Developing an Execution Plan for Scan to BIM (sBEP)

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Stantec

AUTODESK. UNIVERSITY

About the speakers

Raghavendra Bhat

- Pune BIM Leader at Stantec
- Sr. Civil Engineer
- Autodesk Certified Associate and Professional
- Integrator, Mentor & Trainer
- AU Speaker in 2013, 2016, 2017, 2019

Joseph Huang

- Chicago BIM Leader at Stantec
- Registered Architect (Illinois)
- Experience from Buildings to Wet Infrastructure
- XR Professor at Northwestern University
- AU Speaker in 2011, 2013, 2016, 2017, 2019


Stantec
Business Lines:
Buildings
Community Development
Environmental Services
Mining
Oil & Gas
Power
Transportation
Water
Waterpower & Dams
22,000 employees
Over 400 locations

Key Learning Objectives

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

- Discover requirements for a Scan-to-BIM job
- Learn how to define and set standards for level of accuracy and level of development
- Learn how to save time in handling and modeling from large-size point clouds
- Learn about QC workflows using Revit templates, Navisworks, and Virtual Reality

Scan to BIM Execution Plan

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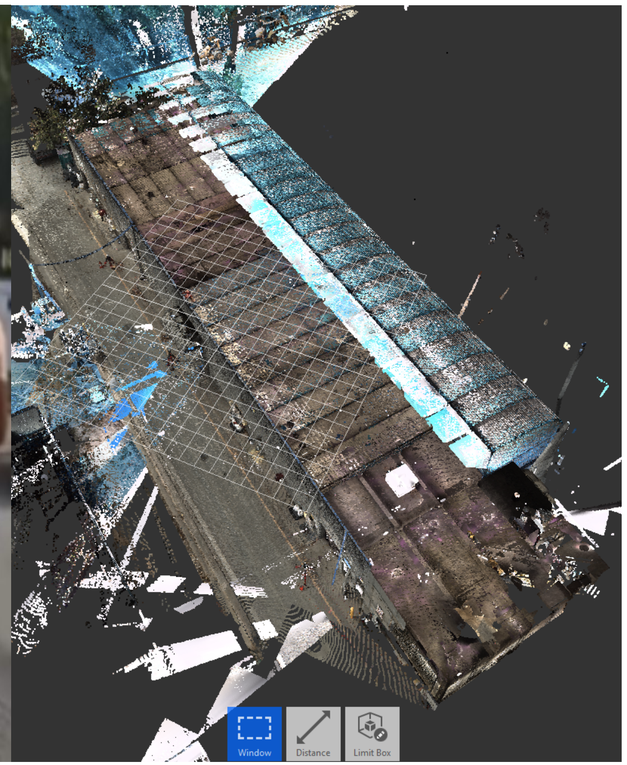
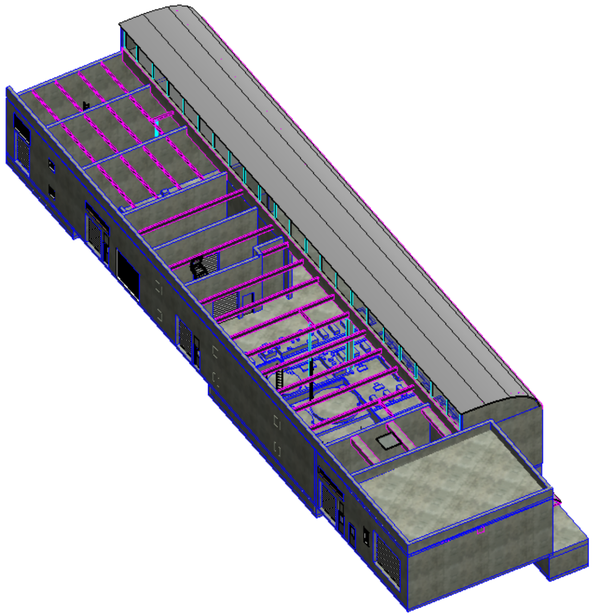
SCAN TO BIM – HIGH LEVEL WORKFLOW

Capture → Process → Modeling → Quality Control






Scan to BIM Execution Plan
Project Information
Client Objectives
Scope and Planning
Estimation
Competence and Training
Standards
Workflows
Data Transfer / Information Management
Model Setup
Model QC
Advanced Visualization

Taking Down Requirements - Essentials

Client Requirements

You Need

Team Requirements

We Need

EIR -Employer's Information Requirements

"Beginning with the end in mind"

Client Need - Define Purpose & help understand the intended use

An As-Built Scan model

- Site/Area of interest highlighted on a
  - PDF
  - Google Earth Image
  - Site Photos
  - Recap Comments
- Level of Detail Required for each area
  - Highlight using different marker for AOI based on the Level of detail you want it to be modelled.
- Intended use of model
  - Refurbishment
  - Quantity Take Off
  - Develop As-Built Drawings
  - Site Verification

Client Requirements & Setting Expectations

Client

- Workflow
- Tools
- Deliverables
- LOD

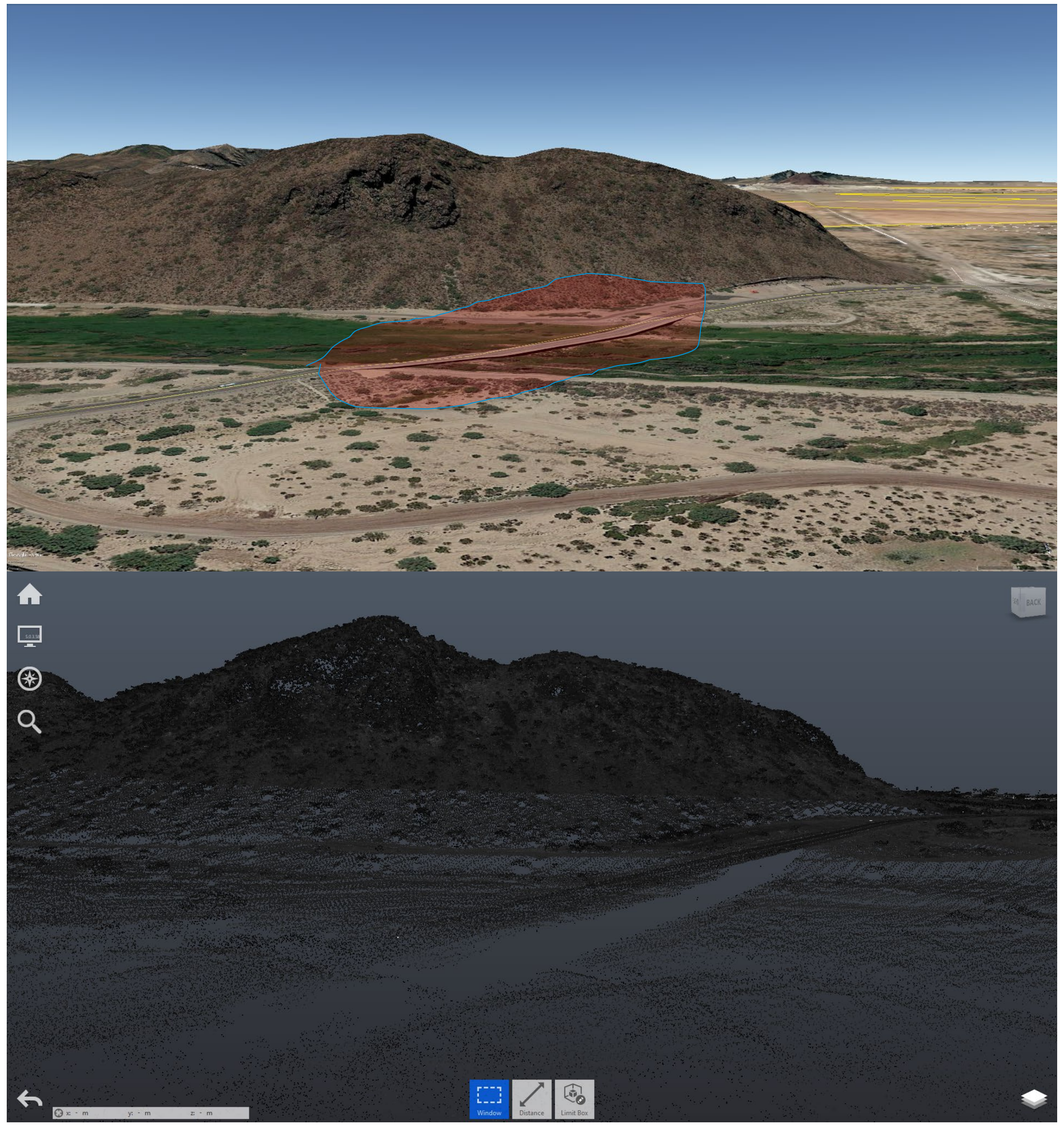
Team

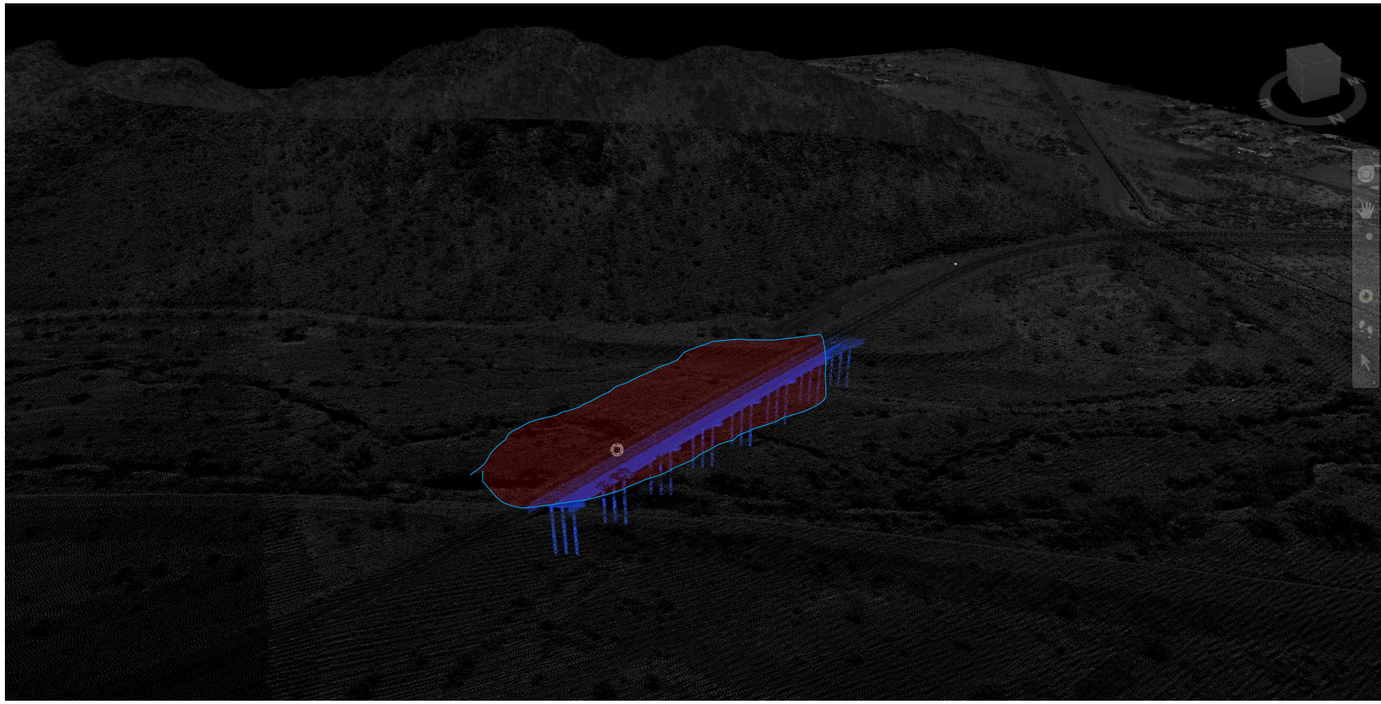
- Workflow
- Tools
- Deliverables
- LOD
- QC Workflows

Communication is the Key

Effect of Poor Information

Uncoordinated Information & Geospatially Incorrect Information

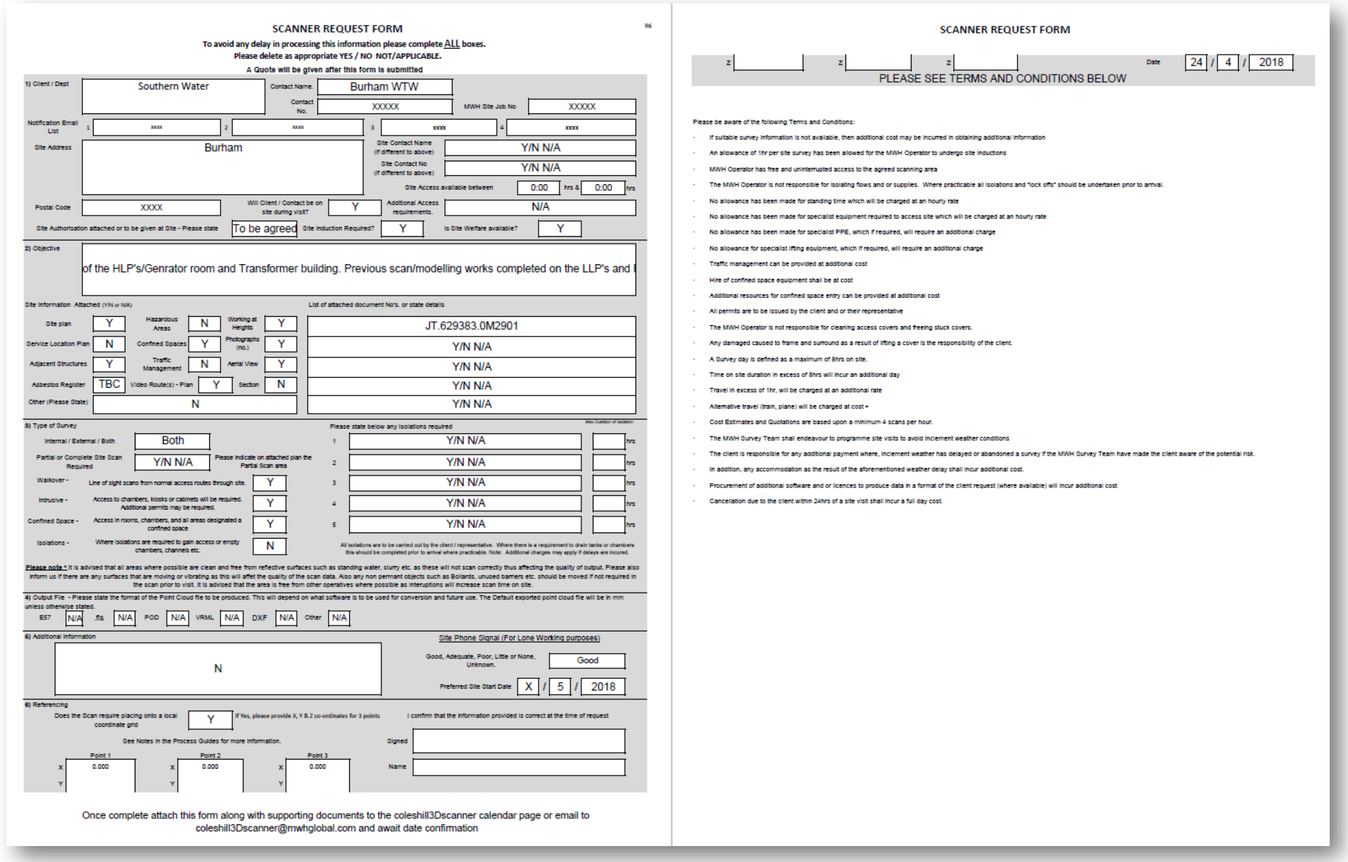




- Lack of clearly communicated survey information required.
- Lack of good density scan.
- Lack of coordinates registration cross verification.

Requirement Sheet to Surveyor – Need's to contain

Scanner	XXX
Scan density	XXX
RGB values registered	Yes, Required.
Scan's Geo located to Coordinate system	Having all the independent scans geo located is very essential.
Scan Formats Required	E57, RCS/RCP (2 formats required)
Scan Cleanups	Any points captured far off from the Area of Interest need to be deleted. If there are scans of trees and plantation in the background captured (not in Area of Interest), would need to have them cleaned up and not included in the final format being submitted.
Embed 360 Real views	It is essential to have the 360 Real Views embedded with the scans.
SOP (Setout points)	Request to obtain few setout points with X,Y, Z information. Will be very valuable Just in case need to orient/verify/position the model.



SCANNER REQUEST FORM

To avoid any delay in processing this information please complete ALL boxes.
Please delete as appropriate YES / NO NOT/APPLICABLE.
A Quote will be given after this form is submitted

1) Client / Dept: Southern Water — Contact Name: Burham WTW — Contact No.: XXXXX — MWH Site Job No: XXXXX
Notification Email List: 1 xxxx 2 xxxx 3 xxxx 4 xxxx
Site Address: Burham — Site Contact Name (if different to above): Y/N N/A — Site Contact No (if different to above): Y/N N/A
Site Access available between: 0:00 hrs & 0:00 hrs
Postal Code: XXXX — Will Client / Contact be on site during visit?: Y — Additional Access requirements.: N/A
Site Authorisation attached or to be given at Site - Please state: To be agreed — Site Induction Required?: Y — Is Site Welfare available?: Y

2) Objective: of the HLP's/Genrator room and Transformer building. Previous scan/modelling works completed on the LLP's and

Site Information Attached (Y/N or N/A) — List of attached document No's, or state details

Site plan	Y	Hazardous Areas	N	Working at Heights	Y	JT.629383.0M2901
Service Location Plan	N	Confined Spaces	Y	Photographs (No.)	Y	Y/N N/A
Adjacent Structures	Y	Traffic Management	N	Aerial View	Y	Y/N N/A
Asbestos Register	TBC	Video Route(s) - Plan	Y	Section	N	Y/N N/A
Other (Please State)	N					Y/N N/A

3) Type of Survey
Internal / External / Both: Both
Partial or Complete Site Scan Required: Y/N N/A — Please indicate on attached plan the Partial Scan area
Walkover - Line of sight scans from normal access routes through site: Y
Intrusive - Access to chambers, kiosks or cabinets will be required. Additional permits may be required.: Y
Confined Space - Access in rooms, chambers, and all areas designated a confined space: Y
Isolations - Where isolations are required to gain access or empty chambers, channels etc.: N

Please state below any isolations required (Max Duration of Isolation)

1	Y/N N/A	hrs
2	Y/N N/A	hrs
3	Y/N N/A	hrs
4	Y/N N/A	hrs
5	Y/N N/A	hrs

All isolations are to be carried out by the client / representative. Where there is a requirement to drain tanks or chambers this should be completed prior to arrive where practicable. Note: Additional charges may apply if delays are incured.

Please note * It is advised that all areas where possible are clean and free from reflective surfaces such as standing water, slurry etc, as these will not scan correctly thus affecting the quality of output. Please also inform us if there are any surfaces that are moving or vibrating as this will affet the quality of the scan data. Also any non permant objects such as Bollards, unused barriers etc. should be moved if not required in the scan prior to visit. It is advised that the area is free from other operatives where possible as interuptions will increase scan time on site.

