Walk-in Slide: AU 2014 Social Media Feed

1. Click on the link below, this will open your web browser

http://aucache.autodesk.com/social/visualization.html

2. Use “Extended Display” to project the website on screen if you plan to work on your computer. Use “Duplicate” to display same image on screen and computer.

FB5474 - Create Structural Shops Drawings and Fabrication Models Using Autodesk Revit

Dan McCloskey, P.E.

Erich Bretz, P.E.

Principals, MB BIM Solutions

Class summary

Due to new tools available to design teams and contractors, faster construction schedules, and the increased in integrated project delivery through the use of BIM, the ‘who’, ‘how’, and ‘when’ of shop drawings and fabrication models is changing. It is now possible to leverage a structural engineer’s design model to create shops drawings and fabrication models for rebar, precast, structural steel and miscellaneous metals, and to create concrete lift drawings.

The ‘who’ is starting to change from fabricators and subcontractors to structural engineers, and BIM consultants. The ‘how’ is changing from 2D CAD for rebar, concrete lift drawings, and precast concrete, and from Tekla and SDS/2 for steel. Revit (and Advance Steel) can now be used to do this on a true BIM platform, with the advantage being to re-use the information and knowledge in a design Revit model further downstream into fabrication and construction. The ‘when’ is being change from a linear design-bid-build structure to a collaborative structure in which shop drawings and piece drawings are being produced in the late stages of the design process. This new approach enables schedule and constructability efficiencies by engaging the fabrication and construction team’s knowledge and preferences before design is complete.

Key learning objectives

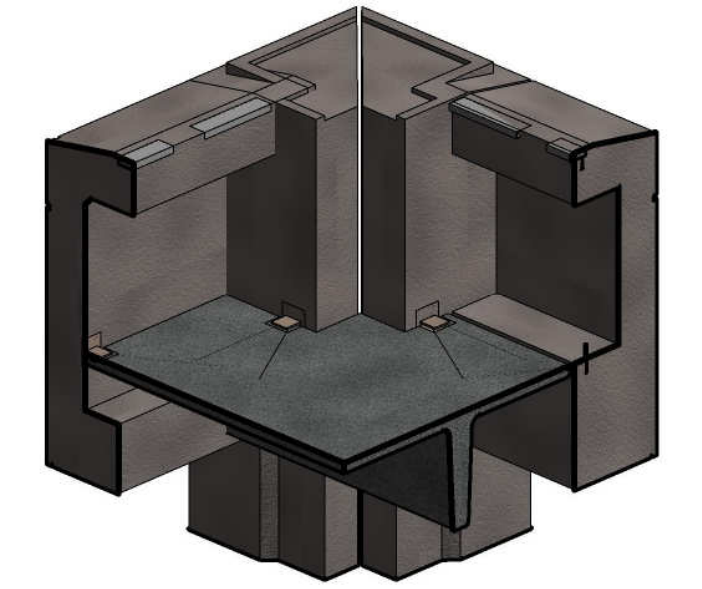
At the end of this class, you will be able to:

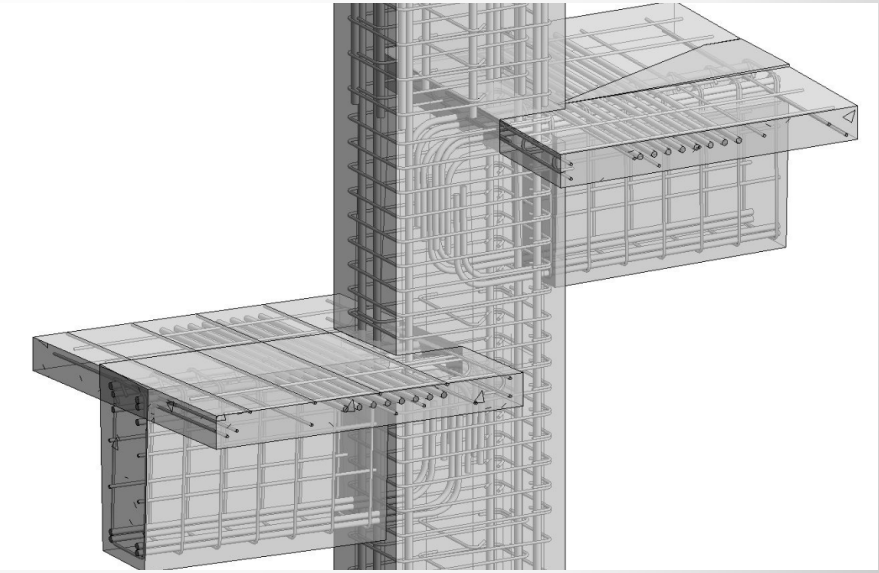
- Learn how BIM can be used to bridge the information gap between design and construction for a typical project.
- Learn about what types of construction services can be readily offered by entities acting as the link between design and construction.
- Learn about how design data can be utilized to start construction activities earlier than in a typical design-bid-build process.
- Learn what the advantages and disadvantages of such BIM-based delivery are to common project participants (Owners, designers, general contractors, subcontractors, etc).

MB BIM Solutions

A Quick Overview of What We Do:

- Fabrication Level Models (and Shop Drawings from these models):
  - Rebar, Precast, Structural Steel and Miscellaneous Metals

