Los Angeles Metro's DigAlert Team Benefits from ArcGIS Spatial Conversion

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Metro

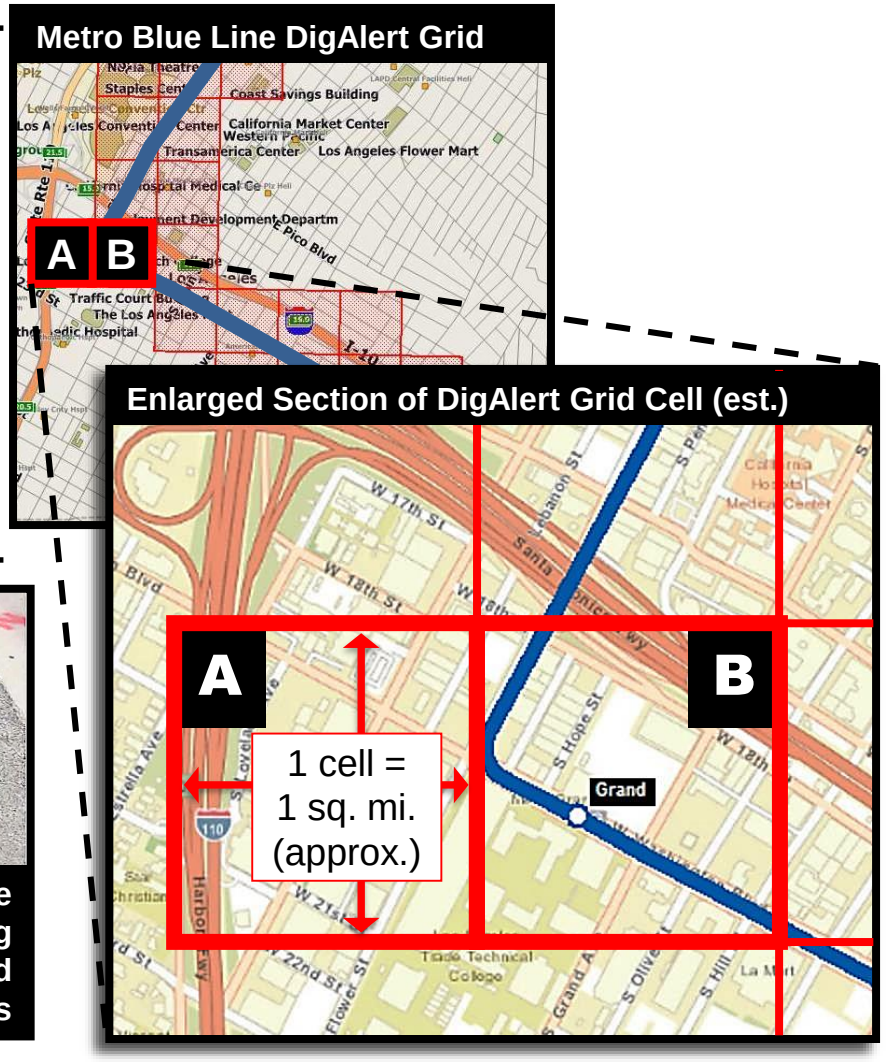
Background

- The "**DigAlert**" notification system or Underground Service Alert of Southern California was formed on September 13th, 1976 in response to a tragic accident that occurred in Culver City
- DigAlert notifications are mandated by law and serve nine Southern California counties aimed at eliminating the routine hazards experienced by construction crews digging near underground water, gas, or electrical utility equipment
- Before digging begins the location of underground utilities are color coded

Source: https://www.digalert.org/

DigAlert System Process

1. Businesses with underground utilities register with the DigAlert program and identify the location of their equipment using an online grid based system
2. Companies planning to dig use the system to identify the extent of the dig area, after which an email is sent to any DigAlert member with equipment within that area
3. DigAlert members are required within two business days to acknowledge that either they DO or DO NOT have equipment
4. If the member has equipment in the area they are required to go and mark it with the appropriate colors



