**SANTIAGO HIGH ARCHITECTURE DESIGN 2A**

**Revit MEP 2017 Demo: Linking MEP Drawings into Architects model**

Students will link Mechanical, Electrical, and Plumbing drawings into the Revit Architecture BIM model.

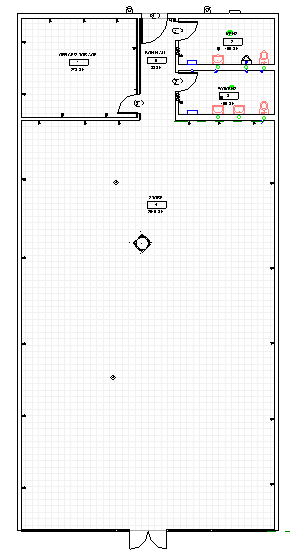
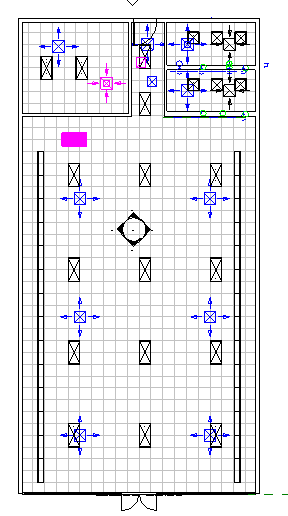
Create the building in Revit Architecture

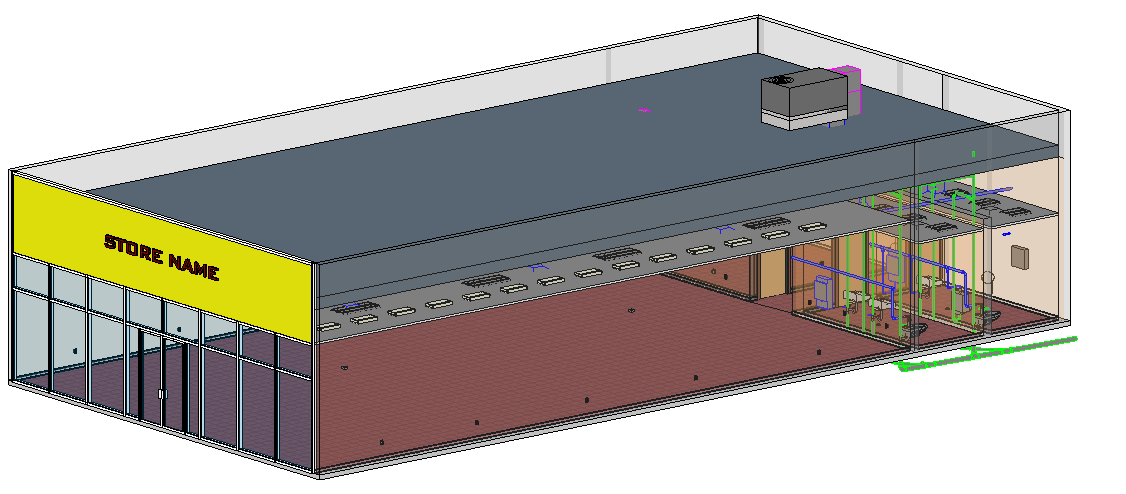
Analyze the 3 Mechanical, Electrical, and Plumbing systems relationship with one another.

Coordinate the 3 systems: Mechanical, Electrical, and Plumbing

Correct clashes in systems

Make design changes based on function of the building and viability.





**Linking the Mechanical, Electrical and Plumbing Disciplines**

The Architect hires the MEP consultant to do the Mechanical, Electrical, and Plumbing systems.

The Architect provides the MEP consultant a copy of the building, drawn in Revit Architecture.

The MEP consultant links the architect’s model into their MEP file.

The MEP consultant(s) does their job, then provides the architect the Revit MEP model.

The Architect links the MEP model/file(s) into their architectural model.

The Architect coordinates the drawings….looking for construction/design problems like collision of plumbing and mechanical….structural and mechanical….etc.

The ability to know your building can be **constructed as designed** is very important! Changes in the field can be costly (who pays for errors??).

In Revit Architecture 2017

Open a new file in Revit. Use the Architecture Template.

Change Level 2 to 14’0”. Name it Roof.

Floor Plan Level 1

Let’s start by linking in the Architectural Model

Insert

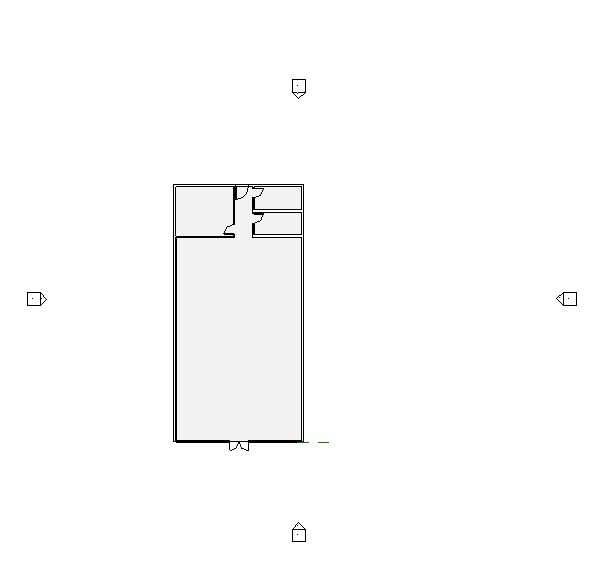
Link Revit

Open Revit Arch Building for MEP 2017.rvt

This is the original Revit Architecture file (provided by the architect)

**Origin to Origin** Open

See the building? Pass your mouse over it. See the blue box? It is one “linked” file.



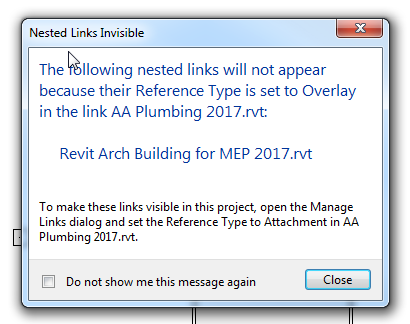
Let’s continue by linking in the Plumbing Model

Insert

Link Revit

Store Plumbing 2017.rvt **Origin to Origin** Open

This dialog box comes up:

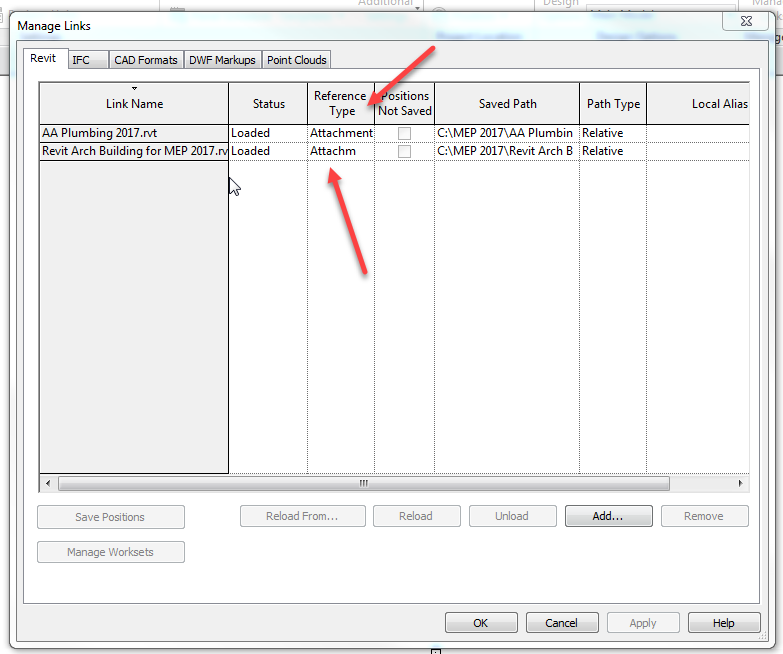


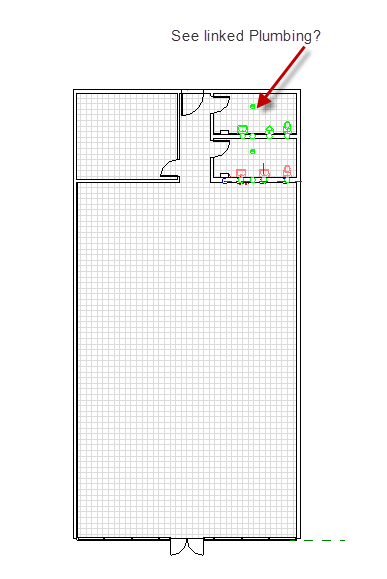
We need to do what it says…..

Manage

Manage Links

Change the Reverence Type to “Attachment”…OK





Floor Plan Level 1

Let’s continue by linking in the Mechanical

Insert

Link Revit

Store Mechanical 2017.rvt (use the revision) **Origin to Origin** Open

The same Nested links warning comes up. Fix it like you did the other 2!

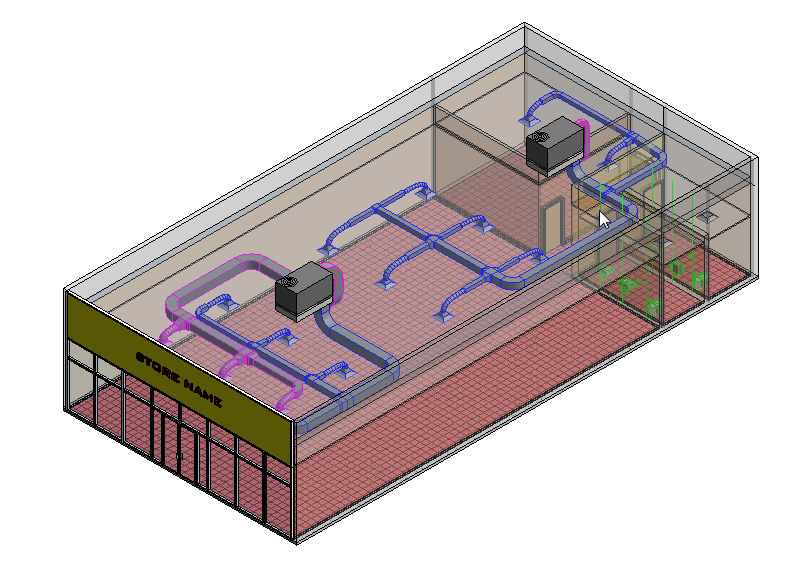
See the Ducts, AC unit? NO???

Go to Ceiling plan Level 1….see the diffusers?

Go to 3D view

You will need to make the walls, ceiling, and roof 75% transparent

VV…..see transparent option? Set at 75% for the objects. Set to shaded.



Floor Plan Level 1

Let’s continue by linking in the Electrical

Insert

Link Revit

Store Electrical.rvt **Origin to Origin** Open

The same Nested links warning comes up. Fix it like you did the other 3!

