BUILDING INFORMATION MODELING (BIM) IMPLEMENTATION IN CONSTRUCTION PLAN

HOTEL AVALON
VERSION 3 - 06.14.16

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SECTION 0: PROJECT SUMMARY

I. PROJECT DETAILS

1. **PROJECT OWNER:** NORTH AMERICAN PROPERTIES/STORMONT HOSPITALITY GROUP
2. **PROJECT NAME:** HOTEL AVALON
3. **PROJECT LOCATION AND ADDRESS:** ALPHARETTA, GA
4. **CONTRACT TYPE / DELIVERY METHOD:** CM AT RISK
5. **BRIEF PROJECT DESCRIPTION:** HOTEL (12 STORIES), CONFERENCE CENTER, PARKING DECK
6. **PROJECT NUMBERS:**

Project Information	Number
Brasfield and Gorrie	15571
Architect/Owner	20130026

7. **PROJECT SCHEDULE / PHASES / MILESTONES:**

Project Phase / Milestone	Estimated Date	Description
SD Package	09.11.15	--
DD Package	02.12.16	
Foundation Permit	05.06.16	BIM UG Coordination based off this set
CD Package	06.17.16	BIM OH Coordination based off this set
Project Milestone	--	--
GMP Documents	--	--
Bid Package	--	--
Project Milestone	--	--
BIM COORDINATION START	05.26.16	BIM Coordination Kickoff
UG COORDINATION END	06.15.16	UG
OH COORDINATION END	09.20.16	OH
Handover	TBD	Final As-builts, Coordinated Model

These schedule dates are for reference only. Refer to the Project's CPM schedule regarding contractual milestones.

II. Key Project Contacts

Role	Organization	Contact Name	Location	E-Mail	Phone
Project Leads	Owner	TBD			xxx-xxx-xxxx
	Architect	Andrew Haney, CC Jason King, CC	Atlanta	AndrewHaney@coopercarry.com JasonKing@coopercarry.com	678-539-4660 404-240-9517
	Interiors	Jacqueline McGee, Perkins+Will	Atlanta	jacqueline.mcgee@perkinswill.com	617.406.3550
	Structural Engineer	Rees Culpepper, Uzun + Case	Atlanta	RCulpepper@uzuncase.com	678.553.5228 678.778.6469
	MEP Engineer	BWA- Garry Jenkins, M/P Thomas Mercer, M/P Kevin Price, Elec	Norcross	Gjenkins@BarrettWoodyard.com tmercer@BarrettWoodyard.com KPrice@BarrettWoodyard.com	770-810-8800 678-301-2209
	Civil Engineer	Brian Martin, Kimley Horn	Alpharetta	brian.martin@kimley-horn.com	470-299-7044
	Construction Manager	Steven Johnson, B&G Tyler Yarbrough B&G	Kennesaw	SJohnson@brasfieldgorrie.com TYarbrough@brasfieldgorrie.com	678-581-6443 678-581-6471
BIM Leads	Contractor	Michael Hasamoh, B&G	Kennesaw	MHasamoh@brasfieldgorrie.com	770-423-3749
	Mech Trade	McKenney's- Chris Kitchen Dan Cotton Bobby Baskette	Atlanta	chris.kitchen@mckenneys.com Dan.Cotton@mckenneys.com Bobby.Baskette@mckenneys.com	404-624-8659 678-232-5015
	Plumb Trade	Harry Harringon & Jim Bargy, Miller Mechanical	Marietta	hharrington@mmce.us jbargy@mmce.us	770-952-3864
	Elect Trade	Chad Shaw, Allison Smith	Smyrna	cshaw@allisonsmith.com	404-367-6132
	FP Trade	Bill Smith, Pasco	Covington	bsmith@pasco-inc.com	678-342-9499
Detailer Leads	Mechanical Piping	Kane Hobbs, McKenney's	Atlanta	Kane.Hobbs@mckenneys.com	404-624-8746
	Mechanical Duct	Danny Gautier, McKenney's	Atlanta	daniel.gautier@mckenneys.com	404-624-8606
	Plumbing / Gas	Tom Miller, Miller Mechnical	Marietta	tom.miller@mmce.us	404-569-0538
	Electrical	Karen Pierce, Allison Smith	Smyrna	kpierce@allisonsmith.com	404-367- 6198
	Fire Protection	Bill Smith, Pasco	Covington	bsmith@pasco-inc.com	678-342-9499
	Concrete Structure	Michael Hasamoh, B&G	Kennesaw	mhasamoh@brasfieldgorrie.com	770-423-3749
	Structural Steel	Jeremy Bunyard, Southern Steel	Meridian, MS	jeremy@southernsteel.pro	601-653-5777 601-616-4510