4) Output File - Please state the format of the Point Cloud file to be produced. This will depend on what software is to be used for conversion and future use. The Default exported point cloud file will be in mm unless otherwise stated.
E57 N/A .fls N/A POD N/A VRML N/A DXF N/A Other N/A

6) Additional Information: N
Site Phone Signal (For Lone Working purposes): Good, Adequate, Poor, Little or None, Unknown. Good
Preferred Site Start Date: X / 5 / 2018

6) Referencing
Does the Scan require placing onto a local coordinate grid: Y — If Yes, please provide X, Y & Z co-ordinates for 3 points
See Notes in the Process Guides for more information.
Point 1 X 0.000 Y
Point 2 X 0.000 Y
Point 3 X 0.000 Y

I confirm that the information provided is correct at the time of request
Signed
Name

Once complete attach this form along with supporting documents to the coleshill3Dscanner calendar page or email to coleshill3Dscanner@mwhglobal.com and await date confirmation

SCANNER REQUEST FORM

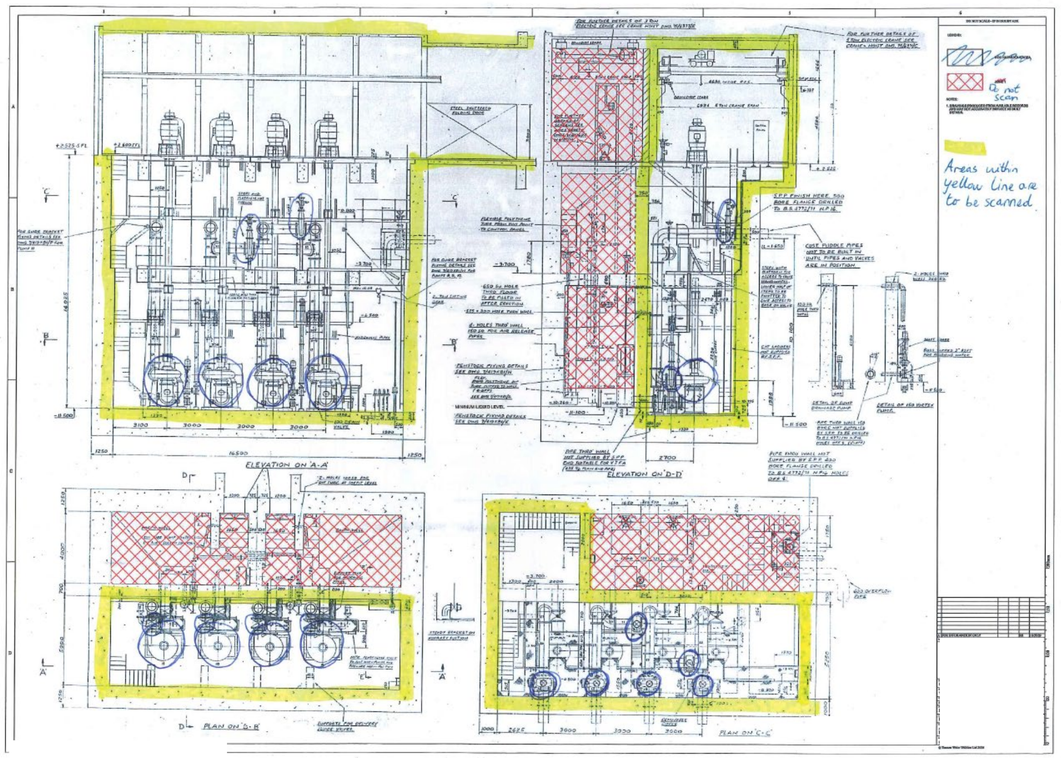
Z Z Z Date 24 / 4 / 2018

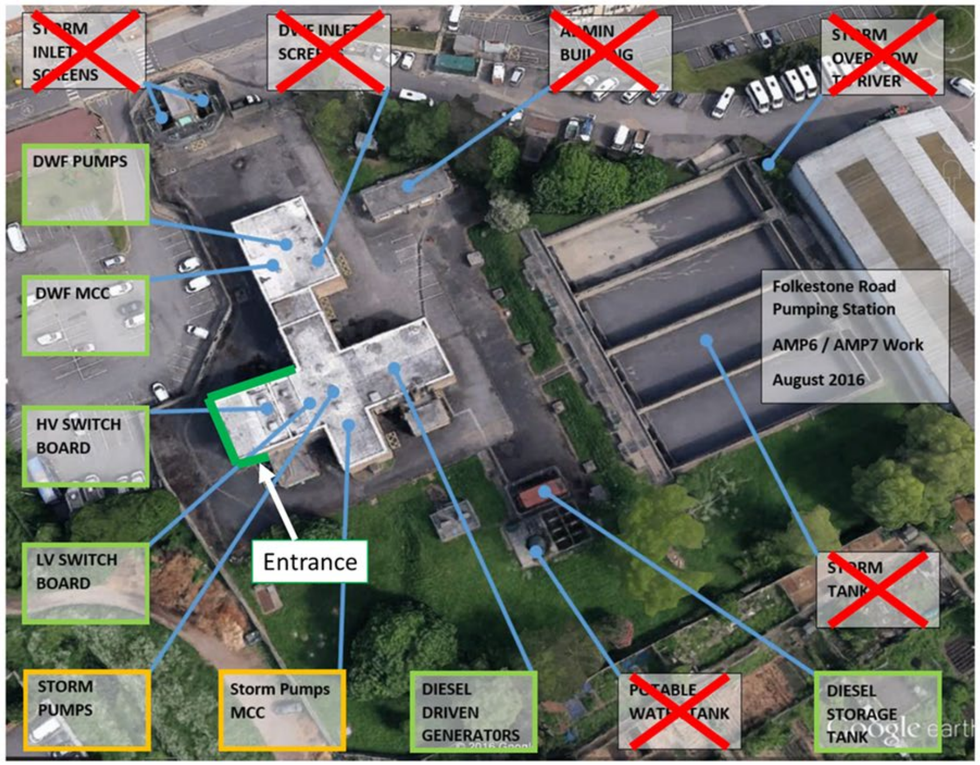
PLEASE SEE TERMS AND CONDITIONS BELOW

Please be aware of the following Terms and Conditions:

- If suitable survey information is not available, then additional cost may be incurred in obtaining additional information
- An allowance of 1hr per site survey has been allowed for the MWH Operator to undergo site inductions
- MWH Operator has free and uninterrupted access to the agreed scanning area
- The MWH Operator is not responsible for isolating flows and or supplies. Where practicable all isolations and "lock offs" should be undertaken prior to arrival.
- No allowance has been made for standing time which will be charged at an hourly rate
- No allowance has been made for specialist equipment required to access site which will be charged at an hourly rate
- No allowance has been made for specialist PPE, which if required, will require an additional charge
- No allowance for specialist lifting equipment, which if required, will require an additional charge
- Traffic management can be provided at additional cost
- Hire of confined space equipment shall be at cost
- Additional resources for confined space entry can be provided at additional cost
- All permits are to be issued by the client and or their representative
- The MWH Operator is not responsible for cleaning access covers and freeing stuck covers.
- Any damaged caused to frame and surround as a result of lifting a cover is the responsibility of the client.
- A Survey day is defined as a maximum of 8hrs on site.
- Time on site duration in excess of 8hrs will incur an additional day
- Travel in excess of 1hr, will be charged at an additional rate
- Alternative travel (train, plane) will be charged at cost +
- Cost Estimates and Quotations are based upon a minimum 4 scans per hour.
- The MWH Survey Team shall endeavour to programme site visits to avoid inclement weather conditions
- The client is responsible for any additional payment where, inclement weather has delayed or abandoned a survey if the MWH Survey Team have made the client aware of the potential risk.
- In addition, any accommodation as the result of the aforementioned weather delay shall incur additional cost.
- Procurement of additional software and or licences to produce data in a format of the client request (where available) will incur additional cost
- Cancelation due to the client within 24hrs of a site visit shall incur a full day cost.

Examples of Prioritizing Scan Work





Priority

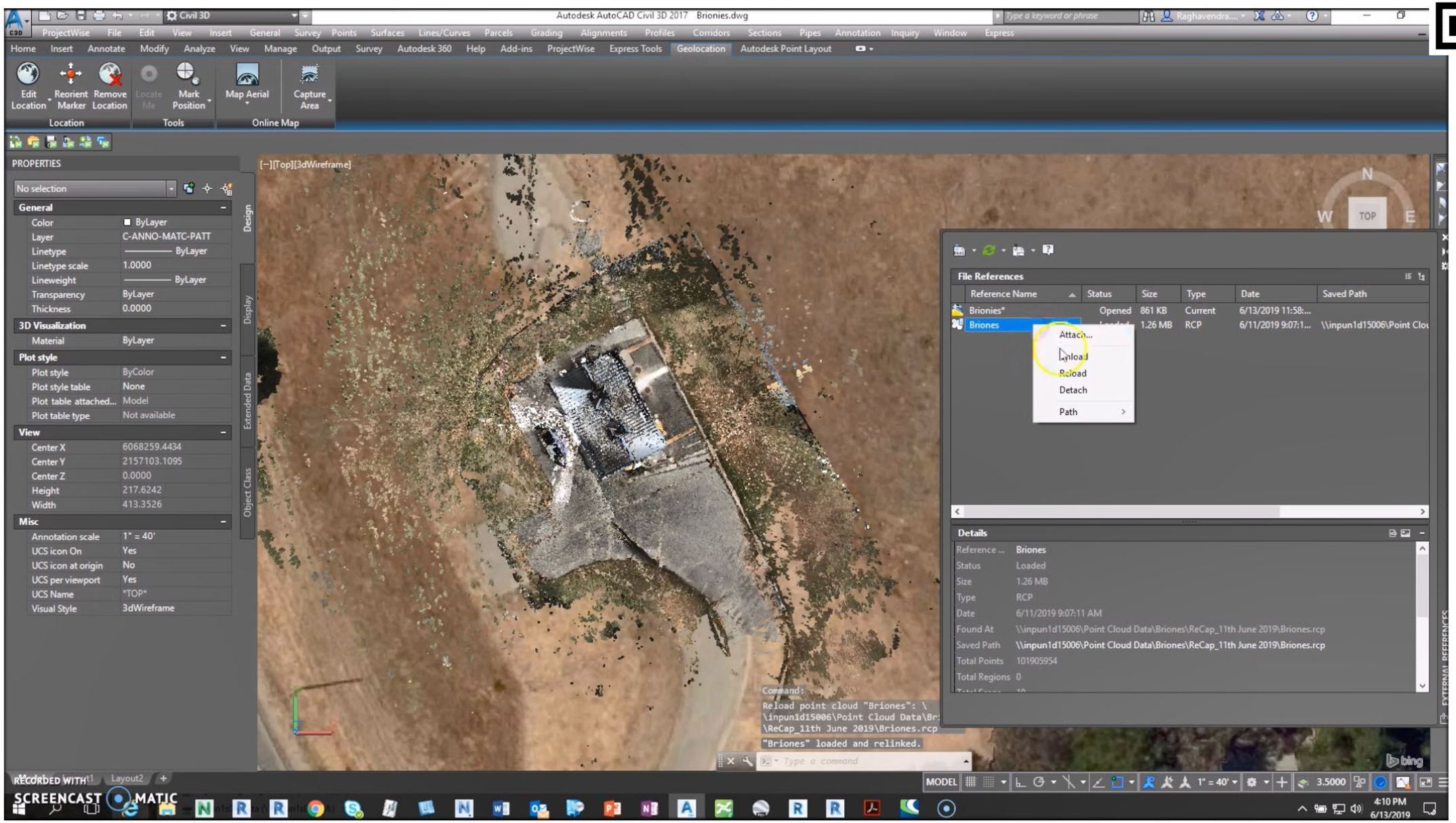
Secondary

Not Required

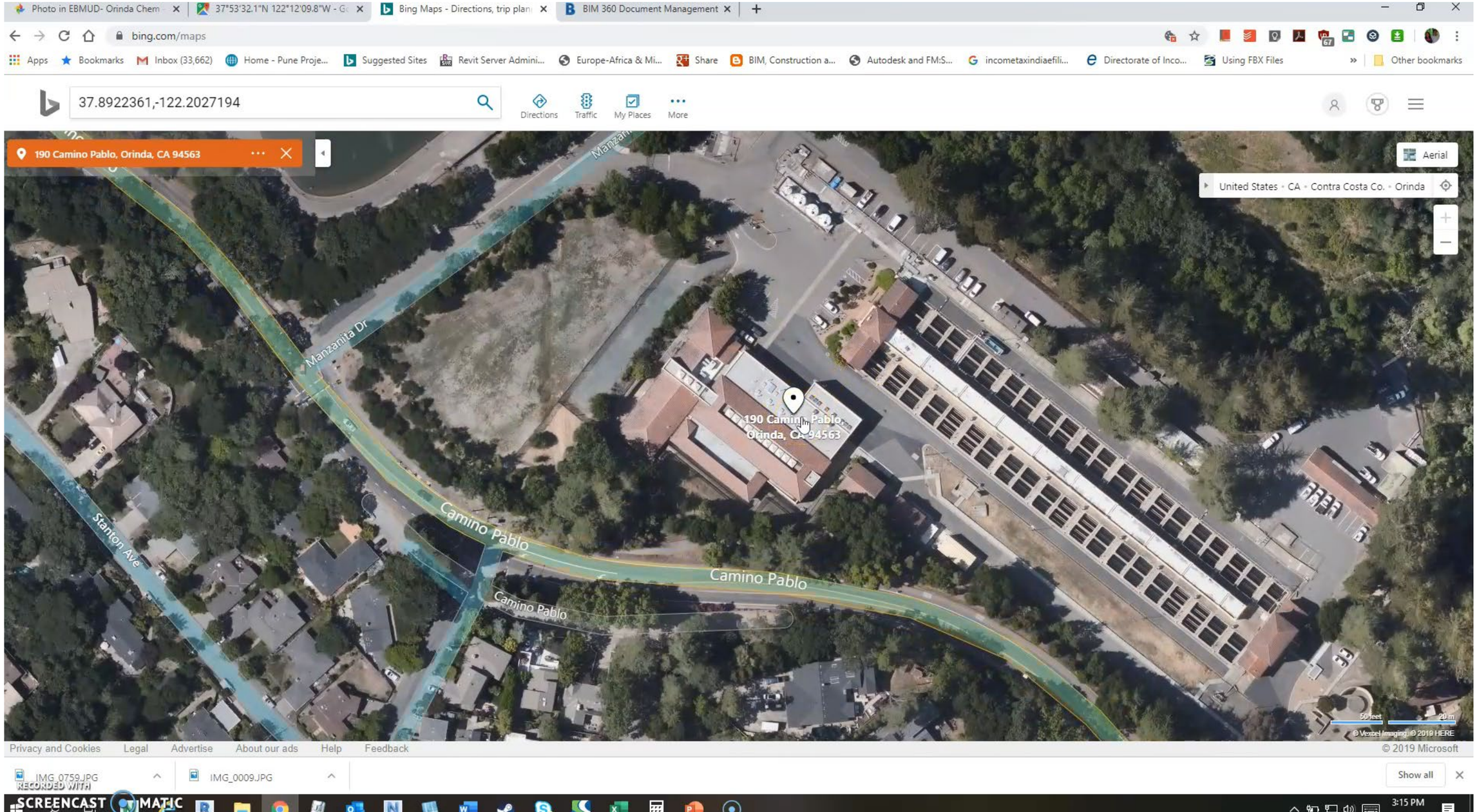
Setout Points – From Surveyor

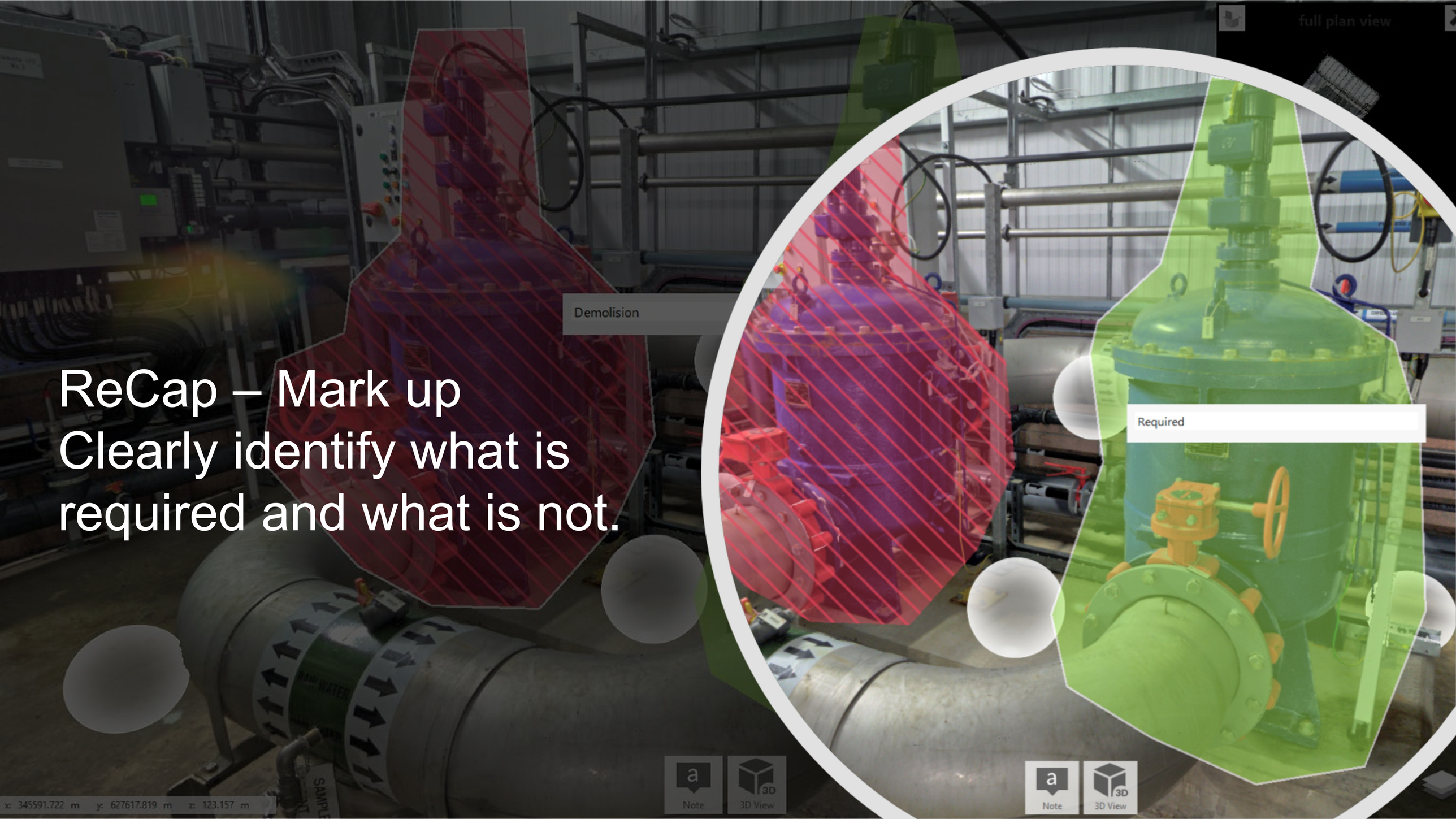
	A	B	C	D	E
1	SOP1	359710.422	677960.702	14.358	
2	SOP2	359701.790	677929.706	11.477	
3	SOP3	359668.450	677913.524	11.032	
4					
5					

Check Using Map Overlay



Geotag Photos

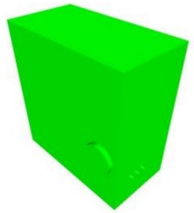
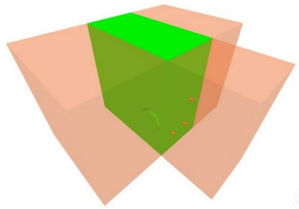
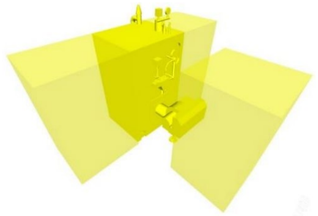
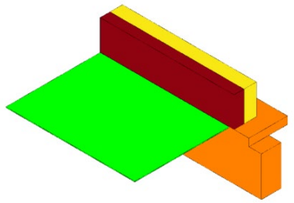
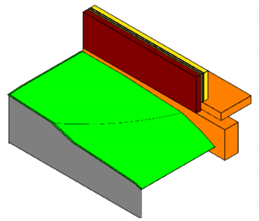
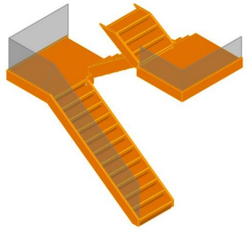
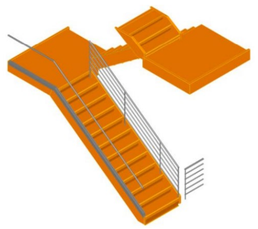
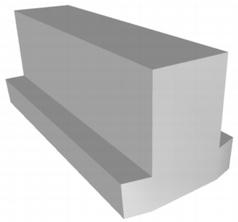
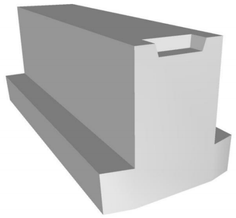




ReCap – Mark up
Clearly identify what is required and what is not.


