

# MEP Virtual Construction: When the Design Gloves Come Off

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# Class Summary

In today's fast-paced world it is becoming increasingly important to know how to utilize the design information received to create the most efficient and accurate plan for the construction of the designed systems. We'll talk about how we work with design models outside of Building Information Modeling (BIM) coordination to get more accurate information to estimators, foremen, and electricians. There will also be a brief overview of how we approach the subject of prefabrication from an electrical view.

# Learning Objectives

At the end of this class, you will:

- Learn how to better communicate needs to the design team, as well as internal construction team
- Discover additional ways to utilize design models
- Gain some tips and tricks in Revit MEP for construction
- Explore some additional MEP technology for electrical construction



# 💡 Watts Up Las Vegas! 💡

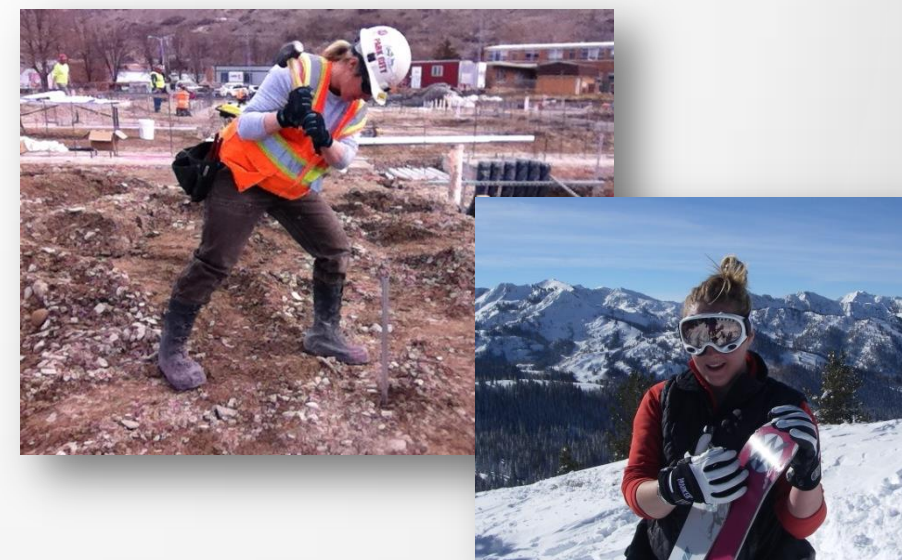
## SUNNY (CASSANDRA) WATTS



- Worked in the ski industry as a snowmaker from 2001 - 2008
- Last 5 years in the industry worked as a snowmaking technician for one of the largest snow gun manufactures in the world
- Left the ski industry to pursue an electrical career
- Started working at Taylor Electric in 2009 as an electrician.
- Has been an expeditor, on site electrician, robotic total station operator and currently is the manager of the Layout Department

- Started in the industry of Interior Design
- Worked for local Electrical Engineering firms for several years
- Specializes in Revit MEP and Family Building
- Started work at Taylor Electric in 2014 to help develop the Virtual Design department.
- Teaches at a local Autodesk Training Center

## NIKKI DIVERS





# TAYLOR ELECTRIC



Taylor Electric has been handling projects with skilled hands and a thorough eye since 1975.

Completed over \$500,000,000 worth of quality electrical construction.

Over 250 dedicated quality production and office personal.

Always using state-of-the-art products for cost effective installation & construction



# Challenges in Electrical Construction

👷 Communication

👷 Documentation

👷 Material

👷 Labor





An aerial view of a city skyline with a bridge and a river. The bridge is a multi-lane highway with a rainbow-colored line running along its length. The river is a wide body of water. The city skyline in the background features several tall skyscrapers. The text "Communicate needs to the design team, as well as internal construction team" is overlaid in a large, blue, sans-serif font.

**Communicate needs to the design team,  
as well as internal construction team**

# Communicate needs to the design team, as well as internal construction team

*“You can have brilliant ideas, but if you can't get them across, your ideas won't get you anywhere.”— Lee Iacocca*

## START and Start Early –

Utilize in-house kick-off meetings to discuss model information and project needs.

- Gather Key Players
  - Operation Manager, Project Manager, Safety Manger, Virtual Design Team and Foreman
- Establish design parameters and practices:
- Set deadlines and formats for requests:



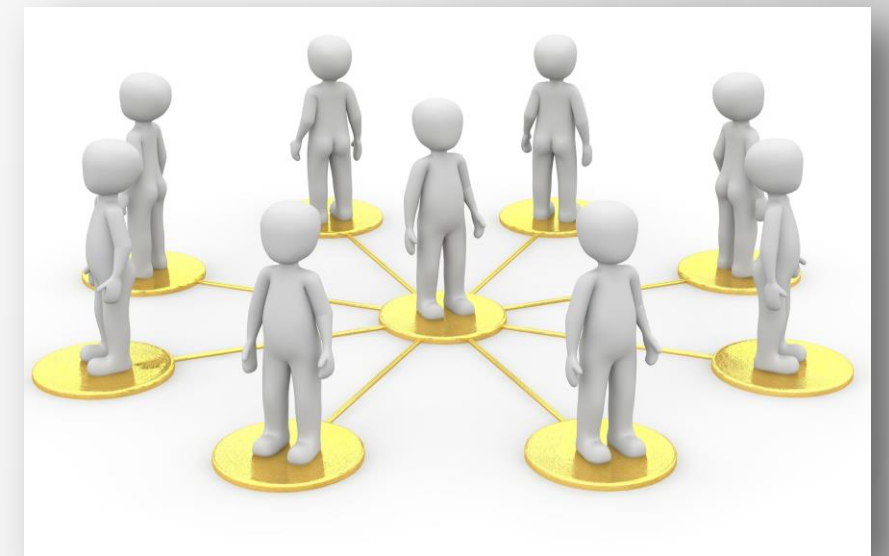
# Communicate needs to the design team, as well as internal construction team

## Communication with BIM Coordination

- Communicate finale in-house use for BIM models
- Build Schedule for coordination and pre-fabrication with job foreman

## Set a standard for document sharing and distribution:

- Explore available technology for document sharing
- Give tools and set expectations for information sharing
- Train, Train.... And RETRAIN!





An aerial view of a city skyline, likely Chicago, featuring a large bridge crossing a river. The bridge has a rainbow-colored line running along its length. The city skyline is visible in the background, with several tall buildings. The foreground shows a green park area with trees and a path.

# Additional ways to utilize design models



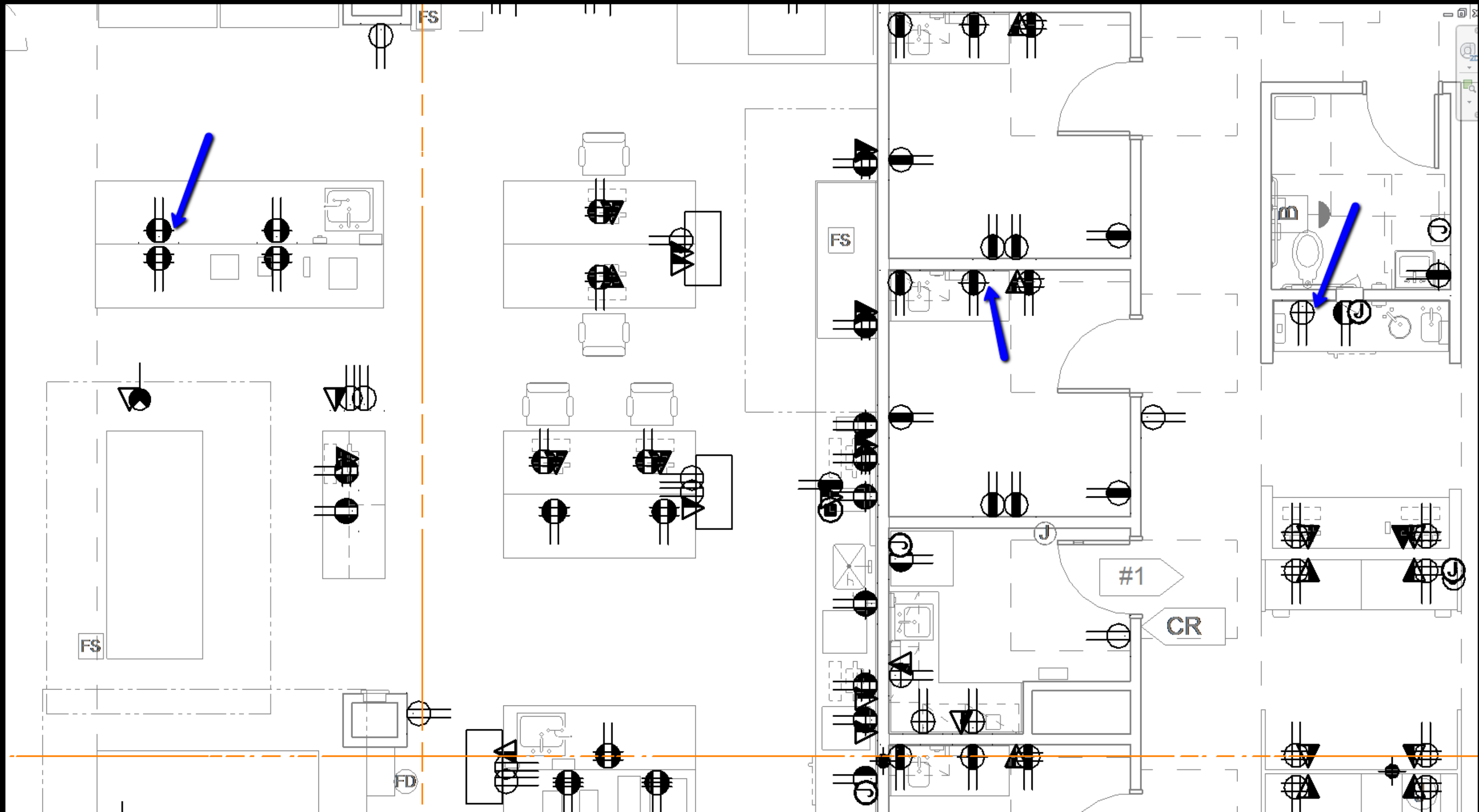
# Additional ways to utilize design models

## Revit as a construction tool:

- Information Intuitively linked to dynamic geometry
- Easier to retrieve information through details and scheduling
- Possible to enter the space before ground is ever broken

## The power of Revit schedules for construction

- Utilizing schedules to obtain counts of equipment and material
  - Revit Schedules read information from parameters either existing in the engineered models, or added by the virtual design team.

