Get to the Point - A guide to sourcing and using Point clouds for Revit

Kris McIsaac

Project Technology Manager – Buildings - APME

AUTODESK. UNIVERSITY

About the speaker

Kris McIsaac

Jacobs (Melbourne)

Project Technology Manager – Buildings - APME

18 Years Industry Experience

13 years Revit

7 years Point Clouds

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Goals

UNDERSTANDING CLIENT REQUIREMENTS

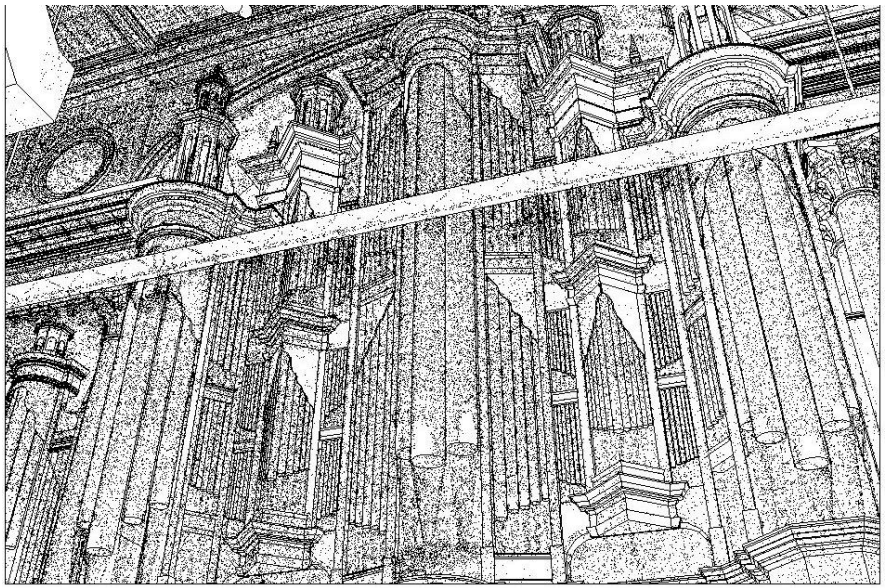
Know the course before you start the race

BRIEFING YOU SURVEYORS

Know what to ask for and how to ask for it

WORK WITH POINT CLOUDS IN REVIT

Tips, tricks and workflows



What is a Point Cloud and Where do they come from

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From Laser Scanners

What is a Point Cloud and Where do they come from

From Laser Scanners. Big ones.

What is a Point Cloud and Where do they come from

From Laser Scanners. Big ones. Small ones

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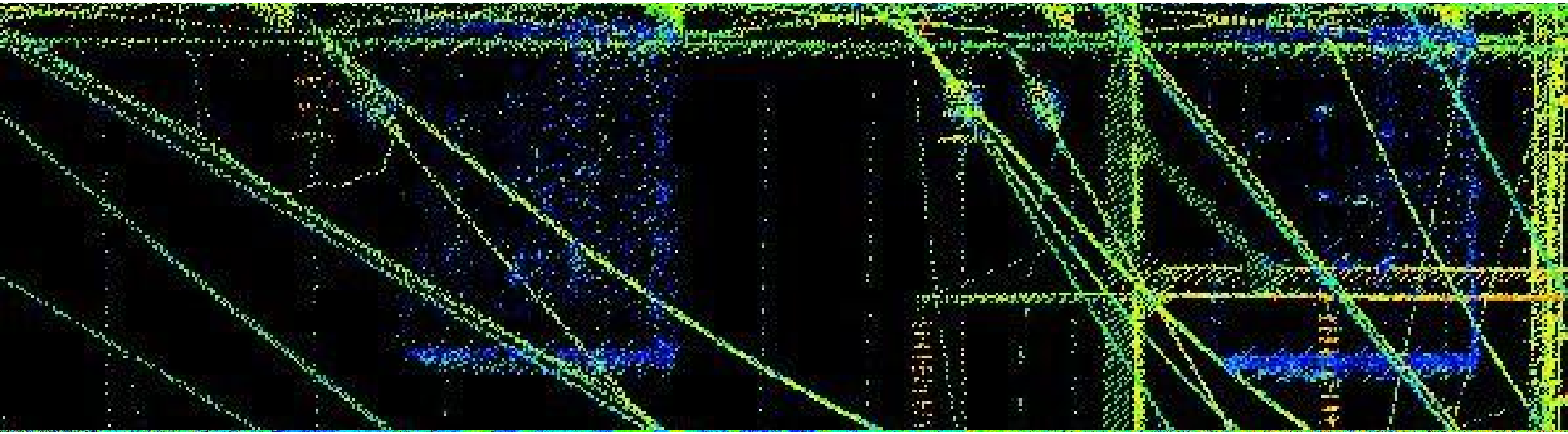
From Laser Scanners. Big ones. Small ones. Mobile ones

What is a Point Cloud and Where do they come from

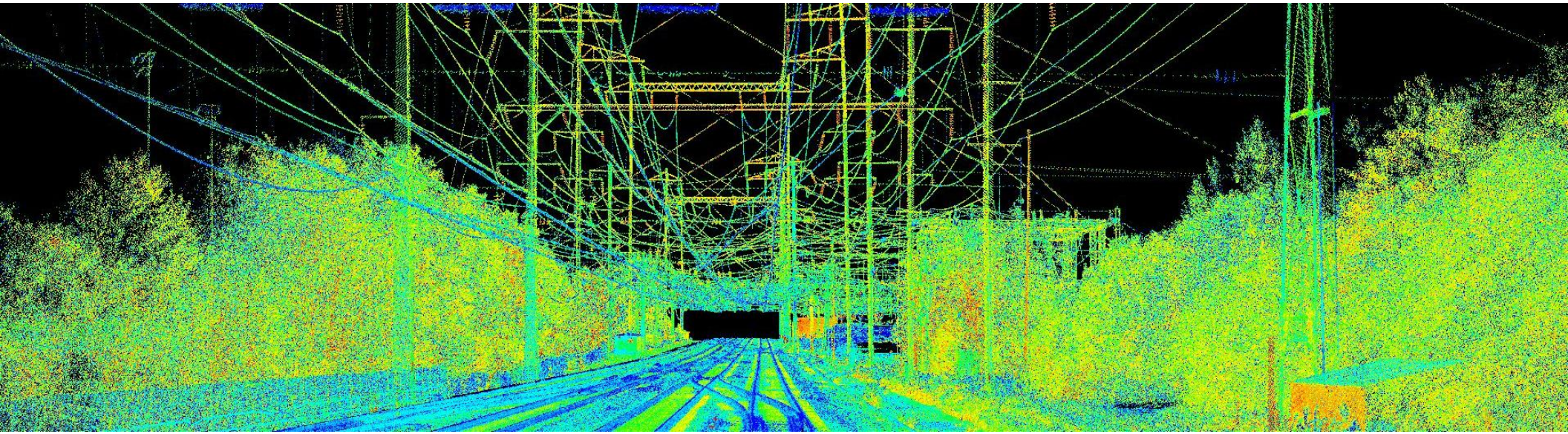
From Laser Scanners. Big ones. Small ones. Mobile ones. …….


PSYCHEDELIC 1960'S
Michelle LeAnn Scott
#2014#



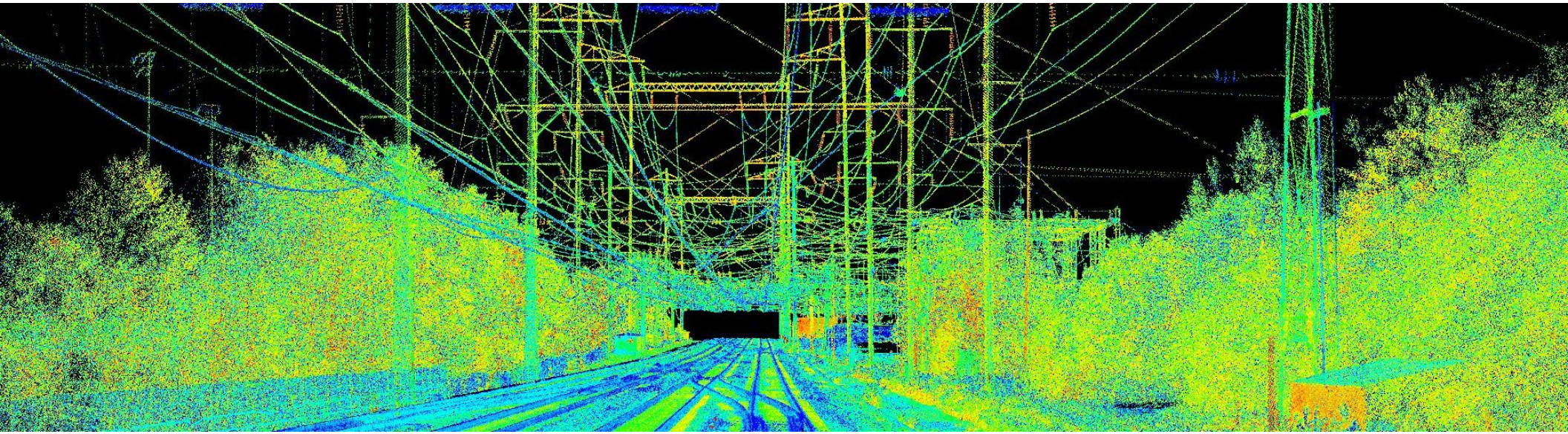
What is a Point Cloud and Where do they come from

Scanners make dots



What is a Point Cloud and Where do they come from

Lots of dots



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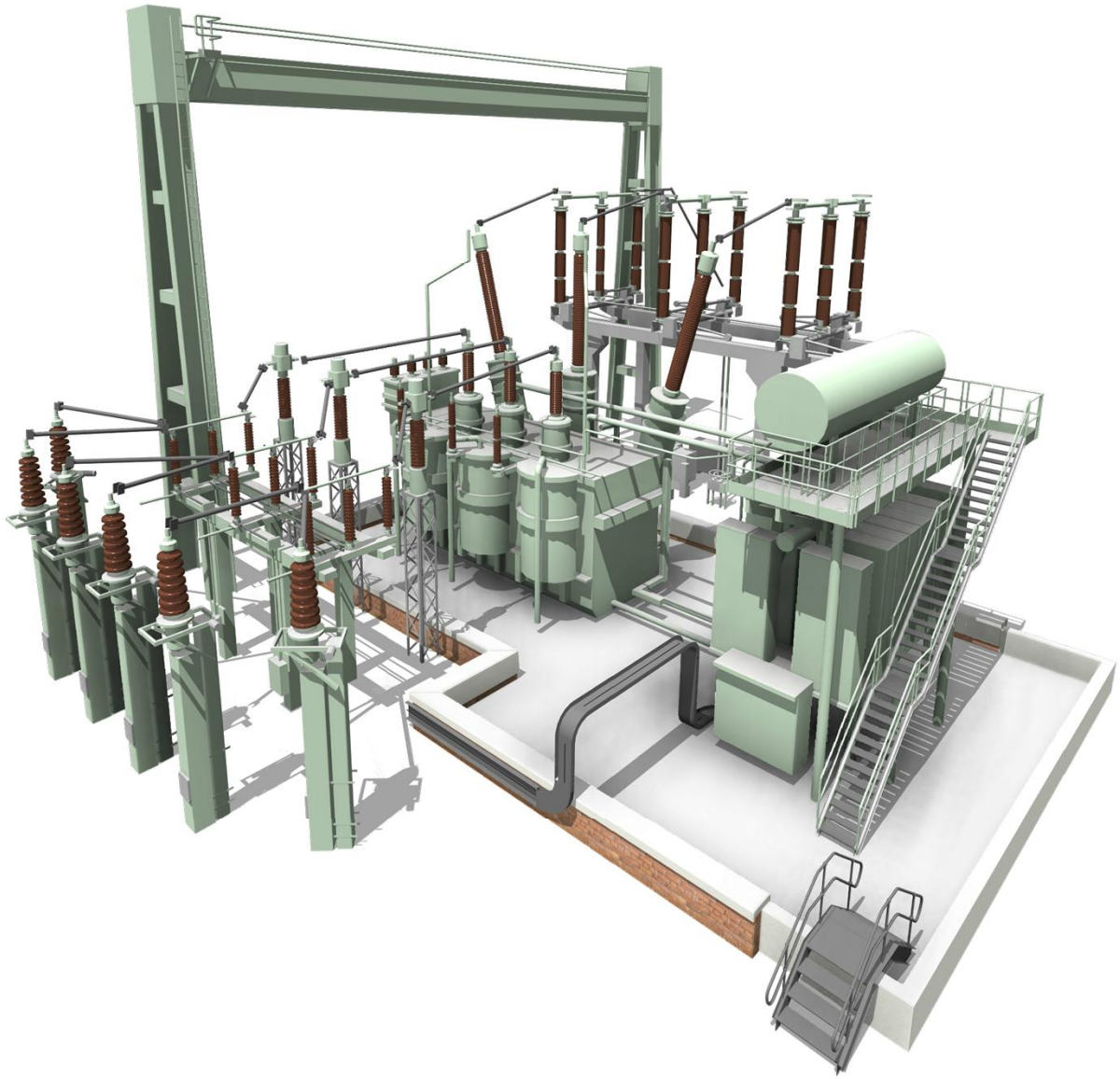

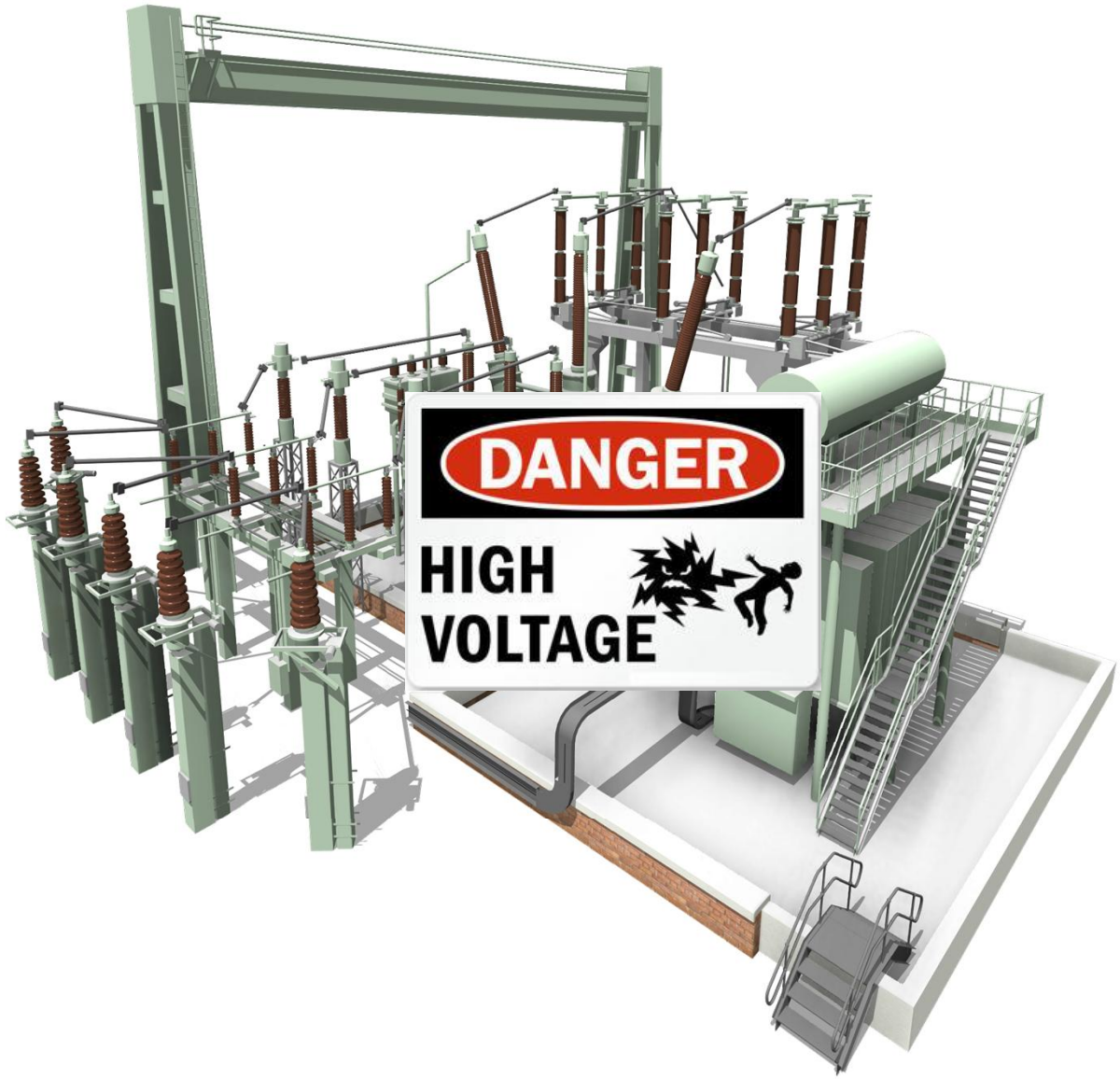
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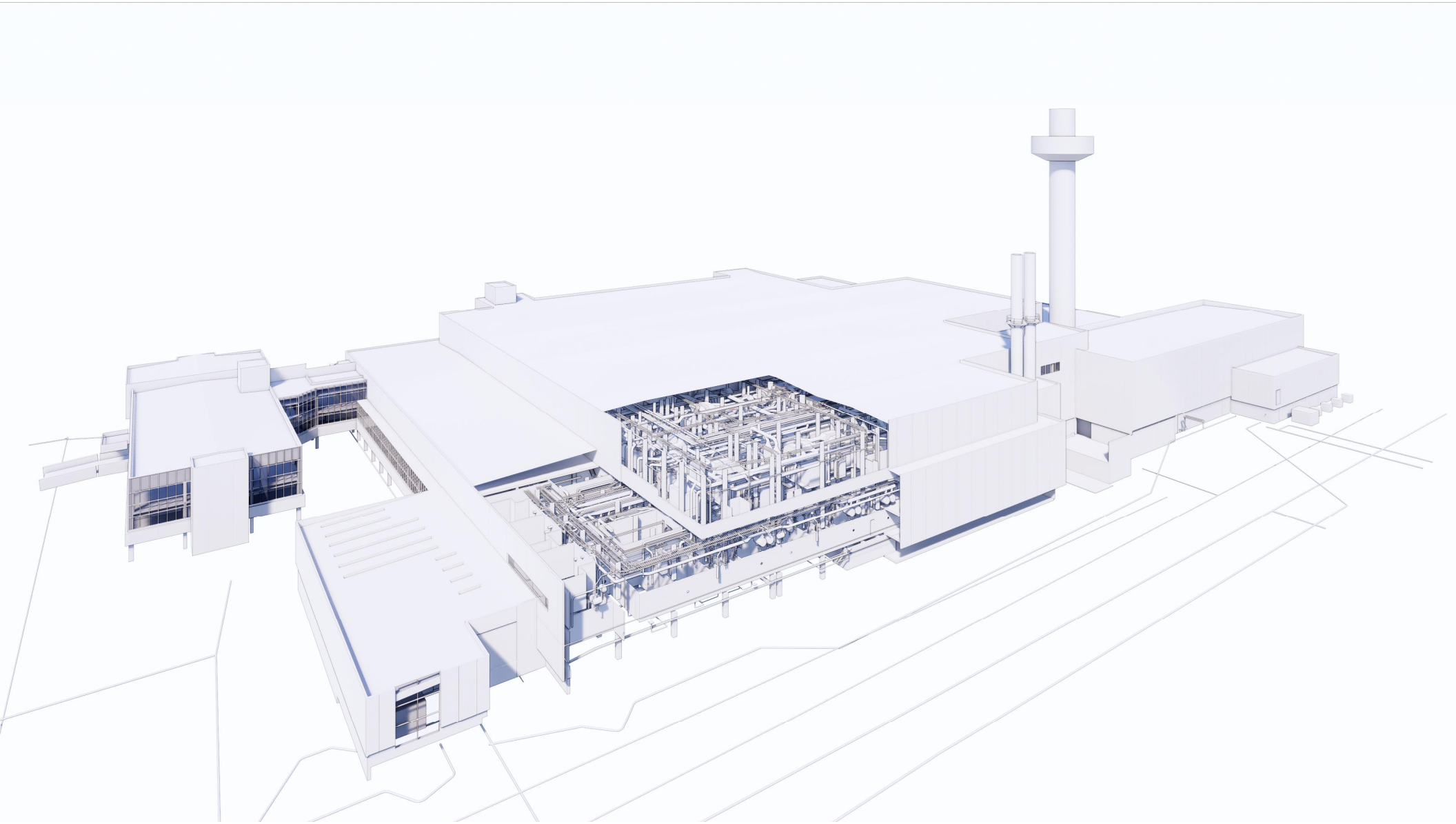