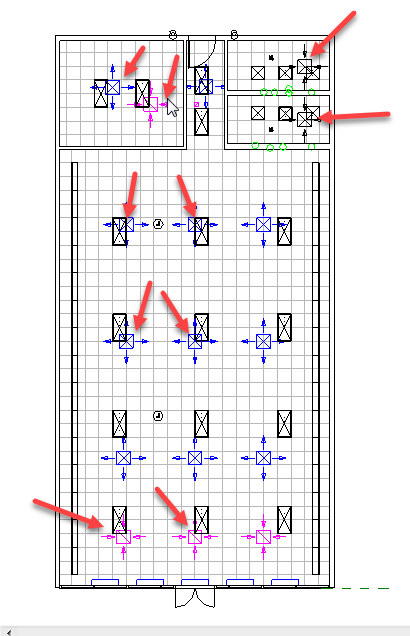
See the switches and outlets?

Go to Ceiling Plan Level 1

See the lights and diffusers?

Go to 3D view

Look around! Any collisions?



If so, you need to decide what gets moved.

Let’s say a light and a supply diffuser collide. Which moves? Probably the diffuser, since we strategically placed the lights to provide a specific amount of light to a particular area (remember footcandles in Visual software??)

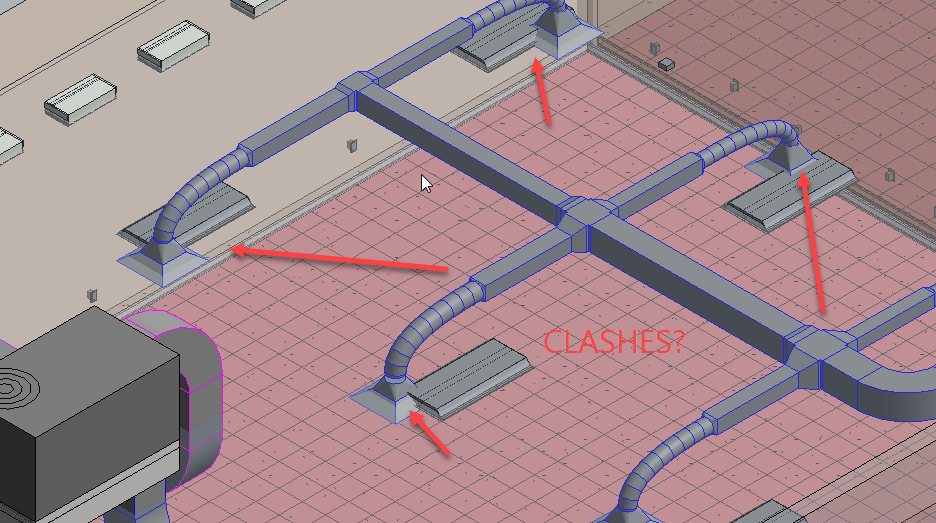
Let’s say a plumbing line runs into a duct? Probably easier to move the plumbing line since the duct is bigger and harder to wiggle around things.

Let’s say a vent pipe (inside a wall) runs into an outlet? Move the outlet!

What happens if there is not enough room between the ceiling and the roof to place the ductwork?

What happens if structural members are placed so the duct runs can’t happen?

Making these decisions sometimes involves a design team of MEP consultants, structural consultants and Architects. Even the client can be involved. The idea is to work out all the building challenges BEFORE construction starts or before it is too late to make efficient changes.



Set transparency back to normal

Save file as Linked Model 2017.rvt

**Navisworks**

There a two ways to this…..here is the first way:

In Revit Architecture 2017

Open Linked Model 2017.rvt

Be in the 3D View

This would be the complete Revit model with all of the disciplines involved.

You will export the Revit file to Navisworks 2017

R

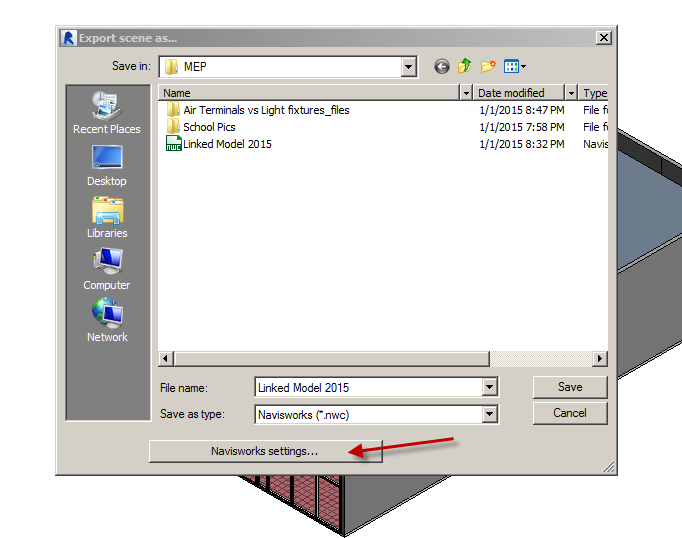
Export

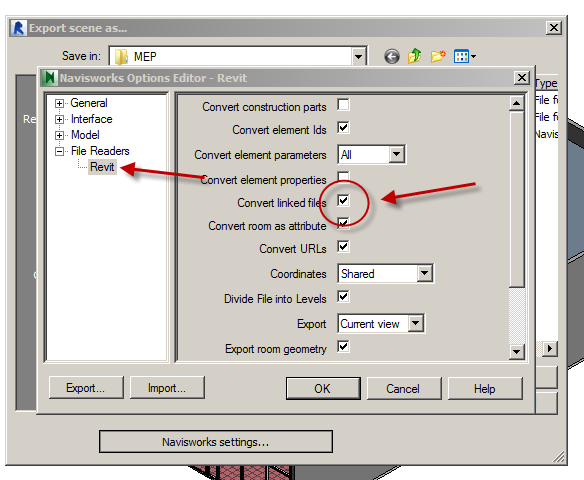
NWC

Save as Linked Model 2017.nwc

Before you hit save:

Navisworks Settings





You need to check “Convert Linked Files”….OK….Save

In Navisworks Manage 2017

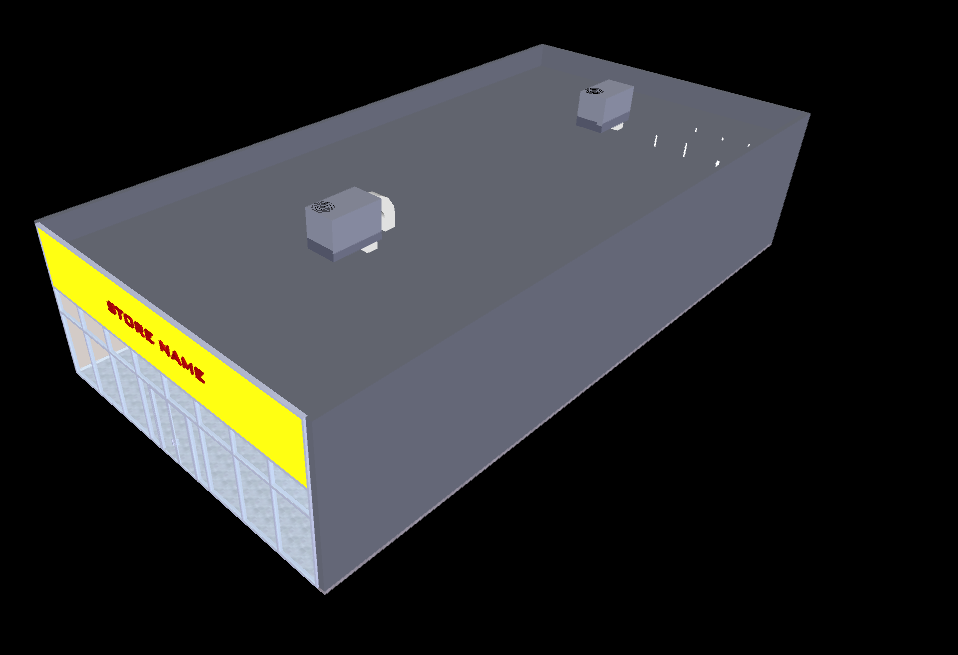
Open

(no files???)

Files of Type: Navisworks Cache (NWC)

Linked Model 2017.nwc

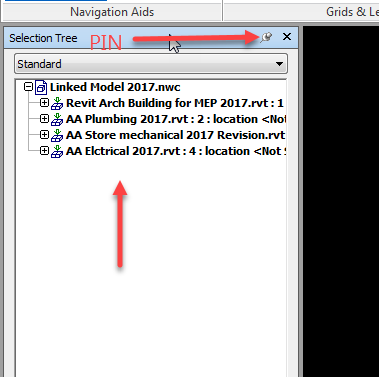
Open



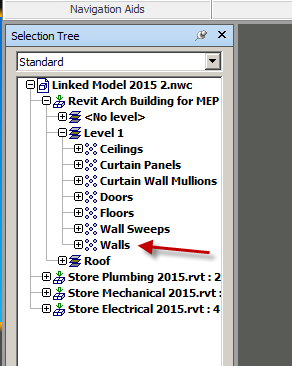
Let’s see the inside elements better.

View….Windows….Selection Tree

Pin it



Pick Walls in selection tree



Item Tools

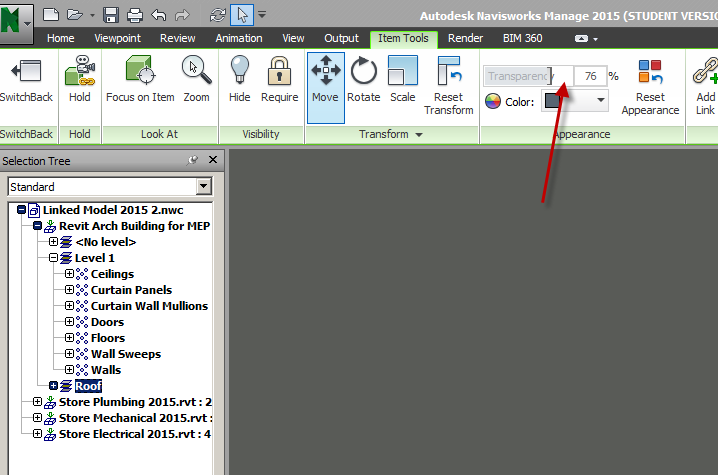
Transparency: 75% or so

Do the same with the Roof:

Pick Roof in selection tree

Item Tools

Transparency: 75% or so



To change to Shaded Mode (you are probably seeing Render mode and we do not have render materials going)

Viewpoint

Render Style

Mode: Shaded

Should look something like this:



That’s good….but all the objects look the same color.

Let’s differentiate the plumbing from the electrical from the mechanical!

In selection tree, pick Store Plumbing 2017

Item tools

Color

Change to yellow

Check out the Plumbing….YELLOW!

In selection tree, pick Store Electrical 2017

Item tools

Color

Change to Purple

See the purple lights and outlets??

In selection tree, pick Mechanical

Item tools

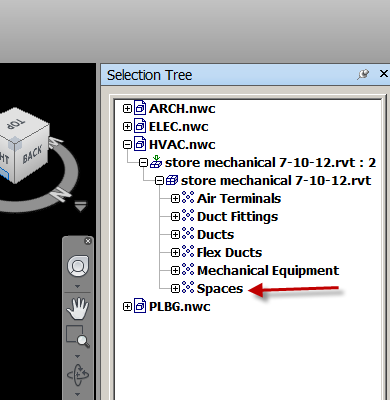
Color

Change to Green

Open up

Note the HVAC turns green, but a big space may have turned green too.