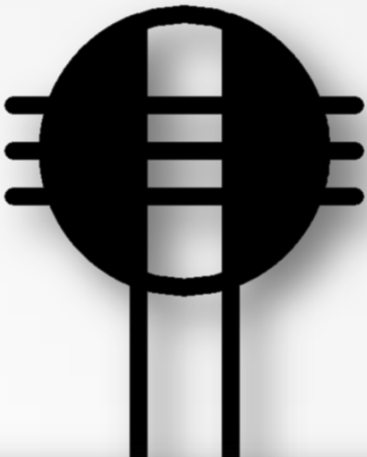




<Electrical Fixture Schedule>			
A	B	C	D
Family	Type	GFCI - YES	Count
4Plex - Level	GFCI Above Counter EM	Yes	5
4Plex - Level	GFCI HG EM	Yes	1
Duplex - Level	Drinking Fountian	Yes	10
Duplex - Level	GFCI	Yes	21

HG EM GFCI	<input type="checkbox"/>	=
HG EM	<input type="checkbox"/>	=
HG	<input type="checkbox"/>	=
GFCI WP	<input type="checkbox"/>	=
GFCI	<input checked="" type="checkbox"/>	=
Floor Recept	<input type="checkbox"/>	=
EM	<input checked="" type="checkbox"/>	=

Duplex EQ - Level	Soda	Yes	1
Duplex EQ - Level	Toaster	Yes	1
zEX - Duplex	Drinking Fountian	Yes	1
zEX - Duplex - Hospital Grade	HG GFCI	Yes	1
zEX - Duplex - Hospital Grade	HG GFCI Above Counter	Yes	9

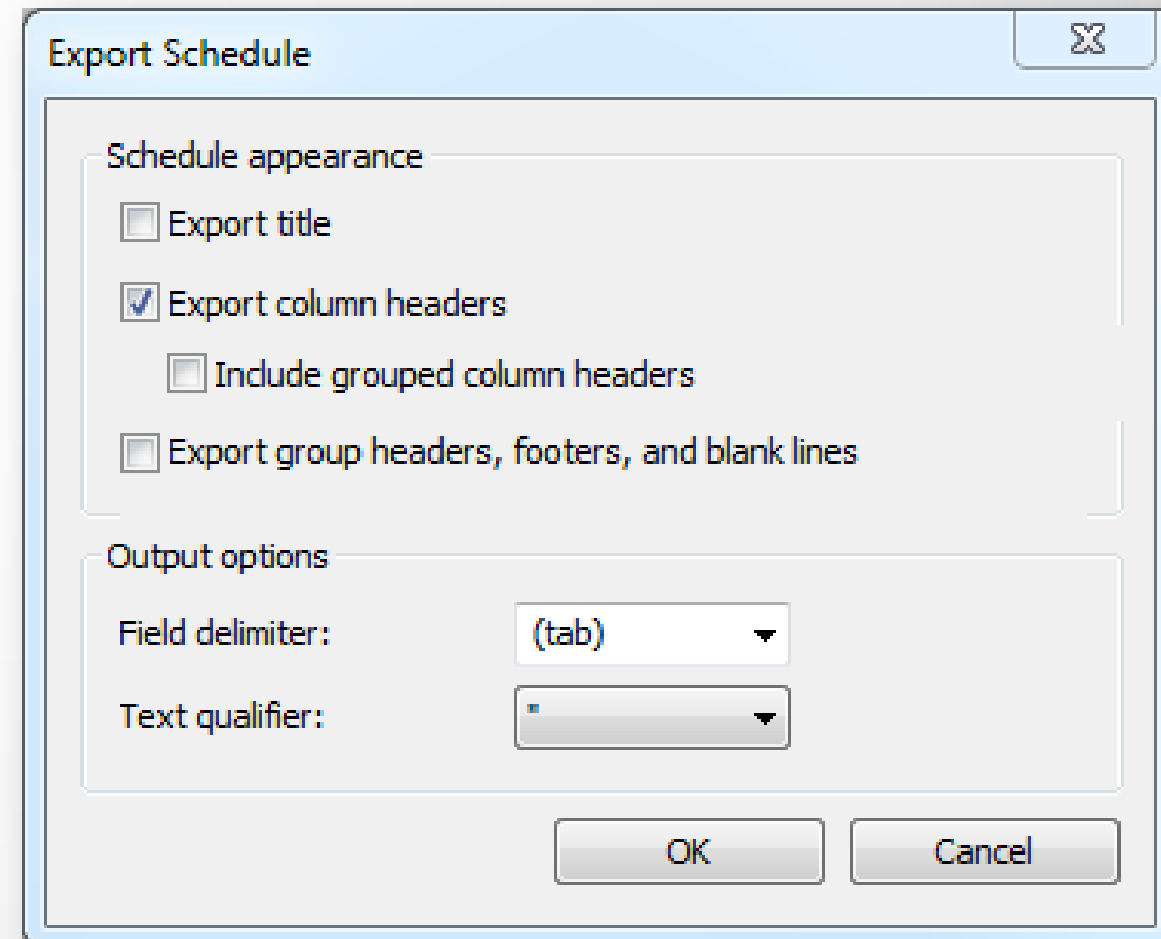


# Additional ways to utilize design models

## The power of Revit schedules for construction

- Utilizing Schedules to generate labels for receptacles on the site

<Electrical Fixture Schedule>		
A	B	C
Family	Panel	Circuit Number
P-Fourplex Receptacle	1L1	3
P-Fourplex Receptacle	1L1	3
P-Fourplex Receptacle	1L1	4
P-Duplex Receptacle	1L1	5
P-Fourplex Receptacle	1L1	5
P-Fourplex Receptacle	1L1	5
P-Special Purpose	1L1	6,8
P-Special Purpose	1L1	7,9
P-Duplex Receptacle	1L1	12



The 'Export Schedule' dialog box is shown with the following settings:

- Schedule appearance:**
  - ☐ Export title
  - ☒ Export column headers
  - ☐ Include grouped column headers
  - ☐ Export group headers, footers, and blank lines
- Output options:**
  - Field delimiter: (tab)
  - Text qualifier: "

Buttons: OK, Cancel



# Additional ways to utilize design models

## The power of Revit schedules for construction

- Utilizing Schedules to generate labels for receptacles on the site

1L1-3		1L1-3		1L1-4		1L1-5
1L1-5		1L1-5		1L1-6,8		1L1-7,9
1L1-12		-		-		-

# Additional ways to utilize design models

*“Of all of our inventions for mass communication, pictures still speak the most universally understood language.”*