SECTION 1: PROJECT GOALS

The goal of this BIM implementation plan is to provide guidance for the effective coordination of all trades and to facilitate efficient fabrication and installation of work. This will, in turn, provide the Owner with accurate as-built documentation. Project Coordination is intended to be a collaborative process in which all necessary project team members are present and active in Brasfield & Gorrie (B&G) led weekly meetings. Work is to be installed exactly as detailed in the coordinated model unless necessary changes are coordinated with all trades and is specifically approved by B&G.

I. Collaboration

Our process is designed around communication with the project team and subcontractors as well as open file sharing. Open information sharing creates an effective project that reduces the amount of errors that would typically be encountered in the field. Our coordination requires weekly uploads and weekly meetings in which the entire team attends and are actively participating. Specific model requirements are listed below, but models are to include appropriate level of detail pertaining to all installed systems. This includes major systems, hangers, seismic bracing requirements, unistrut supports, also future and existing work correctly delineated in the models.

II. Construction Model Coordination

The coordination process begins with an initial kickoff meeting that explains the overall BIM implementation plan for the project. The team is required to attend and is expected to adopt the standards shown in this plan. During this meeting, the meeting dates and times are established as well as the file upload and file organization protocol.

III. Coordination Model Requirements (By Scope):

1. Site Model
    1. Underground Electrical Conduit and Mechanical Piping, Etc.
    2. Site Utilities
    3. Topography model as deemed necessary by project team
2. Architectural Model
    1. Skin Elements
    2. Doors w/ King Studs
    3. Fire Rated Walls/Priority Walls
    4. Reflected Ceiling Plans
    5. Equipment, including Owner Provided Equipment
    6. Access Flooring and Pedestals
    7. Vertical Circulation (Shafts, Stairs, Elevators, Escalators, Etc.)
    8. Manway Access and Maintenance Clearances
    9. Slip track clearance if required for seismic

3. Structural Model
    1. Foundations, Including Deep Foundations
    2. Columns and Beams (including tapered, sloped, etc.)
    3. Elevated Slabs
    4. Slab Depressions
    5. Sloped Slabs
    6. Concrete Reinforcing/Post Tensioned Cables
    7. Column Grids
    8. Shear Walls and Penetrations
    9. Misc. Structural Components
        a. Unistrut or support framing
        b. Light and Equipment Supports
        c. Lintels and impenetrable block
        d. Top rail angle for rated walls
    10. Roof Blockouts and Openings
    11. K-Joists w/ Bridging and Bracing
    12. Embeds

4. Mechanical
    1. Mechanical Ductwork
    2. Mechanical Piping + Insulation 1" in diameter or greater
    3. Racked Piping – any grouping of piping that creates a barrier greater than 1"
    4. Ceiling Devices such as diffusers and registers
    5. All insulation on both ductwork and piping
    6. Mechanical Equipment – both major, minor equipment to actual approved sizing
    7. Fire, Smoke, and Control Dampers with required clearances
    8. Clearances required for operational/maintenance including but not limited to:
        a. All Equipment
        b. Access Panels
        c. VAV Boxes
        d. Fan coil units
        e. Terminal air distribution boxes
        f. Air Handling Units (AHU)
        g. Valves
        h. Gauge Reading
    9. Valves with Valve Tags – Coordinate with facility's existing numbering system (if applicable)
    10. Building Automation Systems panels and clearances

5. Plumbing
    1. Plumbing Piping + Insulation 1" in diameter or greater
        a. Rain Leader
        b. Overflow Drain
        c. Vent
        d. Waste Water / Sanitary
        e. Domestic Cold Water
        f. Domestic Hot Water
        g. Medical Gas / Vacuum

2. Gravity piping to be modeled with necessary slope to meet code requirements
3. Racked Piping – any grouping of piping that creates a barrier greater than 1"
4. Plumbing Equipment and Fixtures
5. Valves with Valve Tags – Coordinate with facility's existing numbering system
6. All insulation per the specifications
7. Clearances including range of motion valve clearances
8. Radiant floor system

