

# Terrestrial Photogrammetry for Construction, Engineering, and Surveying



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**Pix4D**

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# Terrestrial Photogrammetry

Terrestrial photogrammetry is not a new concept.

## Roadblocks for adoption:

- Complicated rigs
- Poor Geolocation
- Complex processing
- Low resolution
- Portability
- Cost



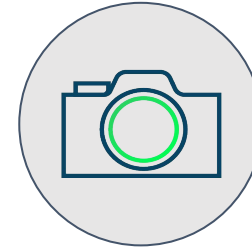
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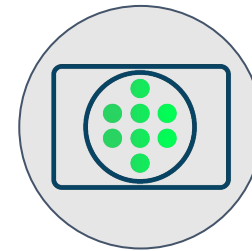
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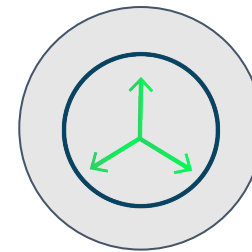
# The camera on every jobsite



Camera



LiDAR



ARKit &  
ARCore



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# Pairing with RTK GNSS

Pairing the phone sensors with low cost RTK GNSS

- Good initial position
- Accurate image geolocation
- Maintain accuracy over longer distances
- Faster processing
- Scalability



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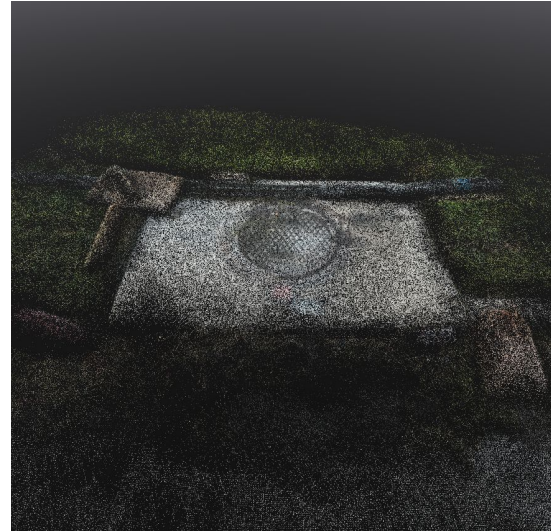
# Phone LiDAR

- Short range, 10-15ft
- Point cloud is not dense
- Point cloud can be noisy

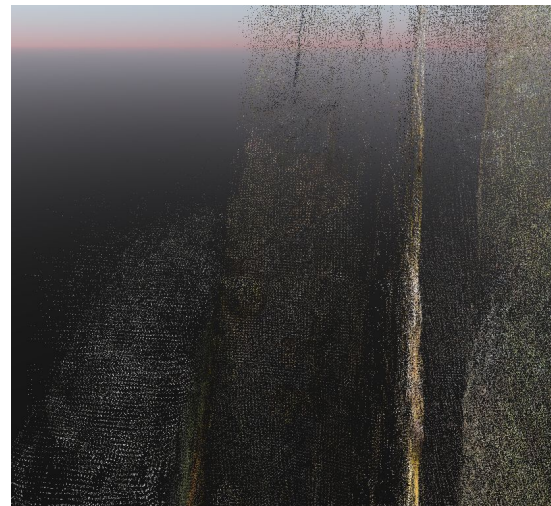
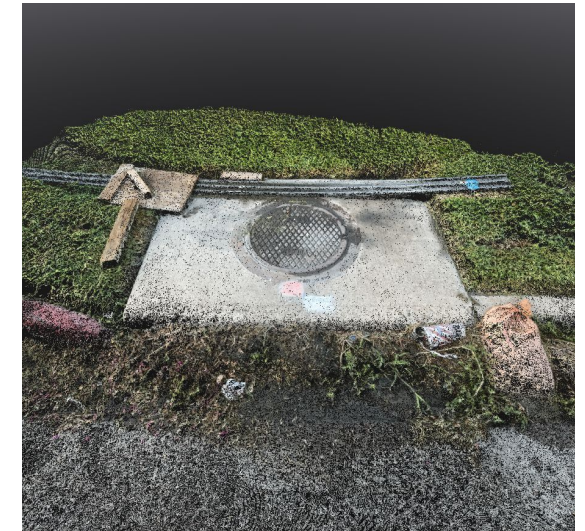
## Still Useful Data