*- Walt Disney*

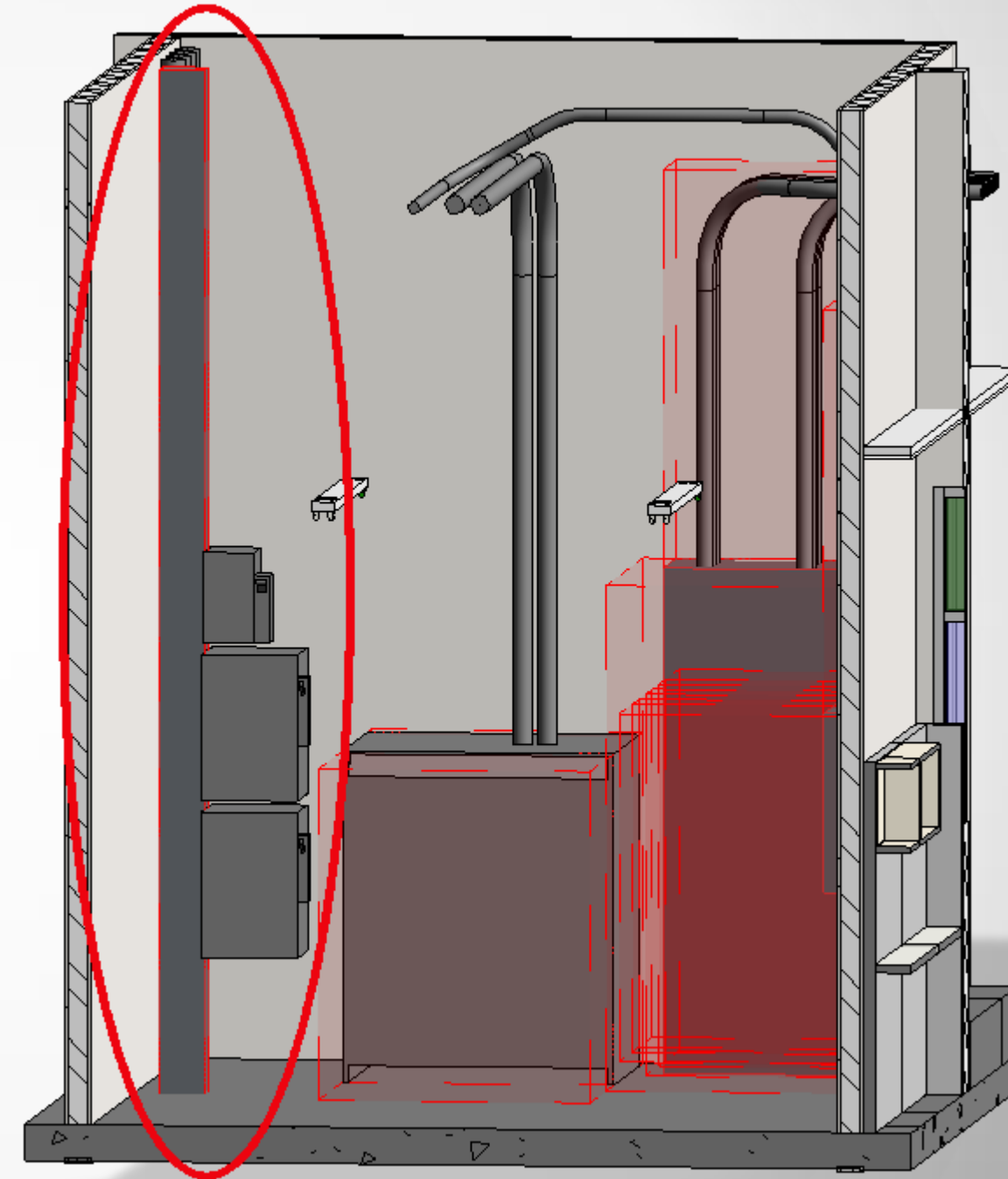
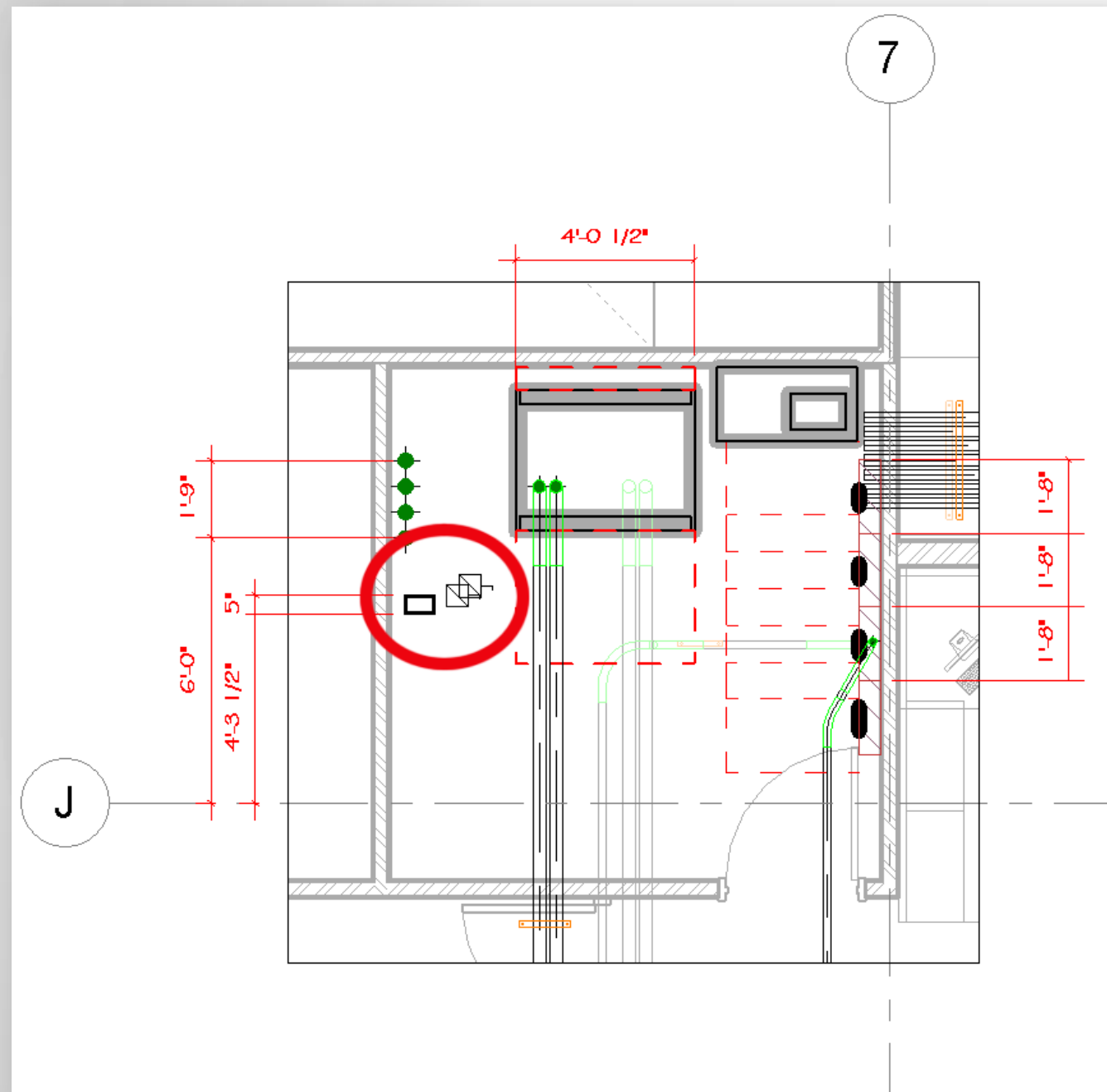


## The power of Revit visualization





# Additional ways to utilize design models



*Generating 3D views and details of the model in conjunction with construction documents to increase understanding.*

# Additional ways to utilize design models

## **Remember:**

*The model is not the contracted information. Official construction documents should always be referred to*

*Plans change! Not just in the design process, but clear through construction. Proposal Requests, Requests for Information, and Change Orders may not be reflected in the design model. Utilize the information provided in the model, and update the information that wasn't final when the model was created.*



# Additional ways to utilize design models

The power of Revit visualization:

CULTURE CHANGES – PREFABRICATION



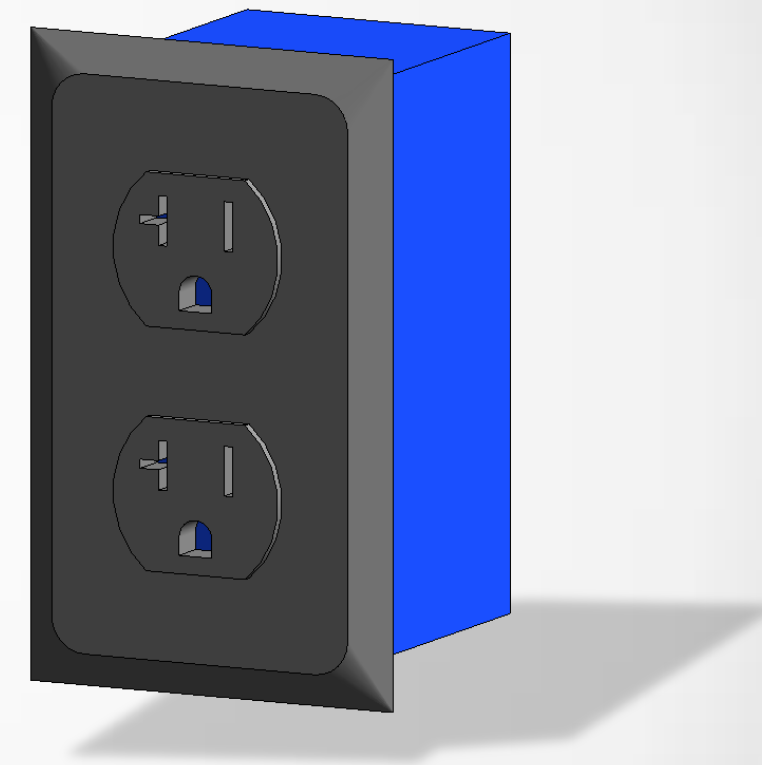
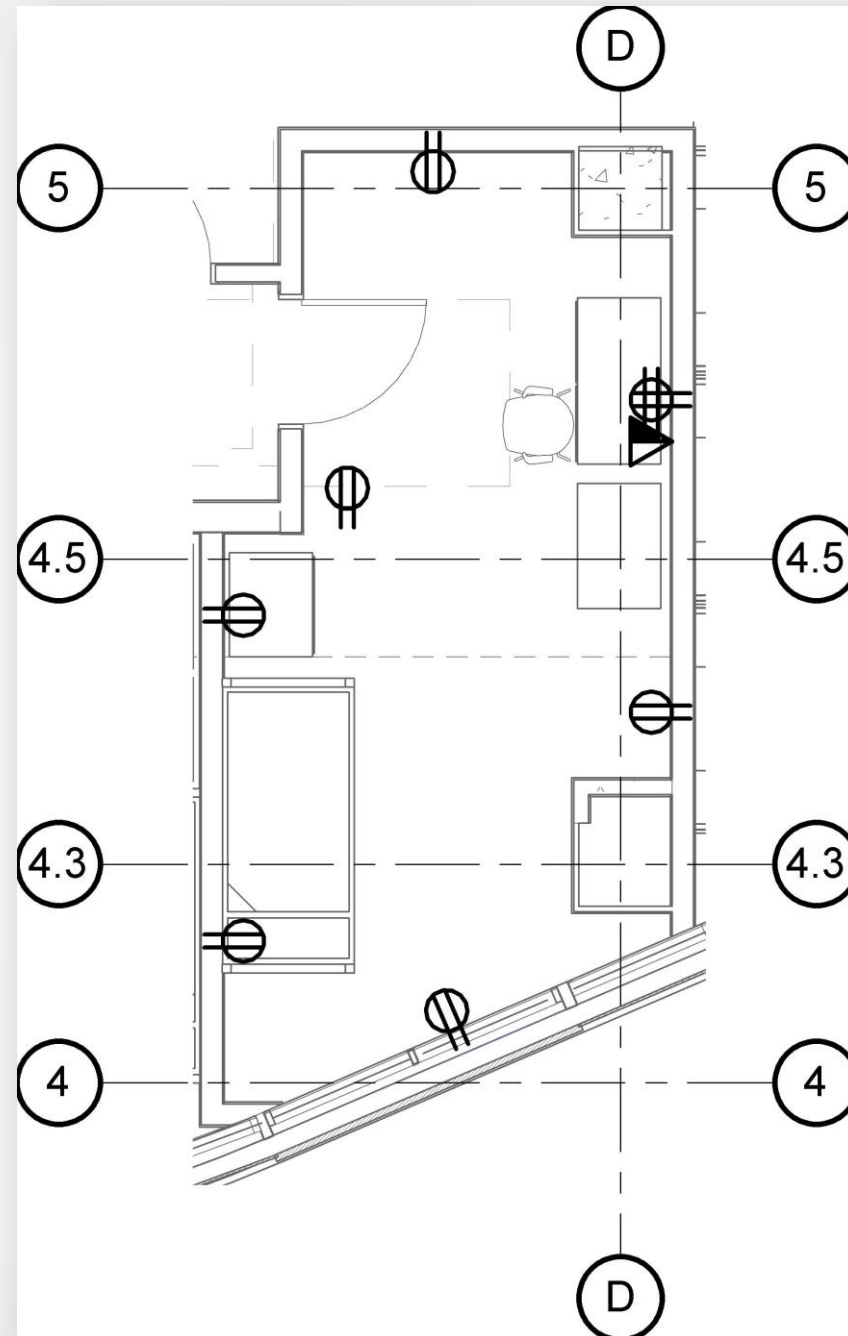
AUTODESK  
AUTOCAD



