Feature Extraction from LiDAR

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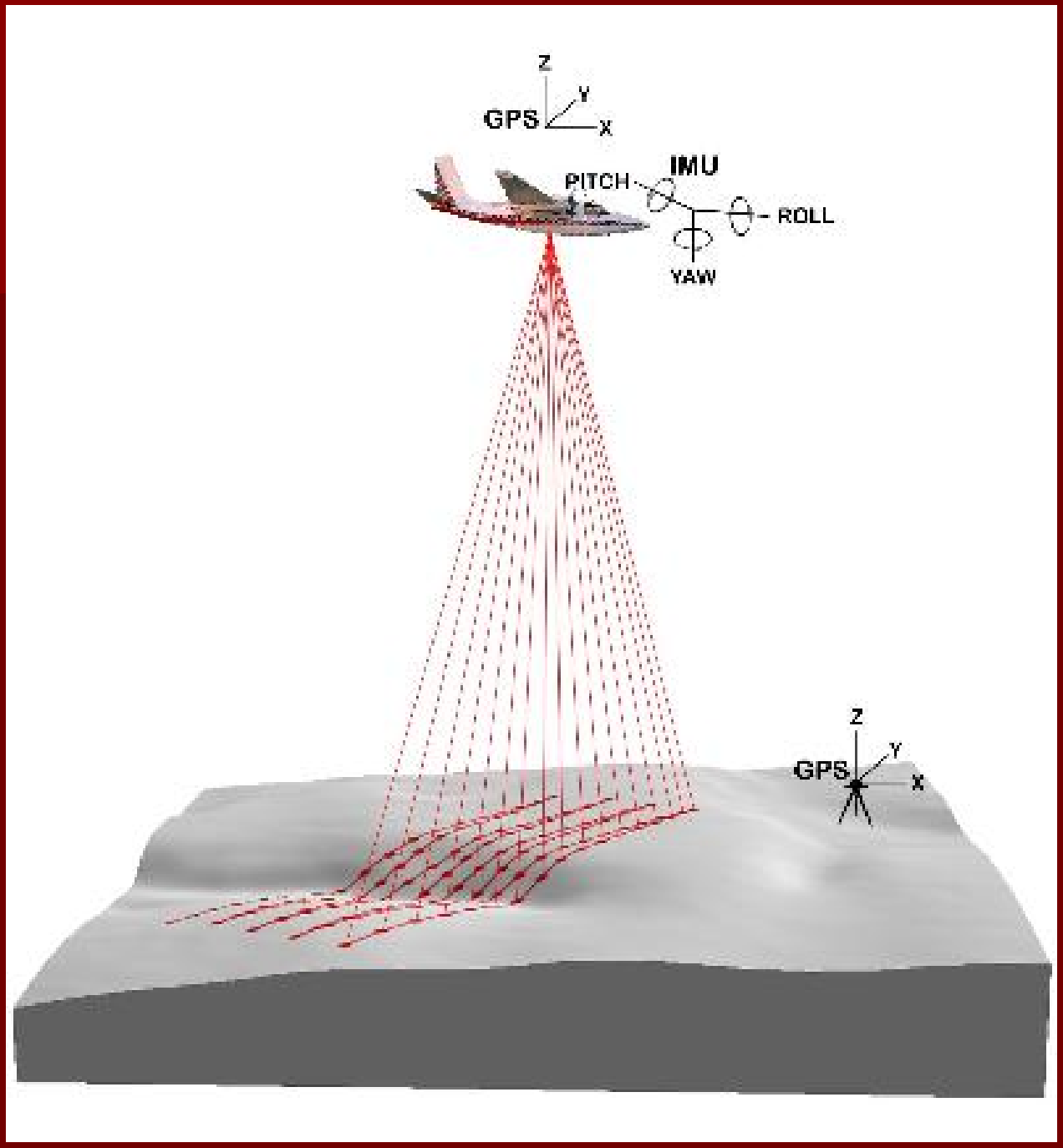
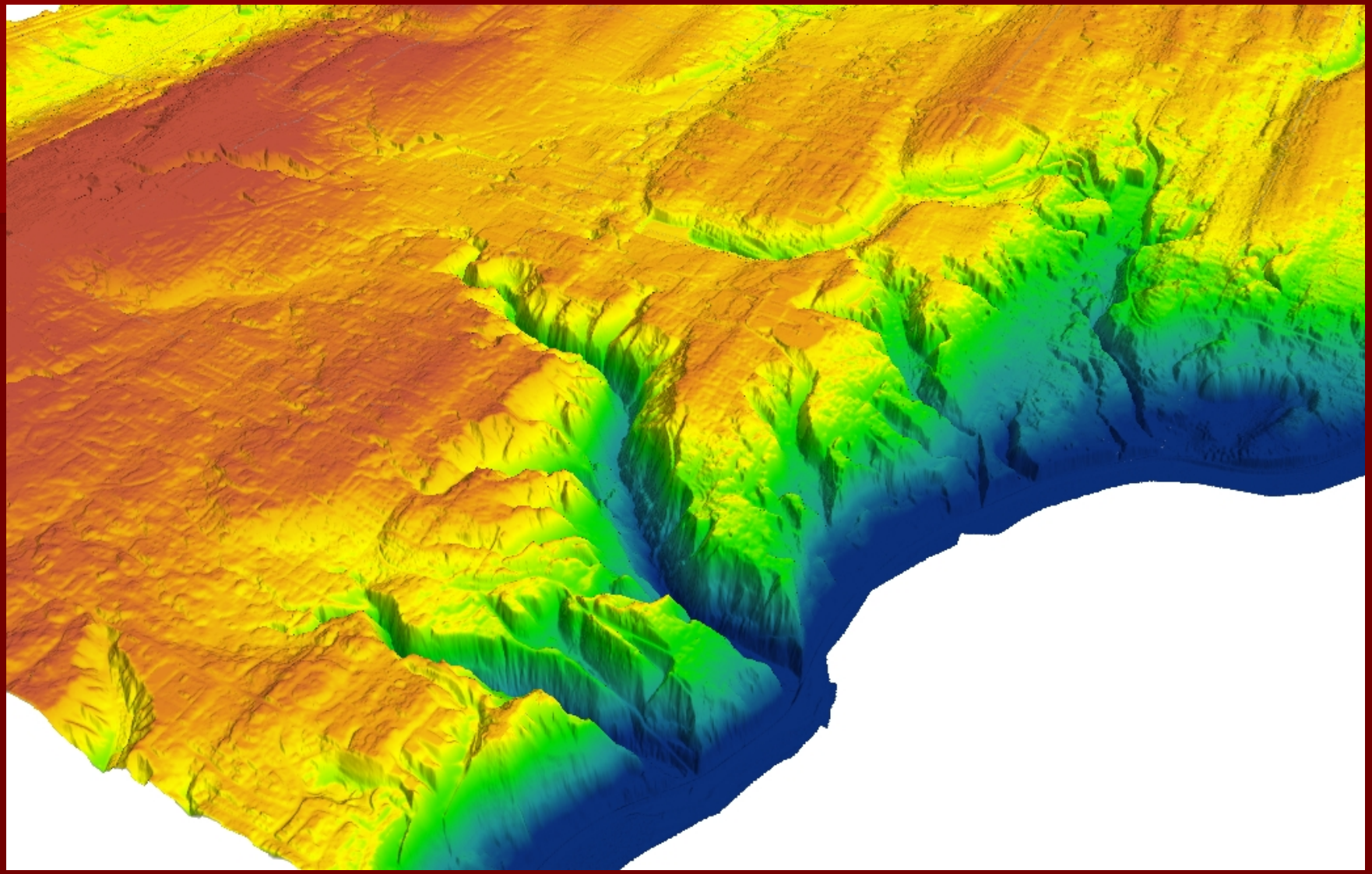
LiDAR and DEM

