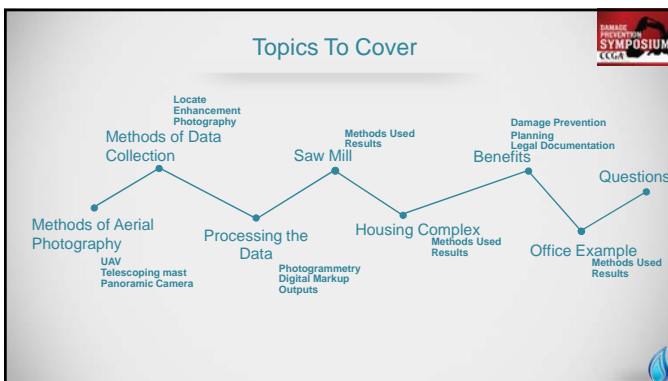


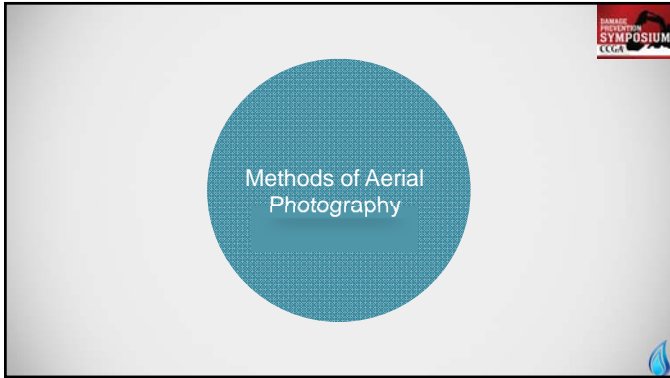
WESTERN
LOCATES
A DIVISION OF WESTERN LEAKAGE SERVICES LTD.

Aerial Photography To Map
Underground Utilities
Presented by:
Charles Moolin

With respect to our environment, the CCGA chooses not to print session notes. We know many people find session notes to be beneficial, therefore session notes for most sessions are available for download by clicking: <http://crowd.cc/2015ccga> from your device.




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Methods of Aerial Photography

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Telescoping mast



- Easily controlled and highly portable
- Has less deployment restrictions than the quadcopter.
- Height up to: 70ft / 21.35m
- Higher resolution camera

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UAV



- Quadrotor or Fixedwing
- Greater field of view
- Larger projects can be easily completed with multiple photos

Panoramic Camera



- Very quick and easy to use
- Data can be processed quickly

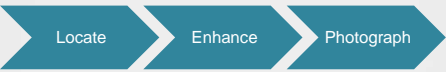
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Methods of Data Collection



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Data Collection



Locate
Locate Utilities
Mark the underground utilities using conventional locate methods.

Enhance
Enhance Paint
Placement of colored markers to enhance the marking of the utilities.

Photograph
Photograph Site
Use UAS, telescoping mast, or panoramic camera to capture photographs of the marked out utilities.

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Utility Locating



- Conductive Locating
- Inductive Locating
- Ground Penetrating Radar
- Marked out with Paint, stakes, or other markers

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Enhancement



- Plastic Markers
- Colors associated with different utilities
- Allows location of utility to be seen from a distance