AUTODESK®  
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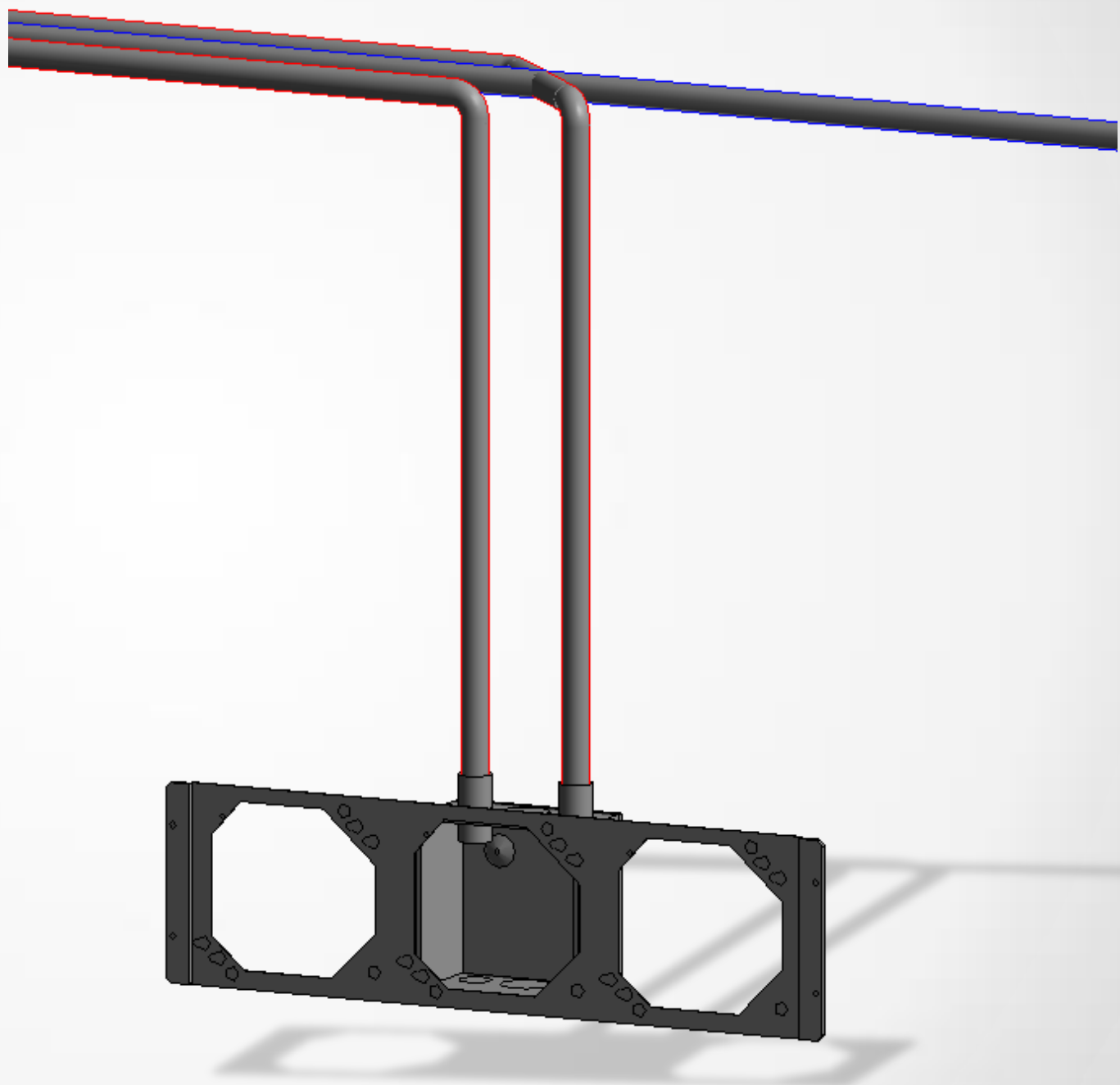
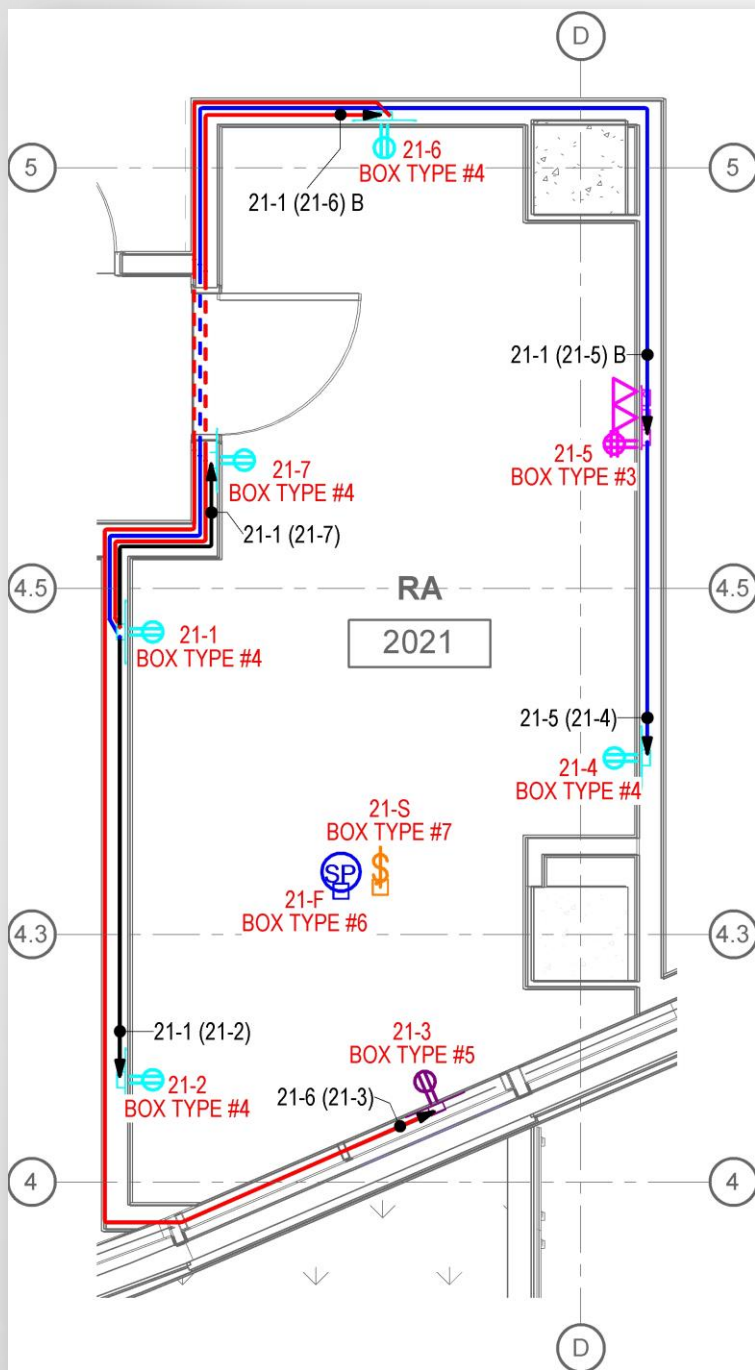