6. ELECTRICAL
    1. Individual Electrical Conduit 1" or greater
    2. Racked Conduit – any grouping of conduit that creates a barrier greater than 1"
    3. Electrical Lighting (with working clearances)
    4. Ceiling Devices (with working clearances) (Fire Alarm Devices, Wireless Access Points, Strobes, Nurse Call)
    5. Electrical Equipment and Clearances (both out and above)
    6. Electrical Panels and Panel Schedules
    7. Electrical Floor Boxes
    8. Lightning Protection Systems
    9. Electrical Pull Boxes and Junction Boxes with required clearances
    10. Bus Ducts, High Voltage Runs, Main Feeders, and Sub Feeders
    11. Cable Tray with required access clearance, Including J-Hooks are required in area for cabling bundles
    12. Electrical Room – entire room clearance to make project team aware of other trade work in electrical rooms
    13. Radiant floor system

7. FIRE PROTECTION
    1. Fire Protection Piping and Devices 1" or greater
    2. Fire mains, branches, and head drops
    3. Equipment – both major and minor equipment to actual approved sizing
    4. Control Panels with clearances both out and above as required by code

8. SPECIAL SYSTEMS MODEL:
    1. Fire Alarm Devices
    2. VESDA
    3. Clean Agent Fire Protection equipment, piping, and panels
    4. Electrical Low Voltage Wiring
    5. Security System Devices
    6. Pneumatic Tube System
    7. Nurse Call System Devices
    8. Telemetry Systems
    9. Kitchen Equipment
    10. Building Automation Systems Panels with clearances both out and above as required by code

IV. BIM ROLES AND RESPONSIBILITIES:

The following matrix is to communicate each party's deliverable with regard to modeling for the coordination process:

Design Team – Need to identify single point of contact for Contractor BIM communication. Design Team is expected to be "gate keeper" to rest of design team while Contractor will be "gate keeper" to the construction team. Work with Contractor BIM/VDC staff for model management and sharing per BIM Execution Plan. Participate in Coordination meetings that affect Design, i.e. MEPFP vs. Ceiling Heights, MEPFP vs. Structure.

Contractor BIM Manager / BIM Coordinator - Contractor BIM Manager / BIM Coordinator will manage model storage/exchange for construction team; will facilitate coordination meetings and coordination of multiple trades in conjunction with Contractor Project Engineers responsible for contract management of trades coordinating. BIM Manager / BIM Coordinator will also work with Superintendent and Project Managers to support field work.

Subcontractor Project Managers (MEP, Concrete Structure, Steel, Misc. Metals, Enclosure) - All Project Managers involved in these contracts will be involved to some degree in virtual coordination of these items. Reviewing shop drawing submittals with BIM Manager/Engineer and Coordination models is required.

Trade Partner Job Captain – The primary responsibility of the Job Captain is to minimize issues/clashes at a trade level and derive potential solutions before engaging the entire team in resolution. The "Job Captain" is the lead point of contact for the trade's scope and is responsible to review their systems and ensure cleanup before submitting it to Brasfield and Gorrie for review/resolution in a formal clash and coordination environment. This person can also the modeler/detailer depending on their experience/workload and is expected to report daily progress and identify significant issues as they arise, with the Brasfield and Gorrie BIM Coordinator and the other (trade) Job Captains. It is expected that each trade conduct their own (internal) clash reporting/model reviews during the modeling effort to minimize incidental clashes with the available trade models. Brasfield and Gorrie will support significant multi-trade coordination challenges with the design team's input for timely resolution. Foreman shall view Composite Coordination model previous to meetings to ensure constructability of the systems.

Contractor Project Managers and Superintendents will enforce the coordination schedule, and reserves the right to modify as necessary to meet the construction schedule. Each subcontractor should think about a backup staffing (detailer) plan in event of vacation, illness, overlap coordination vs. fabrication/field drawing schedule. Job Captains are responsible to properly staff their support team to meet the coordination and/or construction schedule.

The field installation schedule will not be held up to accommodate a coordination schedule that gets behind.