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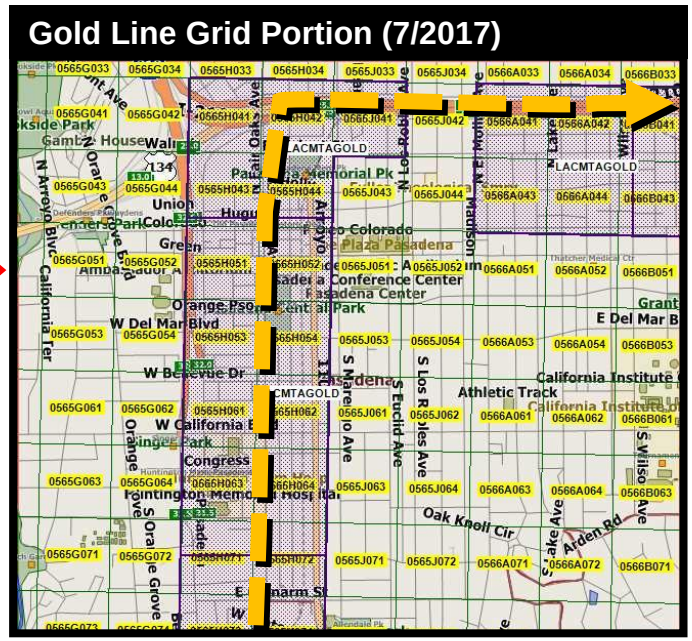
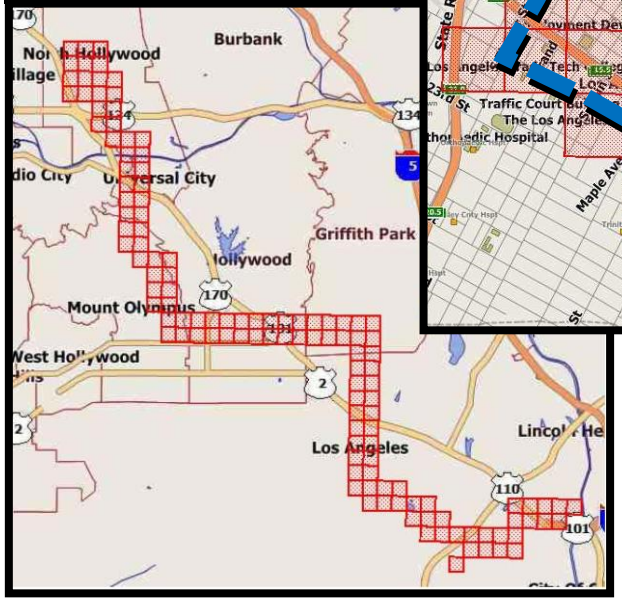
Metro Rail Line DigAlert System Grid Maps

System Grid Maintenance Window

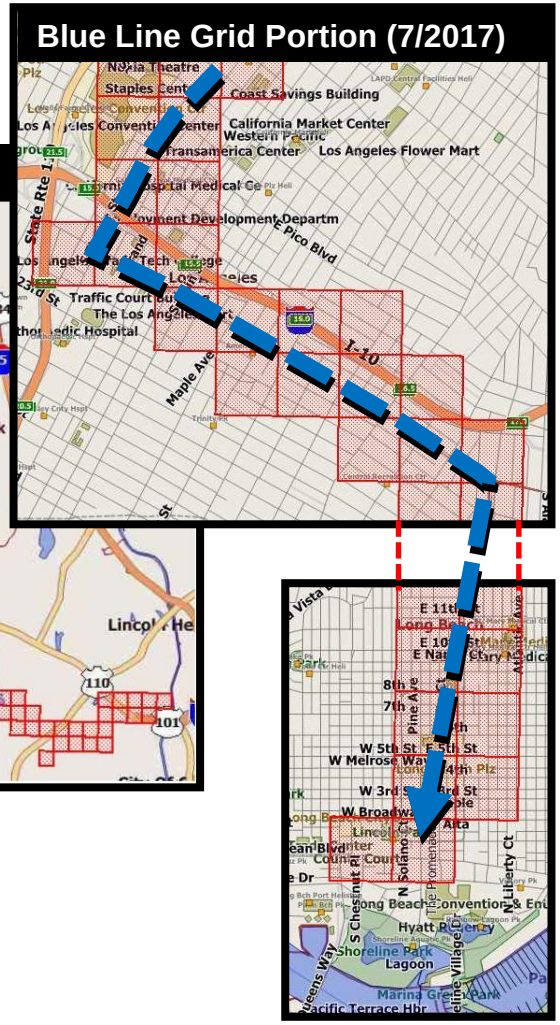
Gold Line Grid Portion (7/2017)



Red Line Grid (7/2017)



Blue Line Grid Portion (7/2017)