# Additional ways to utilize design models



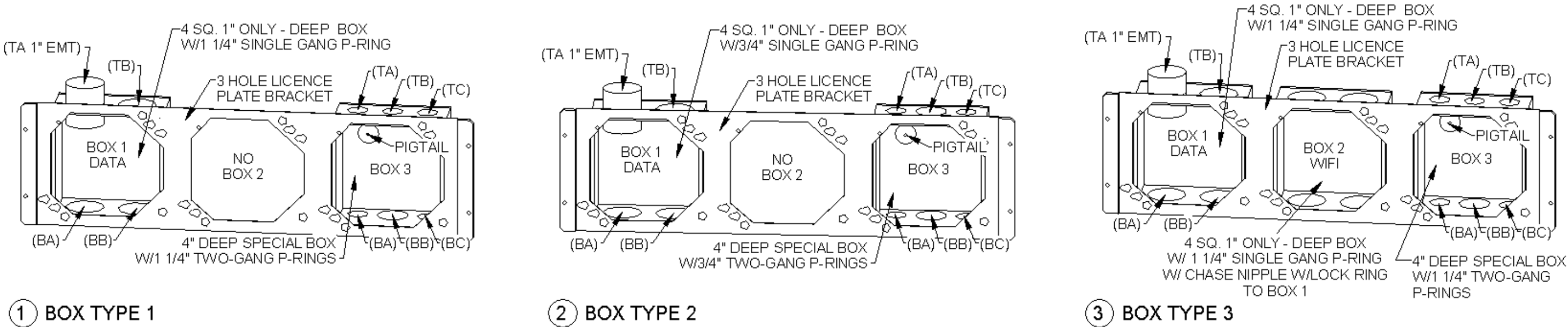
*Replacing simple models with complex assemblies and systems for use in Prefabrication*

# Additional ways to utilize design models



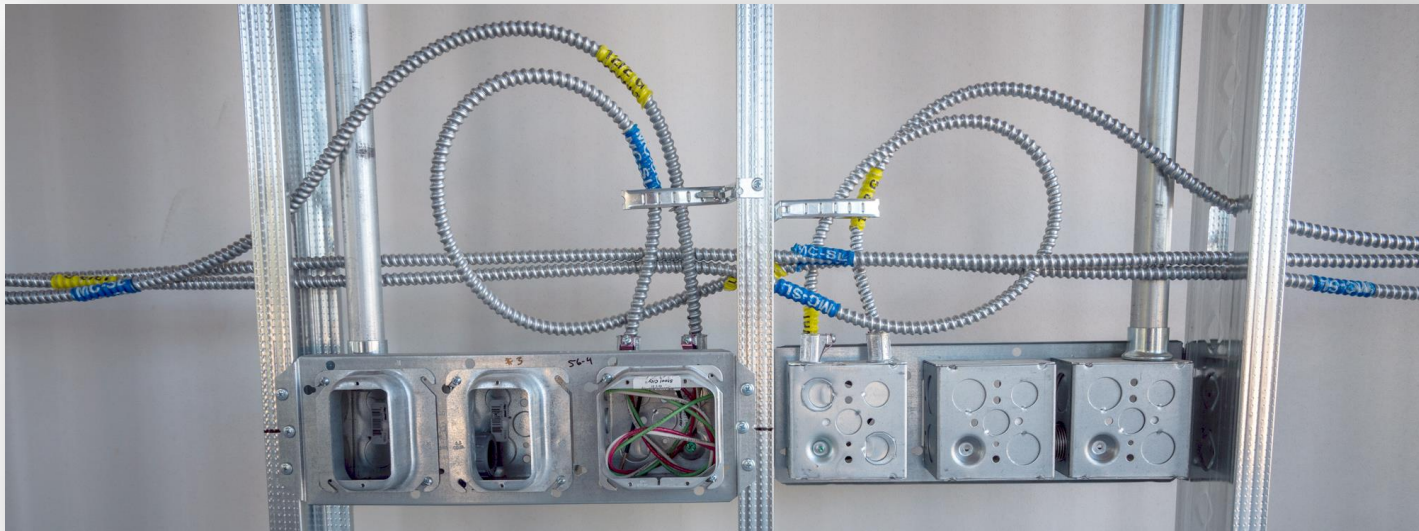


# Additional ways to utilize design models



TYPE	BOXES AND LENGTHS	BOX DEPTH	PIGTAILS	P-RING TYPES	P-RING DEPTH	PLUGTAILS PER ASSEMBLY	TOTAL PLUGTAILS	ASSEMBLY COUNT
BOX TYPE #1	BOX 1 - 4 in, NO BOX 2, BOX 3 - 4 in	DEEP	BOX 3 PIGTAIL	BOX 1 SINGLE GANG, BOX 3 TWO GANG	0' - 1 1/4"	2	16	8
BOX TYPE #3	BOX 1 - 4 in, BOX 2 - 4 in, BOX 3 - 4 in	DEEP	BOX 3 PIGTAIL	BOX 1 SINGLE GANG, BOX 2 SINGLE GANG, BOX 3 TWO GANG	0' - 1 1/4"	2	48	24
Grand total: 32							64	

AREA D - MC CABLE LENGTHS		
ASSEMBLY	WIRE COLOR	TOTAL LENGTH
2021		
21-1 (21-2)	BLACK	15' - 0"
21-1 (21-5) B	BLUE	49' - 0"
21-1 (21-6) B	RED	36' - 0"
21-1 (21-7)	BLACK	11' - 0"
21-5 (21-4)	BLUE	12' - 0"
21-6 (21-3)	RED	54' - 0"









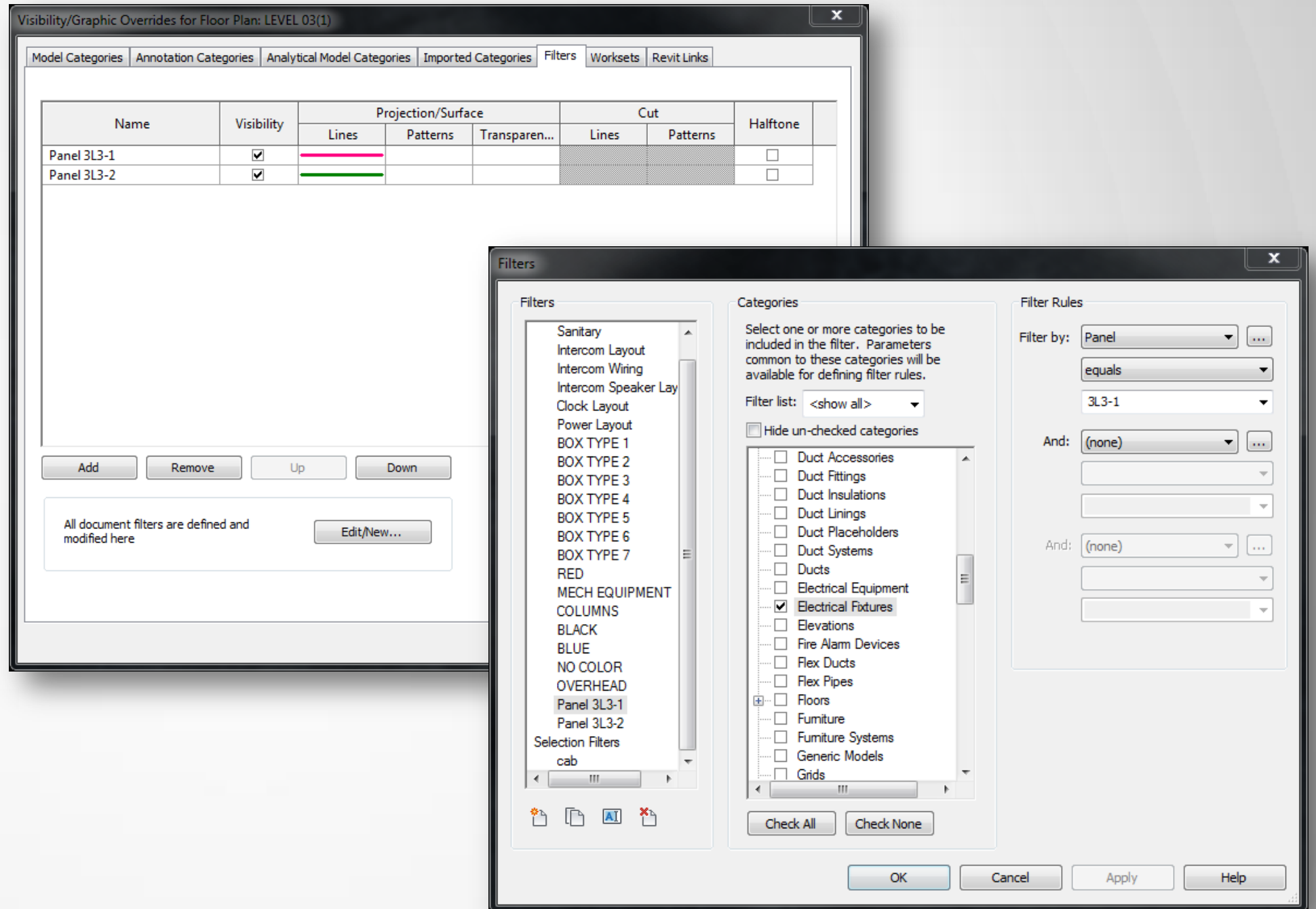
An aerial rendering of a cityscape featuring a large bridge spanning a wide river. A vibrant rainbow line runs along the side of the bridge. In the background, a dense urban skyline with various skyscrapers is visible under a clear blue sky. The foreground shows green grassy areas and some trees.