- Used in calibration steps
- Fills in holes where photogrammetry fails

LiDAR



Photogrammetry



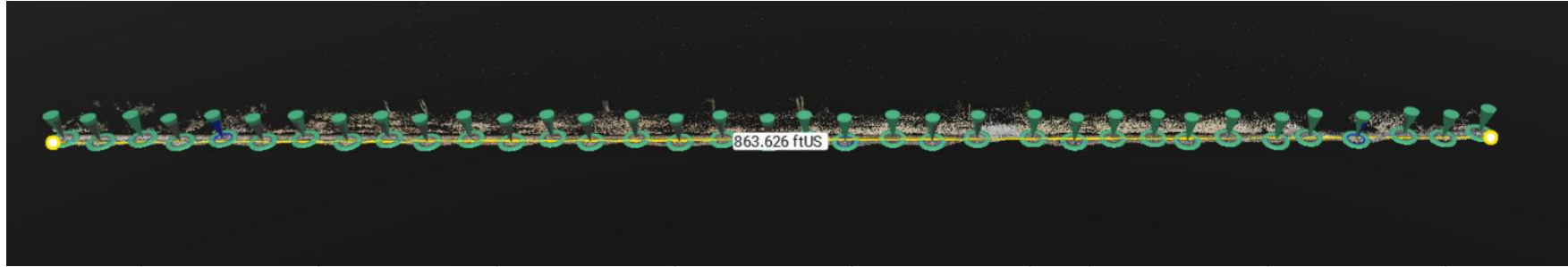
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# Positional Accuracy



Meters								
	RMSE-x	RMSE-y	RMSE-h1	RMSE-h2	RMSE-h	RMSE-v1	RMSE-v2	RMSE-v
<b>RTK Only</b>	0.011	0.026	0.028	0.020	0.035	0.010	0.030	0.032
<b>3 GCP</b>	0.010	0.014	0.017	0.020	0.026	0.013	0.030	0.033
Feet								
	RMSE-x	RMSE-y	RMSE-h1	RMSE-h2	RMSE-h	RMSE-v1	RMSE-v2	RMSE-v
<b>RTK Only</b>	0.037	0.085	0.093	0.066	0.114	0.032	0.098	0.103
<b>3 GCP</b>	0.032	0.045	0.055	0.066	0.086	0.043	0.098	0.107



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# Relative Accuracy



## Measurements

Point Spacing - 0.0006ft

PIX4Dcloud - 1.001ft  
(picking in point cloud)

PIX4Dmatic/survey - 1.000ft  
(picking from photos)

Measurements	
3D length [ft]	1.000
Height [ft]	0.823
Min elevation [ft]	151.805
Max elevation [ft]	152.629
Slope unit	<input checked="" type="checkbox"/> %
Slope [°]	55.4