AUTODESK RECAP PRO
Membrane Plant Internals
Raghavendr...
connect
View States
Sca...ons
Scan Locations
Annotations
Required
Demolision
Attached Projects
BETA
Window
Note
Limit Box
RealView
RECORDED WITH
SCREENCAST MATIC
y: 627618.873 m
z: 121.978 m

Scan to BIM - LOD Definition / Requirements

Conceptual (LOD 100)	Approximate Geometry (LOD 200)	Precise geometry (LOD 300)	Fabrication (LOD 400)	As-built (LOD 500)
A symbol or other generic representation	Approximate quantity, size, shape, location, and orientation	Specific quantity, size, shape, location, and orientation	Specific size, shape, location, quantity, and orientation with detailing, fabrication, assembly, and installation information	Field verified size, shape, location, quantity, and orientation
Electrical Equipment				
Exterior Wall				
Stairs				
Inverted T Beam				

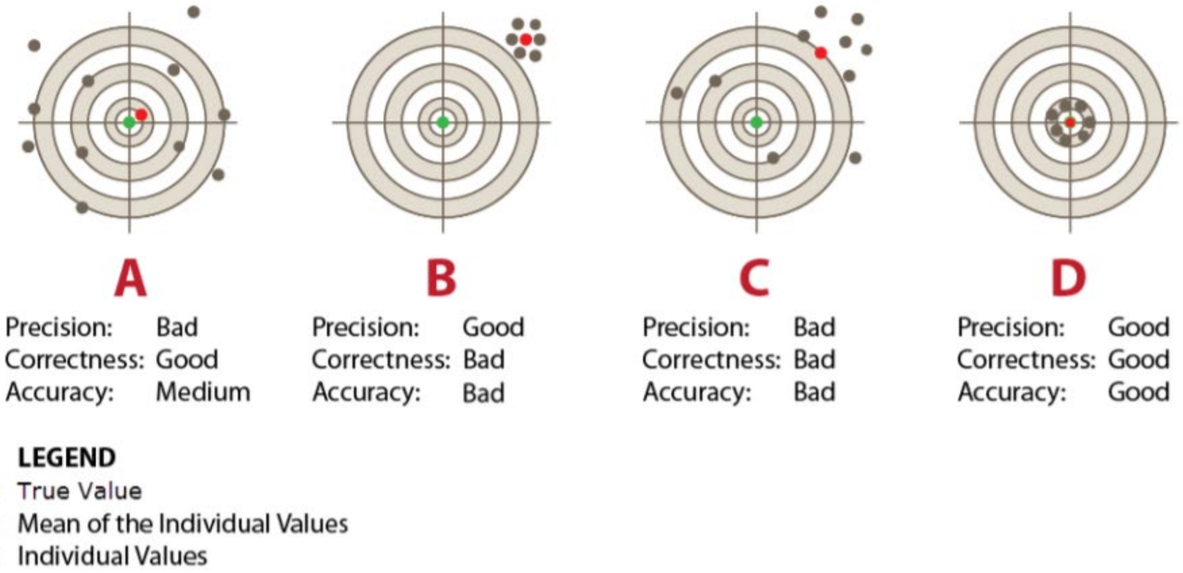
Non-Geometric Attributes

	Required LOD (Accuracy)	Non-geometric Attributes
Floors	Approximate geometry (>2”, Shape Size and Location)	Material
Roof	Approximate geometry (>2”, Shape Size and Location)	Material
Structural Framing	Approximate geometry (Shape Size and Location)	Material
Mechanical Equipment's	Approximate geometry (Shape Size and Location)	Manufacture / Capacity
Electrical Equipment's	Approximate geometry (Shape Size and Location)	Manufacture / Capacity
Pipes	Approximate geometry (Shape Size and Location)	Material
Pipe Accessories	Approximate geometry (Shape Size and Location)	Material
Pipe Fittings	Approximate geometry (Shape Size and Location)	Material
Walls (Masonry/Concrete)	Approximate geometry (Shape Size and Location)	Fire rating / Material
Doors & Windows	Approximate geometry (Shape Size and Location)	Type / Material / Swing Directions
Openings	Approximate geometry (Shape Size and Location)	Type

Level of Accuracy (LOA)

USIBD U.S. Institute of BUILDING DOCUMENTATION

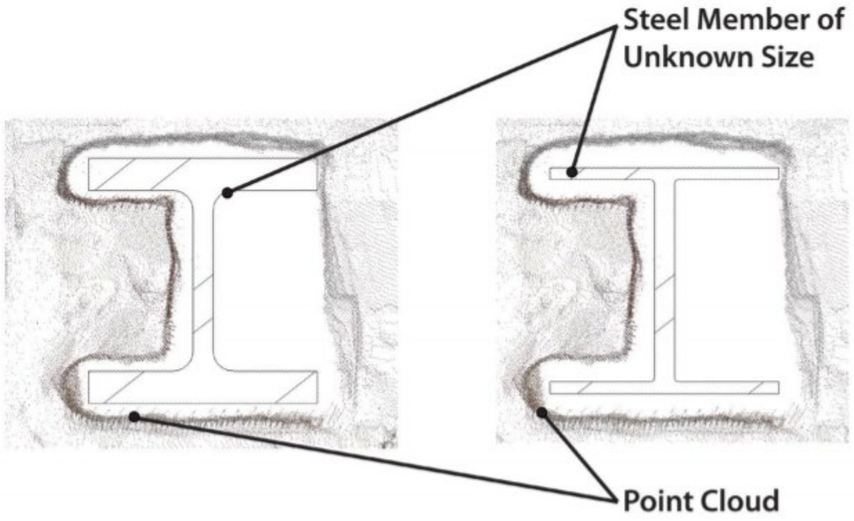
Precision and Correctness

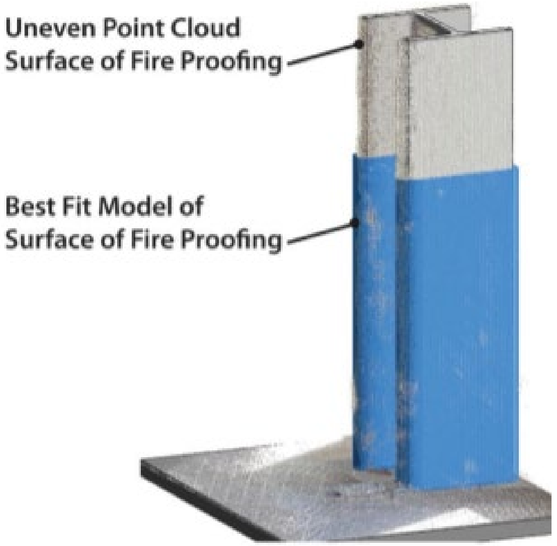


	Level Of Accuracy				
Upper Range (Imperial)	-	2"	5/8"	1/4"	1/16"
Lower Range (Imperial)	2"	5/8"	1/4"	1/16"	0
Upper Range (Metric)	-	5cm	15mm	5mm	1mm
Lower Range (Metric)	5cm	15mm	5mm	1mm	0
	LOA10	LOA20	LOA30	LOA40	LOA50

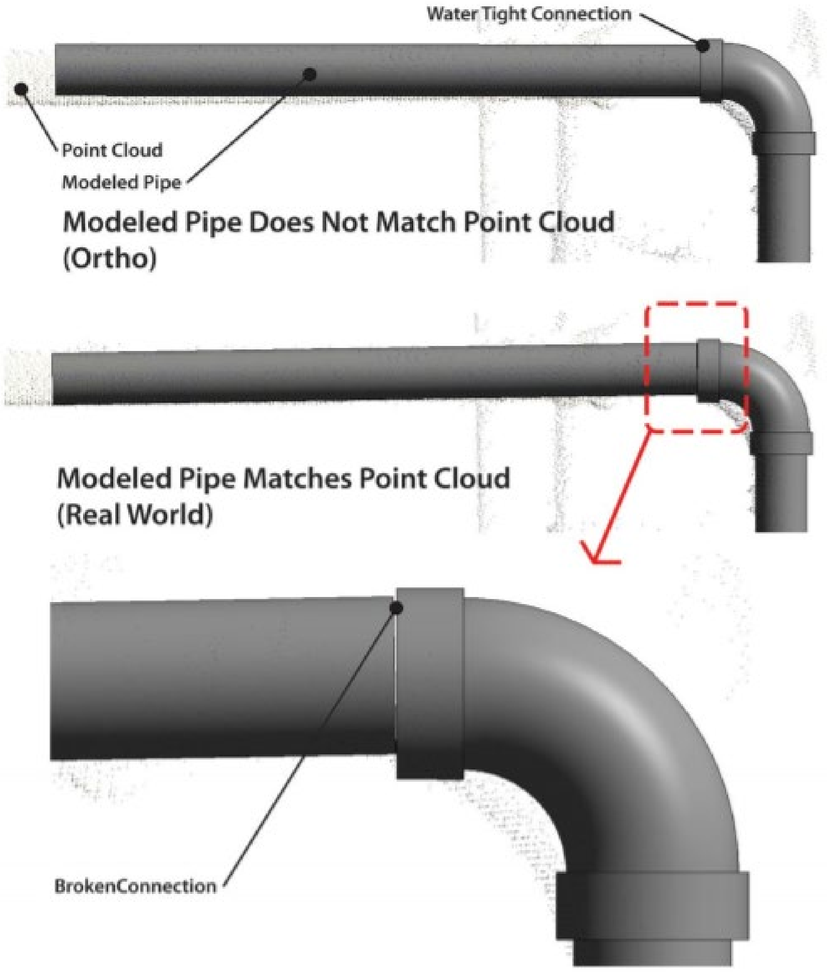
Level of Accuracy (LOA) is a scale developed by USIBD for setting the accuracy of data gathering and for elements modeled based off of gathered data. For example, a laser scan could be done to meet LOA 20, and the elements modeled off of it could meet LOA 30.

Concealed Conditions & Best Fit





Orthogonal vs. Real World



Document before and after modeling

FW: Buffalo pound

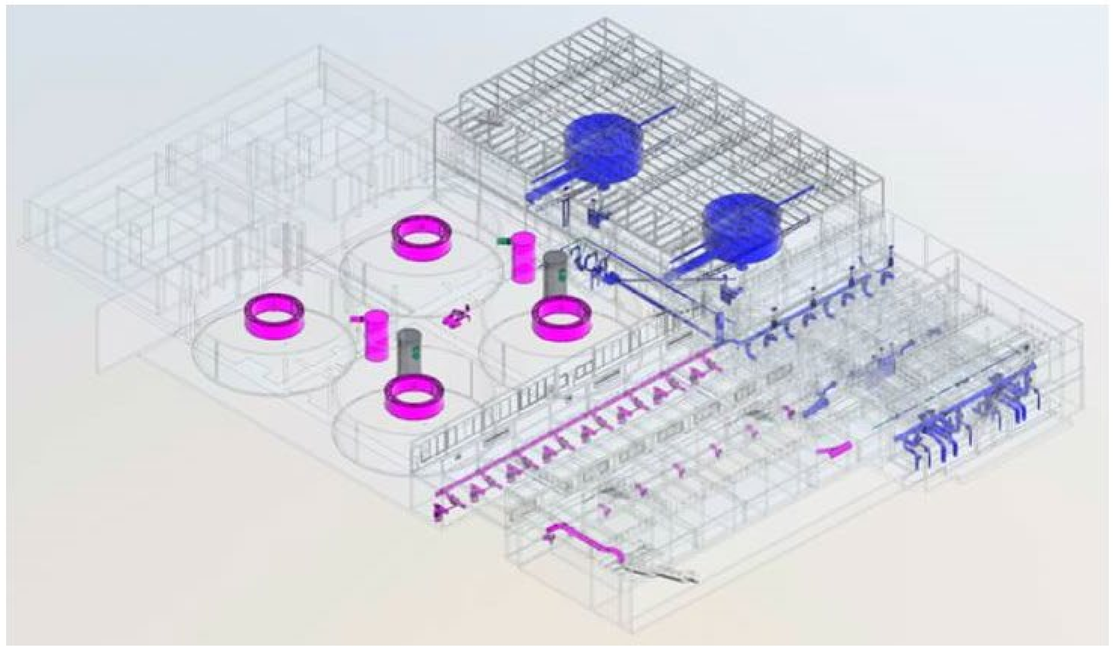
Bhat, Raghavendra
To [redacted]
Cc [redacted]

Retention Policy Full Mailbox - Never Delete (Never) Expires Never

[redacted]

Also, because we have the model partially developed based on as-builts and partially by scans we have added a comment on every element to differentiate them.

	Model developed based on Scans
	Model developed based on As-Builts



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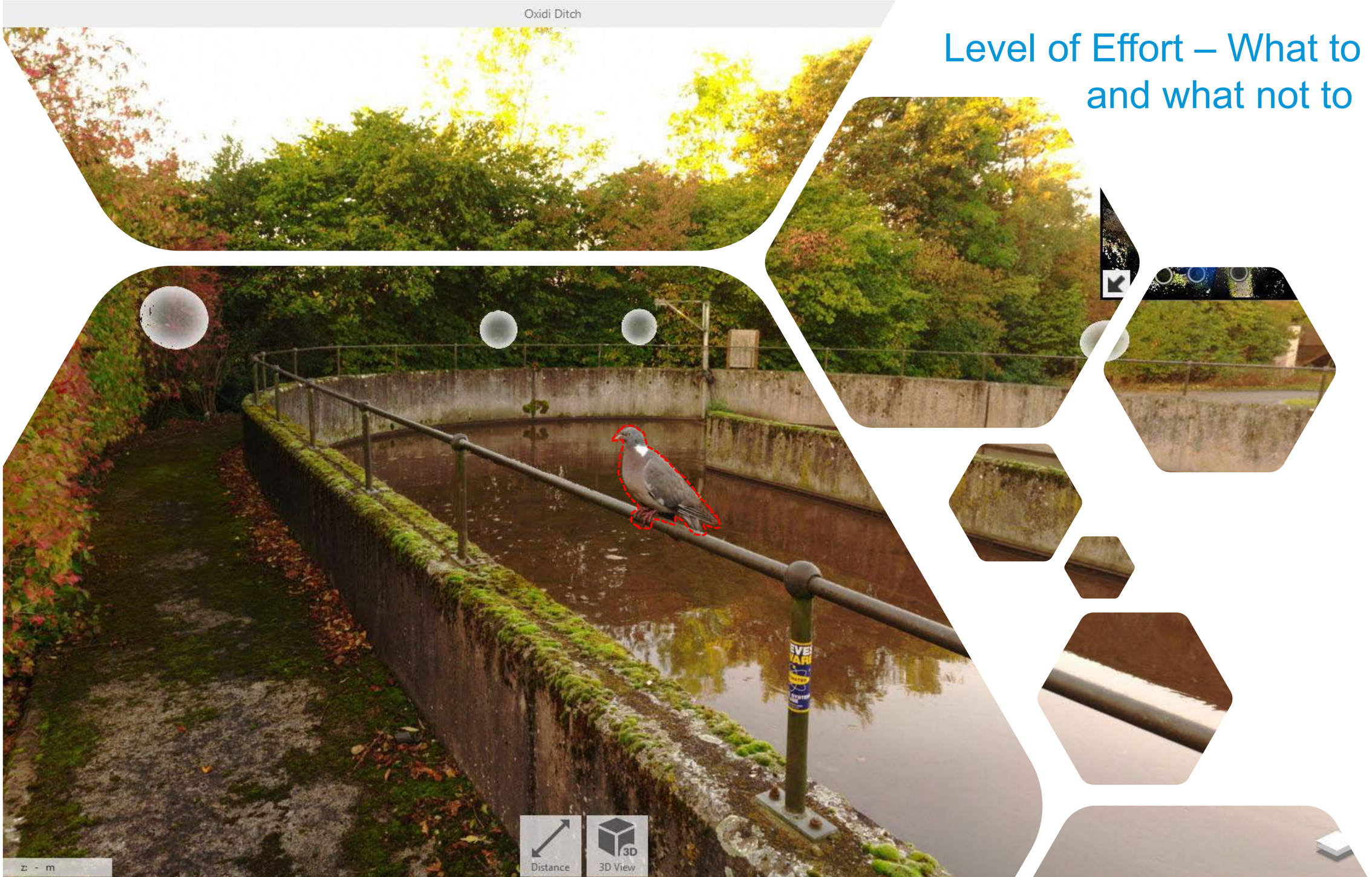
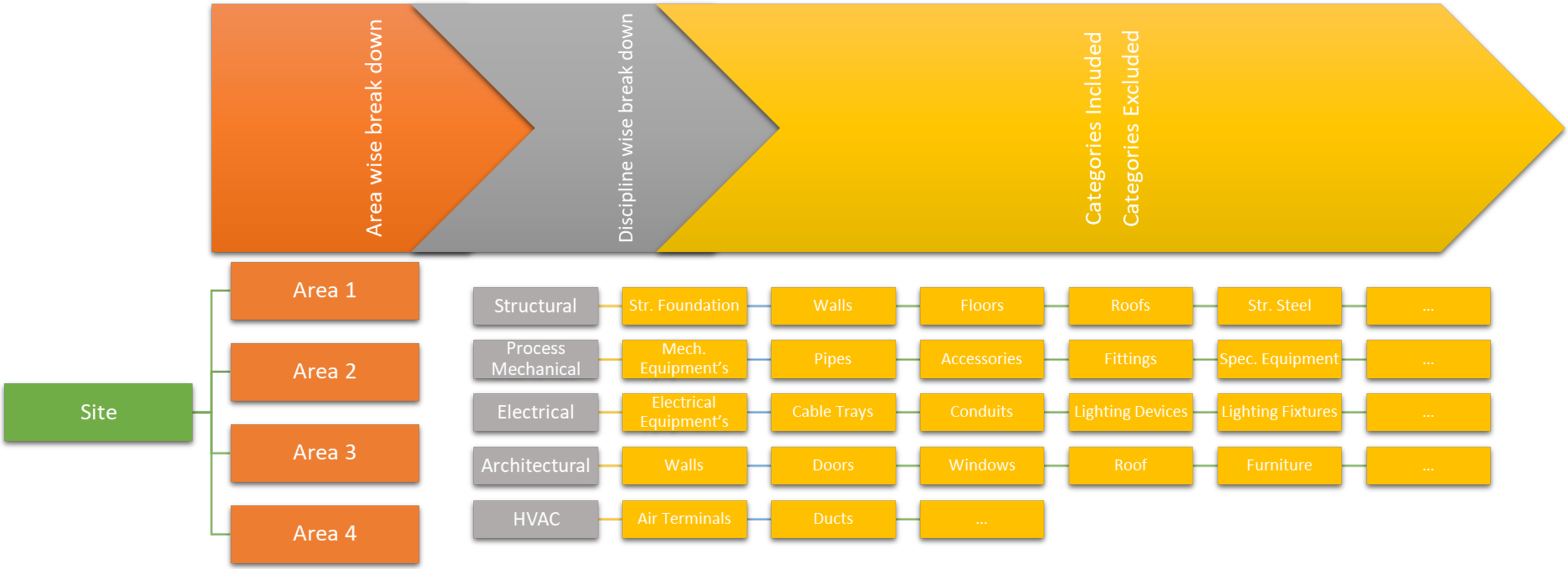
Thank you!

Raghavendra Bhat
BIM Leader

Level of Effort – What to include and what not to



Determine - Level of Effort (LOE)



Level of Effort Estimate		
Areas	Budget	
	Process	Civil/Structural
Model Setup		
• Existing building and tanks		
• Existing storm tanks		
• Existing chemical dosing plant		
• Existing pumping station (including internal elements)		
• Existing inlet and flow control area		
• Existing PST's (4 Nos)		
• Existing tertiary plant		
• Tertiary pump station		
• Tertiary pump station inlet channel		
• Terrain (excluding below ground services)		
Model Coordination		
Total		

Inclusions

- Steel Elements – steel columns, framing and bracing members (in AOI) – LOD200
- Concrete Elements – Concrete walls, Floors, Framings, Corbel, Bund Walls (in AOI) – LOD200
- Pipes & Fittings – pipework, pipe fittings, accessories, major supports (in AOI) - LOD200-250
- Pipes with Dia 150 and larger. (If needed in AOI will need to discuss and make provision)
- Cable Trays – outline of cable tray (in AOI) - LOD150/200
- Electrical Elements – PVC pipes, switches, lights, devices (in AOI) - LOD150/200

Exclusion

- Temporary elements will not be added
- Pipes in AOI will be added based on point cloud data. Default pipes and fittings will be used for modeling. Pipe material will not specified in model.
- Pipe dia will be considered based on scans. Pipe insulation/cover will not be considered.
- Default cable trays will be added, we may not have exact shape of cable trays in model.
- Steel connections (bolts, gusset plate) will not added.
- Sizes for steel columns, beams and bracings will be assumed to match with scans.
- Concrete curbs along roads will not be included.
- Below ground utilities will not be picked up.

