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Scanning and Augmented Reality: Built to Bridge the Gap

Presented By: Ralph Vroegop

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WHO IS
TRIMBLE

Trimble is a global technology company that takes on the **world's biggest challenges** so customers can unlock **a better, faster, safer and greener future.**



THE INDUSTRIES
WE SERVE

Innovation across industries

We exist to
empower
our customers so
they can **improve**
how we live, eat
and move for a
better quality of life
and a better future.

Construction

Building tomorrow's
infrastructure



Transportation

Delivering the goods
of commerce



Geospatial

Building a digital
model of the earth



Agriculture

Enabling a safe and
reliable food supply





Transforming the way the world works

GNSS LIDAR & AR

Mobile Scanning

Applications & Solutions



The Trimble Lineup



GNSS

- Point measurements
- Powerful performance in harsh environments



3D Laser Scanner

- Full dome scans of surroundings
- Auto-registration
- On site georeferencing



Scanning Total Station

- Land survey workflows
- Focus scanning
- Station based registration



GNSS + LiDAR

- Fast data capture
- Low cost setup
- User-friendly
- No reference pts
- Instant feedback



VR

Replacing
your environment
with digital content



AR

Enhancing
your environment
with digital content



MR

Merging
the digital and the
physical
environments



LiDAR in Your Pocket

- Introduced with the iPhone 12 Pro
- Standard feature of all iPhone Pro & iPad Pro devices
- Low cost
- ~5 - 10 m scanning range



SiteVision 3D Scanning

Available on **iPad Pro** (2020 or newer) and **iPhone Pro/Pro Max** (12 or newer)

- Blends **LiDAR** capture capability with the Catalyst DA2 GNSS Receiver
- Collect **georeferenced** point clouds
- Document conditions **quickly** and accurately
- Instant point cloud upload to Trimble Connect



SiteVision Scanning Workflows

So What's the Story?



What Problems Can We Solve?

Instant Real Time Feedback

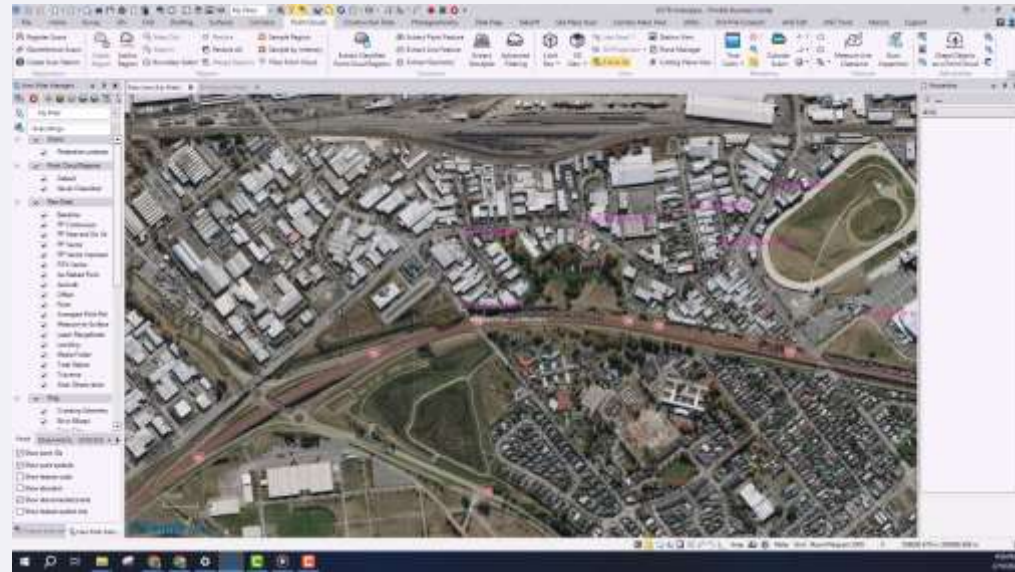
- See the scan points in the AR feed as they are captured
- **Confidence** that you have the data you need
 - Reflective materials
 - Vegetation
- **Easy** for a novice user - don't need to worry about overlap/corners (which can be a challenge for photogrammetry based solutions)



What Problems Can We Solve?

Easy Georeferenced Scans

- Captured scans are **automatically** created in whatever coordinate system SiteVision is using
- Drag and drop straight into TBC/Realworks with **no registration** or post processing required
- **Industry standard** LAZ format offers wide **compatibility** with 3rd party modelling applications



What Problems Can We Solve?