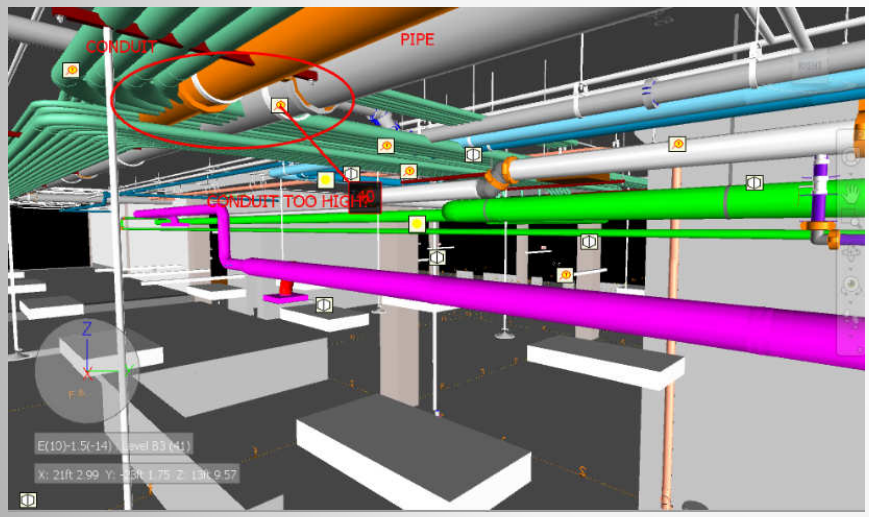


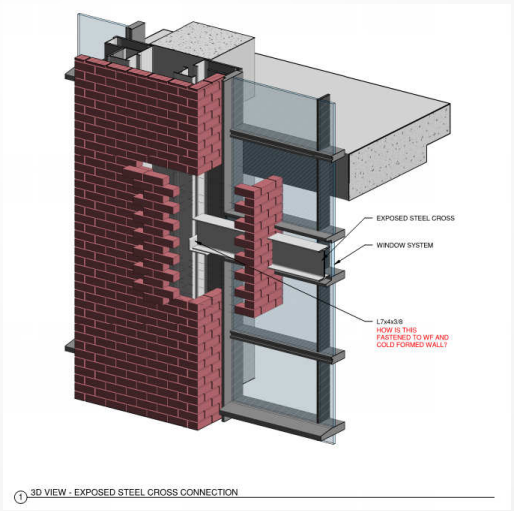


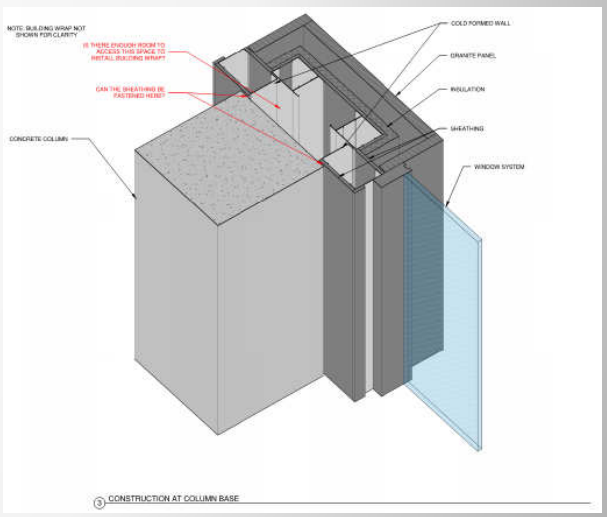
MB BIM Solutions

A Quick Overview of What We Do:

- Navisworks Coordination
- Custom Modeling
  - Virtual Mock-Ups, Constructability Studies



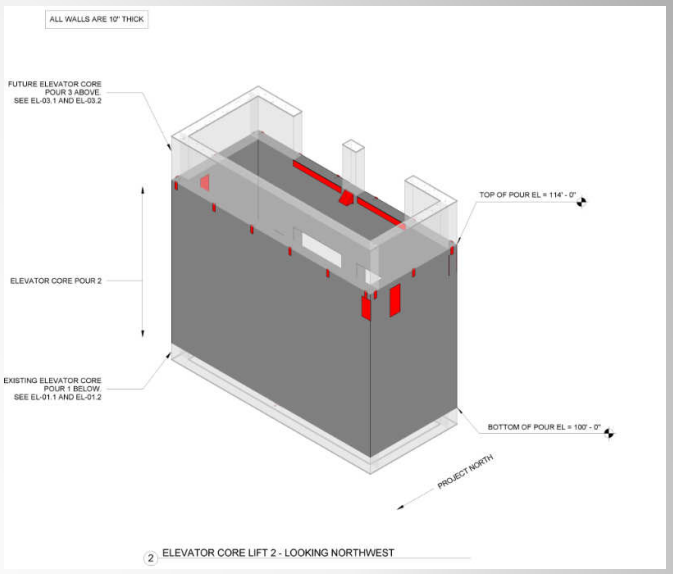


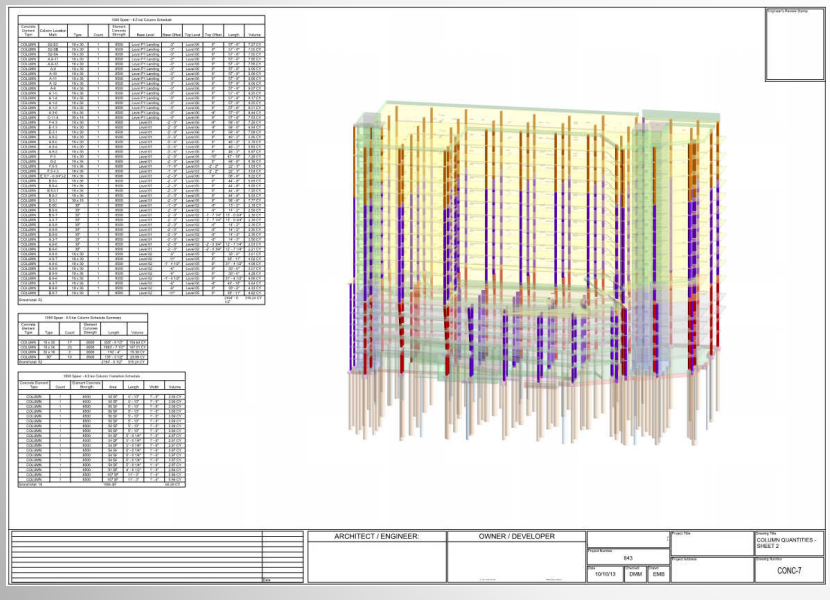


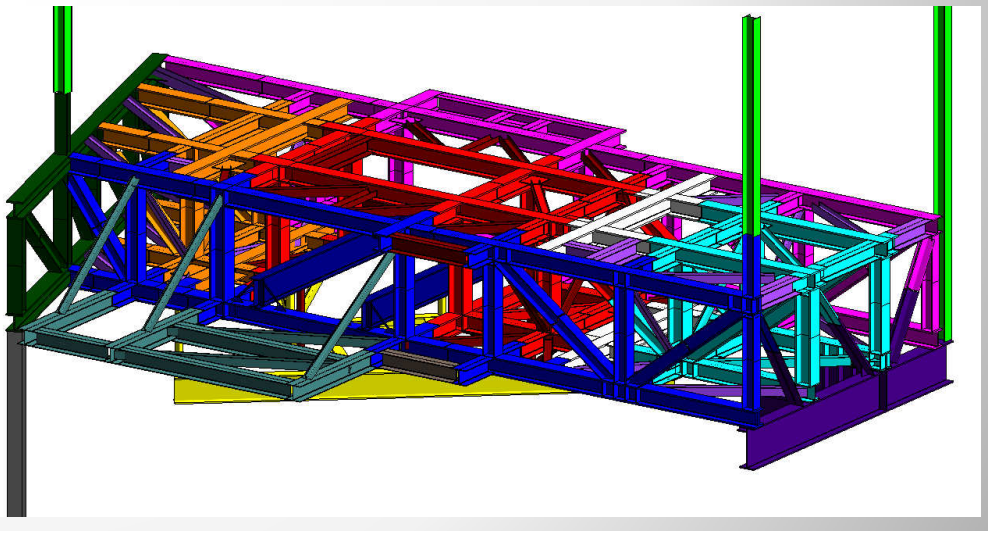
MB BIM Solutions

A Quick Overview of What We Do:

- Concrete Lift Drawings
- Construction Sequence Modeling/Animations
- Model-Based Estimating





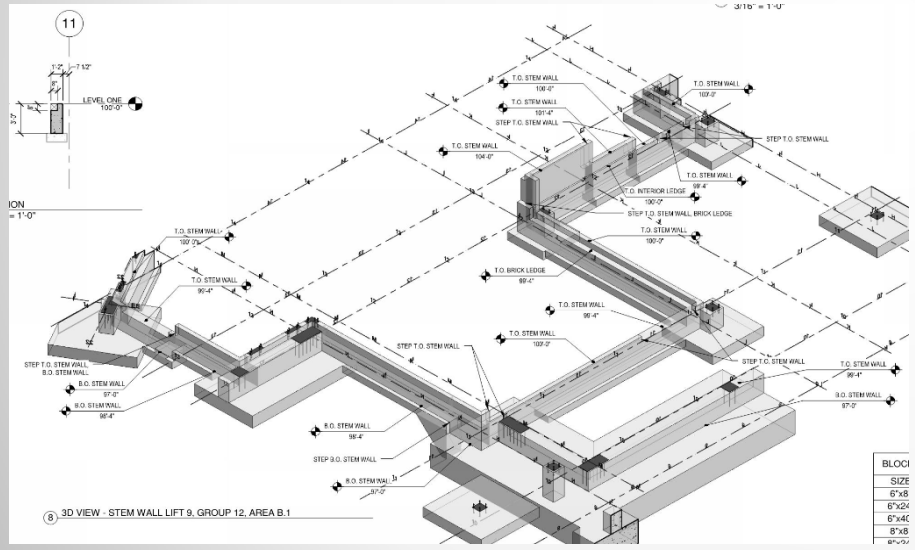


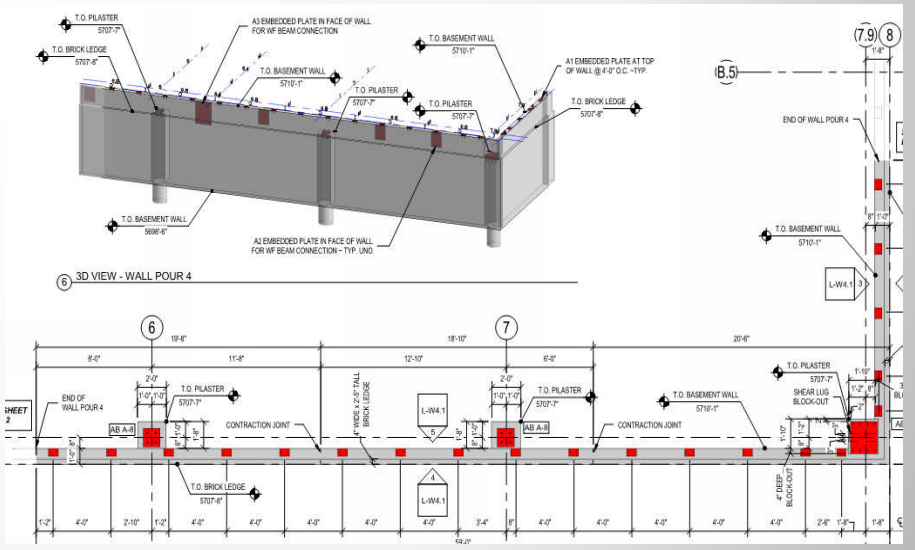
Shop Drawings – ‘Who’, ‘When’, ‘How’ is Changing

- Prevent Drop-Off of Information and Knowledge into Construction
  - Enhance quality of the final built product
- BIM Tools Enabling Change in Workflow and Responsibilities
- Typical Design-Bid-Build Is Changing
  - Pros and Cons
- Who Realizes the Benefit?
  - Design Teams
  - Fabricators / Specialty Subs
  - GC’s
  - Owners

Concrete Lift (Line) Drawings

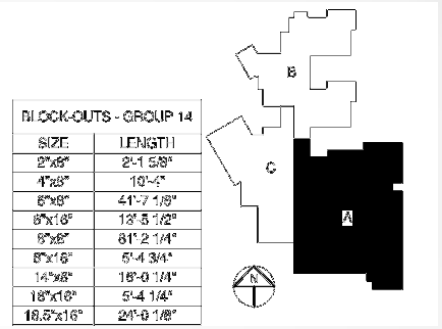
- What is Included?
  - All edges and items embedded in concrete
- What to Look For?
  - Constructability, Sequencing, Access, Design Discrepancies

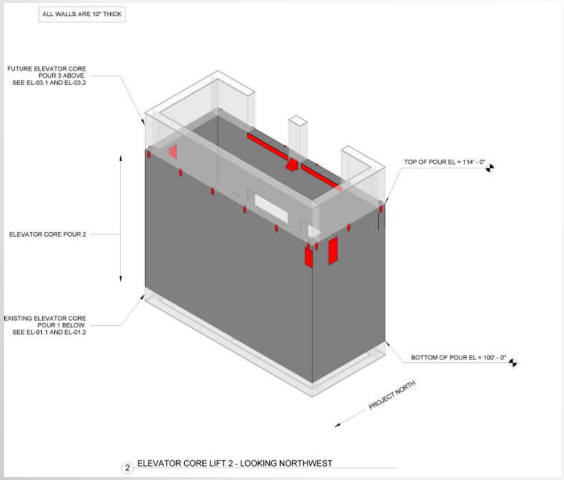


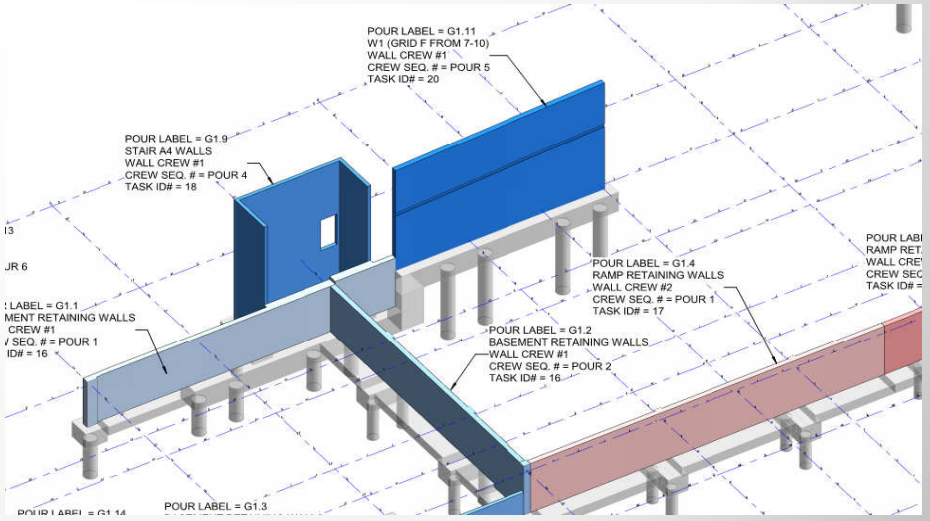


Concrete Lift (Line) Drawings

- Benefits:
  - Enhanced Productivity
  - Field Labor Visualization
  - Sharing of Models
  - Enhanced Coordination
  - Quantity Management
  - Schedule Management

