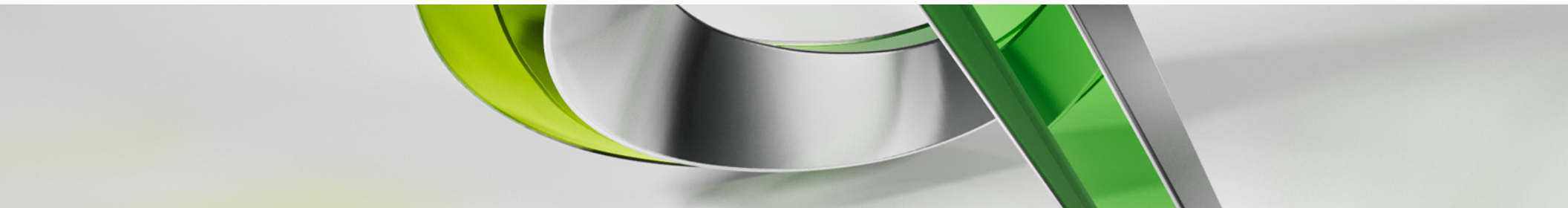




# Building Information Modeling on a Smaller Scale

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## Class summary

When looking at case studies and success stories that demonstrate how construction projects have implemented Building Information Modeling (BIM), the project values are at least \$30 million, and they usually run into the hundreds of millions of dollars. This does not address the numerous projects that are much smaller and still require detailed coordination efforts. This class will look at using BIM and virtual design and construction (VDC) on smaller projects, as well as explore the tips and tricks that our firm has learned using BIM on smaller projects, including projects valued at less than \$10 million.

# Key learning objectives

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

- Understand key factors that make BIM feasible on smaller projects
- Be able to find ways to integrate BIM into the project team
- Learn how to create and use model templates and standards specifically for small projects
- Learn tips and tricks designed specifically for smaller projects

# Introduction

- Background
- Company Overview

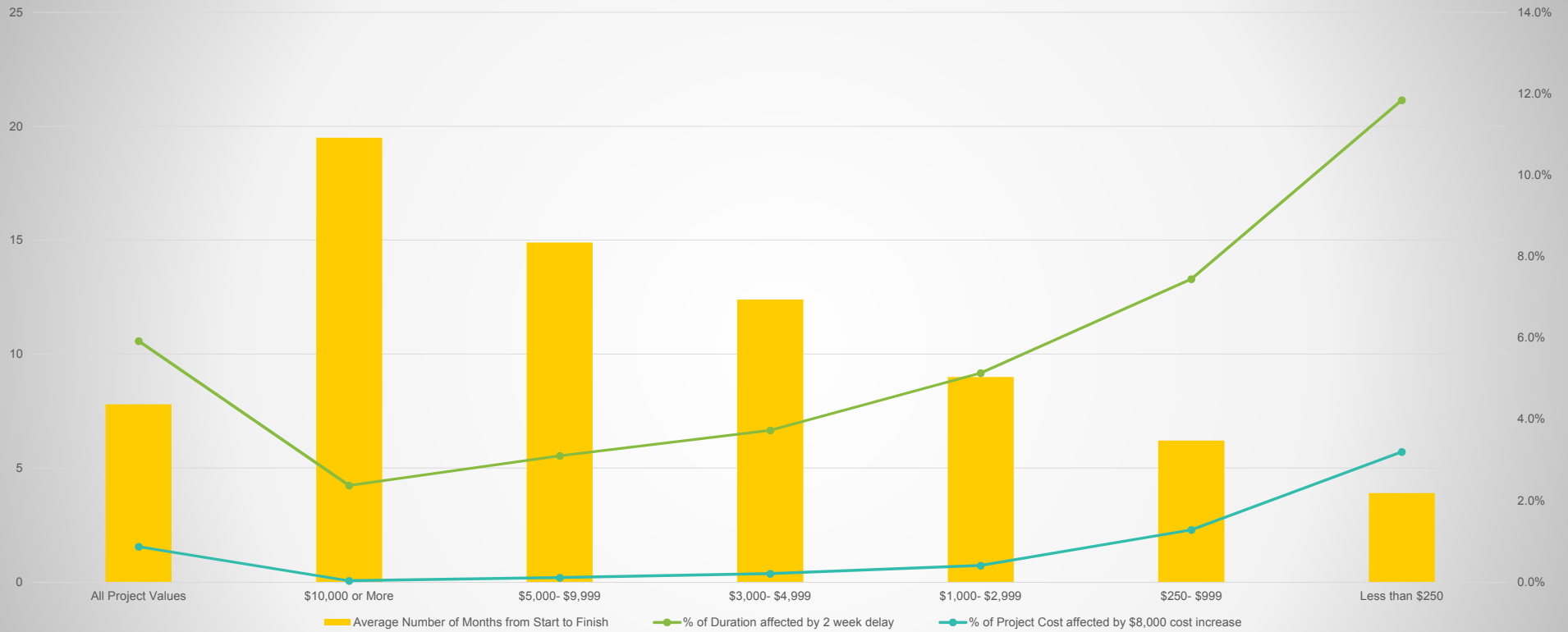
# Understand key factors that make BIM feasible on smaller projects

## How can BIM be a benefit to a small project

- Efficiency gains seen on large projects are applicable to small projects
  - The stakes are higher on smaller projects:
    - Consider an issue where the resolution resulted in an \$8,000 cost increase, and a two week delay

Average Number of Months from Start to Completion by Project Value

(In Thousands of Dollars)



DATA COURTESY OF THE UNITED STATES CENSUS BUREAU [WWW.CENSUS.GOV/CONSTRUCTION/C30/PDF/T109.PDF](http://WWW.CENSUS.GOV/CONSTRUCTION/C30/PDF/T109.PDF)

## How can BIM be a benefit to a small project

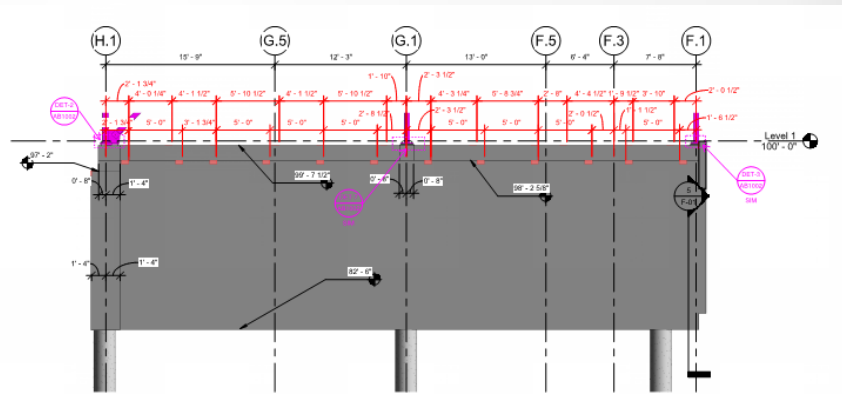
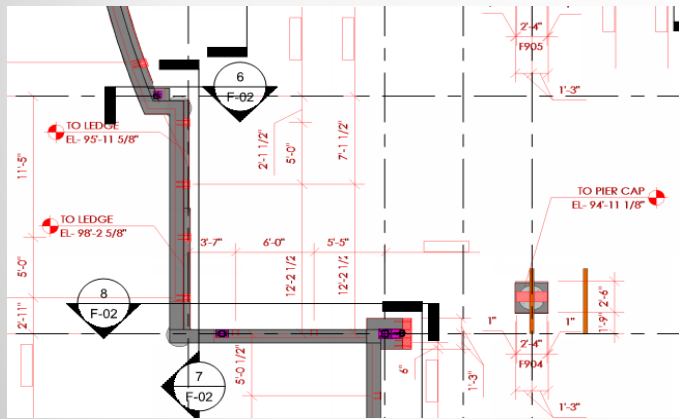
- Efficiency gains seen on large projects are applicable to small projects
  - The stakes are higher on smaller projects
- Determine if BIM is needed
  - BIM does not work on all small projects
- Simple Benefits