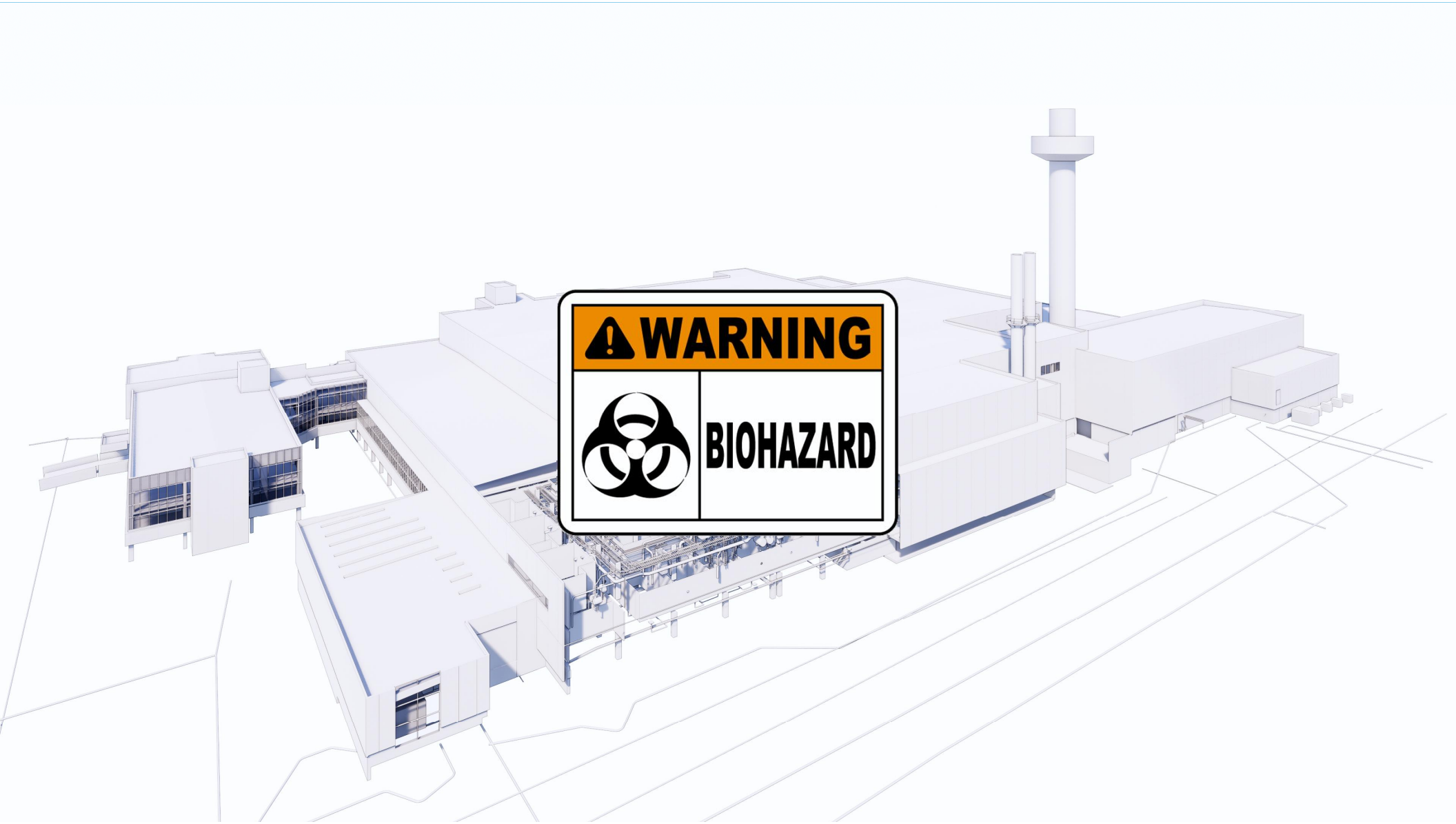
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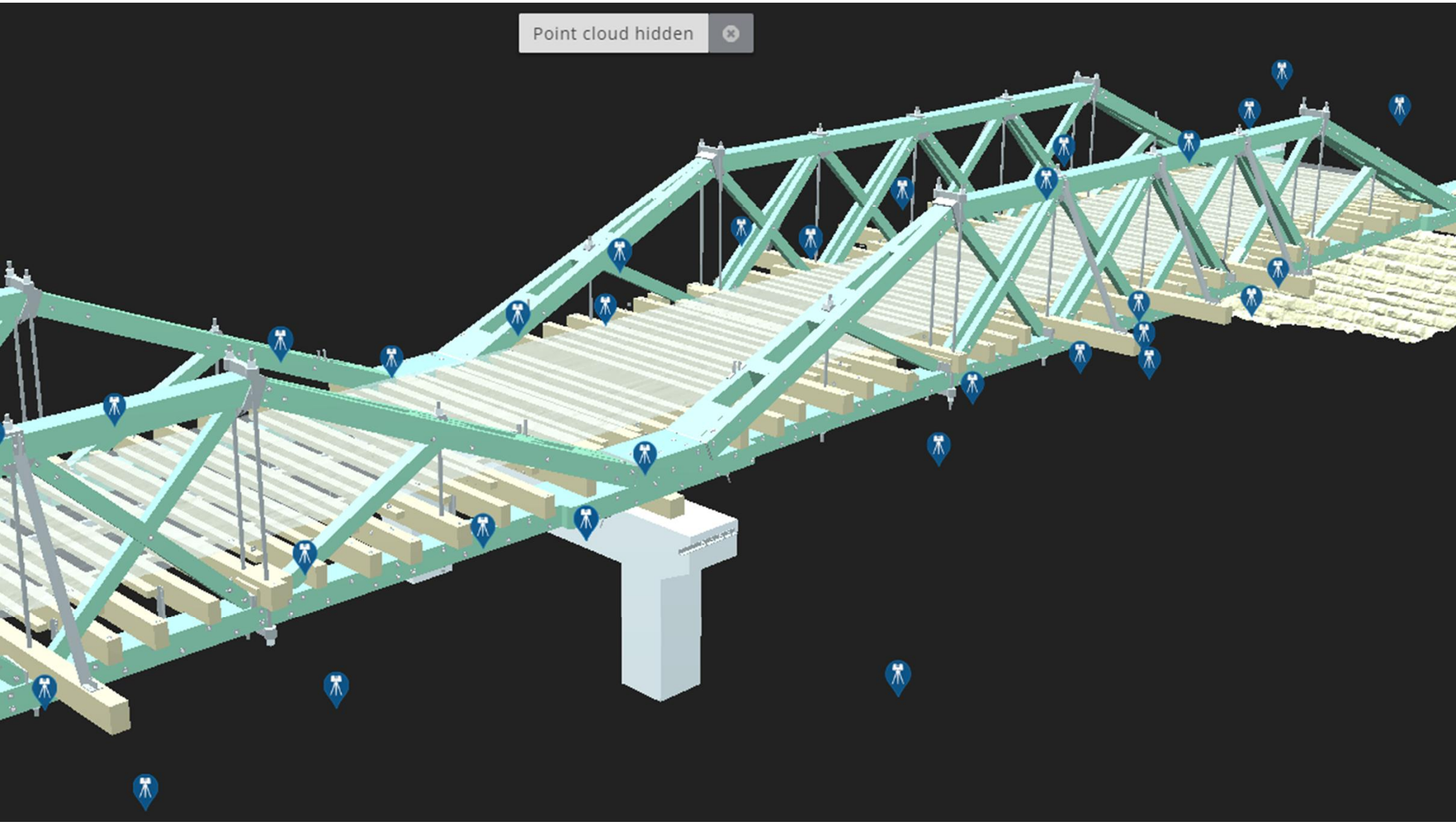
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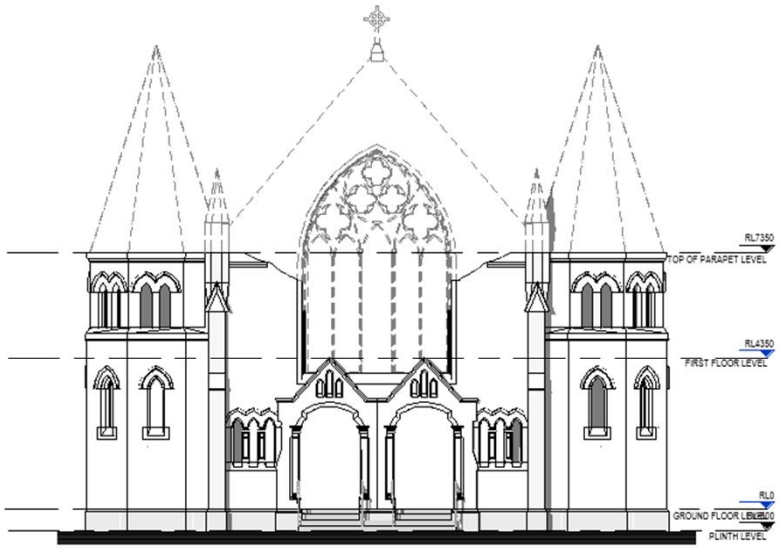
SOUTH ELEVATION

EAST ELEVATION

SOUTH ELEVATION

EAST ELEVATION



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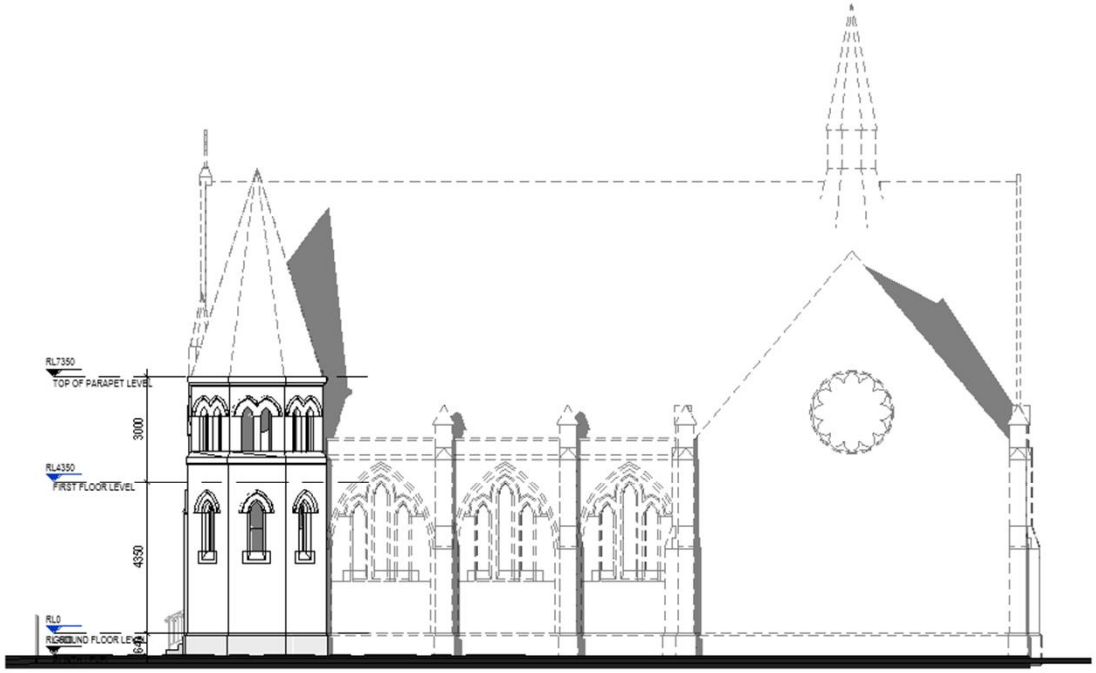
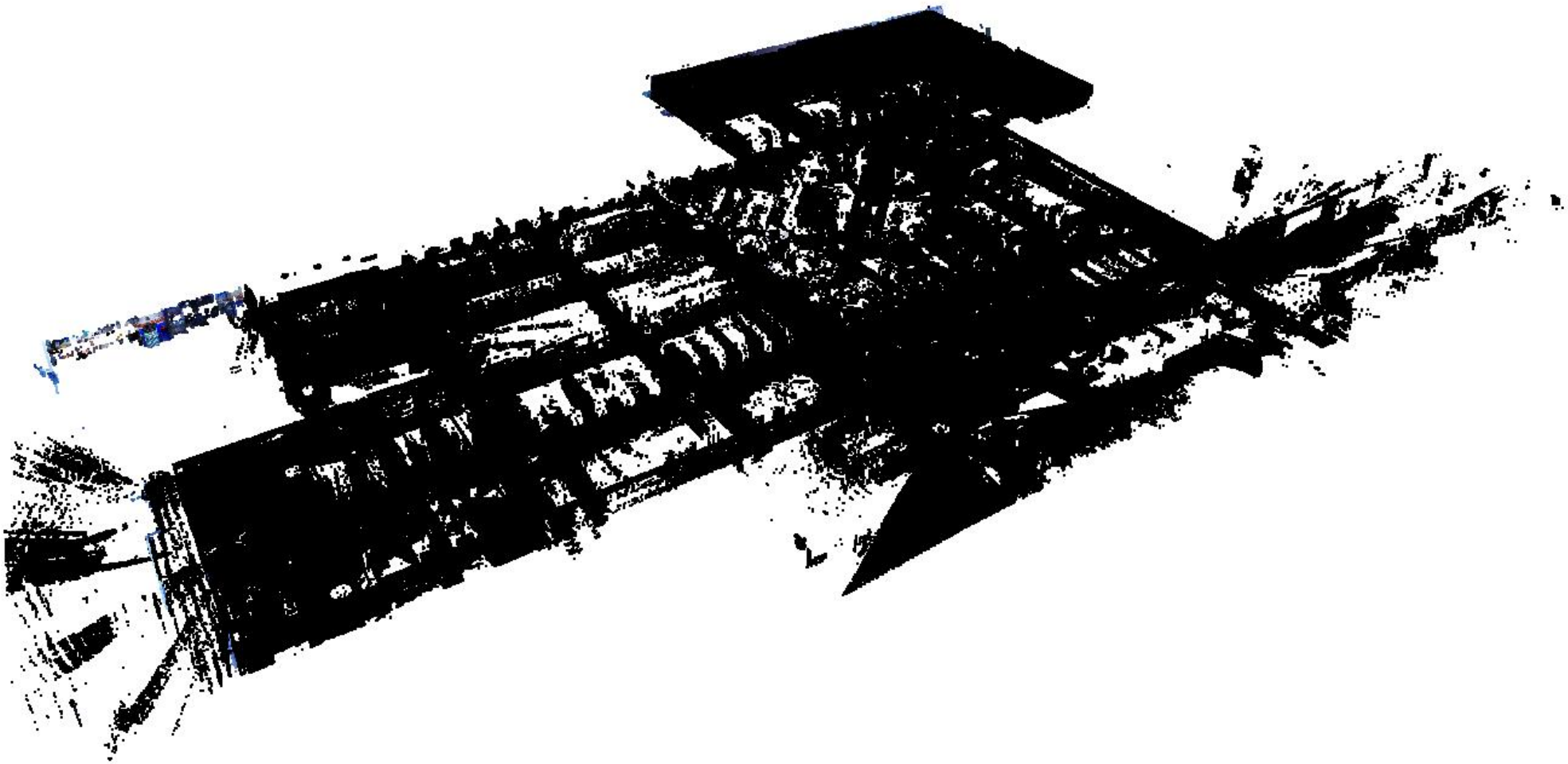
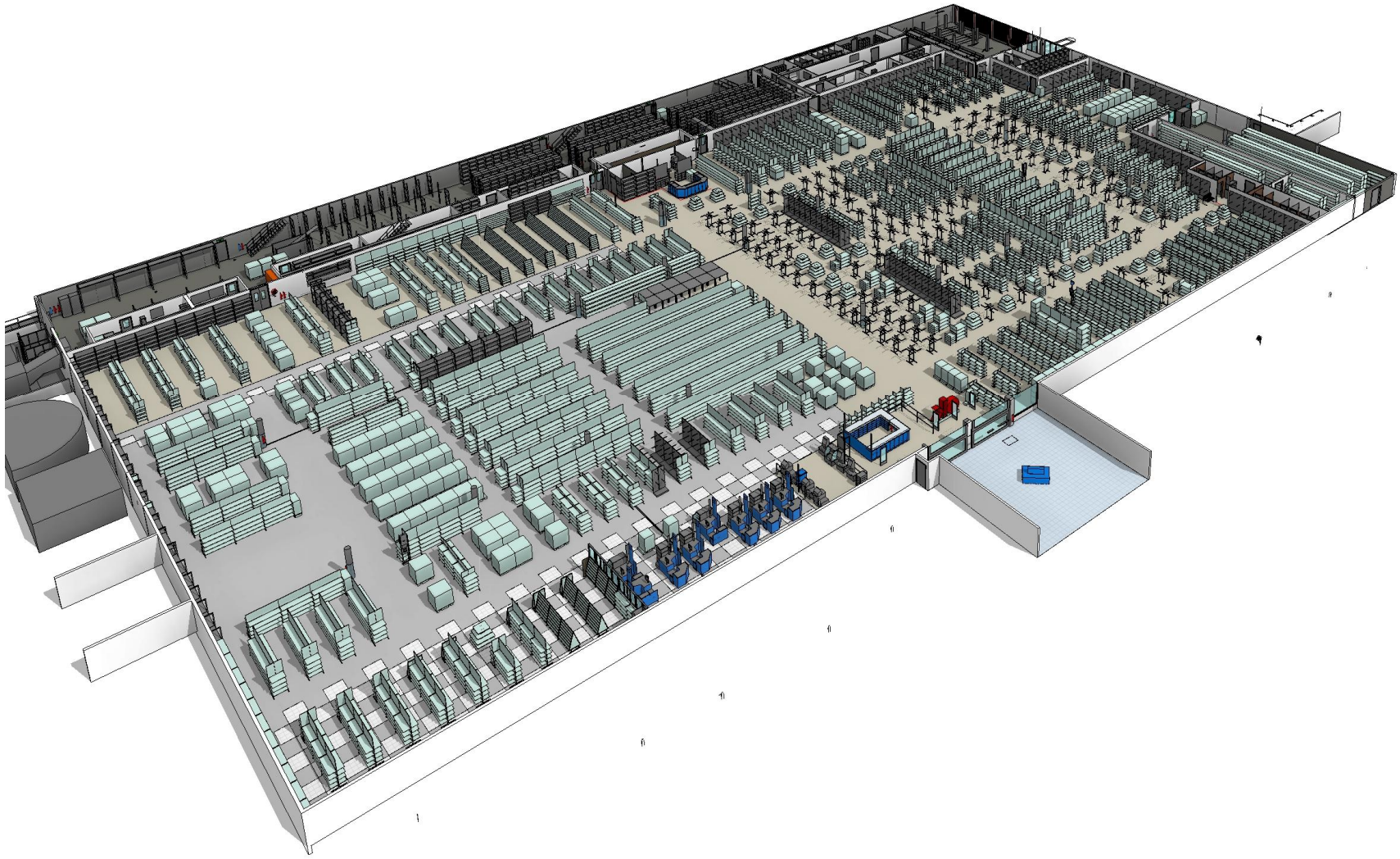
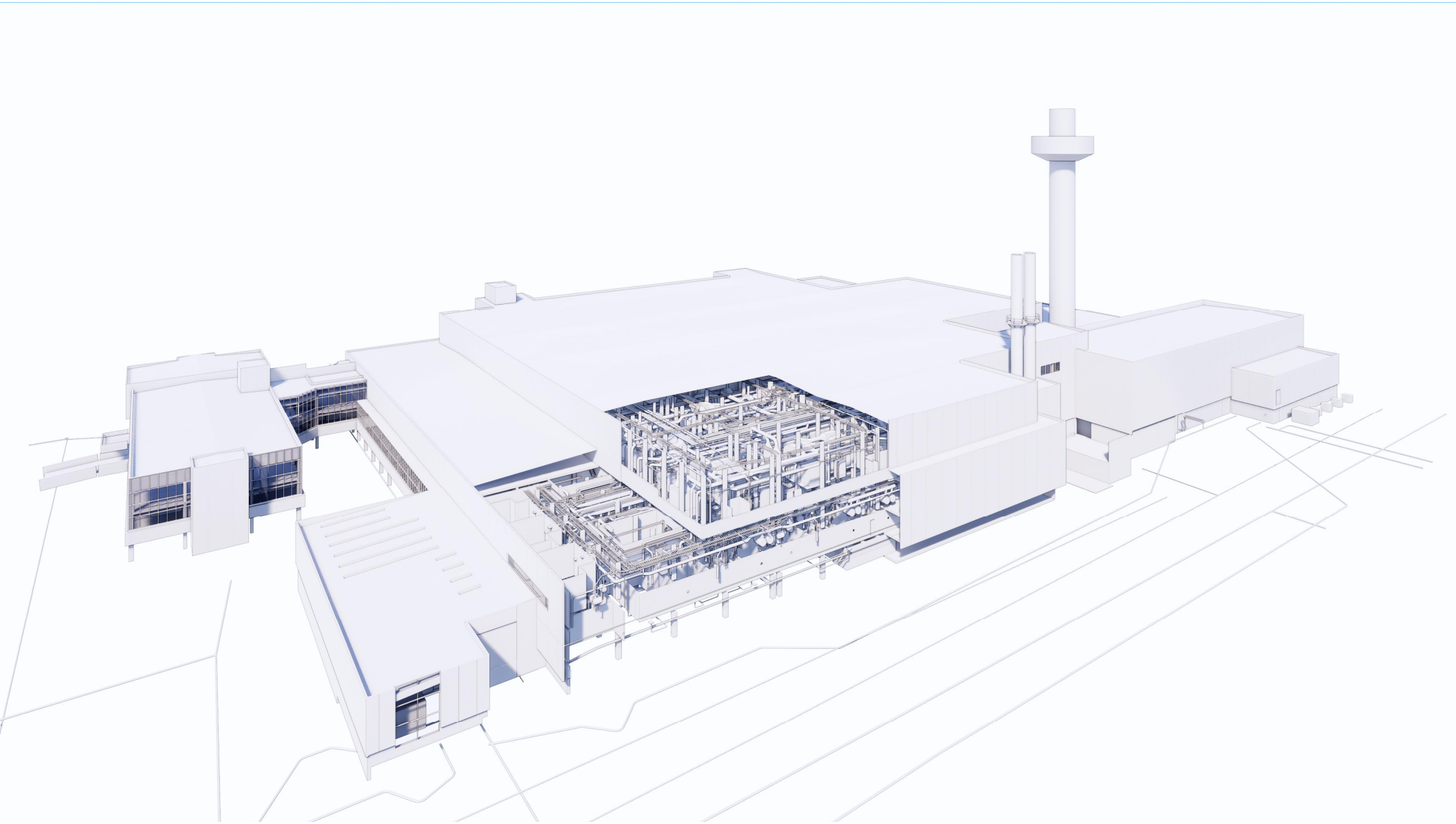