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# Use Cases - Utilities



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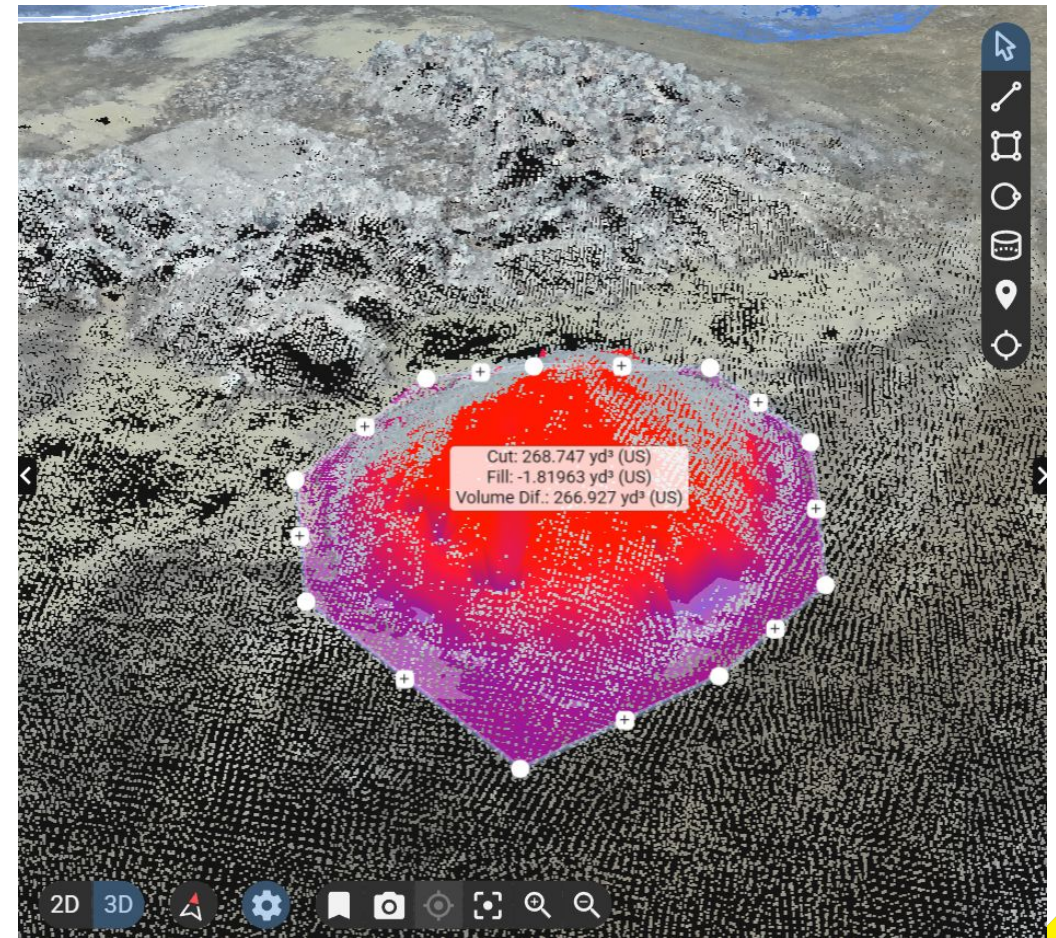
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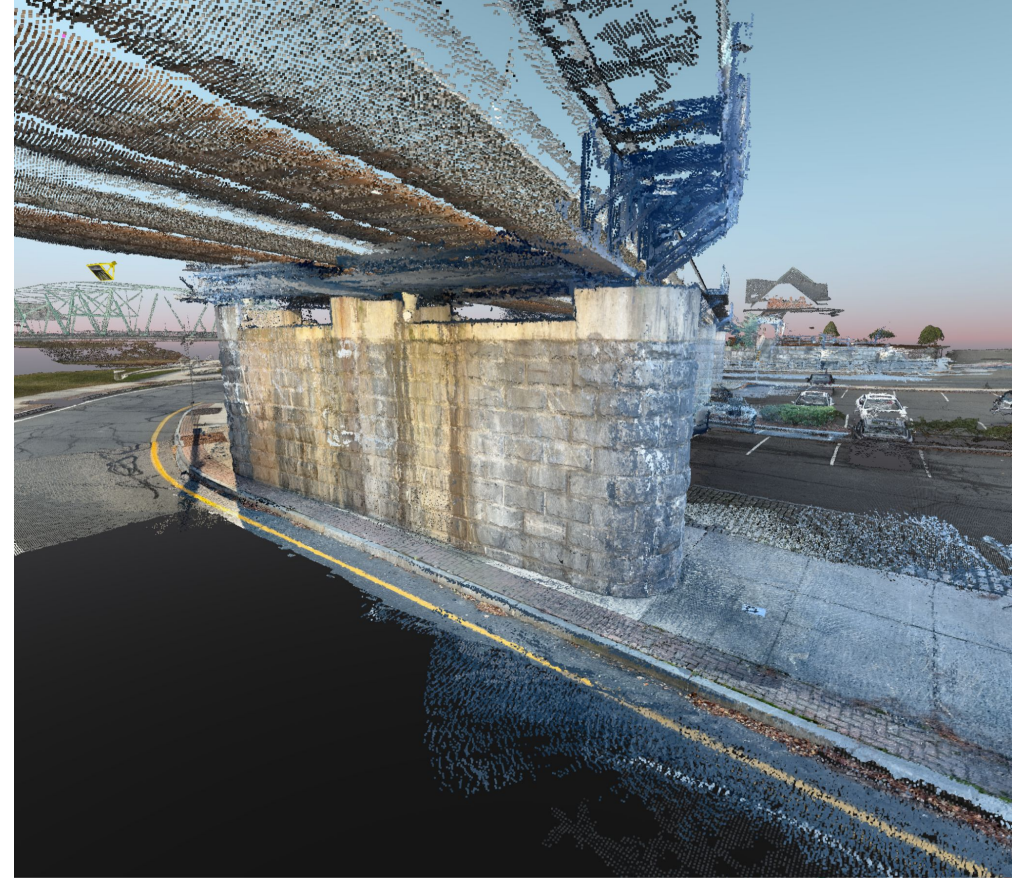