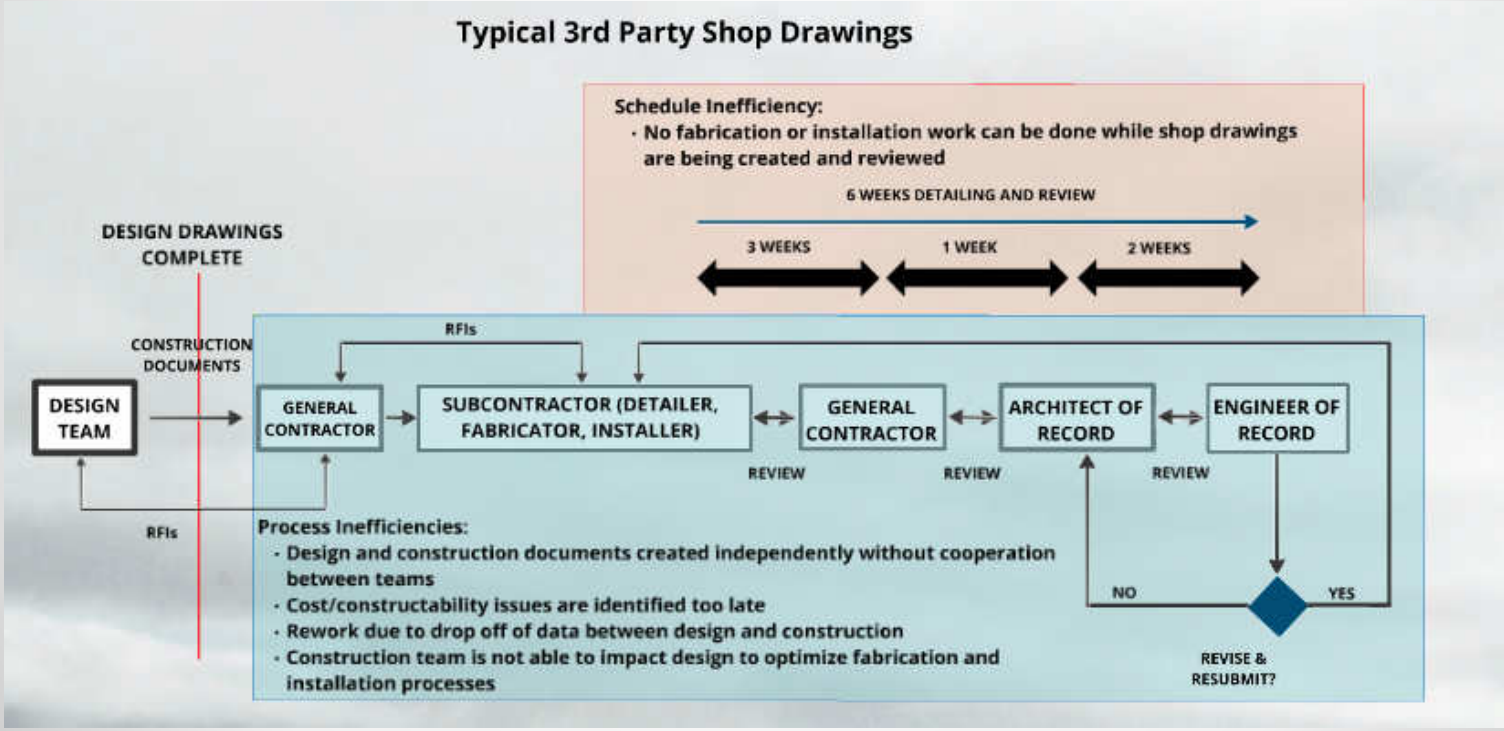






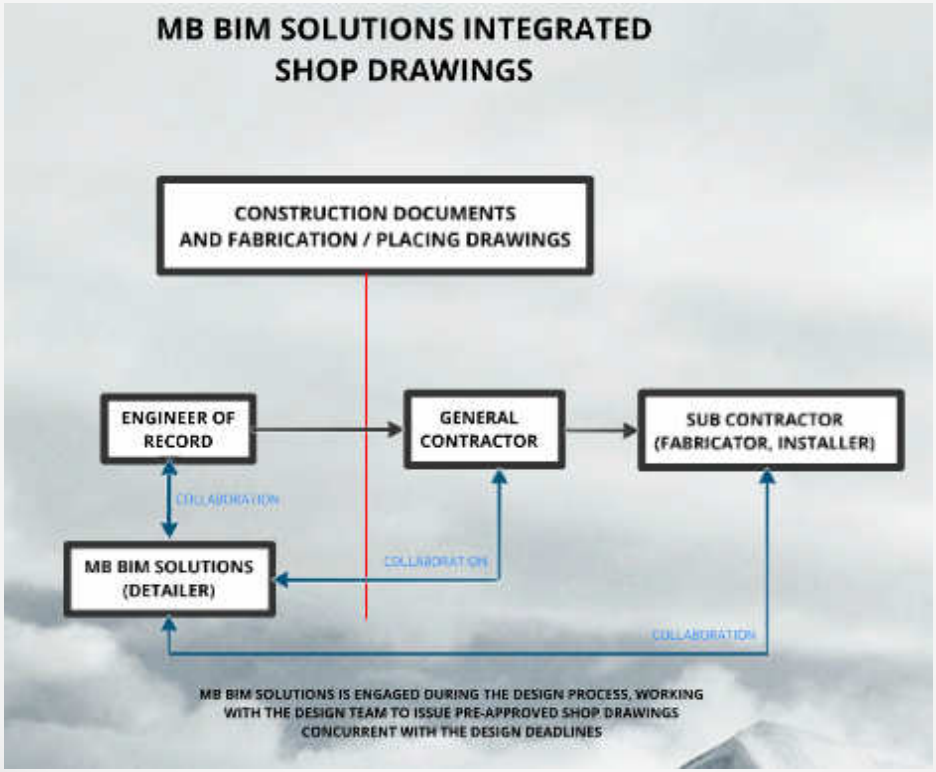
Rebar Shop (Placing) Drawings

- Typical Process:



Rebar Shop (Placing) Drawings

- Integrated Process:



Rebar Shop (Placing) Drawings

- Advantages:
  - Material Savings

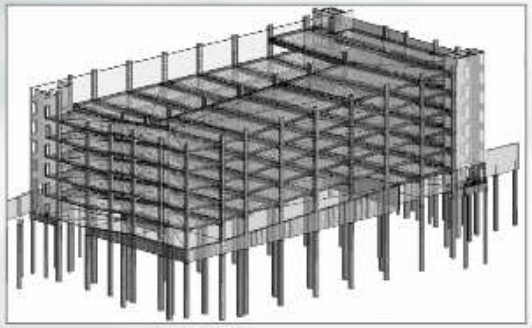
Highpointe Parking Garage, Denver, CO

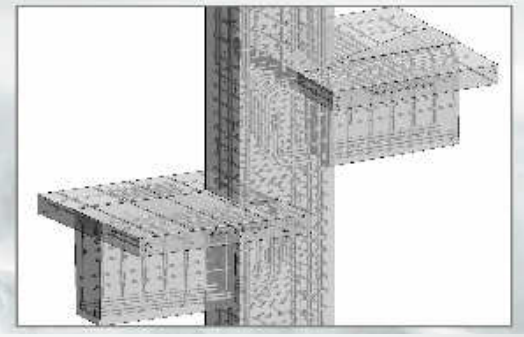
Team:
- McClone Concrete Construction (Client)
- Anchor Engineering (Structural EOR)
- Sierra Rebar (Installer)

Project Stats:
- 6-Story, ~125,000 sq. ft., Concrete Beam and Slab System
- Final Rebar Tonnage = 360 tons
- Staggered Column Splices, 2-Story Cages
- 1-Story Below-Grade (Basement Walls)

DIRECT COMPARISON TO FABRICATOR HARD-BID!!!
- Beam Tonnage Savings = 28.9 Tons (21%)
- Column Tonnage Savings = 14.9 Tons (16%)
- Slab Tonnage Savings = 15.6 Tons (16%)

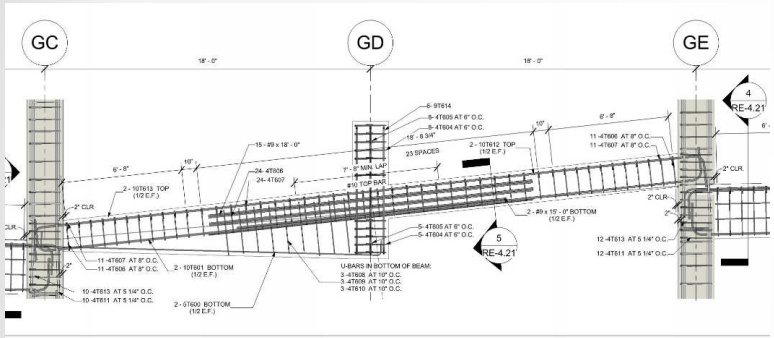
TOTAL TONNAGE SAVINGS = 59.4 TONS = 18% = $71,280
- MB BIM 'Premium' Cost = $7,420
- Total Dollar Savings = $63,860
- ROI = 860%!!!

