



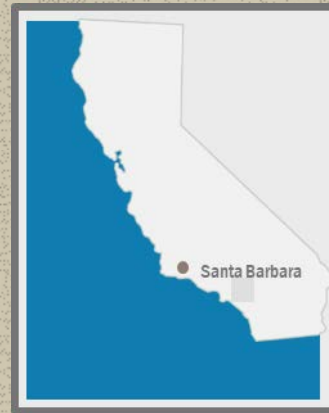
PUBLIC WORKS DEPARTMENT
WATER RESOURCES DIVISION

USING GPS FOR CRITICAL WATER ASSET MAPPING, IMPROVING PLANNING & COORDINATION

ESRI User Conference
July 9, 2019

City of Santa Barbara

- Approximately 90 miles north of Los Angeles
- ~95,000 water customers
- 12.5 MGD potable water on average
- Recently went from Stage 3 Drought to Stage 1 Water Supply Condition

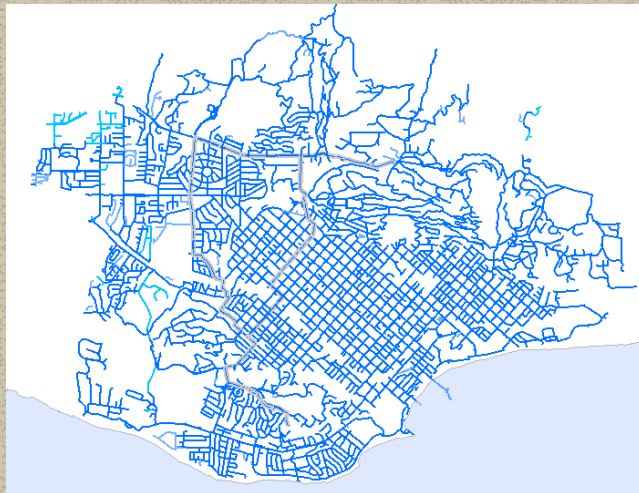


Santa Barbara Water System – Asset Management



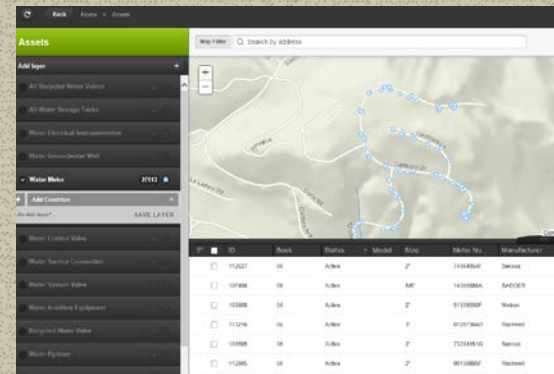
27,500 Water Meters

- 5 year replacement program



300 Miles of Water Main

- 2% per year replacement goal



New Work Order System

- Paper to digital

Initial Meter GPS Efforts

- Collected high quality data, but made data processing and attribute data collection difficult
- Handling Equipment in the field required 2 people
- ~1 hour of daily setup for base station
 - Had to be put up and taken down each day of use



Eos Arrow Gold



- Access to multiple satellite constellations
 - E.g. Gaileo, GLONASS, Beidou
- Provides sub centimeter RTK (Real Time Kinematic) accuracy
- Integrates seamlessly with the whole suite of ESRI programs and apps
- Bluetooth to tablet or phone
- Continuously operating base station network



High Accuracy: Utilizing Local RTK Base Station Networks

- CRTN

Scripps Orbit and Permanent Array Center / California Spatial Reference Center

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Search ...

- CRTN
- CRTN Registration
- Connecting to CRTN
- CRTN: Disclaimer and Usage Guidelines
- Station List
- CRTN Status Map
- Consortium FAQs
- Consortium Members
- NTRIP Protocol
- Gifts