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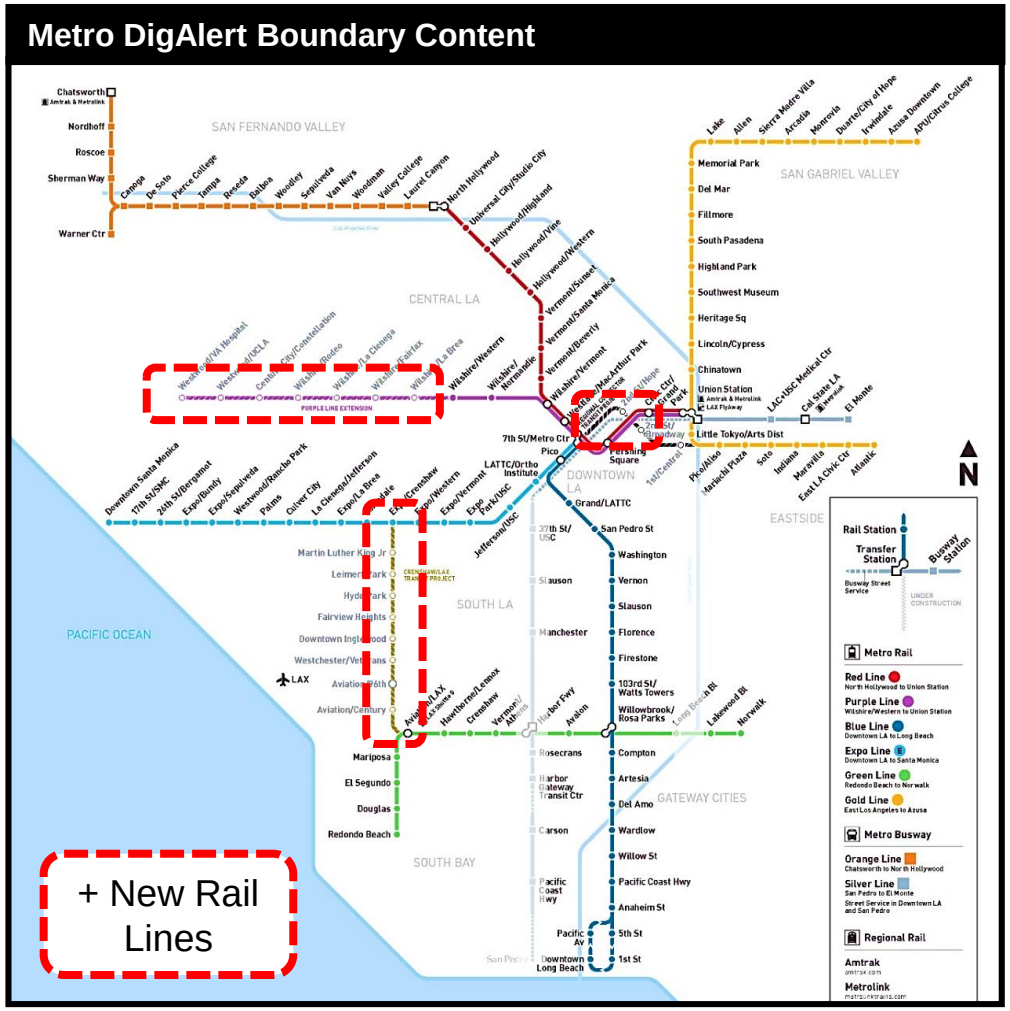
Metro's DigAlert Geospatial Conversion Project Scope

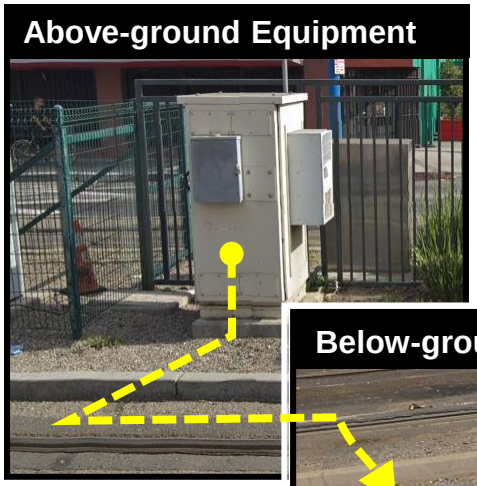
- DigAlert program office notified members that on November 1, 2017 the grid system would be replaced with a minimum 100 ft. buffer boundary
- Metro's buffer would include:
  - 118 miles of active rail lines & Orange Line bus guideway
  - 14 miles of new rail lines under construction
  - 123 passenger stations
  - 7 Rail Maintenance Yards
  - Various equipment along each rail & bus alignment

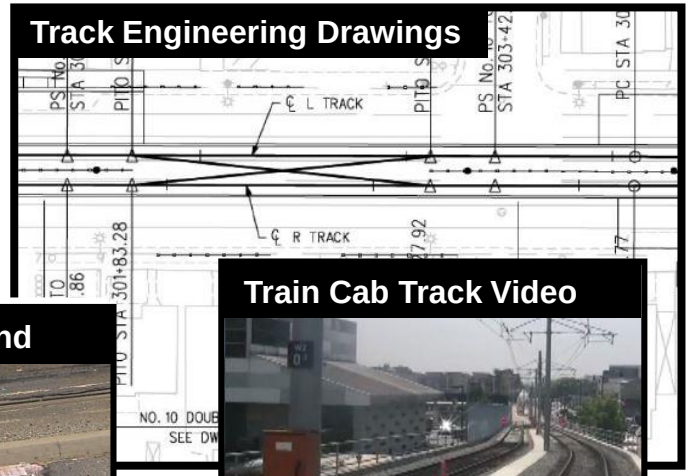


Source: https://www.metro.net

Begin Project - Gather Information, Create Data Matrix

- Develop matrix of reference material
  - Eng. Drawings: Rail track / bus guideway (plan & elevation)
  - Rail track geometry tables
  - Passenger stations (architectural)
  - Communication & electrical buildings & cable routes
- Metro department resources
  - Existing GIS rail line
  - Real-estate parcel data
  - Station & facilities data
  - Track video