- **LiDAR** (Light Detection And Ranging) is a remote sensing technology that measures distance and other properties usually using a laser

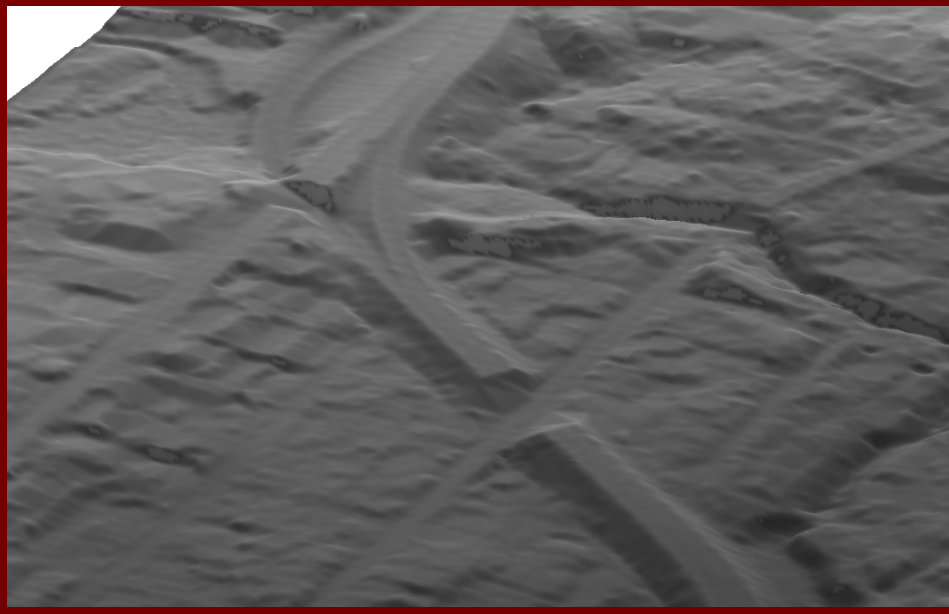
- LiDAR points can form a blanket of data or a **DEM** (Digital Elevation Model)

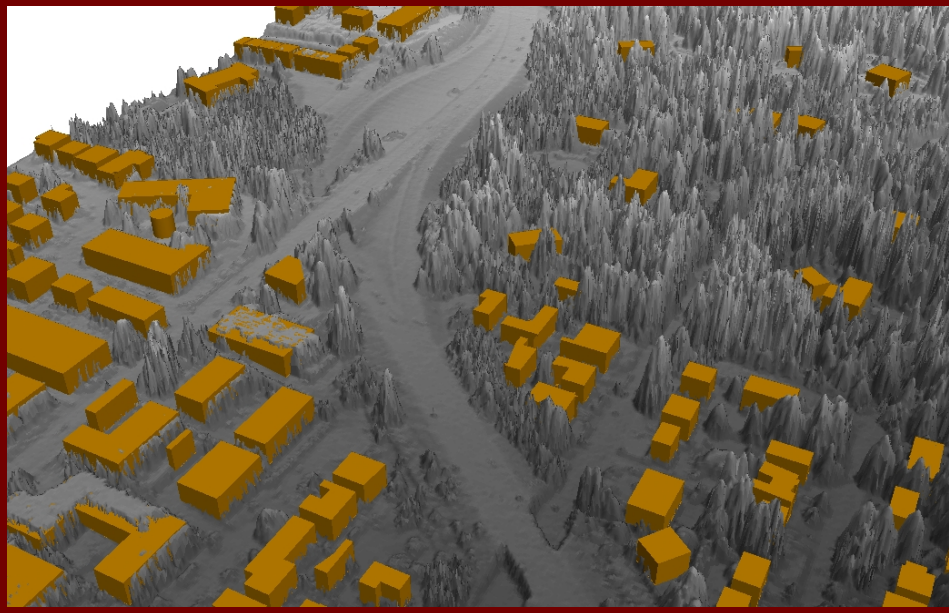

Z
Y
GPS
X
IMU
PITCH
ROLL
YAW
Z
Y
GPS
X



DEM's

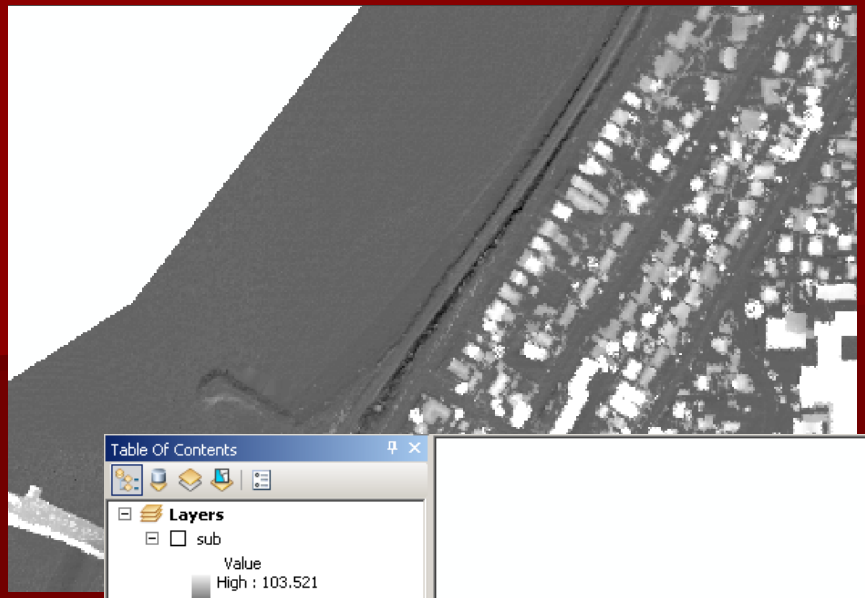
- **Full Feature DEM**
  - First surface the laser hits
  - Top of buildings, trees, bare ground
- **Bare Earth DEM**
  - Software is used to take the full feature data and extrapolate elevations without buildings and vegetation





