

COMPANY

Pinnacle Infotech

LOCATION

Durgapur, India

BIM Came in Handy for Construction of Modera Davis, Portland, Oregon, USA

Project Summary – Modera Davis - Portland, Oregon, USA

Pinnacle Infotech & Marion Construction Company created the 3D BIM Models of Modera Davis - a 12 story mixed used building in the Pearl for Mat Foundation, Elevator Pits, Foundation walls, Retaining Walls, Slab on Grade, Floor Slab, Beams, Floor Opening, Concrete Curbs, Shear Walls, Columns, Sleeves and Ramp. The 130'-4" tall building for developer Mill Creek Residential Trust would include 150 residential units, 4,000 sq ft of retail space and parking for 94 vehicles in two levels of below grade parking after construction. At the 12th floor, the building would include four 2 bedroom penthouse units, each consisting of private terraces at the corners. The 12th floor would be home to the building amenity features, including a fitness room, clubroom and two large exterior terraces. We were also responsible for producing Concrete Lift Drawing, Foundation Drawings, Slab on Grade Drawings, Slab Drawings, Slab Soffit Drawings, Wall & Column Plan & Elevation Drawings.

BIM Coverage, Process & Implementation:

- i. Pinnacle engaged a team of 6 Engineers (in-house), including project lead to provide Services for Marion Construction Company, within stipulated time frame
- ii. Shop drawings were created by using color coding of concrete elements at different elevations. We added water mark "NOT FOR CONSTRUCTION" for both 1st & 2nd Draft submission. Shop drawings were created for both Vertical and Horizontal elements.
- iii. Constructability Review was shared with the client by raising RFIs & RFCs and subsequent solution was incorporated in the design.

Scope of Work:

Pinnacle's scope of work for the project included creation of 3D BIM Model of Sheet Metal and Mechanical Piping of all buildings and Concrete Lift Drawings. Concrete detailing included Floor Plan for Level 1, 2, 3 & 12, Parking 1 & 2, Roof Plan, High Roof and Roof Level Canopy and Concrete Sheet type included various plans such as Foundation, SOG, Wall & Column, Wall & Column Elevation, Section & Details, Slab and Soffit. Pinnacle created the detailed concrete shop drawings both for Vertical and Horizontal elements for Marion Construction to meet the project objectives including:

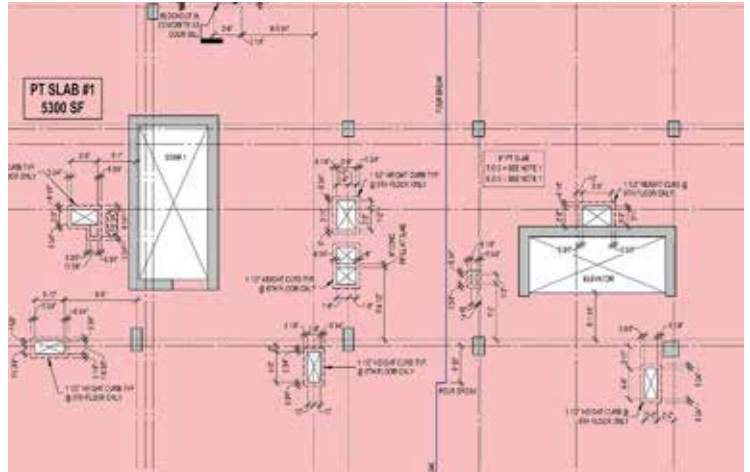
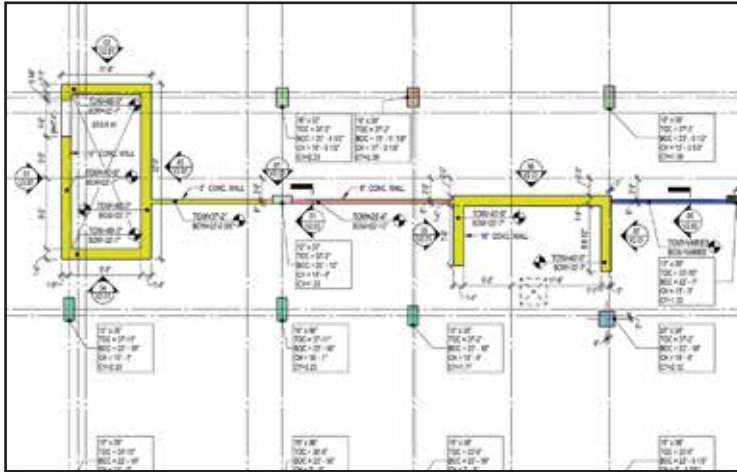
Facts at a glance:

- Trades Covered: Concrete
- Client/Company Name: Marion Construction Company
- Client Role: Concrete Contractor
- Building Type: Mixed Use Building
- Project Area: 240,700 sq. ft.
- Software Used: AutoCAD LT 2016
- Architect: SERA Design and Architecture, Inc.
- General Contractor: MCRT PNW Construction, LLC
- Developer & Owner: 10th & Davis Apartments, LLC
- BIM Start Date (Month & Year): 27th Feb'17
- BIM End Date (Month and year): 31st Jul'17
- Average Team Size: 6 Engineers
- LOD: Revit model creation @ LOD 400 from 95% Construction Set



- Foundation drawings
- SOG drawings
- Wall & Column arrangement
- Slab Arrangement Drawings
- Framing Plan Drawings
- Elevation drawing for vertical elements
- Detail Drawing
- Shop drawing validation
- Constructability review

Shop drawings created for both Vertical & Horizontal elements



Constructability Review shared with client by raising RFIs & RFCs; Subsequent solution incorporated in the design

With reference to the FLOOR PLAN- PARKING 2, we have the following issues:

ISSUE -1:
 Could you please provide us the slab thickness for yellow marked area as it is not found in Structural as well as Architectural drawing.

PIS ASSUMPTION: We have assumed the slab thickness 0'-8".

ISSUE -2:
 Please provide us the top of Mat slab elevations for green marked area.

PIS ASSUMPTION: We have considered top of Mat slab El. 12'-8".

Modeling Stages

Stage 1: Revit model of LOD 400 from 95% Construction Set - Pinnacle created the 3D BIM model of Mat Foundation, Elevator Pits, Foundation walls, Retaining Walls, Slab on Grade, Floor Slab, Beams, Floor Opening, Concrete Curbs, Shear Walls, Columns, Sleeves & Ramp

Stage 2: Shop Drawing Creation - Pinnacle created the following shop drawings for Marion Construction Company:-

- Foundation Plan
- Slab on Grade

- Slab Plan
- Soffit Plan
- Wall & Column Plan
- Roof Level Slab Plan
- Sections/Elevations/Details

Stage 3: Constructability review - Model updation to reflect changes resulting from Design changes & RFI updation

Challenges Faced & Solution:

Challenge 1: Input Inconsistency -

The CD sets had several inconsistencies that needed to be sorted out before creating the detailed drawings of concrete elements. Pinnacle also received Addendum AB003 during this stage.

PIS Approach:

- I. The engineers checked and compared the CD sets for inconsistencies.
- II. Issues were raised through RFIs and communicated to client through Webex and email for incorporating desired changes into the drawings.
- III. Over 19 RFIs & 25 RFCs were raised where the client’s decision was considered necessary. The RFIs were vetted by the client, who in turn escalated the same to the consultant for probable solution.

Challenge 2: Aggressive Project Deadline

PIS Approach:

Pinnacle engaged a team of Structural engineers by clearly defined targets to complete the project within stipulated time frame. Moreover, senior team members provided technical guidance and quality check, whenever needed.

Challenge 3: Missing Information -

Slab thickness was not found for Structural & Architectural Drawings with reference to Floor Plan Parking 2. Moreover, top of Mat Slab Elevation was missing and marked dimensions for EOS was missing in Structural (S1P1) and Architectural drawings (A1P1S).

PIS Approach:

Pinnacle assumed slab thickness to be 0'-8" and considered top of Mat slab El to be 12'-8". Pinnacle team manually measured the EOS from PDF.

Challenge 4: Design Discrepancy -

Pinnacle found a discrepancy of elevator pit detail in between Structural & Architectural drawings. If Pinnacle team followed the section 10/S501, there could be a mismatch with Architectural detail 5/A511.