# Tips and Tricks in Revit MEP for construction



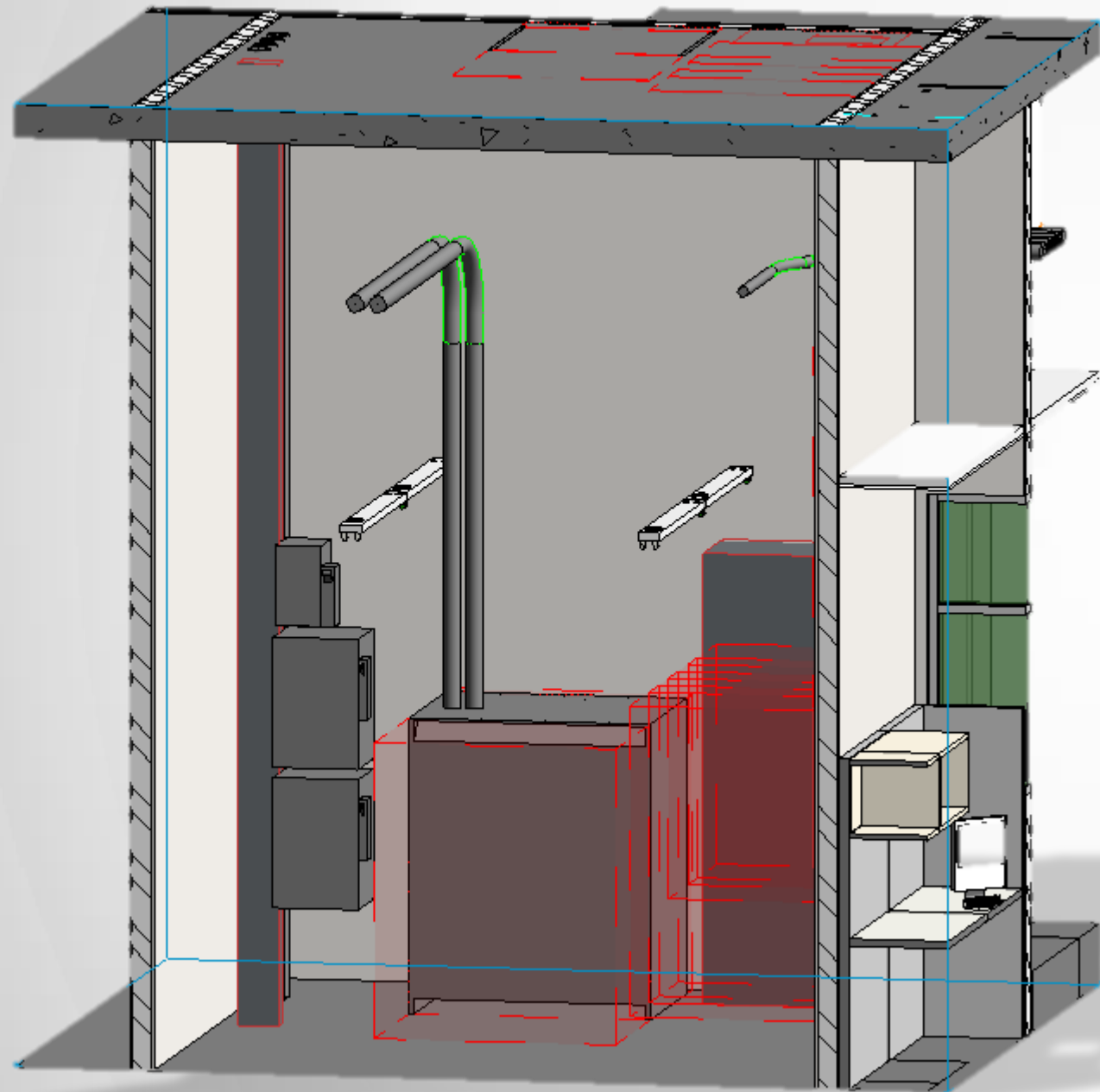
# Tips and tricks in Revit MEP for construction