Efficient Cloud Workflow

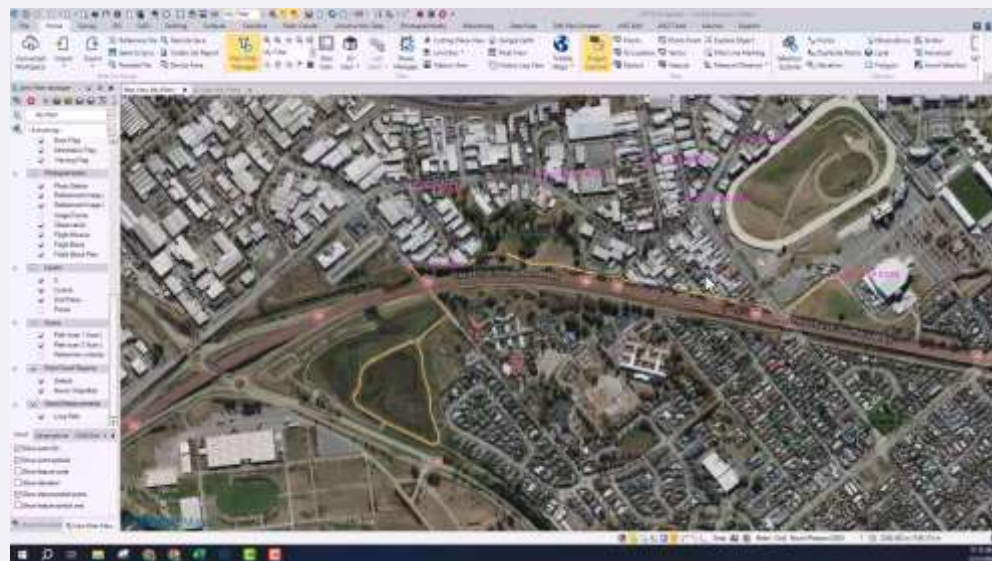
- Minimal setup time
- Captured scans are **synced** directly to Trimble Connect
 - Focused nature of scans means they are typically only 30 - 200MB in size
- **Instantly available** to office based staff to take action



What Problems Can We Solve?