California Real Time Network

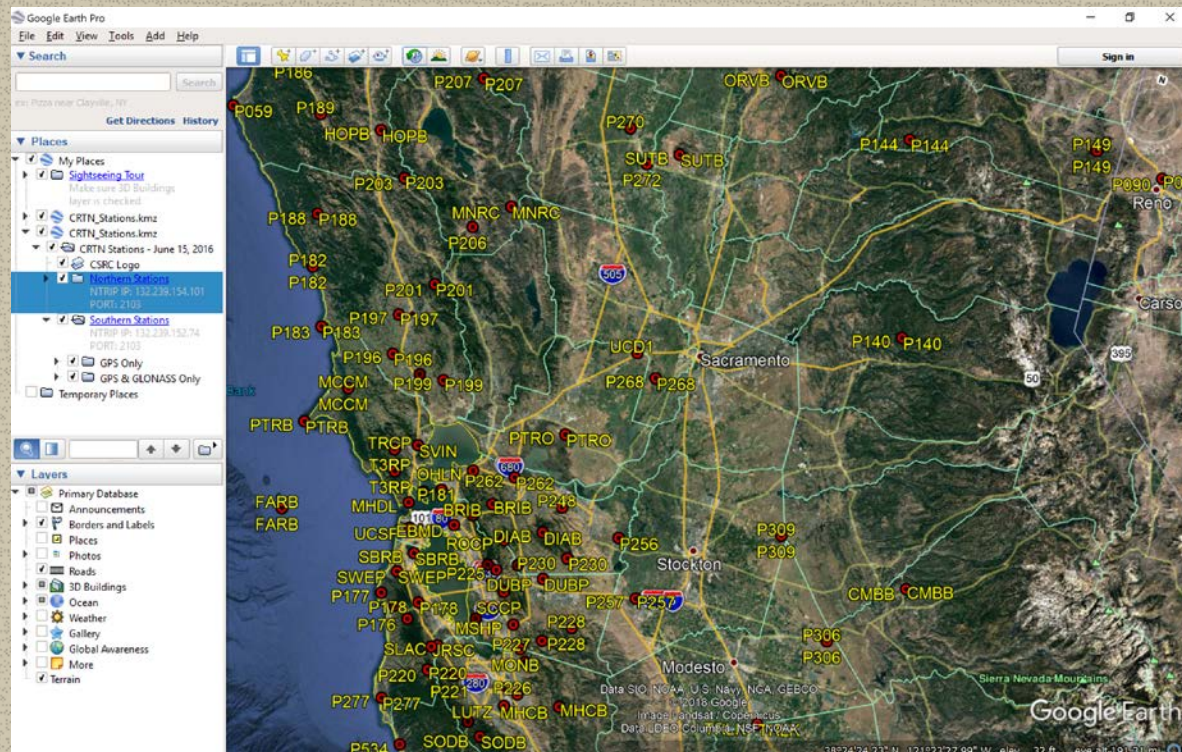
Alert (10/12/2018): We have not been receiving real-time data from the USGS SCIGN stations in southern California for the last month. RINEX data are unavailable, as well, from SOPAC or UNAVCO archives. This causes a significant gap in coverage in the greater Los Angeles area. We do not know when the USGS service will be restored.

The California Real Time Network (CRTN) is a multipurpose statewide GNSS network that utilizes the existing geophysical and geodetic infrastructure for two primary purposes: (1) research into earthquake early warning and rapid response, and (2) to provide a public utility in support of RTK positioning. CRTN is managed through the California Spatial Reference Center (CSRC) and the CRTN Consortium.

CRTN is a clearinghouse of high-rate real-time data obtained from multiple servers, at UNAVCO

CSRS Epoch 201...