## Sourcing Models

- As a GC, our goal is to self-perform as little of the modeling as possible
  - Lose intent from designers, and trade specific input from subcontractors
  - Need to be flexible with the different model sources
- BIM becomes a pre-qualification criteria
  - Helps level the playing field
  - Places emphasis on quality partners that can use the model

# Scope of 3D Modeling

- Finding success with BIM is not an all in or all out
  - If parts are missing, can the modeling be self-performed?
  - Can 2D files be used in conjunction with 3D models?



Images courtesy of FCI Constructors Inc.

## Scope of 3D Modeling

- Finding success with BIM is not an all in or all out
  - If parts are missing, can the modeling be self-performed?
  - Can 2D files be used in conjunction with 3D models?
  - Limit the scope to only the parts of the project where BIM makes sense.

## Early Involvement

- The earlier you can get involved in a project, the better
  - During design- ensure that constructability is addressed when appropriate action can be taken
  - During construction- make sure that you have as many options for issue resolution as possible without re-work

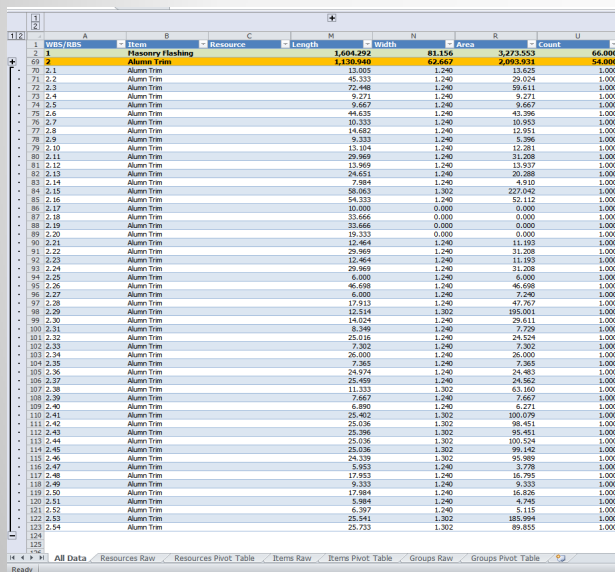
## Cost

- The applications of BIM are not new tasks that are required to complete projects
  - Need to ensure that the work to be performed by BIM is appropriate for the scope of the project
- Need to be as efficient as possible
  - Avoid specialty programs or websites

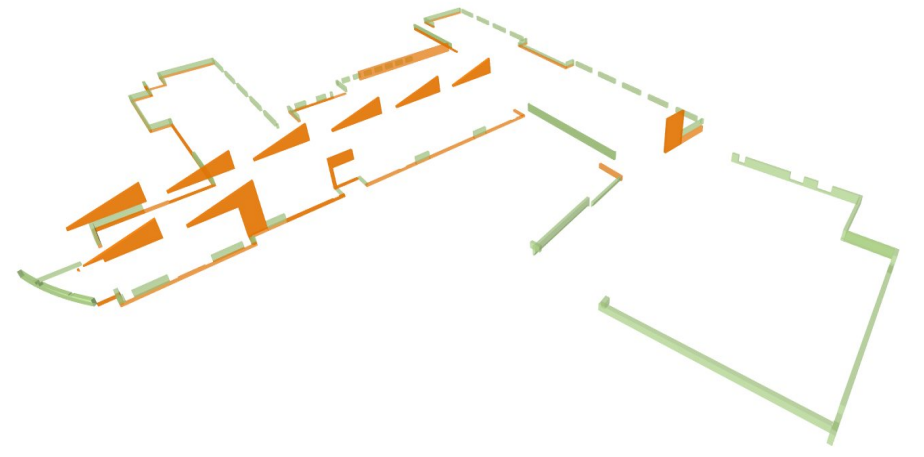
**Be able to find ways to integrate  
BIM into the project team**

# Finding Opportunities

- Internal to your organization
  - Ask to learn more about other positions in your organization



	A	B	C	D	E	F	G	H
	WBS / RBS	Item	Resource	Length	Width	Area	Count	U
1		Masonry Flashing		1,604.252	81.159	327,355.3	66,000	
2		Alum. Trim		1,130,948	82,447	2,493,931	54,000	
70	2.1	Alum. Trim		13,005	1,240	13,625	1,000	
71	2.2	Alum. Trim		45,333	1,240	29,524	1,000	
72	2.3	Alum. Trim		72,448	1,240	99,811	1,000	
73	2.4	Alum. Trim		9,667	1,240	5,271	1,000	
74	2.5	Alum. Trim		14,682	1,240	10,953	1,000	
75	2.6	Alum. Trim		9,333	1,240	5,296	1,000	
76	2.7	Alum. Trim		10,333	1,240	10,953	1,000	
77	2.8	Alum. Trim		14,682	1,240	12,951	1,000	
78	2.9	Alum. Trim		9,333	1,240	5,296	1,000	
79	3.0	Alum. Trim		13,104	1,240	12,281	1,000	
80	3.1	Alum. Trim		29,969	1,240	31,208	1,000	
81	3.2	Alum. Trim		13,969	1,240	13,537	1,000	
82	3.3	Alum. Trim		24,651	1,240	20,248	1,000	
83	3.4	Alum. Trim		7,884	1,240	4,910	1,000	
84	3.5	Alum. Trim		18,363	1,302	22,742	1,000	
85	3.6	Alum. Trim		14,333	1,240	12,112	1,000	
86	3.7	Alum. Trim		10,000	0.000	0.000	1,000	
87	3.8	Alum. Trim		33,666	0.000	0.000	1,000	
88	3.9	Alum. Trim		33,666	0.000	0.000	1,000	
89	4.0	Alum. Trim		19,333	0.000	0.000	1,000	
90	4.1	Alum. Trim		12,464	1,240	11,193	1,000	
91	4.2	Alum. Trim		29,969	1,240	31,208	1,000	
92	4.3	Alum. Trim		12,464	1,240	11,193	1,000	
93	4.4	Alum. Trim		29,969	1,240	31,208	1,000	
94	4.5	Alum. Trim		6,000	1,240	6,000	1,000	
95	4.6	Alum. Trim		46,608	1,240	46,608	1,000	
96	4.7	Alum. Trim		6,000	1,240	7,240	1,000	
97	4.8	Alum. Trim		17,913	1,240	47,767	1,000	
98	4.9	Alum. Trim		12,514	1,302	195,001	1,000	
99	5.0	Alum. Trim		15,024	1,240	24,611	1,000	
100	5.1	Alum. Trim		8,349	1,240	7,729	1,000	
101	5.2	Alum. Trim		25,016	1,240	24,524	1,000	
102	5.3	Alum. Trim		7,302	1,240	7,302	1,000	
103	5.4	Alum. Trim		26,100	1,240	24,524	1,000	
104	5.5	Alum. Trim		7,365	1,240	7,365	1,000	
105	5.6	Alum. Trim		24,974	1,240	24,483	1,000	
106	5.7	Alum. Trim		26,459	1,240	24,562	1,000	
107	5.8	Alum. Trim		11,333	1,302	63,169	1,000	
108	5.9	Alum. Trim		7,667	1,240	7,667	1,000	
109	6.0	Alum. Trim		6,890	1,240	6,271	1,000	
110	6.1	Alum. Trim		25,402	1,302	100,079	1,000	
111	6.2	Alum. Trim		25,036	1,302	98,451	1,000	
112	6.3	Alum. Trim		25,396	1,302	98,451	1,000	
113	6.4	Alum. Trim		25,036	1,302	100,524	1,000	
114	6.5	Alum. Trim		25,036	1,302	99,142	1,000	
115	6.6	Alum. Trim		24,339	1,302	95,989	1,000	
116	6.7	Alum. Trim		5,953	1,240	3,728	1,000	
117	6.8	Alum. Trim		17,953	1,240	16,795	1,000	
118	6.9	Alum. Trim		9,333	1,240	9,333	1,000	
119	7.0	Alum. Trim		17,984	1,240	16,826	1,000	
120	7.1	Alum. Trim		8,984	1,240	4,745	1,000	
121	7.2	Alum. Trim		5,397	1,240	5,115	1,000	
122	7.3	Alum. Trim		25,941	1,302	185,994	1,000	
123	7.4	Alum. Trim		25,723	1,302	89,455	1,000	