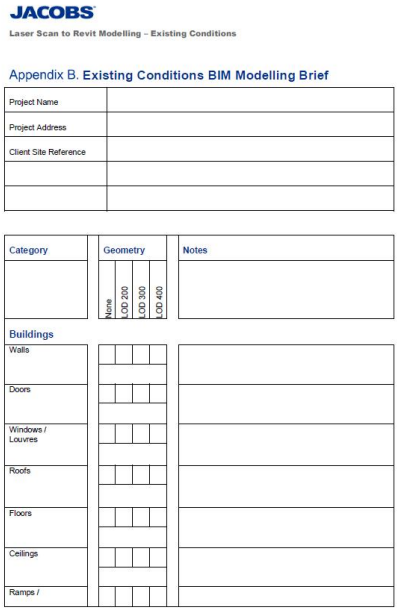
EAST ELEVATION

Client Requirements









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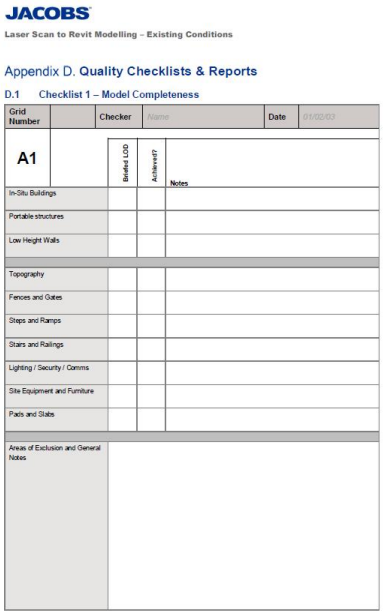
Laser Scan to Revit Modelling – Existing Conditions

Appendix B. **Existing Conditions BIM Modelling Brief**

Project Name	
Project Address	
Client Site Reference	

Category	Geometry				Notes
	None	LOD 200	LOD 300	LOD 400	
Buildings					
Walls					
Doors					
Windows / Louvres					
Roofs					
Floors					
Ceilings					
Ramps /					



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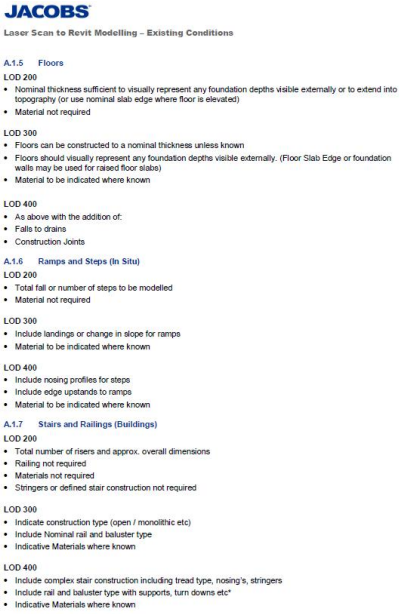
Appendix D. **Quality Checklists & Reports**

D.1 Checklist 1 – Model Completeness

Grid Number		Checker	Name	Date	01/02/03
A1		Briefed LOD	Achieved?	Notes	
In-Situ Buildings					
Portable structures					
Low Height Walls					
Topography					
Fences and Gates					
Steps and Ramps					
Stairs and Railings					
Lighting / Security / Comms					
Site Equipment and Furniture					
Pads and Slabs					
Areas of Exclusion and General Notes					



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A.1.5 Floors

LOD 200
- Nominal thickness sufficient to visually represent any foundation depths visible externally or to extend into topography (or use nominal slab edge where floor is elevated)
- Material not required

LOD 300
- Floors can be constructed to a nominal thickness unless known
- Floors should visually represent any foundation depths visible externally. (Floor Slab Edge or foundation walls may be used for raised floor slabs)
- Material to be indicated where known

LOD 400
- As above with the addition of:
- Falls to drains
- Construction Joints

A.1.6 Ramps and Steps (In Situ)

LOD 200
- Total fall or number of steps to be modelled
- Material not required

LOD 300
- Include landings or change in slope for ramps
- Material to be indicated where known

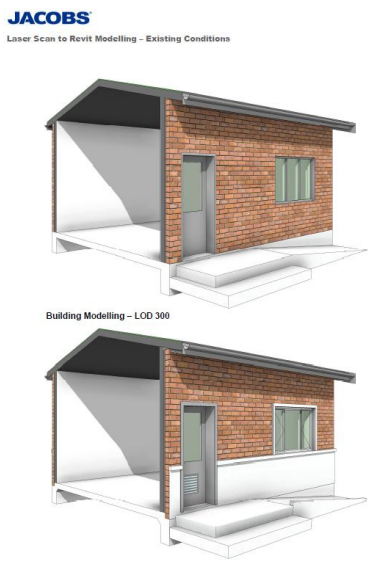
LOD 400
- Include nosing profiles for steps
- Include edge upstands to ramps
- Material to be indicated where known

A.1.7 Stairs and Railings (Buildings)

LOD 200
- Total number of risers and approx. overall dimensions
- Railing not required
- Materials not required
- Stringers or defined stair construction not required

LOD 300
- Indicate construction type (open / monolithic etc)
- Include Nominal rail and baluster type
- Indicative Materials where known

LOD 400
- Include complex stair construction including tread type, nosing's, stringers
- Include rail and baluster type with supports, turn downs etc*
- Indicative Materials where known



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Laser Scan to Revit Modelling – Existing Conditions

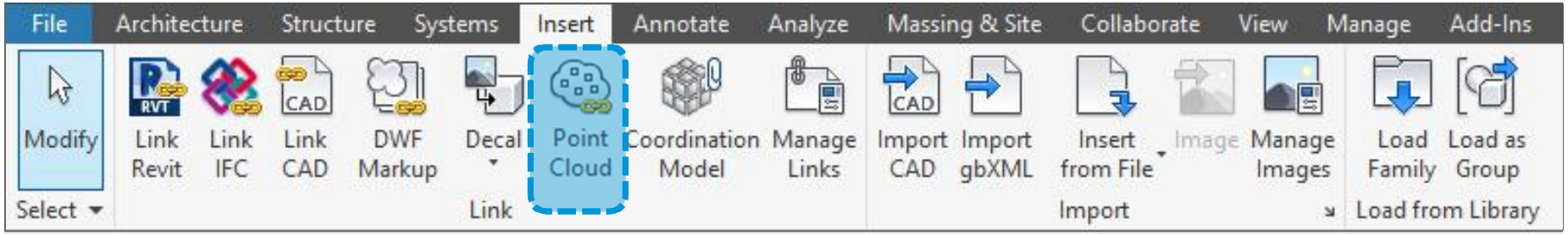
Building Modelling – LOD 300

Building Modelling – LOD 400

Briefing Documents

- Capture client requirements
- Inform surveyors
- Guide modelers
- Audit models

Survey Requirements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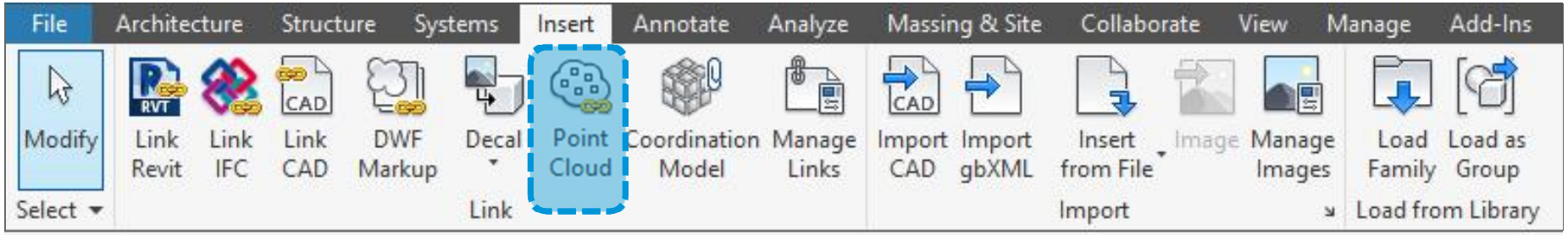
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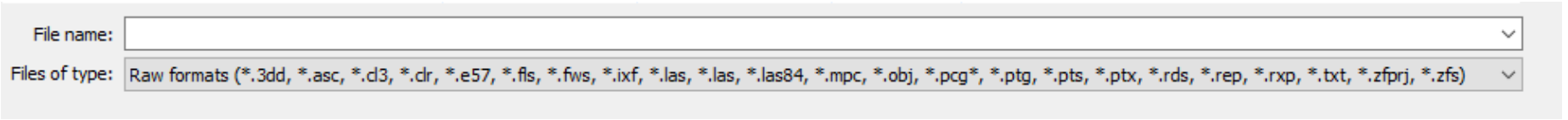
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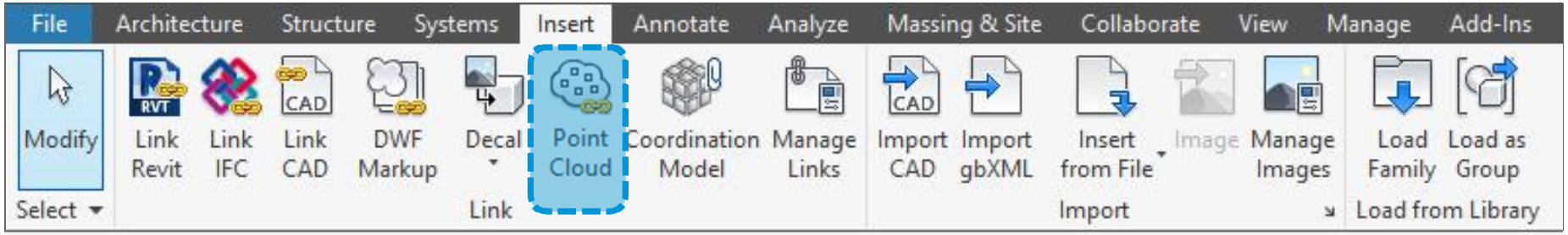
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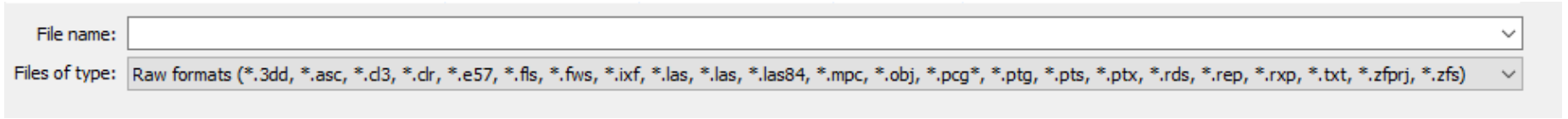
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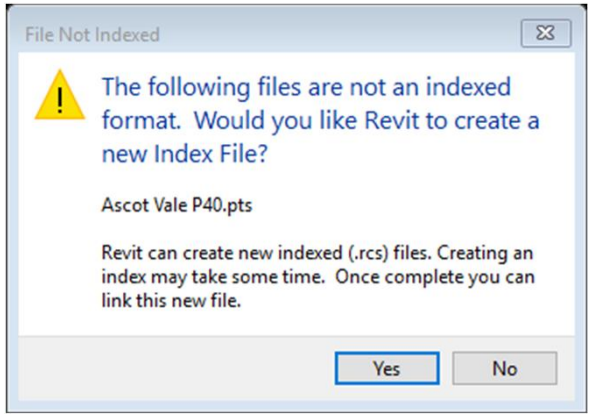
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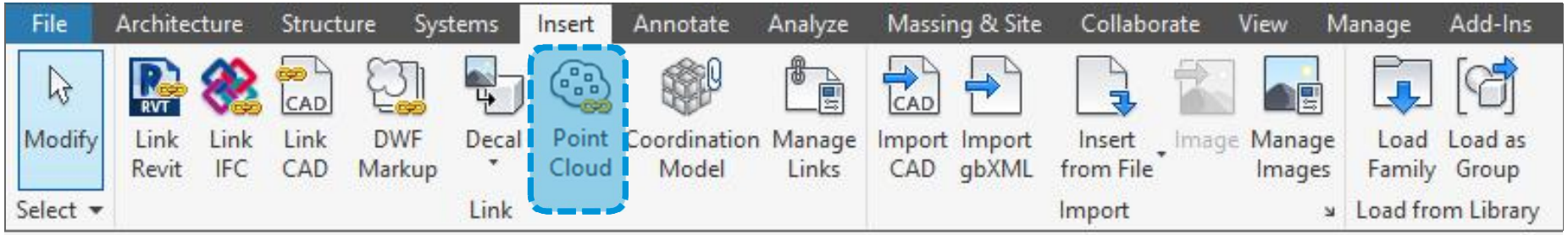
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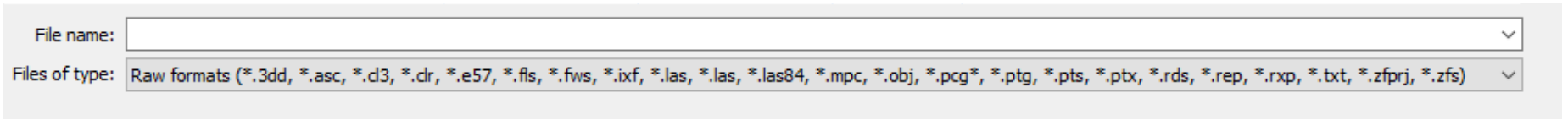
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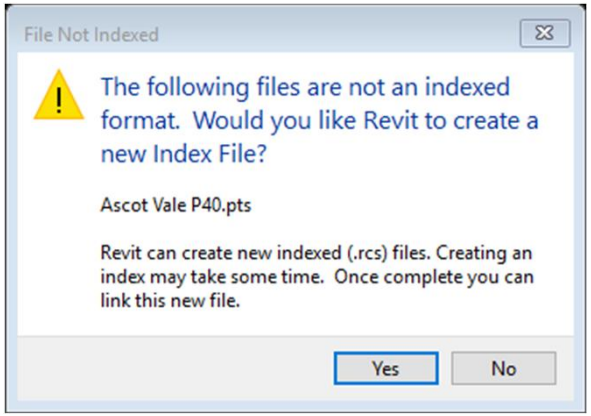
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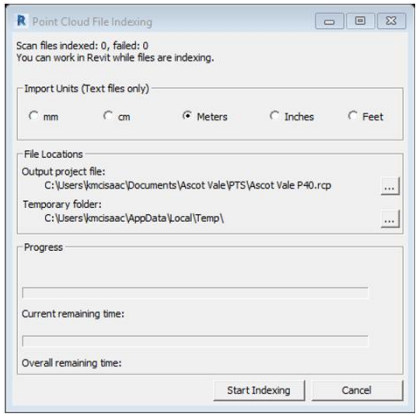
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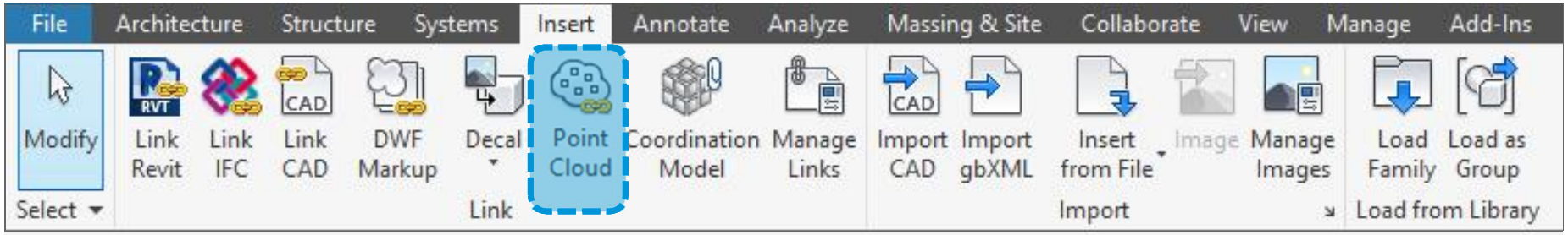
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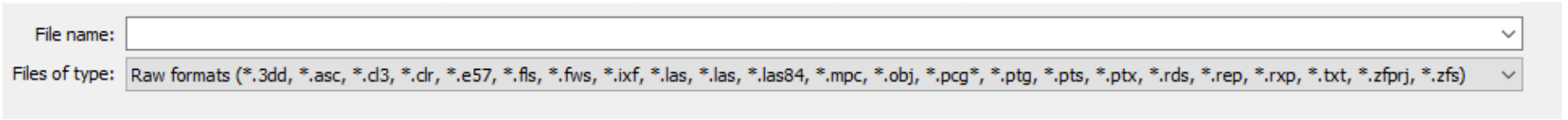
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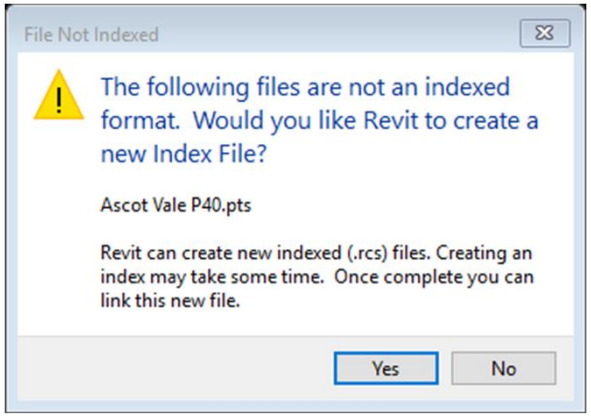
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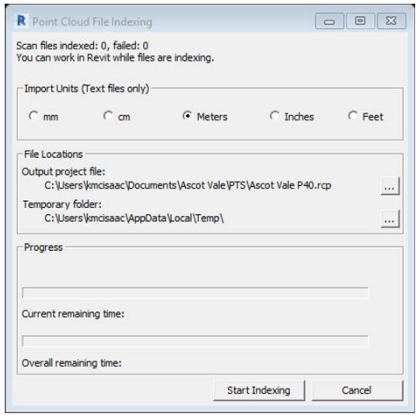
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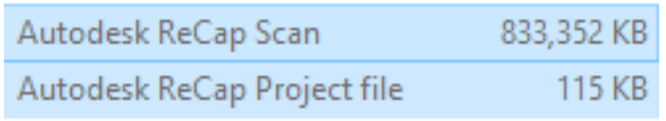
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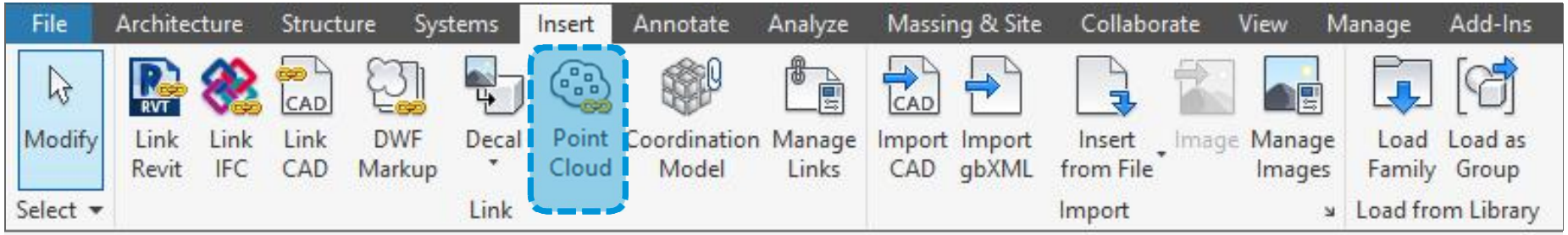
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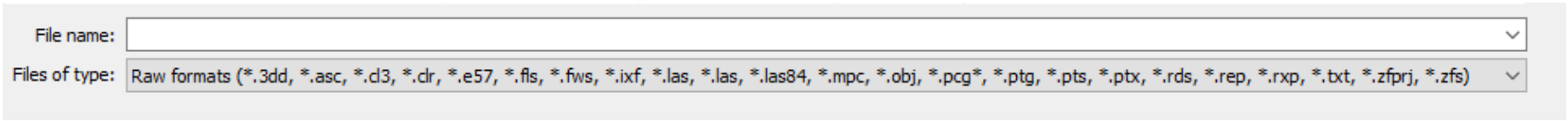
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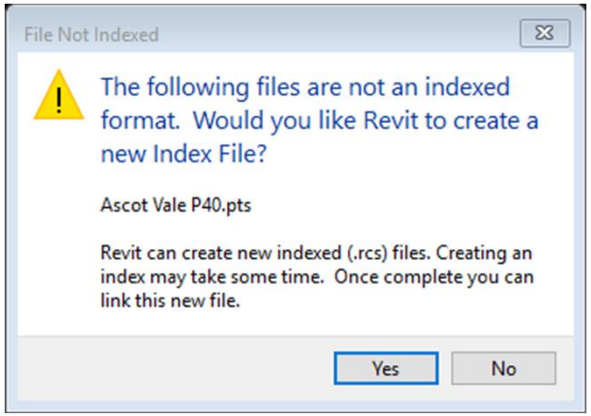
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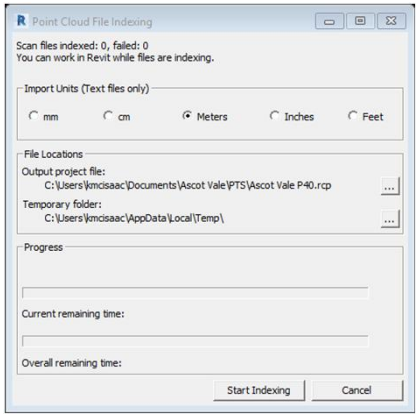
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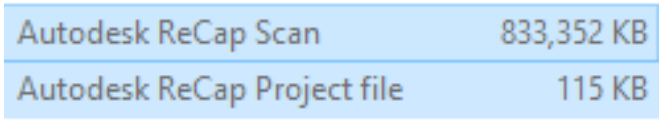
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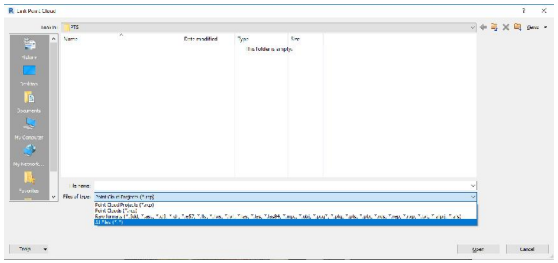
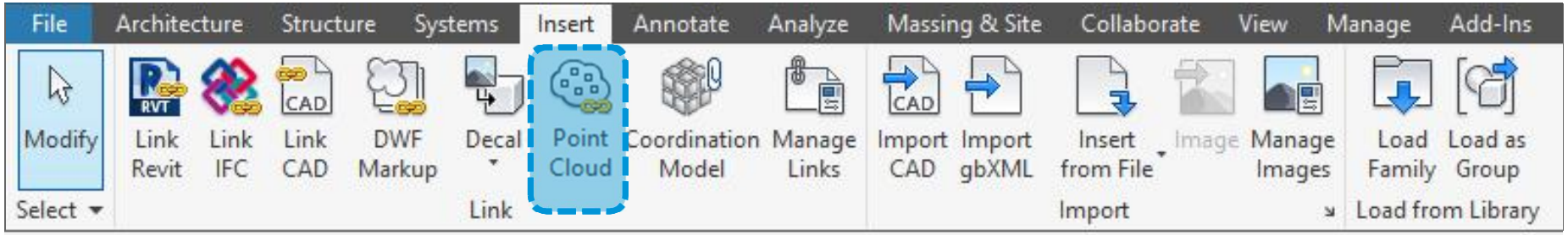
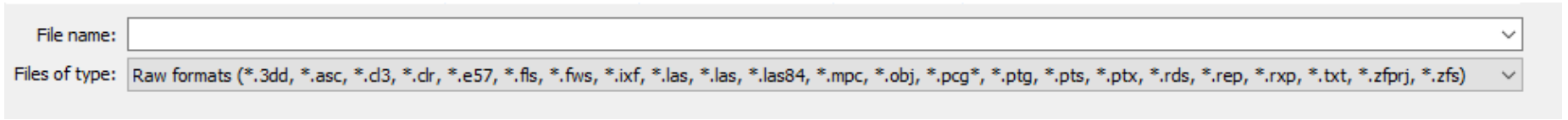
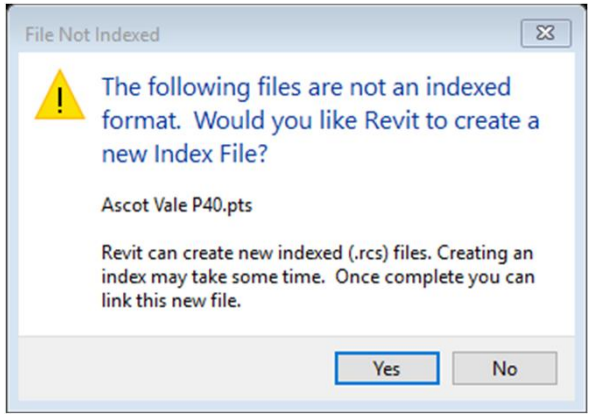
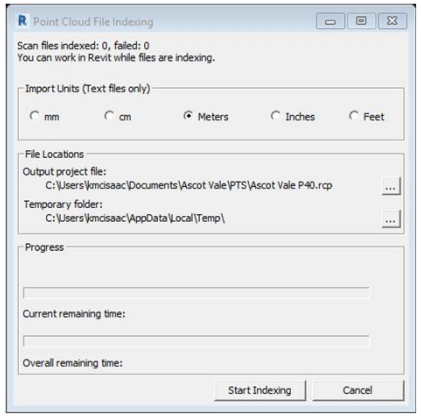
833,352 KB
Autodesk ReCap Project file
115 KB

