

3D LASER SURVEY

Benefits of 3D Laser Survey in the Design of Vertical Upgrades

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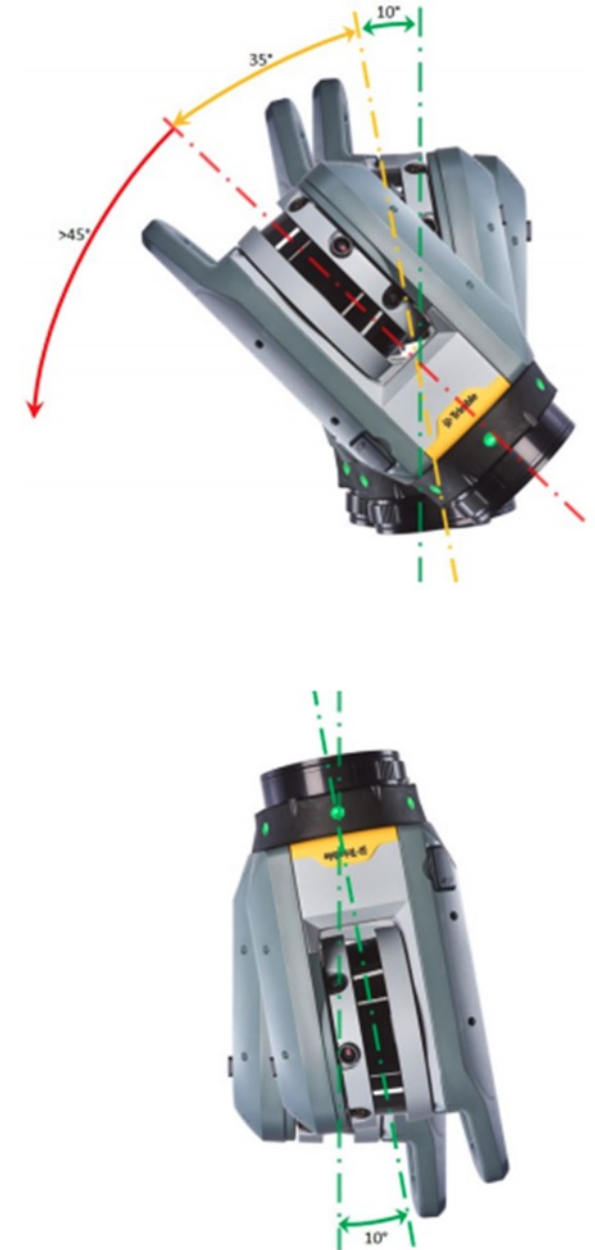
AGENDA

- **What is 3D Scanning**
- **Scanner Specifications**
- **Why Use 3D Scanning?**
- **Example Projects**



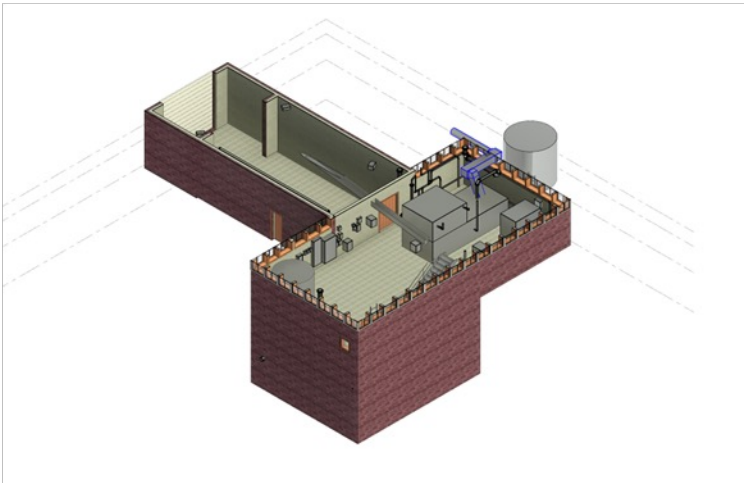
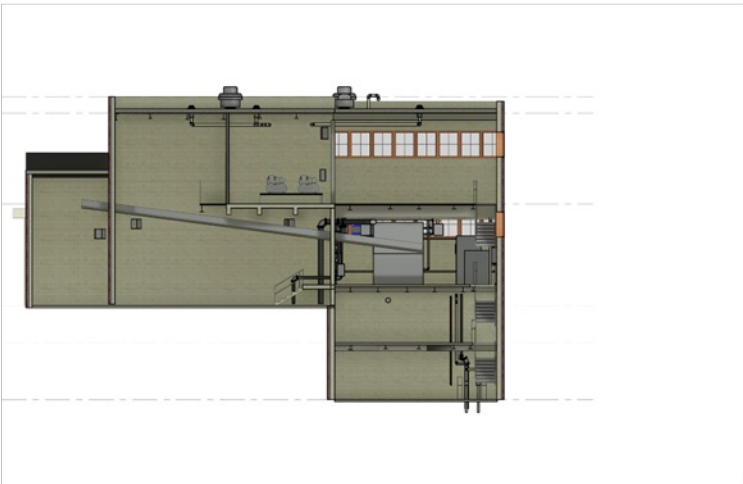
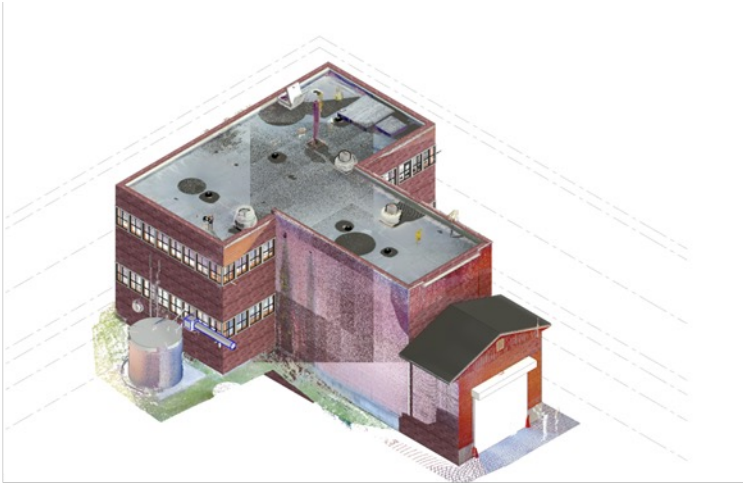
TRIMBLE X7 FEATURES & TECHNICAL SPECS