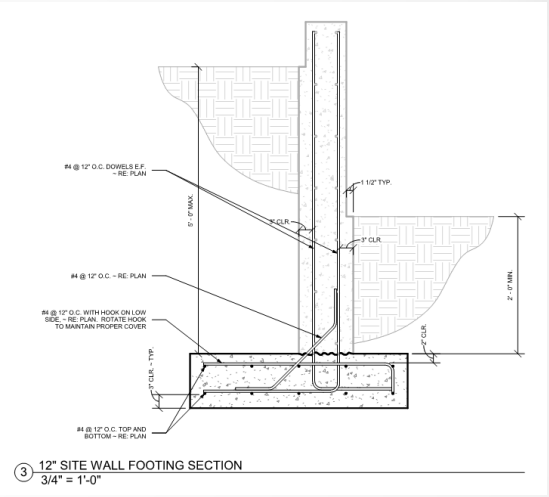


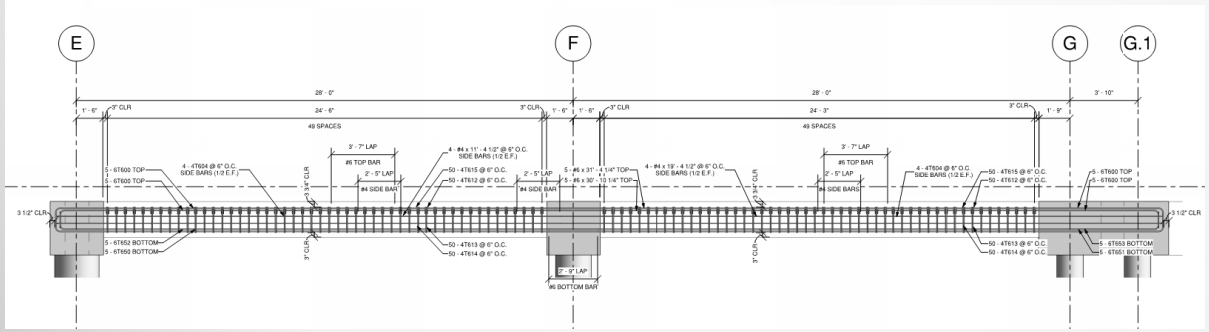


Rebar Shop (Placing) Drawings

- Advantages:
  - Material Savings
  - Better Shops = Easier Installation

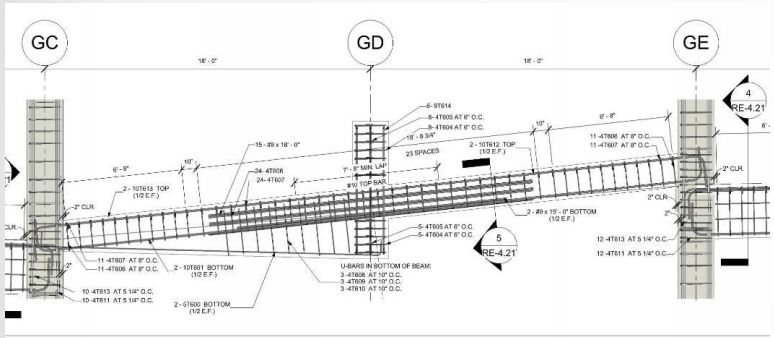


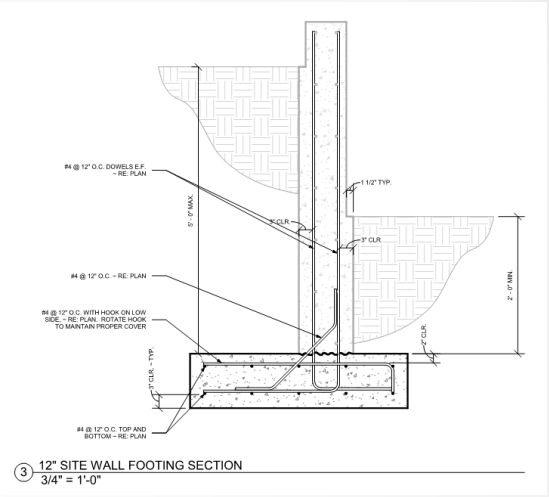


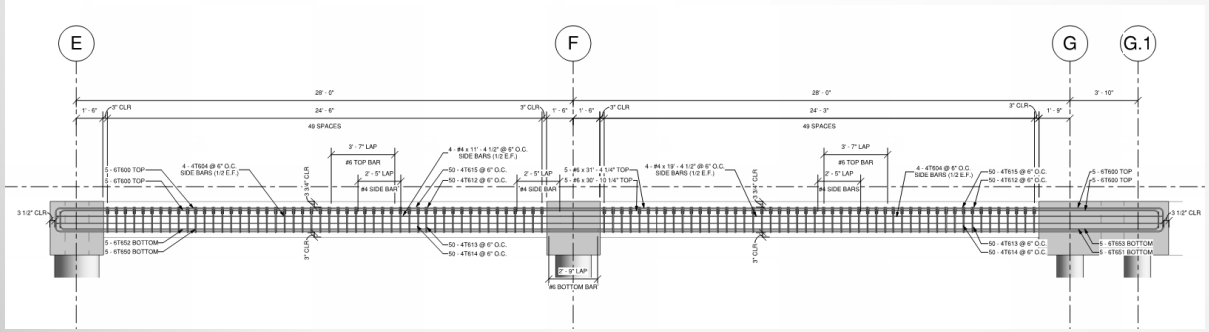


Rebar Shop (Placing) Drawings

- Advantages:
  - Material Savings
  - Better Shops = Easier Installation

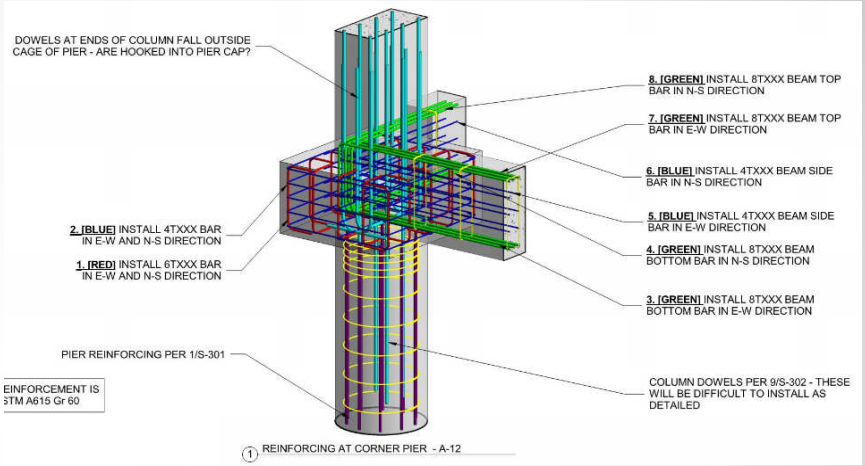


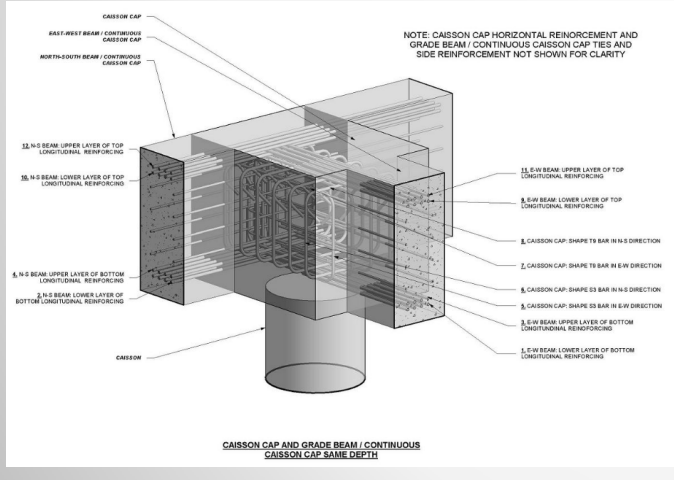


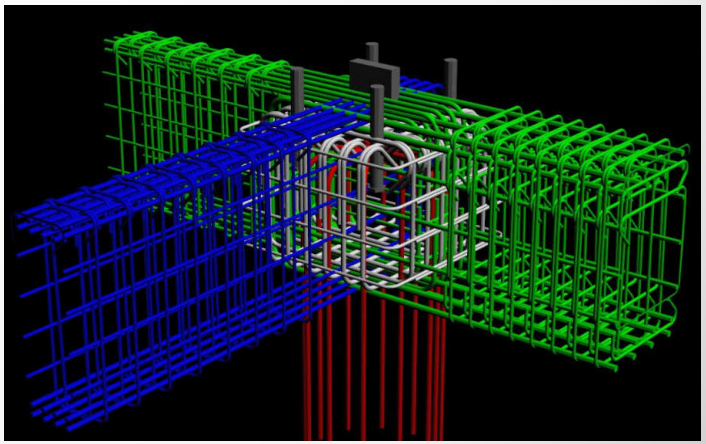


Rebar Shop (Placing) Drawings

- Advantages:
  - Material Savings
  - Better Shops = Easier Installation
  - Enhanced Coordination
  - Reduced Congestion
  - Schedule!!

