Enterprise GIS and Asset Management

ESRI Southwest User Conference
April 2018
About Denver Water

• Established 1918
  ➢ 2018 is our 100 year anniversary!

• Serves 1.4 million customers

• Service area = 335 sq. miles

• Largest and oldest water utility in Colorado

• Denver Water is a separate entity from the City and County of Denver.

• ESRI customer #1640
  – 1st water utility to buy ESRI software?
Distribution System

- 3,000+ miles of Mains
  - More than 1,600 map sheets printed at a scale of 1” = 200 feet
- 500+ miles of Conduits (>24” pipe)
- 23 Pump Stations
- Includes Denver International Airport
Collection System

➢ Covers 4,000 sq. miles (2.5M acres)

➢ Extends into Park, Grand, Jefferson, Gilpin, Summit, Teller, Douglas, Clear Creek counties

➢ Water = Mostly Mountain Snowmelt
Denver Water Distributors

Denver Water provides clean, treated water to more than 60 smaller water districts. Since all pipes are connected we need to map their assets too.
History of GIS at Denver Water

1985 - 1990
- Digital Conversion from Paper
- Attributes Added
- Distribution Facilities Digitized
- Technology Migration

2001 – 2006
- Data Improvements
- 2nd Technology Migration – ESRI/SDE

Historically – two GIS Groups:
- Water Resources GIS in Planning
- Distribution GIS in Engineering/IT

Now three groups:
- Engineering/Asset Recording
- Administrative GIS Services
- IT Geospatial Asset Management
Overview of GIS and Asset Management

• Robust GIS supports many aspects of our business
• Asset management is core to operations, maintenance, finance, planning, and engineering.
• Keeping data current and accurate is an ongoing challenge
• Integrates multiple, legacy systems
• Supports field operations with mobile solution
Enterprise Asset Management
Managing $2B in Water System Assets

- 3,000+ miles of transmission and distribution mains
- More than 240,000 active taps serving 1.4M customers
- 80,000+ valves used to operate the system
- 23 Pump Stations, 4 Treatment Plants
- Mountain Collection system spans 4,000 square miles across 8 counties
  ➢ with pipes, canals, tunnels, and siphons to maintain
GIS is at the hub of our business
Why do we need GIS?

Capital Projects in 2017

- 130 Projects – $160M budgeted
- 69 Projects in Construction
- 35 Completed Construction Projects
- $107M Construction cost
- 100 year old facilities require maintenance!

Gross Reservoir Flyover
https://youtu.be/eF0hwI2Py9k
Posting As-Built Drawings to ArcGIS

- AutoCAD drawings depict as-built conditions
- E-Map is an ArcGIS Server based intranet GIS (internally developed)
- CAD drawings are used to update E-Map via ArcGIS SDE
- E-Map includes links to the PDF drawings for reference
- Mobile crews can access E-Map in the field
ProjectWise for CAD document management
CAD to GIS to Maximo
Work Management
Franklin st. and Platte River

System is relatively new and overall in excellent condition. There are a few dings in the polyurethane coating, most notably on the south side, that could be touched up. The short reach of 1965 pipe on the north side should eventually be re-coated.
Customer Locations

- More than 320,000 taps and associated meter locations mapped
- Initial data collection using GPS over 3 year period
- Supplemented by visual identification from aerial imagery and Google Street View maps
- New taps located with GNSS survey receivers
Chart represents all of Denver, total service and read and bill customers. Master metered customers are not included.
Activated Taps within Denver Water's Service Area/Decade

Year Range
1900 to 1909

Decade Taps
- 1873 - 1899
- 1900 - 1909
- 1910 - 1919
- 1920 - 1929
- 1930 - 1939
- 1940 - 1949
- 1950 - 1959
- 1960 - 1969
- 1970 - 1979
- 1980 - 1989
- 1990 - 1999
- 2000 - 2009
- 2010 - 2017
Hydraulic Model Integration

• 1 to 1 GIS to InfoWater all pipes model
• Semi-automated update process for ~357,000 pipe segments
• Excellent GIS data quality supports model integration
• Utilities have *talked* about Model/GIS integration for years. Denver Water is doing it!
Evolving technology for the next 100 years!

- Example: 3-D models of treatment plants require accurate asset mapping
- One benefit of a mature GIS and asset management system
Questions?