- **Auto Calibration** – every scan, no annual maintenance fees or downtime!! Cutting-edge technology
- **Self Leveling** – ease of use
- Range: ~2ft – 260ft*
- **Accuracy:** 1/8in @ 60ft*
- Dual Band WiFi between instrument & tablet
- Trimble Perspective Software
 - **Auto Registration** – builds PC in the field
 - Notes & Measurements
- Speed: 1:34-14:57 min:sec
 - Includes AC, SL & scan
- Scan View: 360° x 282°
- Density: 1/8-7/16in @ 33ft*
- Points/ Scan: 12-125 million
- Camera: 1-2min panoramic
 - 3 Coaxial 10MP cameras
- Operating Temp Range
 - -4F – 122F



<https://geospatial.trimble.com/blog/trimble-x7-unique-design-extra-functionality>

Point Cloud to Revit Model



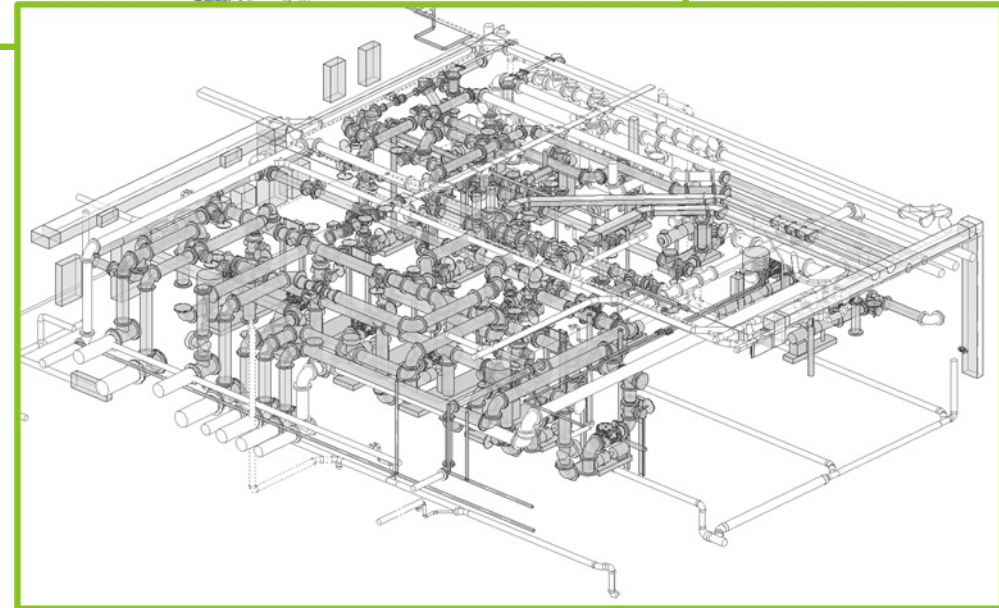
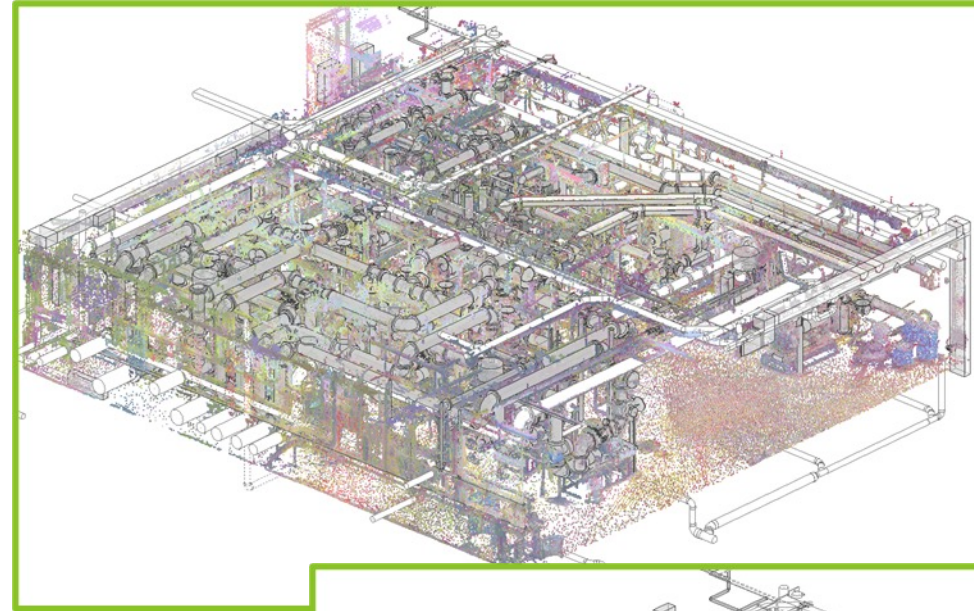
WHY USE 3D LASER SCANNING?

