersons (and if required, designers) sufficient to keep pace with the Coordination Process Schedule (a sub-section of the Bid Schedule).

k. Participating Contractors outlined herein agree to participate in the BIM Implementation Plan outlined herein at no additional cost.

B. Participants

1. Architect / Engineer (all references to “Architect” in this document collectively refers to the entire design team of Architect, Engineer, and any other consultants or sub-consultants)

2. Construction Manager

3. Participating Contractors Providing BIM
   a. Structural Steel
   b. Curtainwall / Punched Windows
   c. Precast
d. HVAC

e. Plumbing

f. Fire Protection

g. Electrical / FAS / Security

h. IT

i. Firestopping

4. Participating Contractors Providing Information for BIM

a. Framing / Drywall

b. Carpentry/Casework/Millwork

C. Uses

1. Design Authoring
2. End User Visualization
3. Existing Conditions Modeling
4. Construction & Spatial 3D Coordination
5. BIM Linkage for 4D Sequencing and Schedule for Project Coordination and Controls
6. BIM As-Built Documentation Deliverable Requirement
7. Facility Management: Space Management/ Tracking
8. Facility Management: Fire /Life Safety data parameter requirements
9. Facility Management: Warranty, Operations and Maintenance Data

D. Participating Contractor Model Requirements

1. General

   a. The LOD of the model provided by the contractor shall be sufficient for use in accurate detection and resolution of clashes between the Contractor’s work, the work of the Owner as depicted in the design models and the work of other participating Contractors as depicted in the other participating Contractor’s models of their respective scopes of work.
b. It is required that BIM submissions be rendered in the current digital Autodesk Revit version format (Architecture, Structural or MEP as may best apply to the scope of the individual Participating Contractor), supplemented by corresponding Autodesk DWG files by floor/area for floor plan, reflected ceiling plans, and ceiling devices and a NavisWorks NWC file exported from said model. The Construction Manager will expect the Participating Contractor to utilize the digital format specified by the Participating Contractor on its Bid Form, with the understanding that the bidding contractor represents that the format is compatible with or the latest available version of NavisWorks, and that the element properties for each BIM-based model element is viewable within NavisWorks, including but not limited to element descriptions, sizes, dimensions, locations, and associated unique element identifiers. Contractors must request approval to utilize AutoCAD 3D as a substitute for Autodesk Revit. Should a Contractor be granted approval to use AutoCAD 3D software, submissions shall be in the form of DWG files, and shall be saved according to the lowest common denominator version of AutoCAD 3D, which for this project has been determined to be the version. The Construction Manager may change this version after bid but prior to the commencement of the BIM Coordination Process if it is determined that a later version may serve as the lowest common denominator.

c. BIM-based models submitted shall be of sufficient detail/breakdown and granularity to allow graphical tracking of model elements representing earned (in-place) quantities and progress by week, correlated to the level of detail in the project schedule, regardless of whether the level of detail and/or granularity required to do so exceed that expressed elsewhere in these contract documents.

2. Participating Contractor-Specific Requirements – The BIM-based model submissions made by Participating Contractors shall include in their respective BIM-based models accurate 3D representations of each element of its Work, with each element including accurate associated data including but not limited to the description, location, size, and unique identifier for each such element.

3. Elements modeled shall include any and all elements representing scopes of work along with the modeling and coding (to filter for display/suppression) of any associated spatial reservations required for each element (e.g. space reserved for code compliance/clearance, for maintenance access such as filter or change out of components, connection of hoses, effluent, etc.) to the extent required to assure full and accurate representation in the model of all elements potentially causing a clash with the work of other contractors. The following examples of trade-specific modeled elements shall not limit in any fashion the LOD or granularity required to be modeled by other Contract Documents or portions of this specification:
a. Structural Steel - angles, any elements potentially clashing with work of other trades, beams, bracing, columns, connections, gusset plates, stairs, structural deck, trusses.