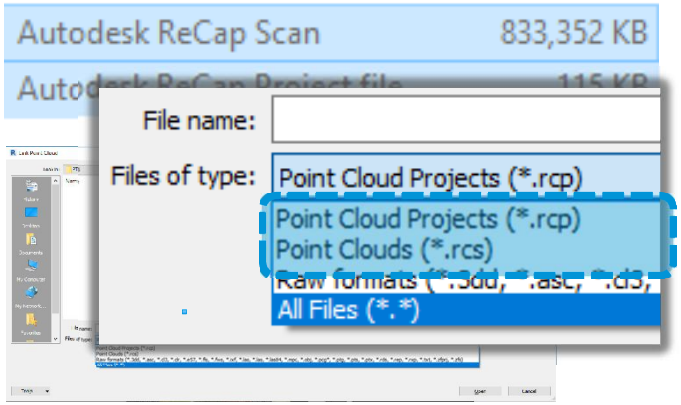


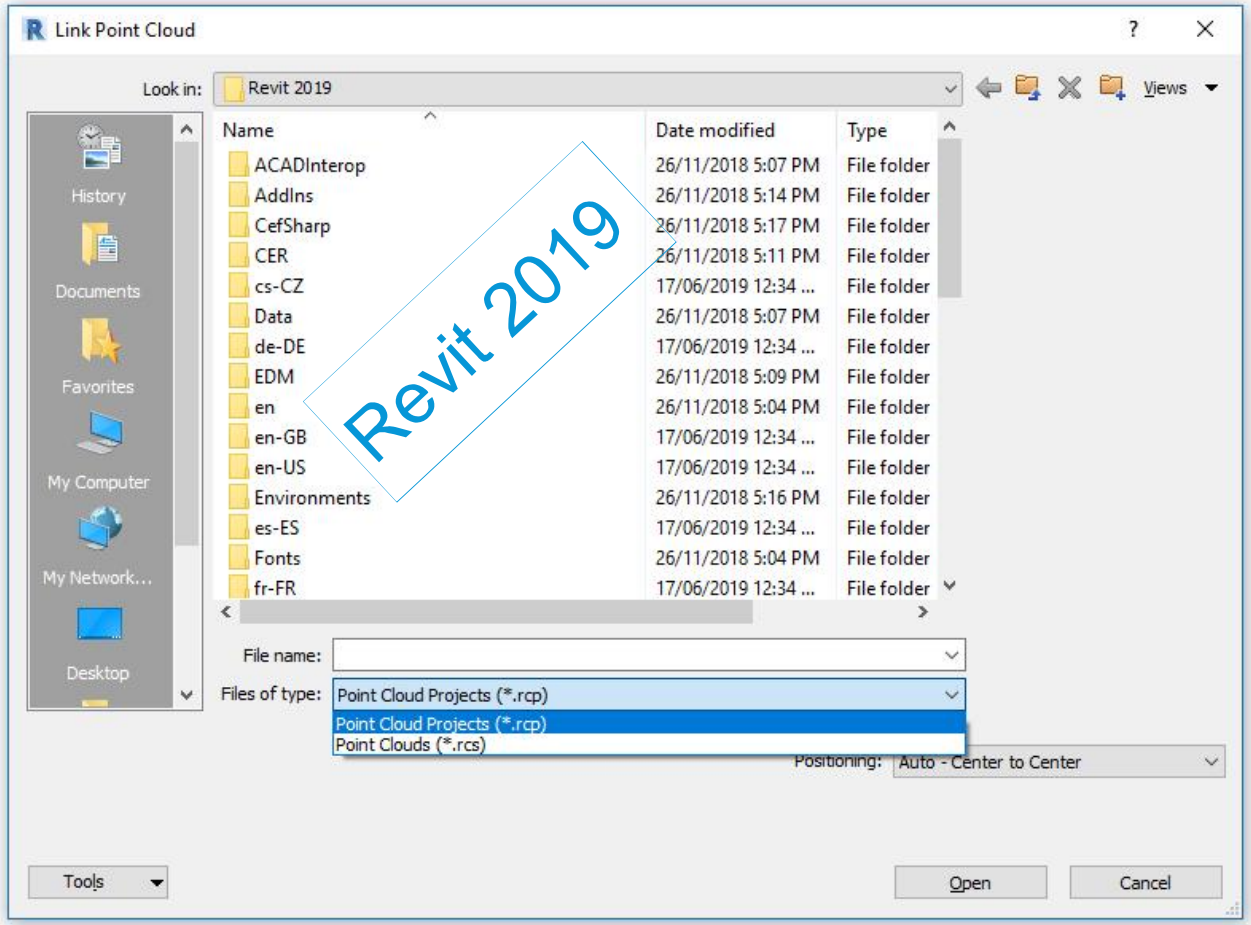

File
Architecture
Structure
Systems
Insert
Annotate
Analyze
Massing & Site
Collaborate
View
Manage
Add-Ins
Modify
Select
Link Revit
Link IFC
Link CAD
DWF Markup
Decal
Link
Point Cloud
Coordination Model
Manage Links
Import CAD
Import gbXML
Insert from File
Image
Manage Images
Import
Load Family
Load as Group
Load from Library

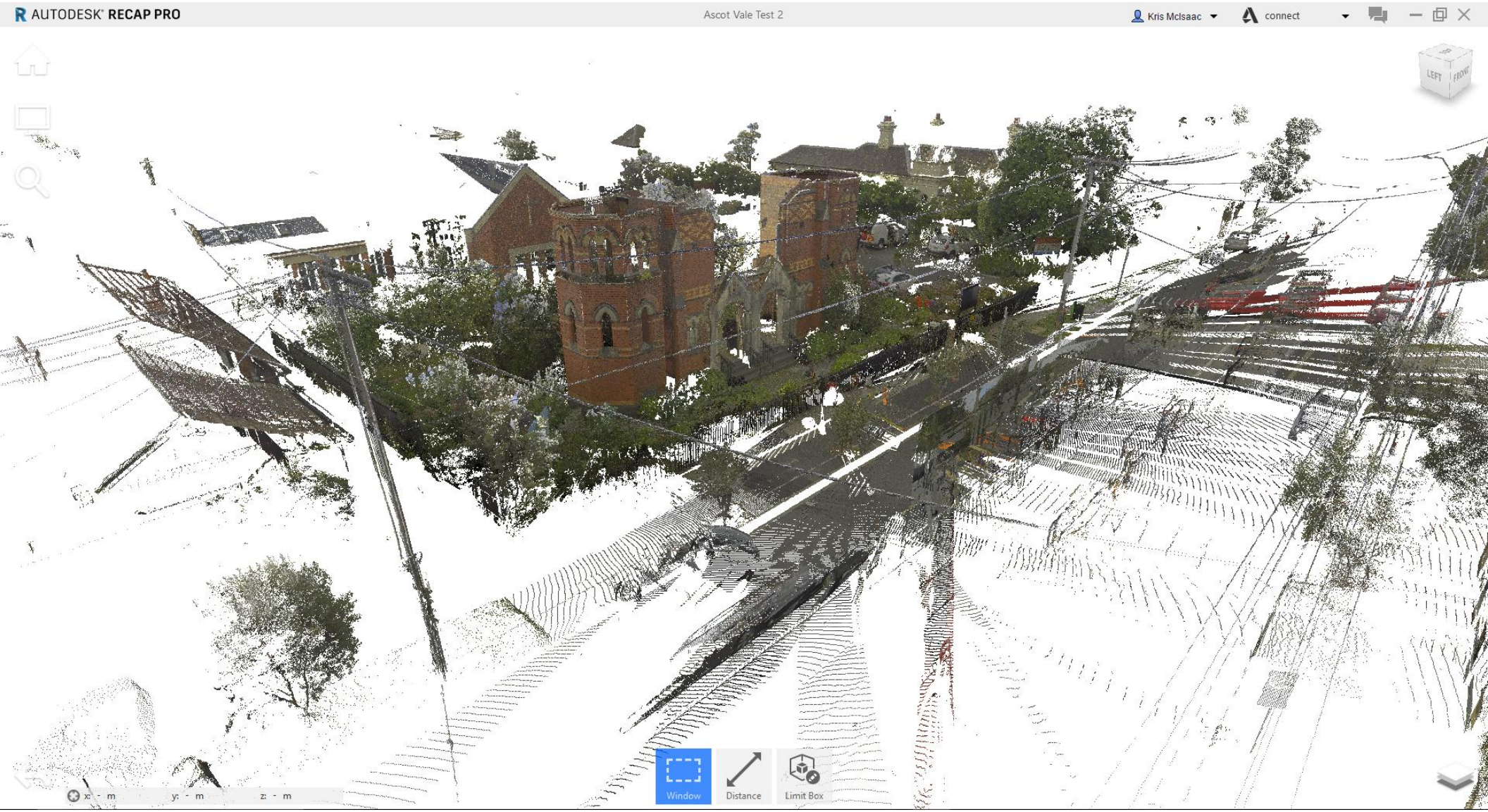

File name:
Files of type:
Raw formats (*.3dd, *.asc, *.cl3, *.clr, *.e57, *.fls, *.fws, *.ixf, *.las, *.las, *.las84, *.mpc, *.obj, *.pcg*, *.ptg, *.pts, *.ptx, *.rds, *.rep, *.rxp, *.txt, *.zfprj, *.zfs)

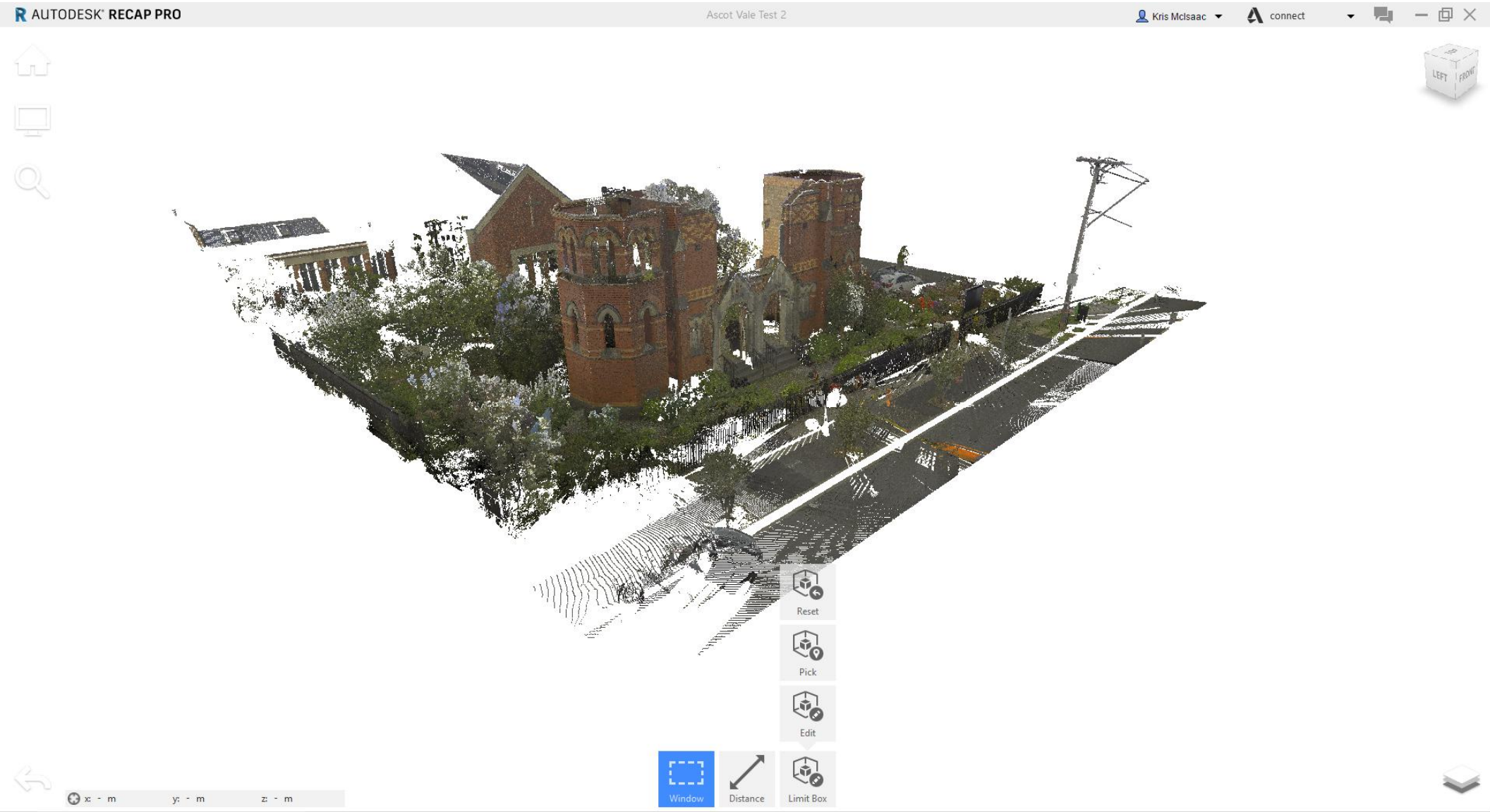

File Not Indexed
The following files are not an indexed format. Would you like Revit to create a new Index File?
Ascot Vale P40.pts
Revit can create new indexed (.rcs) files. Creating an index may take some time. Once complete you can link this new file.
Yes
No