- **Document existing conditions**
- **Missing record drawings**
- **Upgrades to existing buildings, equipment, piping, etc.**
- **Discipline Coordination**
- **Team access to field conditions**
- **“Desktop” field verification**
- **Preconstruction record**
- **Communication (show and tell)**

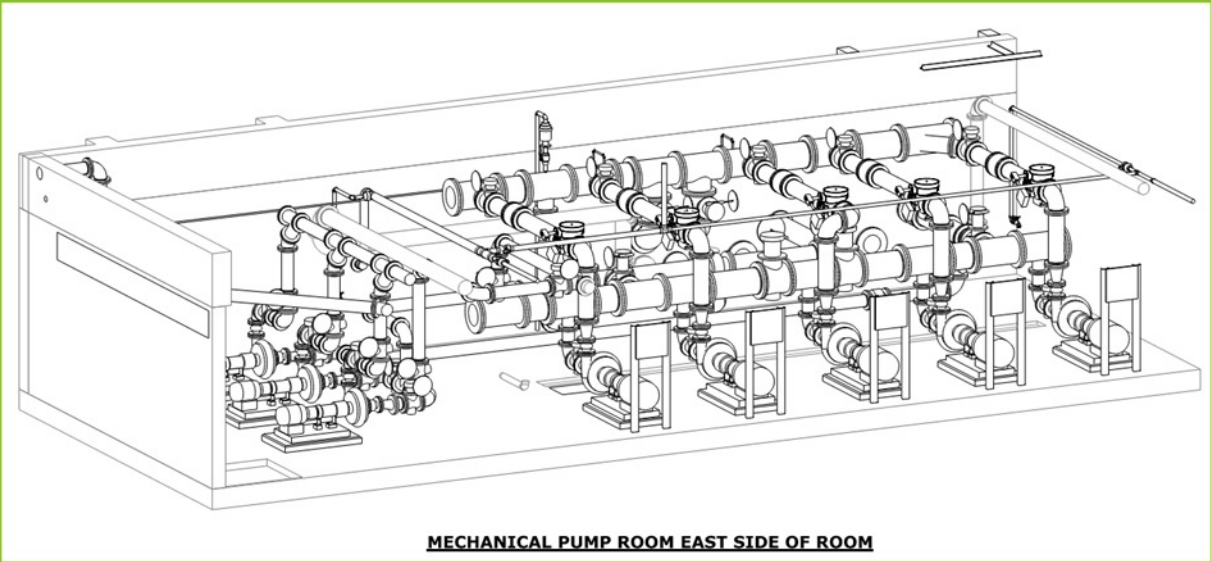
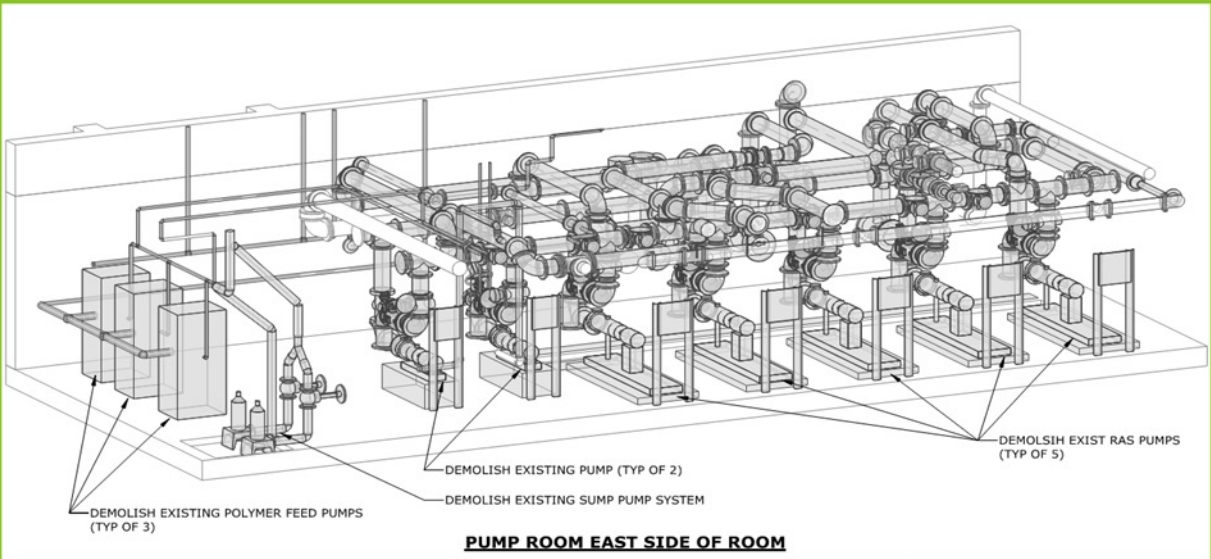
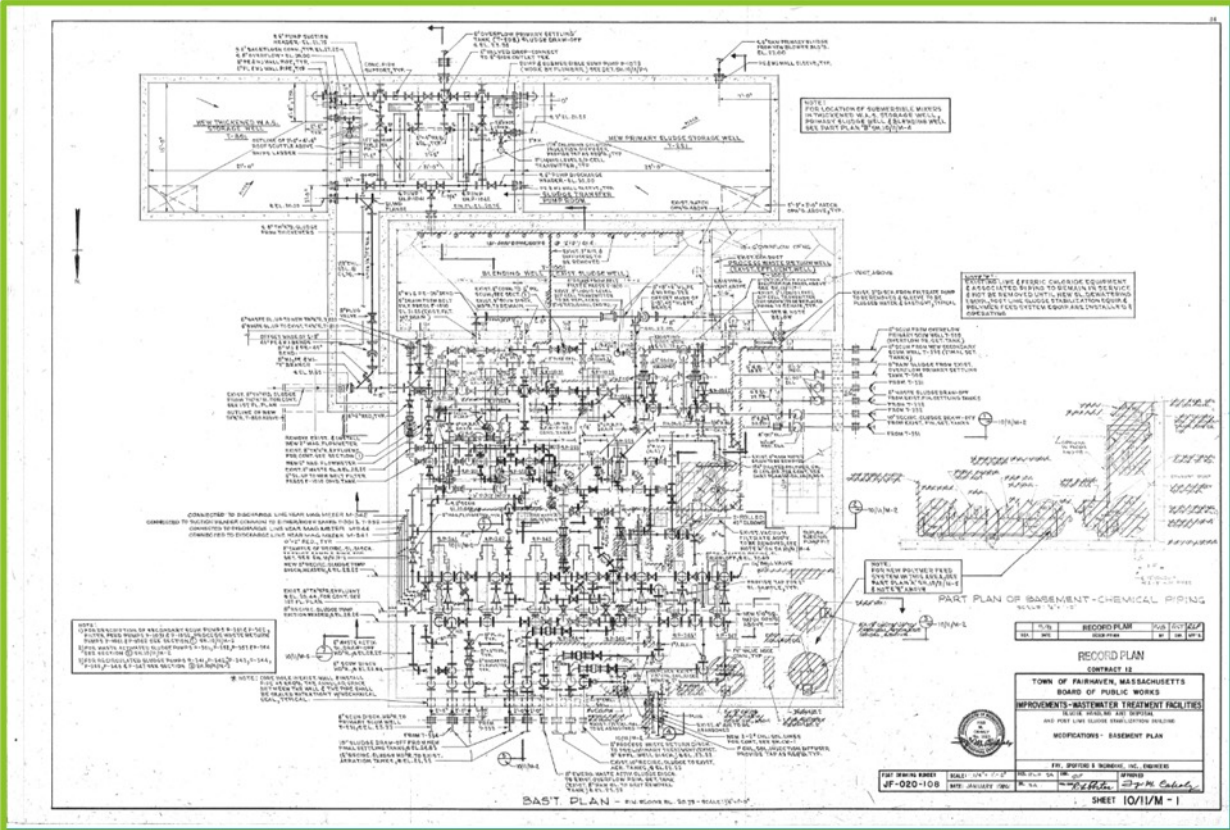