b. Framing Contractor – the Framing Contractor providing a model, locations, sizes and orientation of any special or unusual framing, king studs, supports, kickers, etc., and any item that may potentially clash with work of other trade, shall be communicated to the Construction Manager so that either an existing model may be modified, or a separate model may be developed to reflect any such potential clash-causing elements.

c. Carpentry/Casework/Millwork Contractor – The Carpentry/Casework/Millwork contractor shall provide traditional shop drawings and shall not be required to provide a model. However, because a high level of detail for carpentry, millwork and casework exists in the design architectural model, and because the architectural model is intended to be used for clash detection with models provided by other trade contractors, the Carpentry/Casework/Millwork Contractor shall, prior to the commencement of clash detection in any given area of the project, promptly advise the Architect, thru the Construction Manager, of any significant potential deviations from the carpentry, millwork and casework as modeled. Significant potential deviations include those deviations that would need to be reflected in the architectural model to reserve enough space for the installation and operation of the contractor’s work, so that the modified architectural model could be used during clash detection reviews. This contractor is to note the requirement for prompt production of blocking drawings specified elsewhere in this document.

d. Curtainwall / Punched Windows - angles, any elements potentially clashing with work of other trades, embedded items, framing, individual panels, supports, windows.

e. Precast – angles, any elements potentially clashing with work of other trades, embedded items, framing, individual panels, supports, windows.

f. HVAC – AHU’s, access doors, control valves, diffusers, drains, ductwork, equipment and inertia pads, fans, gauges, grilles, hangers, insulation (piping, ductwork, etc.), louvers, piping (coded by system), pumps, registers, seismic supports/bracing, sleeves, starters, tanks, valves (including stems, handles, reserved space for operator access and effluent/connections), modeling of any existing elements encountered / exposed during the installation of underground work.

g. HVAC Controls – reference electrical items (see below) as they relate to HVAC Controls scope, plus control panels, thermostats.
h. Plumbing - access doors, clean-outs, control valves, downspouts, equipment and inertia pads, fixtures, gauges, gutters, hangers, insulation, piping/risers (chilled water, domestic hot water, domestic cold water, hot water, medical gasses, natural gas, steam, sanitary), piping and fixture supports / in-wall carriers, pumps, seismic supports / bracing, sleeves, tanks, valves (including stems and handles), water heaters, modeling of any existing elements encountered / exposed during the installation of underground work.

i. Fire Protection - access doors, controllers, drains, equipment and inertia pads, fire department valves, hangers, piping (branch, main, risers - by system), pumps, seismic supports / bracing, sleeves, sprinkler heads, valves (including stems and handles)

j. Electrical /FAS / Security – access doors, ATS, BMS Sensors, cable trays, conduit racks, conduits / flex, conduits / rigid, data racks, electrical panels, equipment and equipment racks for AV systems, equipment and inertia pads, exit signs, fire alarms, generators, hangers, light fixtures, parallel gear, security cameras, security devices and sensors, seismic bracing / supports, sleeves, speakers, starters, switches, transformers, outlets, VFD's, modeling of any existing elements encountered / exposed during the installation of underground work.

k. IT Contractor - reference electrical items as they relate to IT Contractor scope, plus control panels, thermostats.