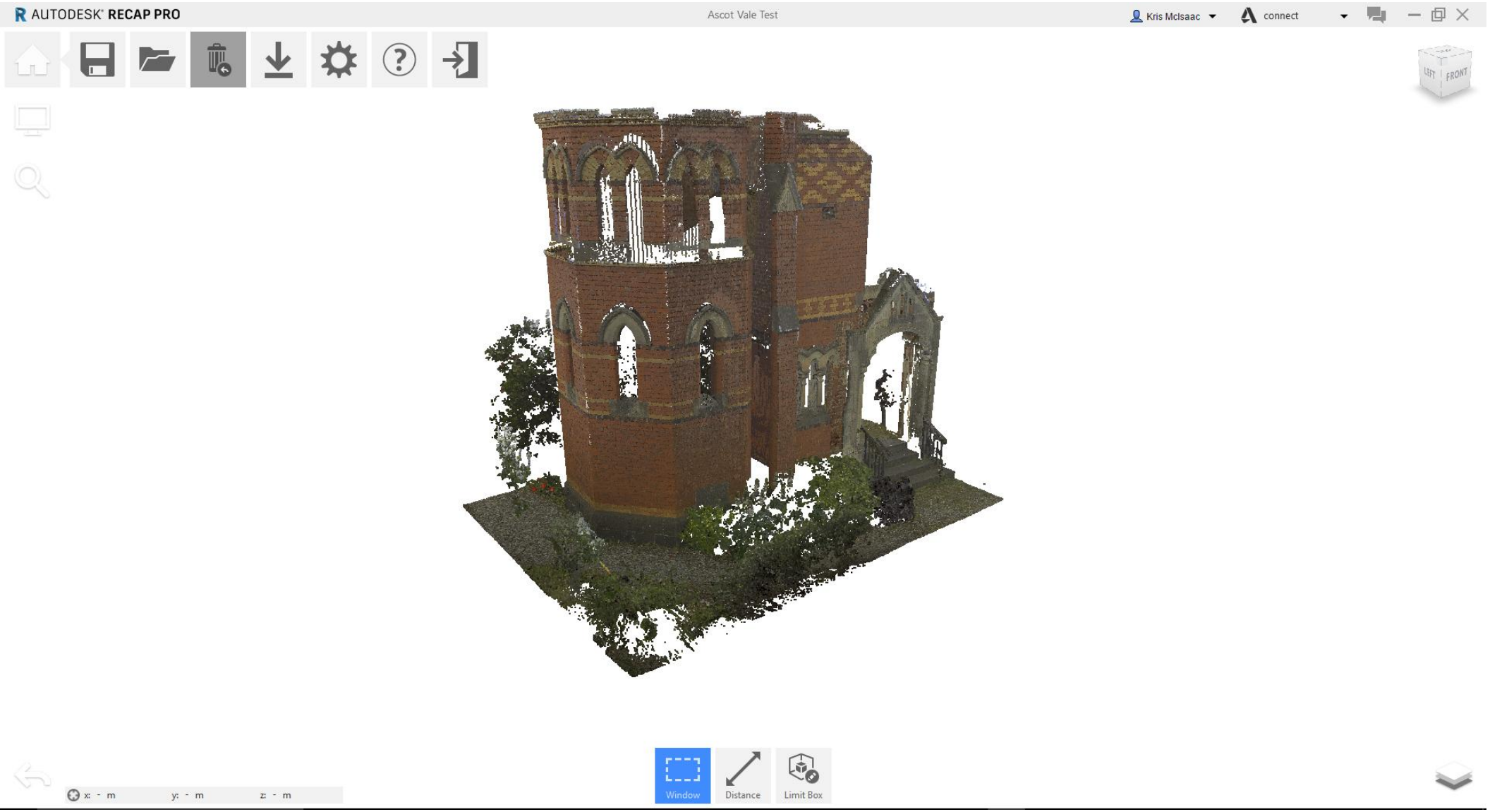

Point Cloud File Indexing
Scan files indexed: 0, failed: 0
You can work in Revit while files are indexing.
Import Units (Text files only)
mm
cm
Meters
Inches
Feet
File Locations
Output project file:
C:\Users\kmcisaac\Documents\Ascot Vale\PTS\Ascot Vale P40.rcp
Temporary folder:
C:\Users\kmcisaac\AppData\Local\Temp\
Progress
Current remaining time:
Overall remaining time:
Start Indexing
Cancel

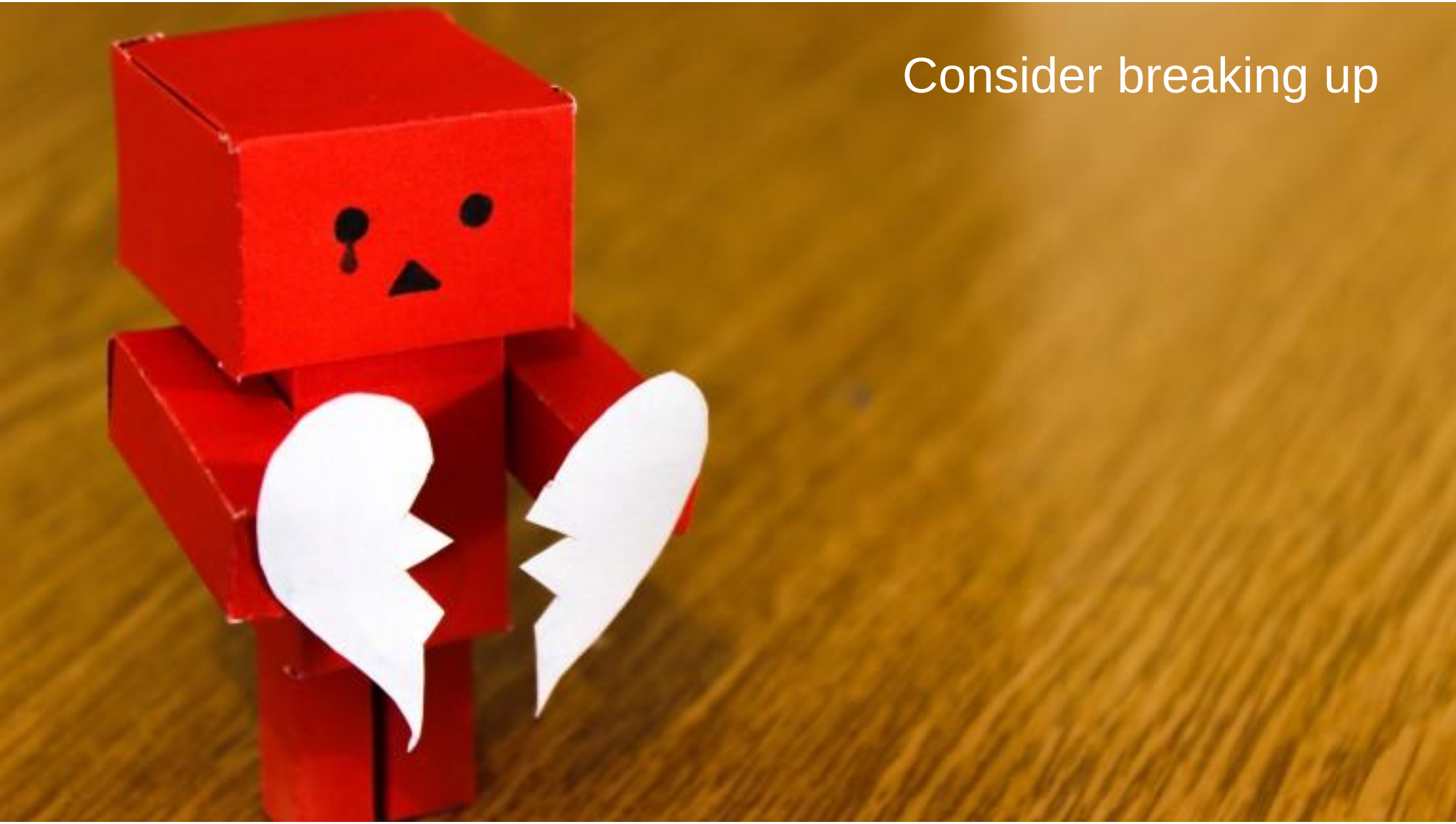

Autodesk ReCap Scan
833,352 KB
File name:
Files of type:
Point Cloud Projects (*.rcp)
Point Cloud Projects (*.rcp)
Point Clouds (*.rcs)
All Files (*.*)

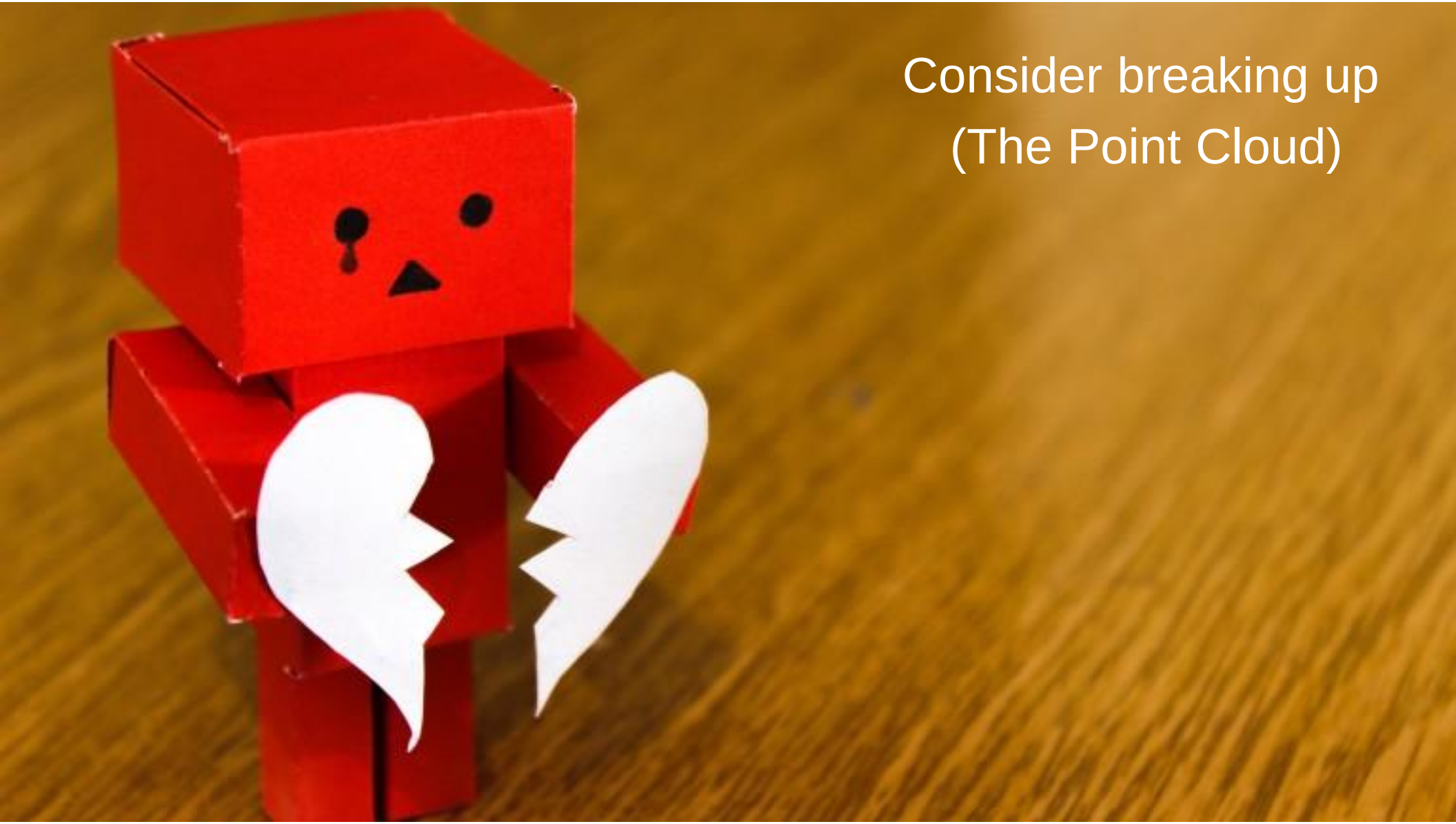

Link Point Cloud
Look in:
Revit 2019
Views
History
Documents
Favorites
My Computer
My Network...
Desktop
Name
Date modified
Type
ACADInterop 26/11/2018 5:07 PM File folder
AddIns 26/11/2018 5:14 PM File folder
CefSharp 26/11/2018 5:17 PM File folder
CER 26/11/2018 5:11 PM File folder
cs-CZ 17/06/2019 12:34 ... File folder
Data 26/11/2018 5:07 PM File folder
de-DE 17/06/2019 12:34 ... File folder
EDM 26/11/2018 5:09 PM File folder
en 26/11/2018 5:04 PM File folder
en-GB 17/06/2019 12:34 ... File folder
en-US 17/06/2019 12:34 ... File folder
Environments 26/11/2018 5:16 PM File folder
es-ES 17/06/2019 12:34 ... File folder
Fonts 26/11/2018 5:04 PM File folder
fr-FR 17/06/2019 12:34 ... File folder
Revit 2019
File name:
Files of type:
Point Cloud Projects (*.rcp)
Point Cloud Projects (*.rcp)
Point Clouds (*.rcs)
Positioning:
Auto - Center to Center
Tools
Open
Cancel


AUTODESK RECAP PRO
Ascot Vale Test 2
Kris McIsaac
connect
LEFT
FRONT
Window
Distance
Limit Box

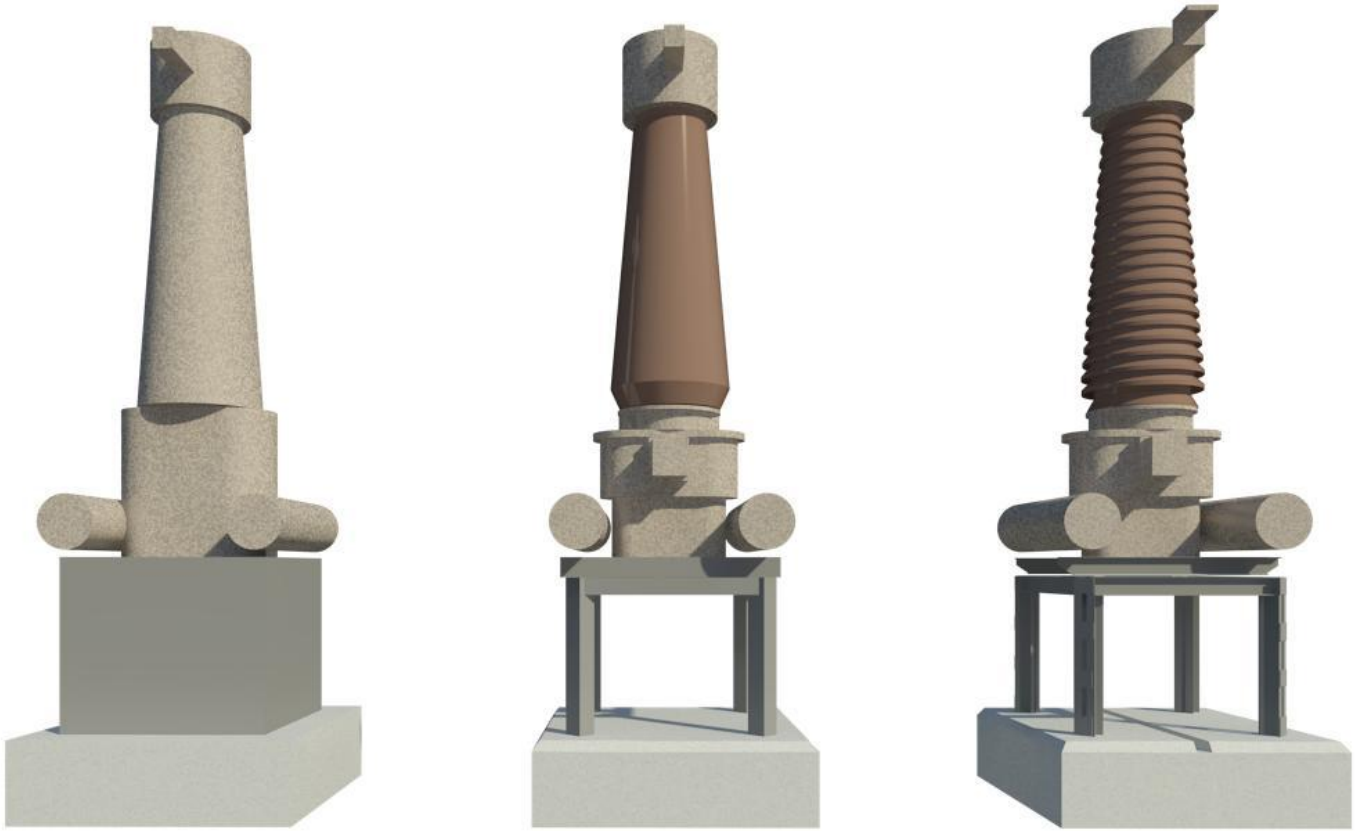

AUTODESK RECAP PRO
Ascot Vale Test 2
Kris McIsaac
connect
LEFT
FRONT
Reset
Pick
Edit
Window
Distance
Limit Box
x: - m
y: - m
z: - m


AUTODESK RECAP PRO
Ascot Vale Test
Kris McIsaac
connect
LEFT
FRONT
x: - m
y: - m
z: - m
Window
Distance
Limit Box


Consider breaking up

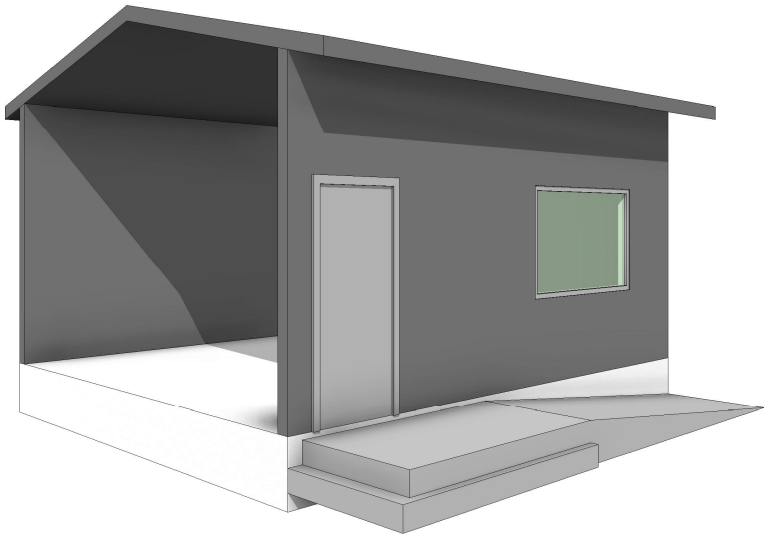

Consider breaking up
(The Point Cloud)

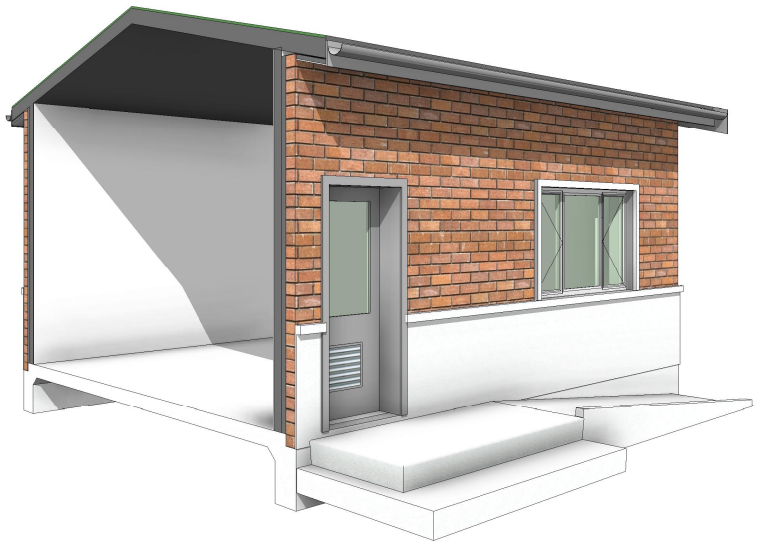
Model Requirements



Level Of Detail….but not as we know it

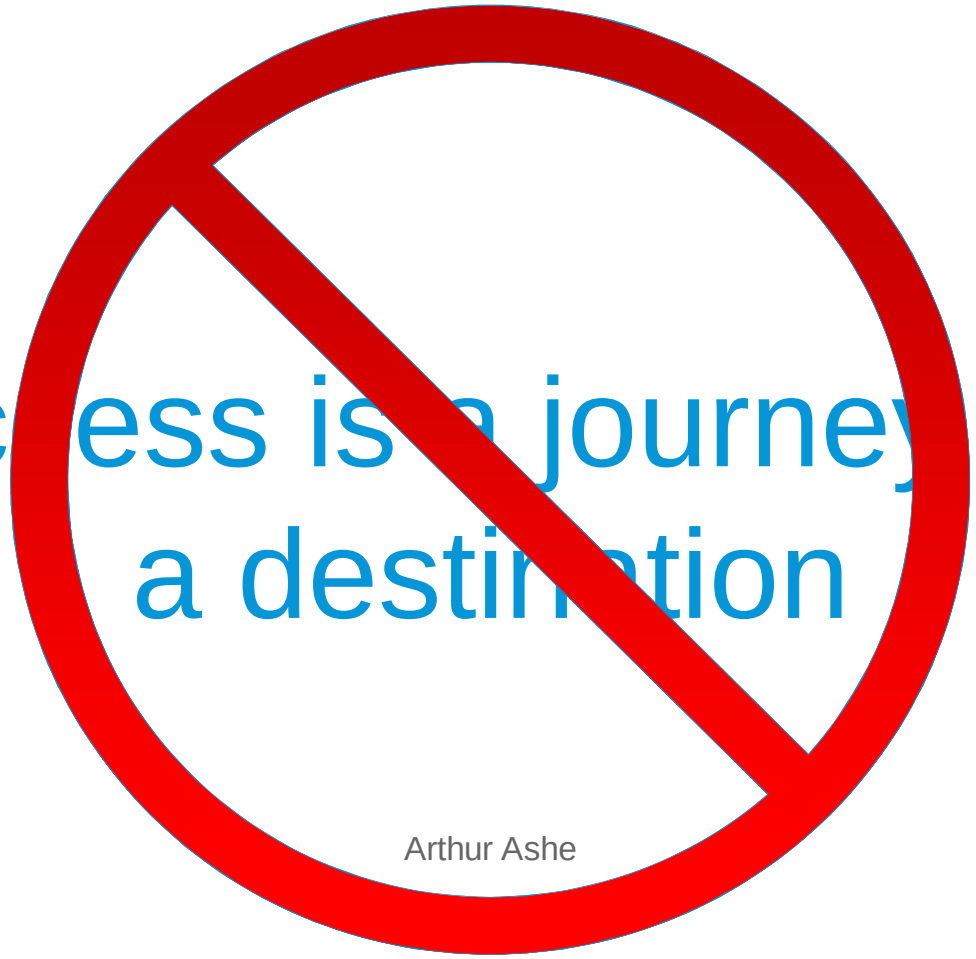
Detail Vs. Accuracy





Success is a journey, not a destination

Arthur Ashe


Success is a journey not
a destination
Arthur Ashe

Know the course before you start the race

Me


HYUNDAI
HYUNDAI
Sabelt
HMI


PENNZOIL

Revit……

Coordinates

Does your project already have coordinates established?