SECTION 2: TRADE HIERARCHY FOR CLASH RESOLUTION

The following systems are listed in order of general precedence in the event there is a conflict between two or more systems. If there is a conflict and one of the systems must change, it is the intent to move the component of whichever system that least impacts the job's cost and schedule. In some rare instances, it may be possible that a system of lower precedence in the list below take priority over its predecessor.

The final hierarchy will be determined in the formal Kick-Off Meeting:

1. Structural
2. Ceilings
3. Architectural
4. Miscellaneous Metals
5. Equipment/Clearances/Access
6. Gravity Plumbing
7. Fire Stand Pipe
8. Welded Piping Mains
9. Duct Mains
10. Large Electrical Conduits and Racked Systems
11. Piping Racks
12. Fire Mains
13. Pneumatic Tube
14. Small Electrical Racks
15. Cable Tray
16. Mechanical Pipe Branch lines
17. Fire Protection Branch Lines

SECTION 3: PROJECT STANDARDS

I. Modeling Standards

A. Any modeling authoring software will be acceptable, as long as it is Navisworks compatible.

B. All steel/piping/conduit 1" diameter or larger should be modeled along with all "racked" systems.

C. Any grouping of steel/piping/conduit that creates a barrier greater than 1" should be modeled.

D. Existing systems/Future systems need to be on separate layers from current construction

E. All clearances above or around equipment should be modeled per code and for maintenance and approved by local inspector.

F. Clearances such as Service Space, Gauge Reading, and Valve Clearances

G. All insulation on any work will be modeled

H. All hangers will be modeled before areas or section will be considered "collision free"

I. Special bracing of work such as seismic bracing and equipment supports

J. Individual model files from subcontractors as assumed to be collision free within itself

K. Formal Signoff for each area released for fabrication and "Field Use"

II. File Naming Conventions

File naming structure should follow the format below:

[Project Name]_FLOOR_[Trade]_[Type].dwg
i.e. Hotel Avalon_L01_MECH_SM.dwg

Trade Tags			
Mechanical	MECH	Structural	STR
Plumbing	PLUMB	Architectural	ARCH
Fire Protection	FP	Civil	CIVIL
Electrical	ELEC	Pneumatic Tube	PTS
Unistrut	UNI		
Type Tags			
Mechanical – Sheet Metal	SM	Electrical – Equipment	EQUIP
Mechanical – Piping	MP	Fire Protection – Mains	MN
Mechanical – Equipment	EQUIP	Fire Protection - Branches	BL
Plumbing – Domestic	DOM	Fire Protection – Pipe	SP
Plumbing – Sanitary	SAN	Structural Concrete	CONC
Plumbing – Medical Gas	MG	Structural Steel	STEEL
Electrical – Lights	LIGHTS		

III. File "Cleaning" Requirements – breakout per platform (Revit/Cad)

Every file uploaded to the File Sharing Site should at a minimum have the following commands run prior to uploading. As a "Rule of Thumb", only 3D geometry necessary for coordination should be visible. This is necessary in order to limit file size and avoid confusion when sharing:

A. Remove any borders and title blocks

B. Detach all XREFs and Links

C. Purge All

D. Audit All

E. Compress

F. Detach from Central

G. All layers turned on and thawed

H. No geometry shall reside in "0" or "DEFPOINTS" layers

I. Remove model elements that are not part of the final construction (annotation items, floating elements, etc.)

J. All Text shall be on a separate layer

K. All colors, linetypes, and lineweights shall be set to BYLAYER

IV. Upload Frequency

A. All files to be submitted to Brasfield and Gorrie's VDC Coordinator via Box.com.

B. All information pertaining to file uploads will be covered in depth at the first BIM Kick-off Meeting established by the project team.

C. All uploads are to be posted 8 hours before the meeting to allow for model preparation.

D. Models that are not uploaded will be excluded from the meeting that day.

E. Do not change the name of uploaded files; keep the same naming throughout the project.

F. Coordination meetings will be held at weekly intervals or at intervals necessary to meet the overall project schedule and coordination schedule. The meeting time will be established by the team during the kickoff meeting.

SECTION 4: MODELING SPECIFICS PLAN

I. Modeling Specifics and Guidelines

Follow a specific color modeling style that will be used to designate different trades for collision meetings. It is preferable that uploaded models utilize colors prior to being uploaded. Having separate layers and colors for each of the systems is required. Layers should also be named in a descriptive manner that someone could identify a system by its layer name. Revit components and systems should be used and linked as much as possible to help aid in the coordination process.