l. Firestopping Contractor – Each modeling construction contractor shall model all elements penetrating fire and/or smoke rated wall assemblies and floor/ceiling assemblies, regardless of the size of the element, coordinated with the requirements of the Owner’s firestopping program indicated in the "Environment of Care and Interim Life Safety Measures Handbook" and "Main Campus Fire Plan for Coded Fire Alarm Systems". Further, each modeling construction contractor shall model an appropriately sized element representing a wall/floor opening or a sleeve system (e.g. EZ-Path) specifically tagged as a “Fire/Smoke Stopped Penetration”, and indicating whether any fire/smoke rated sleeve system will already be provided by the modeling construction contractor to comply with the modeling construction contractor’s technical specification and scope requirements. This will be done with the understanding that these elements will be used to develop a schedule of fire/smoke stopped penetrations that will form part of the basis of the scope for future bidders of the Firestopping Bid Package, and that will form the basis of a trackable inventory for the Owner’s facility management. Should the BIM Coordination Process (and thus modeling) be incomplete by the time the Firestopping Bid Package is scheduled to be issued, participating modeling contractors shall supplement models provided to date with a marked-up set of floor plans indicating anticipated types, sizes, locations, and elevations of each penetration requiring firestopping, with the understanding that the precise location as modeled during the BIM Coordination Process may vary
slightly as the result of the BIM Coordination Process. In addition to the above, the participating modeling contractor shall provide a tabular listing of all rated penetrations by type, floor, size, and room number. Should a participating modeling contractor fail to model or identify one or more such elements, that participating modeling contractor shall be responsible for the cost of firestopping and modeling the missed penetration(s). The Firestopping Contractor (or, the other element modeling contractor in instances where the other element modeling contractor is providing a sleeve system as part of its scope) shall then provide separate coordinated firestopping models containing a fire/smoke stopping element for each penetration, with each element tagged with NavisWorks-viewable parameters including information required for facilities maintenance for each fire/smoke stopping element, including but not limited to the permit number associated with each element and the name of the PDF file containing an image of the permit associated with the element. The Contractor shall also provide a set of individual PDF files containing scans of each permit, with the file name being of the format:

FSTOPPERMIT-BLD-PERMITNUMBER-YYYY-MM-DD.pdf

Where the BLD code shall correlate to the Owner’s master building numbering system, and where YYYY-MM-DD shall represent the year, month, and day of the permit’s issuance or update.

i. Model elements need to be accurate in terms of size, location, and description. Unless an area is designated by the Owner or elsewhere in the Contract Documents to serve as a virtual mock-up, the elements do not need to include elements such as colors and textures that would be required for the model element to be photorealistic in addition to being of accurate geometry and building information data.

ii. Granularity

m. The elements in each model shall be broken up/split (i.e. granulized), at a minimum, per the granularity notes provided in the LOD Chart.

n. All elements shall be granulized, as a minimum, by building, level (including underslab and roof), and in the case of exterior surfaces, by elevation.

o. Work in or related to shafts shall be modeled separately.
E. BIM Coordination Process

1. As Architect is providing some models working mostly in Revit, in addition to posting initial design models and updates of design models, the Architect will also generate and post corresponding Autodesk DWG files by floor/area for floor plan, reflected ceiling plans, and ceiling devices as well as a NavisWorks NWC file exported by floor/area from said model, placing the files in locations specified in the “General File Management” section of this outline (which also contains information regarding the intended setup to be used as a repository for current/updated as well as archived/historical files). Design Models will include those models listed at the top of the LOD Chart, in the formats specified in the LOD Chart.

2. The Construction Manager shall arrange for the Architect’s modification of existing design models and/or the development of supplementary models by a party other than the Architect to reflect anticipated conditions and/or input from contractors that are required to provide details of potentially clashing elements or required granularity prior to fabrication or field work. This input includes:

   a. Framing Contractor input by area regarding any bracing / kickers, etc. that needs to be added to the architectural model.

   b. Carpentry/Casework/Millwork Contractor input regarding any changes required to the detailed modeling of the carpentry/casework/millwork as it exists in the architectural model. Furthermore, this Contractor shall expedite the production of shop drawings indicating the required locations, types and sizes of blocking required for the installation of its work, as well as blocking that the Contractor is required to provide the scope of others, such as for Owner-installed equipment and devices (e.g. Sharps containers). The Construction Manager shall arrange for a portion of this blocking to either be included in a separate model prepared by either the Construction Manager or a party to be designated by the Construction Manager, with the model to be made available for use of Participating Contractors in coordinating their respective work and checking for clashes. Such modeling of blocking shall be limited to non-strap blocking, and shall be further limited to areas enumerated in the “Electrical Conduits” section of the Granularity Notes Key.

   c. Construction Manager input for any major model modifications needed for coordination (leave outs for hoists/cranes, etc.)

