LP360

Case Study

GIS Department
City of Franklin, TN

Identifying Building Heights over 32 ft for the City of Franklin Fire Department

Using tools such as aerial photographs and the global positioning system (GPS), the GIS team gathers and processes spatial coordinates, topology and dimensions of fixed physical objects such as buildings, rivers and roads, and translates the raw data into usable information. Combined with a strategic vision, this data provides a powerful system capable of analyzing complex information regarding our physical environment. Trained personnel use this information to create digital and paper maps of extraordinary detail, plan for future growth, perform trend modeling, monitor environmental changes, assess security and disaster requirements, and efficiently dispatch emergency services.

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"Using LP360's comprehensive toolbox it was easy to create and implement a workflow and provide the information required." - Jake Harvey

HISTORIC FRANKLIN TENNESSEE

Challenge

Use LIDAR data to identify buildings over 32 ft (3 stories) in height for the City of Franklin Fire Department to maintain a building database with elevation information.

Solution

The Franklin Fire Department asked if our GIS department could identify all of the buildings within the city limits that were over 32ft or 3 stories tall. This information was needed on behalf of the ladder company for a new ISO insurance rating purpose. Building height data was currently not being maintained, so we turned to our LIDAR data as a source to extract the elevation information required. Using LP360 we were able to render the height information needed for each structure and create not only a qualitative but also a quantitative analysis based on the building footprint shapefile.

To accomplish this, I first classified and generated squared footprints for all the buildings. (Figure 1)

The heights in LP360 are absolute (above sea level) (Figure 2). For our purposes we needed to determine building height above ground

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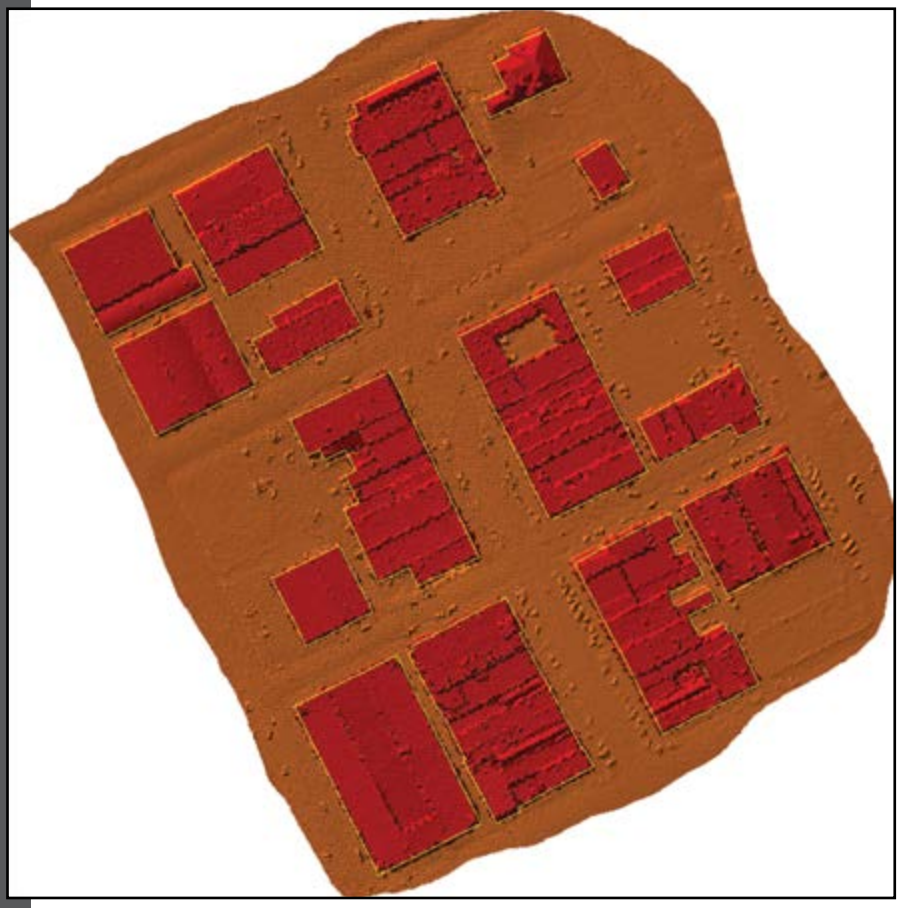