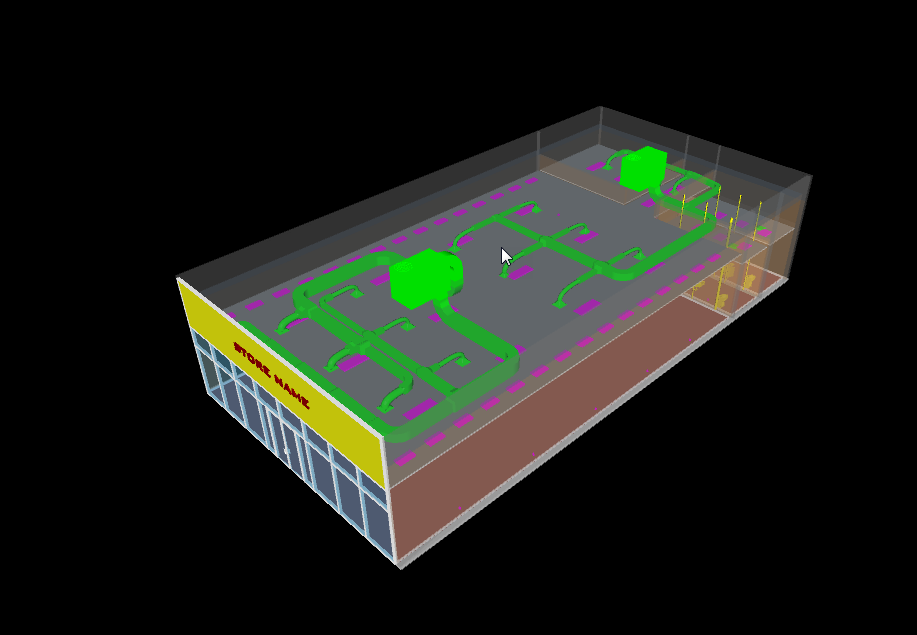
Here’s why….spaces are under Mechanical



RC on Spaces

Hide

Better?



Navigating in the model

**Navigation Bar**

The Navigation bar is that little tool bar to the right of the window. It has all of the navigation commands on it.

Right click on the navigation bar

Global options

Interface…..Display units. Set them to feet and inches

For display units go ahead, and select the display units that you'd like to have as a default for Revit.

Go to the viewpoint tab, and you'll see we also have a navigate panel. Click the navigate button down. You can choose how to accelerate or slow down if you're going around a corner.

You'll find when you're walking through a model or flying through a model you might want to turn this stuff back or up.

**Walking through your model**

This is the navigation command you'll probably use the most. To start walking forward, you just hold down the pic button. That's the left button. With the left button held down, move your mouse forward. The farther you move your mouse away from you the fast you will go. You can stop, and you can pull your mouse towards you, and you will back up. Some more functionality with this command is the ability to pan up and down. To do this, you hold down your Shift button, while holding down the scroll button on your mouse. If you move your mouse towards you, with these two buttons held down, you can actually pan down the model.

Once you let go of the two buttons, you'll stop. To advance forward, hold down the pic button. The object is to try to walk into one of these rooms. Go ahead and guide yourself towards a room.

If you scroll towards you with your wheel button, you can actually look up. If you scroll away from you, you can actually look down. One other thing you can do is we can pan left or right. By holding down the same buttons, the shift button and your scroll button, move your cursor to the right. We're panning ourselves to the right.

Hold down the shift button and the scroll button. And pan yourself to the left. Now you are free to roam about the model anyway you see fit. It takes a lot of practice not to accidentally walk through walls. For some, this is going to take some time and patience.

**Looking around your model**

The icon is an eyeball. This tool allows you to stop and look around as if you were just standing there. What's also nice about this tool is that the spot where you stop looking is the perspective view, you will bring with you as you commence with the other navigation mode you were in.

Hit the drop-down and make sure that Collision and Gravity are turned off. By doing that, you just click the drop-down, and if they're checked on, just select it again, and it'll check it off.

Making sure they're cleared out, we can start walking. I'm going to get up to a certain point, hold my Shift key and my wheel button, and pan down, so I'm walking down the first floor. I'm going to stop in the hallway. I think right here's about a good spot to take a look around. On my navigation bar. I'm going to click the Look Around button. Notice that the icon changes. Now if I pick a point, and move my mouse away from me, I can look up. I can move to the right, I can look to the right.

Move it to the left and then I can look to the left. So now if I want to look up. And if I want to check out the ceiling as I'm walking down the hallway, I can just keep my focus looking up. Now when I start my walk command, I can walk down the hallway and not go in the actual direction that I'm looking in. The some of the other navigation commands, you can't do this. This is a great way to look through a building while you're looking at a specific item, as if you were standing there looking up walking down the hallway.

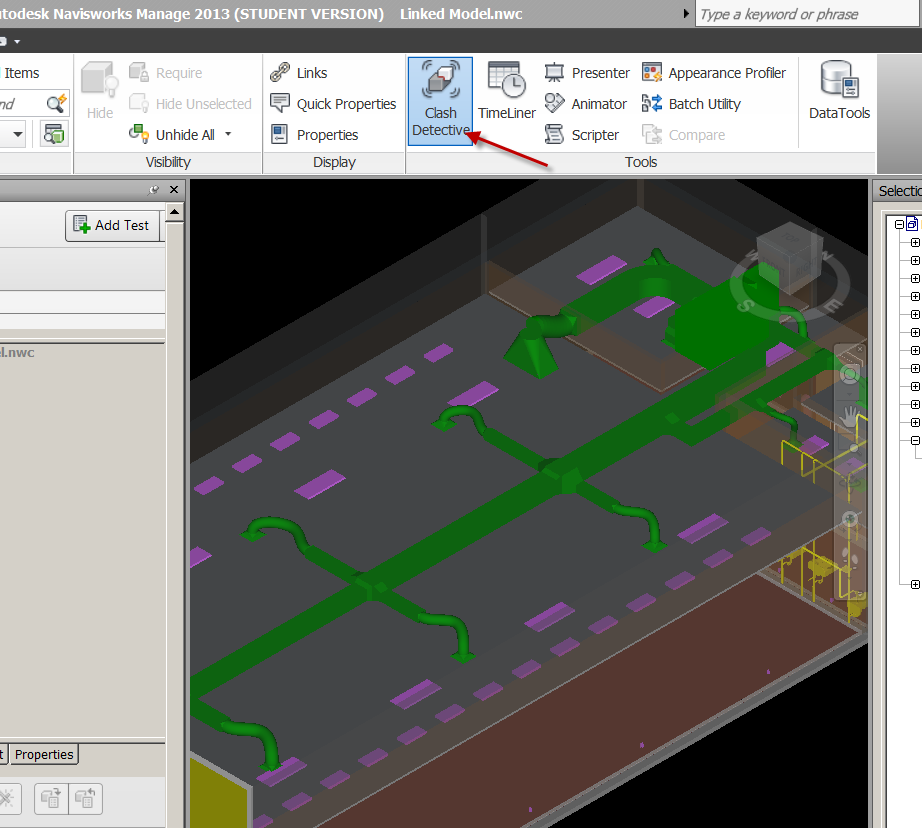
**Gravity tool**

The gravity tool is used in conjunction with the walk command. By turning on gravity, you're saying to Navisworks that you want to keep your feet upon the ground. You're also telling Navisworks that if a staircase or a ramp comes along, you'd like to walk up or down it. And open it up. With the Orbit tool running, spin around and look at the side of the building. Select the Walk command. Hit the drop down, and make sure Collision and Gravity are turned off. Walk right through the wall as if it wasn't there. I'm going to turn around to the right, and notice that there's a staircase there. To walk up the staircase, I need to turn my gravity on and I need to turn my collision on. Once we do this, we'll no longer be able to walk through a wall. Go ahead and click the drop down underneath the walk icon, and turn on gravity.

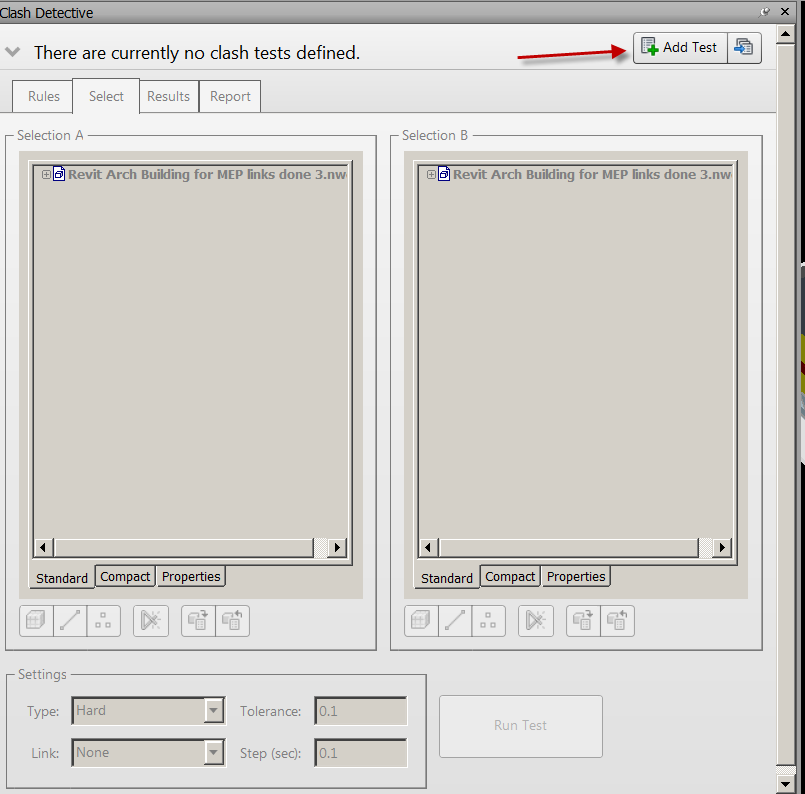
Click the drop down again just to verify that collision and gravity are both turned on and click off of it. Notice that when you start walking Navisworks will shove you right down to the floor. Keep walking and this is going to test your navigation skills. I am going to come around the corner. I am going to come over to my stairs. And I am going to start walking up them.

Home

Clash Detective

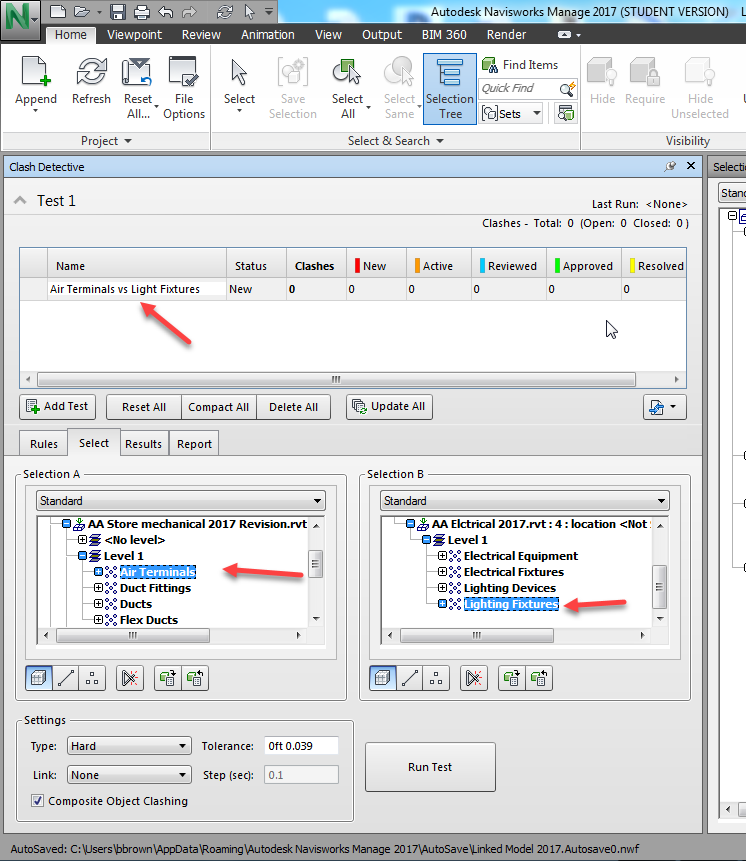


Add Test



Let’s run a check for Air Terminals (Diffusers) vs Lights to see if any of our ceiling lights are hitting diffusers.