- Not easy to acquire from a Point Cloud
- 20 mile limit
- Ask survey for a Cad plan
- Point Clouds will link by Shared coordinates

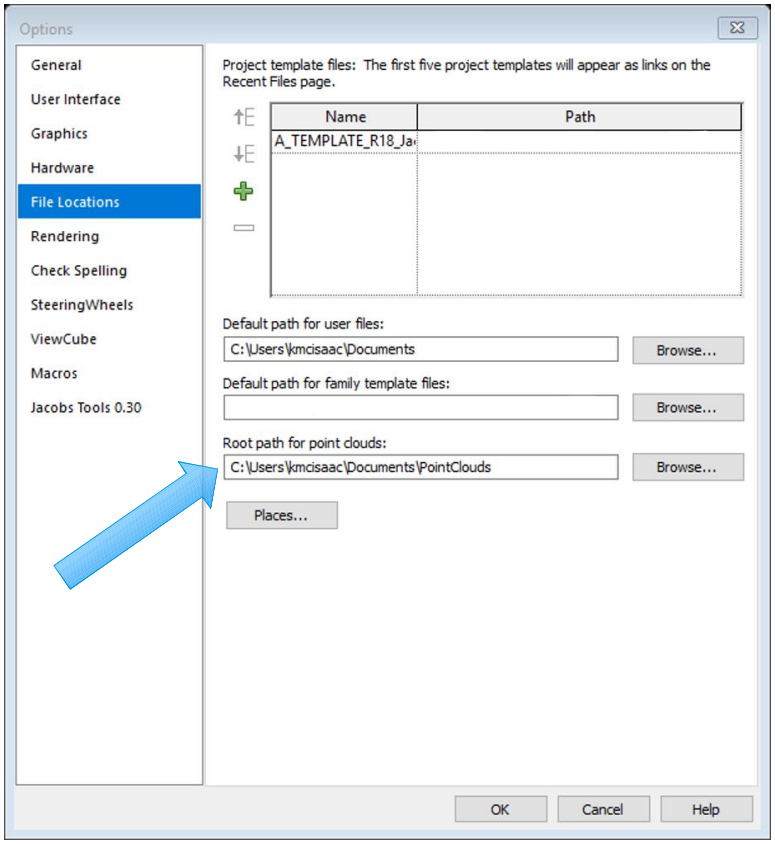
Linking

Do you link direct to your project or into a container

- Make the container specifically for Point Clouds
- Turn links on and off or turn point clouds on and off

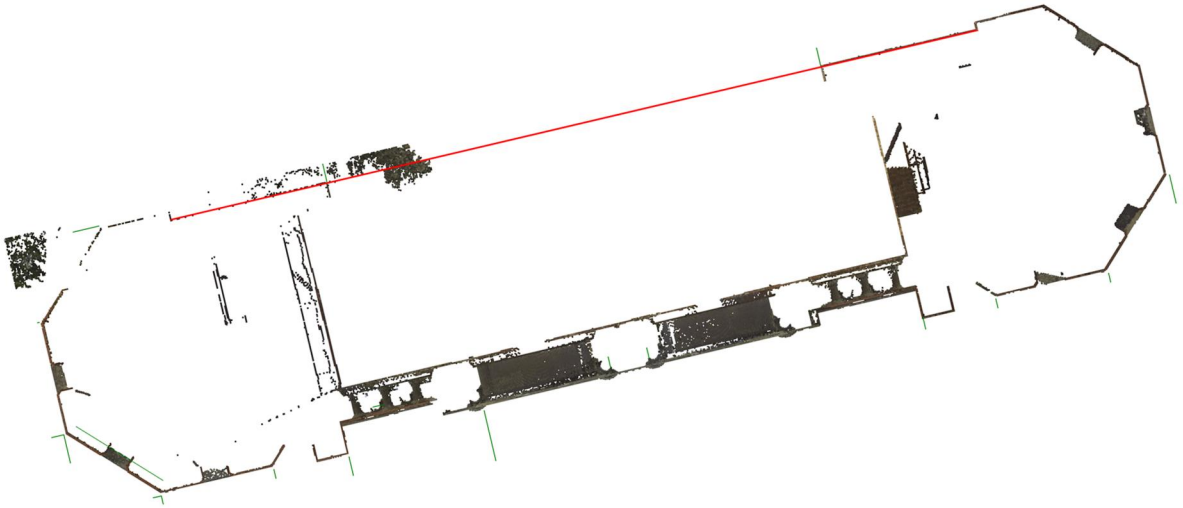
File Location

- Point Clouds are big - 6 scans = 800mb
- Can work over a good LAN
- BIM360 or Distributed teams need local copies
- Point Cloud Root Path