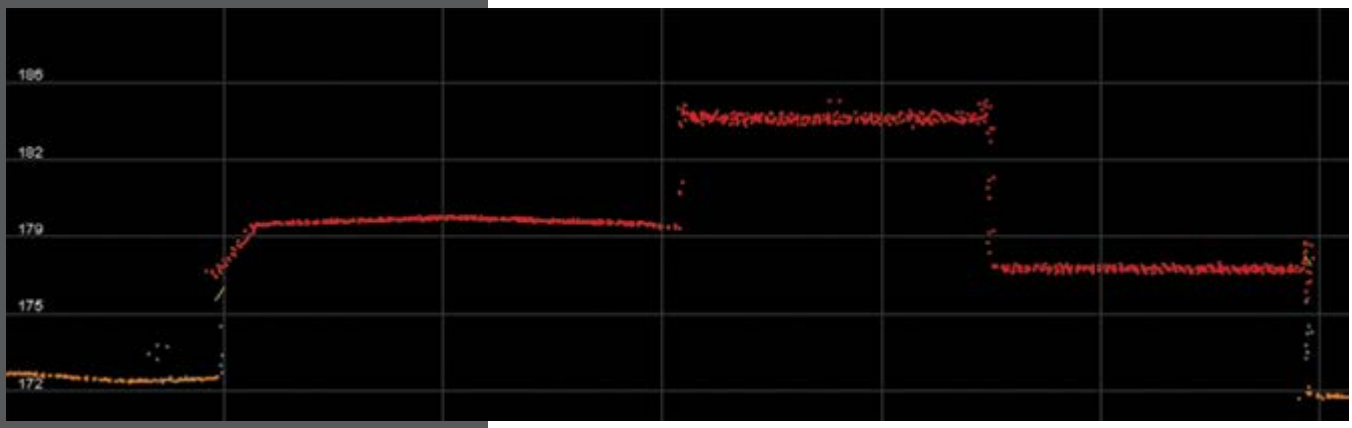
Figure 1 – Sample area of classified and squared footprints of the buildings

so the next step requires the creation of the height (Z value) for each building, relative to the ground.

One of the byproducts of the LP360 Volumetric Analysis Point Cloud Task is the option to generate a new LAS file for a subject area that have heights relative to ground. The resulting LAS file will contain only the exported building points (displayed by classification). (Figure 3)

Figure 2 – Building profile with absolute building heights

As you can see in the LP360 Profile View (Figure 4) the resultant



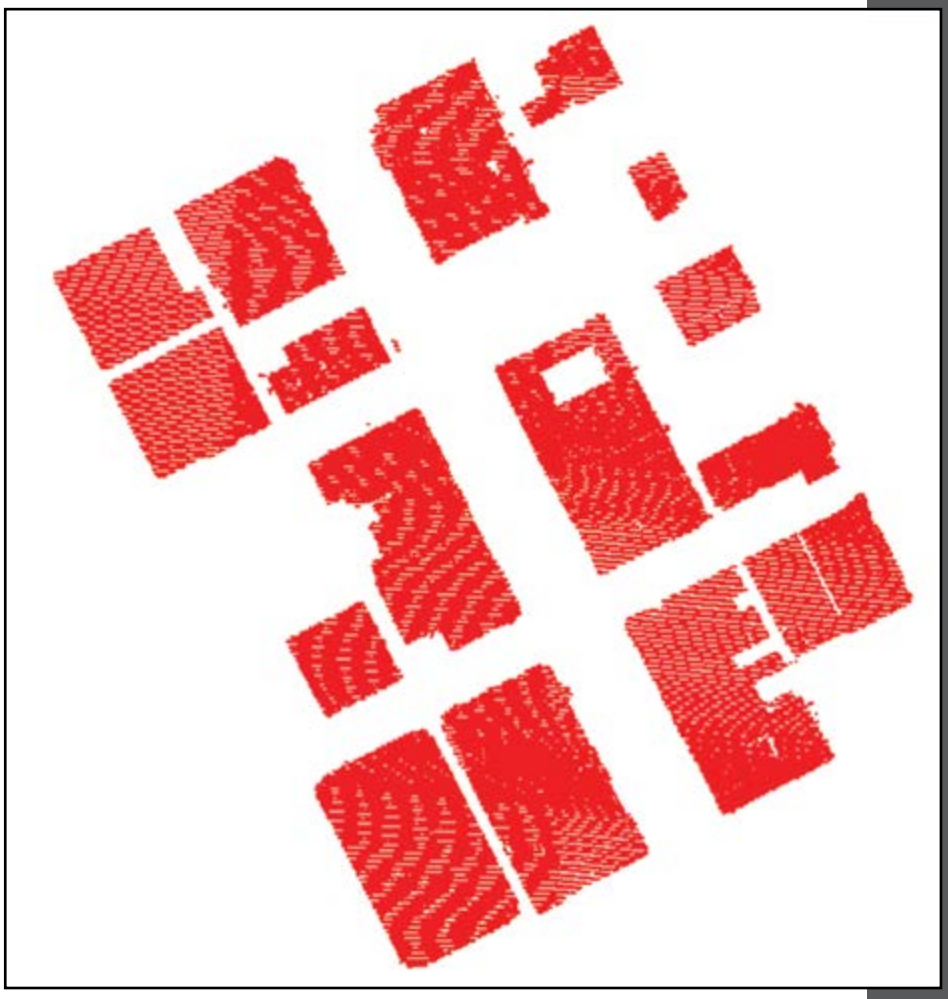


Figure 3 – Resultant LAS file from the Volumetric Point Cloud Tasks displayed by classification

height is now relative to ground as opposed to absolute as we saw in Figure 2.