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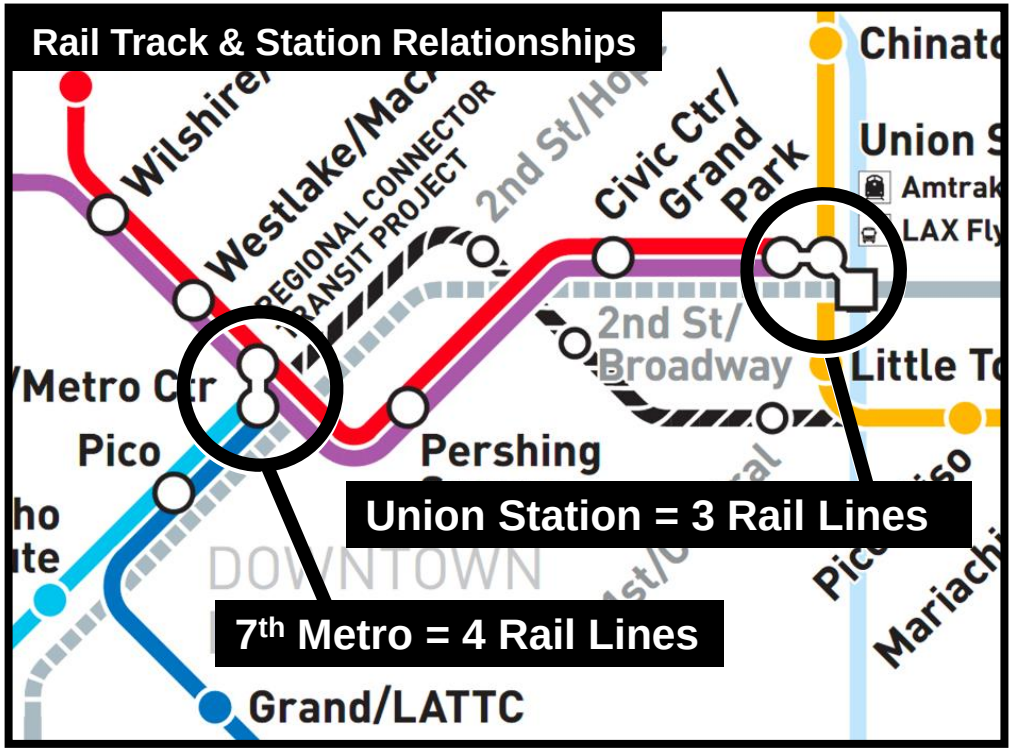
Compile, Scrub, Code & Identify Equipment Relationships

- Rail station boundary relationships:
  - **IF** – A passenger station supports multiple rail lines, **THEN** create one boundary and duplicate for the others
  - **IF** – rail track or station is below ground, **THEN** check for emergency access hatches along the sidewalk
- Track boundary relationships:
  - **IF** – Two or more rail lines use the same track, **THEN** create one boundary and duplicate for other rail lines
  - **IF** – Train is street running, **THEN** cable equipment will be beneath the street or sidewalk

Roger Tomlinson (Thinking About GIS)
Multiplicity of Association
"Number of objects that can be associated to another object"

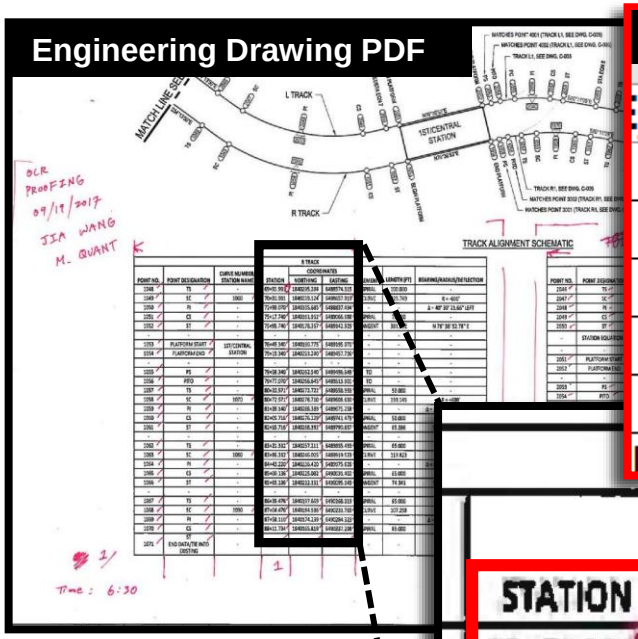


Source: https://www.metro.net

Track Buffers are Generated from Rail Track Centerlines

- For new rail lines convert track geometry coordinates to geospatial data

Engineering Drawing PDF



Optical Character Recognition (OCR) Results in MS Excel

STATION	NORTHING	EASTING
69+91.991	1840295.2840	6488574.3150
70+91.991	1840239.1240	6488657.0190
72+99.070	1840105.6850	6488837.4940
75+17.740	1840161.9620	6489066.6880
75+95.740	1840178.3670	6489142.9290
76+49.340	1840190.7750	6489195.0700