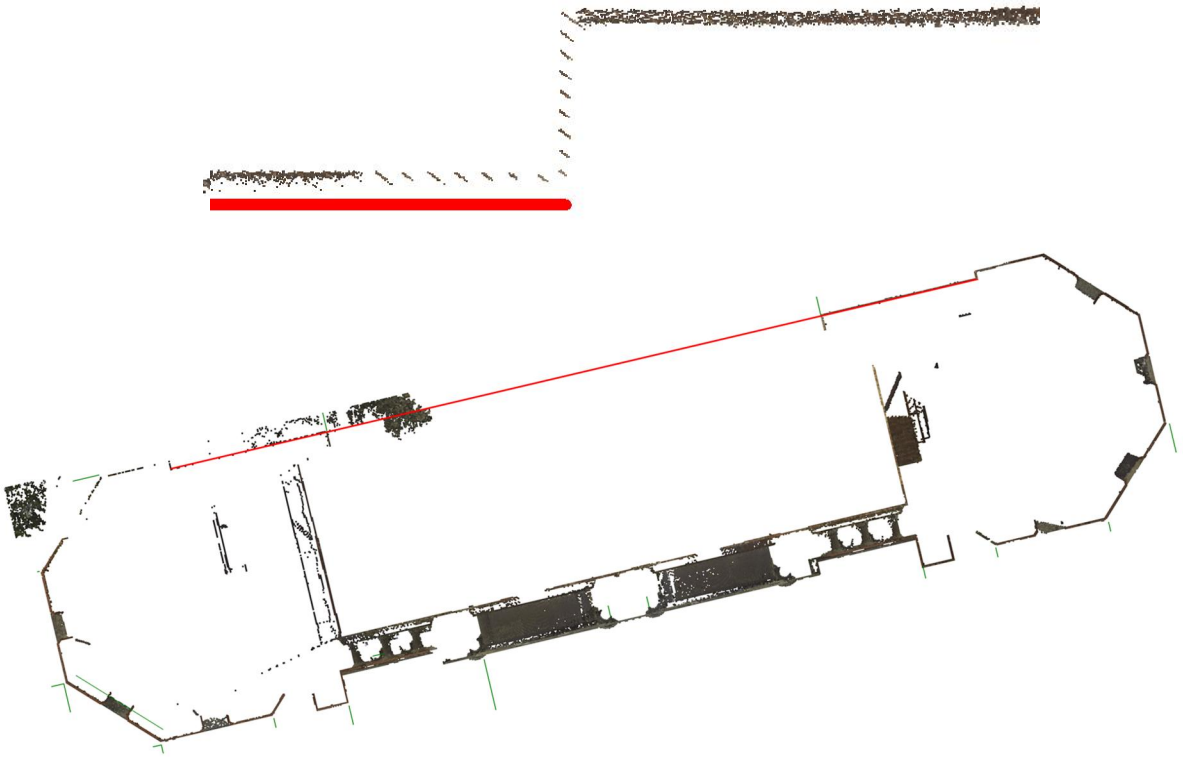
Rotation

- Project North
- Scope Boxes



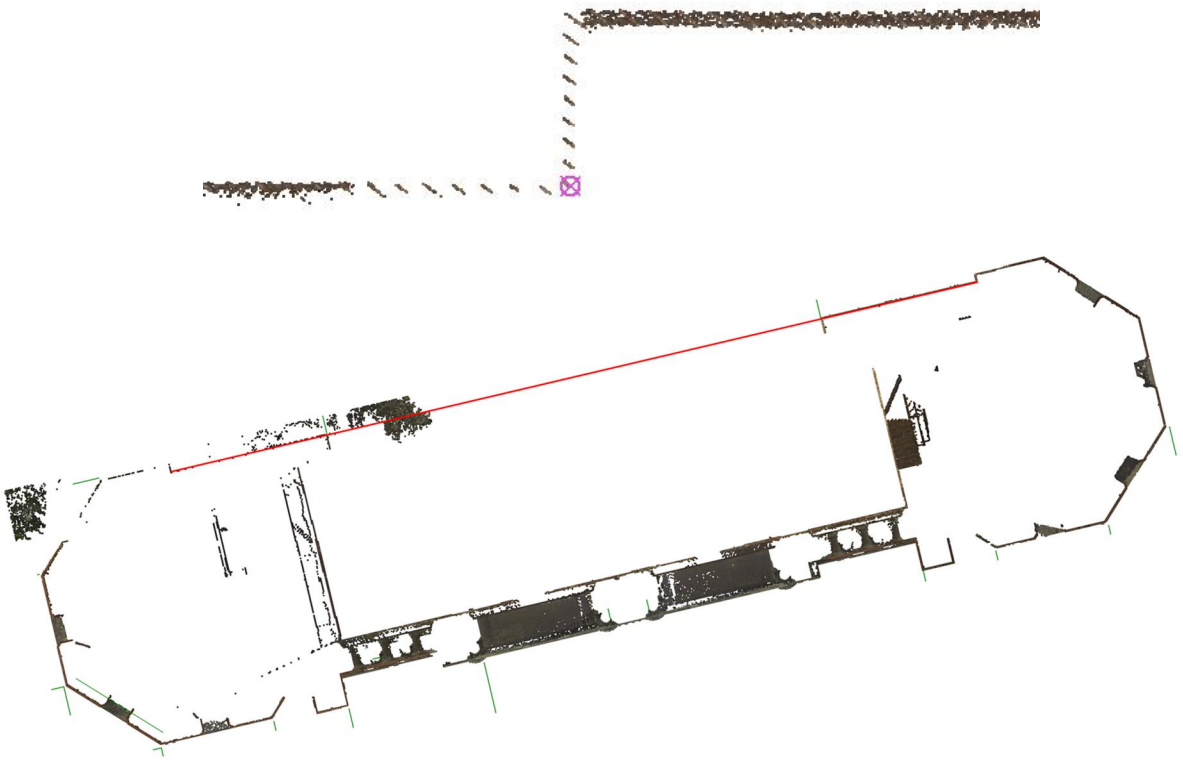
Rotation

- Project North
- Scope Boxes



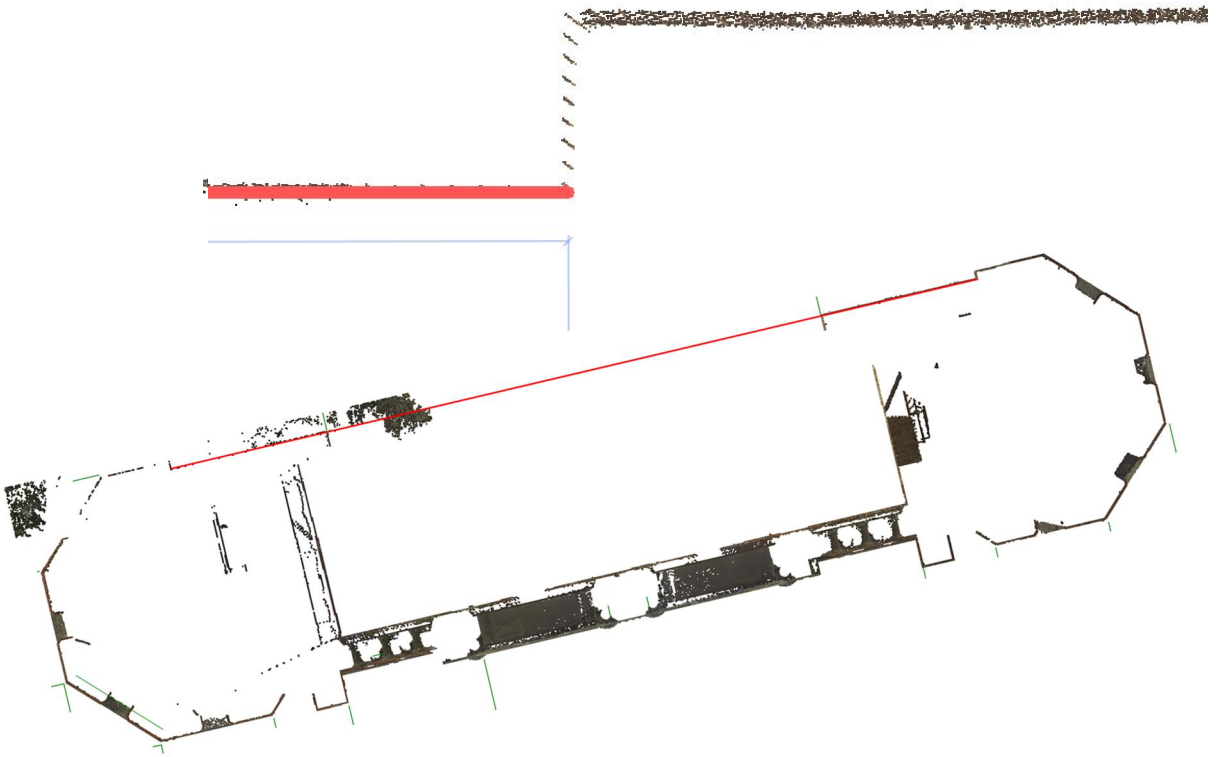
Rotation

- Project North
- Scope Boxes

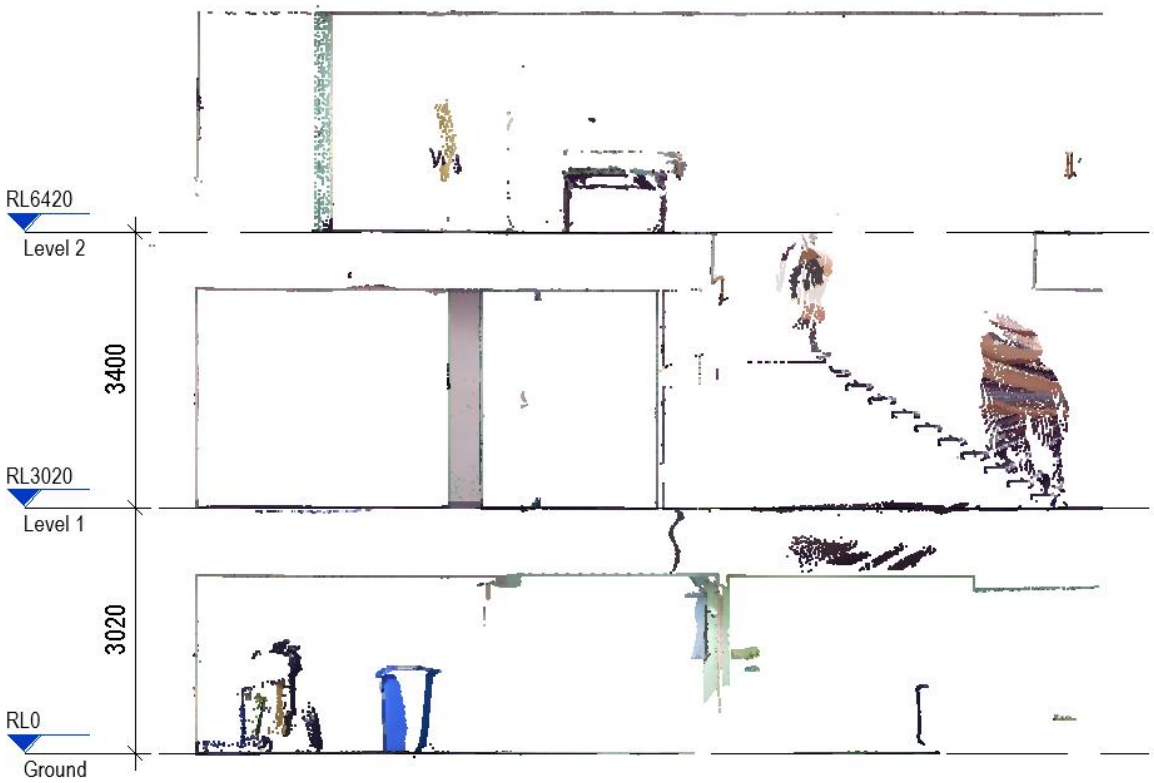


Rotation

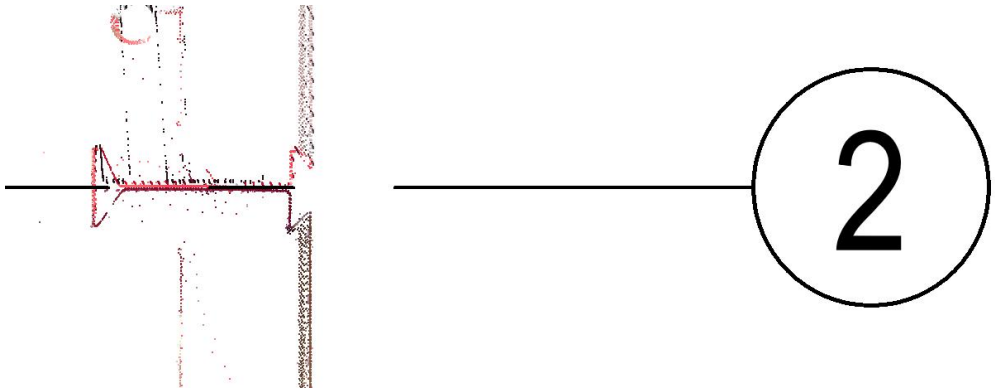
- Project North
- Scope Boxes

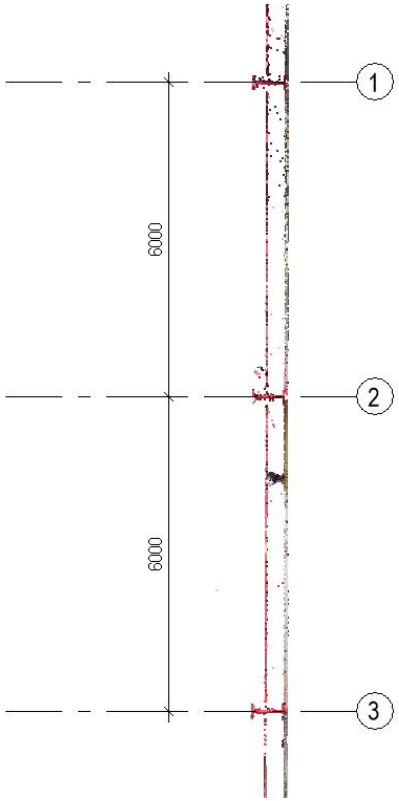


Levels



Grids





Phasing

Views

Views

If you can dodge a wrench, you can dodge a ball

Patches O’Houlihan

Revit Families

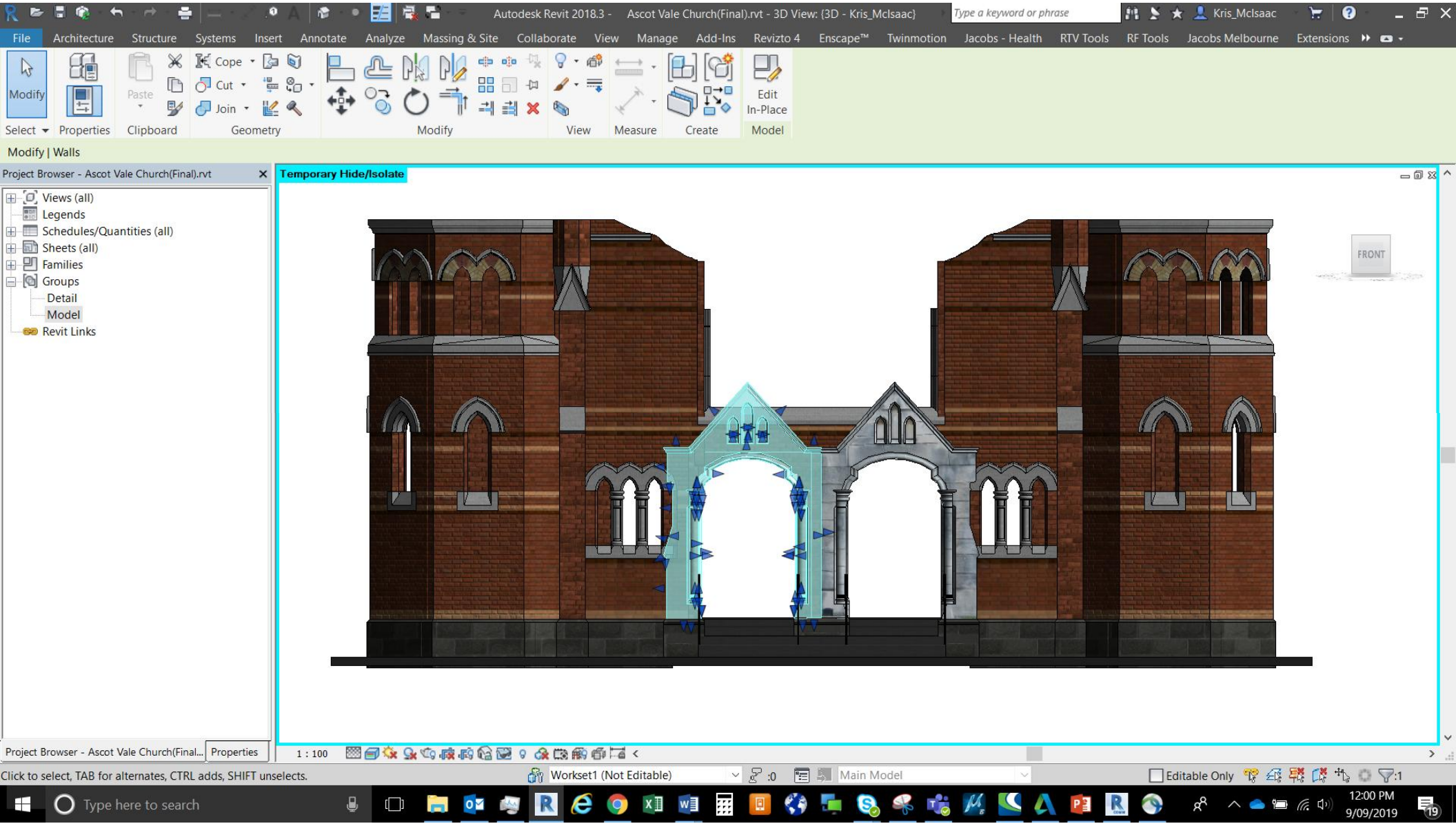
Component Vs. In-place

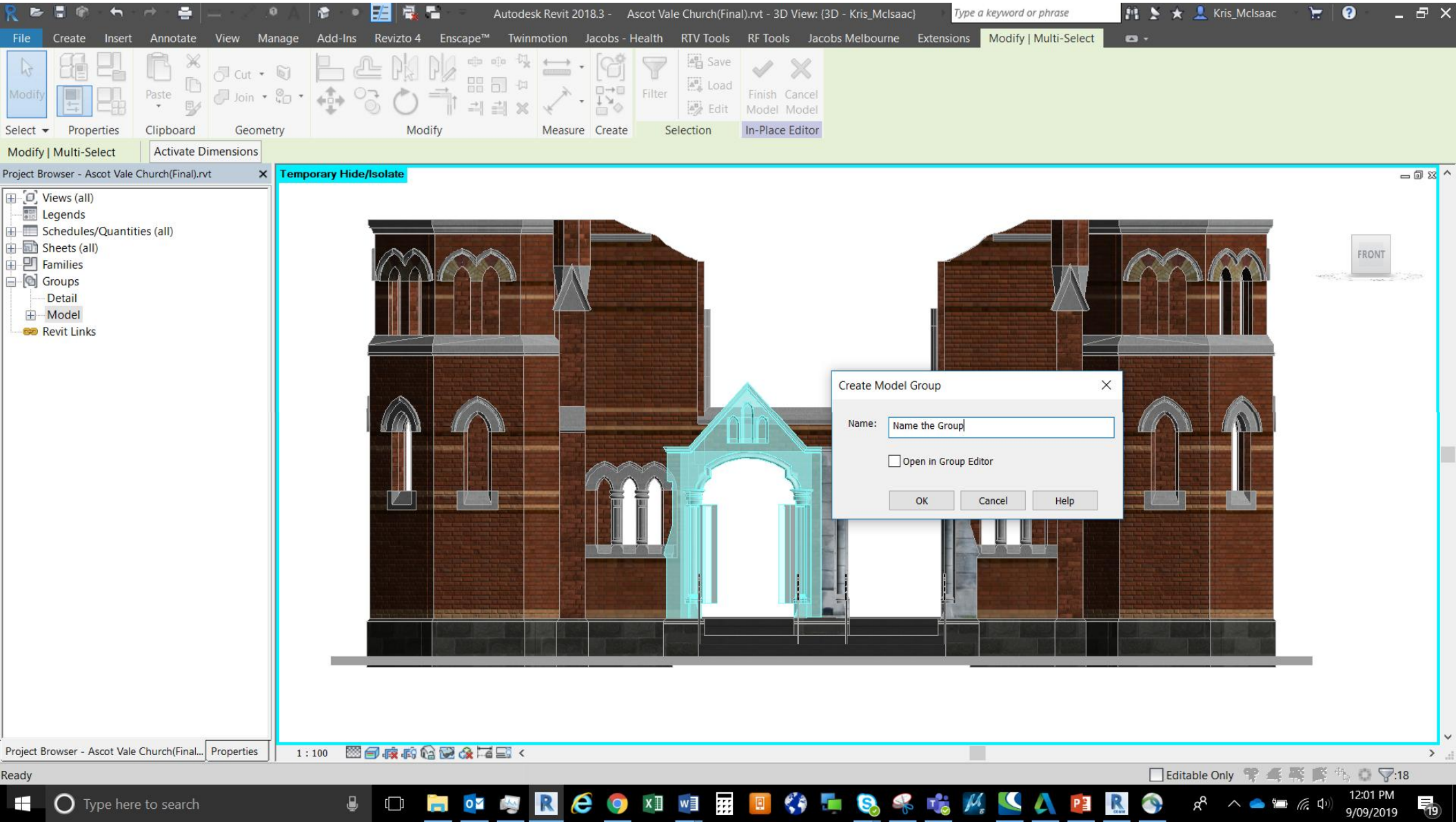
IN-PLACE

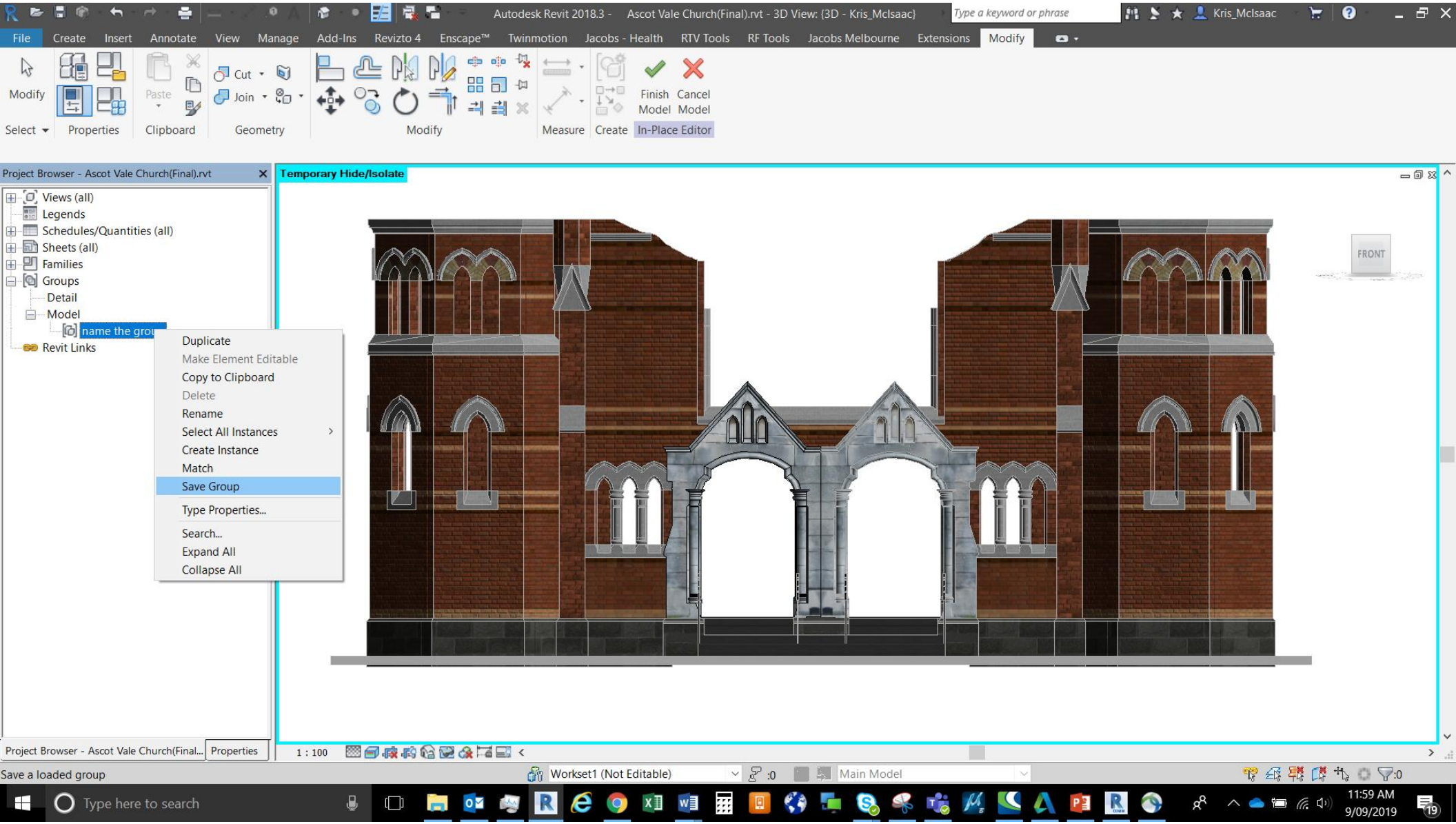
- Reference the model
- Use the Point Cloud

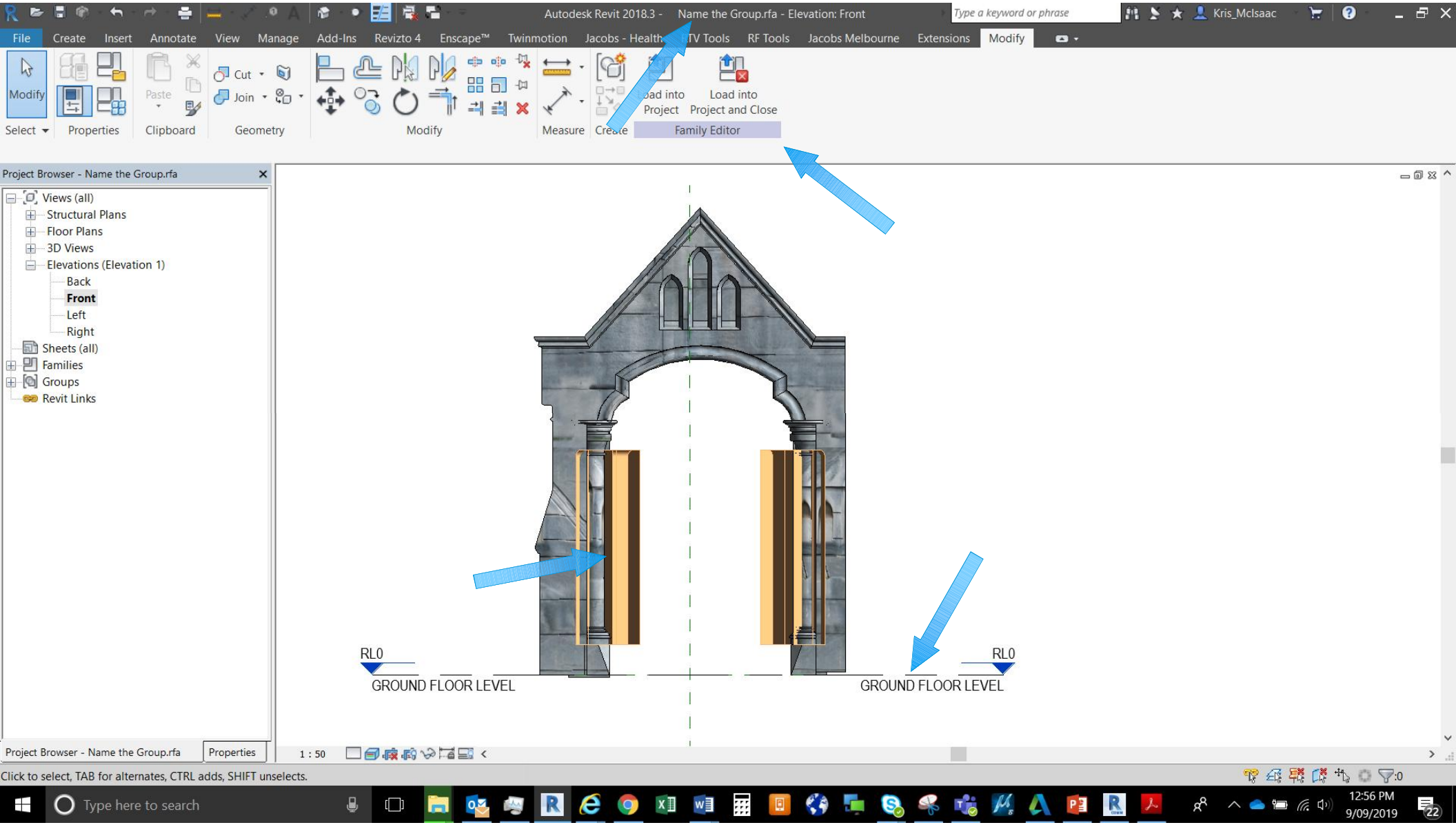
COMPONENT

- Better File size
- Better for Reuse


Autodesk Revit 2018.3 - Ascot Vale Church(Final).rvt - 3D View: {3D - Kris_McIsaac}
Type a keyword or phrase
Kris_McIsaac
File
Architecture
Structure
Systems
Insert
Annotate
Analyze
Massing & Site
Collaborate
View
Manage
Add-Ins
Revizto 4
Enscape™
Twinmotion
Jacobs - Health
RTV Tools
RF Tools
Jacobs Melbourne
Extensions
Modify
Select
Properties
Paste
Clipboard
Cope
Cut
Join
Geometry
Modify
View
Measure
Create
Edit In-Place
Model
Modify | Walls
Project Browser - Ascot Vale Church(Final).rvt
Views (all)
Legends
Schedules/Quantities (all)
Sheets (all)
Families
Groups
Detail
Model
Revit Links
Temporary Hide/Isolate
FRONT
1 : 100
Project Browser - Ascot Vale Church(Final...
Properties
Click to select, TAB for alternates, CTRL adds, SHIFT unselects.
Workset1 (Not Editable)
Main Model
Editable Only
Type here to search
12:00 PM
9/09/2019

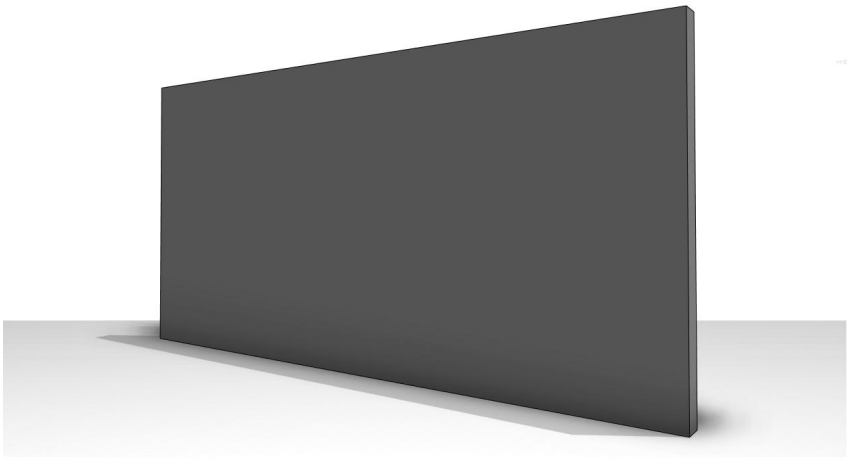

Autodesk Revit 2018.3 - Ascot Vale Church(Final).rvt - 3D View: {3D - Kris_McIsaac)
Type a keyword or phrase
Kris_McIsaac
File
Create
Insert
Annotate
View
Manage
Add-Ins
Revizto 4
Enscape™
Twinmotion
Jacobs - Health
RTV Tools
RF Tools
Jacobs Melbourne
Extensions
Modify | Multi-Select
Modify
Select
Properties
Paste
Cut
Join
Clipboard
Geometry
Modify
Measure
Create
Filter
Save
Load
Edit
Selection
Finish Model
Cancel Model
In-Place Editor
Modify | Multi-Select
Activate Dimensions
Project Browser - Ascot Vale Church(Final).rvt
Views (all)
Legends
Schedules/Quantities (all)
Sheets (all)
Families
Groups
Detail
Model
Revit Links
Temporary Hide/Isolate
FRONT
Create Model Group
Name:
Name the Group
Open in Group Editor
OK
Cancel
Help
1 : 100
Project Browser - Ascot Vale Church(Final...
Properties
Ready
Editable Only
Type here to search
12:01 PM
9/09/2019

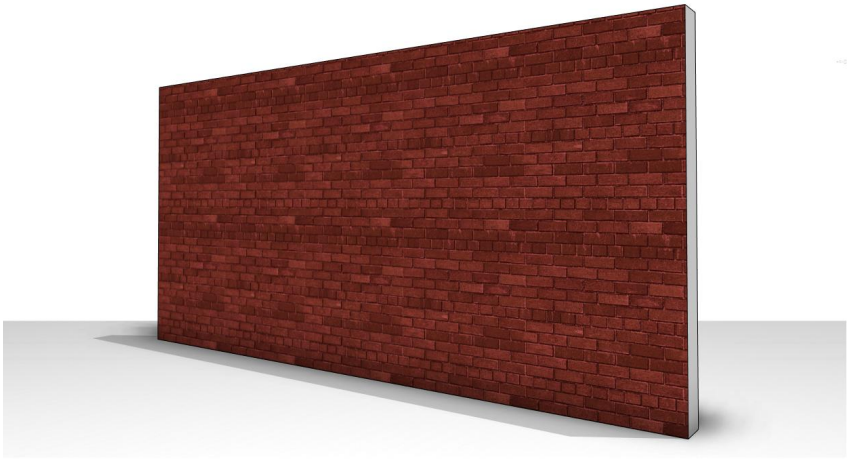

Autodesk Revit 2018.3 - Ascot Vale Church(Final).rvt - 3D View: {3D - Kris_McIsaac)
Type a keyword or phrase
Kris_McIsaac
File
Create
Insert
Annotate
View
Manage
Add-Ins
Revizto 4
Enscape™
Twinmotion
Jacobs - Health
RTV Tools
RF Tools
Jacobs Melbourne
Extensions
Modify
Modify
Select
Properties
Paste
Clipboard
Cut
Join
Geometry
Modify
Measure
Create
Finish Model
Cancel Model
In-Place Editor
Project Browser - Ascot Vale Church(Final).rvt
Views (all)
Legends
Schedules/Quantities (all)
Sheets (all)
Families
Groups
Detail
Model
name the grou
Revit Links
Duplicate
Make Element Editable
Copy to Clipboard
Delete
Rename
Select All Instances
Create Instance
Match
Save Group
Type Properties...
Search...
Expand All
Collapse All
Temporary Hide/Isolate
FRONT
1 : 100
Project Browser - Ascot Vale Church(Final...
Properties
Save a loaded group
Workset1 (Not Editable)
Main Model
Type here to search
11:59 AM
9/09/2019


Autodesk Revit 2018.3 - Name the Group.rfa - Elevation: Front
Type a keyword or phrase
Kris_McIsaac
File
Create
Insert
Annotate
View
Manage
Add-Ins
Revizto 4
Enscape™
Twinmotion
Jacobs - Health
TV Tools
RF Tools
Jacobs Melbourne
Extensions
Modify
Modify
Select
Properties
Paste
Clipboard
Cut
Join
Geometry
Modify
Measure
Create
Load into Project
Load into Project and Close
Family Editor
Project Browser - Name the Group.rfa
Views (all)
Structural Plans
Floor Plans
3D Views
Elevations (Elevation 1)
Back
Front
Left
Right
Sheets (all)
Families
Groups
Revit Links
RL0
GROUND FLOOR LEVEL
RL0
GROUND FLOOR LEVEL
1 : 50
Project Browser - Name the Group.rfa
Properties
Click to select, TAB for alternates, CTRL adds, SHIFT unselects.
Type here to search
12:56 PM
9/09/2019