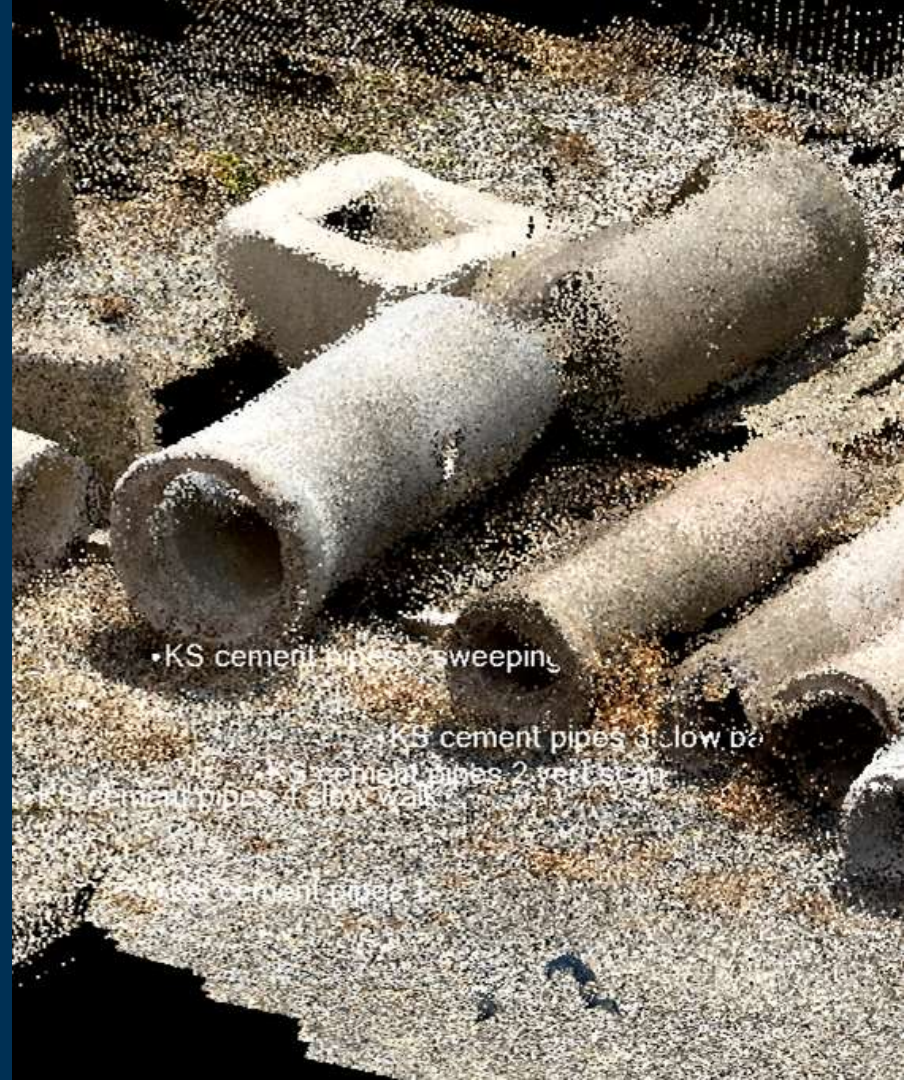
Linear Scanning

- SLAM scanners, or photogrammetric solutions will accumulate drift error over distance
- The Catalyst DA2 GNSS receiver is continuously correcting for this drift
- Long, linear scans are possible and are dimensionally accurate over distances of ~ 1 km
- Can also pause and resume at any time



Applications in the Field

What Can We Do?



•KS cement pipes 3 sweeping

KS cement pipes 3 low pa

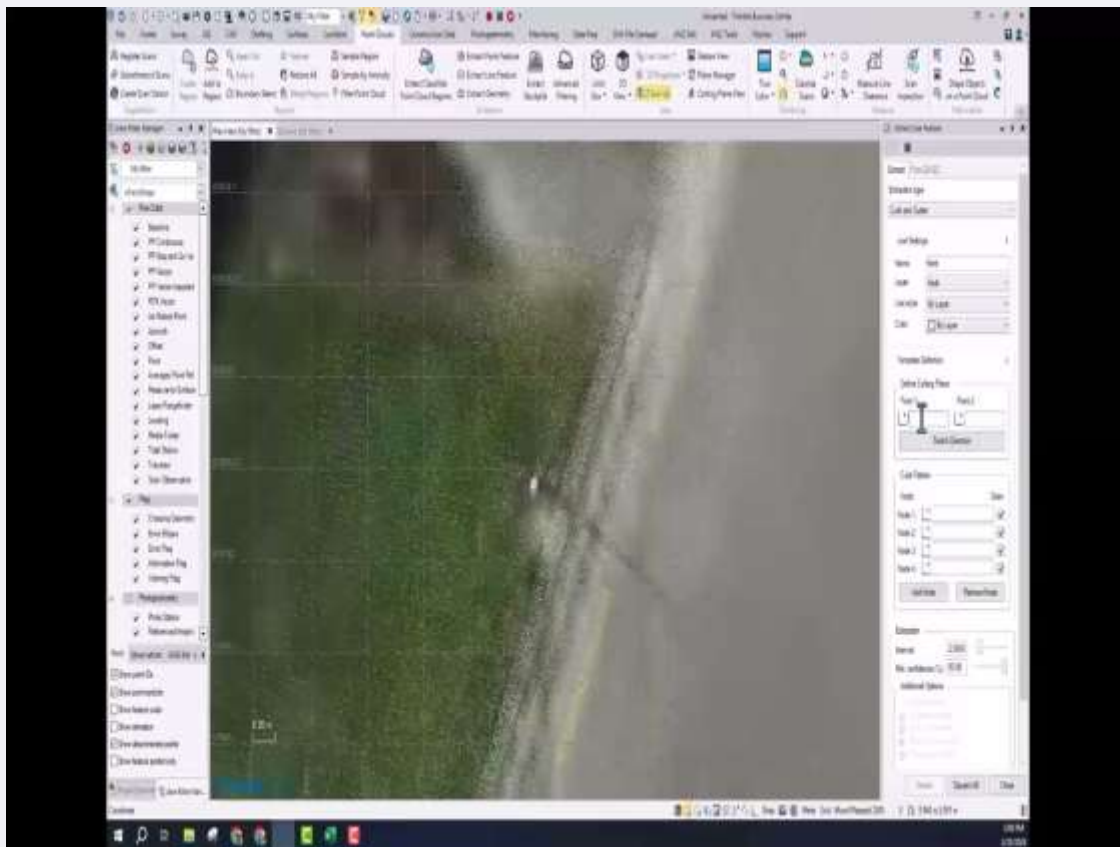
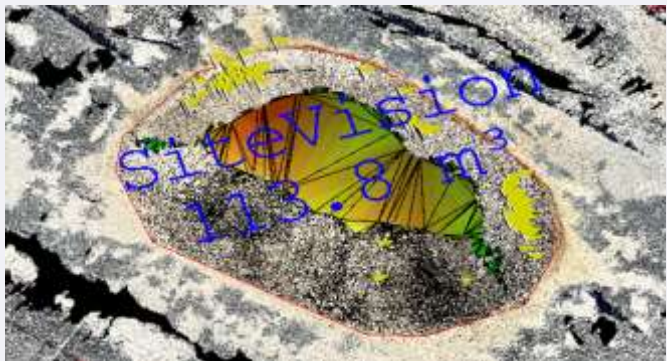
KS vertical pipes 2 vertical an

