

The City of Atlanta: Investing in a Useable Water Utility GIS

Esri UC 2013

Session Title: GIS Implementation

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Authors

Rasheed Ahmed, PH.D, P.E. Senior Watershed Manager, Atlanta DWM

Dax Flinn, GISP, Watershed GIS Manager, Atlanta DWM


Eric Glover, P.E, Deputy Commissioner, Atlanta DWM

Andy Creek, GIS Analyst, ARCADIS

Ryan McKeon, PMP, GISP, VP Technology & Strategy, Wachs Water Services



Agenda

- } Presenters
 - } City of Atlanta Overview
 - } Comprehensive Project Overview
 - } GIS Implementation Phase
 - } GIS Adding Value
 - } Questions & Answers
- 

Presenters

Sewelo Keleagetse, GISP, Regional Information
Manager, Wachs Water Services

Agenda

} Presenters

} **City of Atlanta Overview**

} Comprehensive Project Overview

} GIS Implementation Phase

} GIS Adding Value

} Questions & Answers



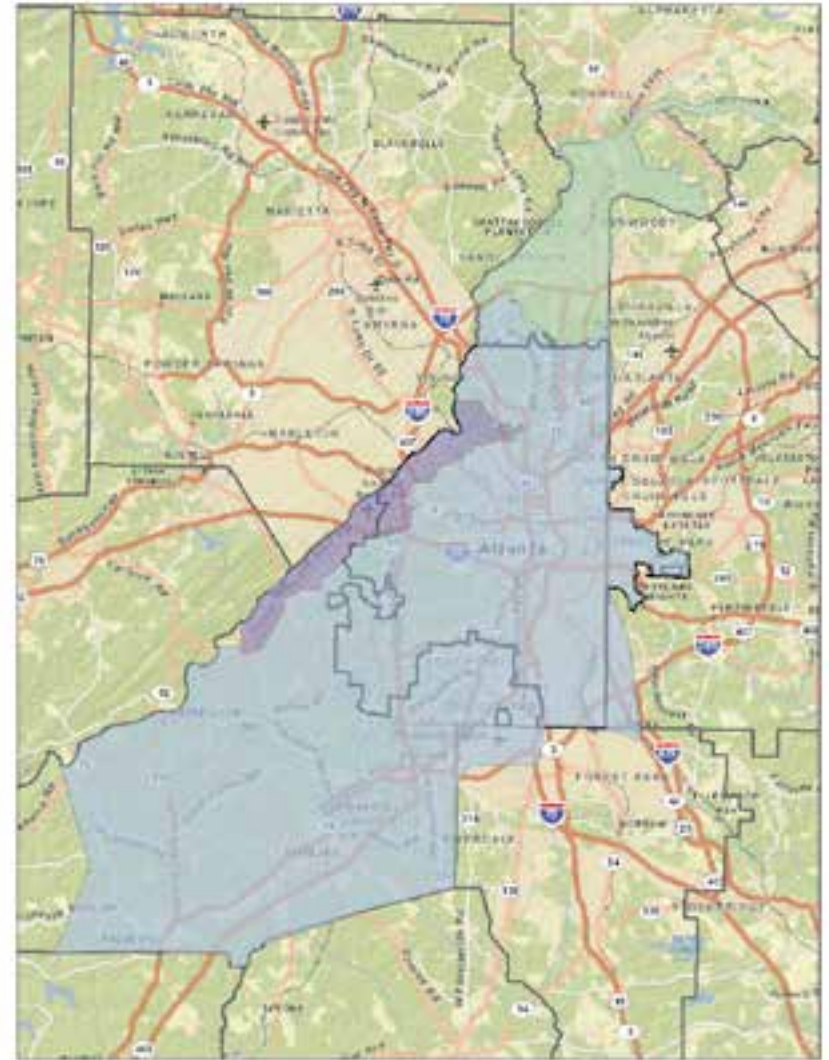
The City of Atlanta

- Ninth largest metropolitan area in the United States
- One of the biggest and oldest water systems in the country