   d. Regarding equipment provided by the Owner
e. For Owner Furnished / Contractor Installed equipment, each Participating Contractor responsible for installing the equipment shall coordinate its model with the vendor supplied equipment, based on equipment as identified in the Project Equipment Manual included in the documents furnished after bid but prior to the commencement of the BIM Coordination Process, with the understanding that the model may need to be adjusted if the Owner later selects an alternative piece of equipment.

i. For Owner Furnished / Vendor Installed equipment and Owner Furnished / Owner Installed equipment, suppliers may be not be finalized until after the BIM Coordination Process, and even then supplier information may not be provided in the form of BIM. Therefore, Participating Contractors are to coordinate information provided in the contract documents, adjusting as and if necessary once Owner equipment selections are made.

3. Prior to the commencement of the BIM Coordination Process, the Construction Manager shall conduct a kick-off meeting at which general guidelines for model layering and reserved zones shall be established (e.g. duct may be required to be initially modeled no closer than 4 inches from the underside of a deck and no closer than 2 feet from the top of ceiling framing/grid, etc.)

4. Participating Contractors shall begin modeling their respective work in the following area and trade sequence. However, Participating Contractors are not required nor encouraged to wait for the previous models for use as background in instances where the definition of reserved zones enable a Participating Contractor to begin modeling elements to get a head start on the modeling and coordination of its work.

a. Area sequence: As identified by Construction Manager based upon system and construction sequencing requirements.

b. Trade sequence (unless otherwise agreed upon by owner)
   i. Structural Contractor
   ii. Curtainwall / Punched Windows Contractor
   iii. Precast Contractor
   iv. Framing Contractor (provide supplemental framing information, for kickers, etc., to the modeler designated by the Construction Manager)
v. Carpentry/Casework/Millwork Contractor (provide supplemental model information, for modifications to the existing design model for carpentry/millwork/casework, if required, to the modeler designated by the Construction Manager)

vi. Plumbing Contractor – Gravity Pipe

vii. HVAC Contractor – Sheet Metal and Ductwork and HVAC Piping

viii. Electrical / FAS / Security Contractor – Electrical Work

ix. Fire Protection Contractor

x. Plumbing Contractor

xi. IT Contractor

xii. Firestopping Contractor

5. Each Participating Contractor shall upload/post its coordinated BIM-based model for a given area to the specified upload area (see “General File Management” section in this document), no later than the time and in the sequence specified by the Coordination Process Schedule/sequence, with the representation that the uploading Participating Contractor has already detected and resolved clashes, utilizing the Participating Contractor’s own copy of NavisWorks, with both the BIM-based design models and the BIM-based models of other Participating Contractors who have, by virtue of their being earlier in the Coordination Process Schedule/sequence for the given area, already uploaded their coordinated BIM-based models. Progress status models shall be uploaded/posted at a regularly scheduled weekly interval according to the Coordination Process Schedule to allow the Construction Manager to confirm that model development is progressing. Models shall be posted more often as directed based upon project conditions, including but not limited to modifications to the project design.

6. To facilitate the alignment of models and visual confirmation of said alignment when models are combined in NavisWorks,

   a. Each BIM-based model shall adopt the project’s standard point of origin, which shall be the as established by the Architect in the Architect's models.

   b. Each BIM-based model posted shall contain a 10 foot cube as a benchmark/control reference, with the bottom surface at elevation.
7. Each Participating Contractor shall coordinate its work in any given area as it creates its model, coordinating with both the design models and the coordination models of other Participating Contractors who, due to their being scheduled earlier in the coordination sequence for the area, shall have already uploaded clash-resolved models for subject area. Participating Contractors shall if necessary contact or meet with any other Participating Contractors or the Architect, as needed, to resolve any clashes discovered during this or any other segment of the overall BIM Coordination Process.