KS cement pipes 1 slow walk

KS cement pipes 2

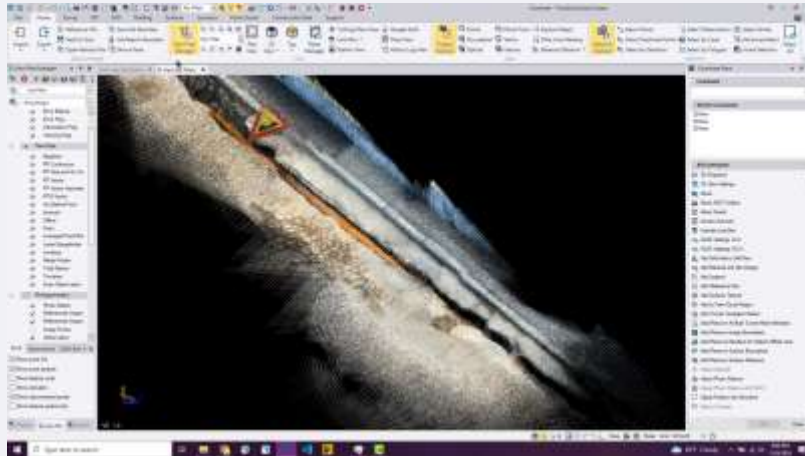
Topographic Survey

- Surface creation
- Contour extraction
- Curb extraction
- Drainage slopes
- (small) stockpiles



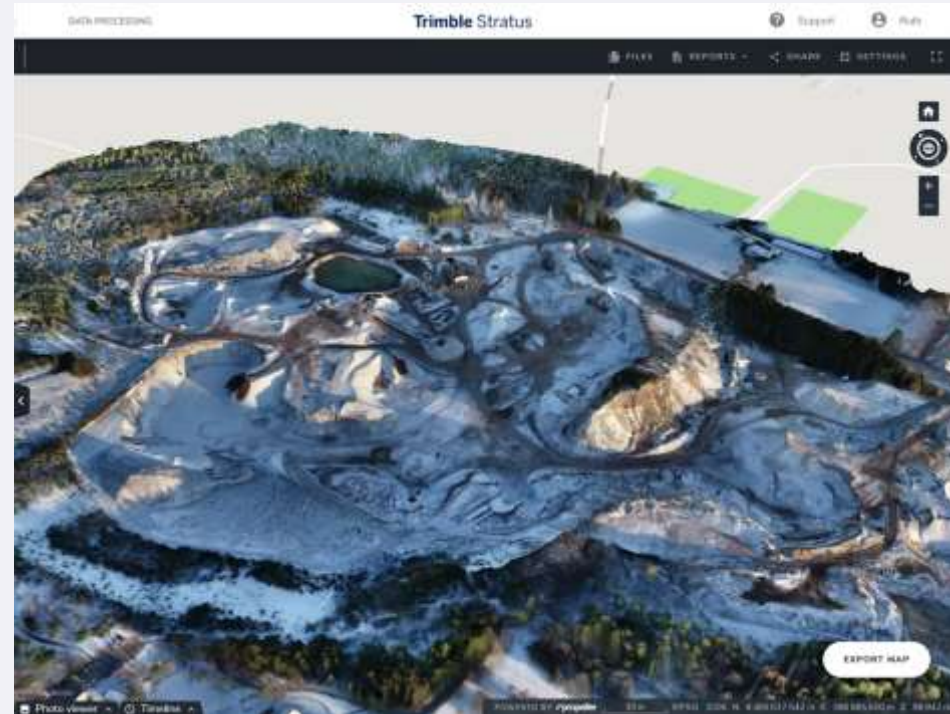
As Built Utility Data

- Emerging requirement in some jurisdictions
- Speed is critical for buried infrastructure that may only be exposed for hours at a time