Sample

Identifying Risks

- Verify if the coordinates are appropriate
- Verify if RGB values have been registered.
- Verify if the panoramic spears appear in Recap.
- Verify if As-builts are available.
- Verify the total size of scans & format in which it will be available.
- Verify the output format and the tools that will be used, agree on the workflow.
- Verify the Common Data Environment (CDE).
- Verify project schedule.
- Verify the Priority Areas.
- Estimation based on As-built scan PDF.

Identifying Tools

Standardized Workflows – For Easy Implementation

Reality Capture ⇨ **Reality Computing** ⇨ **3D Model Converting** ⇨ **Design Production**

Equipment to Capture Data

Point Cloud

Laser Scanner

.FLS
.E57

Supporting Registration

Software & Steps to Process Data

ReCap Pro (ReCap 360 Pro)

- Registration
- Indexing for Import to Revit
- Measuring Features
- Publish to Web for Clients

.RCS
.RCP

Convert to 3D Editable Models

Edgewise (requires .FLS or .E57)

InfraWorks 360
(Point Cloud Terrain & Modeling)

Integrate with BIM Platforms

Revit (As-Built Model)

Export as i-Model / idgn

AECOsim / MicroStation

Navisworks (Clash Review)

InfraWorks (Site Model)

Convert to HD 3D Mesh Models

Photogrammetry

Drone

RAW images

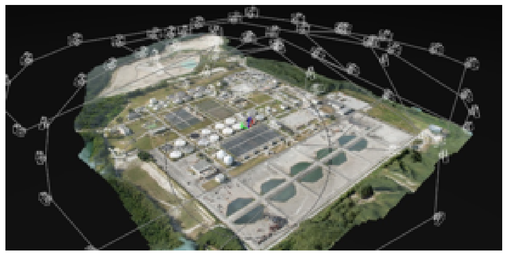
ReCap Pro (ReCap 360 Pro)

Acute 3D (ContextCapture)

Pix4D

Process/Stitch the Images to Cloud

ReCap Photo (ReMake/Memento)



Visualization Purpose

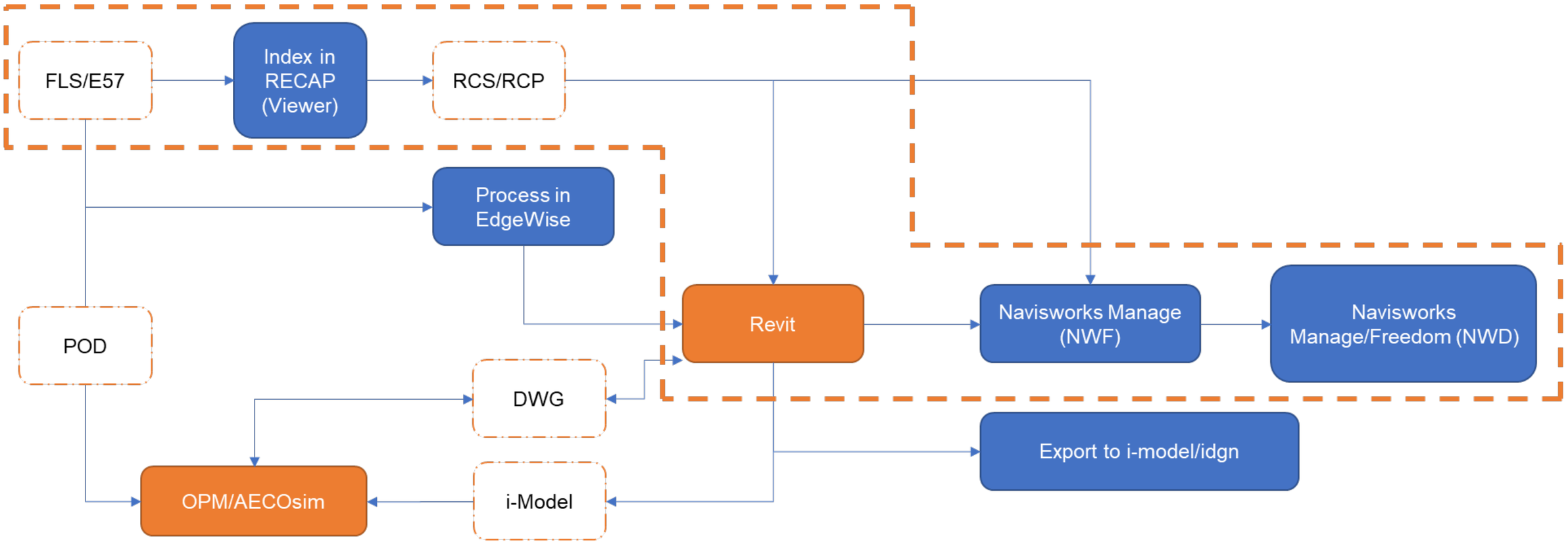
Images & Videos

AR/VR Publishing (.FBX + Unity/Unreal)

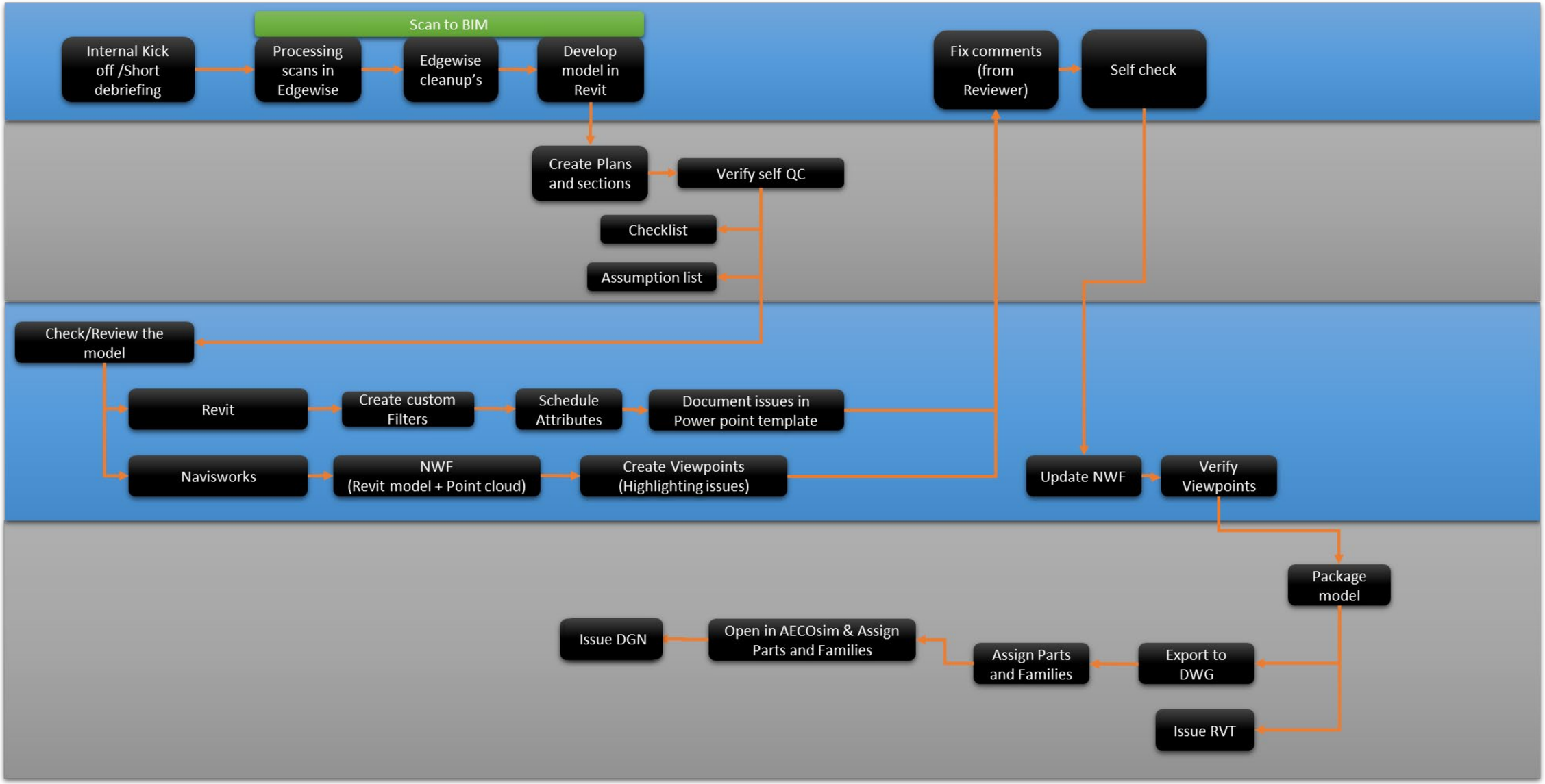
3D Printing (.STL + MeshMixer)

CNC Support (.OBJ + Fusion 360)

Standardized Workflows – For Easy Implementation



Customized Workflows – For Each Project

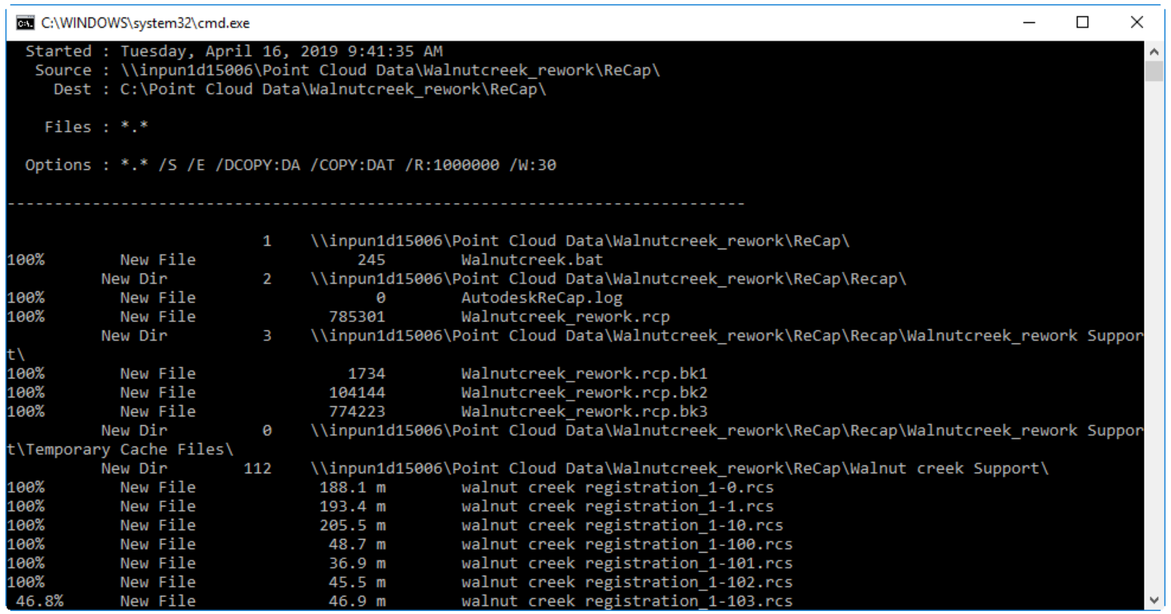


Automation to Copy Large Sets of Data

Sample.bat - Notepad

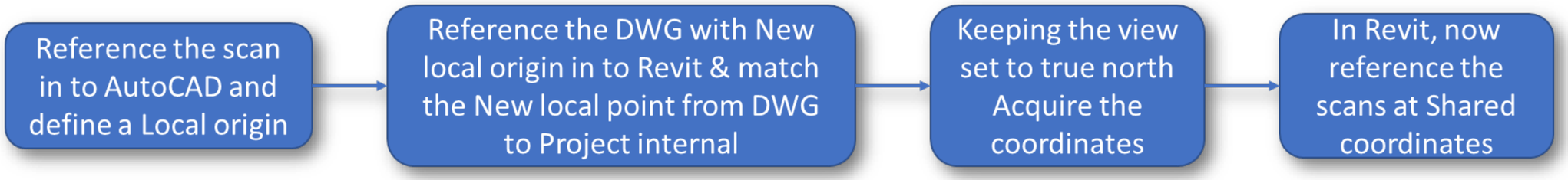
File Edit Format View Help

```
@echo off

SET Source="\\Source folder path"
SET Destination="C:\Local folder path"

IF NOT EXIST %Destination% md %Destination%

robocopy  %Source% %Destination% /E
PAUSE
```



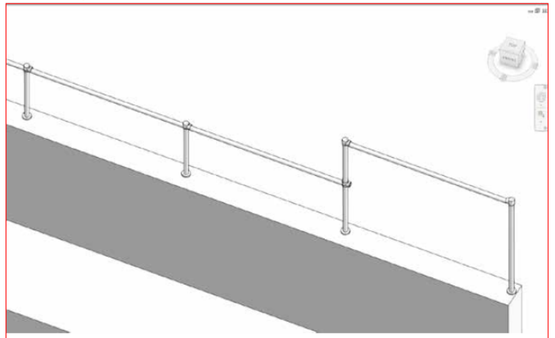
Model Setup (Guideline)

- Always use the point cloud scan coordinates to setup the shared coordinates in Revit – in that way it will help align your model to it when exported to world coordinate.
- Have an independent Revit model with scans loaded into it. Beneficial when there are more than one discipline working on independent As-built Revit models.



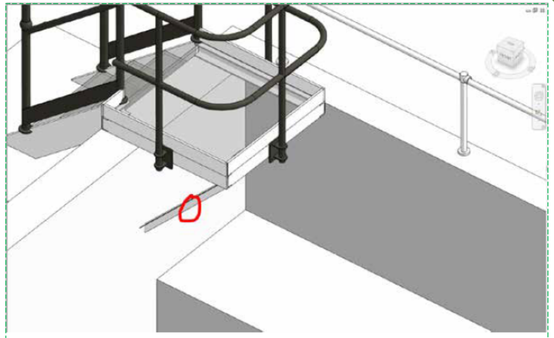
Document the Discrepancies / Assumptions

Assumptions



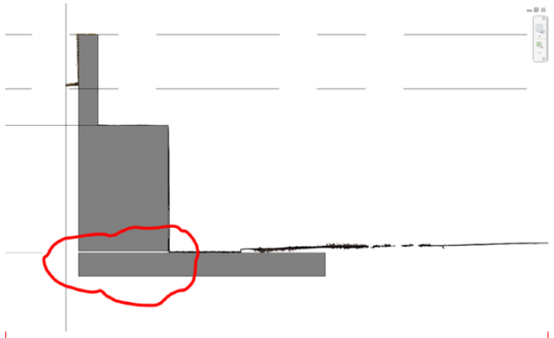
Railing types are used from OTB library. We have matched post locations to scans and post type is shown identical.

Assumptions



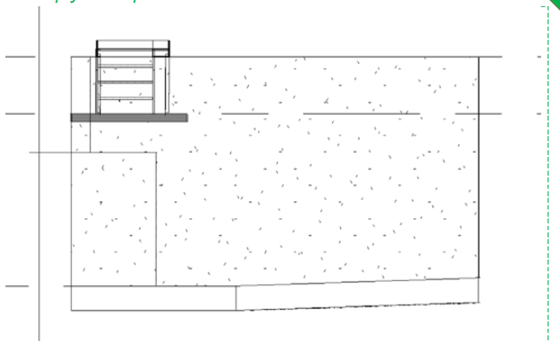
Default railing type is used which might not match with existing condition.

Reviewer observation



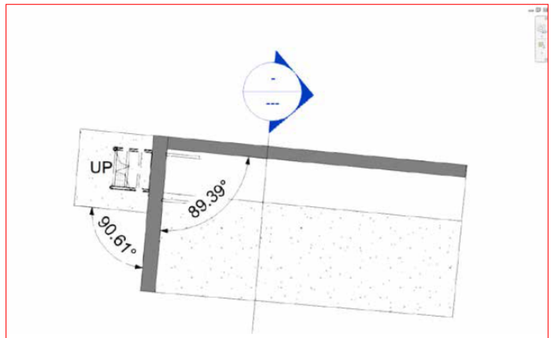
Remove this gap, attach bottom of the wall to top of slab.

Snap from updated model



Gap is removed and slope in bottom slab is incorporated.

Reviewer observation



Make corner of walls with 90 degree.

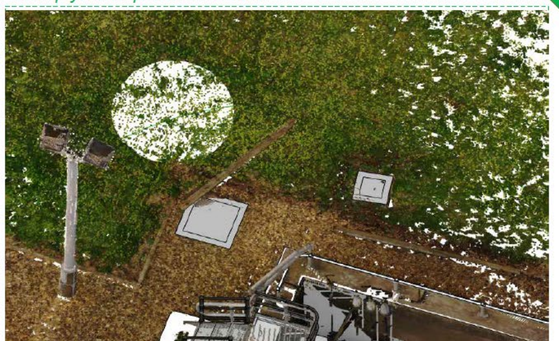
Snap from updated model

Update model as per comments.

Reviewer observation

Add this chamber, you can assume depth.

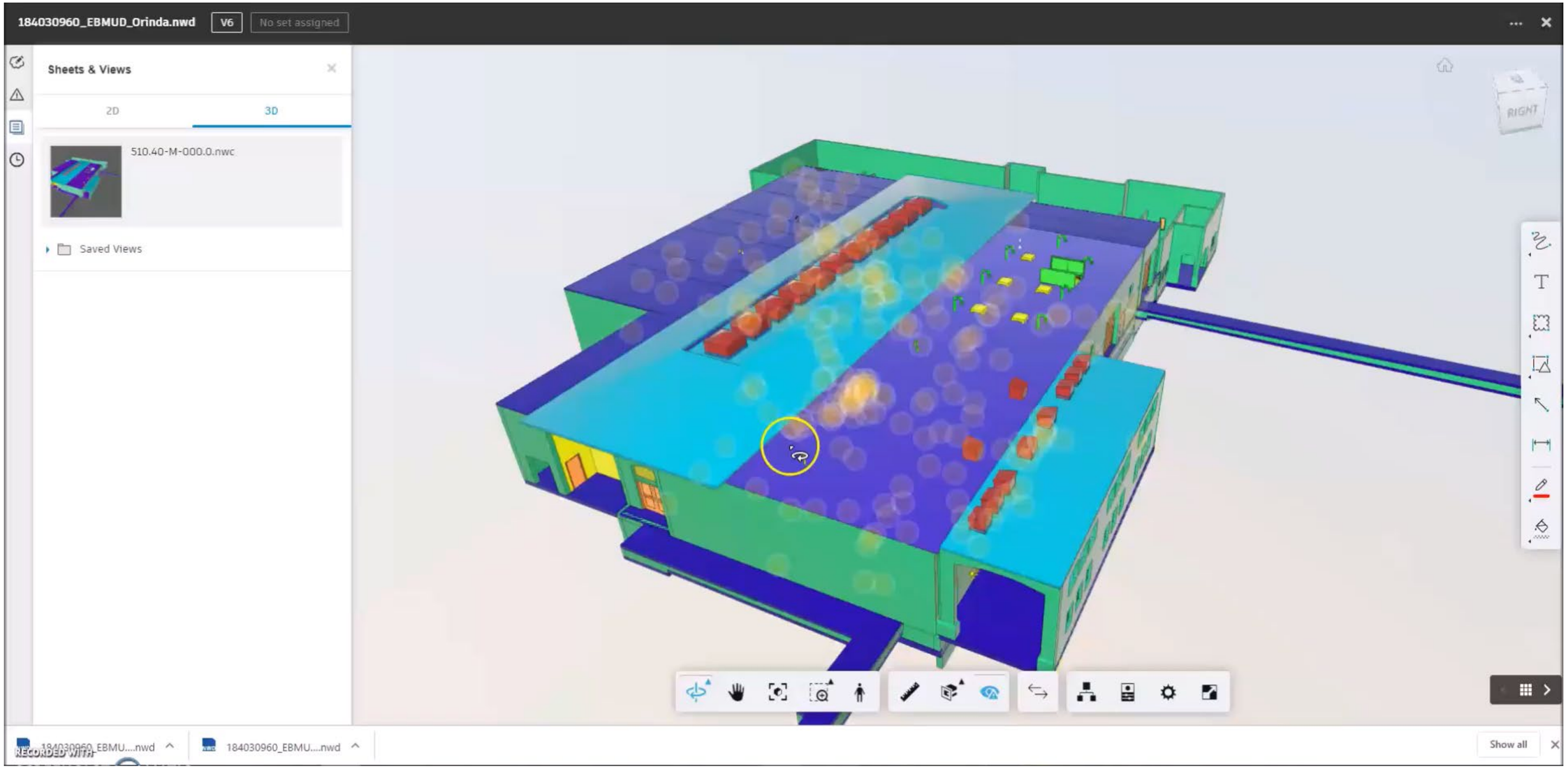
Snap from updated model



Location of chambers traced from scans. We are not sure what will be the depth of these chambers, hence depth is assumed.