Name it Air Terminals vs Light fixtures

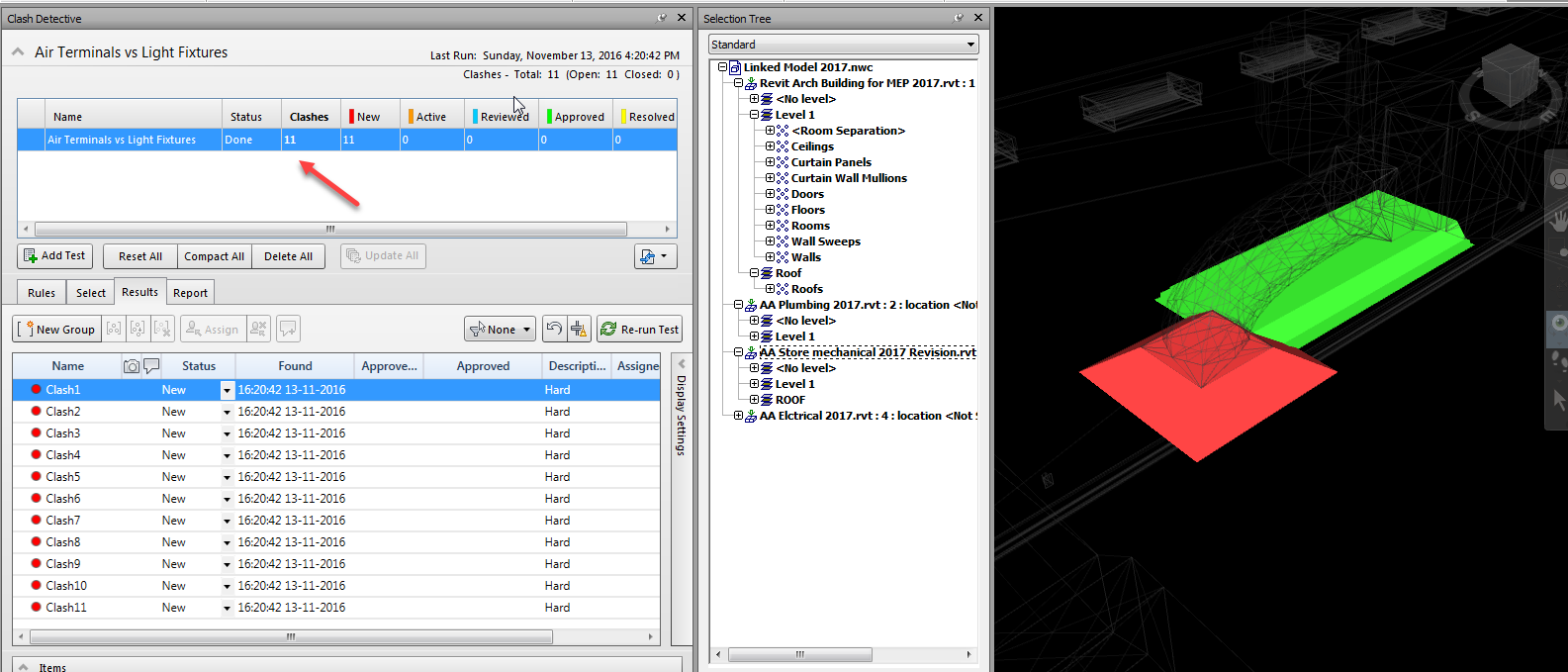


So the categories are picked. Hint: Don’t do everything vs everything….it’s a nightmare to look at!

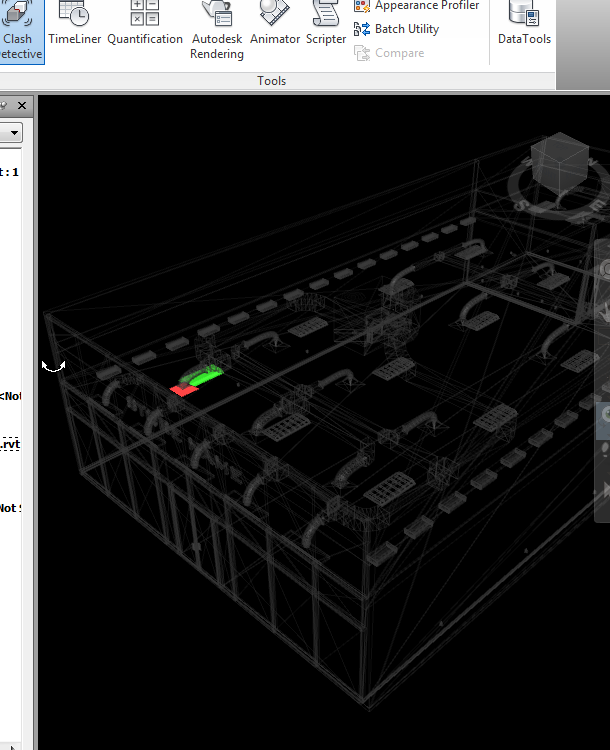
Run Test

Just 11 in my model….

Note: There will be repetition….but the collisions are shown!



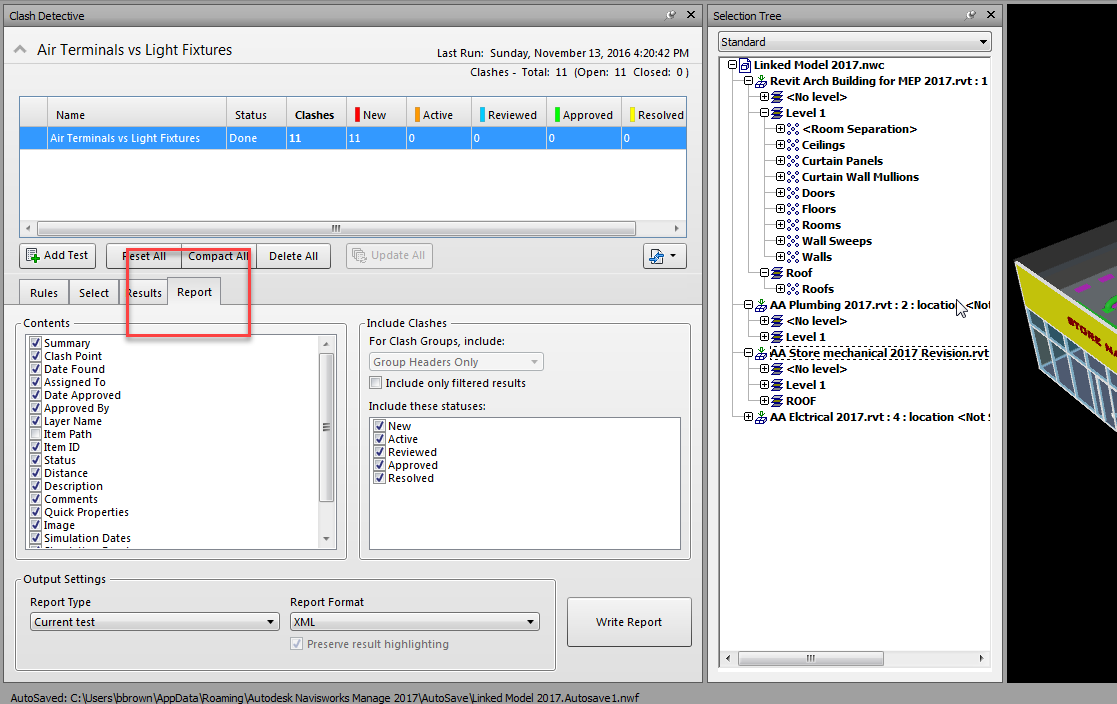
Zoom out a little to see where you are in the building!

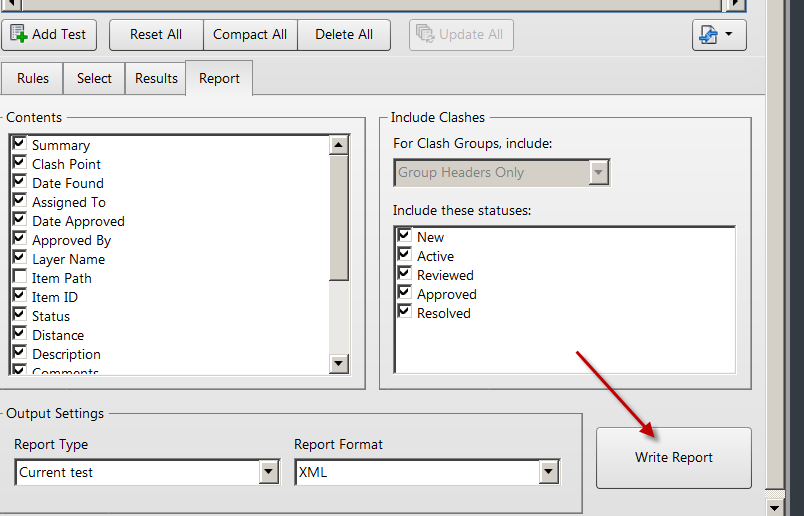


Select the other clashes…see where they are! Hint: Use “Page Up” on keyboard to zoom all.

**Clash Reports**

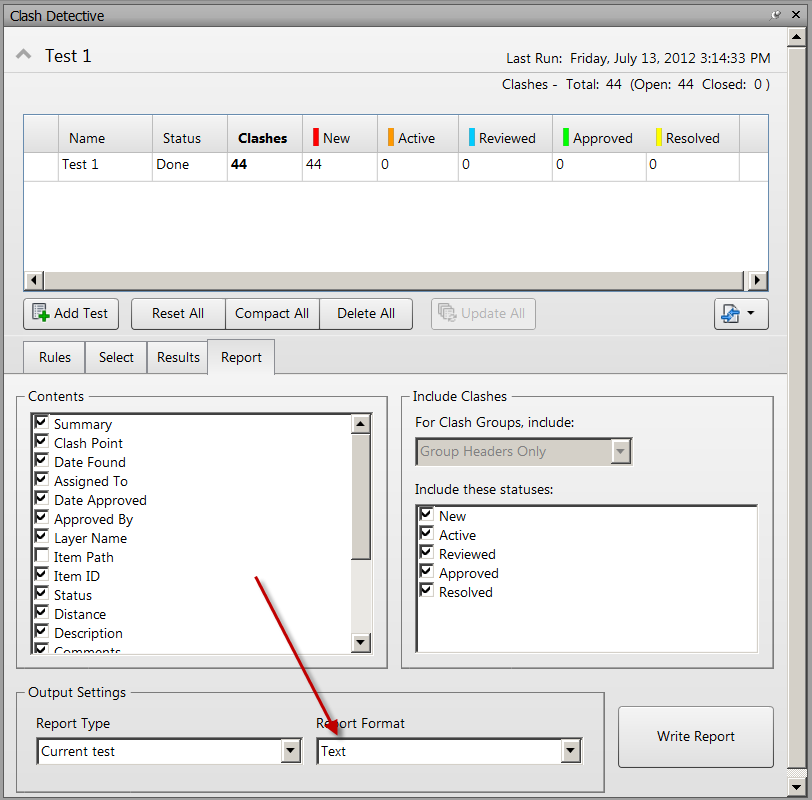
You can create a clash report. This could be brought into a collaboration meeting to “discuss” who is going to fix what.