Images courtesy of FCI Constructors Inc.

# Finding Opportunities

- Internal to your organization
- External to your organization
  - Spend time with the other organizations with which you are associated

**Learn how to create and use  
model templates and standards  
specifically for small projects**

# Templates

- Revit Templates

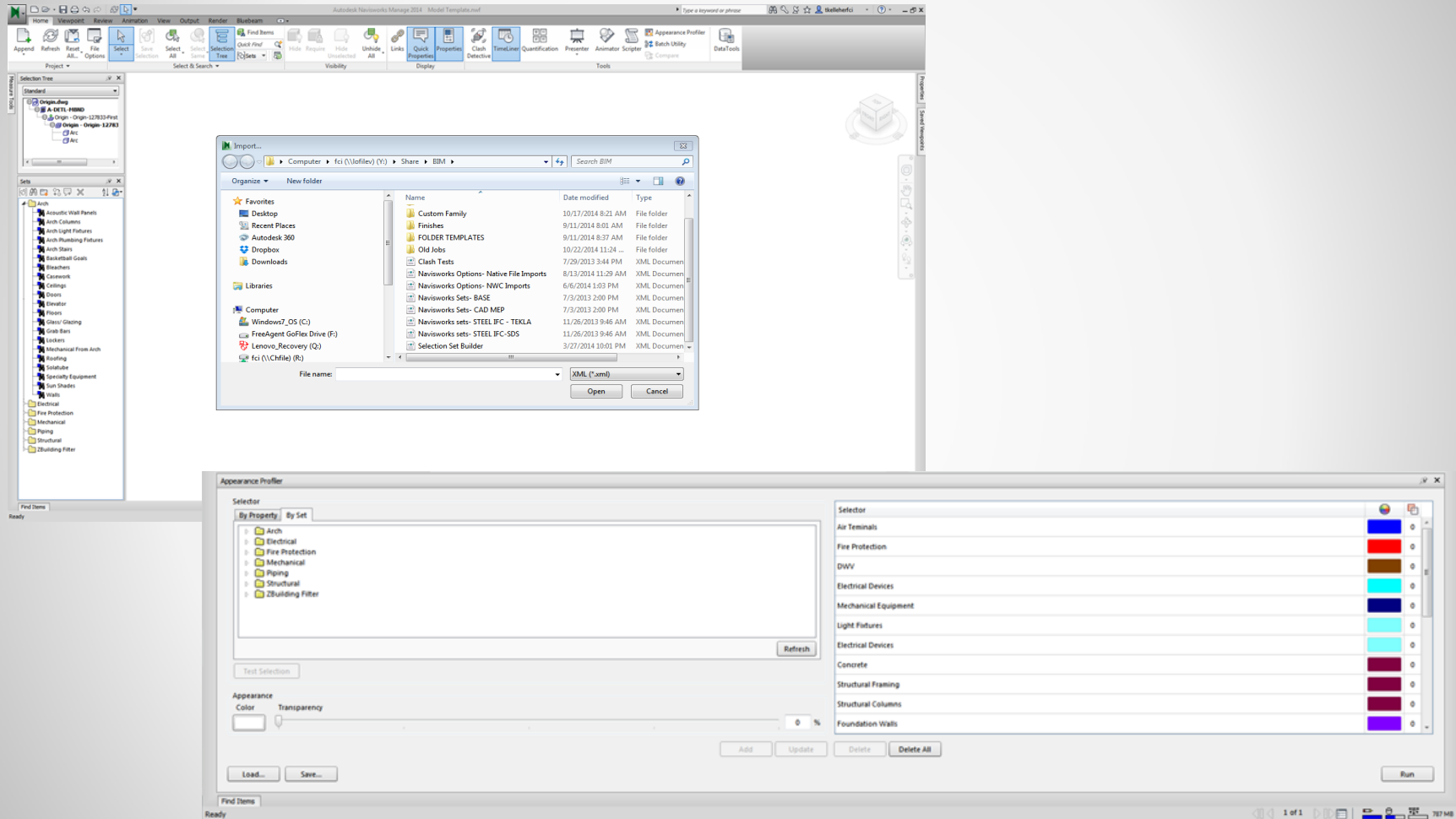
- Focus on eliminating repetitive tasks that eat up time
- My templates are set up with views, filters, and sheets ready to use
- Start with one of the pre-loaded templates, and modify it through a pilot project

# Templates

- Navisworks Templates

- A generic .nwf file set up with search sets, clash tests, etc., all built and linked together
- Intent is that you can open the template, append in the different trade models, and update/verify search sets to start working

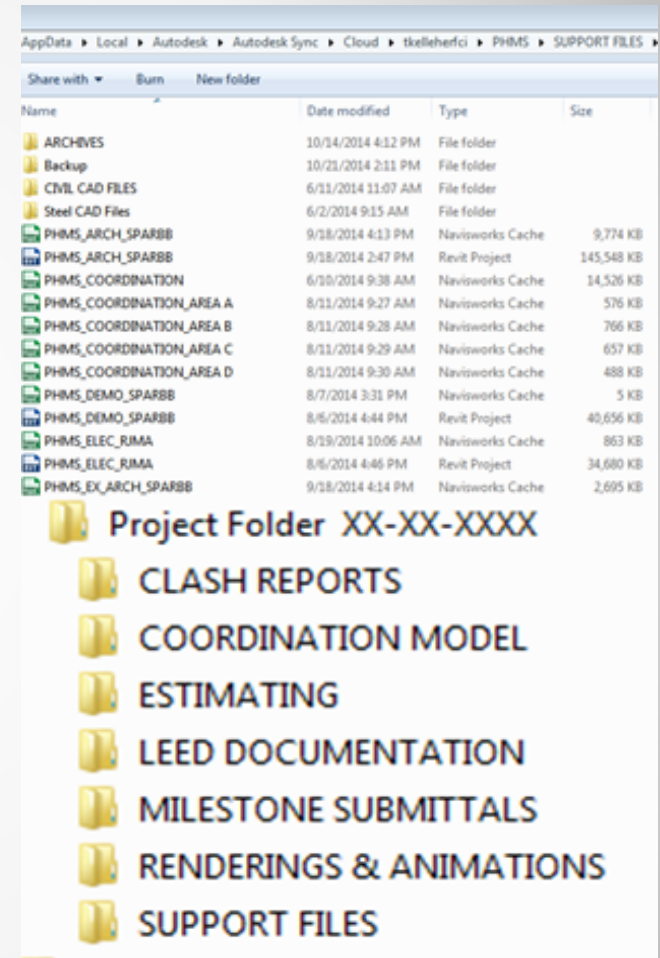
# Templates



Images courtesy of FCI Constructors Inc.