PIS Approach:

Pinnacle asked client to confirm the sump pit location in plan drawing - 11/S501, so that the same can be incorporated in the shop drawings

BIM Simplified Pinnacle’s Work Process:

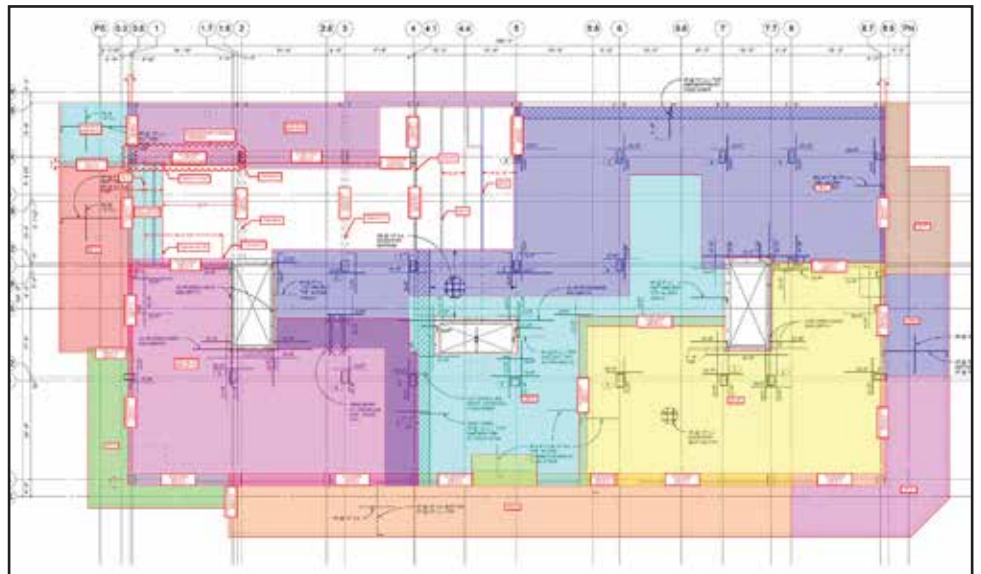
- **Input Challenge:** BIM helped to find several inconsistencies in the input drawings.
- **Incomplete Information:** Mat slab elevation, sump pit location, ramp slope at parking level, floor drains position & variable slopes on Structural slabs were done using BIM
- **Constructability Issues/ Reviews:** There were some conflicts between Architecture and Structure which could have affected the actual construction in terms of time, cost, manpower and material. BIM minimized all wastages.

Modera Davis Concrete Detailing Schedule					
Sheet Type	First Draft Complete	Initial Review Complete	Second Draft (Submittal Copy) Complete	Submittal Review Complete	Issued For Construction (Final) Complete
Floor Plan-Parking 2	27-Feb	13-Mar	20-Mar	3-Apr	10-Apr
Floor Plan-Parking 1	13-Mar	27-Mar	3-Apr	17-Apr	24-Apr
Floor Plan-Level 1	27-Mar	10-Apr	17-Apr	1-May	8-May
Floor Plan-Level 2	10-Apr	24-Apr	1-May	15-May	22-May
Floor Plan-Level 3	24-Apr	8-May	15-May	29-May	5-Jun
Floor Plan-Level 12	8-May	22-May	29-May	12-Jun	19-Jun
Roof Plan	22-May	5-Jun	12-Jun	26-Jun	3-Jul
High Roof	5-Jun	19-Jun	26-Jun	10-Jul	17-Jul
Roof Level Canopy	19-Jun	3-Jul	10-Jul	24-Jul	31-Jul

Responsible Party	Pinnacle	MCC	Pinnacle	GC	Pinnacle
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PROJECT DELIVERY SCHEDULE PROVIDED BY THE CLIENT:

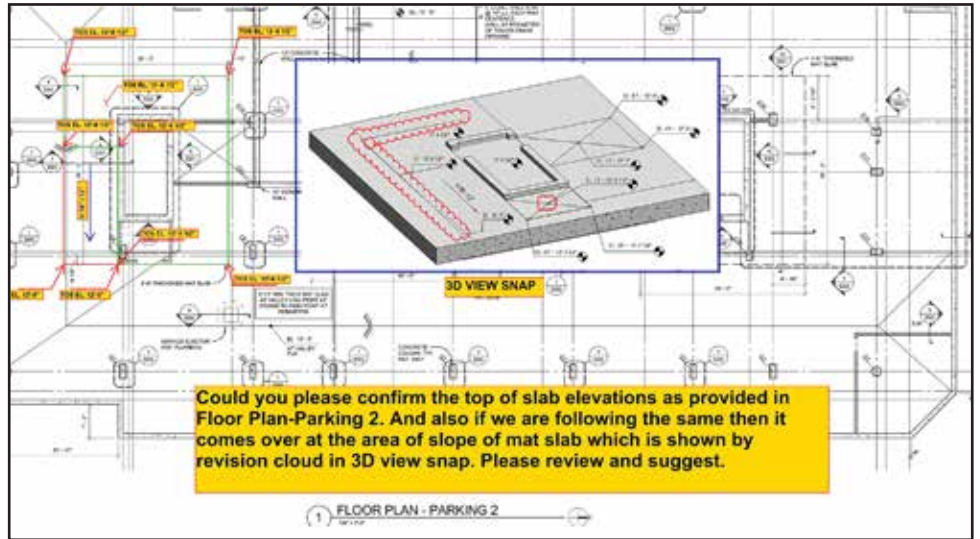
- Coordinating /Design Issues Faced: BIM coordination identified the clash and helped Pinnacle to raise the clashes to consultants, which resulted in revision of design. The following issues were identified in drawings and resolved through drawing validation:
 - Pouring sequence was changed
 - Mat slab thickness was modified
 - Floor opening terminated at Level-1



REINFORCING PLAN - CHANGED POURING SEQUENCE

Pinnacle's Value Addition:

Pinnacle delivered models and lift drawings, undergoing thorough checking for design discrepancies, codes adherence, constructability and coordination issues. Project kick off meeting was held at the beginning of the project with several attendees including CSH, PM, TLs and Client. Moreover, daily status meeting was held with the Project Manager and Team Leaders along with Client Head Review Meeting every week with CSH, PMs and TLs for smooth and error-free communication. During the project execution stage Pinnacle raised 19 RFIs & 25 RFCs and received 10+ RFIs raised by the client. Pinnacle started the project based on the 95% Construction sets, received AB003 documents (Latest Revision) and updated the shop drawings accordingly.



MAT SLAB THICKNESS WAS MODIFIED

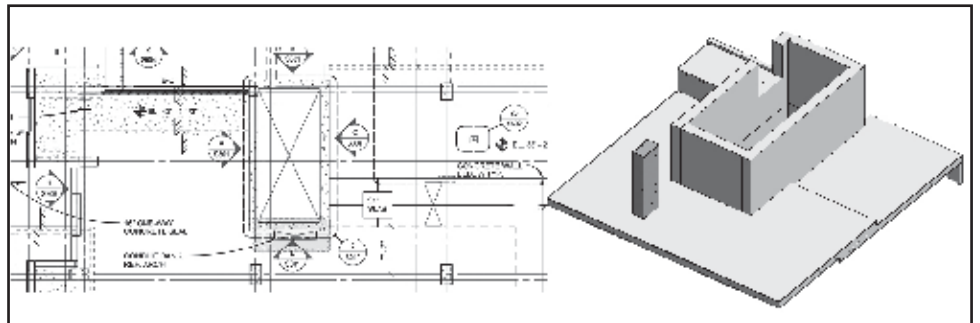
Client Feedback:

"The process seems to be working very well for us."
 - Cody Olson, Marion Construction Company -
 (Average rating by the client - 4.5 out of 5)

Testimonial from Pinnacle Infotech Team Members:

Mr. Kunal Ghosh, Deputy Manager & Mr. Goutam Das, Senior Manager said

– "Autodesk Revit BIM software helped us to identify constructability issues prior to the execution stage and progress through each phase of the project. We reviewed critical areas in 3D for changes made and evaluated space constraint successfully. BIM facilitated various design disciplines to collaborate in a flawless manner as single information platform, enhancing work efficiency, reducing errors, verifying aesthetic looks and improving building performance."



FLOOR OPENING TERMINATED AT LEVEL-1