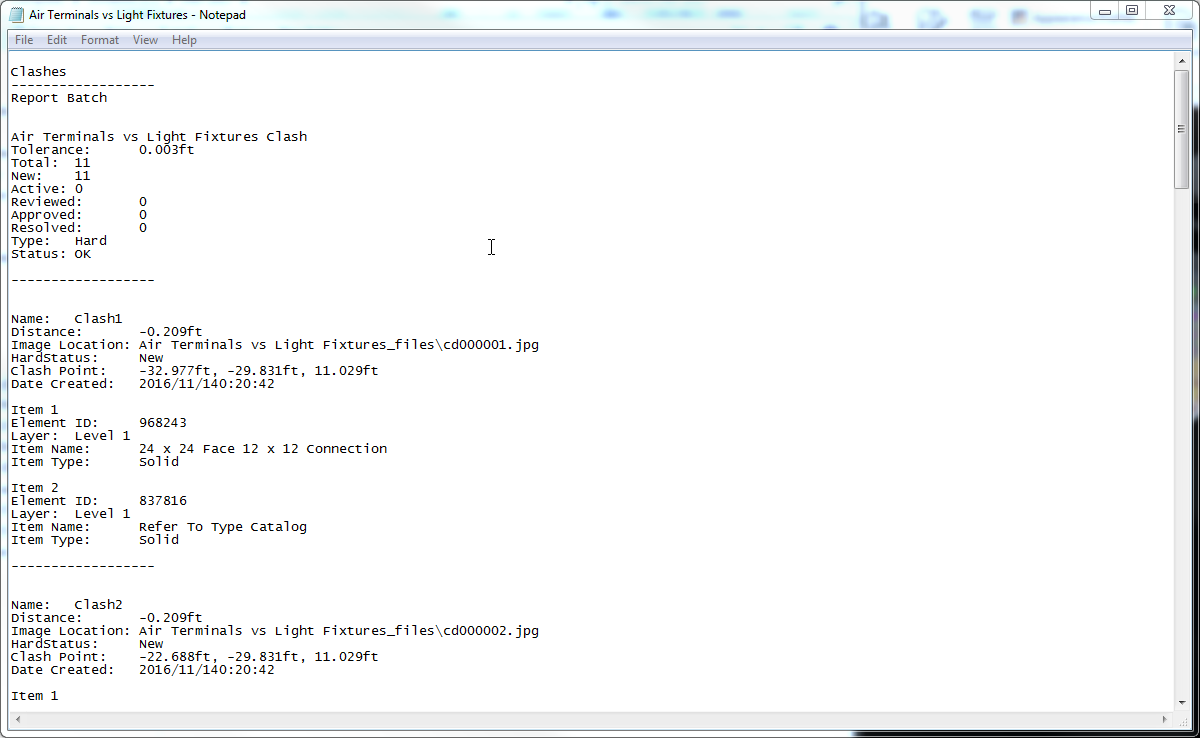




The report is an .xml file (just like the revit file we exported into EnergyPro). Save

You can also create a report as a text file:





Viewpoints Report

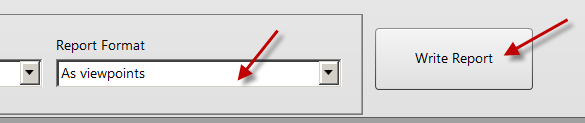
This is a really cool way to show the errors:

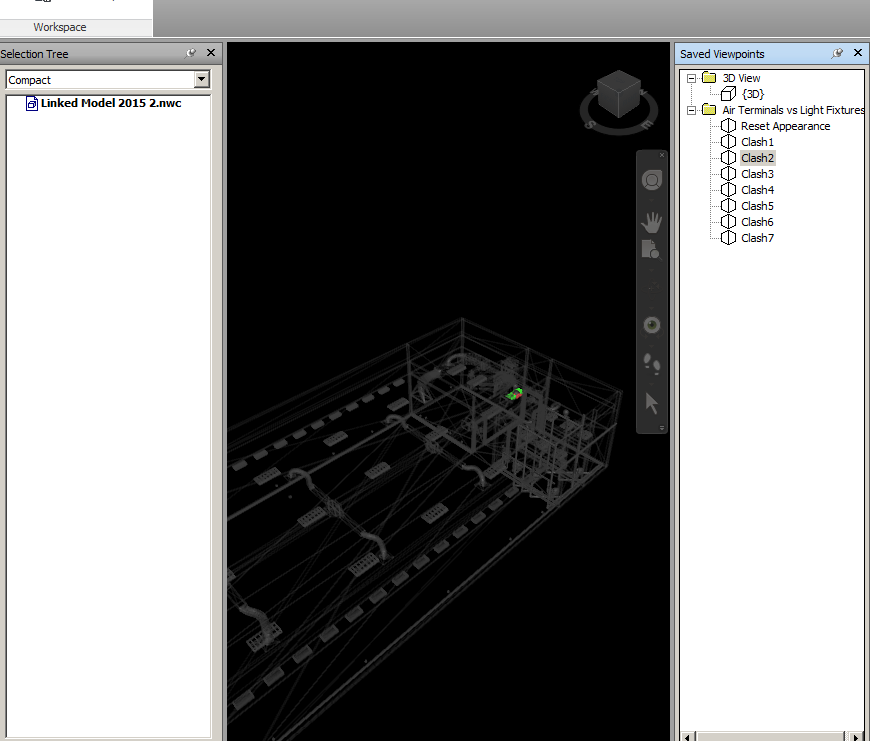
Report

Report Format: As Viewpoints

Write Report

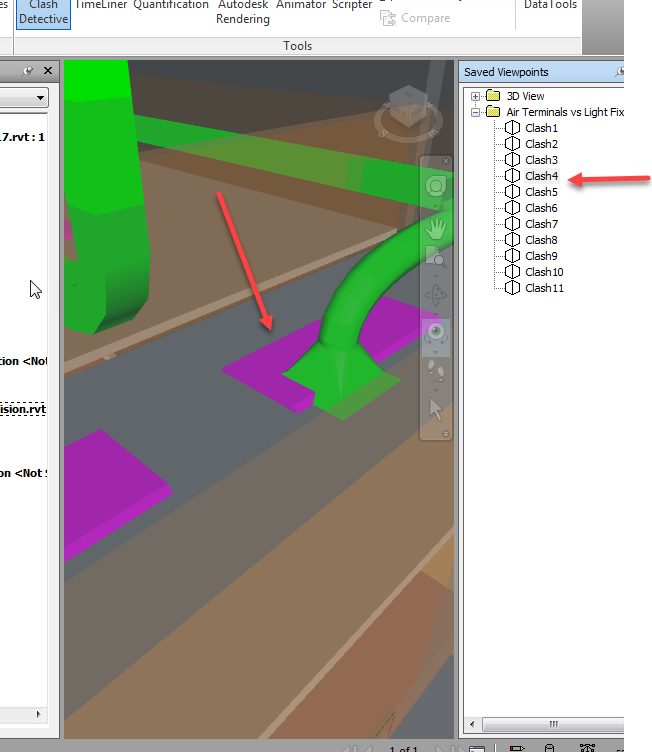
Check Preserve result highlighting





Open the + sign on Air Terminals vs Lights?

You can pick on each clash!!!



**Another way to bring Revit file in Navisworks**

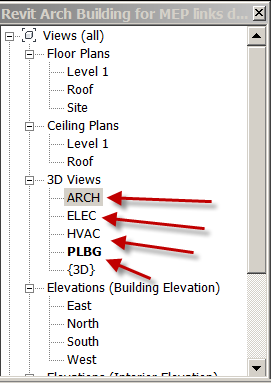
In Revit Architecture 2017

Open Linked Model 2017.rvt

This is the linked file with the building, mechanical, electrical, and plumbing.

**We are going to separate the disciplines….**

Make 4 copies of 3D view

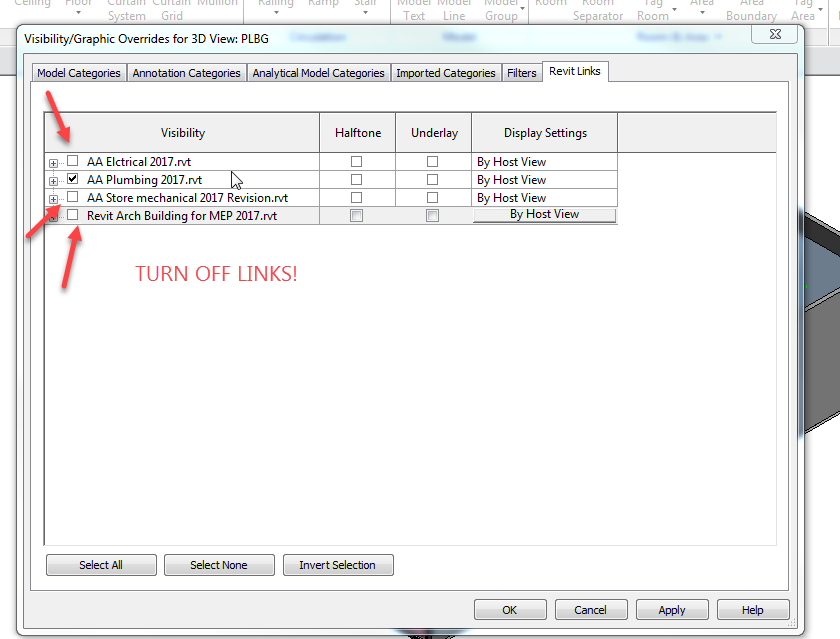


We will start with Plumbing

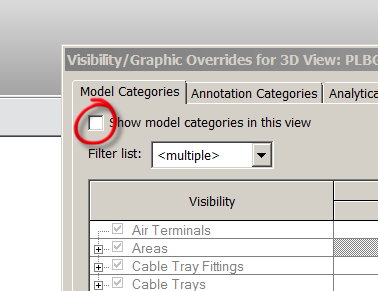
VV

Revit Links

Turn Off the other 3 links



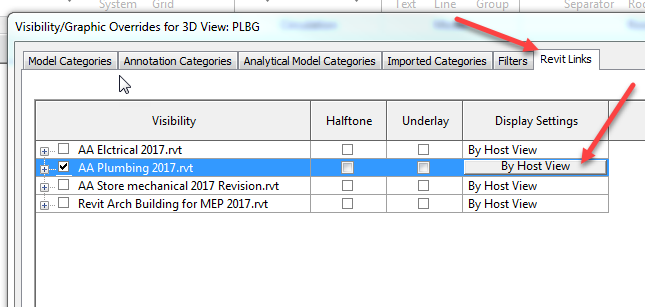
Model Categories tab…uncheck Show model categories in this view