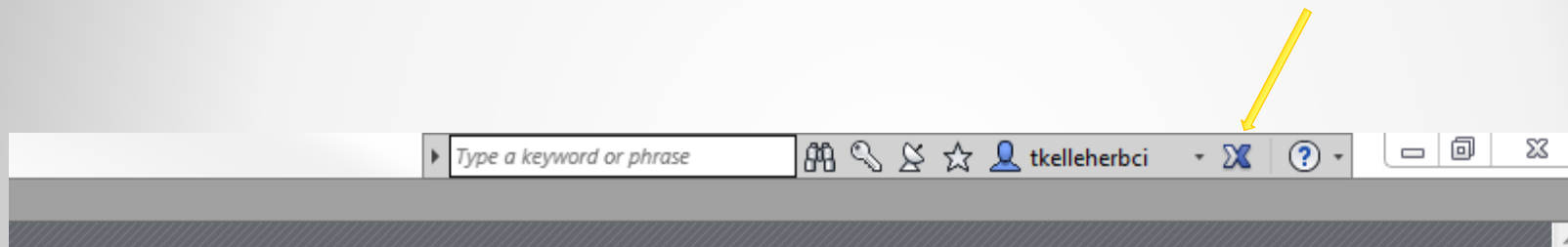
# Standards

- Keep the national standards
  - They are used nationally for a reason
- Naming Conventions
  - Clarity for which files go where
  - Update models by replacing files
- Folder Structure
  - Helps templates work better
  - Clarity for which files are current



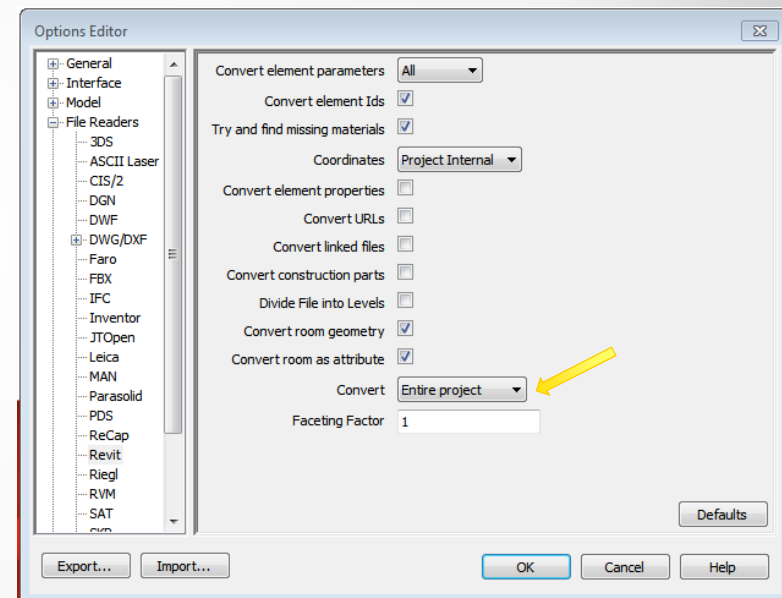
**Learn tips and tricks designed  
specifically for smaller projects**

# Exchange Store



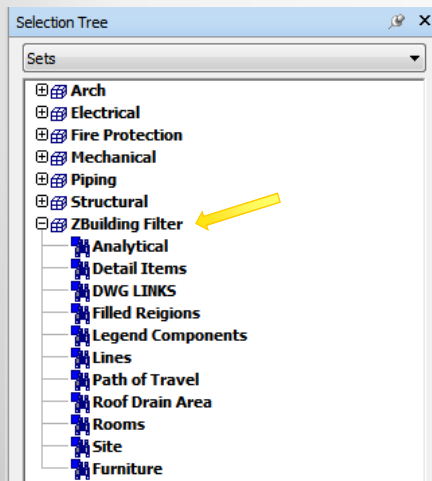
# Native File Hosting in Navisworks

- All model files on small projects come in natively
  - Quickest way to get model files into Navisworks without having to create views and export
  - Revit file exporter needs to be correctly configured for this to work properly.

