Using LiDAR to Obtain Manhole Elevation

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Introduction

- Accurate manhole elevation data are critical to modeling utility network.
- Getting manhole elevation is a labor intensive task.
  - Traditional survey (high accuracy)
  - GPS (varying accuracy)
LiDAR (Light Detection And Ranging)

- High accuracy (up to half foot)
- High efficiency
Get Manhole Elevation by LiDAR

- Obtain LiDAR data
- Process LiDAR data
- Extract manhole elevation
- Verify manhole elevation
Obtain LiDAR Data
Get Manhole Elevation by LiDAR

- Obtain LiDAR data
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Process LiDAR Data

- Use ArcGIS 3D Analyst tools to generate
  - DSM (Digital Surface Model) First Return
  - DEM (Digital Elevation Model) Bare Earth
Process LIDAR Data (Continued)
Process LIDAR Data (Continued)

DEM
Get Manhole Elevation by LiDAR

- Obtain LiDAR data
- Process LiDAR data
- Extract manhole elevation
- Verify manhole elevation
Extract Manhole Elevation

- Use ArcGIS Spatial Analyst tools to extract manhole elevation from DEM
Get Manhole Elevation by LiDAR

- Obtain LiDAR data
- Process LiDAR data
- Extract manhole elevation
- Verify manhole elevation
Verify Manhole Elevation

- Use ArcGIS Spatial Analyst tools to extract manhole elevation from DSM
- Compare the elevations from DEM to DSM for each manhole
- Identify the manholes with larger elevation difference and select some manholes randomly
- Verify the selected manhole elevations with field data.
Verify Manhole Elevation (Continued)
Verify Manhole Elevation (Continued)
Verify Manhole Elevation (Continued)

Histogram

Elevation Difference between DEM and Field Data (feet)

Frequency %

-5 to 0: 73.59%

0 to 5: 26.41%
Summary

- Getting manhole elevation by LiDAR
  - Efficient
  - Accurate
  - Not labor intensive
Questions