DOCUMENT EXISTING CONDITIONS

- **Provides One Source of Truth**
 - Existing Record Drawings are unreliable and sometimes unavailable
 - Not representative of existing conditions
 - Tape measure field verification obsolete
 - Accuracy of bid drawings critical for starting design with accurate base map
- **Undocumented Renovations**
 - Record/Bid Drawings only capture major process upgrades, omit ancillary systems
 - Compiles all upgrades into one point cloud vs. multiple sets of record drawings

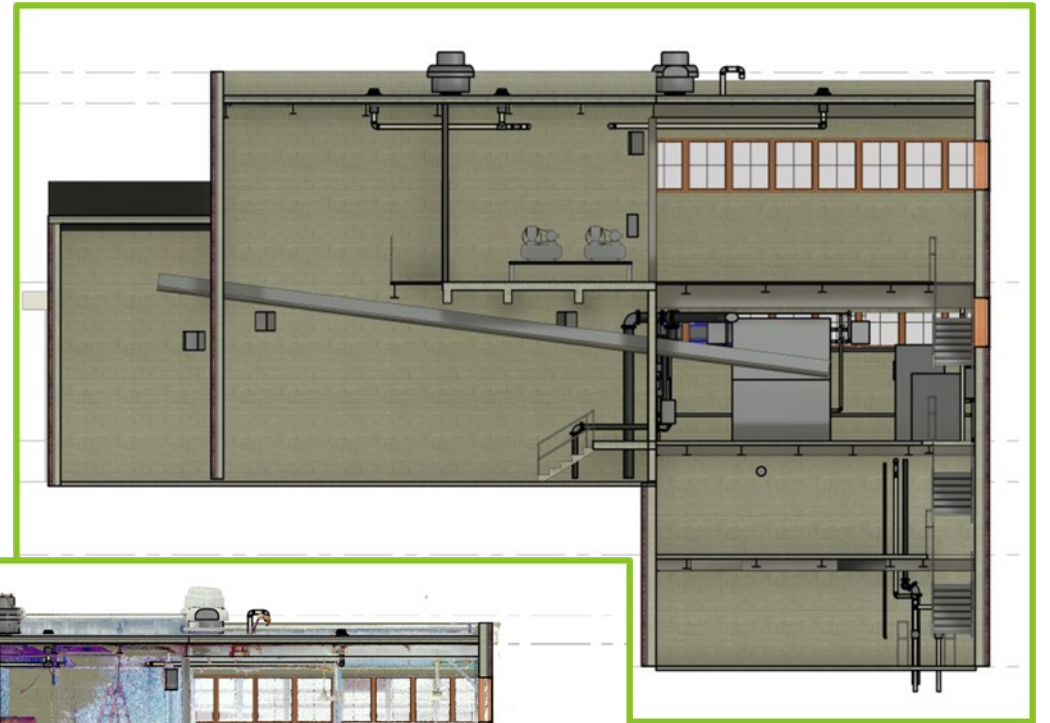
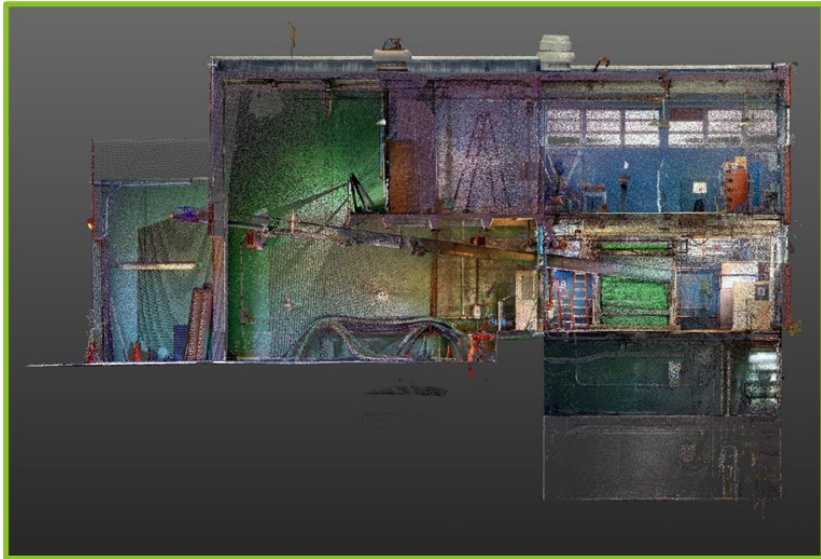