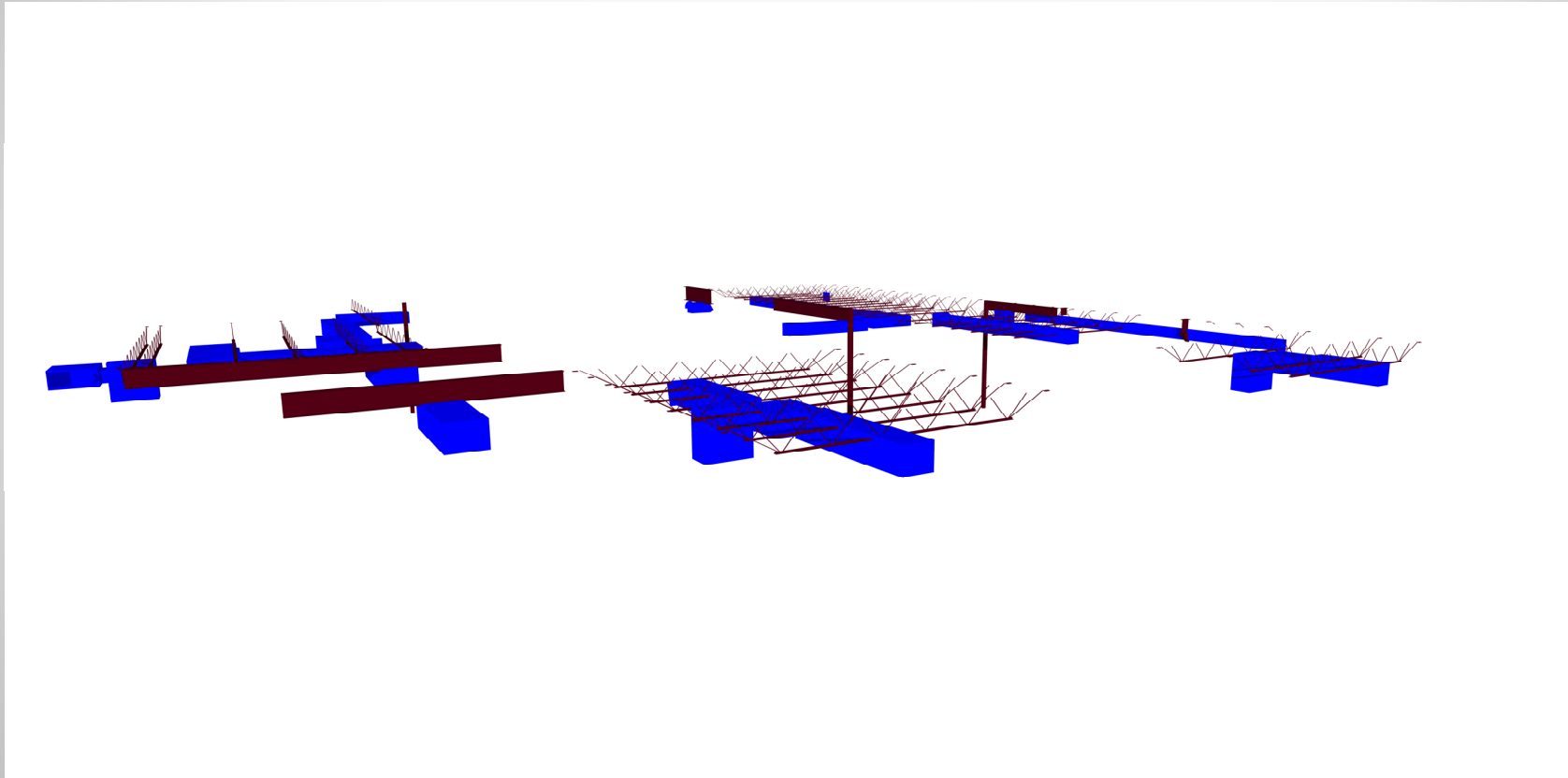


# Combating Long Load Times/ Extraneous Model Items

- There will always be load times in Navisworks
  - Be mindful of the properties(information) you convert
  - Make sure the version of Revit is the same version of Navisworks
  - Specific search set for the unwanted items that come in

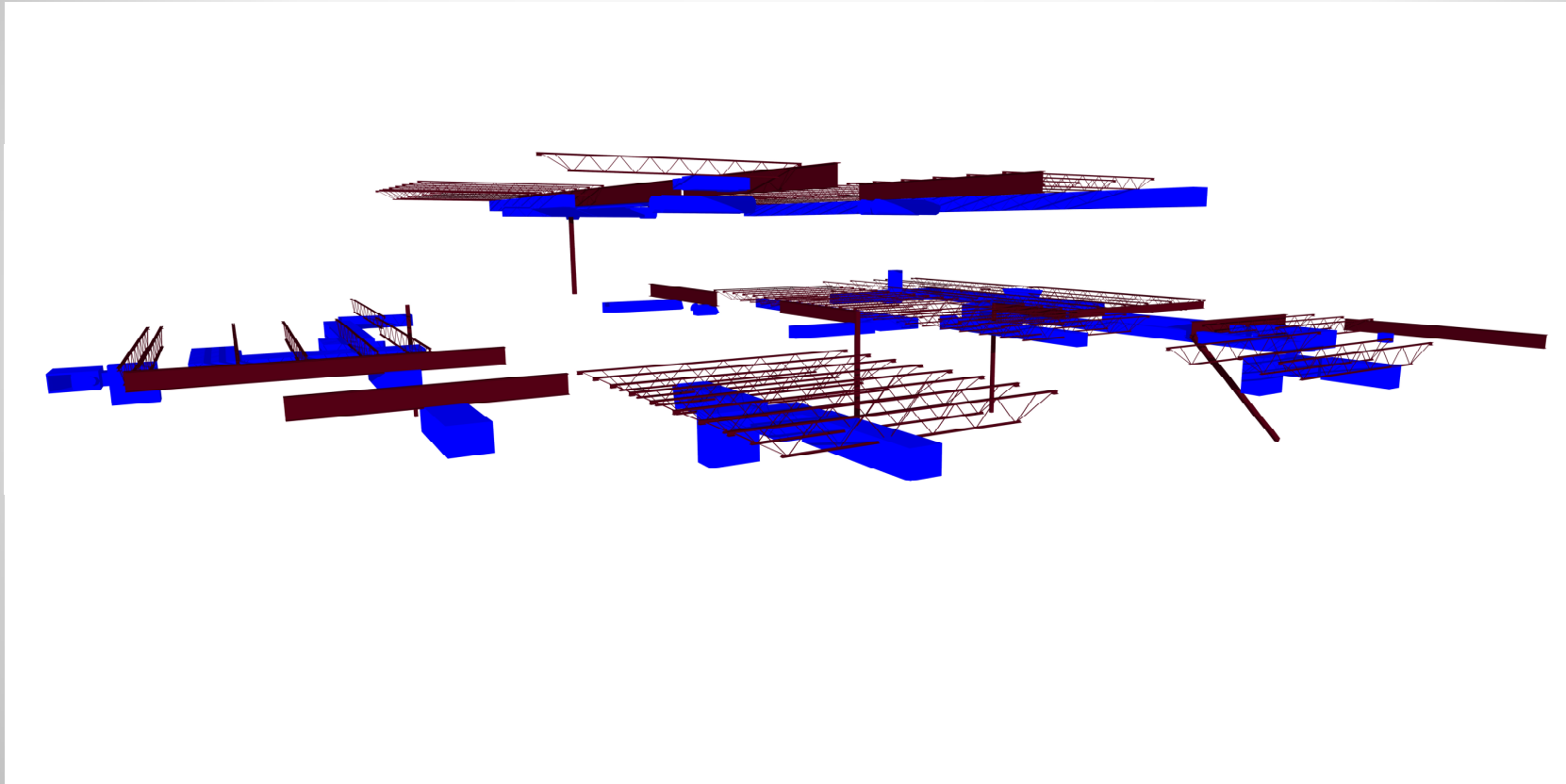


# Section Planes in Clash Tests



*Images courtesy of FCI Constructors Inc.*

# Section Planes in Clash Tests



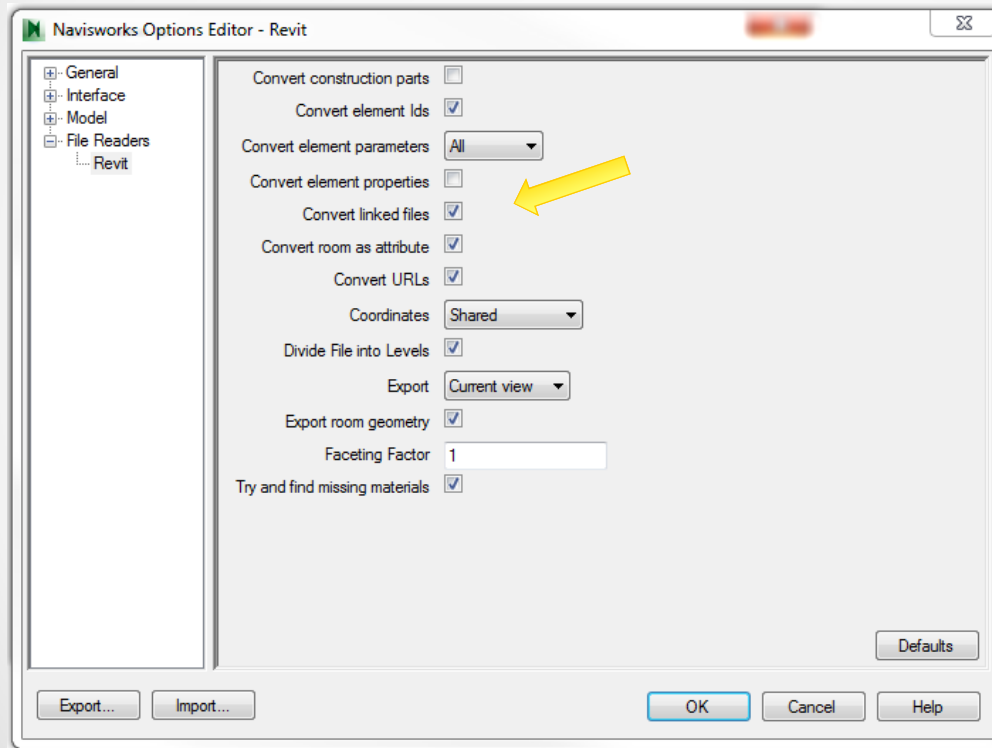
*Images courtesy of FCI Constructors Inc.*