COORDINATES

STATION	NORTHING	EASTING	ELEMENT
69+91.991	1840295.284	6488574.315	SPIRAL
70+91.991	1840239.124	6488657.019	CURVE
72+99.070	1840105.685	6488837.494	-
75+17.740	1840161.962	6489066.688	SPIRAL
75+95.740	1840178.367	6489142.929	TANGENT

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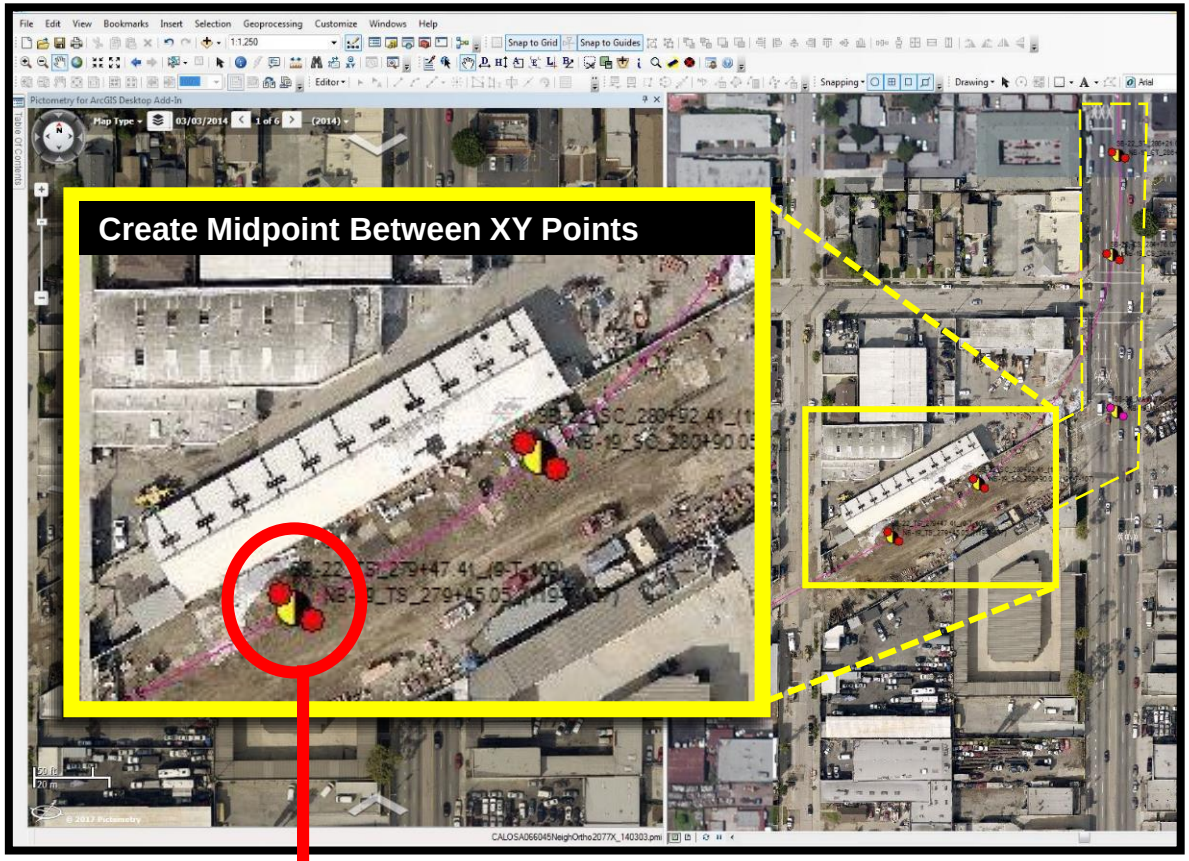
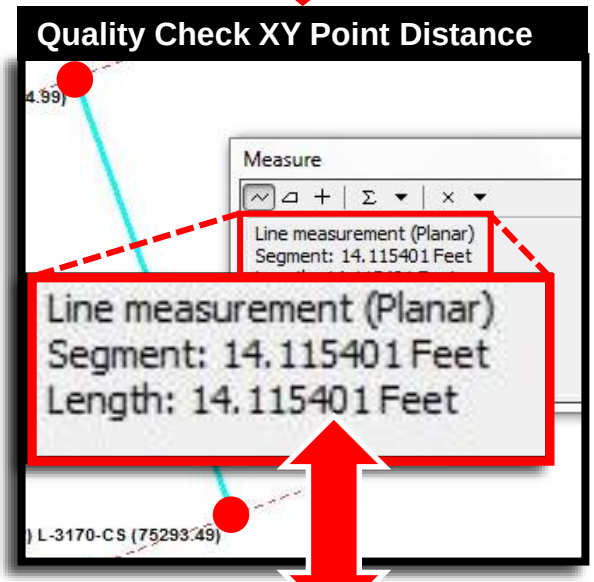
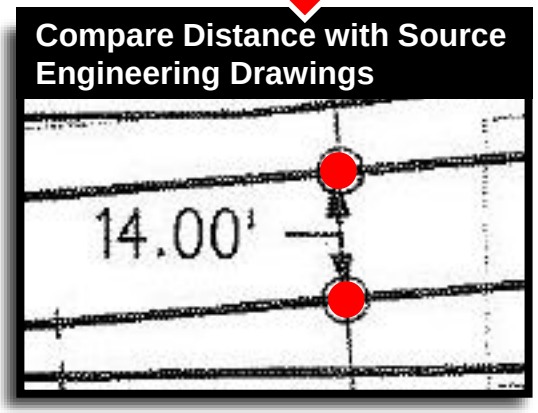
Track Geometry Coordinates Imported into ArcMap