"Perfect 90 degree angles do not exist."

Progressive Review using BIM 360



Quality Control (QC)

Checklist for Scan to BIM team – Structural and Architectural

- [ ] Verify if, correct levels/Grids established & appropriately named in model?
- [ ] Verify if, all wall corners are aligned at 90 degree (typically)
- [ ] Verify if, All internal dimensions have a round off values? (should be in multiples of 25mm, avoid decimals)
- [ ] Verify if, walls are positioned parallel ?
- [ ] Verify if, appropriate material are assigned to elements? (Need to use OTB textures, if using new textures need to make sure you inform everyone in the project, esp. who are working with the models)
- [ ] Is there are any in-place elements added in model, verify to have correct category and material assigned to these?
- [ ] Verify if all as-built elements modelled are in existing phase? (use default phasing do not create new phases unless instructed)
- [ ] Verify if, all elements are placed in right category? (specifically for mechanical, electrical Equipment's, specialty equipment's)
- [ ] Is there view created in project browser for Navisworks export/Glue export? If Yes then verify below points
  - [ ] Turn off all annotation categories from visibility settings.
  - [ ] Turn off all analytical categories from visibility settings.
  - [ ] Turn off all imported categories if not required.
  - [ ] Turn off unwanted Revit links if not required to export
  - [ ] Switch off building pads, Mass, project base point, survey point and line category from visibility graphics.
  - [ ] Set correct phase and phase filter for views from property pallet.
  - [ ] Set correct detail level (Fine view) and part visibility (if used divide parts to show construction joint or precast wall panels)
  - [ ] Lock view orientation and turn off section box, uncheck crop/crop box option from property pallet if not required.
  - [ ] Is required view exported by Shared coordinates?
  - [ ] If view exported in any format, open it and check everything looks ok then publish to glue
  - [ ]
- [ ] Link all Revit or CAD files from same common data environment

Checklist for Scan to BIM team – Process mechanical/HVAC

- [ ] Are all Grids/Levels copied (copy monitored) from origin model?
- [ ] Is origin model is attached for reference as shared coordinates? (Link reference models from common data environment)
- [ ] Are all elements are covered based on SOW?
- [ ] Are all elements modelled with correct LOD?
- [ ] Are all pipe fittings and accessories hosted with pipes and connected with pipe systems?
- [ ] Are all equipment families added in right category? (like pumps, mechanical equipment, electrical equipment, specialty equipment etc..)
- [ ] Are all pipes/cable trays parallel to the structural walls/elements?
- [ ] Is there pipe penetrations provided in structural model? (will be depends on LOD requirement)
- [ ] Refer above listed points for view setup and common checks (shown in RED)

Initial Checklist at Kickoff

- [ ] Has the scan data copied/replicated with correct file size on replication server & includes all supporting files?
- [ ] Has the scan data registered RGB values?
- [ ] Does the scan data include the spears?
- [ ] Does the Scan have ghosting appearance where multiple areas overlap?
- [ ] Does the scans have the right world coordinates registered? Verify by referencing it into C3D? (verify with historical data if available)
- [ ] Verify who owns the Project/model setup?
- [ ] Verify if appropriate template has been used for project/model setup?
- [ ] Verify which version of the application is to be used for the defined project
- [ ] Verify if the coordinate shave been set in the base template?
- [ ] Verify you have reviewed the SOW document to read through the LOD requirements.
- [ ] Verify the CDE requirements.
- [ ] Verify if the SOW has the final deliverables formats specified, also need to have the workflow defined in the SOW document.
- [ ] Verify if the project has BIM 360 Glue project set up.