DEM Setup

- Subtract Full DEM from Bare Earth DEM
  - Raster Calculator; Spatial Analyst
- Divide by 4 or 8 to setup into “stories” and convert to integer
  - Raster Calculator



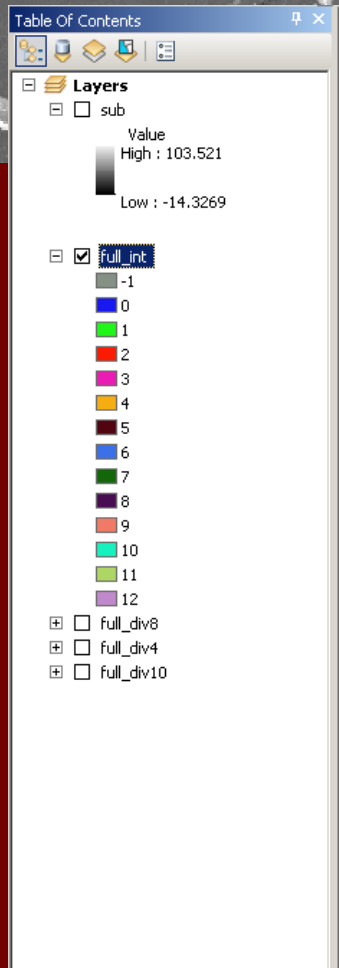
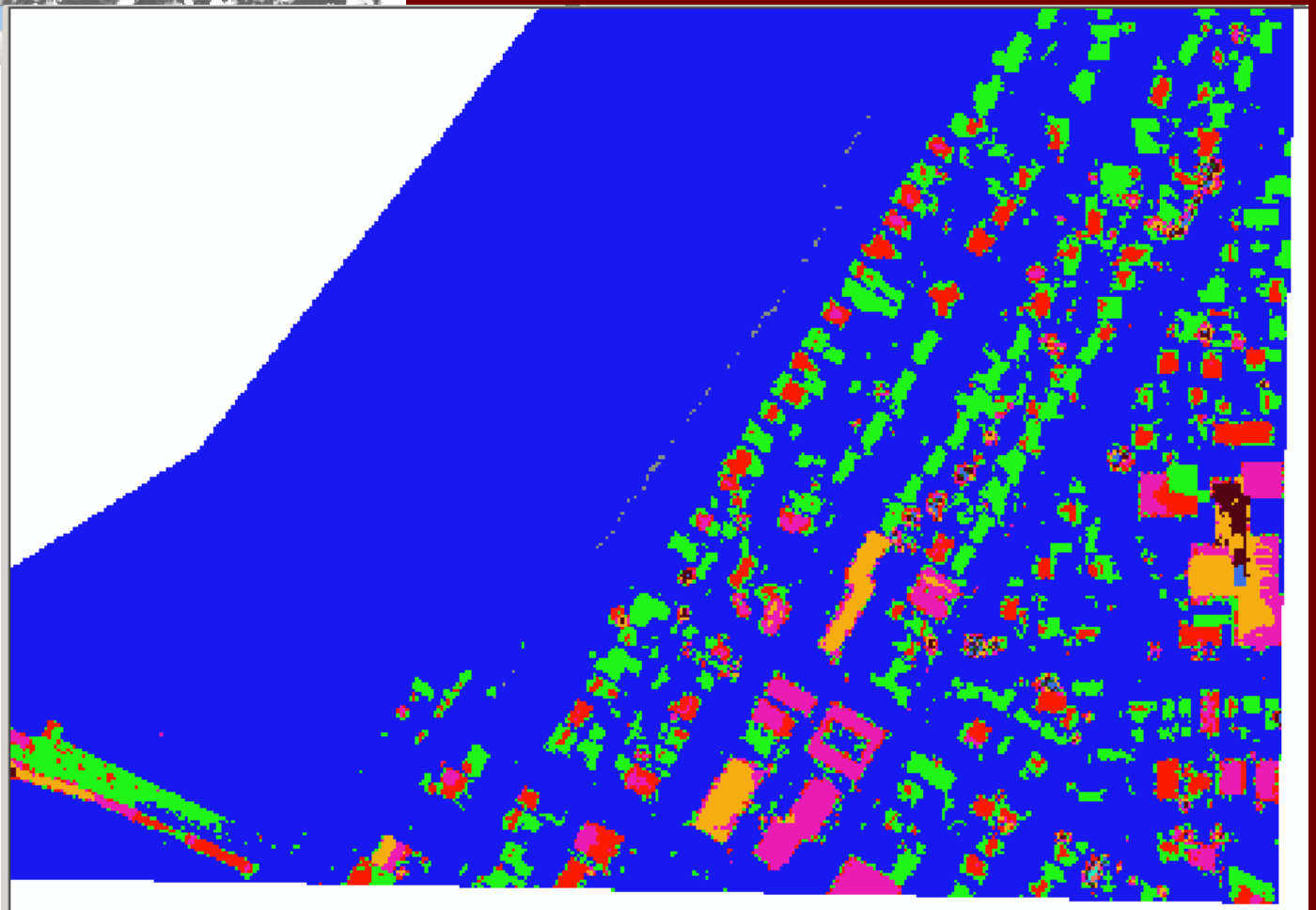
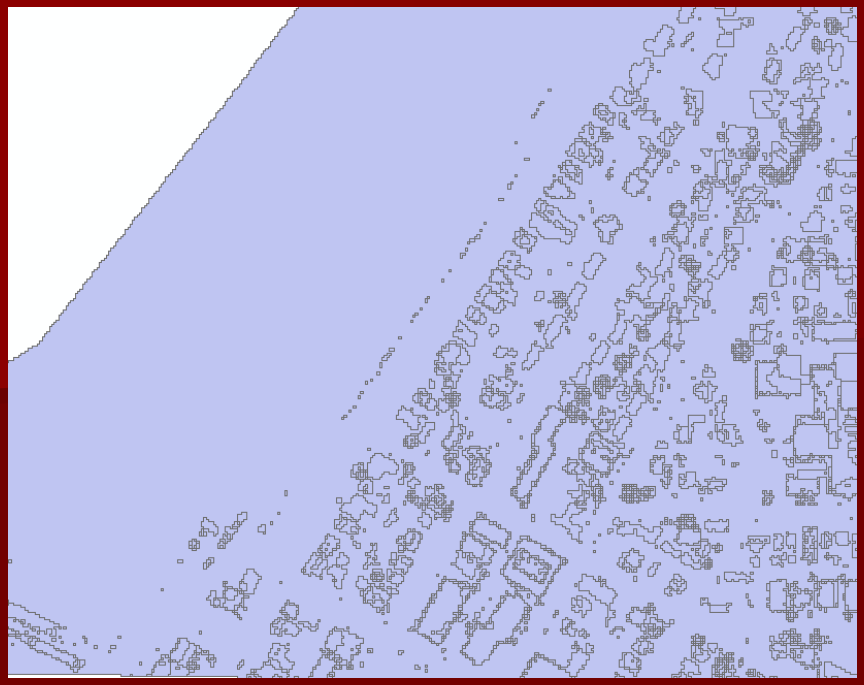


Table Of Contents
Layers
sub
Value
High : 103.521
Low : -14.3269
full_int
-1
0
1
2
3
4
5
6
7
8
9
10
11
12
full_div8
full_div4
full_div10