- Create centerline points & validate data

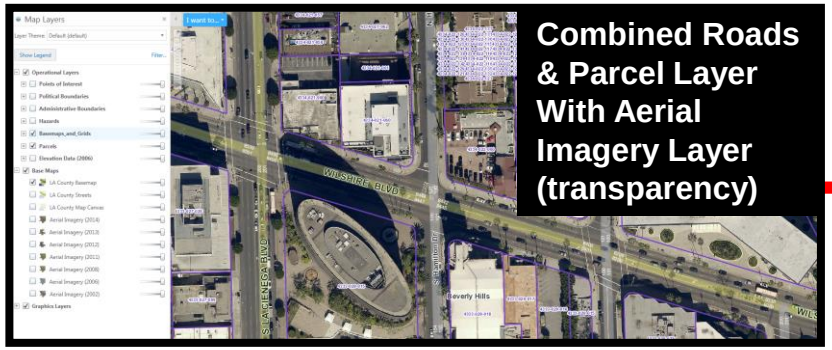


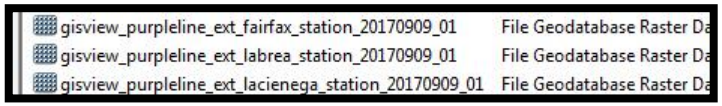


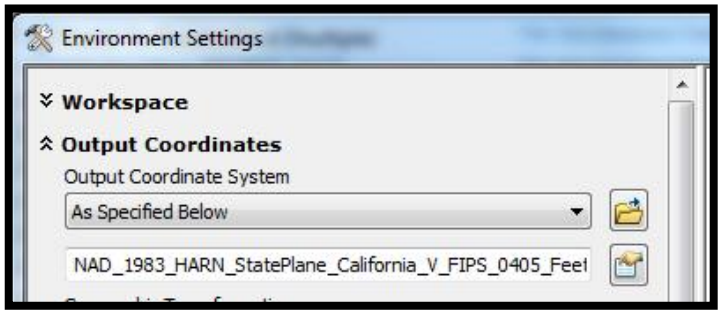


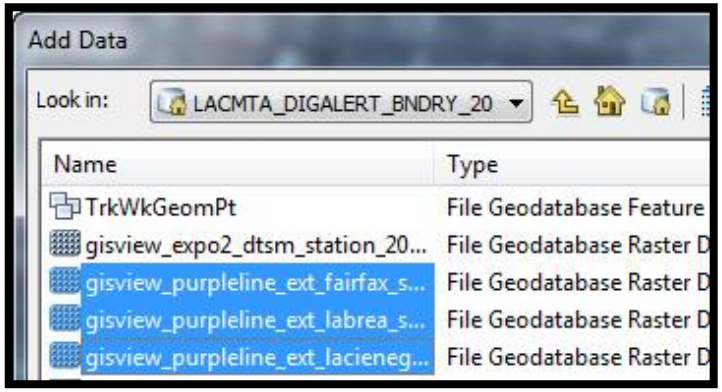
Import Los Angeles County information into ArcMap

- Use of the Los County data & map viewer to generate GeoTIFF containing roads, parcels, and aerial imagery