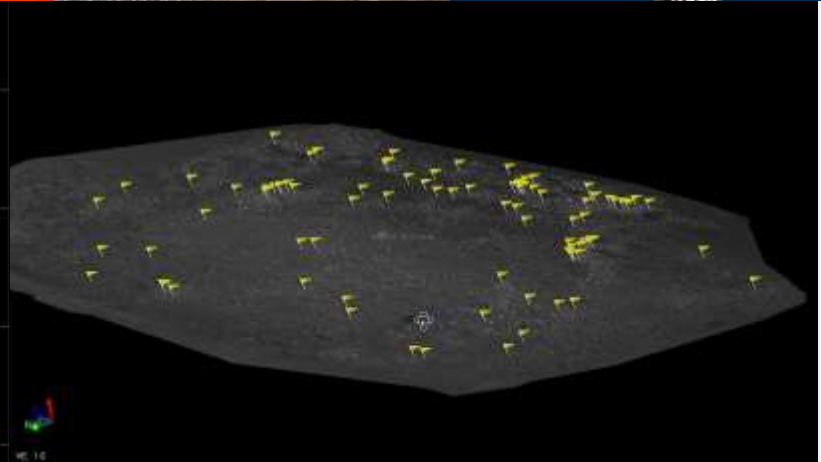
Supplement Drone/Terrestrial Scan Data

- Drone flights can potentially take time to setup and execute
- Quickly capture back of slopes/dead zones in undulating terrain to save multiple setups



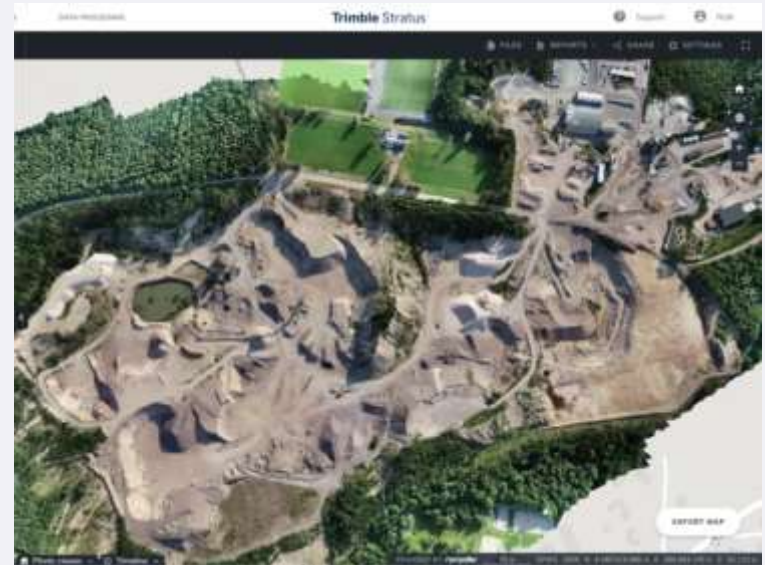
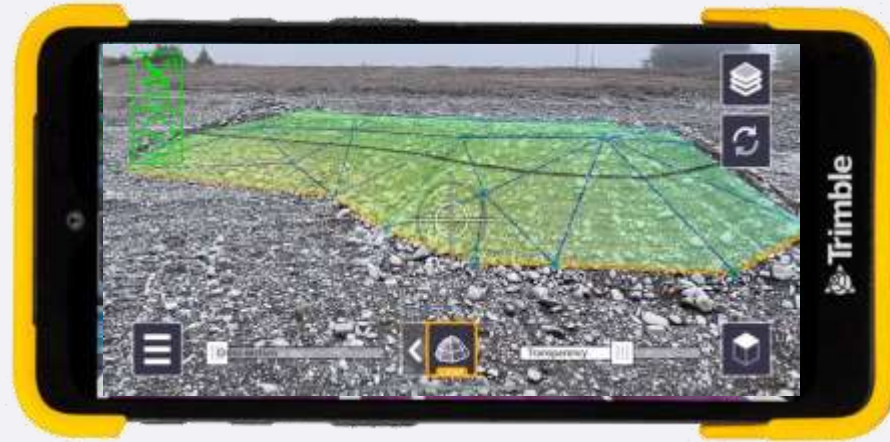
Monitor Progress

Record millions of points in a matter of seconds with GNSS accuracy. Compare surfaces and grades in progress