Now, in order to get the quantitative part of the solution I again used an LP360 point cloud task to conflate the building points and created the final building height shape file with the applicable attributes (Figure 5).

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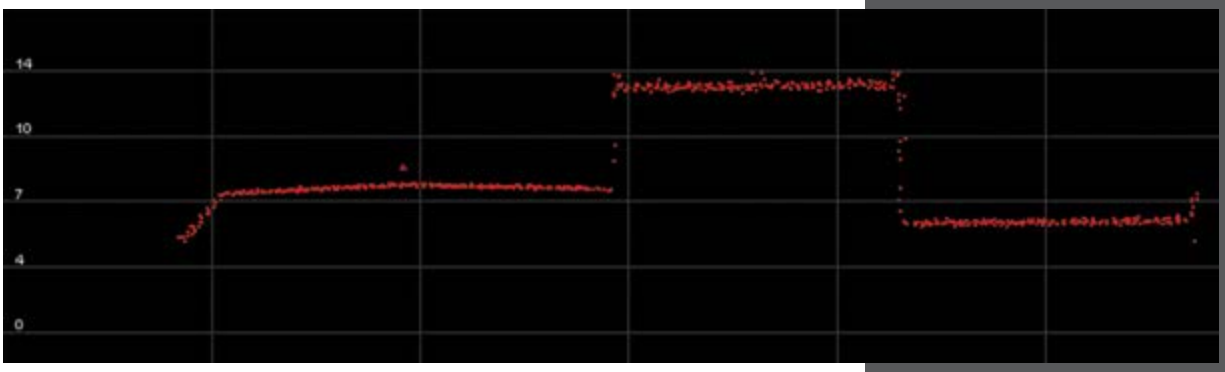


Figure 4 – LP360 Profile Window with building heights displayed relative to ground.

MaxHeight.shp

	FID	Shape	ID	MaxZ	Area	RmsErr	MaxErr	ForceFit
▶	0	Polygon	1	-9999	3736.0148	0.6675	2.2009	0
	1	Polygon	3	8.919	2097.6876	0.3986	1.2447	0
	2	Polygon	4	10.104	1003.1735	0.71	1.9375	0
	3	Polygon	5	7.122	1859.8752	0.3418	1.4073	0
	4	Polygon	6	15.603	2430.8885	0.7678	3.1922	0
	5	Polygon	7	-9999	2997.3878	0.6702	2.022	0

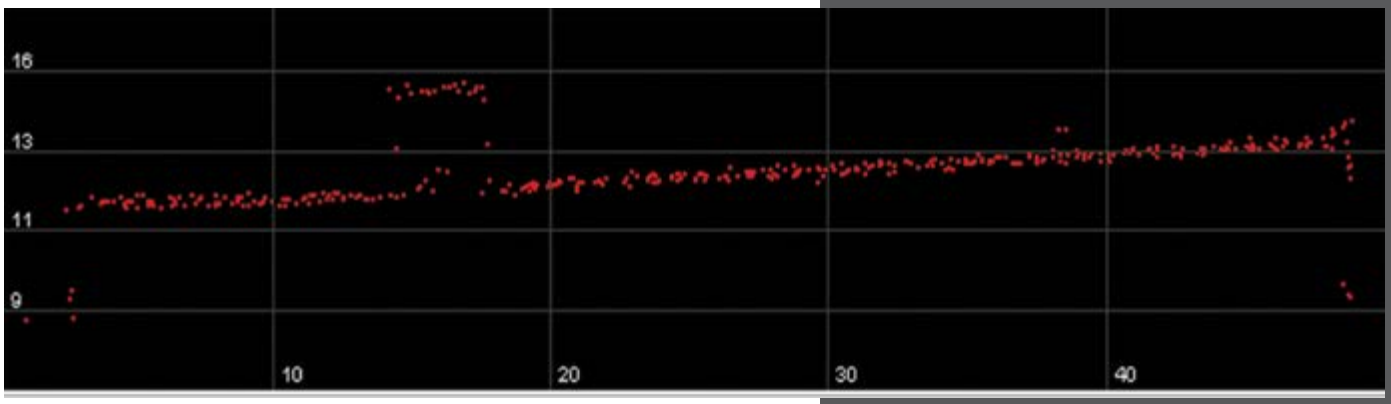
Figure 5 - MaxZ values

The resulting footprint has an updated attribute table that includes the building heights (MaxZ value). Sorting these by ascending order, we see that there are several buildings in this sample area over 32 feet tall (keep in mind the transition from Meters (of the dataset) to Feet) (Figure 5).

Returning to the Profile view (Figure 6), you can quickly view the highest section of the structure to again perform a qualitative analysis and verify the findings for accuracy. Based on the initial classification, this building checks out to the MaxZ value from the attribute table.

This solution worked successfully with only a small margin of error. This error being due to areas of the data being misclassified. An address list was then rendered based on location of each 32ft+ building. Using LP360's comprehensive toolbox it was easy to implement a workflow and provide the information required.

Figure 6 - Verifying MaxZ height



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