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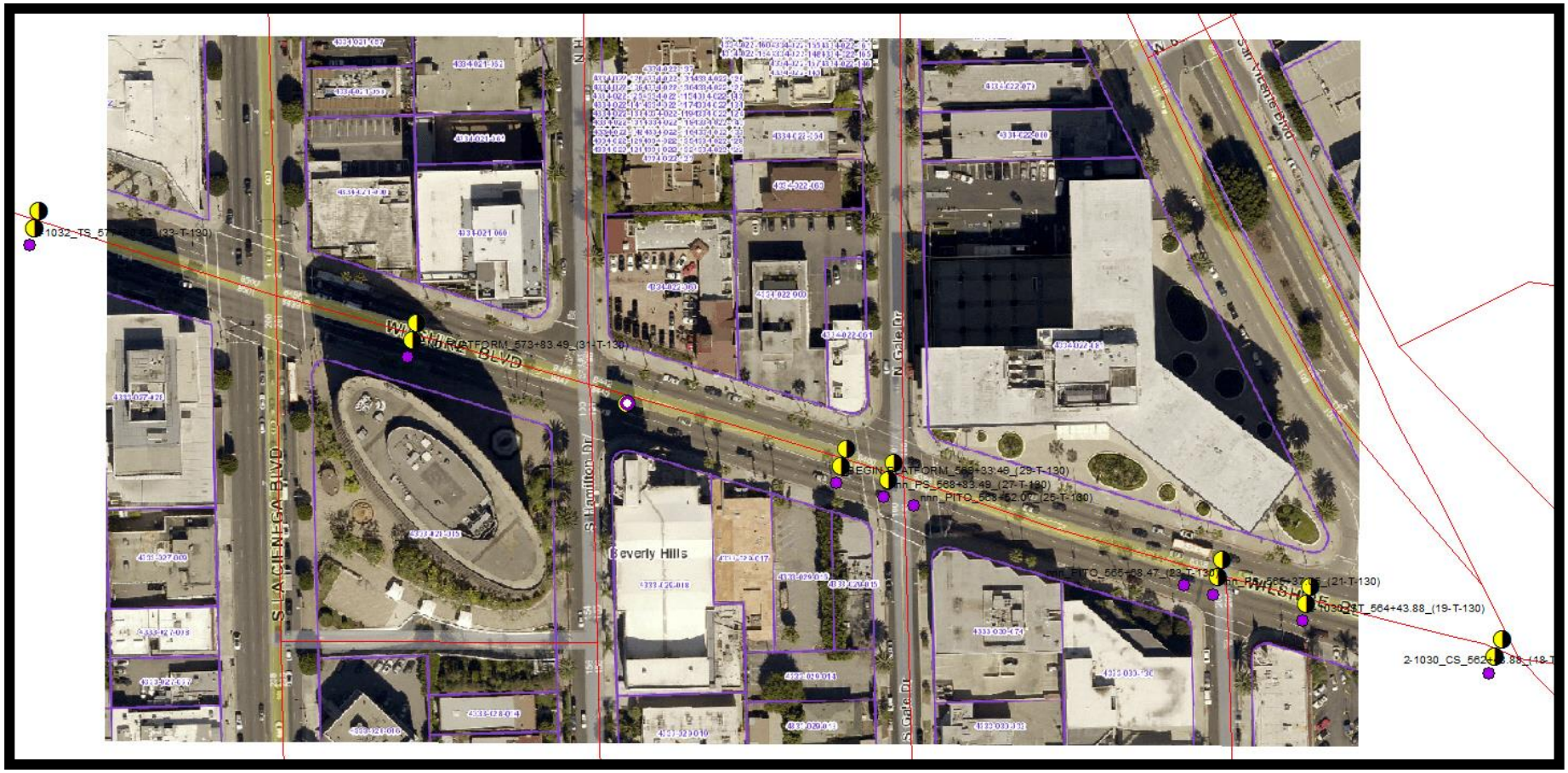
Purple Line Tunnel Section with LA Roads, Imagery & Center Line Points



Boundary Buffer Created Using Track Centerline & Parcel Boundary

- New Purple Line DigAlert boundary overlaid on top of ArcMap World Imagery background layer

Create Station & Parking Lot Boundary

- Los Angeles County GeoTIFF and Metro Real-estate parcel imported into ArcMap to develop rail station & parking lot