As-Builts on the Go

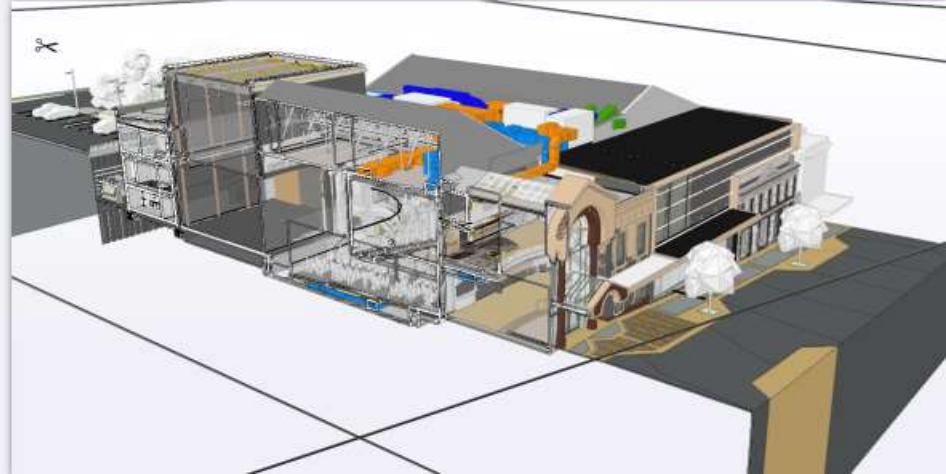
Record millions of points in a matter of seconds with GNSS accuracy. Compare surfaces and grades in progress