8. The BIM Implementation Plan is not intended to limit the obligation of any contractor (Participating Contractor or otherwise) to coordinate its work with the work of the Owner and other contractors. Each Participating Contractor shall also coordinate its work with not only models, but also all Contract Documents, including but not limited to drawings, specification, and any existing conditions, etc.

9. Should a Participating Contractor be unable to resolve a clash for a given area after consulting with the Architect and any other affected Participating Contractors, the clash shall be discussed and resolved at the next scheduled weekly clash resolution meeting.

10. Participating Contractors agree to provide a representative at each clash resolution meeting that is familiar with the Work of the Participating Contractor as well as that Work’s relationship to project elements representing the work and spatial reservations for elements of design models and BIM-based models of other Participating Contractors. The Construction Manager shall chair clash resolution meetings, and shall serve as the NavisWorks model technician, ready to display applicable NavisWorks models / viewpoints so that attendees may discuss any clash resolutions. As chair of the clash resolution meeting, the Construction Manager shall render decisions as to which trade shall be required to move in order to resolve a clash so that the clash resolution adopted will be in the best interest of the Owner. Failure to attend a clash resolution meeting will require the Contractor to accept and implement any relocation deemed by the Construction Manager as necessary for coordination, at no additional compensation in money or time to the absent Contractor.

11. Participating Contractors agree to provide a representative at the meeting that is qualified and able to discuss and react to design and software/data related aspects of the Participating Contractor’s BIM submissions.

12. Once a floor/shaft in a particular building is completely coordinated, the Construction Manager shall verify the area is free of any non-approved clashes, and/or if necessary, shall publish a clash report highlighting areas of clash that must be resolved prior to the next scheduled weekly clash resolution meeting, in the form of a NavisWorks NWD file containing clash viewpoints or excerpts of NavisWorks-detected clashes in Microsoft...
13. Participating Contractors who must modify their respective model(s) to implement the clash resolution derived at a meeting shall re-post their model for the area so that the Construction Manager can once again confirm that the area is clash free.

14. Once an area sequence is confirmed as free of all non-approved clashes by the Construction Manager and all Participating Contractors, the final coordinated NavisWorks model NWD file for the area shall be posted for final review and sign-off by each Participating Contractor confirming concurrence with the clash-free status of the model with respect to its scope of work and relationship to the scope of others (a composite print of the area will be printed by the Construction Manager and presented for physical sign-off at the next clash resolution meeting as a means of confirmation). After sign-off, each Participating Contractor shall provide the Construction Manager with 5 full-sized copies of any prints of dimensioned 2D and/or 3D views of the area that the Contractor may use to communicate installation information to its field operations. It is expected that all such drawings will comply with information in the clash-resolved models, further serving as confirmation of the coordination, and for use by the Construction Manager in for field verification of installation.

15. The day of the week for the weekly tasks of posting of models, updated models, the issuance of clash reports, and for clash resolution meetings, will be determined by the Construction Manager.

16. All shop drawings shall be based on conventional 2D or 3D dimensioned views derived from and in compliance with the clash-resolved models.

F. General File Management / Infrastructure Considerations

1. Autodesk Buzzsaw will be used for all exchanges of BIM files throughout the design and construction phases of the project unless otherwise agreed upon by the Owner.

   a. It is the responsibility of the design team to initially establish and maintain the Buzzsaw account with required number of users until transfer to CM at the start of construction.

   b. The ability to maintain synced versions in metadata without name change is required to be utilized.

   c. The ability to add notes to each upload for change tracking and verification is required to be utilized.

   d. In both the design and construction phase of the project, it is MANDATORY that
notes be added to each model posting by the model poster, indicating each change item (e.g. RFI, Bulletin, Change Order, contractor error correction) included in that posting. These notes will be reviewed by a representative to be designated by the Owner and compared against a list of changes in order to confirm that posted models include all changes known as of that time. Should the Owner’s representative discover that the notes are incorrect or incomplete; the Owner reserves the right to assign a full-time model reviewer to monitor and memorialize changes made in each model posting with the cost of the model reviewer to be backcharged to the errant model posting entity.