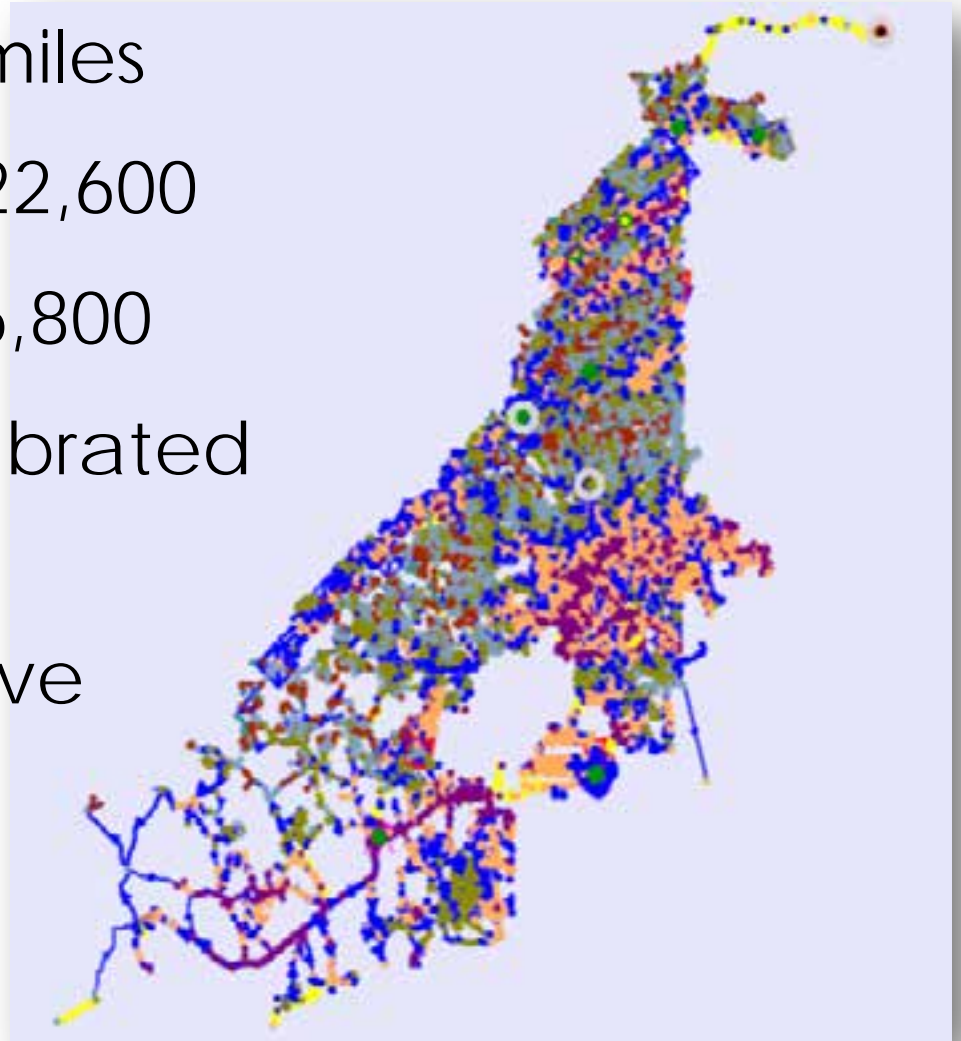
The City of Atlanta Infrastructure

- Delivers to more than one million customers
- Distribution network consists of over 2,800 miles of pipe
- Three water treatment plants
- Three pressure zones
- Main size ranging from 2" to 72" in diameter
- System contains mains up to 90 years old