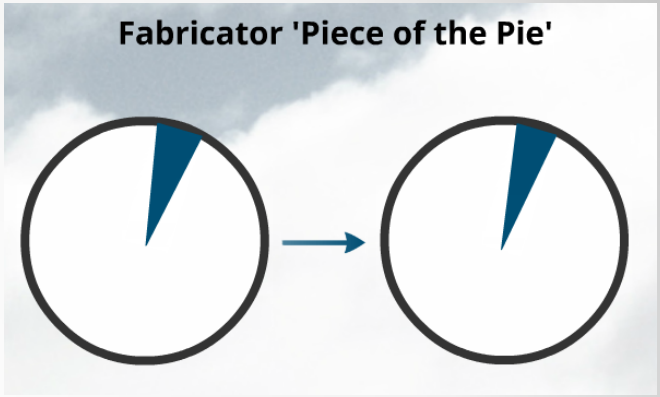






Rebar Shop (Placing) Drawings

- Challenges:
  - Fabricator Involvement
  - Shift of Risk / Responsibility / Reward
    - Different Contractually
  - How to Handle Changes
  - Installer Preference Now Known at Start

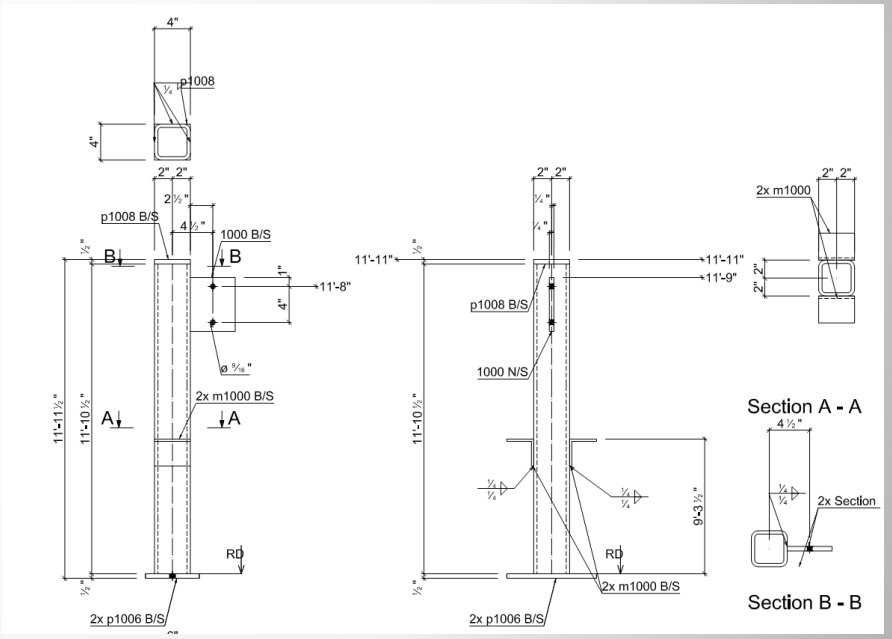


Structural Steel and Misc Metals Shop Drawings

- Advantages:
  - Longer lead time item allows GC to spend small $ (on detailing) to dial in scope for the large $ (buyout of material / erection)
  - Schedule!
  - Integration with design team models

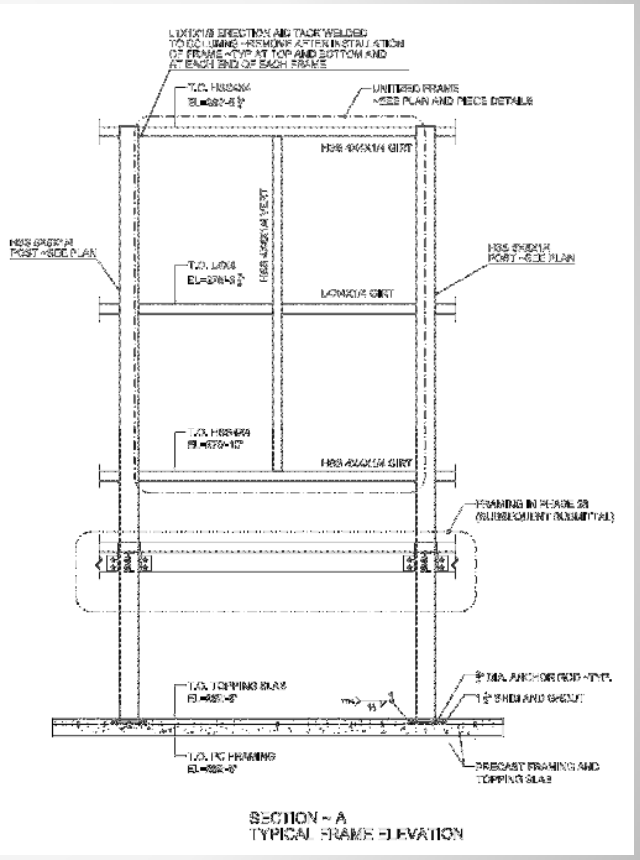
Revit vs Advance Steel?

- Argument for Revit:
  - Linking with design models
  - Leverage your current Revit knowledge
  - Cost of licenses
  - Ease of use!
- Argument for Advance Steel
  - True steel detailing software
  - Automation of tasks
  - CNC output (!)