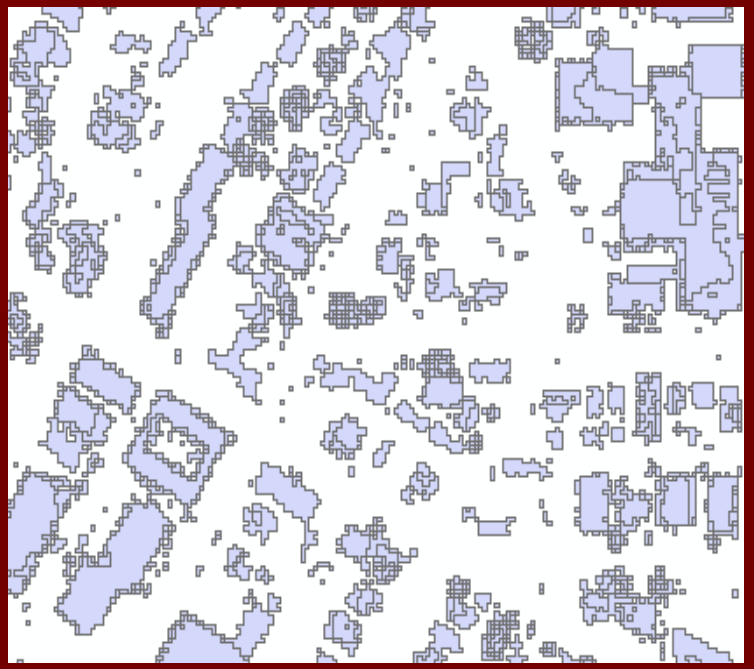


Polygon Setup

- **Convert to Polygon**
- **Select** Polygons that are >2. Less than 2 is everything under 8 feet tall.
- Add area field and **calculate area**
- **Select** large polygons, >300~400 sq ft
- **Export selection**