Revit Links

Display Settings

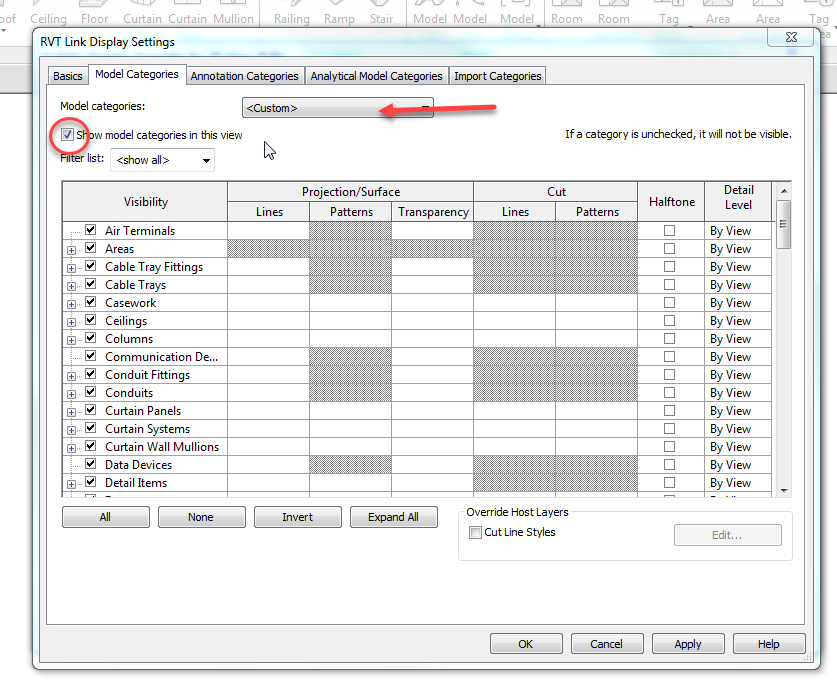
Host to Custom



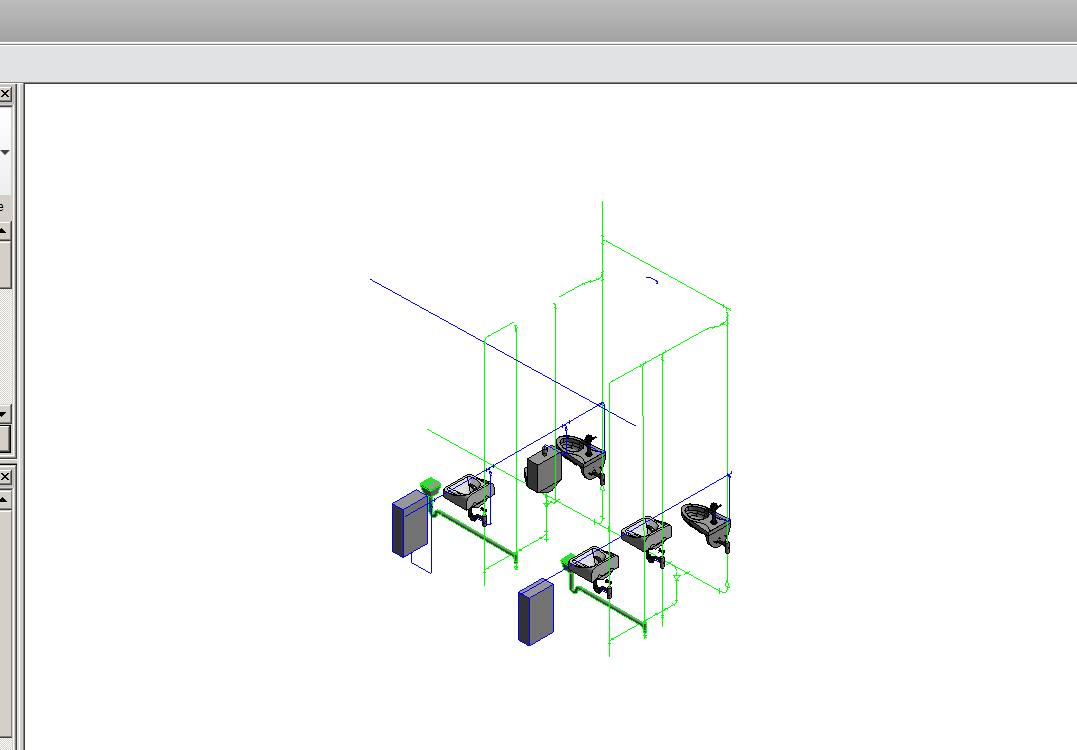
Model Category (in Revit Links)

Custom

Show Model



OK….OK



Just the plumbing shows from the link!

We will continue with the **Electrical**

Select ELEC in Browser

VV

Revit Links

Turn Off the other 2 links (Arch, Mech and Plumbing)

Model Categories tab…uncheck Show model categories in this view

Revit Links

Display Settings

Host to Custom

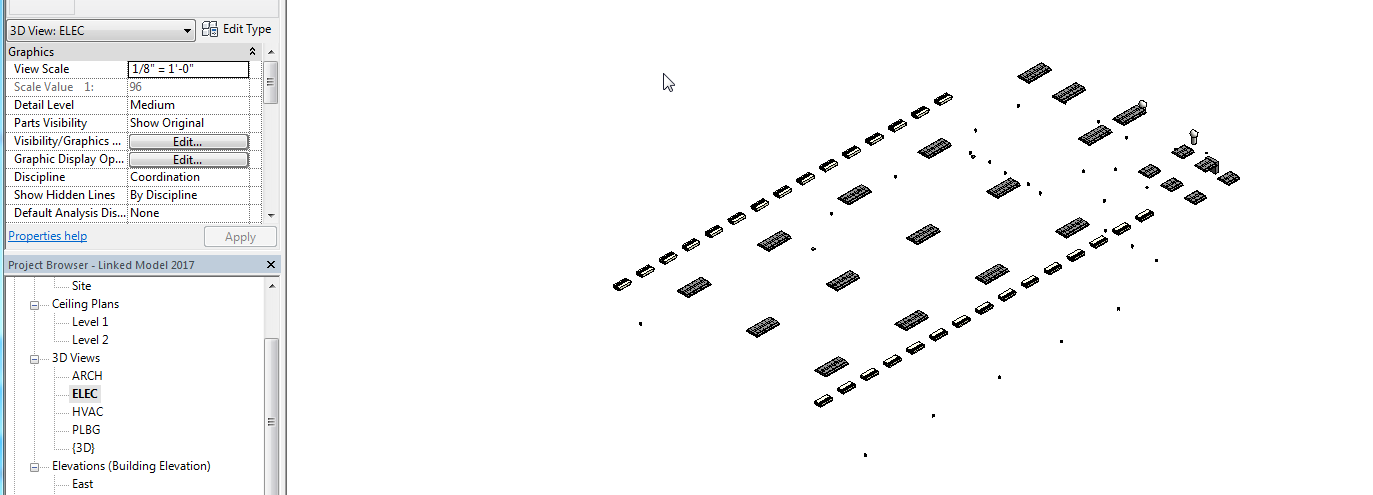
Model Category (in Revit Links)

Custom

Show Model categories in this View (check)

OK…OK

Just the electrical shows from the link!



We will continue with the Mechanical

Select HVAC in Browser

VV

Revit Links

Turn Off the other 3 links (Arch, Elect and Plumbing)

Model Categories tab…uncheck Show model categories in this view

Revit Links

Display Settings

Host to Custom

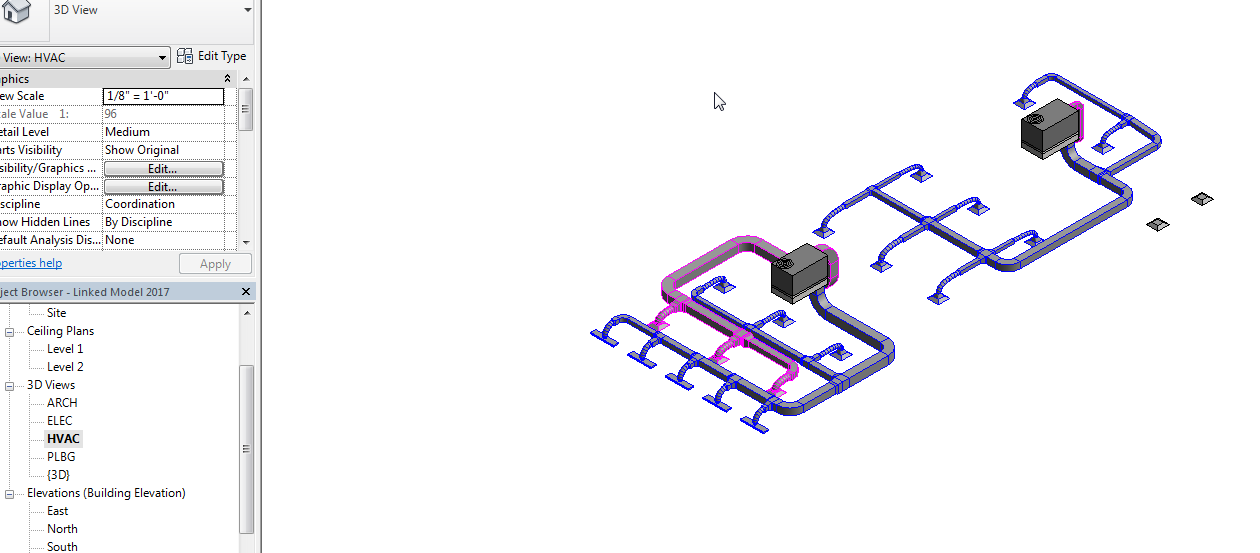
Model Category (in Revit Links)

Custom

Show Model categories in this view

OK…OK

Just the Mechanical shows from the link!