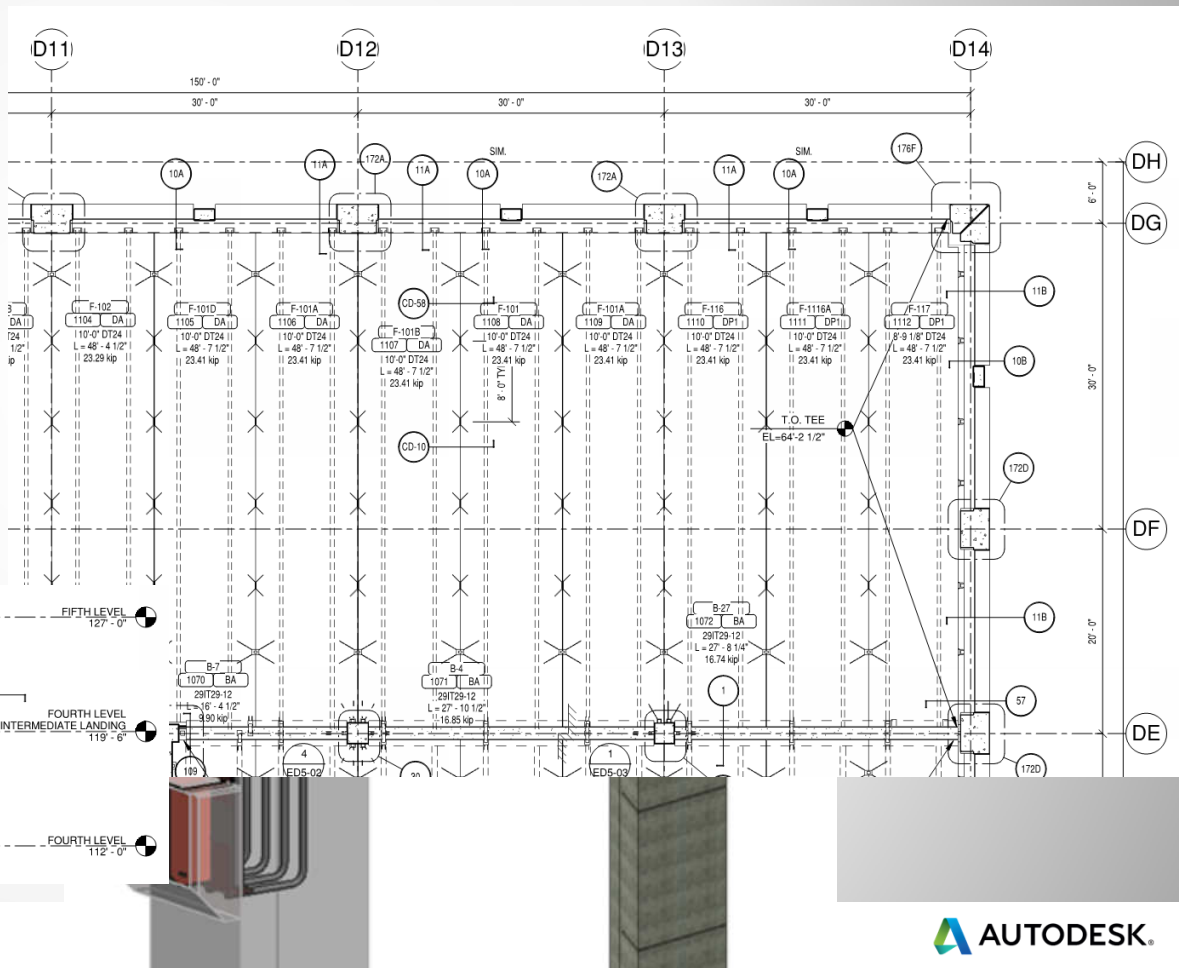


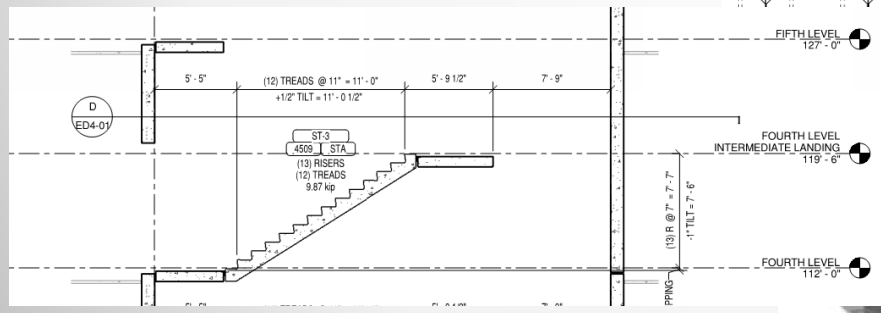
Structural Steel and Misc Metals Shop Drawings

- Challenges:
  - Fabricator Involvement
  - Shift of Risk / Responsibility / Reward
    - Different Contractually
  - How to Handle Changes
  - Installer Preference Now Known at Start



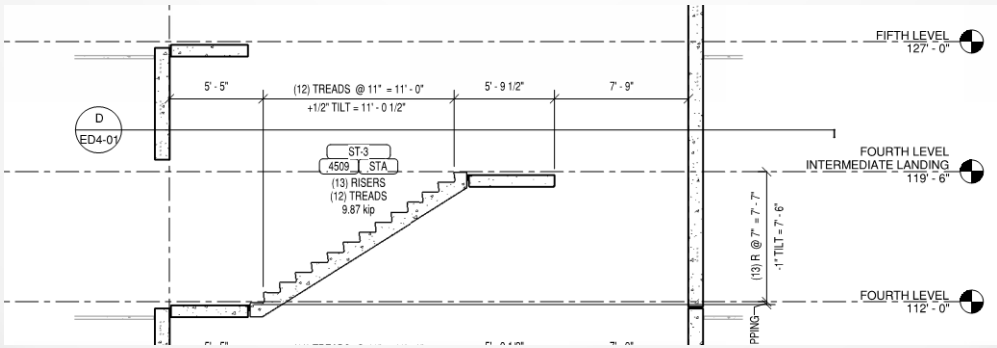
Precast Concrete Shop (Erection) Drawings





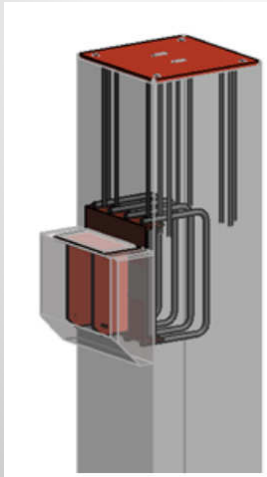
Precast Concrete Shop (Erection) Drawings

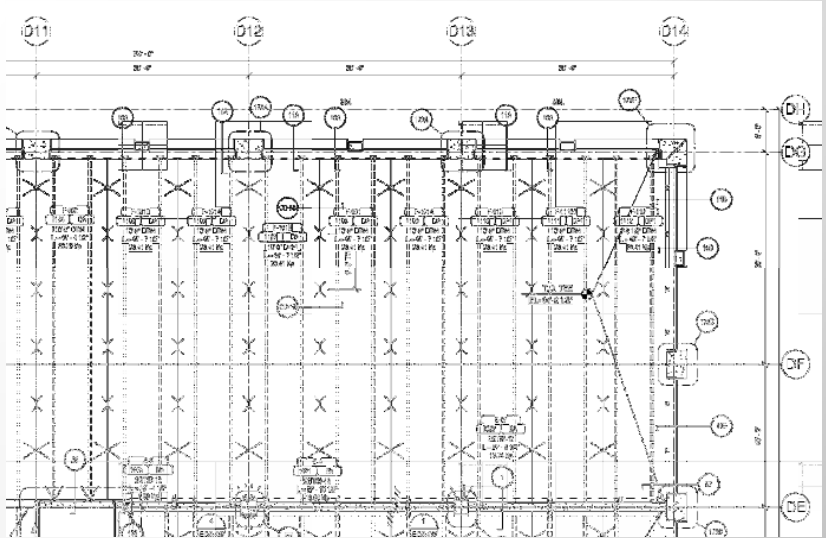
- Advantages:
  - Allows the precast concrete mfg to embed themselves into a project
  - Schedule!
  - Eliminates duplication of work by designers
  - QTO / material planning
  - Better service to the GC/Owner – be seen more as a design ‘partner’



Precast Concrete Shop (Erection) Drawings

- Challenges:
  - Intimate knowledge of precast concrete mfg's standards, standard parts, details, etc is required
  - Revit's ability to work with precast is limited (but getting better quickly)
  - Integration w/ other aspects of PC construction (scheduling, delivery, erection, etc)





Session Feedback

- Via the Survey Stations, email or mobile device
- AU 2014 passes given out each day!
- Best to do it right after the session
- Instructors see results in real-time

Earn your professional Autodesk Certification at AU

Visit the AU Certification Lab