Convert to Polygon

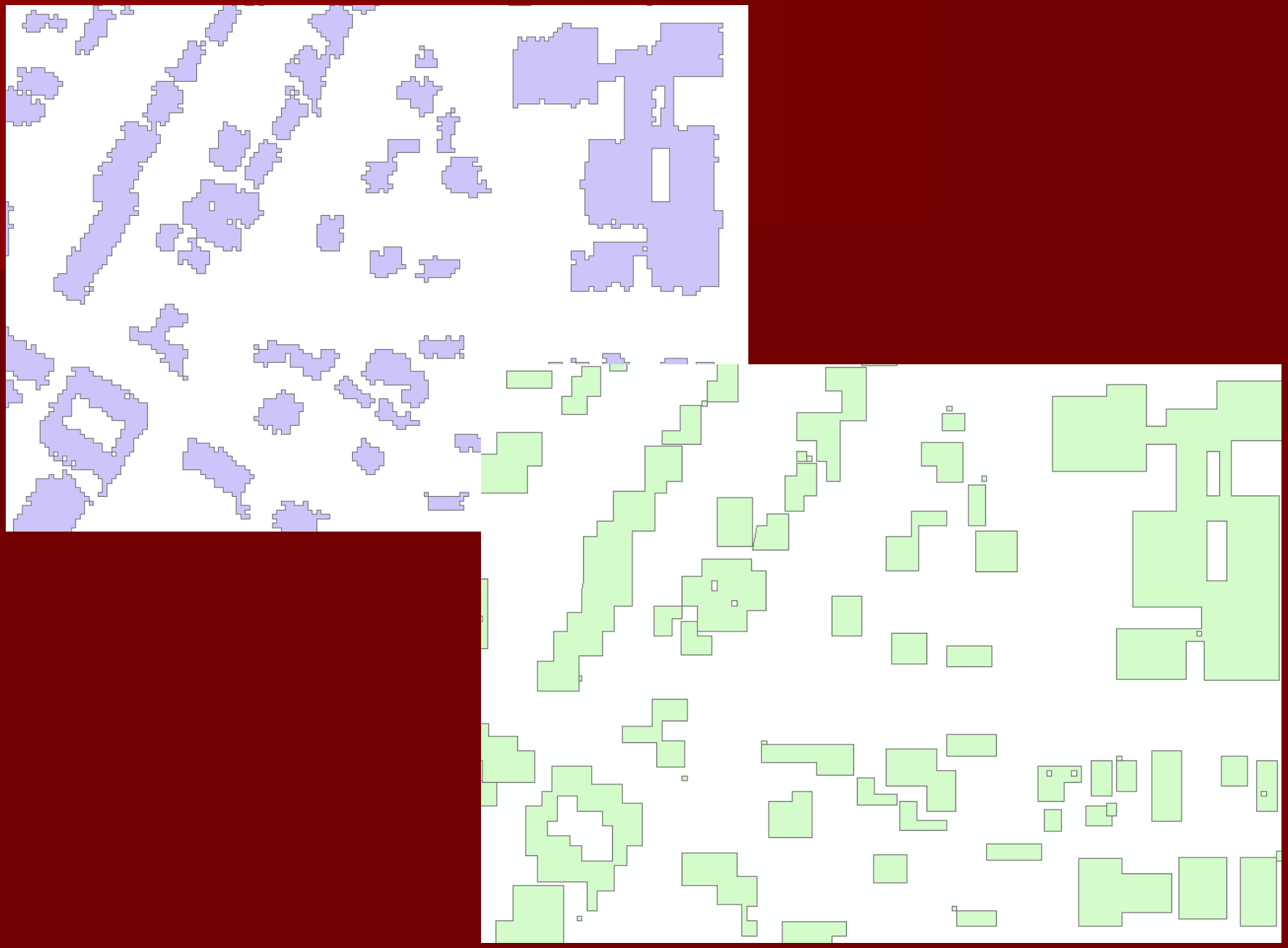


Stories removed, area calculated

Small polygons removed

Polygon Setup cont

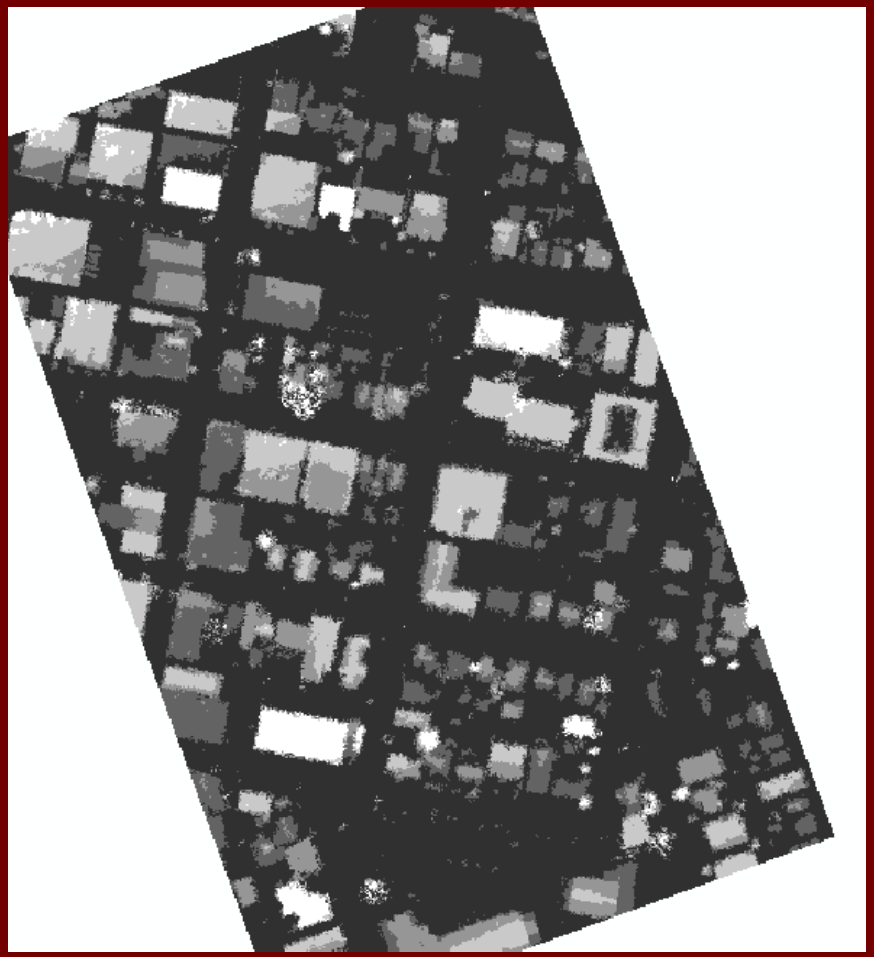
- Add back small polygons that share a border with this new layer. This sharpens up the edges where the DEM may have been split into the wrong story.
- **Merge** large and small polygons in an Edit Session
- **Explode Polygons**
  - Multipart to single part
- **Simplify Building** tool
  - 6 or 12 to 7 or 13 for tolerance



Cleanup

- A fair amount of cleanup is needed to remove large swaths of vegetation and odd building shapes. Any buildings closer than 6-12 feet sometimes merged together.
- Simplify Building tool does not account for buildings on the diagonal of the DEM pixel. Major drawback if dealing with buildings that are not oriented to N,S,E,W