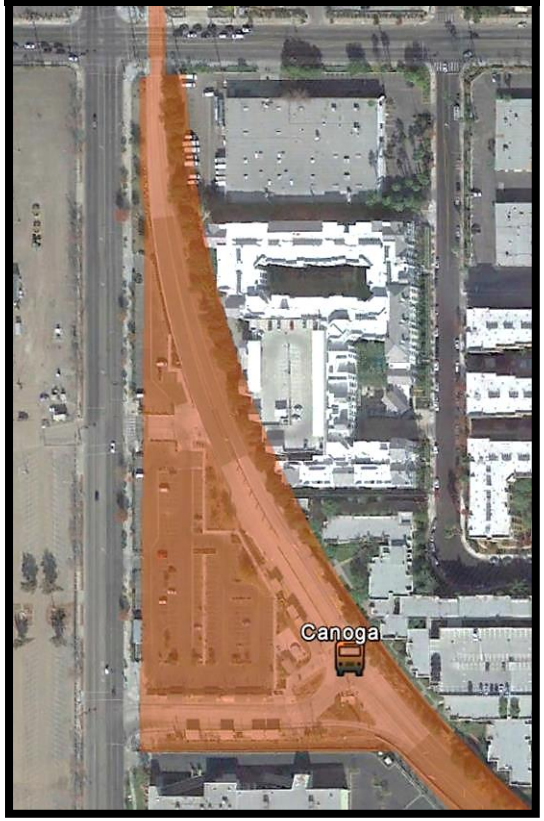
Team Review of DigAlert Buffer Boundary

- Buffer files were exported from ArcMap to Google Earth for review

Purple Line

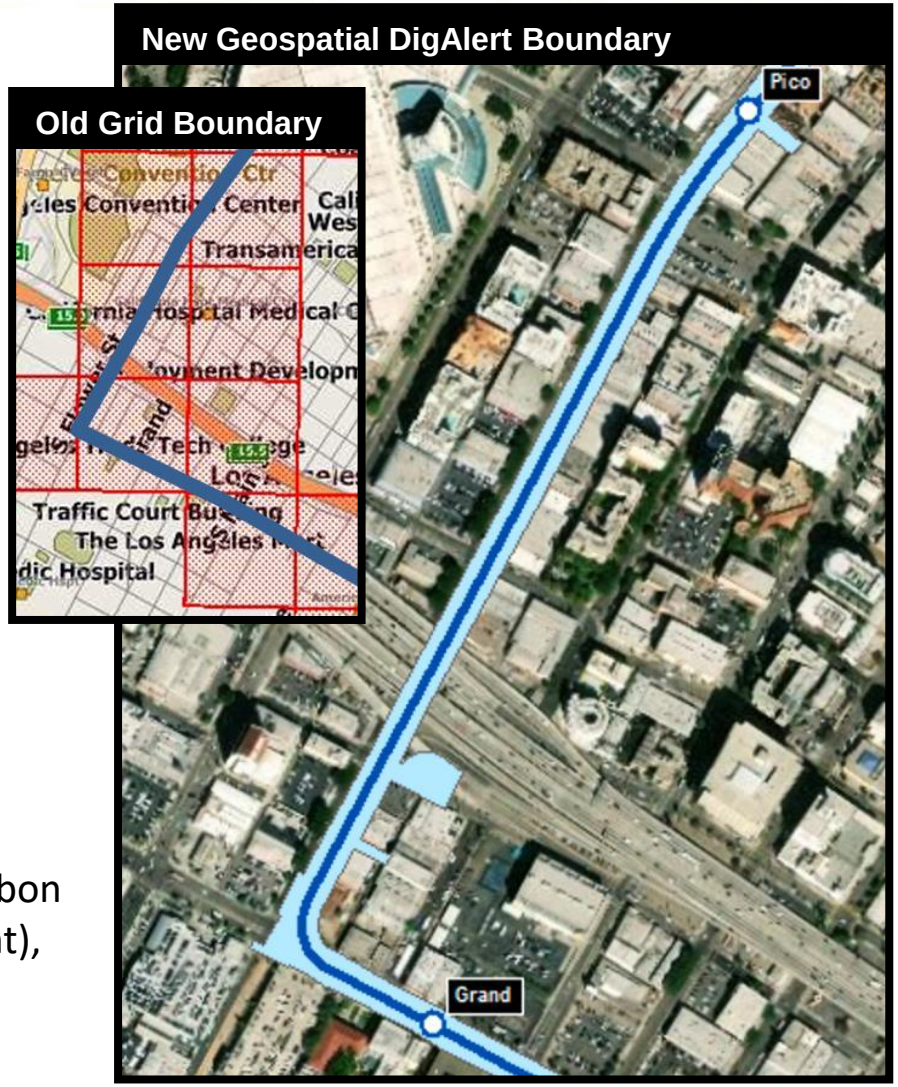
New Crenshaw & Exiting Exposition Line

Orange Bus Line



DigAlert Geospatial Conversion Summary

- Buffers generated
  - 123 transit stations
  - 132 miles (approx.) of rail & bus guideway
  - Assortment of rail equipment
- Immediate results
  - Reduced square mile boundary footprint
  - DigAlert email request reduced from 100+ daily to 150+ weekly
- Tangible cost benefits
  - Fewer emails = less time reviewing emails & engineering drawings
  - Fewer sites to visit = less travel time, lower fuel cost, lower carbon emissions output (smaller carbon footprint), lower vehicle maintenance cost



Questions
&
Discussion

Acknowledgements

- Los Angeles Metro
  - P. Lubash, A. Hernandez, Wayside Systems DigAlert
  - Jia-Wei Wang, (Metro Internship Program), Wayside Systems
  - Operations Performance Analysis
  - Rail Transportation Instruction
  - Real-estate
  - Transit Asset Management
- Los Angeles County Planning Department
  - Los Angeles Region Imagery Acquisition Consortium (LARIAC) Project Team
  - GIS Viewer & GIS Data Portal Team
- The City of Los Angeles, Department of City Planning
  - ZIMAS Aerial Imagery Tool

Contact

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