DOCUMENT EXISTING CONDITIONS



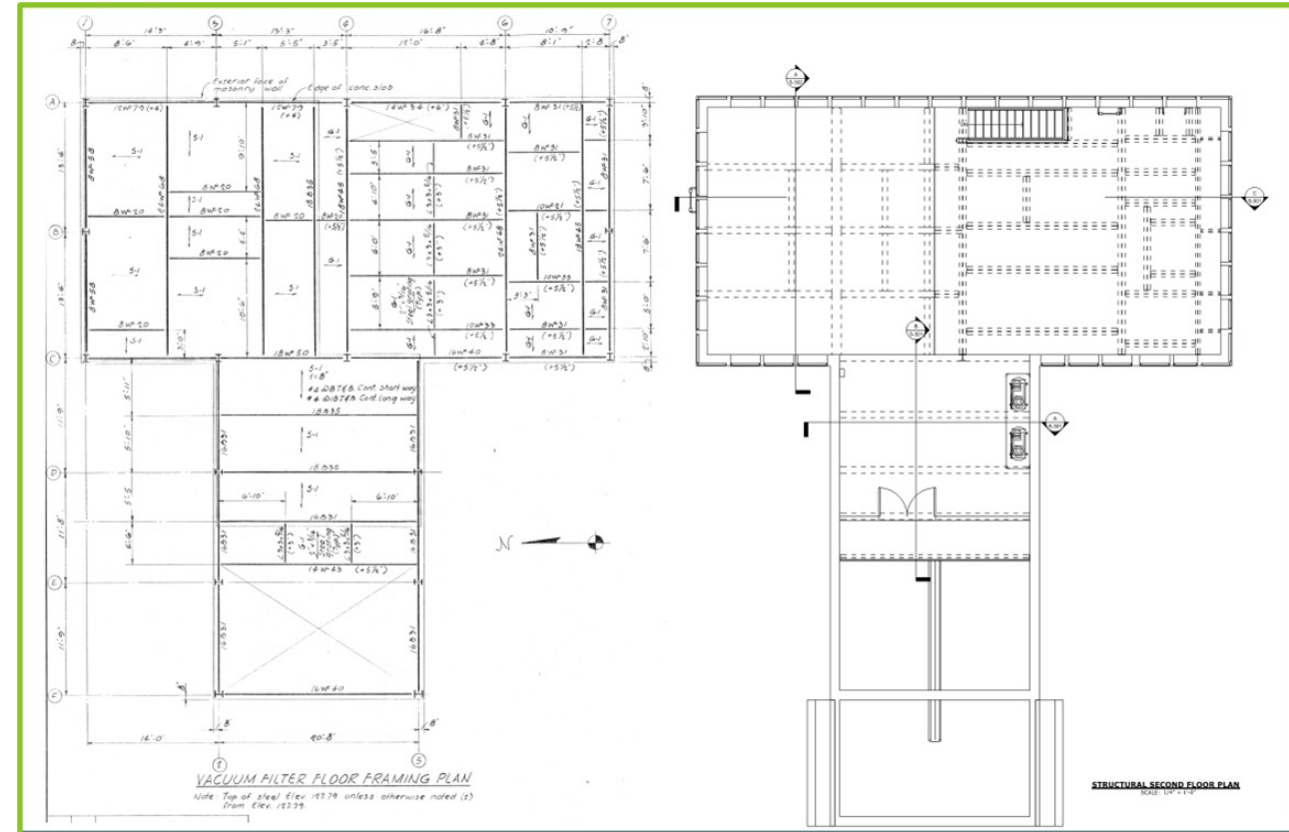
WATER PUMPING STATION

- No existing Record Drawings were available
- Station was modeled entirely based upon 3D Point Cloud obtained in the field



DISCREPANCIES UNCOVERED

- 3D scanning caught differing member sizes and framing layouts
- Engineers preliminary design utilized existing conditions validated by point cloud data
- Ultimately minimizing overall design effort and potential rework and change orders