- Nearest base station close to 30 km away

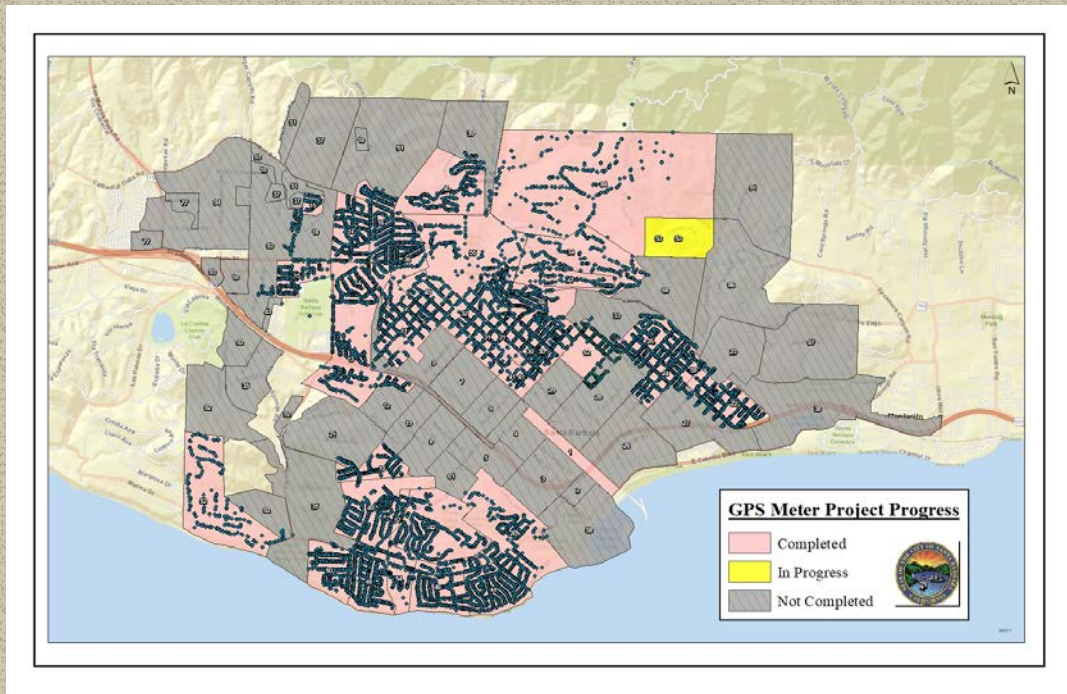


Establishing a Base Station

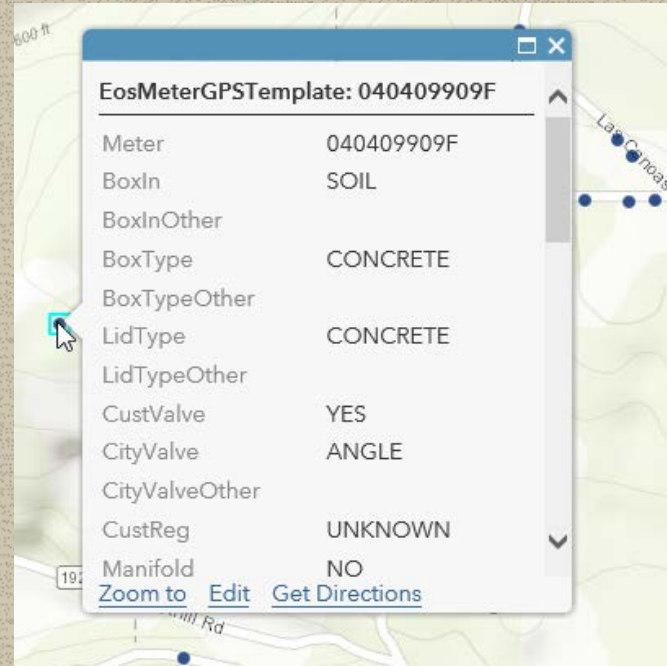
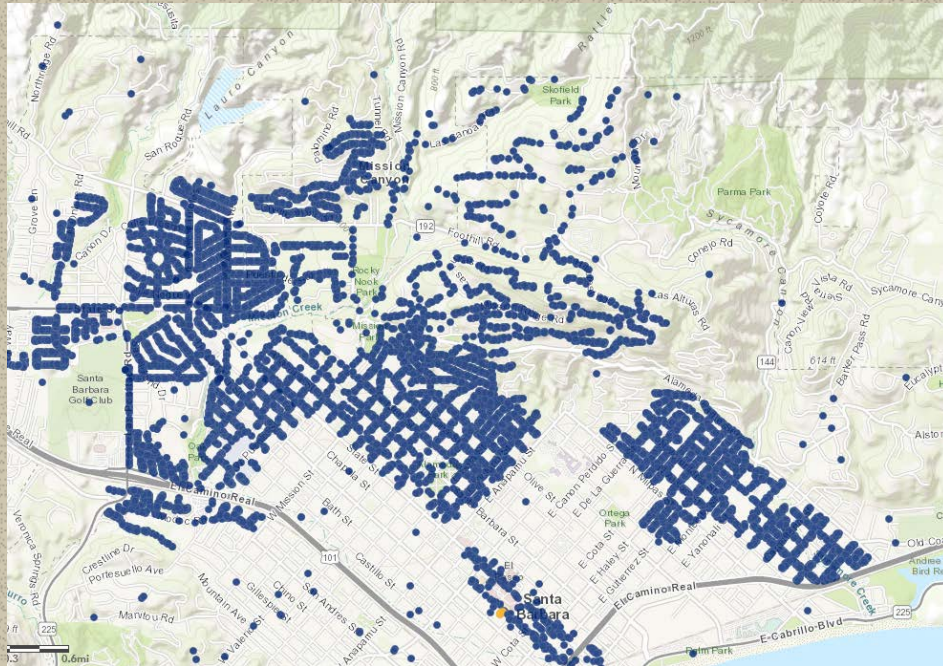
- City established its own continuously operating base station
- Offset issue
 - Due to coordinate system used by City versus the base station