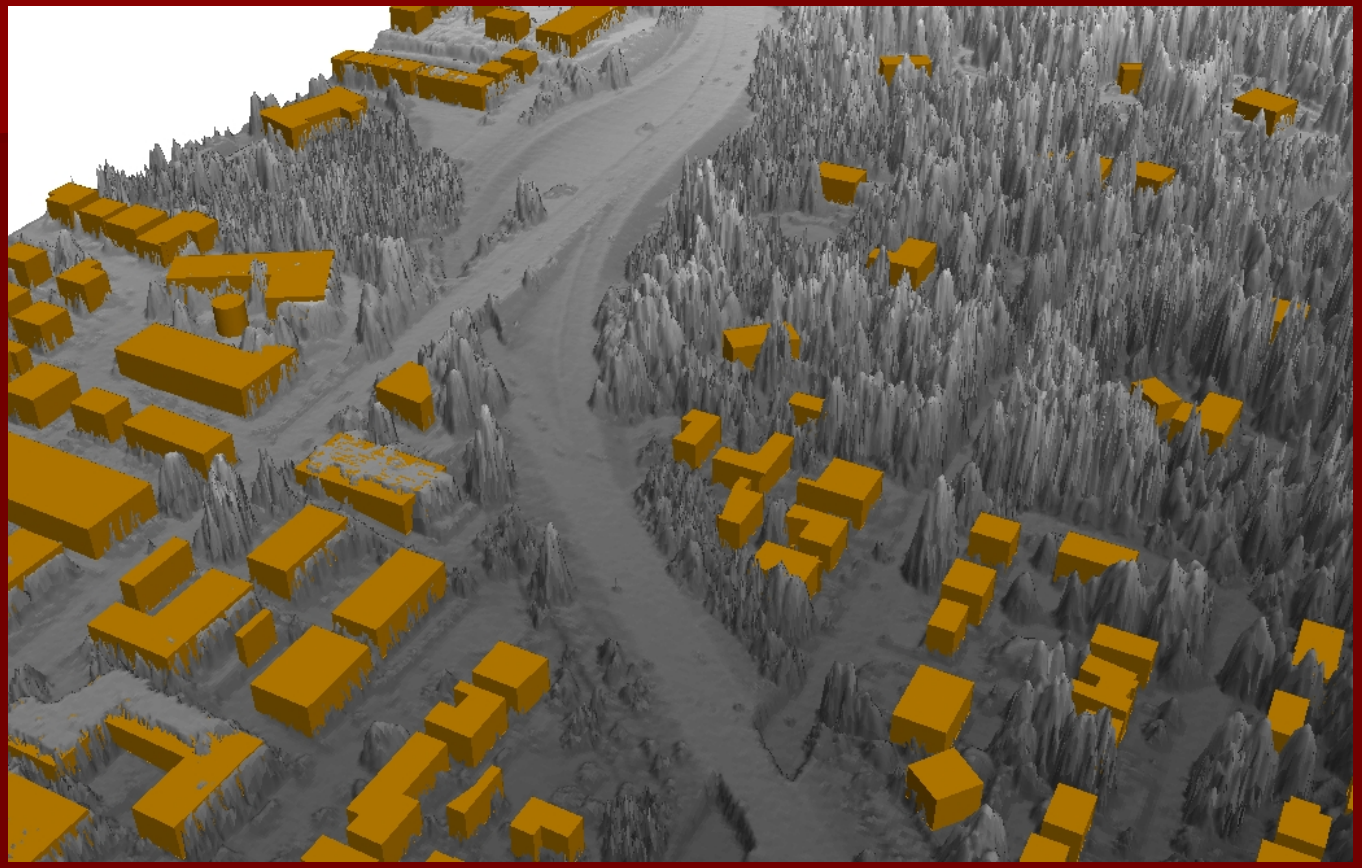
- To account for large areas of uniform angles, rotate the selected area DEM's and perform extraction. Rotate the polygons back when finished.



Extras

- Add back in “stories” data for height or 3D extrusions
- Use gable/slope to add in roof structure
- Merge hand made footprint layer with new automated one
- Use infrared to help clean up high vegetation areas
- **LiDAR Analyst** from Overwatch Geospatial software works better for feature extraction and other remote sensing tools, but $10,000 with a $2,000 maintenance

Questions



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