2. The Construction Manager shall provide a trailer with a meeting room with necessary high-speed internet team access and a SmartBoard system for the Construction Manager’s use in conducting clash resolution meetings with Participating Contractors and other interested parties.

3. Models shall be split by building and area/floor to correlate with the specified coordination sequence by the model author. (if applicable).

4. Revit Model file naming convention shall be: PROJ.#-PROJ.ID-RESP-MODEL. The non-Revit Model file naming convention shall be: PROJ.#-PROJ.ID-RESP-MODEL-FLR-TYPE

a. PROJ.# = Cleveland Clinic Project Number (As assigned by Owner)
b. PROJ.ID = Cleveland Clinic Project Name Abbreviation (As assigned by Owner)
c. RESP = Responsibility (Contractor) Code (If Applicable)
d. MODEL = Model ID
   i. Design Models (Or as otherwise approved)
      a) DARCH = Design Architectural Shell & Structural
      b) DINTF = Design Interior Finish (including casework/millwork)
      c) DHVAC = Design HVAC
      d) DELEC = Design Electrical
      e) DPLUM = Design Plumbing
      f) DFPRO = Design Fire Protection
      g) DCIVIL = Design Civil & Landscaping
      h) DIT = Design Technology
   ii. Coordination Models (Or as otherwise approved)
      a) CSTEEL = Structural Steel
      b) CCWLL = Curtainwall / Punched Windows
      c) CHVAC = HVAC
      d) CPLUMB = Plumbing
      e) CFPRO = Fire Protection
      f) CELECT = Electrical / FAS / Security
      g) CIT = Information Technology
h) CFSTOP = Firestopping  
e. FLR = Level (or Structural Steel Sequence or site sub-area)  
f. TYPE = Work Type (If Applicable)  

5. Models shall be posted in the manner described above at a regularly scheduled weekly interval according to the Coordination Process Schedule, or more often as may be required by project conditions, including but not limited to modifications to the project design.

6. The BIM Coordination Process may need to be repeated as directed by the Construction Manager as needed for specific areas affected by post-coordination modifications, and each Participating Contractor shall keep its model updated. In addition to complying with requirements for submitting traditional as-built drawings and documentation, each contractor shall submit a final copy of its model(s), having been thus updated on an ongoing basis throughout the duration of the project, such that final digital BIM-based model provided to the Owner through the Construction Manager at the end of the project shall constitute an accurate representation of the Participating Contractor's work and spatial reservations required for access, etc. The format for this submittal shall include three identical and properly labeled DVD's containing the final native model files plus NavisWorks-readable files (such as Revit files being accompanied by corresponding DWG and NWC files).

7. For Change Orders and select Proposal Requests, to quantify changes and to correct clashes caused by a design change to signed-off and in-progress areas, the following procedure shall be performed in the sequence in which Change Orders or select Proposal Requests are issued unless otherwise directed by the Construction Manager:

a. Each Proposal Request shall specify whether the Contractor is required to modify its model(s) to reflect the change either during the proposal process, or upon the Construction Manager's conveyance of the Owner's issuance of written authorization to proceed with the Proposal Request. Upon either the Owner's issuance of an authorization to proceed with a Proposal Request requiring modification and coordination of models contemporaneous with construction, or in instances where a particular Proposal Request instructs one or more Participating Contractors to incorporate and coordinate changes into existing models during the preparation of the proposal, of the Participating Contractors that have work directly affected by the Proposal Request documents, the Participating Contractor highest on the previously stated list of the BIM Coordination Process “Trade Sequence” will take the lead in modifying its model and drawings, minimizing the clashes with other trades as much as possible. Revised layouts are to be drawn in an identifiable grouping, named to match the respective Proposal Request. Other affected Participating Contractors in the “Trade Sequence” shall similarly modify and concurrently coordinate their models.
along the same lines as the original BIM Coordination Process.

b. Prior to the start of the above process, the Architect shall issue revised portions of models affected by the Change Order or Proposal Request incorporating said changes.

c. Once the work is modeled by the affected Participating Contractor(s), a clash report the Construction Manager shall perform a clash review and arrange clash resolution meetings as required, similar to or concurrent with the normal weekly clash resolution meetings.

d. The as-built drawings and models submitted by Participating Contractors shall reflect all changes, regardless of whether a Proposal Request or Change Order directs model modifications contemporaneous with construction.