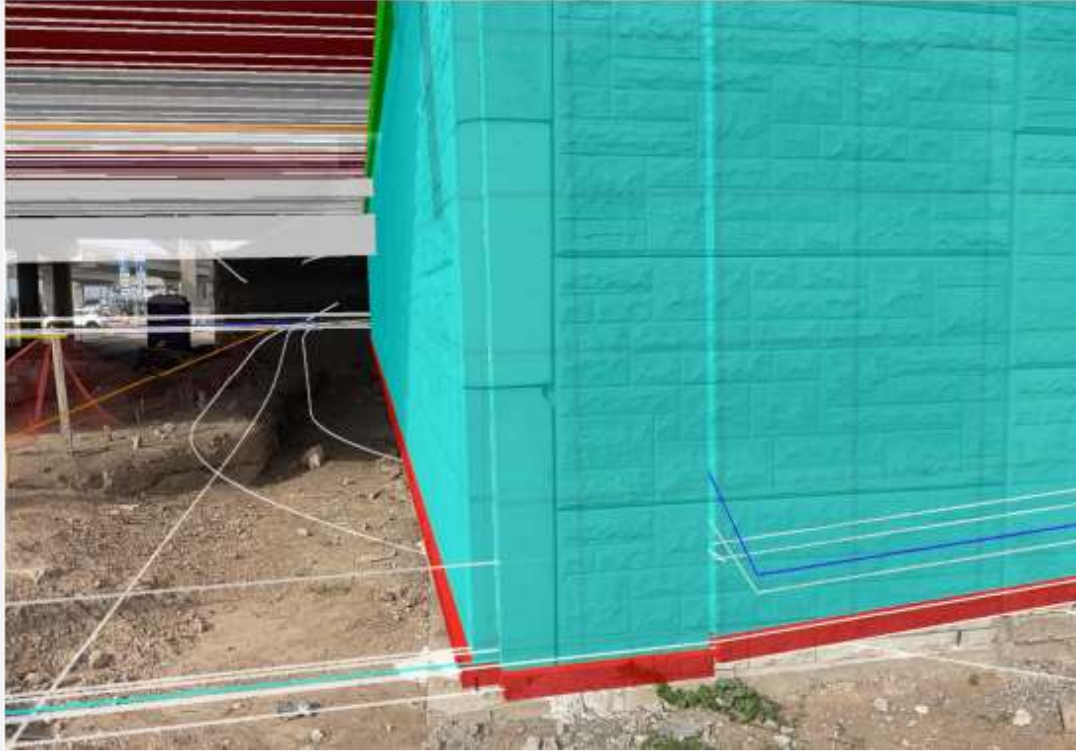
Applications

Capture Field Conditions

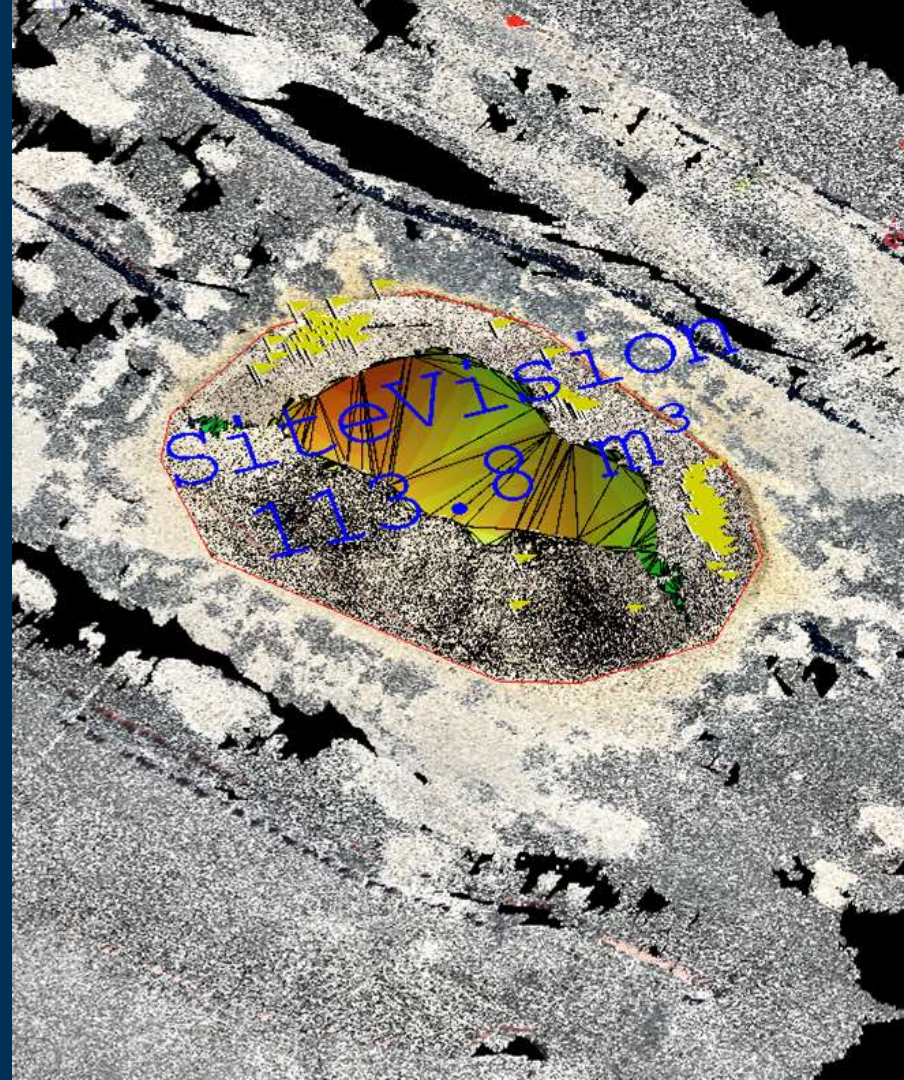
- **Document** or **validate** site conditions
- Especially valuable for remodelling projects
 - Support the design team who are creating 3D models
- Anything with limited time access
 - Opening a trench in a public thoroughfare