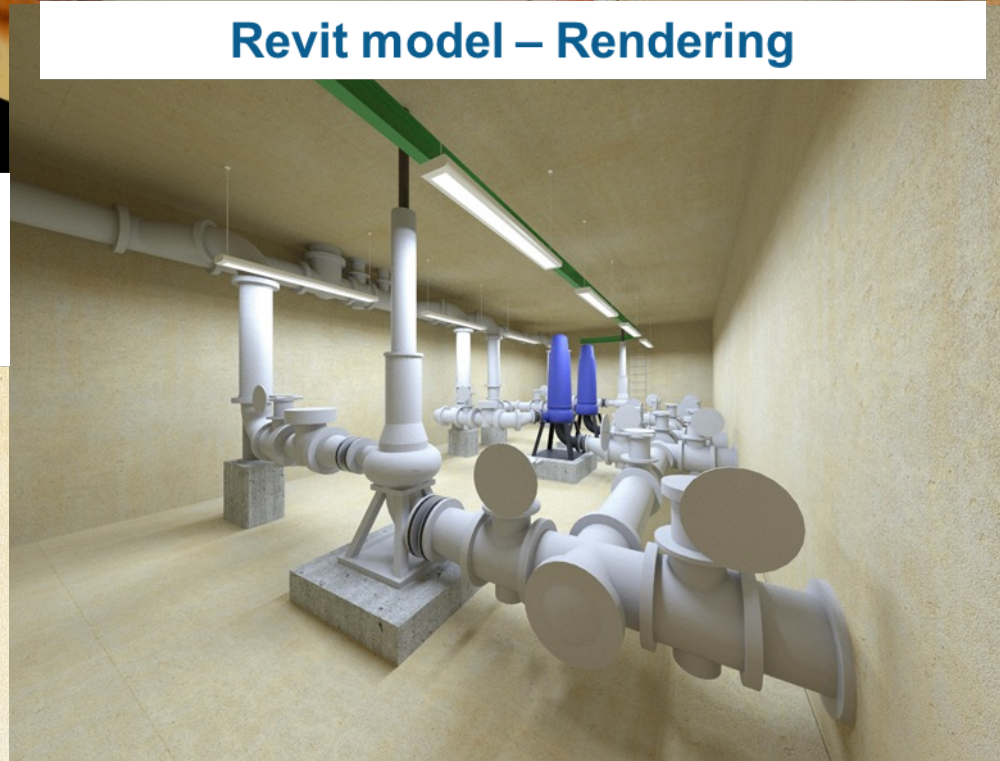
Trimble Scan Explorer Viewer



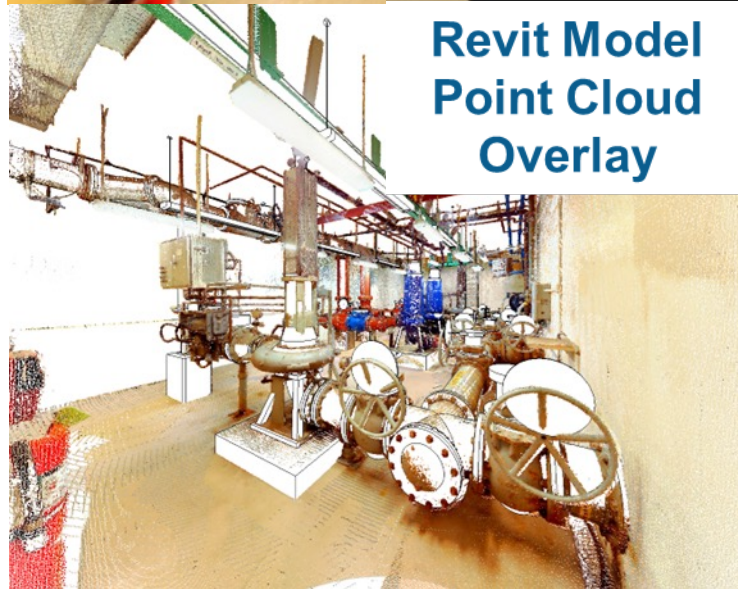
Point Cloud



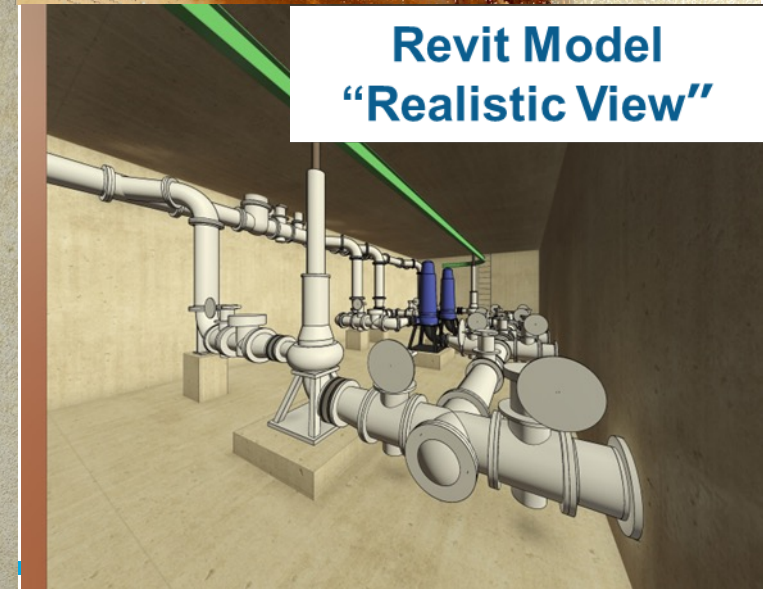
Revit model – Rendering



**Revit Model
Point Cloud
Overlay**



**Revit Model
“Realistic View”**



VIEWER FILE CAPABILITIES

- **Field Verification**

- Horizontal and Vertical measurement available through point cloud or viewer file
- Existing Record Drawings are unreliable and sometimes unavailable

- **Remote Site Visits**

- Allows design engineers to revisit the site instantly to review design intent with entire project team
- Ability to integrate design engineers to site specific areas past initial site visit
- Costs savings on driving time and mileage
- Scanner pays for itself!