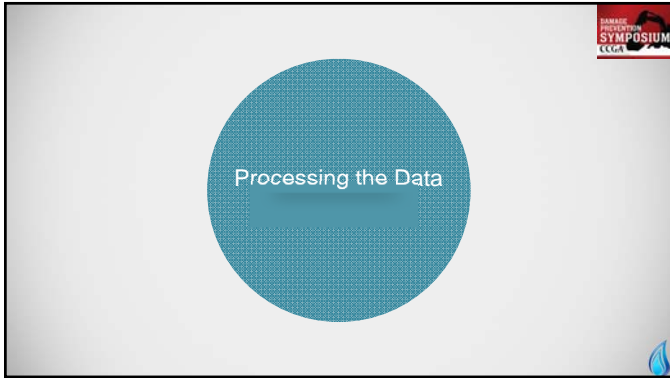
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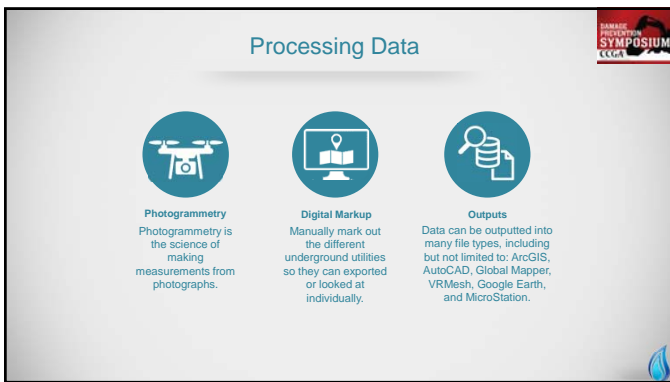
Photography

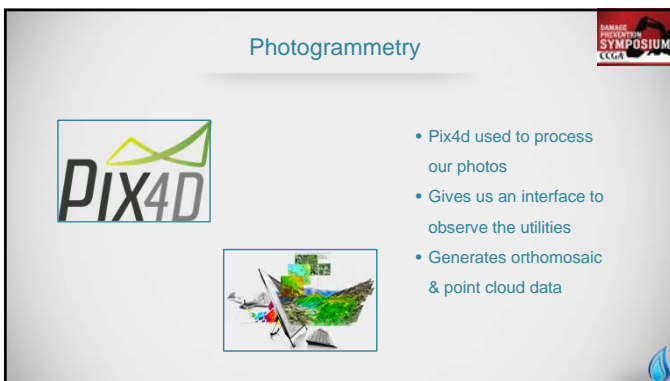


- Photo Sensors
- Mirrorless camera sensor for speed
- Gimbal used to stabilize the sensor
- 360 degree camera for panoramas

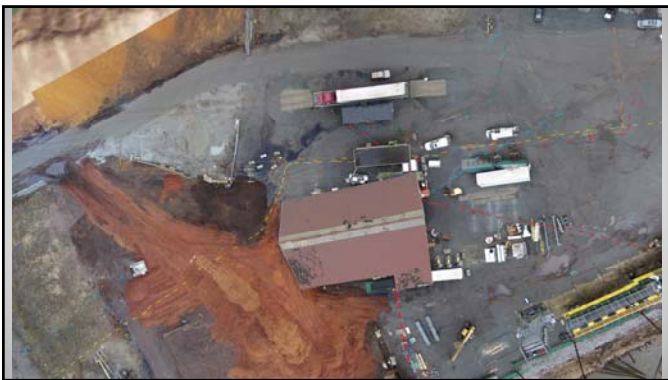
DAMAGE PREVENTION SYMPOSIUM CCA









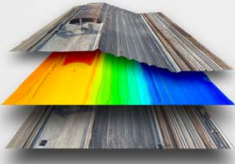


Digital Markup

- We superimpose layers of polylines or vectors
- Allows for the underground utilities to be seen more easily
- Polylines can be exported separately to .dxf, .shp, .kml, or .dng

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Outputs



- Data can be outputted in many formats: DSM, DTM, CAD, textured 3d models, point clouds

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Saw Mill



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Equipment/Scope



- 40,000 square meters(48,000 sq yards)
- GPR & Conductive locating equipment
- UAV Quadrotor
- Processed with Pix4D

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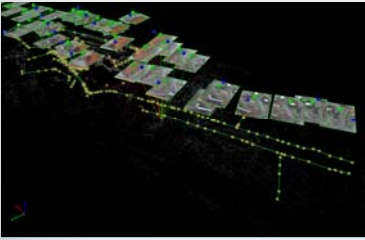
Data





- Multiple Photos Taken in a grid format
- Each photo has GPS coordinates associated with them
- Markers on ground enhance the marked out utilities




Processing





- Pix4D Used to process the photos
- The data is compiled to create a point cloud & geo-referenced orthomosaic



Overlay



- Polylines are manually marked out over the point cloud data



Results



Orthomosaic
Multiple images used to form a mosaic that is orthorectified and geo-referenced.