Walls

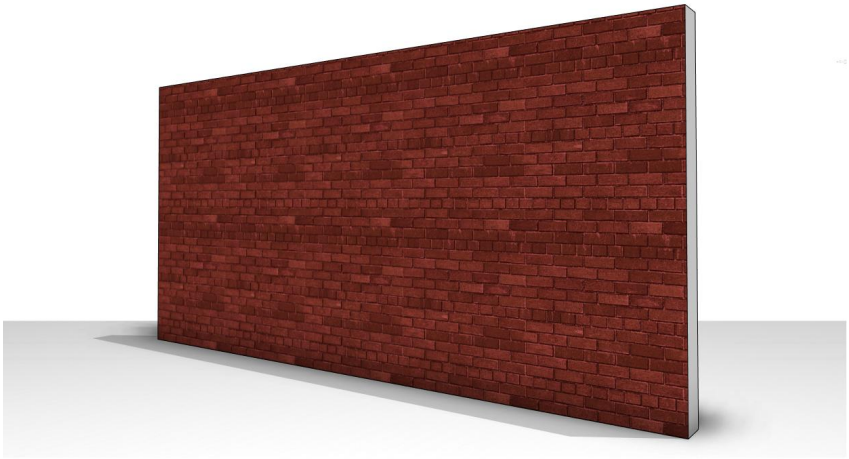
- Materials
- Structure
- Thickness
- Functionality





Walls

- Materials
- Structure
- Thickness
- Functionality
- Fixtures



Nudge, Nudge

Nudge, Nudge

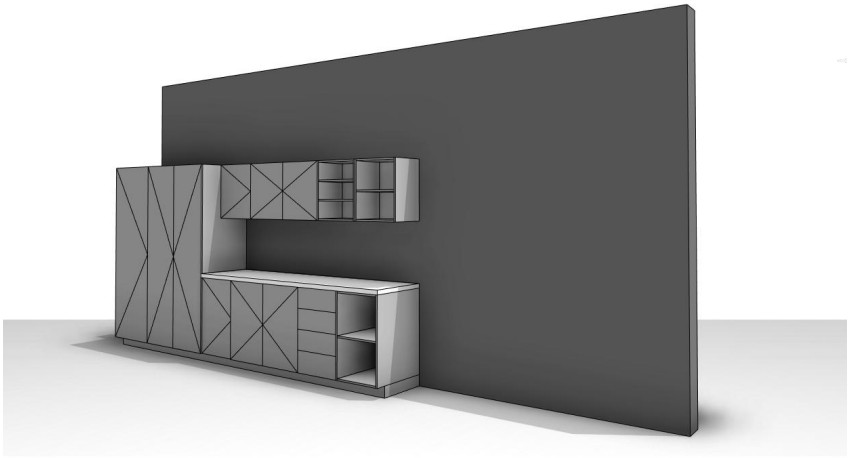
Nudge, Nudge

Windows and Doors

Windows and Doors

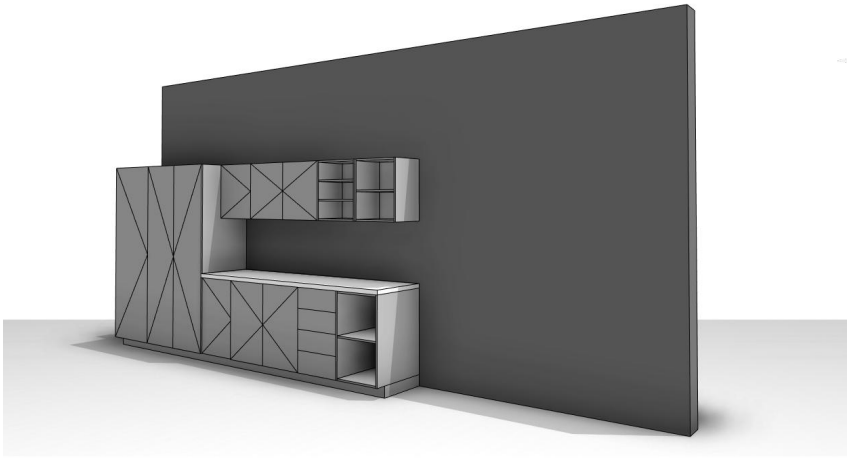
- Materials
- Structure
- Functionality
- Fixtures

Casework



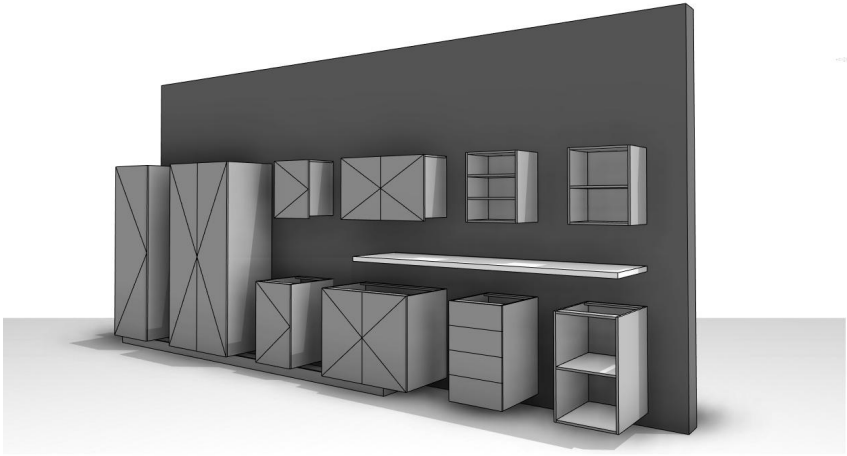
Casework

- Materials
- Structure
- Functionality
- Fixtures



Casework

- Materials
- Structure
- Functionality
- Fixtures



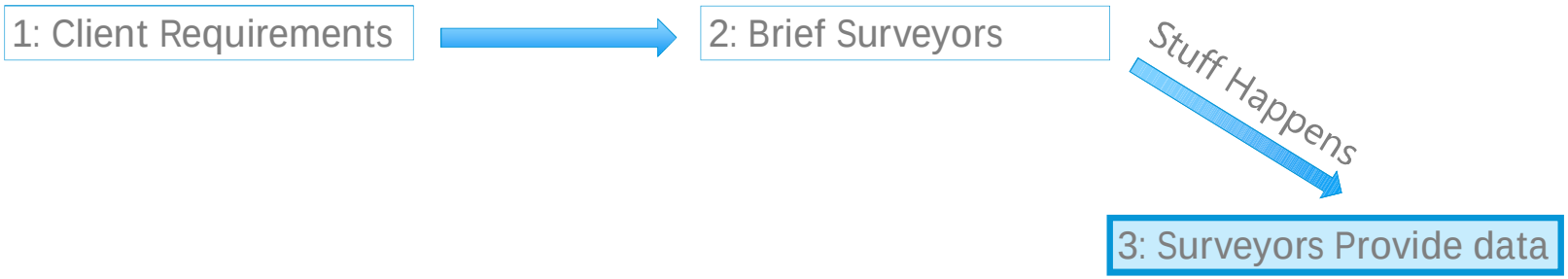
Summary

Summary

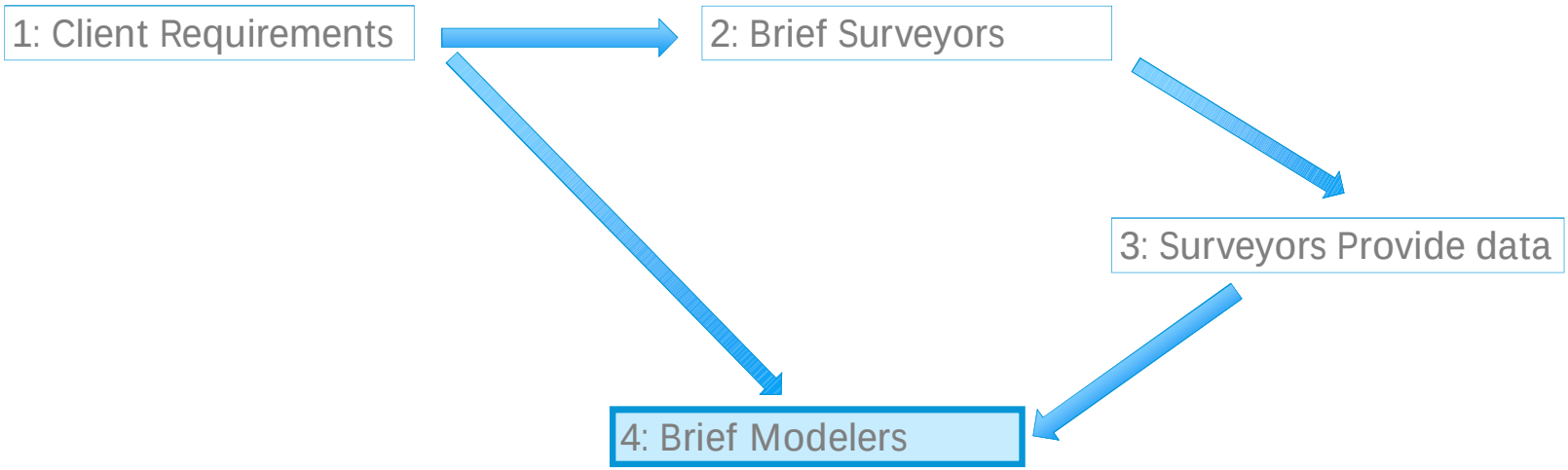
1: Client Requirements

Summary

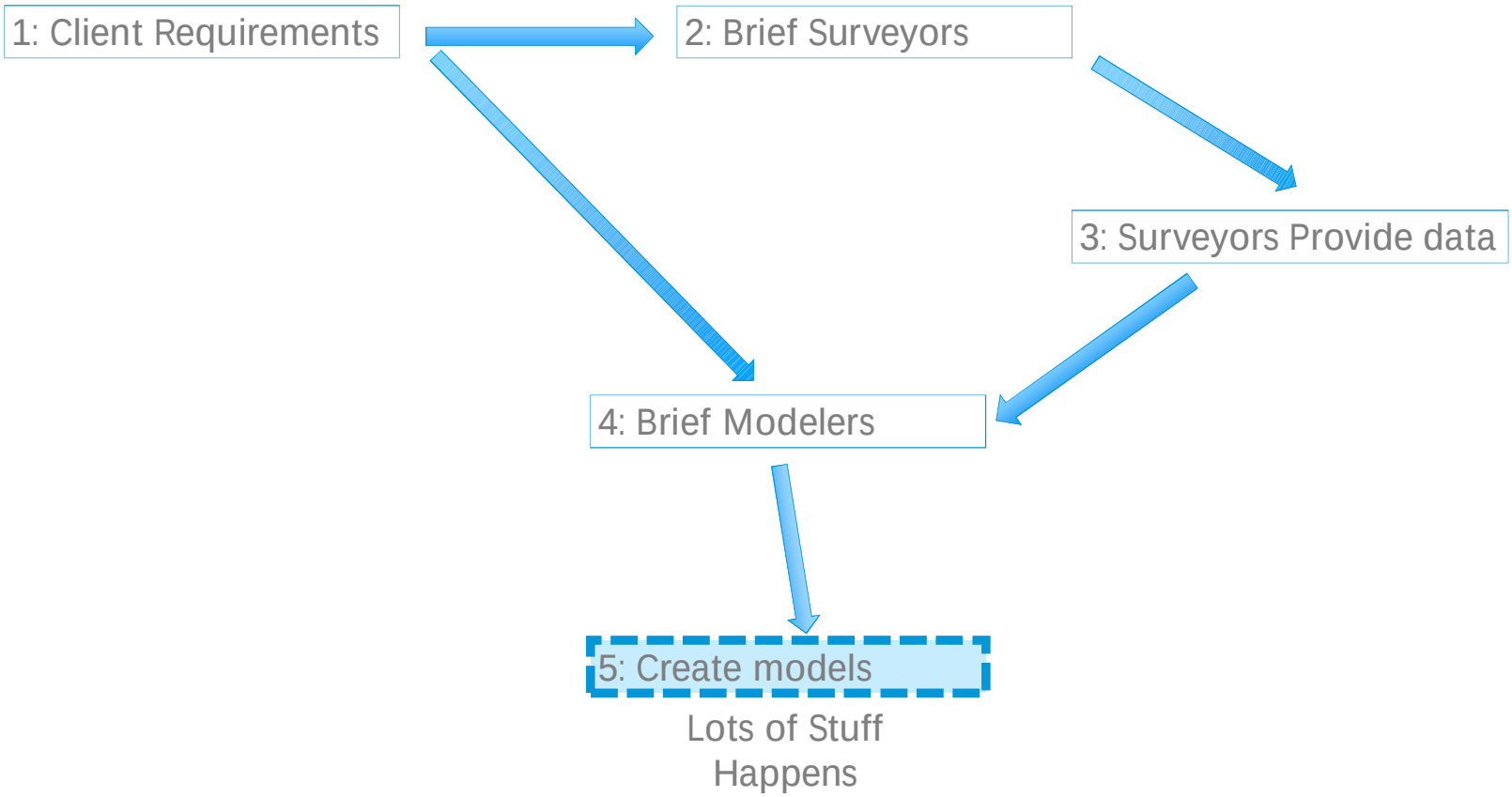
Summary


1: Client Requirements
2: Brief Surveyors
Stuff Happens
3: Surveyors Provide data

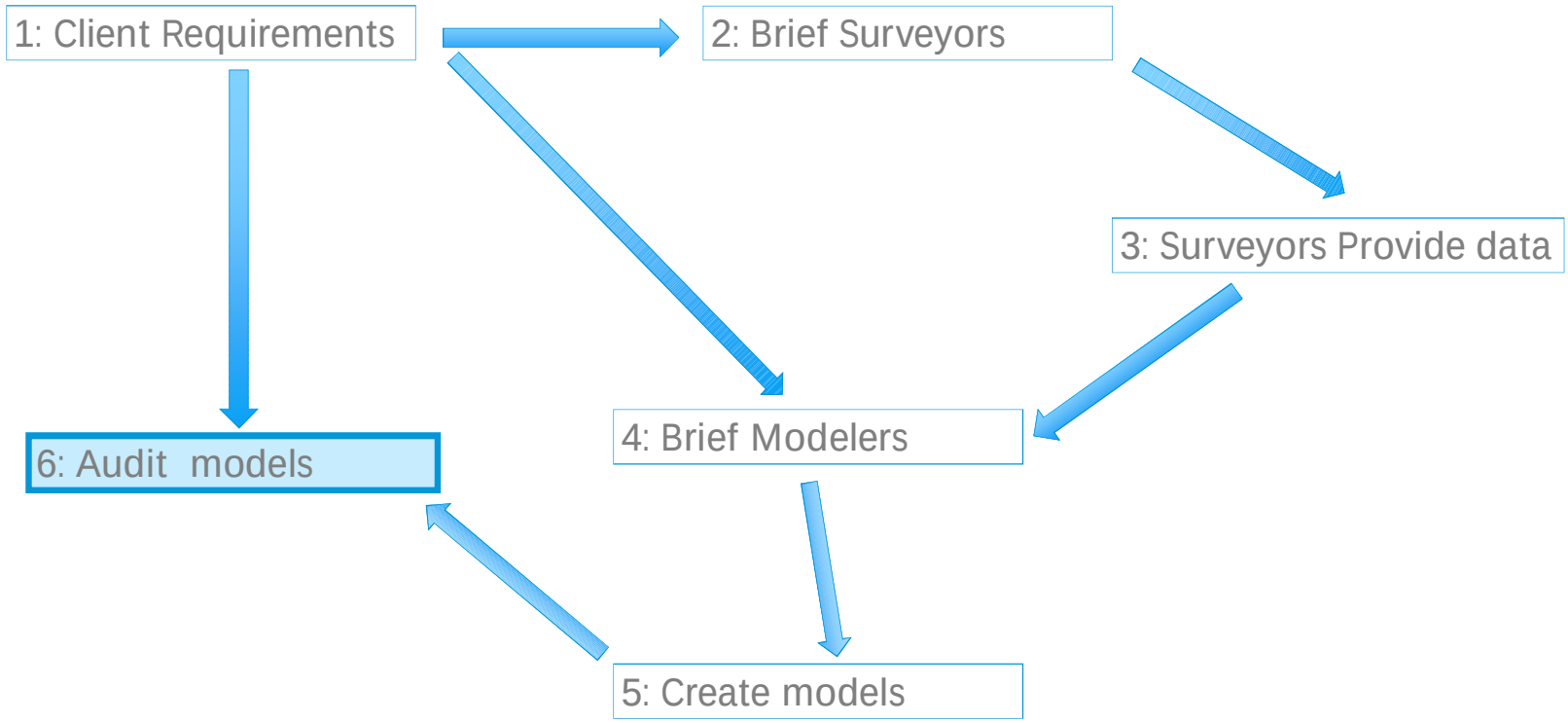
Summary


1: Client Requirements
2: Brief Surveyors
3: Surveyors Provide data
4: Brief Modelers

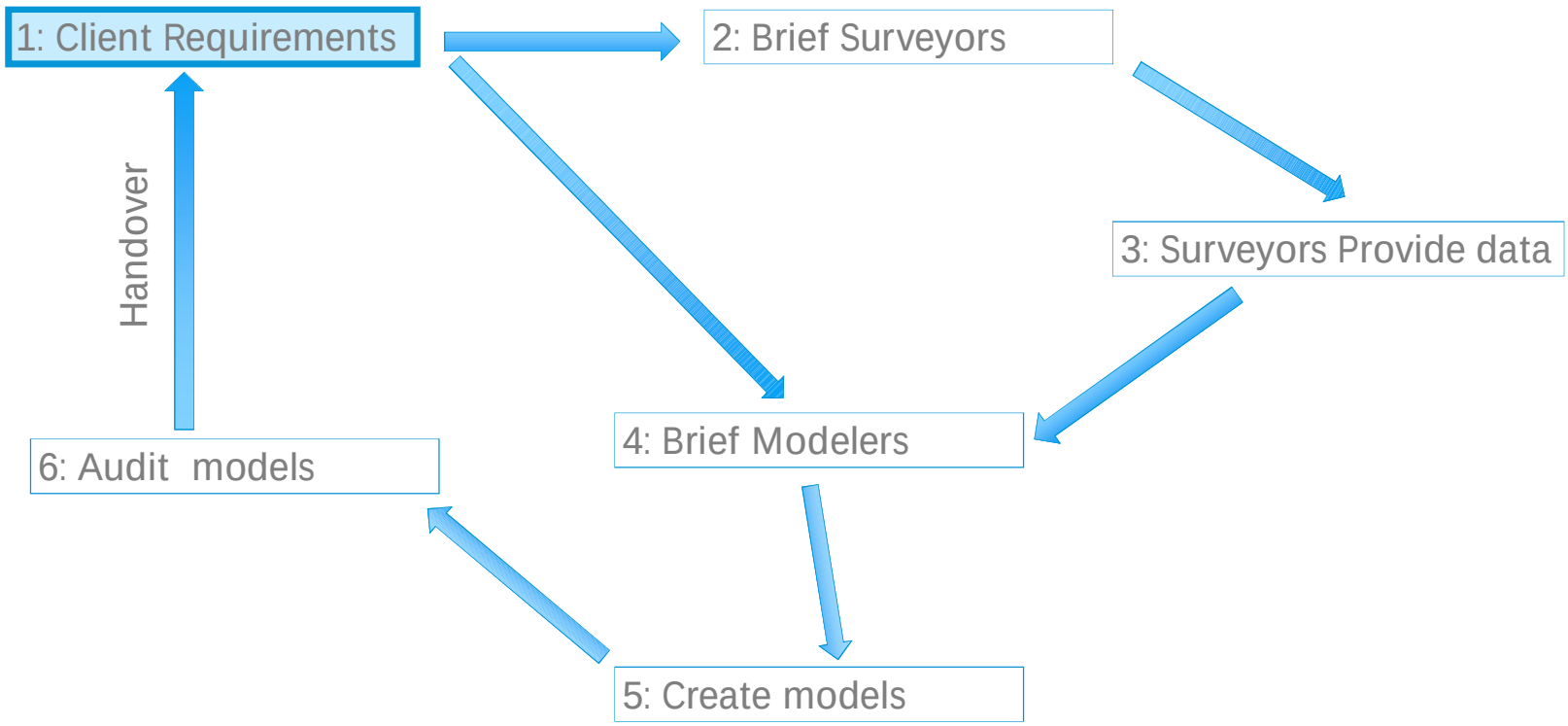
Summary


1: Client Requirements
2: Brief Surveyors
3: Surveyors Provide data
4: Brief Modelers
5: Create models
Lots of Stuff
Happens

Summary


1: Client Requirements
2: Brief Surveyors
3: Surveyors Provide data
4: Brief Modelers
5: Create models
6: Audit models

Summary


1: Client Requirements
2: Brief Surveyors
3: Surveyors Provide data
4: Brief Modelers
5: Create models
6: Audit models
Handover

Make anything™