

UMS Group Inc. Substation Shape File Development



OVERVIEW

- Development of 950+ substation fence shape files
- This new shape layer allowed for colocation analysis of gas transmission assets crossing through substation boundaries, and identified closest distance for each pipe section, and for specific gas pipeline sections that passed within any substation boundary, classification of those gas assets by pipe size, pressure and other risk factors.
- For each substation, the distance in feet to the nearest corrosion and insulation boundary was calculated, and for corrosion also documented elevation and likely impact of the marine layer in terms of corrosion effect.



METHODOLOGY

Substation coordinate data was loaded into open-source GIS software, as well as Google Earth/Maps. Google Maps and Google Earth were used to identify configurations and draw the substation shapes. They were also used to cross reference against each other to find the correct location of the substation (when the imagery differed ~ 10% of stations.)

When the coordinates from the client system of record (e.g., SAP, Aspen, Cascade, GIS) appeared to be incorrect, the GIS coordinates were utilized (if different, and appeared to be more accurate). If an accurate location of a substation could not be determined due to incorrect coordinates, or the correct substation fence could not be distinguished because of neighboring facilities or tree coverage, screen shots were taken, and questions were sent to substation supervisors for assistance or suggested edits.

Google Maps was used to draw the initial substation polygon. KML files were created and loaded into QGIS for final checking/editing. They were saved and exported using the proper coordinate system, and as ESRI Shape and KML file formats. Corrected lat/long coordinates (central point of the polygon) were extracted and exported to excel. After the client reviewed the initial draft of substation shapes, suggested corrections were made, and a final set of files were delivered.

Case Study: Substation Shape File Development



DATA UTILIZED

Substation list extracted from client system (including substation name, coordinates, facility type, etc.), same list of substations extracted from GIS for cross reference purposes when issues were encountered.



CHALLENGES

General data quality issues, e.g., incorrect/missing substation coordinates.



SUCCESS

Example (right) substation point and shape layer seen via Google Earth.



This allowed “colocation” analyses to be conducted for the first time, in which the location of other assets, such as gas pipelines were analyzed to identify assets close to substation properties.

Proximity was quantified and used to measure relative risk.

As seen in the UMS Group analysis platform (right), fenced areas mapped in shape files include the active substation equipment area. High pressure Gas Pipeline objects and pipe segments were then mapped and color coded based on proximity to the SS fence.