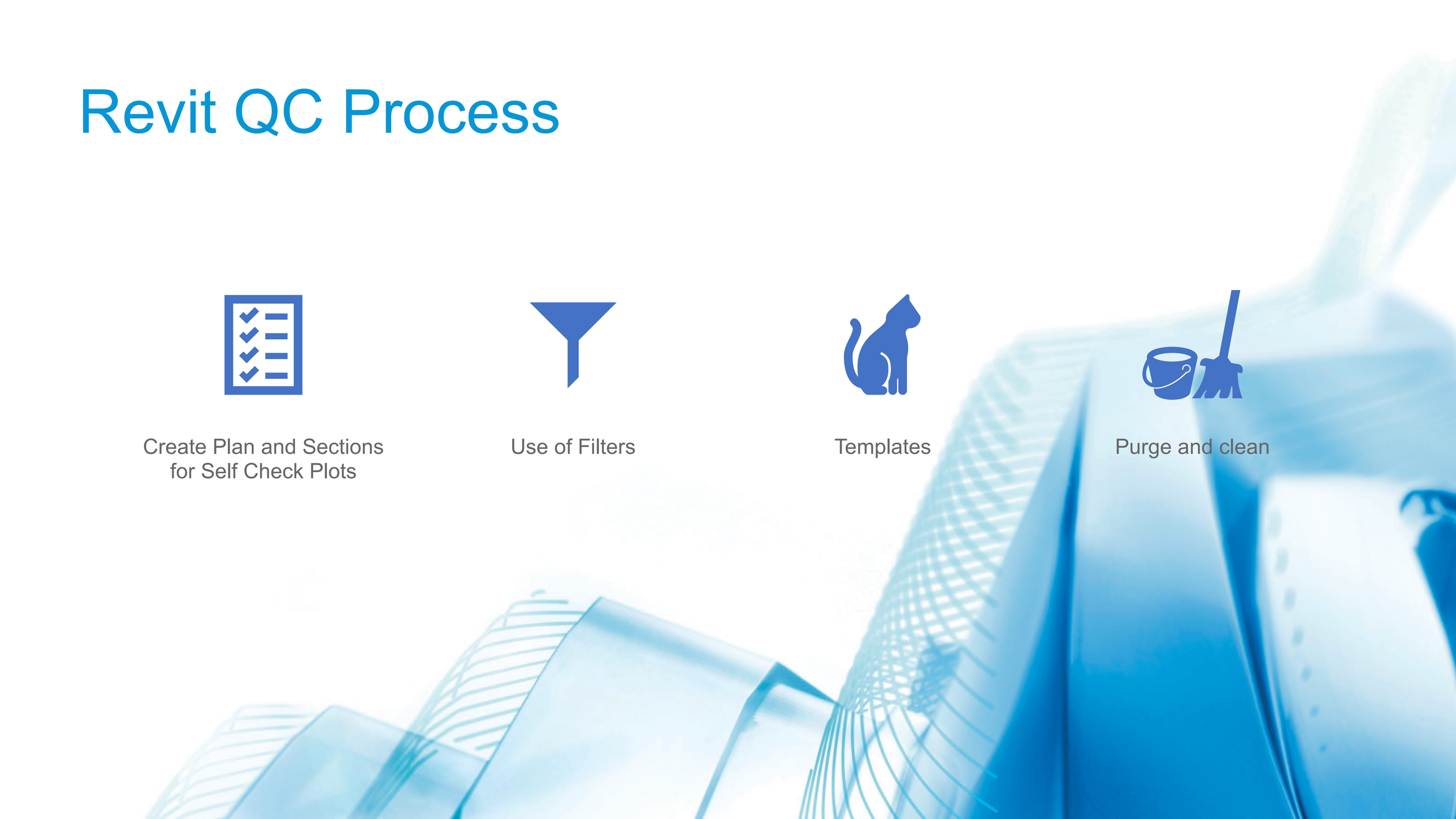
Revit QC Process

Create Plan and Sections for Self Check Plots

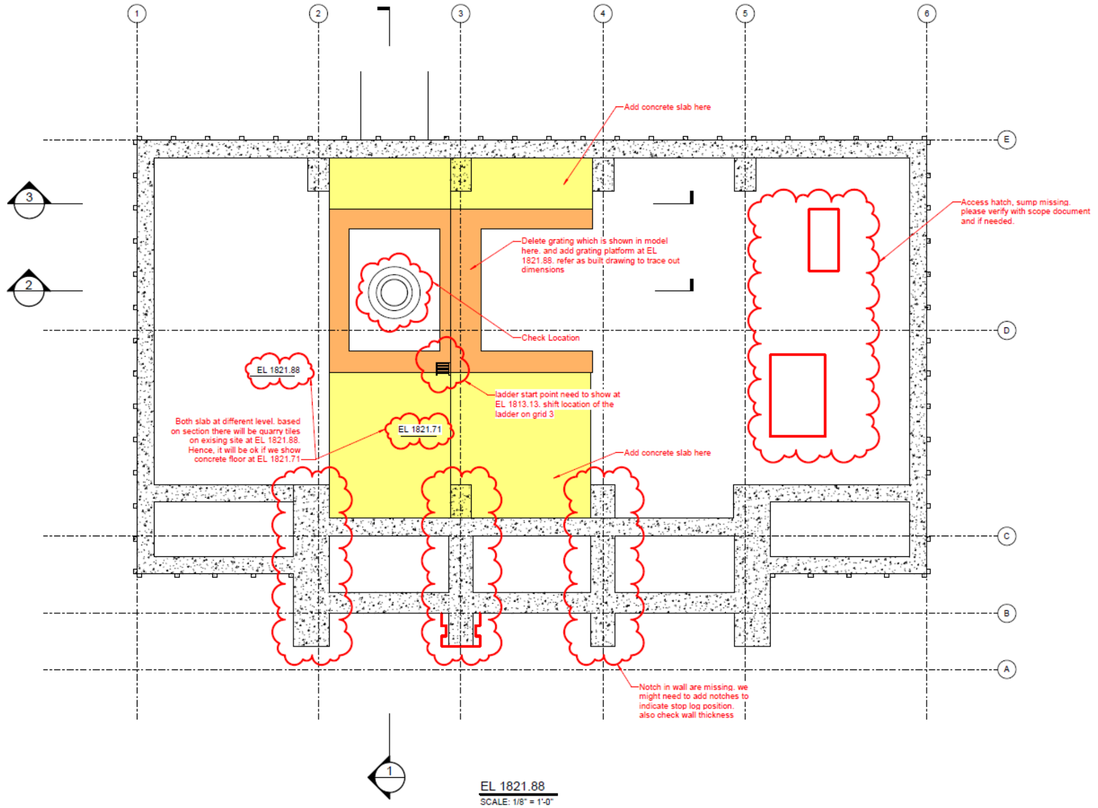
Use of Filters

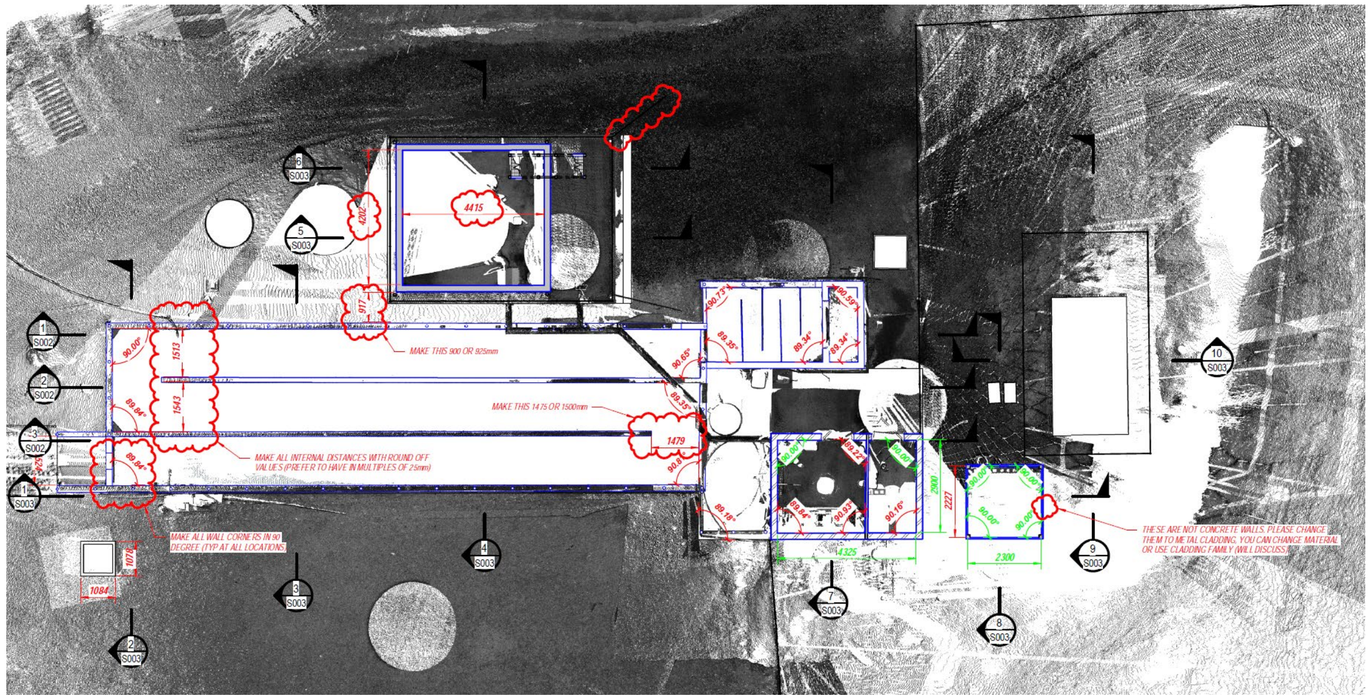
Templates

Purge and clean

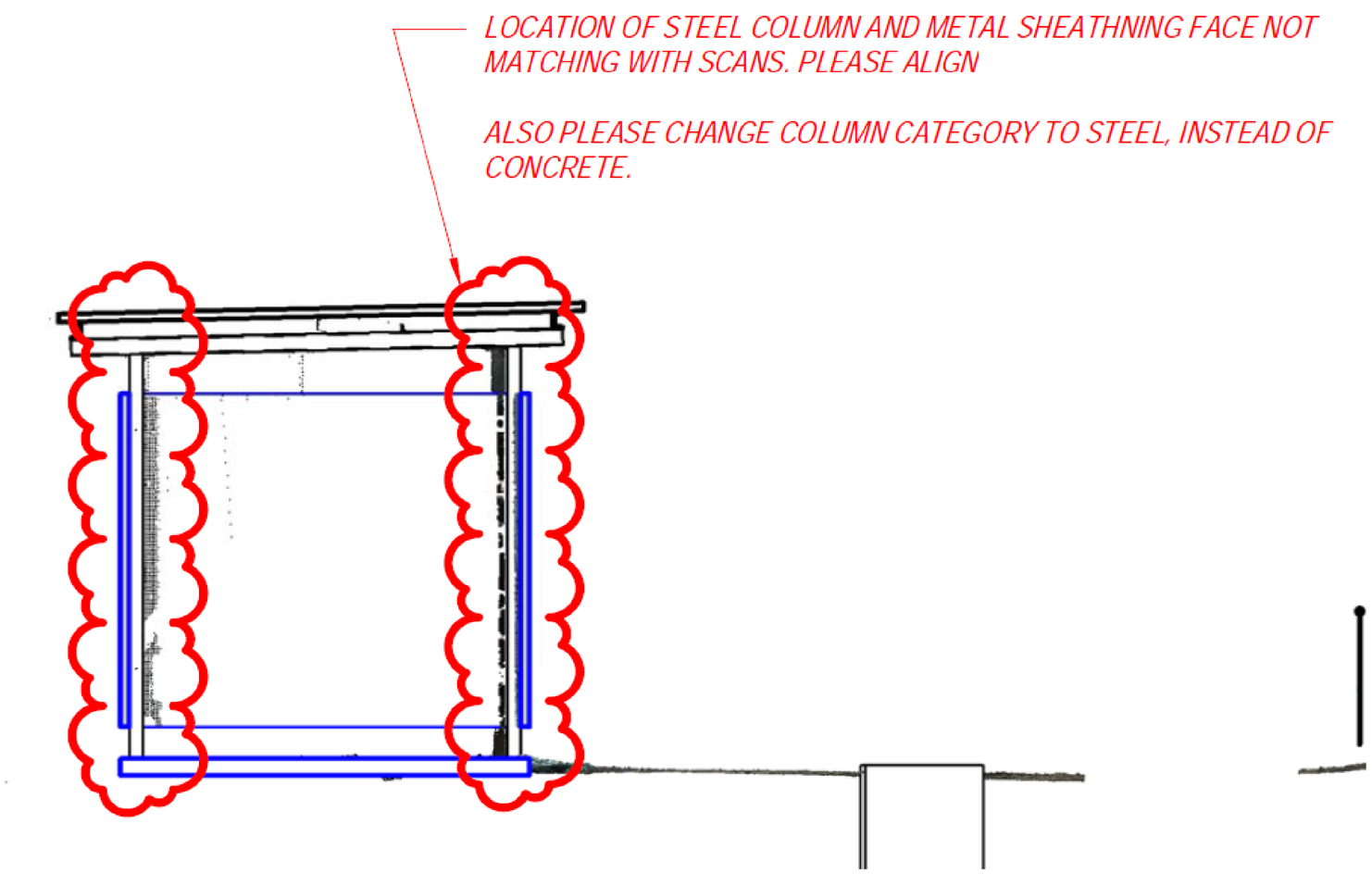


Revit QC Process – Plans and Sections for Self Check

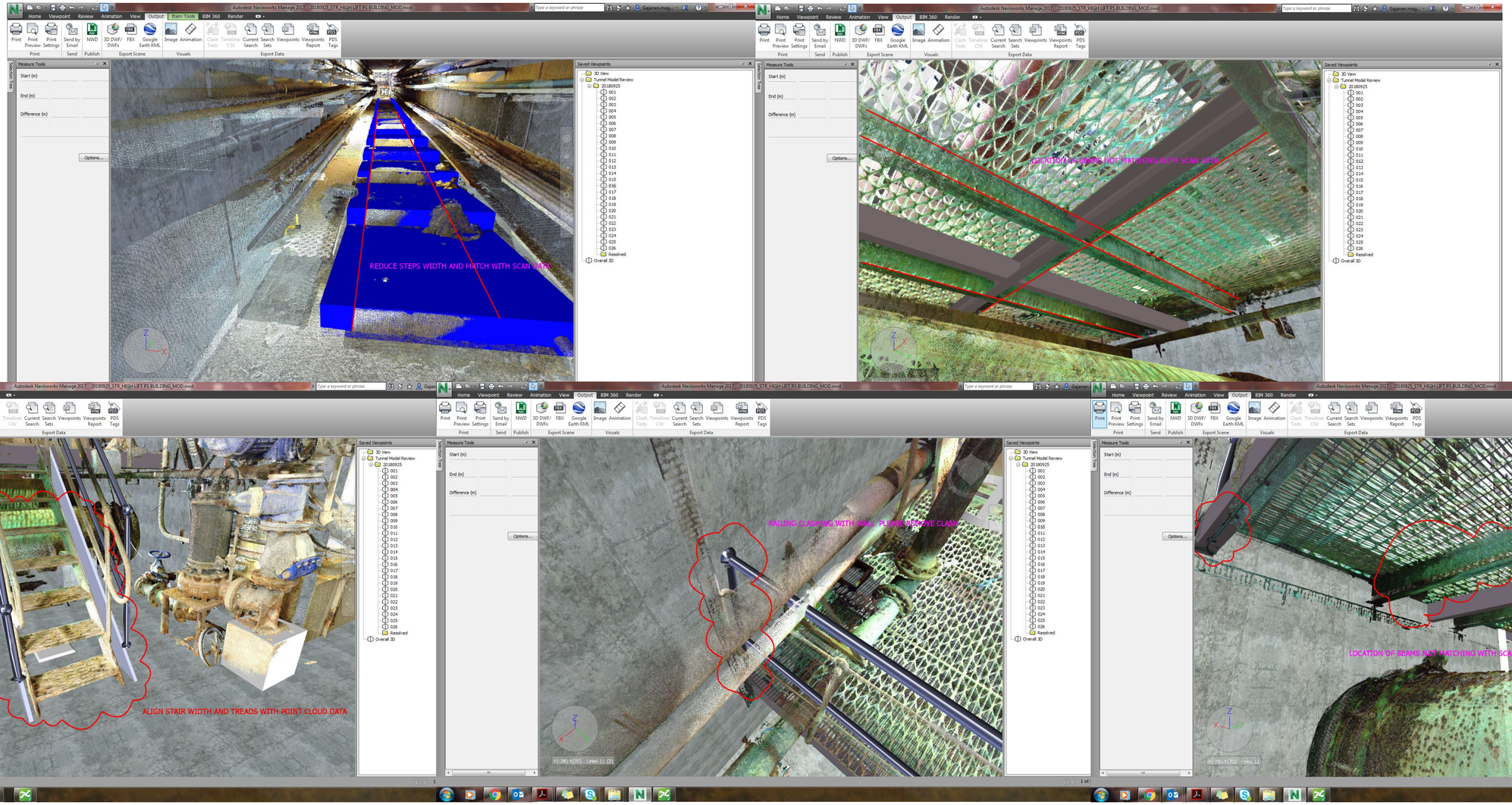




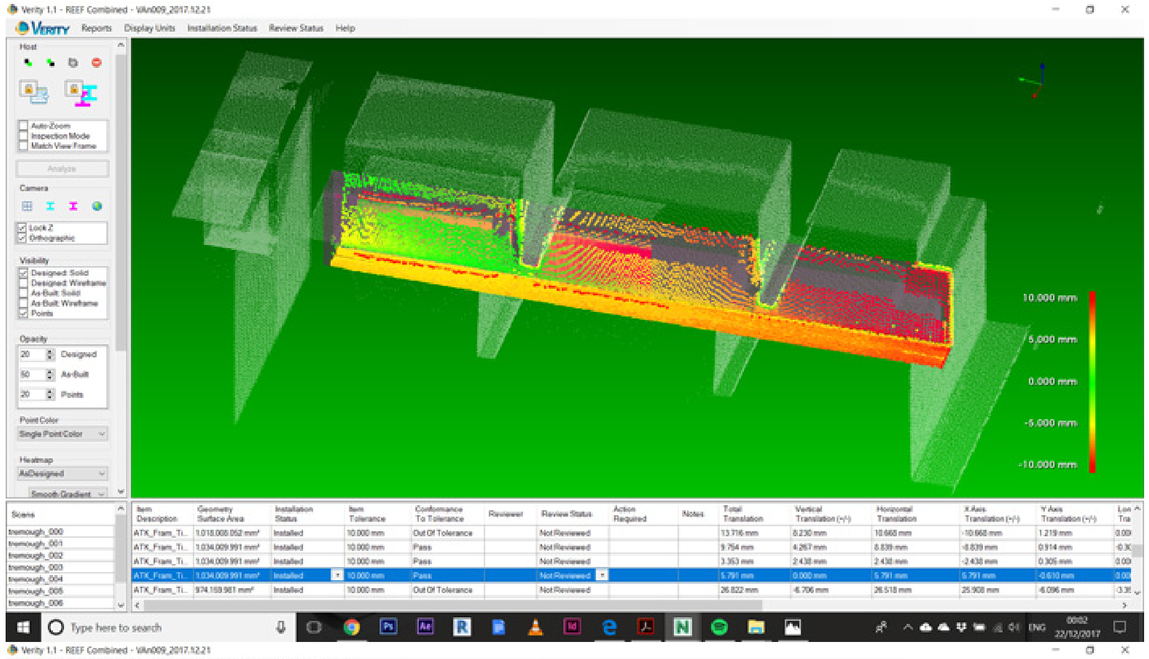
Revit QC Process – Use of Filters

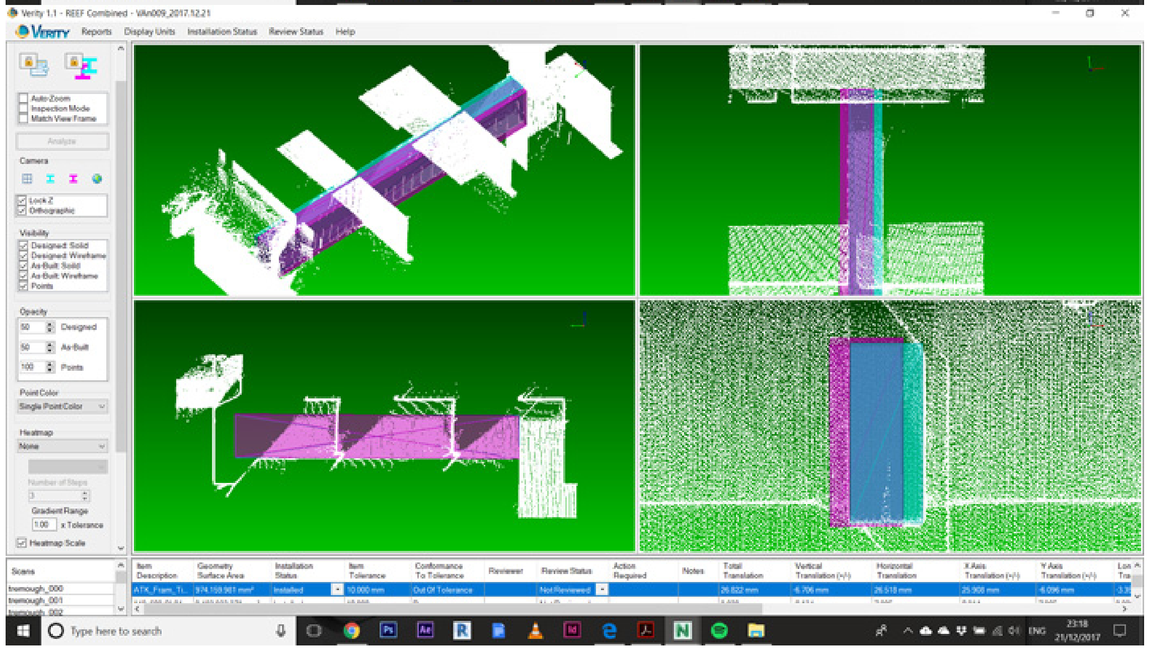


Navisworks QC Process



create saved viewpoints with organized folder structure





CSA

AIRSQUIRE

VERITY

Autodesk Revit 2017.2 - Project1 - Floor Plan: 1 - Mech

Type a keyword or phrase | Raghavendra

Architecture | Structure | Systems | Insert | Annotate | Analyze | Massing & Site | Collaborate | View | Manage | Add-Ins | Site Designer | BIM Interoperability Tools | Stantec | EdgeWise Import | BIM One | Fuzor Plugin | Autodesk Point Layout | Stantec Disciplines | Lu

Set up
- Coordinates
- Control Pts

Add Points
- Manual
- Room
- Wall
- Slab/Footing
- Face
- Model Line
- Ceiling
- Parts

MEP
- Conduit
- Pipe
- Hanger

Browse
- Zoom
- Duplicates

Family Tools
- Cleanup
- Extrusion Pts
- Point Nesting

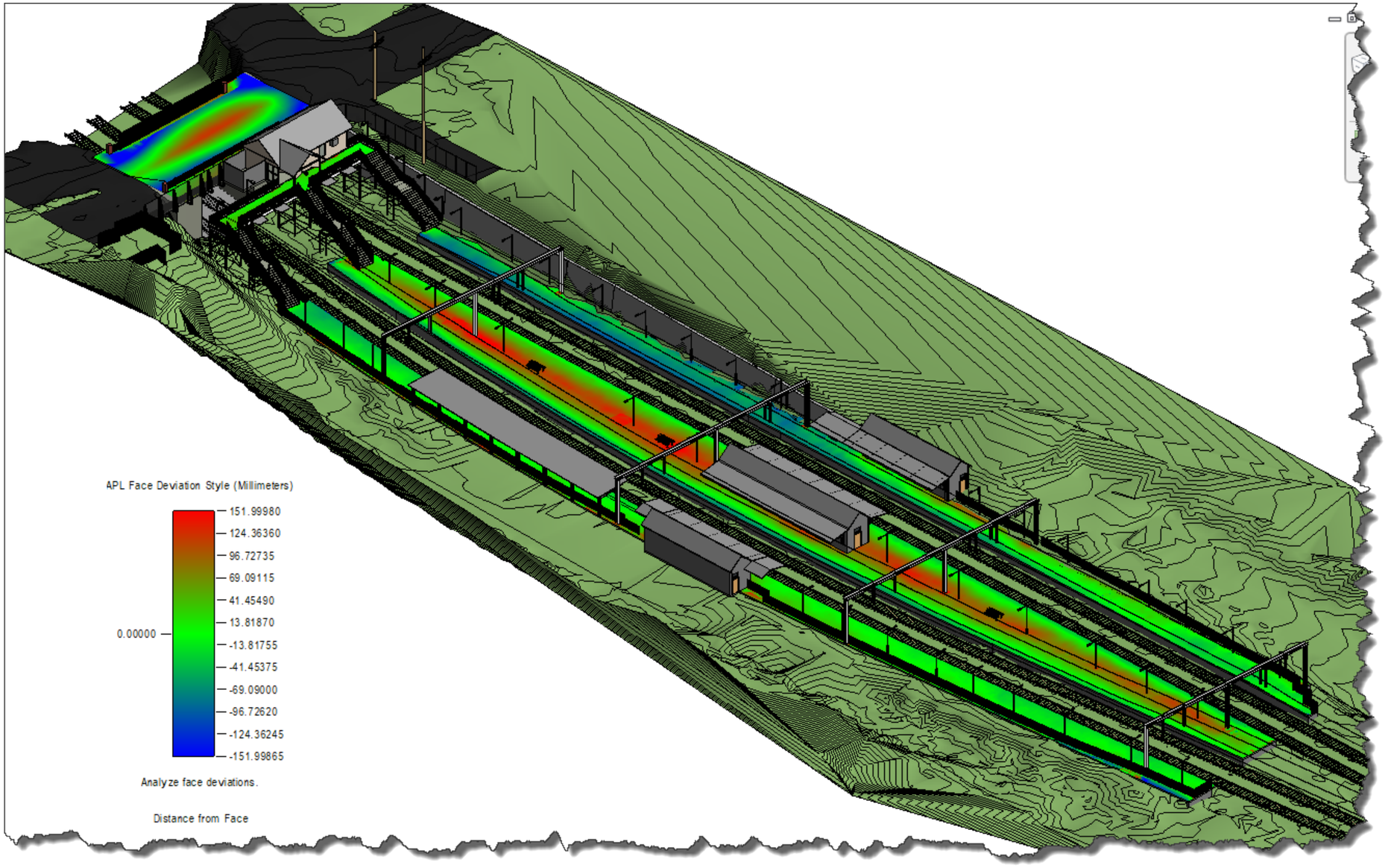
Coordinate
- Compare
- Import
- Export
- DXF/DWG

Customize
- 1→2 Renumber
- Find & Replace
- Add Tags
- Manage
- Modify
- Edit AutoMap
- Edit CodeMap
- Select

Analyze
- Slab Analysis
- Cloud Analysis
- Grid Offset Report
- Connect Pts

General
- Export Parameters
- Import Parameters
- Asymmetrical Walls
- Settings

Help
- Return License
- User Guide
- Product Info



Model Health Checkup

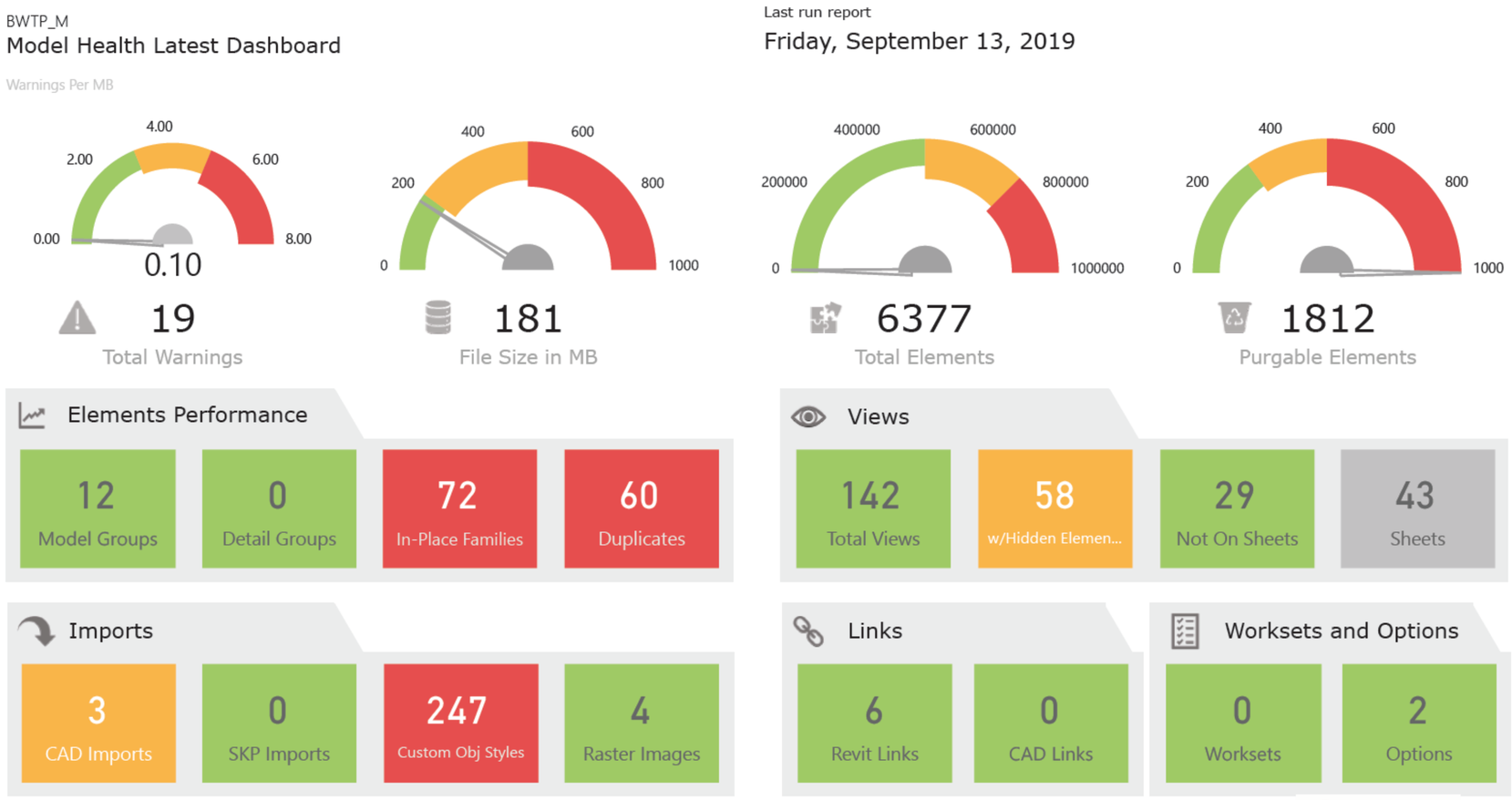
Credits: Autodesk BIM Interoperability Tools

Download and install the "Autodesk Model Checker"

→ Batch run the Checker in Revit

→ Export the report to an Excel file

→ Use the Microsoft PowerBI template, to read the results form the exported Excel and graphically display as below.