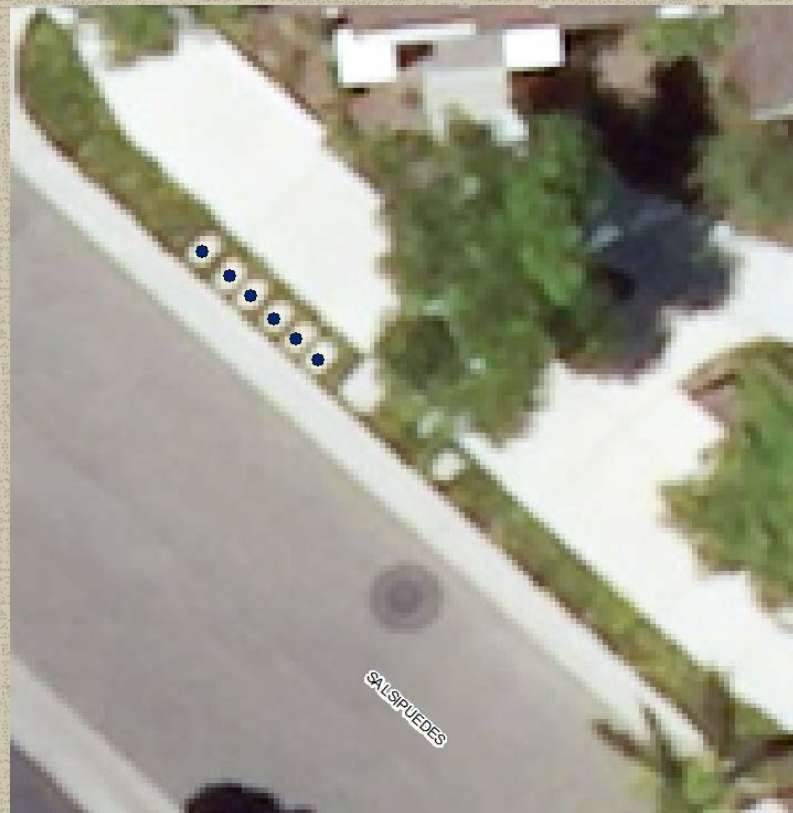
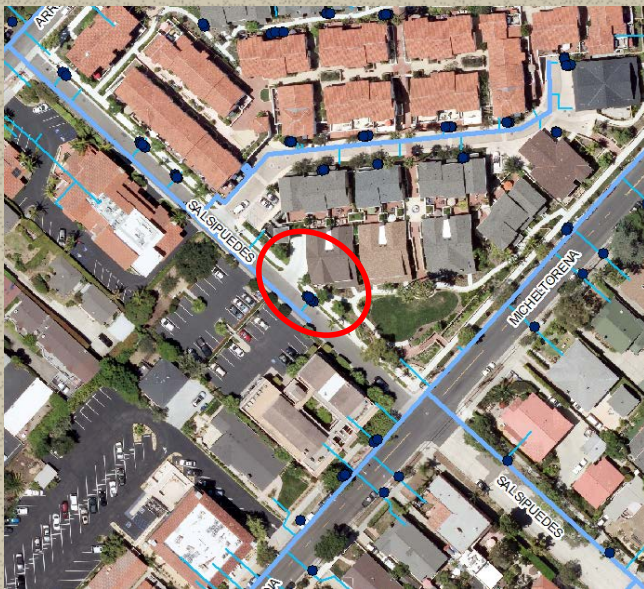
Water Meter GPS Project