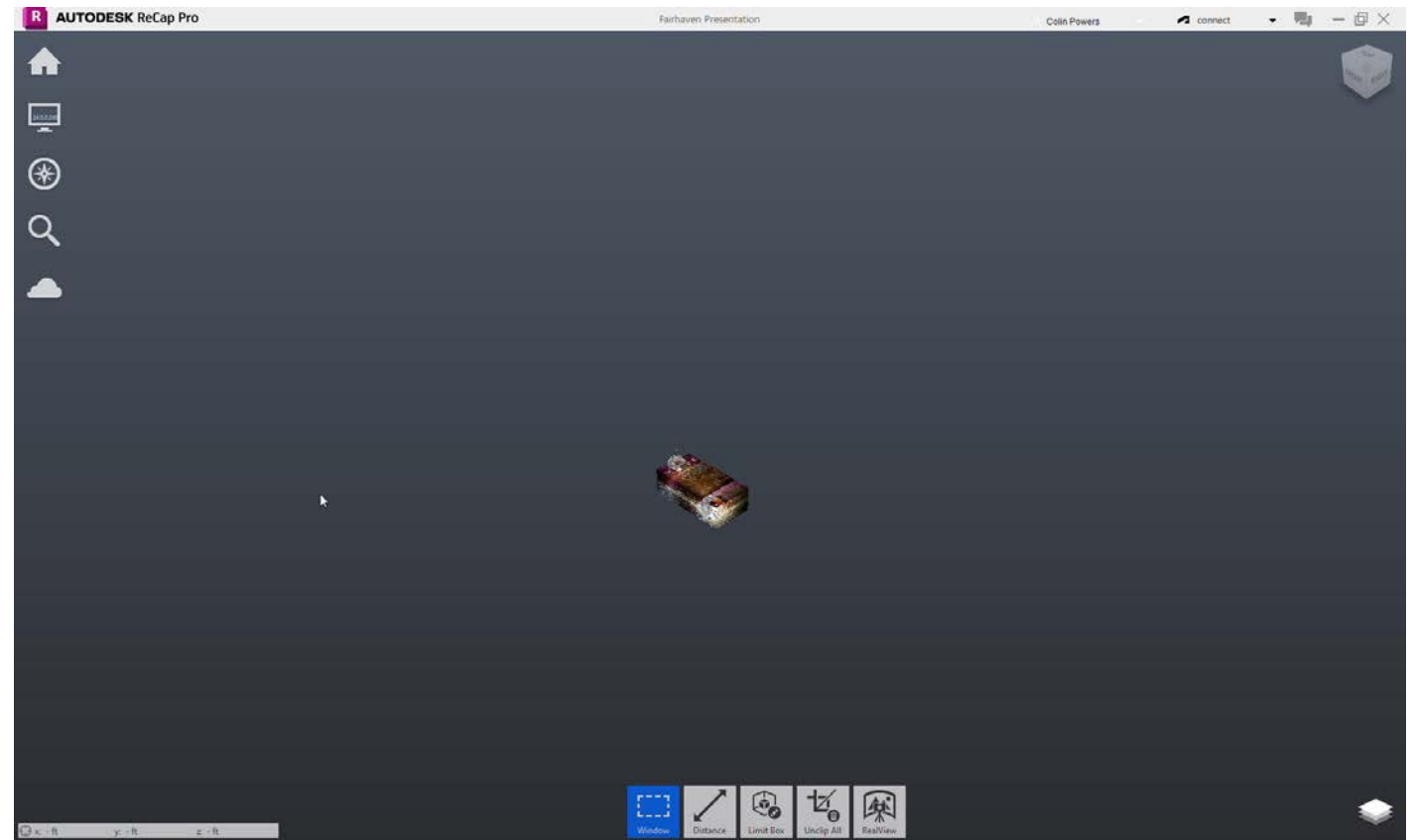
- **Reduces On-Site Activity**

- Ability to revisit site remotely limits impact of day-to-day operation on site
-

CONFINED SPACE SCANNING

- **Inverted Scans**

- Trimble Unit able to be lowered into confined spaces and scan the space
- Provides high resolution photos and point cloud for plans to same level of accuracy
- Safer option than manned entry requiring trained personnel, confined space permits, ventilation, rescue team, etc.
- Quantity takeoffs, condition assessment, visual inspection by entire team



PRODUCES A HIGHLY ACCURATE DESIGN

- **Ability to coordinate across disciplines**
 - 3D Modelling allows for layout of critical infrastructure all during design phase
 - Provides opportunity to advance conflict management all during design phase
- **Provides best opportunity for an accurate design**
 - Precision of scanning survey and deliverables set project up for success
 - 3D models and drawings provide a platform to communicate more detailed layouts and designs



COMMUNICATE THE DESIGN

- **Ability to Communicate to Any Audience**
 - Contractors and stakeholders must understand design intent
 - 3D drawings provide superior form of communication
- **Provides best opportunity for an accurate design**
 - Precision of scanning survey and deliverables set project up for success
 - 3D models and drawings are superior form of communication between Designer and Contractor



3D VIRTUAL TOUR



**Revit Model
Existing
Conditions**



**Revit Model
Highlight
Revisions**



Revit Model – Final Design



Revit Model – Twinmotion





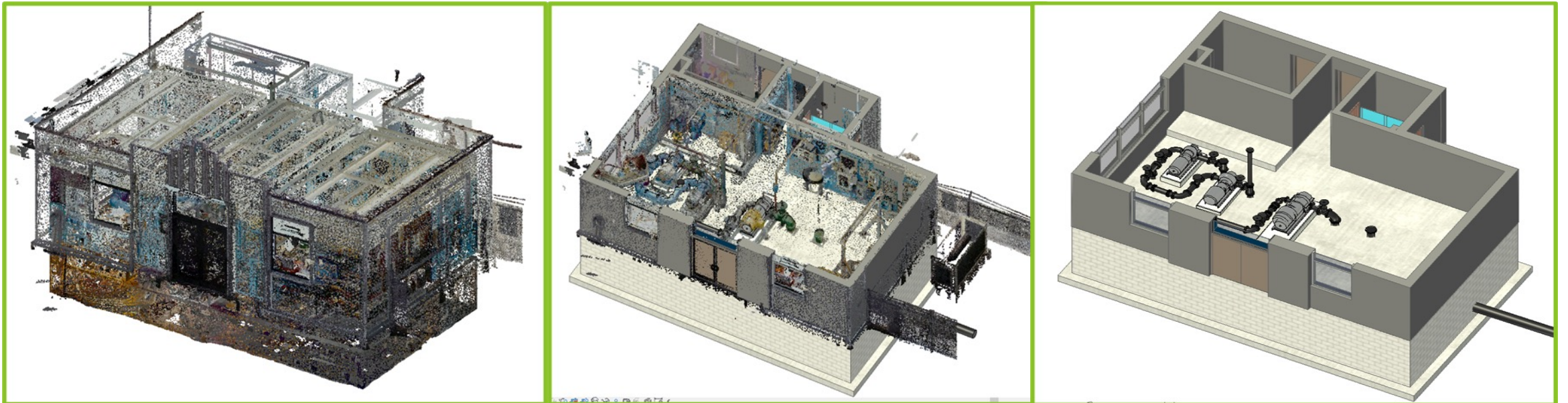
IT WORKS OUTSIDE TOO

- Record location of piles/caps to finalize slab design



SUMMARY

- Excellent design tool
- Accurate records
- Minimize change orders
- Cost effective
- 3D scanning is the new standard



THANK YOU!

- Discussion & Questions

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