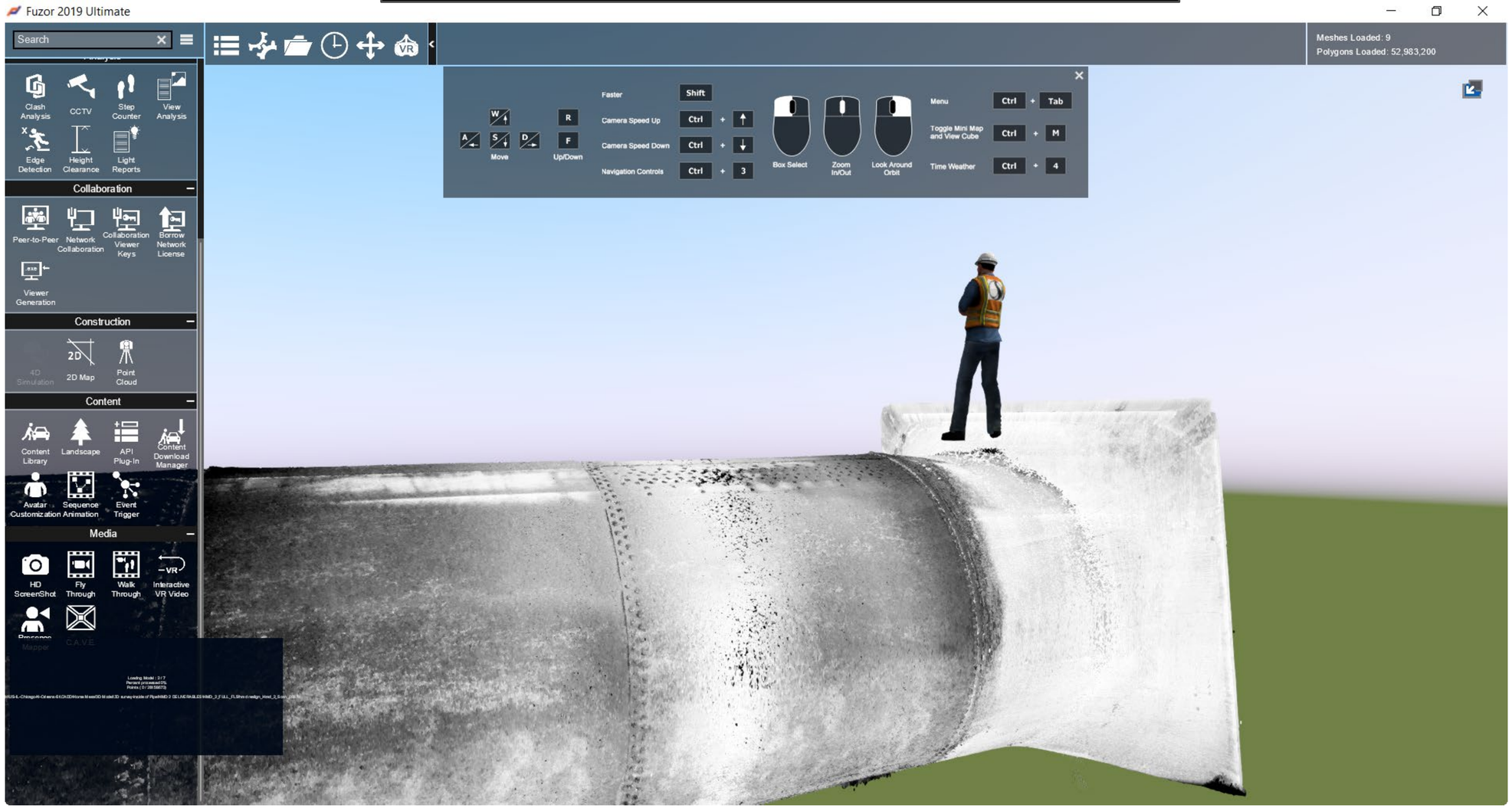
Stantec

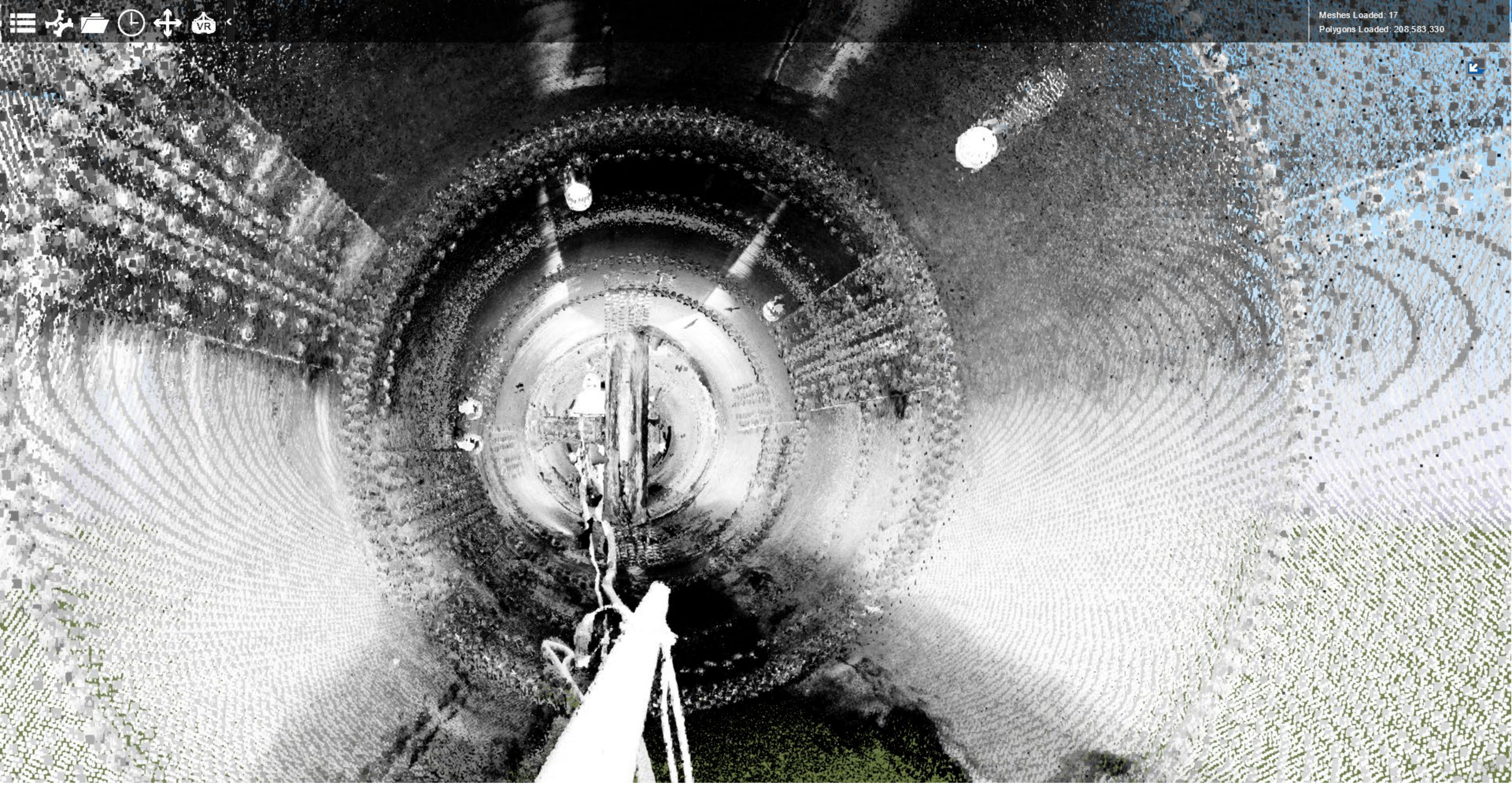
Integrating XR with Point Cloud

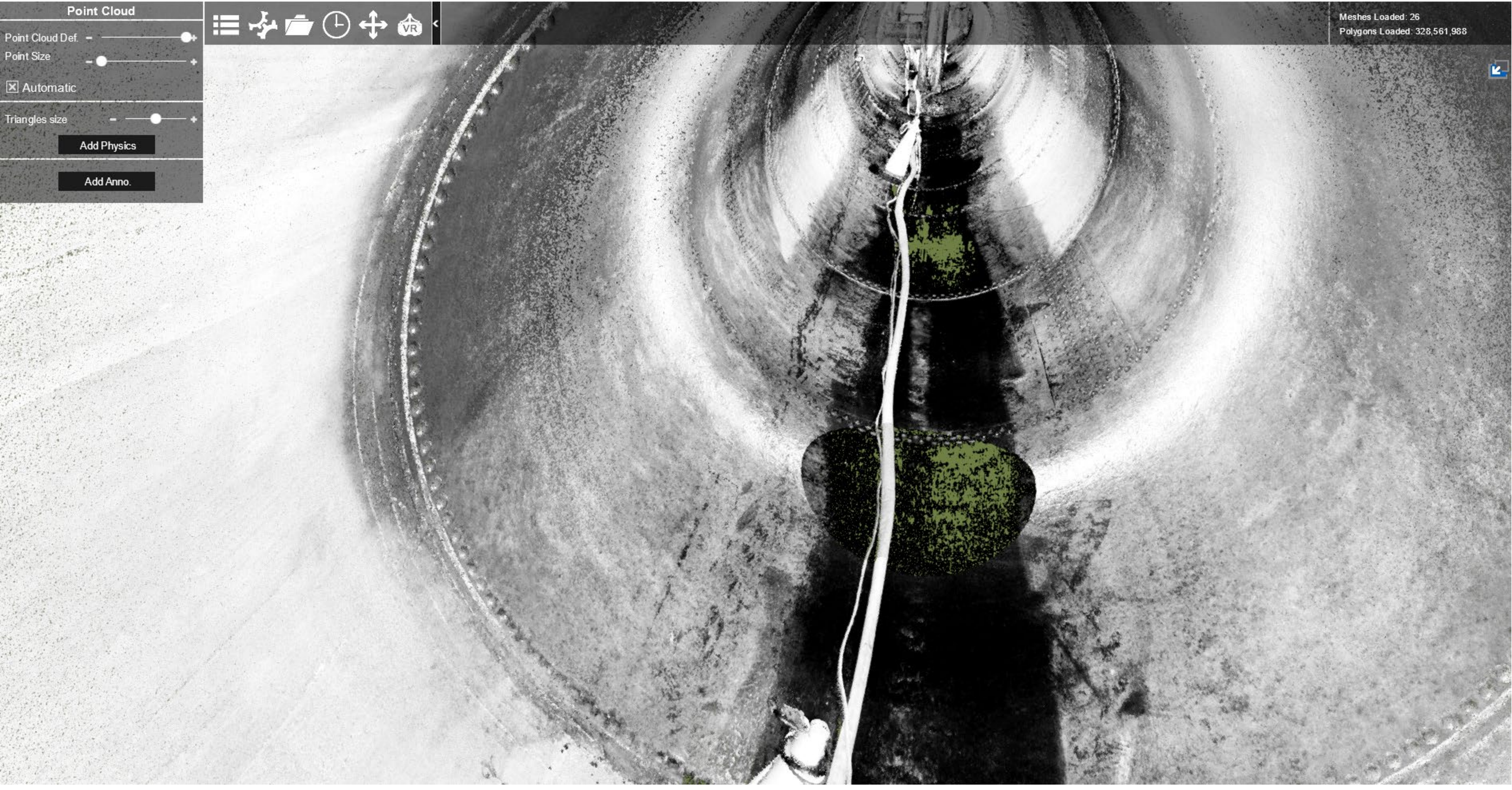
Stantec

Viewing Point Cloud from VR

(1) FLS or PTS > Fuzor > VR Headset

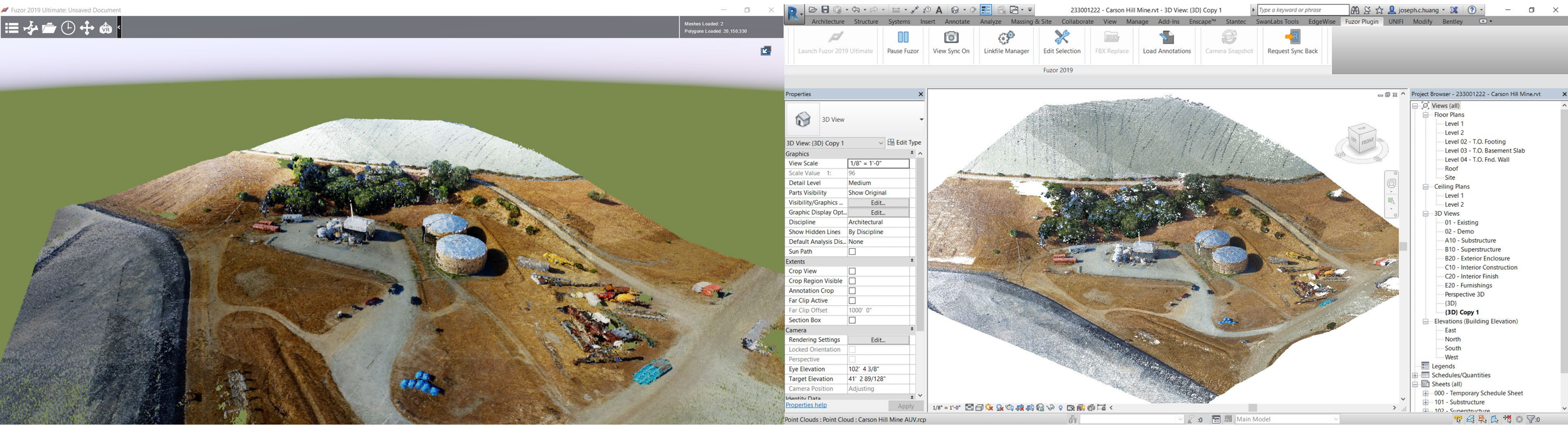



Meshes Loaded: 17
Polygons Loaded: 208,583,330

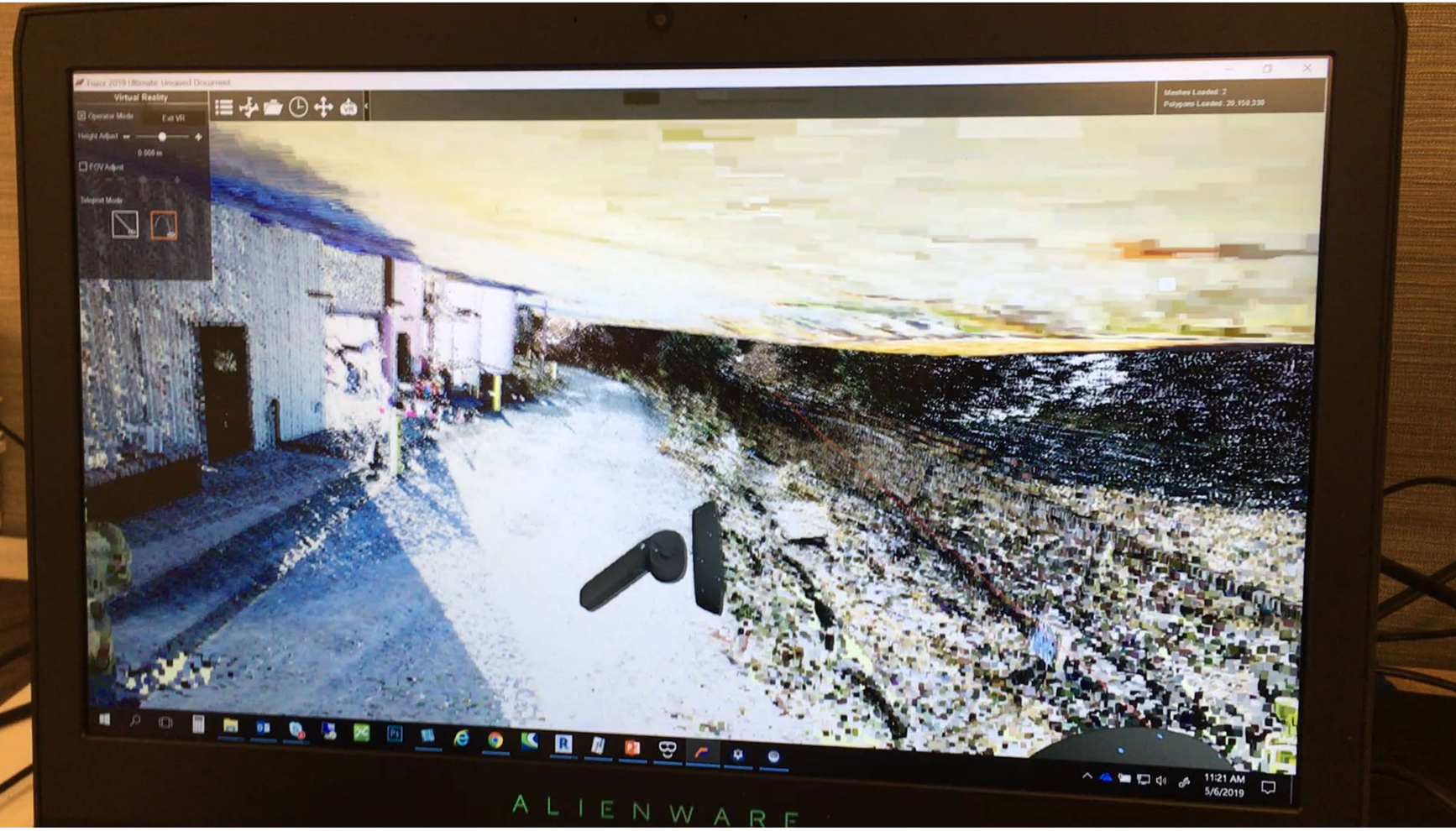

Point Cloud
Point Cloud Def.
Point Size
Automatic
Triangles size
Add Physics
Add Anno.
VR
Meshes Loaded: 26
Polygons Loaded: 328,561,988

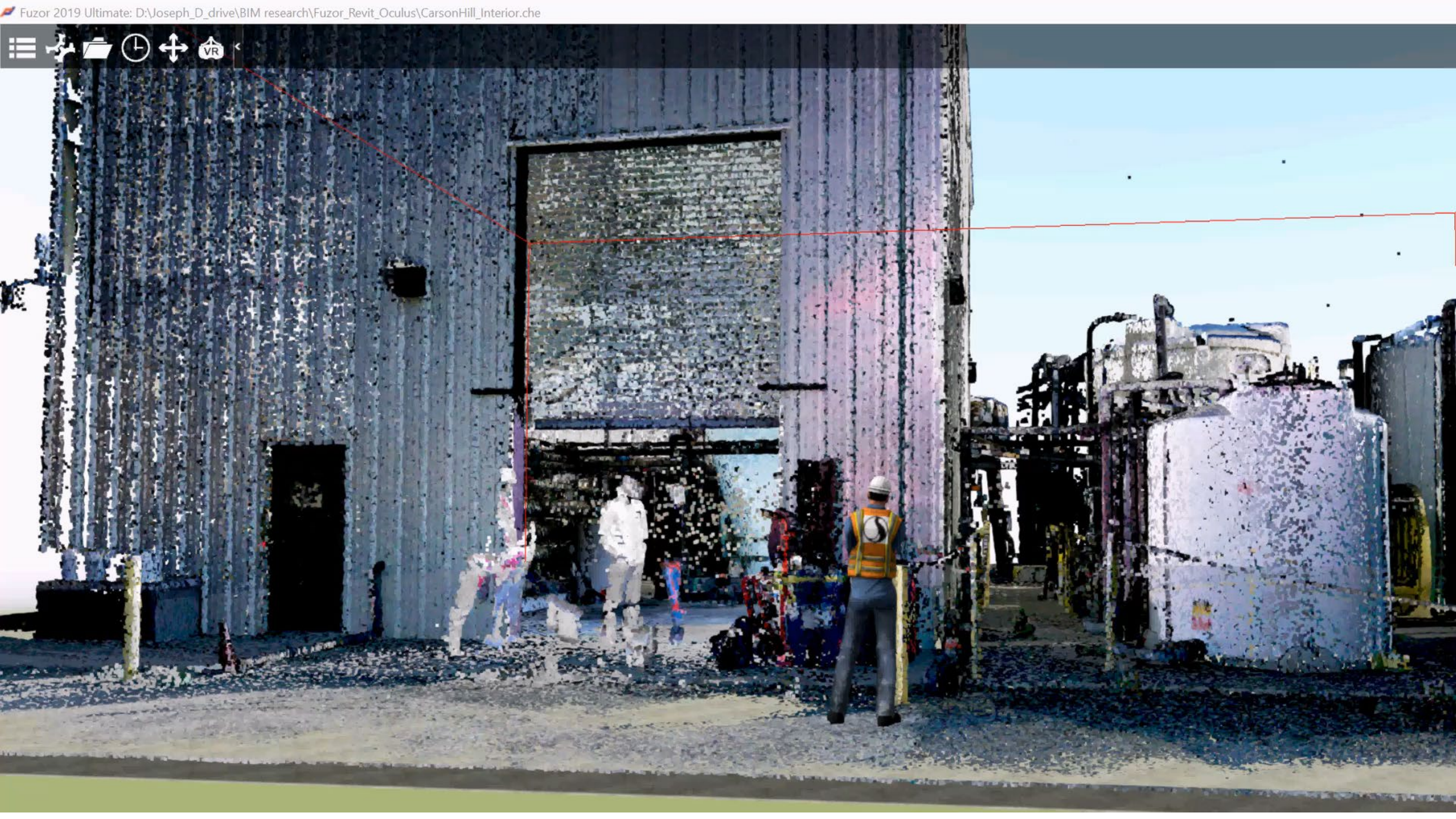
Viewing Point Cloud from VR

(2) RCP/RCS > Revit > Fuzor > VR Headset



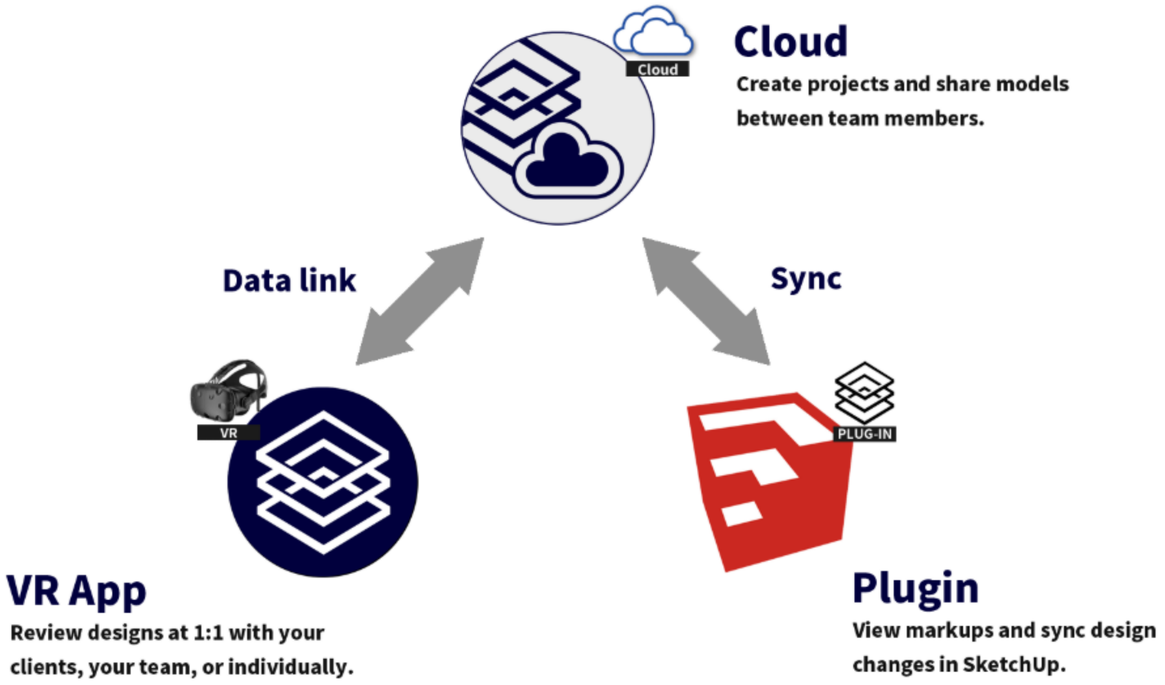
Viewing Point Cloud from VR

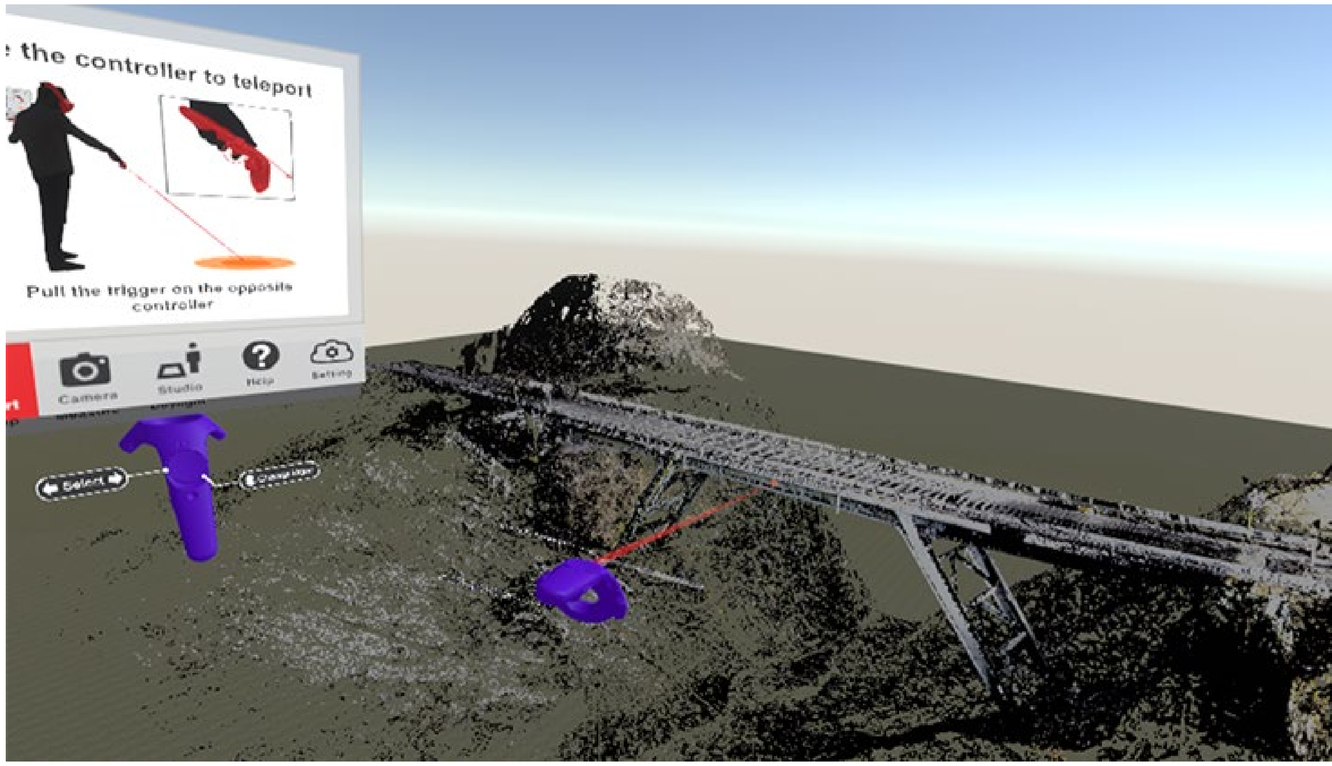



Fuzor 2019 Ultimate: D:\Joseph_D_drive\BIM research\Fuzor_Revit_Oculus\CarsonHill_Interior.che
VR