## 3D Section Boxes in Revit

- For most of my projects, I run both a Navisworks and a Revit coordination model
- On projects where hosting files natively is not a good option, I export from a 3D section box in Revit to a .nwc with all of the linked files
  - Note that I have not fully tested this version with the 2015 version yet
  - In the 2014 version, IFC files imported into Revit did not export with the .nwc

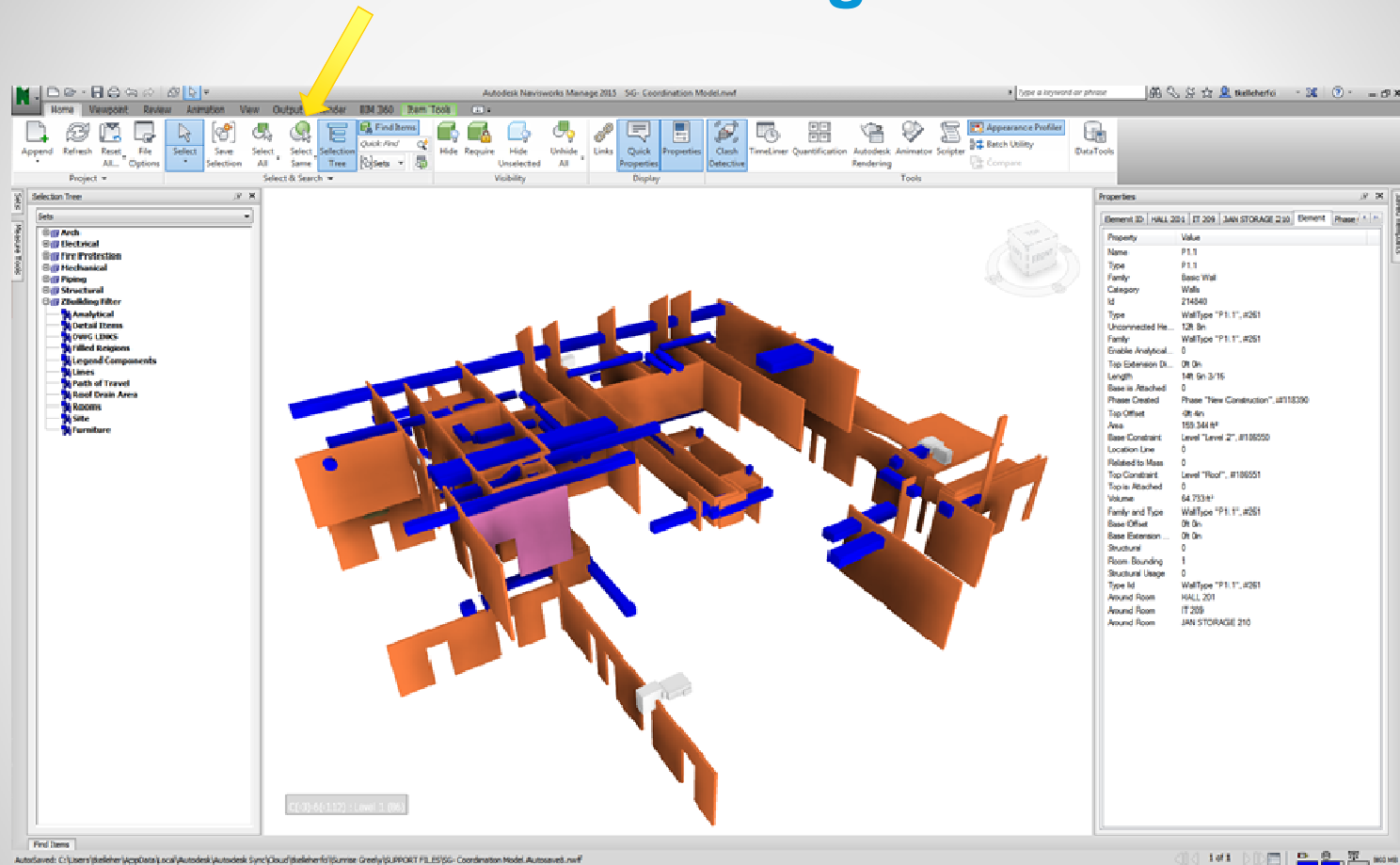
# 3D Section Boxes in Revit



## Use Select Same for Reviewing Clash Tests

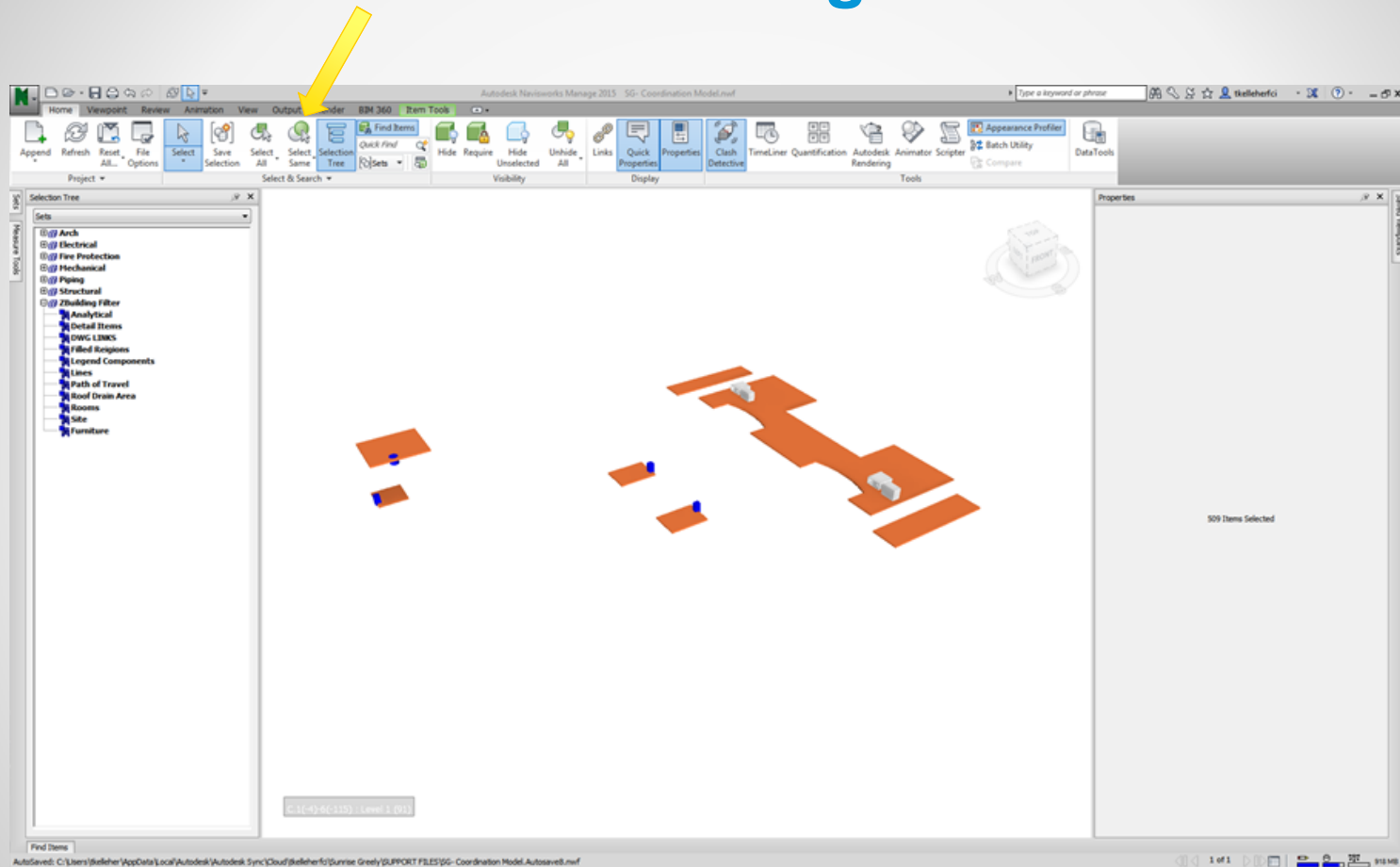
- Rules built into the clash detective are great for common false-positive clashes
- Does not account for one time issues
- If you have to revise a test due to numerous issues, it is time consuming