## ■ *View Filters*





# Tips and tricks in Revit MEP for construction

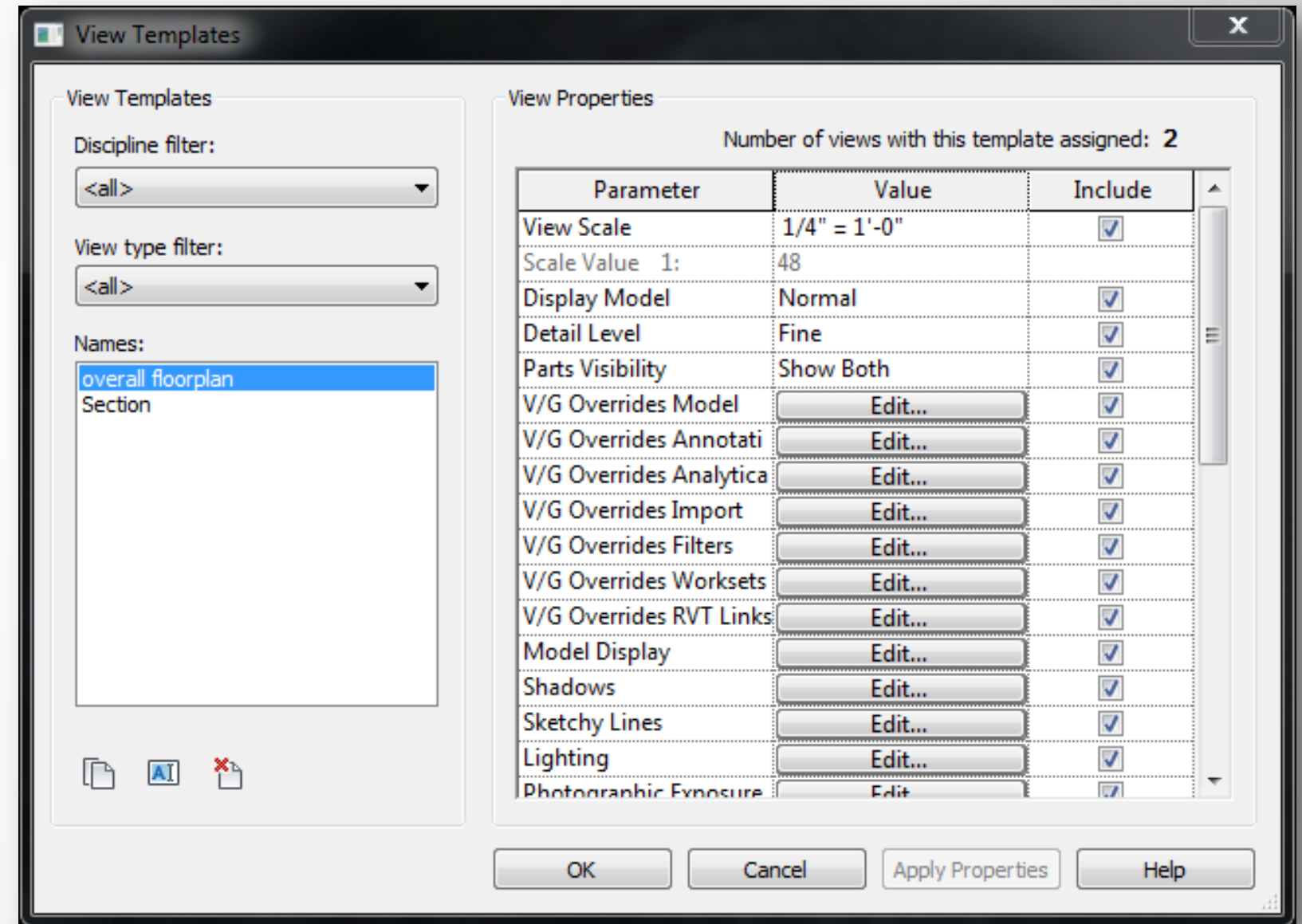


- *Orient 3D view to established plan view*



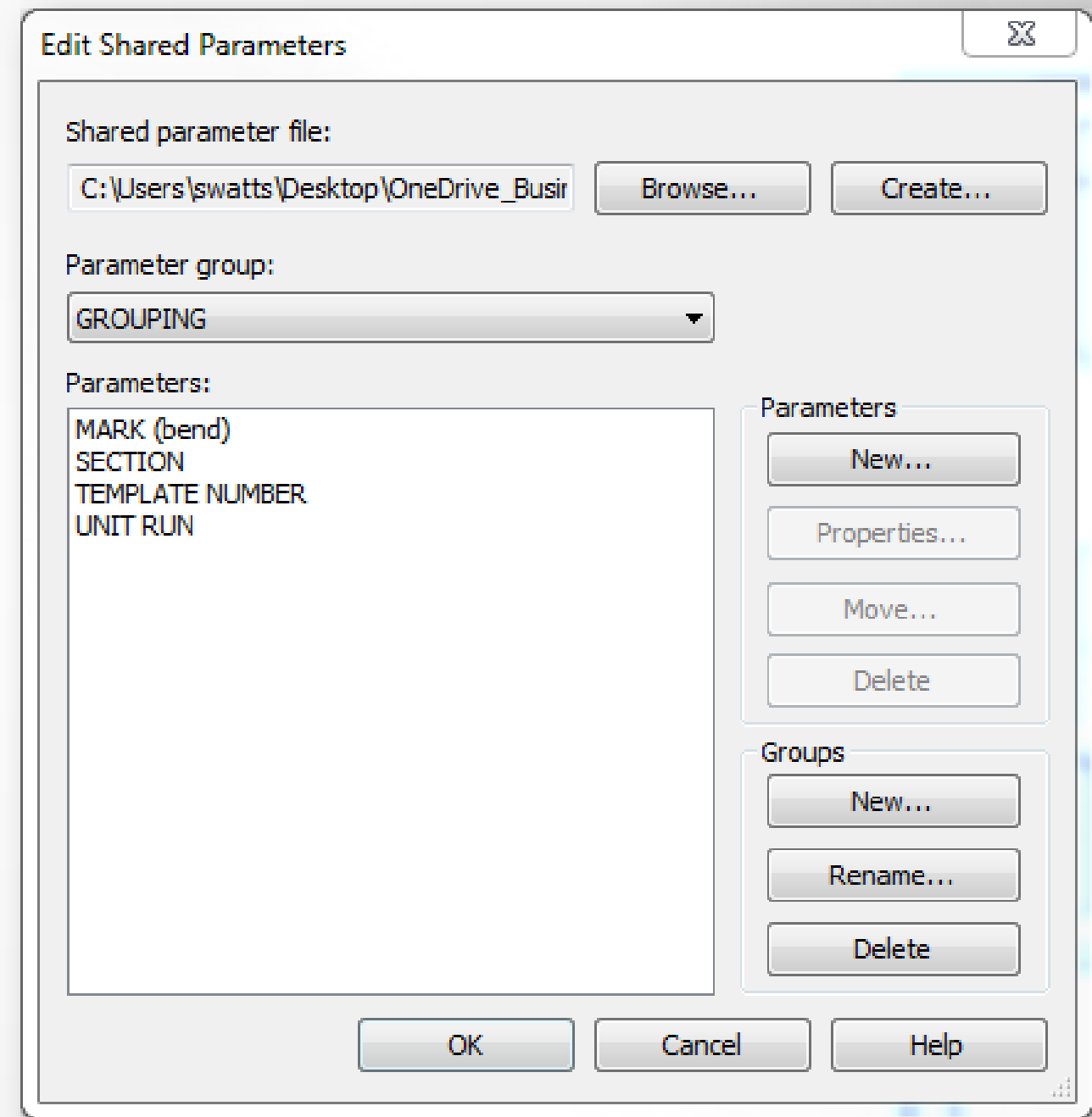
# Tips and Tricks in Revit MEP for construction