Viewing Point Cloud from VR

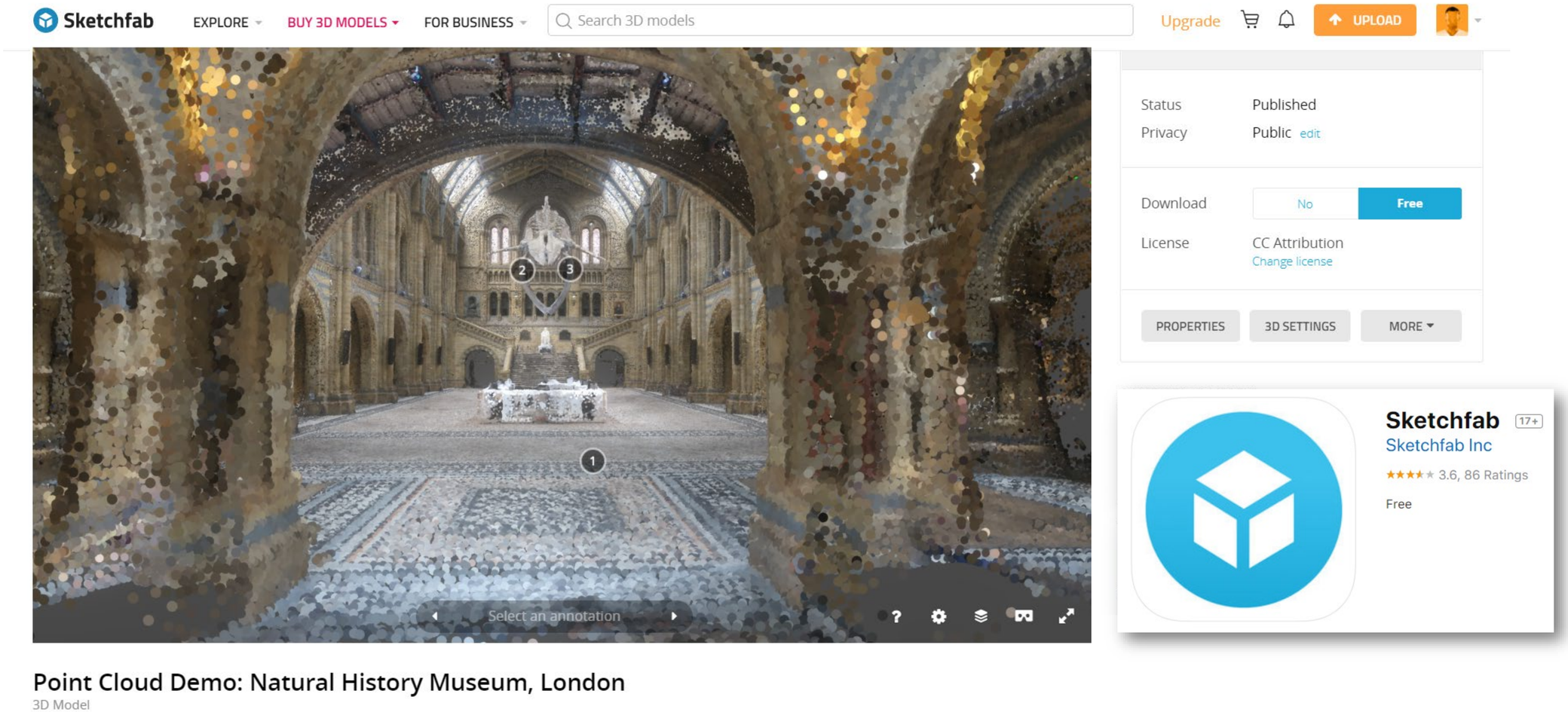
(3) LAS/LAZ > SketchUp > Symmetry > VR Headset

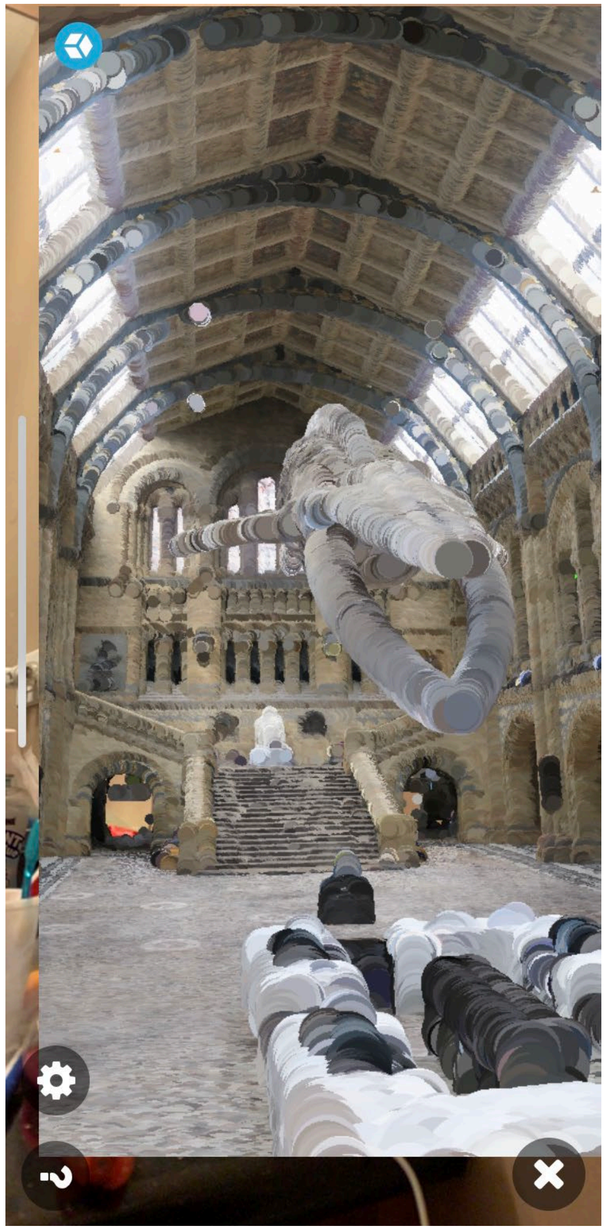




Viewing Point Cloud from VR & AR

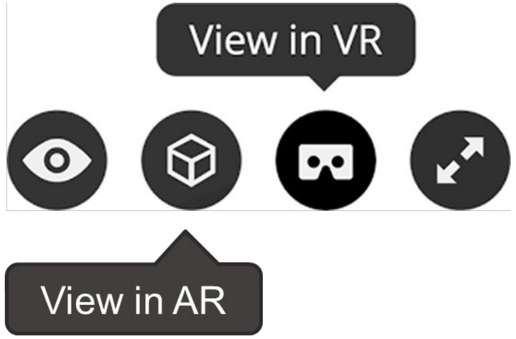
(4) LAS > Sketchfab > AR & VR from Mobile Devices

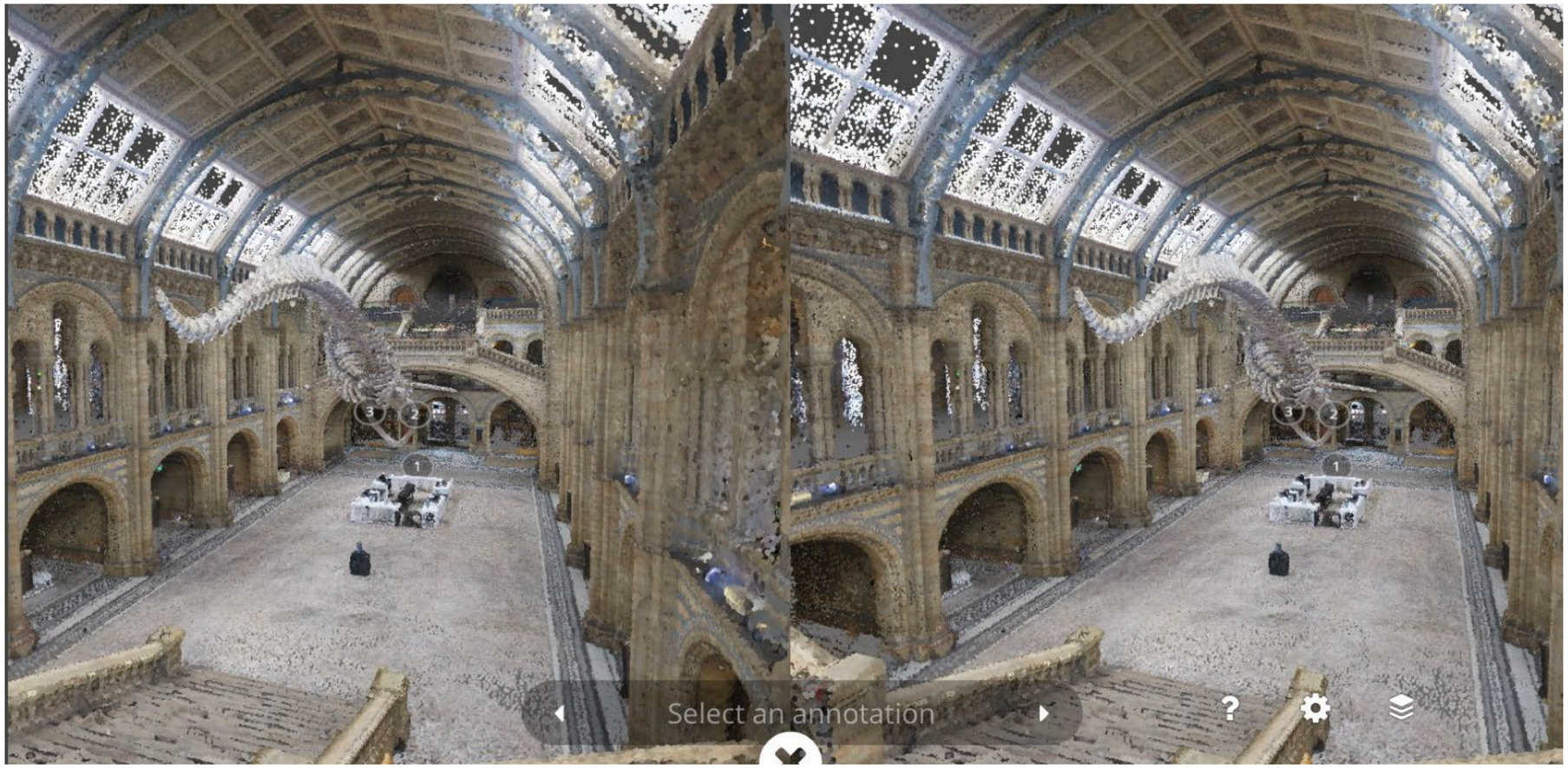




Viewing Point Cloud from VR/AR

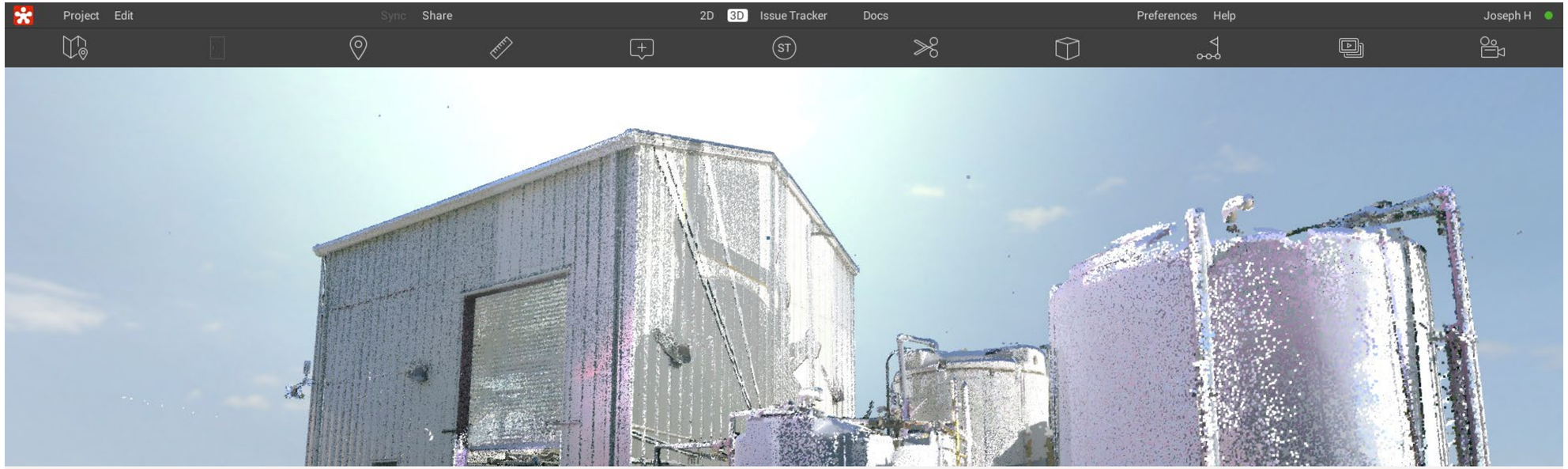
(4) LAS > Sketchfab > AR & VR from Mobile Devices





Viewing Point Cloud from VR

(5) RCP/RCS > Revit > Revizto > VR Headsets and Mobile Devices

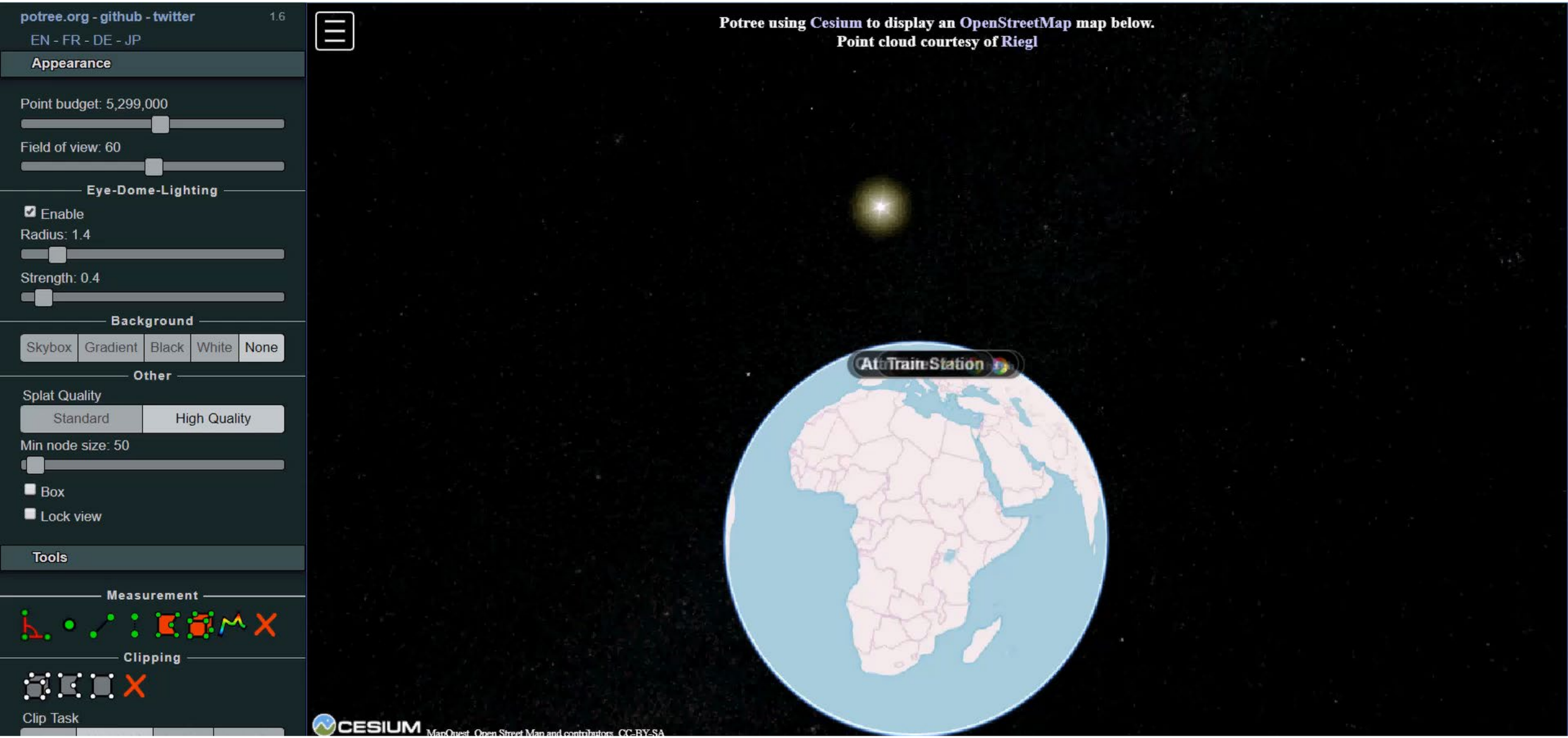


Revizto works with:

Revit
Navisworks
ArchiCAD
AutoCAD
Civil 3D
Solibri
Tekla
SketchUp
Rhinoceros
FBX
IFC
BCF
PDF
DWF
OBJ
RCP
RCS
Faro

Potree: Rendering Large Point Clouds in Web Browsers

Potree: Rendering Large Point Clouds in Web Browsers




Scan to BIM Execution Plan
Project Information
Client Objectives
Scope and Planning
Estimation
Competence and Training
Standards
Workflows
Data Transfer / Information Management
Model Setup
Model QC
Advanced Visualization

Questions?

Raghavendra Bhat
raghavendra.bhat@stantec.com

Joseph Huang
joseph.huang@stantec.com

Kindly take the class survey in the app. Thank you!

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Make anything™

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