Water Meter GPS Project – Collector



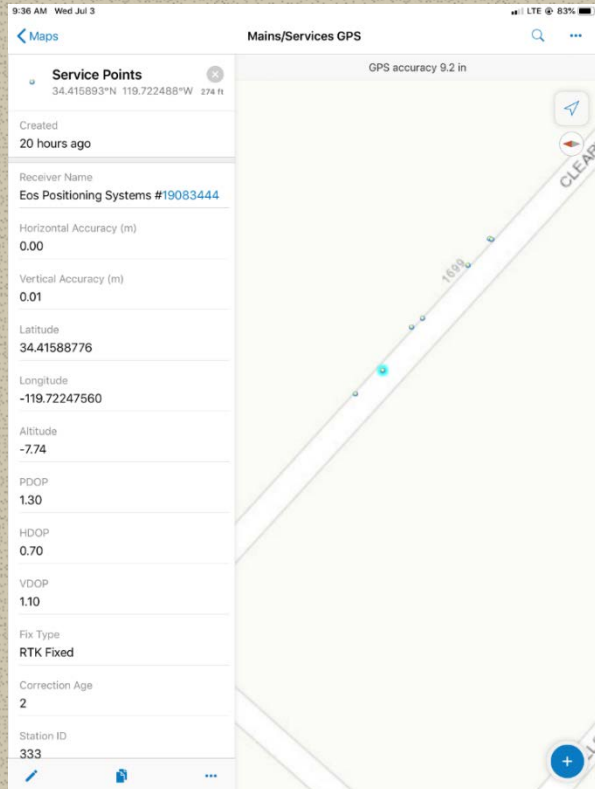
Water Meter GPS Project



High Accuracy GPS Mapping of Other Water Assets

- New Service Installations
- Water Mains
- Valves
- Hydrants



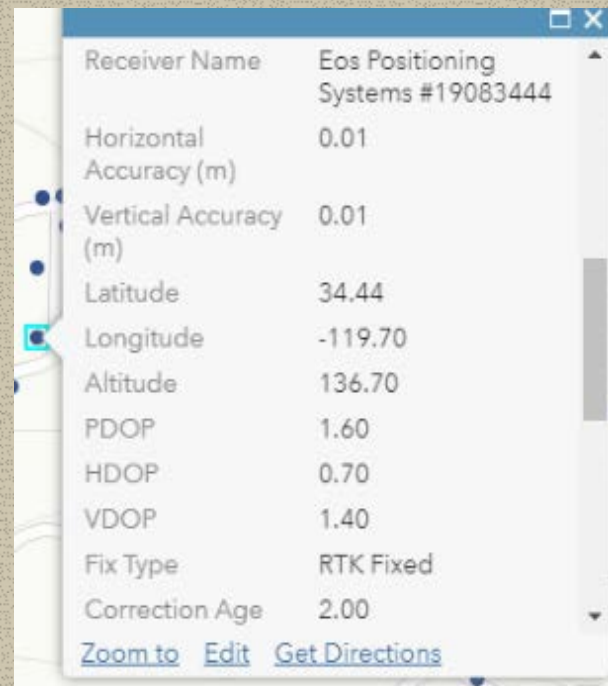


Water System GPS Locations & Installations - Collector

- New or updated asset locations and attributes mapped via Collector
 - Connecting with geodatabase ID's
 - Automatically records location metadata
 - Syncs to ArcGIS Online in real time
- Attributes can be easily collected (i.e. valve type, meter box type, notes)

Collecting GPS Locations & Installations

- Poor accuracy is flagged
 - Easy identification and recollection to insure high quality, reliable data
- Collector allows for multiple users & keeps track of edits & time



Receiver Name	Eos Positioning Systems #19083444
Horizontal Accuracy (m)	0.01
Vertical Accuracy (m)	0.01
Latitude	34.44
Longitude	-119.70
Altitude	136.70
PDOP	1.60
HDOP	0.70
VDOP	1.40
Fix Type	RTK Fixed
Correction Age	2.00
Zoom to Edit Get Directions	

Water Main Replacement

- Doubling Replacement Rate
- Multiple Projects Ongoing



Water Main Replacement – Use of GPS

- Collection of tie-ins, bends and other asset info as it is installed
- Provides a more accurate map of what has been constructed than “As Built”



Water Main Replacement Coordination



- Linking unique ID's helps to view across multiple platforms and groups for coordinated planning and projects
 - Engineering
 - Operations
 - IT

Coordination Improvements

- Benefits to Customers, Water Conservation, Customer Service, Engineering, and IT
- Faster Updates to Field Crew Maps
 - Saves time locating repairs and replacements
 - Aids emergency response

Future Goals

- Finish Meter GPS Project
- Fully Integrate Use of GPS and Collector into Workflows
 - All Water Capital Improvement Projects
 - Training for Operations Staff

Acknowledgments

- Andrew Benson – Senior Water Distribution Operator
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- Natalia Alamilla – Water Resources Technician
- Eric Just – Geographic Information Systems Coordinator
- Matt Ward – Water Distribution Superintendent

Thank You!

- Questions?

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