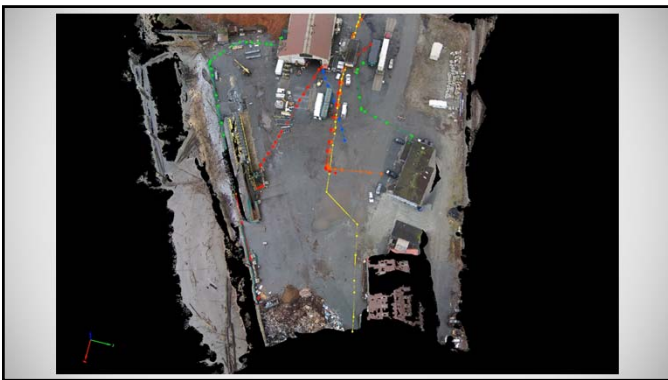
Point Cloud
A set of data points in generated in a three-dimensional space. Each point has gps points associated with it.





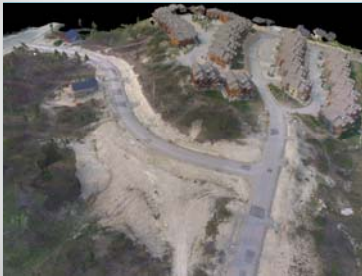








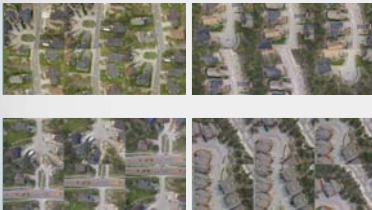
Equipment/Scope



- 94 Acres (38.4 Hectares)
- Conductive locating equipment (only gas located)
- UAV Quadrotor
- Processed with Pix4D



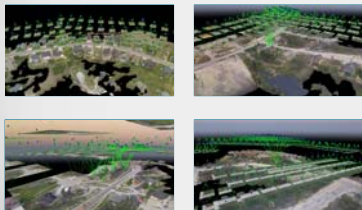
Data



- 750 photos
- Split up into 4 parts(sections)
- Each section processed separately



Processing




- Pix4D Used four separate times to process the photos
- The data was compiled to create four point clouds & geo-referenced orthomosaics




Overlay




- Each orthomosaic has vectors placed over the utilities.
- Street names and points of interest are added in post processing




Results



Orthomosaic
Multiple images used to form a mosaic that is orthorectified and geo-referenced.

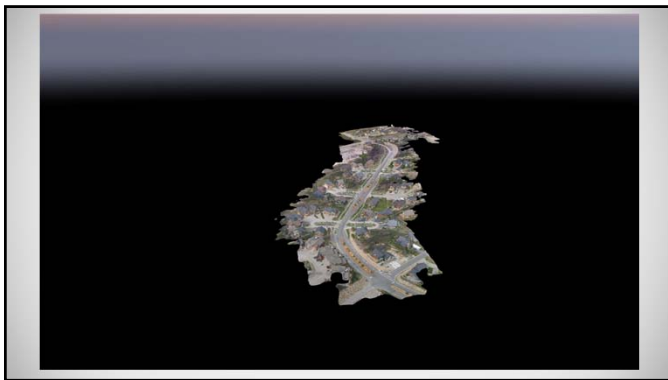


Point Cloud
A set of data points in generated in a three-dimensional space. Each point has gps points associated with it.