Building Inspection example



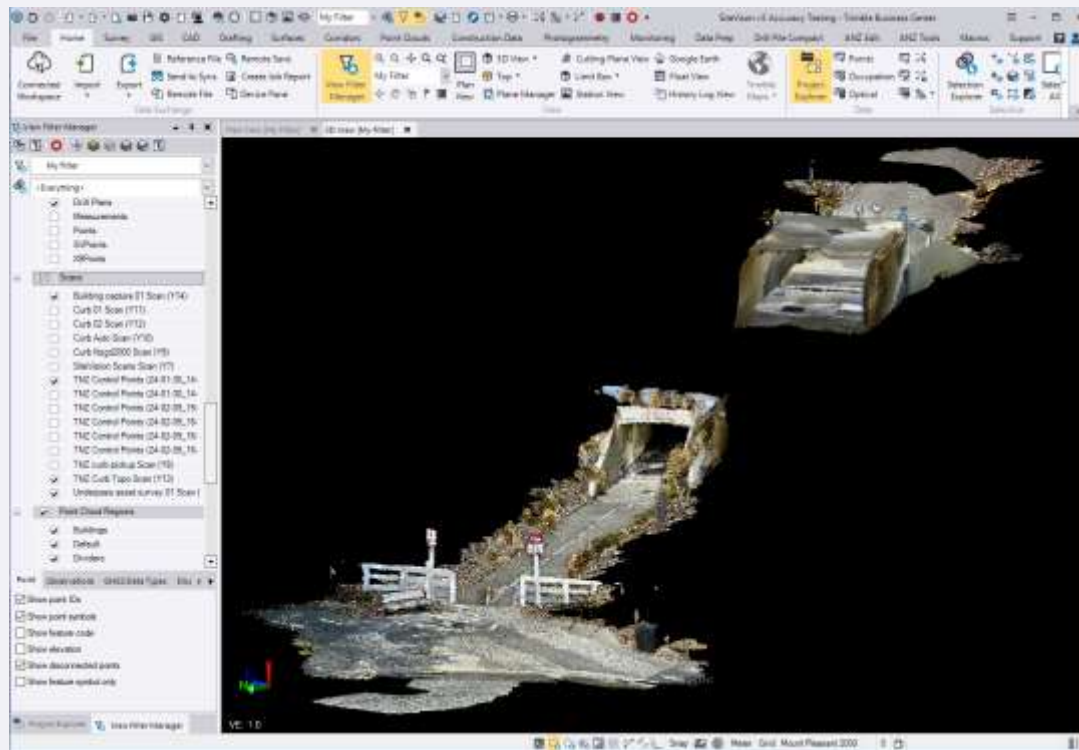
Field to Office



Importing to RealWorks/Trimbe Business Centre

Scan Data Workflows

- Download the LAZ files
- Import into Trimble RealWorks or Trimble Business Center
- Supplement traditional scan data
- Scan data workflows
 - Refine/filter scans
 - Take measurements
 - Extract objects
 - Stockpiles



Importing to SketchUp

Modeling from Scans

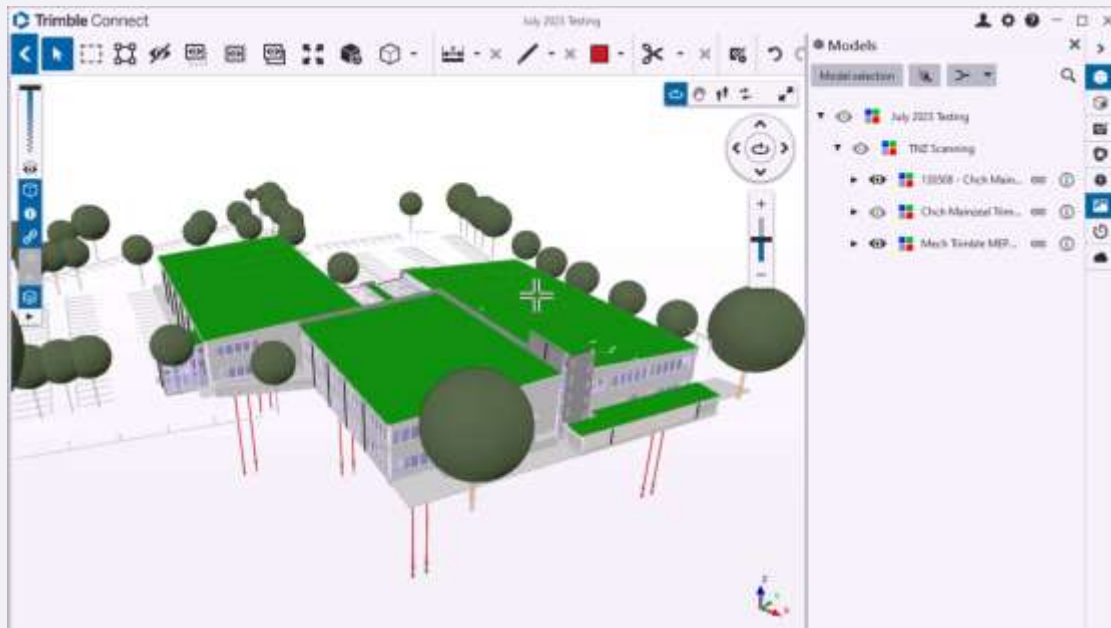
- Download the LAZ files
- Import into Scan Essentials for SketchUp
- Accurately translate your point cloud into a 3D model
 - Draw and snap directly onto your point cloud
 - Extract Planes



Importing to Connect Desktop

Scan & Model Visualization

- Download the LAZ files
- Import into Trimble Connect Desktop
- Compare scans to models
 - Measure
 - Section
 - Document and workflow issues





Transforming the way the world works