# Use Select Same for Reviewing Clash Tests



Images courtesy of FCI Constructors Inc.

# Use Select Same for Reviewing Clash Tests



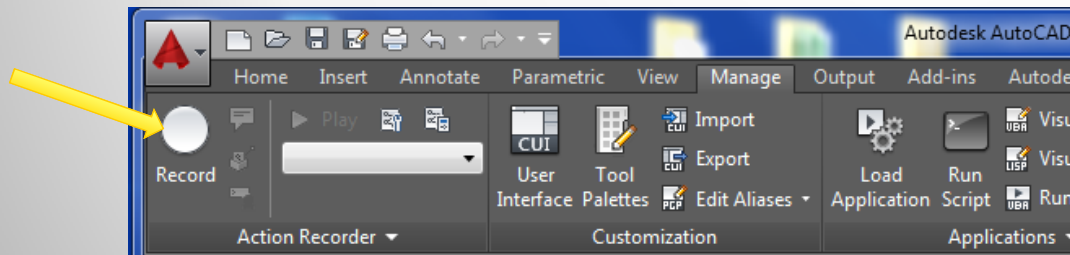
Images courtesy of FCI Constructors Inc.

## Limit the Use of Worksharing

- Most small projects only have 1 person per project
  - Limits unnecessary dialog boxes, reminders, and load times
  - “Pin” items to make sure they do not get accidentally moved
  - Grids and levels drawn in a separate file

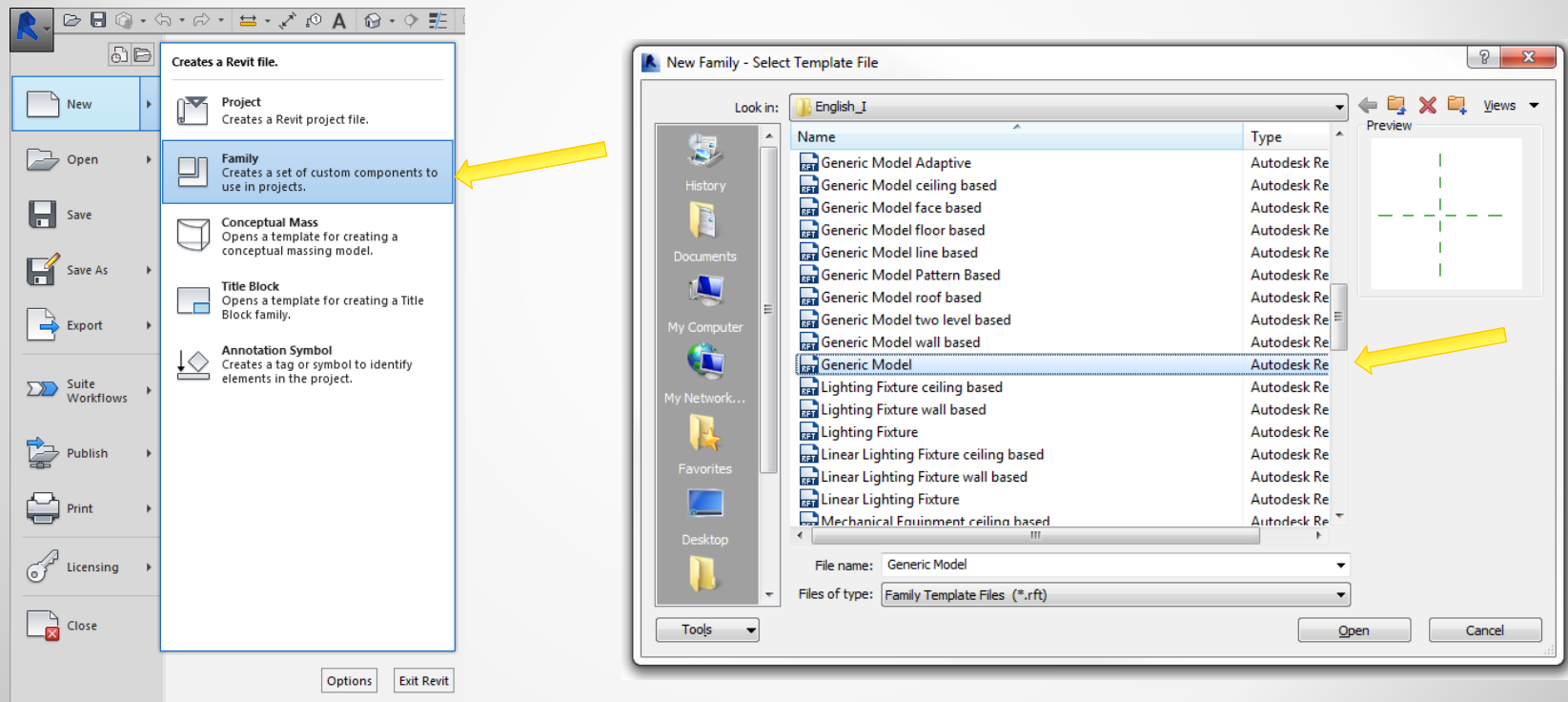
# Host 3D CAD files as a Generic Model Family in Revit

- Involves multiple steps:
  - First steps include preparing the CAD files before they are imported (Based on AutoCAD 2014)
  - Run the PURGE command, followed by set PROXYGRAPHICS to 1, select all and EXPLODE the finish by running CONVERTOMESH
  - Use the Action Recorder to streamline this process