Equipment/Scope

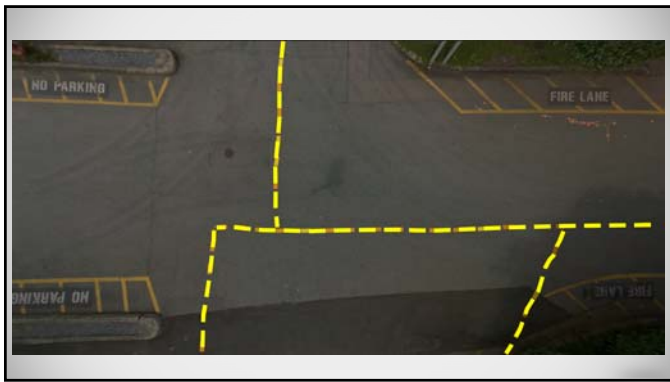


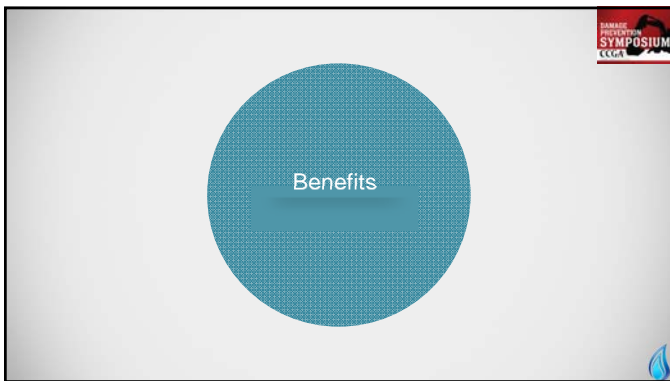
- Conductive locating equipment
- Gas utilities where located
- 360 panoramic camera
- Processed with panoramic editing software











Benefits



Damage Prevention



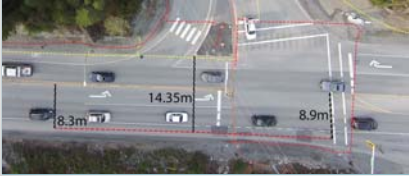
Planning



Legal Documentation

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Damage Prevention



- 100% accurate data of the locate and the work area
- Less interpretation for on site crew

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Planning



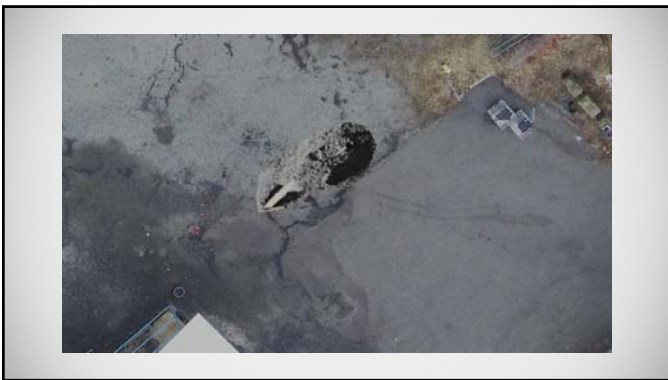
- Get to see recent photo, compare their proposed work to what's actually in the ground

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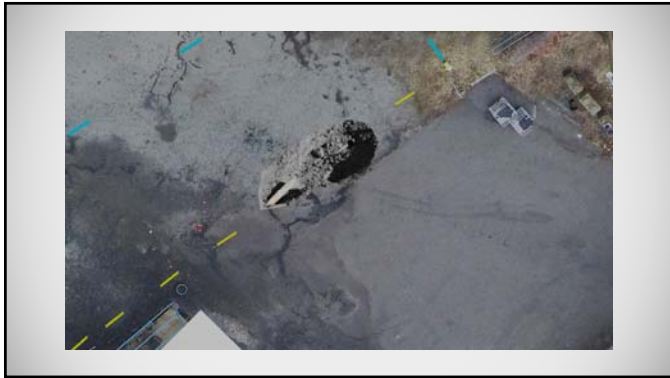
Legal Documentation




- Aids in damage investigation
- Prevents unscrupulous clients from repainting lines
- Court Ready Legal documentation













Thank You For Listening

We'll be answering questions now

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