## ■ *View Templates*

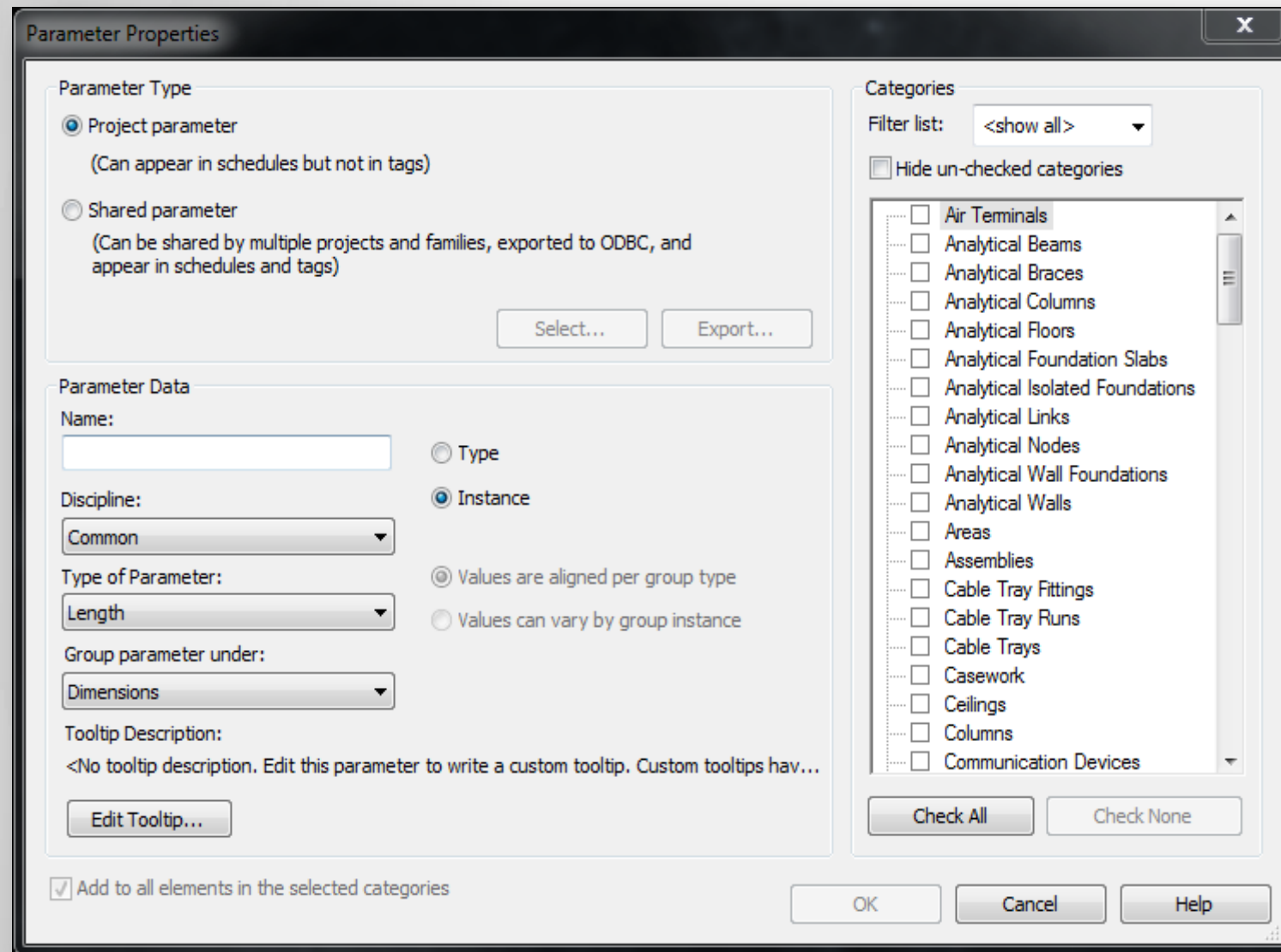


# Tips and Tricks in Revit MEP for construction

## ■ *Shared Parameters*



# Tips and Tricks in Revit MEP for construction

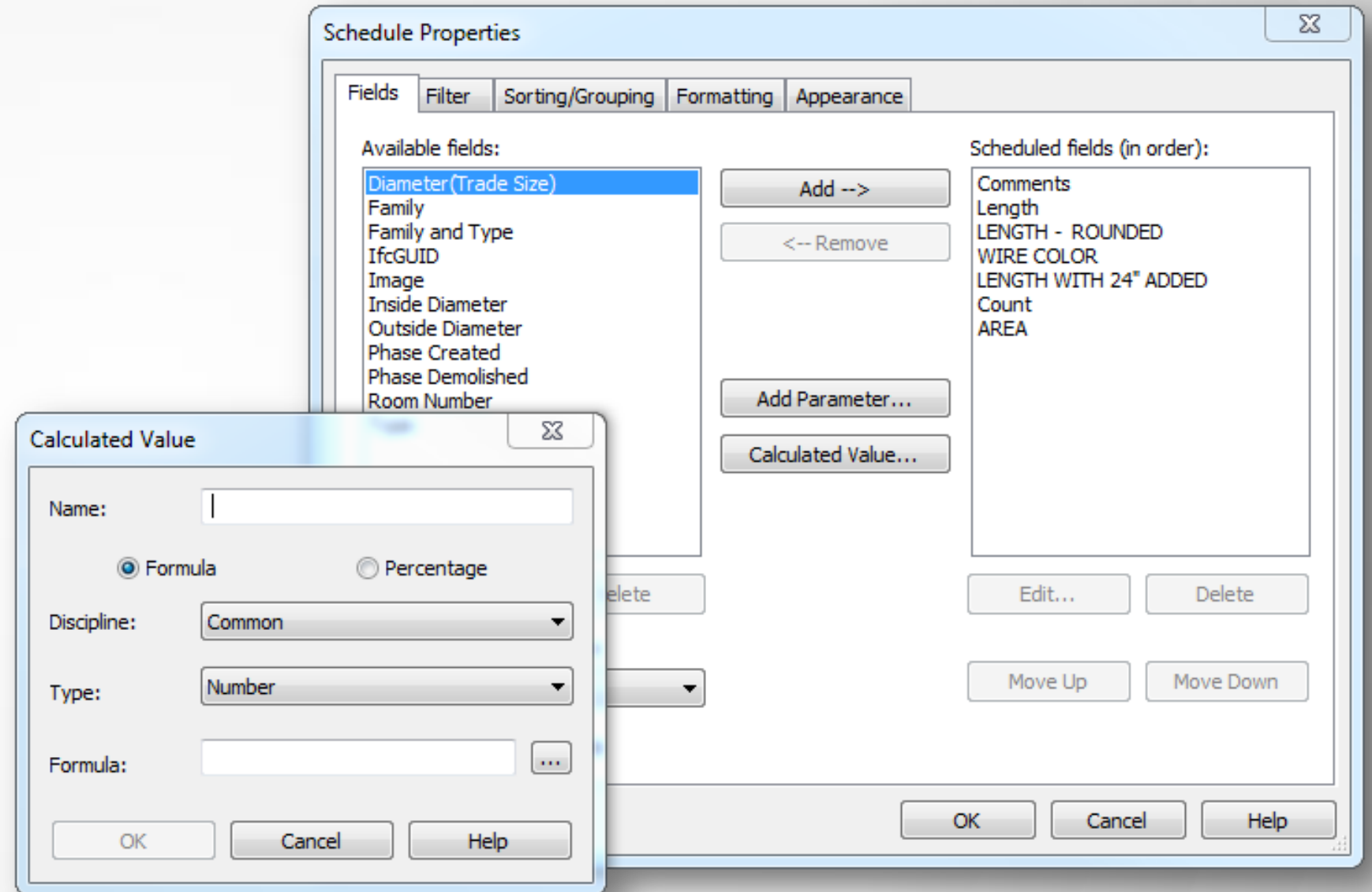


## ■ *Project Parameters*



# Tips and Tricks in Revit MEP for construction

## ■ *Calculated Value*

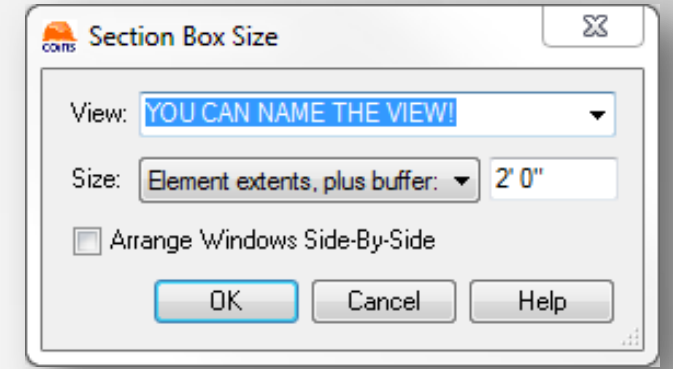


# Tips and Tricks in Revit MEP for construction

## *Non Native Plug-Ins for Revit*

### *Coins Auto Section Box Plug-In VS Revit Native View*

- Name the 3D View while creating it, to make it easier to locate in the future.
- Select Distance around the object selected for 3D View.



### *Palladio X BIM Windows Layout*

- Efficiently utilize screen real-estate
- Organize multiple open views in Revit to panels across multiple screens.
- No need to toggle between views.





An aerial view of a city skyline with a bridge and a river. The bridge is a multi-lane highway with a rainbow-colored line running along its length. The river is a large body of water. The city skyline is in the background with various skyscrapers. The text "Explore some additional MEP technology for Electrical Construction" is overlaid on the image in a large, blue, sans-serif font.

# Explore some additional MEP technology for Electrical Construction

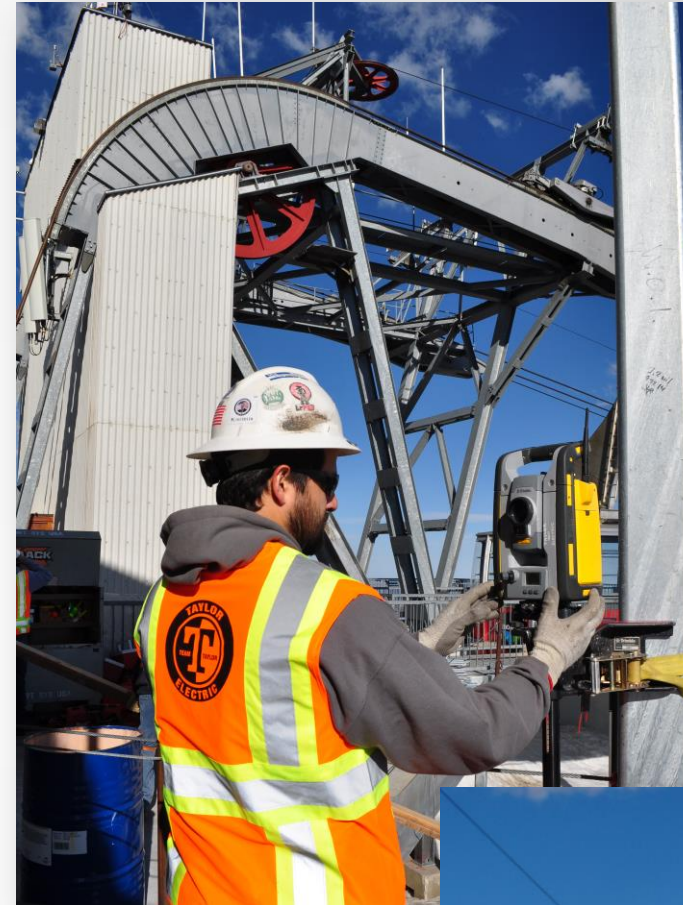


# Explore some additional MEP technology for Electrical Construction

## Point Creator and Robotic Total Station for layout

No longer need tape measures, strings and multiple electricians.

- Easily isolate components and clean up views.
- Gain a better understanding of the construction of each space.



# Explore some additional MEP technology for Electrical Construction

Tablets for document sharing, and Viewing

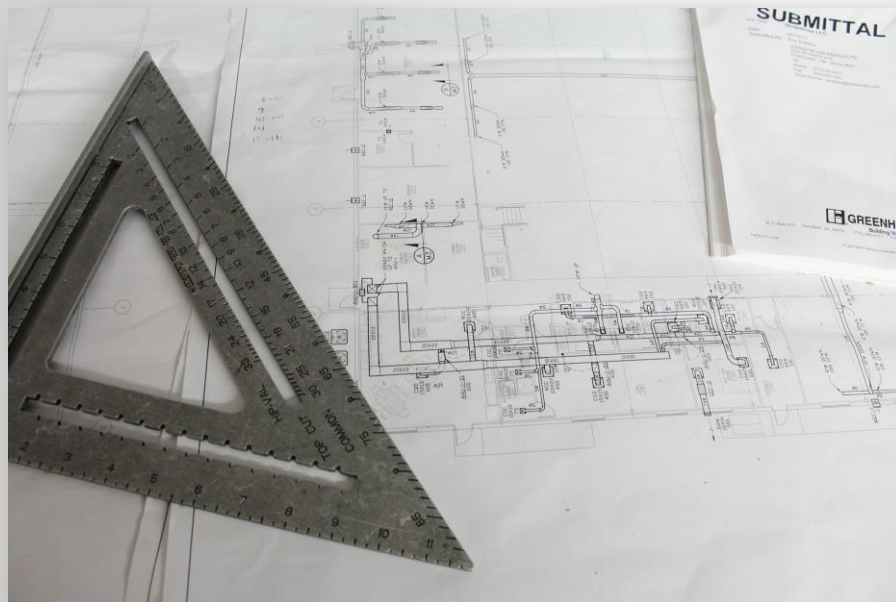
- Faster up-to-date information for everyone In the office and in the field



# Explore some additional MEP technology for Electrical Construction

## Tablets for document sharing, and Viewing

- Faster up-to-date information for everyone In the office and in the field



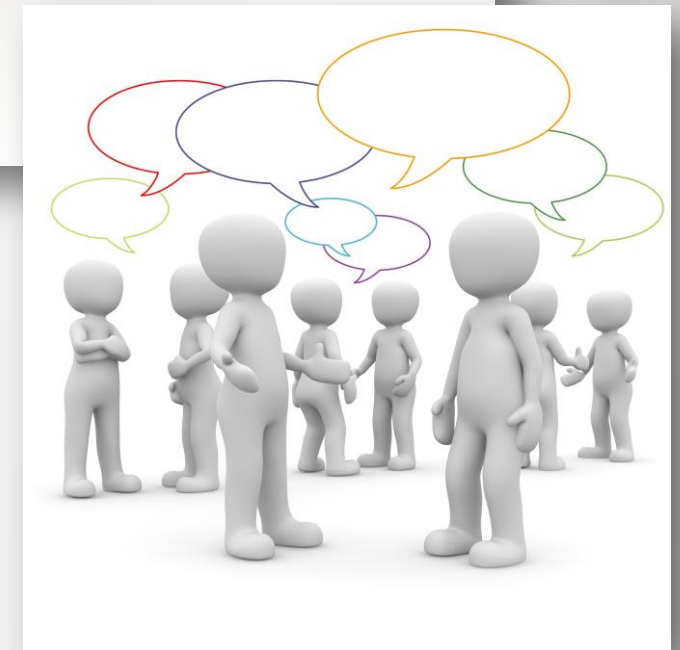


# In Conclusion

- 👷 Communicate Ideas and Concepts
- 👷 Utilize Design Tools
- 👷 Plug-ins
- 👷 Robotic Total Stations

Moving forward as a community:

- AU
- Local User Groups
- Online Forums
- Research with Software companies



# Be heard! Provide AU session feedback.

- Via the Survey Stations, email or mobile device.
- AU 2016 passes awarded daily!
- Give your feedback after each session.
- Give instructors feedback in real-time.



# Too many sessions, too little time?

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- Recorded sessions
- Presentations and handouts
- Key learnings

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- Open daily 8am-10am and Noon-6pm and located just outside of Hall C on Level 2.
- Staffed by Autodesk developers, QA, & support engineers ready to help you through your most challenging technical questions.