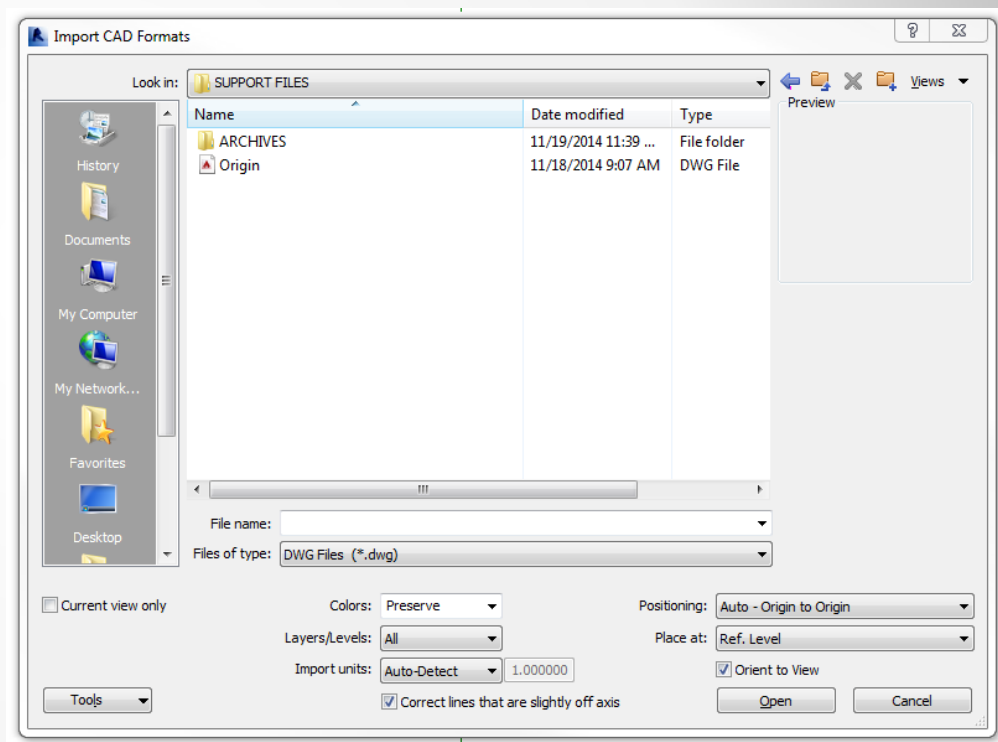
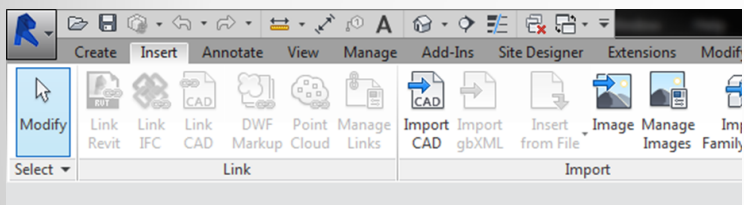
# Host 3D CAD files as a Generic Model Family in Revit

- Create new Generic Model Family to host CAD model



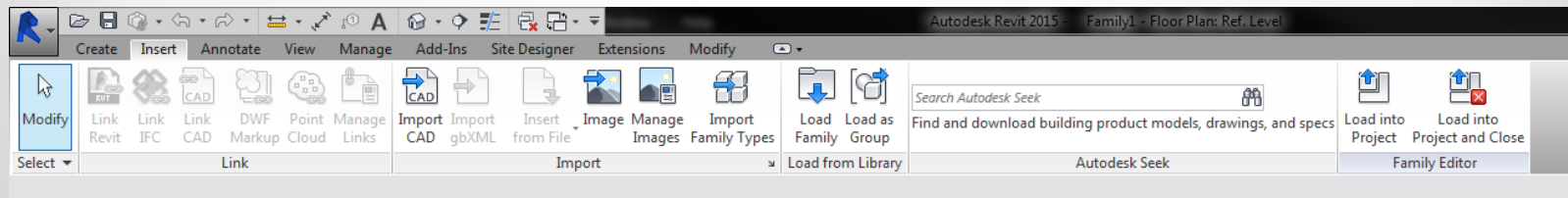
# Host 3D CAD files as a Generic Model Family in Revit

- Import the CAD file Origin to Origin



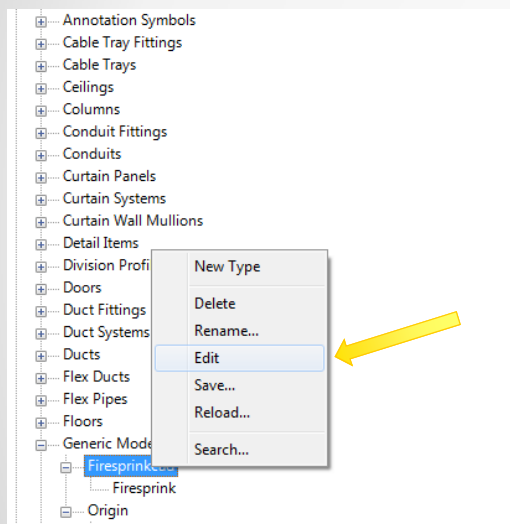
# Host 3D CAD files as a Generic Model Family in Revit

- Save As in an appropriate location, and name correctly
  - Load the new Family into the project, and place appropriately
- I Prefer to use a plan view with the project base point visible*



# Host 3D CAD files as a Generic Model Family in Revit

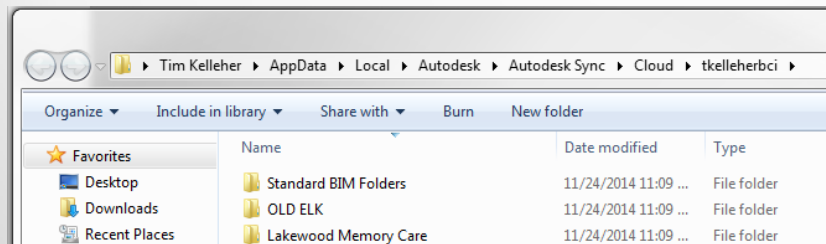
- To update files open the family from either the family that was saved, or by editing the family loaded into the model



- Once changes are made, you can reload into the project overwriting the original version

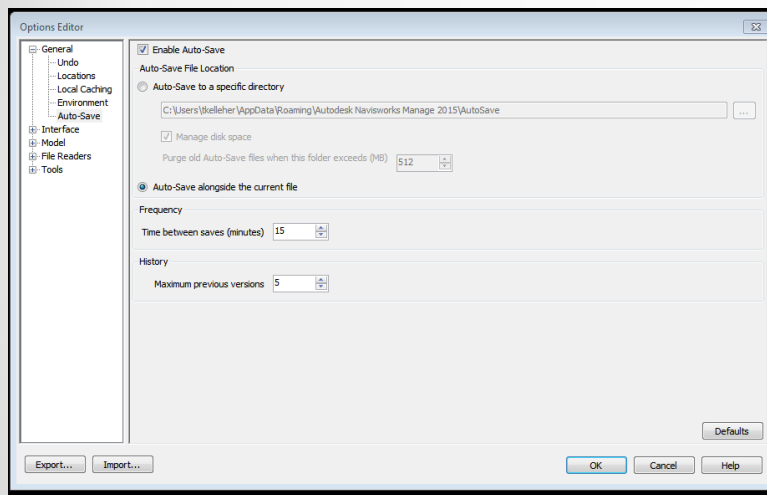
# Cloud Services for Models

- Not able to focus on one project at a time
  - Being mobile with all of your information is very important
  - Keep data stored on your hard drive
  - Files are always backed up
  - Easier to share
- Autodesk 360
  - Custom Shortcut



# Auto-Save in Navisworks

- In the box configuration saves them all in one location



- Re-Configured to Auto-Save similar to Revit

# Questions?