We will continue with the just the Building

Select ARCH in Browser

VV

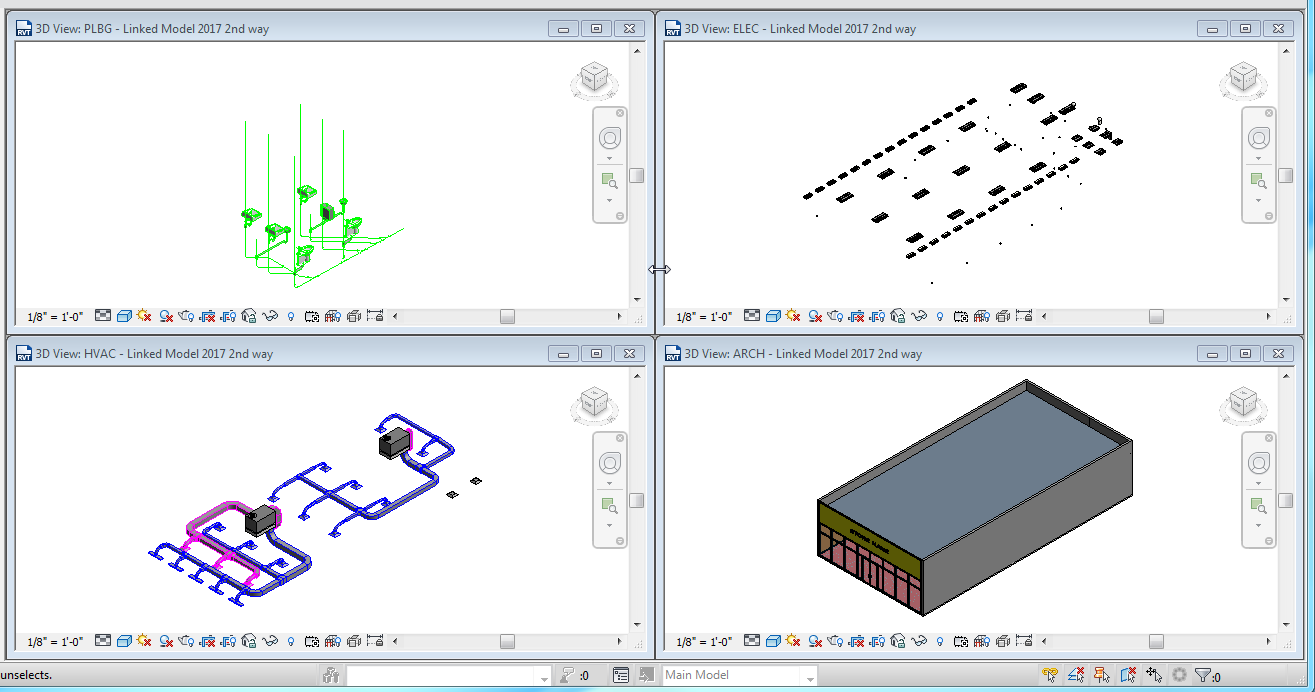
Revit Links

Turn Off the other 3 links (Mech, Elect and Plumbing)

OK…OK

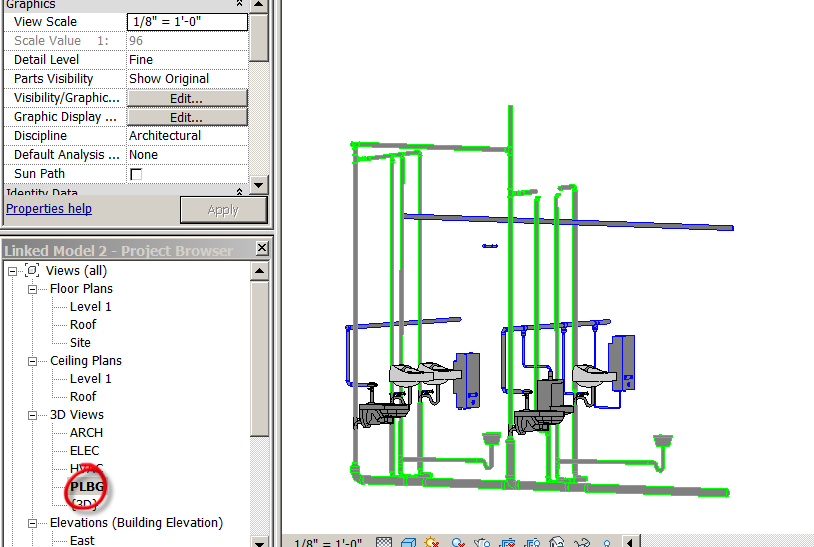
Just the building shows from the link!

Save as: Linked Model 2017 2nd way.rvt



The strategy is to export EACH of the 3D views to Navisworks files.

In 3D View Plumbing (close the other 3D views)

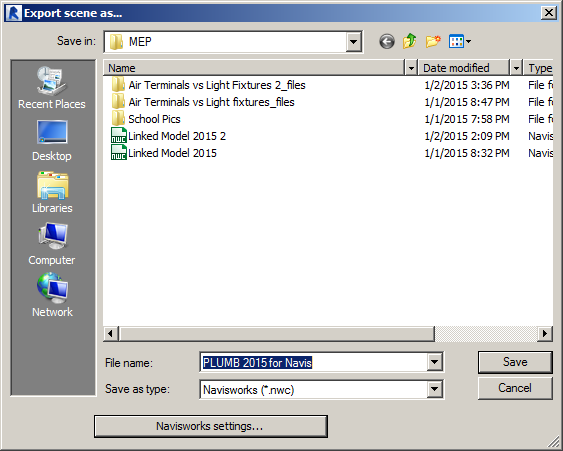


R

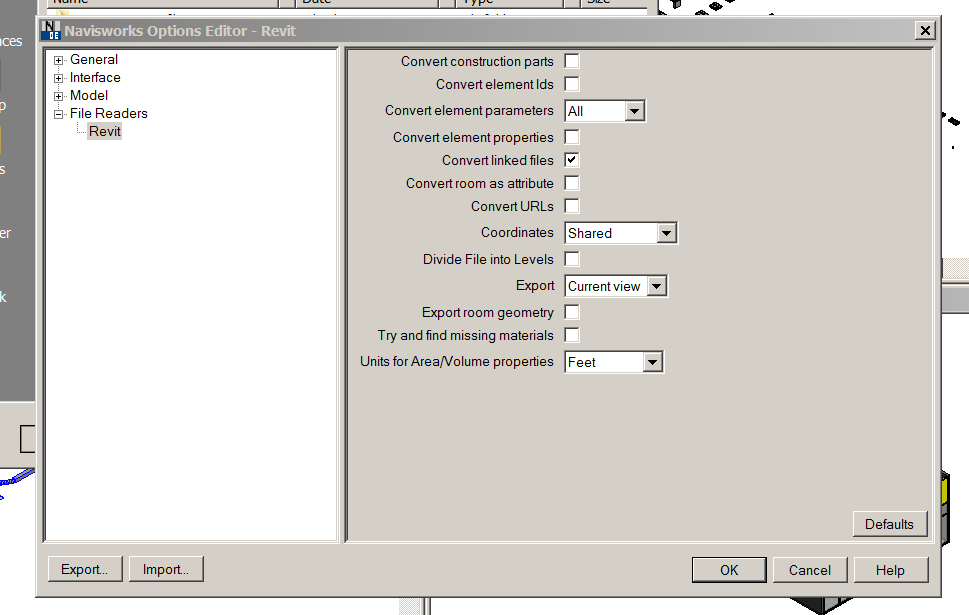
Export

NWC

Name it PLUMB 2017 for Navis



Navisworks Settings



Save

Do that with each of the four 3D views.

Name them:

ELEC 2017for Navis

MECH 2017 for Navis

Arch 2017 for Navis

**In Navisworks 2017**

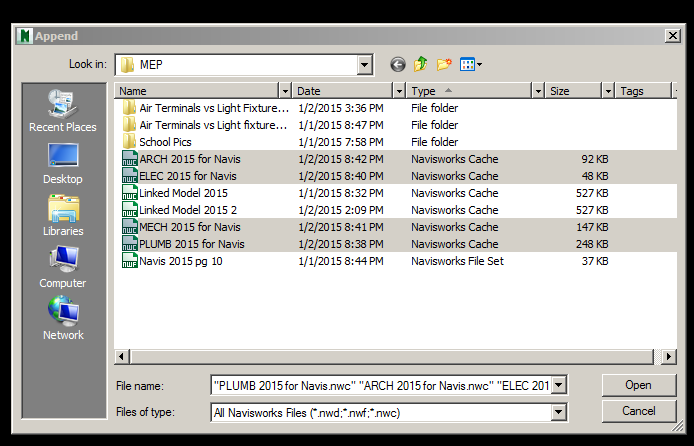
Home

Append

Append (put in)

.nwc

Pick all 4 files

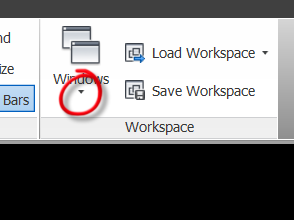


Open

Save as Navis 2017 Clash 2.nwf

View

Windows



Check Selection Tree

Check Saved View Points



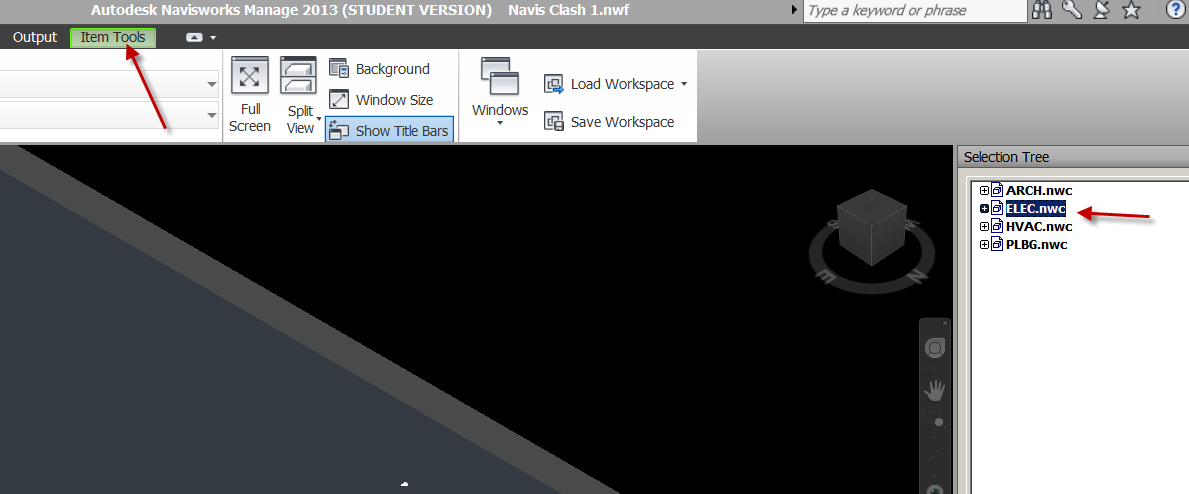
**Setting Colors to the Systems**

You can set Mechanical, Electrical, and Plumbing to different colors …..it’s much easier to see the systems that way! (a little repetition here…..hope that’s OK!)

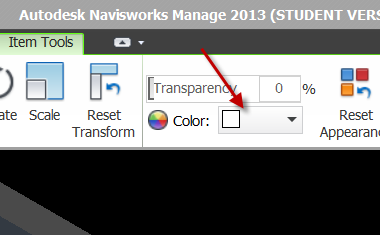
Selection Tree

Pick ELEC

Item Tools



Pick Color



Try red

Can’t see the lights???