II. Origin Point and Floor Elevations

A. The origin point (x= 0', y= 0') shall be the column grid intersection of column line HK & H1 (southwest corner of the site). The elevation, or z-axis, shall use the drawing datums- L01 = 0'-0"

B. Granularity of Model Elements

Model elements should correspond to the 2015 BIM Forum LOD Specification attachment.

SECTION 5: COORDINATION MEETINGS

Meetings will be held at a specific time determined by the project team during the first kickoff meeting. If additional meeting times are required all parties will be notified by email. All subcontractors are required to participate. After the meetings are complete a Navisworks Document will be issued to the team outlining all clashes found in the model. The clash view can be found in the saved viewpoint window in Navisworks. The intent is that the installation drawings will be produced directly from this model and will be the basis for resolving conflicts that come up in the field. The Sign off model will take precedence if there is a conflict in the field and the sign-off model routing will be given favor unless there is no other solution. The intent is that the model is constructible at the time of sign off with as many field interference impacts resolved BEFORE installation.

WEEKLY COORDINATION CYCLE

Select Day of Week to Start the Coordination Cycle – Wednesday
Choose the day most appropriate for the team to hold the weekly CM led BIM Coordination meeting.

M	T	W	TH	F
Trades Upload- noon B&G Clash Run	Share Clash Report Model Creation	**CM Led BIM Mtg** Big Ticket Items, RFI's	Model Creation	Model Creation **Trades Internal Clash**

Model Creation / Updates throughout Week

TYPICAL COORDINATION SCHEDULE SEQUENCE

Below is a typical week-to-week 'Coordination Cycle' to achieve a coordinated level of a building. Determine how aggressive the schedule needs to be with the team as early as possible. See the attached BIM Coordination Schedule.

- **Week 1**- First Clash Tests & Results
- **Week 2**- Updates / Changes / RFI's / Re-run
- **Week 3**- Quality Walk Level
- **Week 4**- Coordinated Level Submittal / Sign-off Model

SECTION 6: INTEGRATION INTO QA/QC PLAN

I. General

Autodesk 360 Glue as well as Navisworks Freedom will be used to locate and verify coordinated locations of systems in the field. The model will be updated after each coordination meeting by the B&G project team to a designated Box.com location. Once updated, it will be each trades responsibility to notify their project team members to update the model on their individual mobile devices. Autodesk 360 Glue and Navisworks Freedom are free viewers and should be no additional charge to the project team.

II. BIM and Facility Data Requirements

The owner does not have any BIM requirements defined at this time;

1. The owner deliverable will be Navisworks Models (.nwd), one overall and one per level. Navis models shall include Record models per item 5 below, with additional requirements per scope and direction of Owners Group.
2. Establish model review meetings with Owner Facilities staff to identify equipment access issues and confirm post construction usability. Subject to subcontractor selection, scope definition, and Owners Group request.
3. Installing from Coordination models has an inherent reluctance from the field personnel to "install as modeled". Trade foremen should review what is being modeled/coordinated prior to and during coordination. "Install what is modeled" is the rule unless the trade foremen knows the model/field installation drawing is wrong and requires correction. In the latter case, the area in question may need additional coordination and edits to trade models, and does not constitute grounds for compensation.
4. Trade foremen need to talk to each other. Plan of the Day (POD) meetings are planned for this communication. The composite model is as much for your own trade as it is for other trades to see where your routes are. Trading reserved space is acceptable if discussed between Job Captains and a Contractor Superintendent prior to installation.
5. 2D As Builts created from Record Models are required for Steel and MEP for this project. The coordination model updated per field coordinated locations is what shall be understood as a Record Model.

SECTION 7: ROBOTIC TOTAL STATION LAYOUT

The use of a robotic total station will be coordinated with the project team and will correlate to the project schedule. This will allow for the proper sequencing of work to allow for this technology i.e. coordinating hanger layout prior to metal stud priority wall installation. The team is encouraged to work together to achieve an overall layout plan.

APPENDIX: ATTACHMENTS

I. List of Attachments

1. BIM Coordination Schedule
2. Project Schedule
3. 2015 BIM Forum LOD Specification