# Use Cases - Construction Inspection



# Use Cases - Supplemental Scanning



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# Use Cases - Inspection



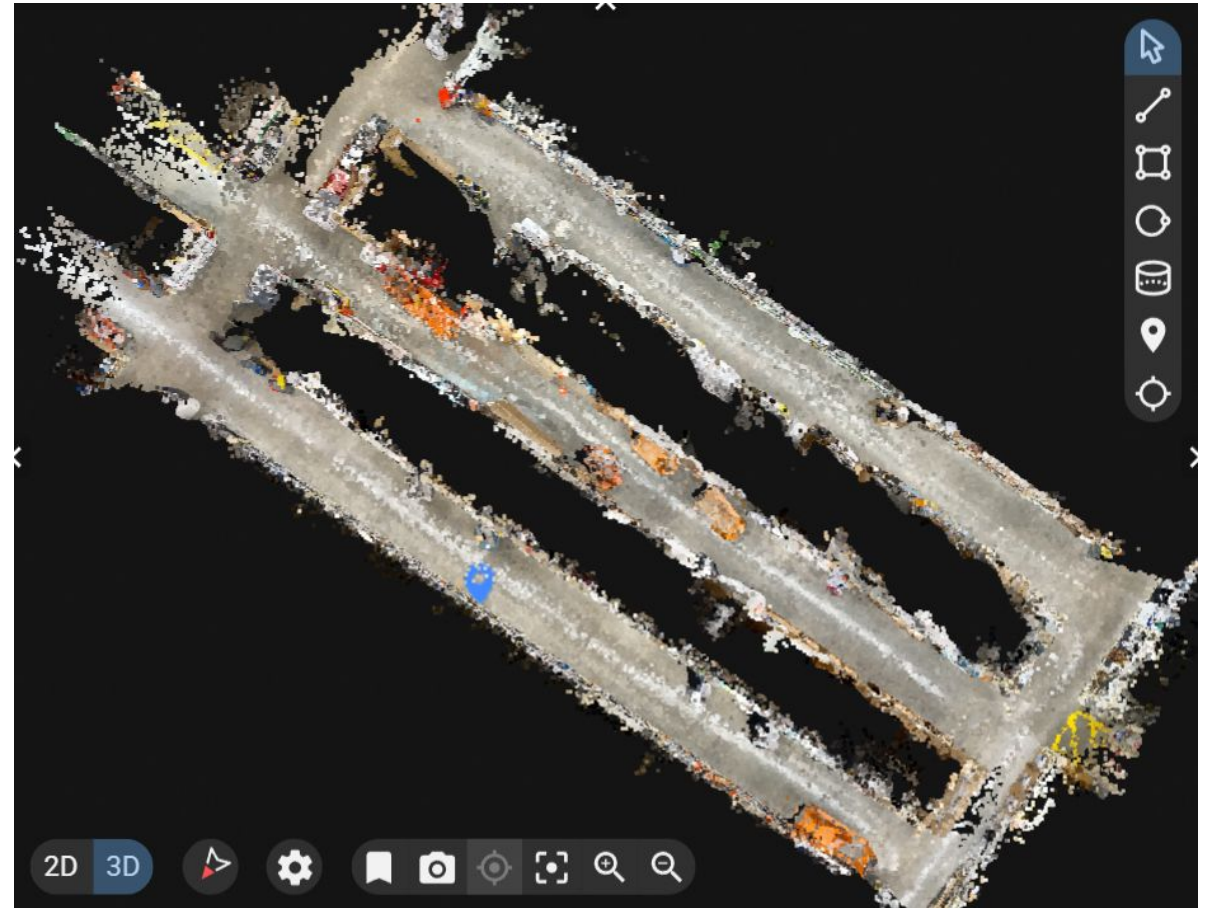
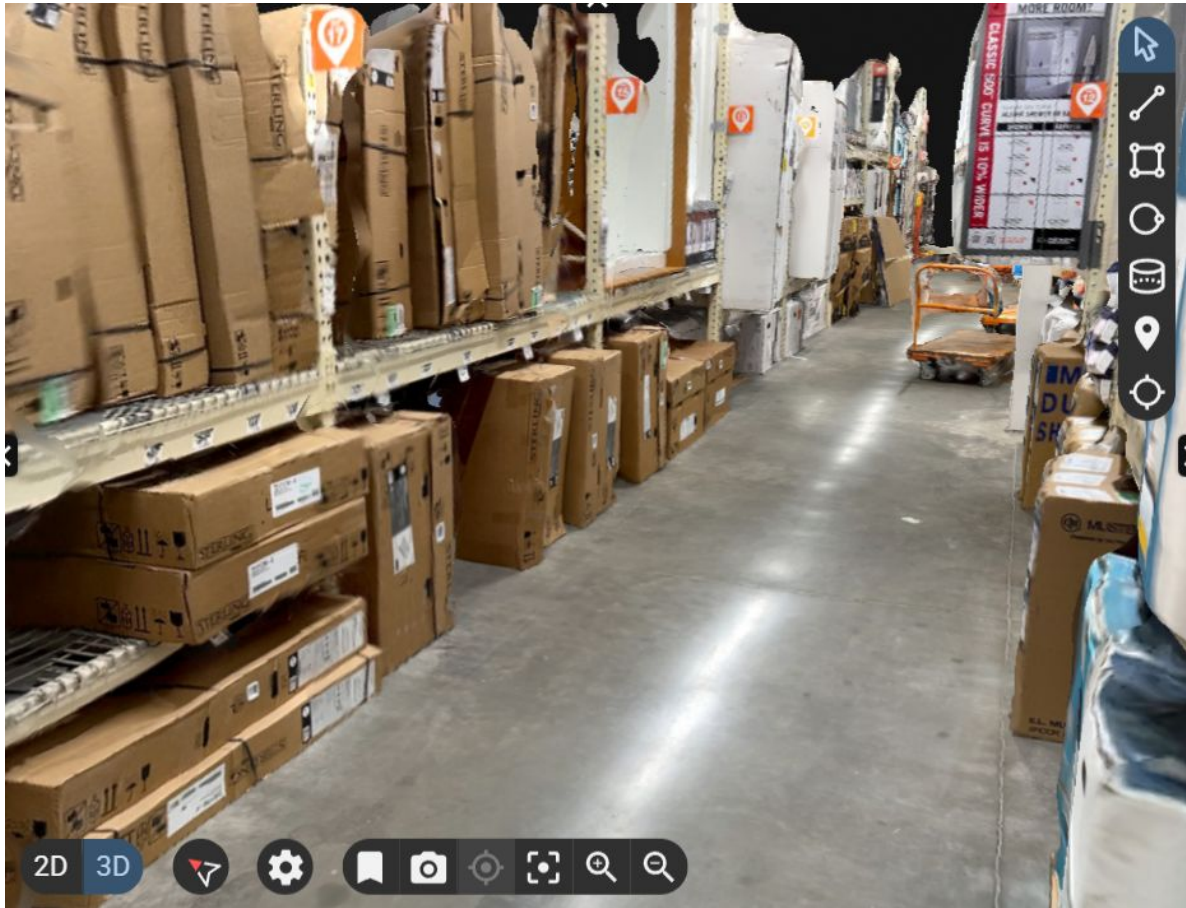
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# Use Cases - Interior Warehouse & Retail