7. The As-Built Model/Record Model will need to maintain its parametric value. The following requirements will be necessary to ensure this.

a. All data or changes will need to be added to the original file with the authoring software or have the ability to automatically transfer to it.

b. Any software used to author the model will need to utilize parametric data.

c. BIM analytical software will be used to analyze the model only.

d. For post-construction purposes the owner requires the ability to edit all submitted parametric models in Revit, unless alternate authoring software is agreed upon.

G. Project Controls

1. Baseline Schedule Development

a. All Contractors shall provide the Construction Manager resource-loaded schedules and schedule information as required by separate scheduling specification entitled “OCTPD Project Control, Performance Measurements, and Diagnostic Program Specification,” with material quantities harvested from the models as indicated in the LOD Matrix for the project.

b. At the conclusion of the model coordination process for an area, each Contractor shall provide the Construction Manager updated planned quantity resource schedule loading information showing correlation to the quantities in the coordination models provided by the Contractor, and shall advise of any modifications required to labor resources and/or durations in order to accommodate any quantity resource
changes.

2. BIM-Related Schedule Updating and Documentation

   a. Contractors shall provide the Construction Manager a listing of modifications to the resource and cost loading and duration and/or logic needed to reflect changes resulting from incorporation of changes in the models, supported by the change in quantities as indicated in the model revision.

H. As-Built BIM Deliverable Requirements

1. Record Model (A Navisworks NWD model ready for Facility Management uses.)
   - Sub models include:
     - Architectural Models
     - Structural Models
     - Mechanical Models
     - Electrical Models
     - Plumbing Models
     - Fire protection Models
     - Pneumatic Tube Models
     - ITD Models
     - Miscellaneous Models (As Required)

2. Original Native files (Each file in its original parametric format for updating)
   - All As-Built verified files including phases and levels
     - Architectural Models
       - Supplied by Architect
     - Structural Models
       - Supplied by Engineer
     - Mechanical Models
       - Supplied by MEP Contractor
     - Electrical Models
       - Supplied by MEP Contractor
     - Plumbing Models
       - Supplied by MEP Contractor
     - Fire protection Models
       - Supplied by MEP Contractor
     - Pneumatic Tubes Models
       - Supplied by MEP Contractor
     - ITD Models
       - Supplied by MEP Contractor
     - Miscellaneous Models
       - Supplied by applicable Contractor
3. The Record Model file is required to consist of simple links that can be recreated by the Owner. Therefore, all model modifications must only be completed in the native files, not the Record Model. The NWD file will be recreated as an NWF file, for updating, on the owners server. Each native file will need an As-Built BIM File Transfer Document that details the following:

- Latest file modification date
- File format
- As-Built certification (yes/no)
- Name of person verifying status
- Model content
- Change orders incorporated into model
- Approved model uses
- Model Component/systems LOD with sign-off.

I. Facilities Management BIM Requirements

1. Space Management/ Tracking

   a. Design team shall name and number rooms within the model according to the Cleveland Clinic standards and applicable sign-off.

   b. Design team shall number doors within the model according to the Cleveland Clinic standards; associated with the applicable room.

2. Fire /Life Safety data parameter requirements

   a. Associated data parameters shall be inserted and populated within the Revit family for the items indicated on the Model Authoring Responsibility LOD Matrix as a level 500.

3. Warranty, Operations and Maintenance Data

   a. All MEPT systems and/or equipment manufacturer data shall be referenced in the model by each applicable contractor unless otherwise approved by the owner or owners representative

   b. Data shall be required to be linked in the model prior to substantial completion for review