Pick ARCH2017 for Navis (the building)

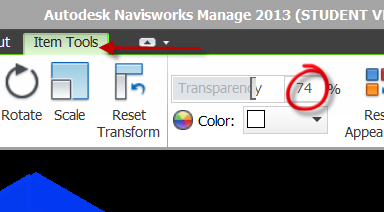
Item Tools

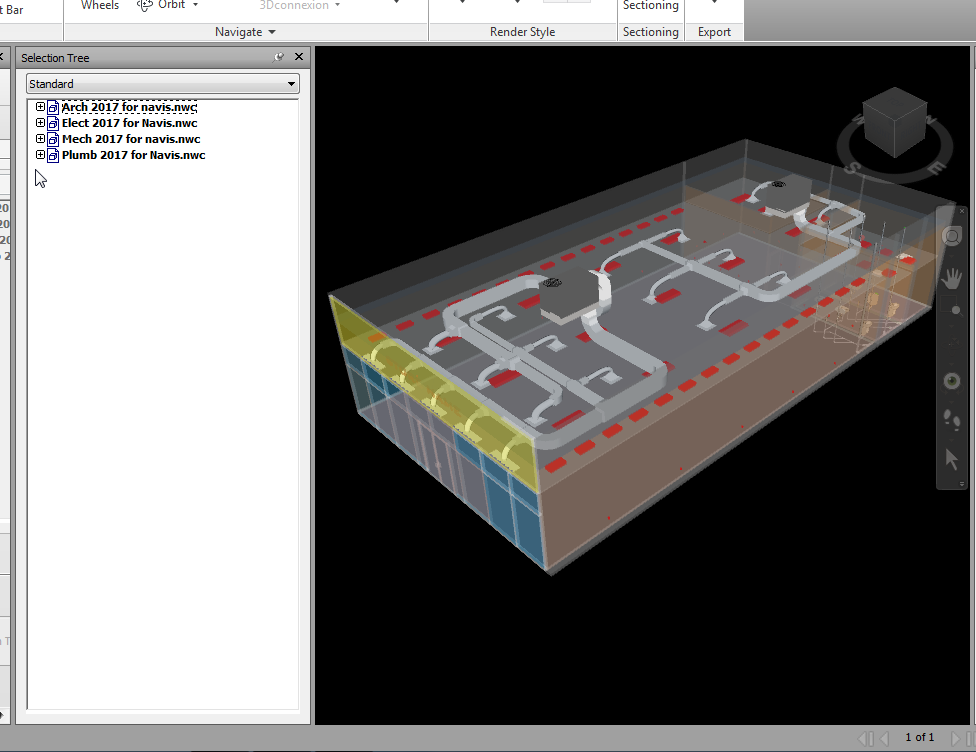
Transparency

Set to 75% or so

Set color to Shaded:

Viewpoint…..Render Style….Mode….

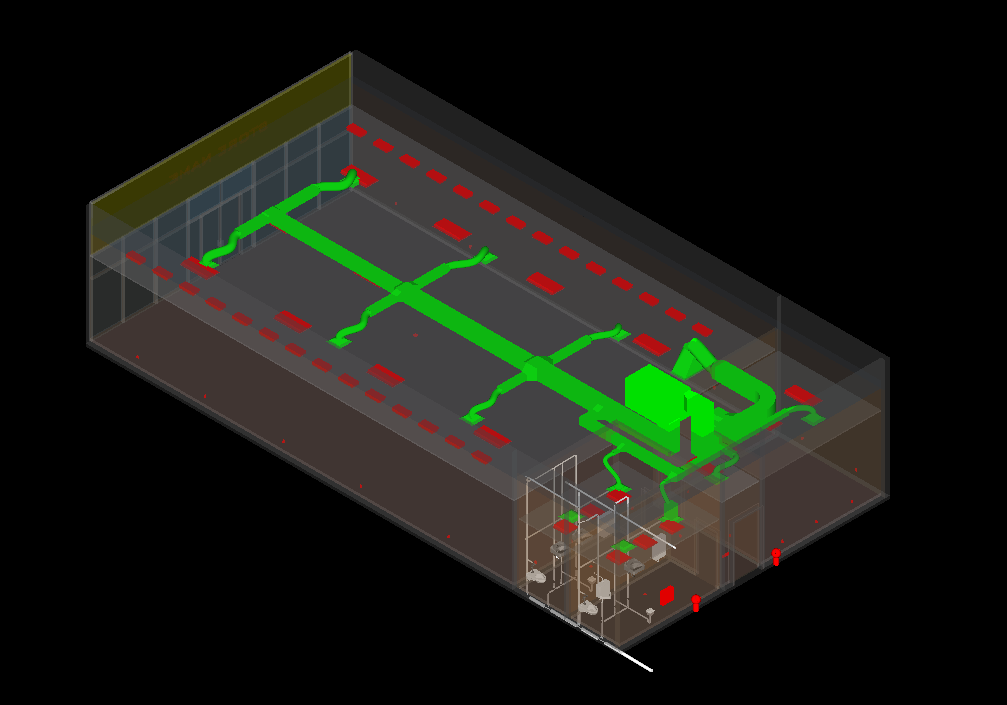




Pick MECH2017 for Navis

Item Tools

Color…pick Green



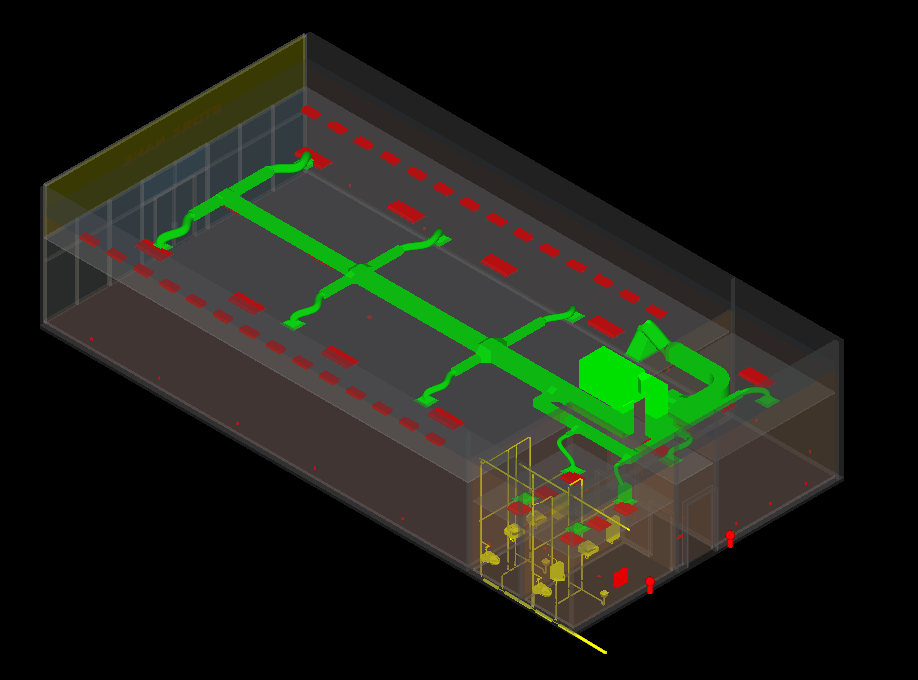
Now the Plumbing

PLBG 2017 for Navis

Item Tools

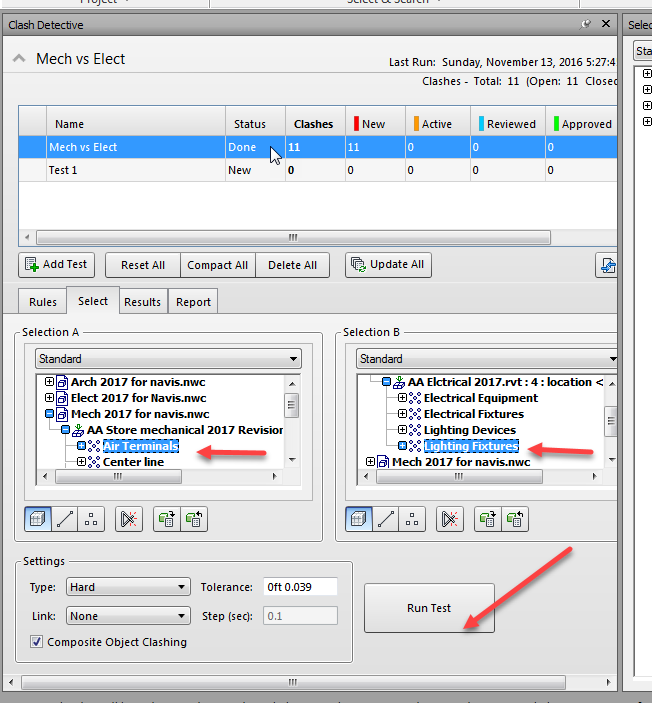
Color

Yellow



Now go to the Clash Detective and run your tests!

This time we will do all of the MECH vs ELEC again (should get the same results???)



Same 11 Clashes?

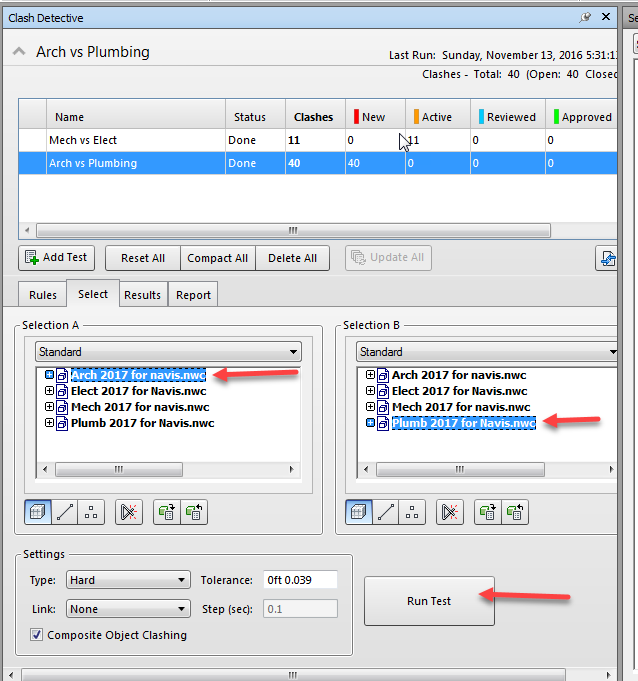
Set up a report as viewpoints.

Write Report (button)

Save file as Navis Clash 2.nwf

Let’s add another test

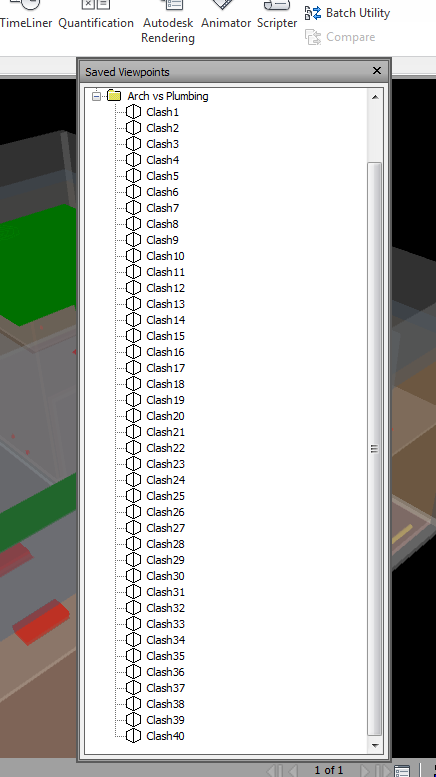
Let’s do Arch vs Plumbing



Wow….a bunch of clashes! Let’s see where they are!

Set up a report as viewpoints.

Write Report (button)



Write Report as an HTML

Open it. Pretty Cool. Ready for a coordination meeting!