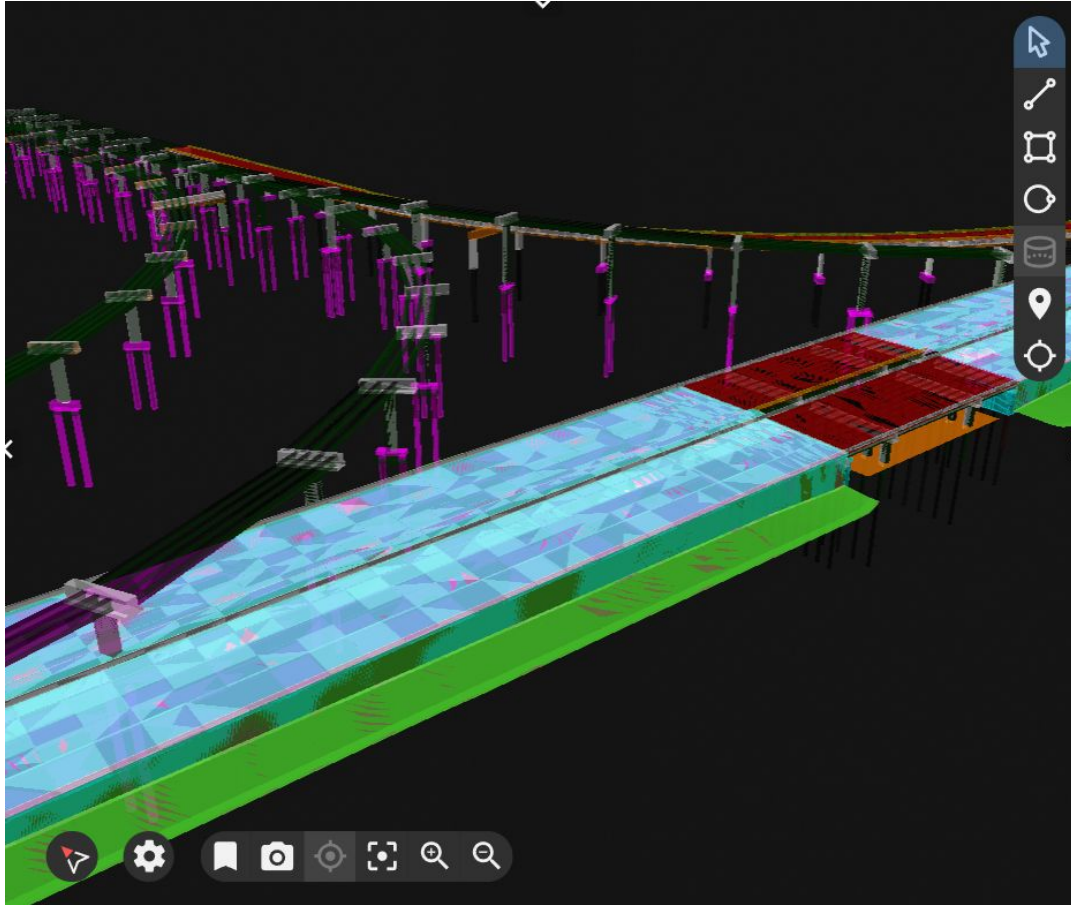
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# Use Cases - Digital Twin Maintenance



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# Augmented Reality

- Design Plans
- Utility Records
- Old Markouts
- GIS Data
- Field Notes
- Models & Point Clouds
- Volume Measurement
- Points and Alignments



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Thank you!

## Contact

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