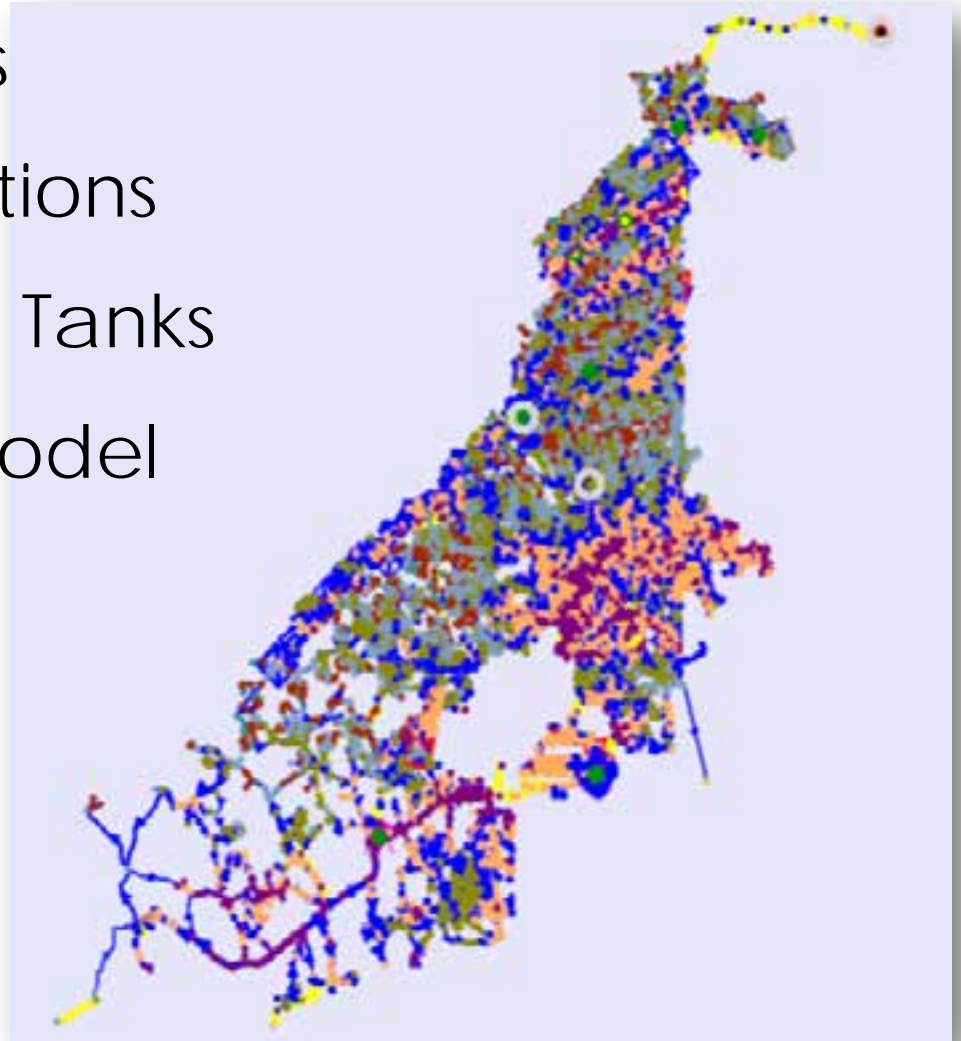
Atlanta Water Model

- Pipe Length = 2,500 miles
- Number of Nodes = 22,600
- Number of Pipes = 26,800
- Extended Period Calibrated Model
- Pipe Size 6" and above
- (a few under 6")



Atlanta Water Model (Cont'd)

- 3 WTP Pumps Stations
- 3 Major Re-Pump Stations
- 2 Elevated & Ground Tanks
- Max Day Demand Model (140 MGD)
- 3 Pressure Zones



Pressure Zones & Treatment Plants

Pressure Zones:

North Area (AFC) 1225 Zone

Hemphill 1175 Zone

Chattahoochee 1020 Zone

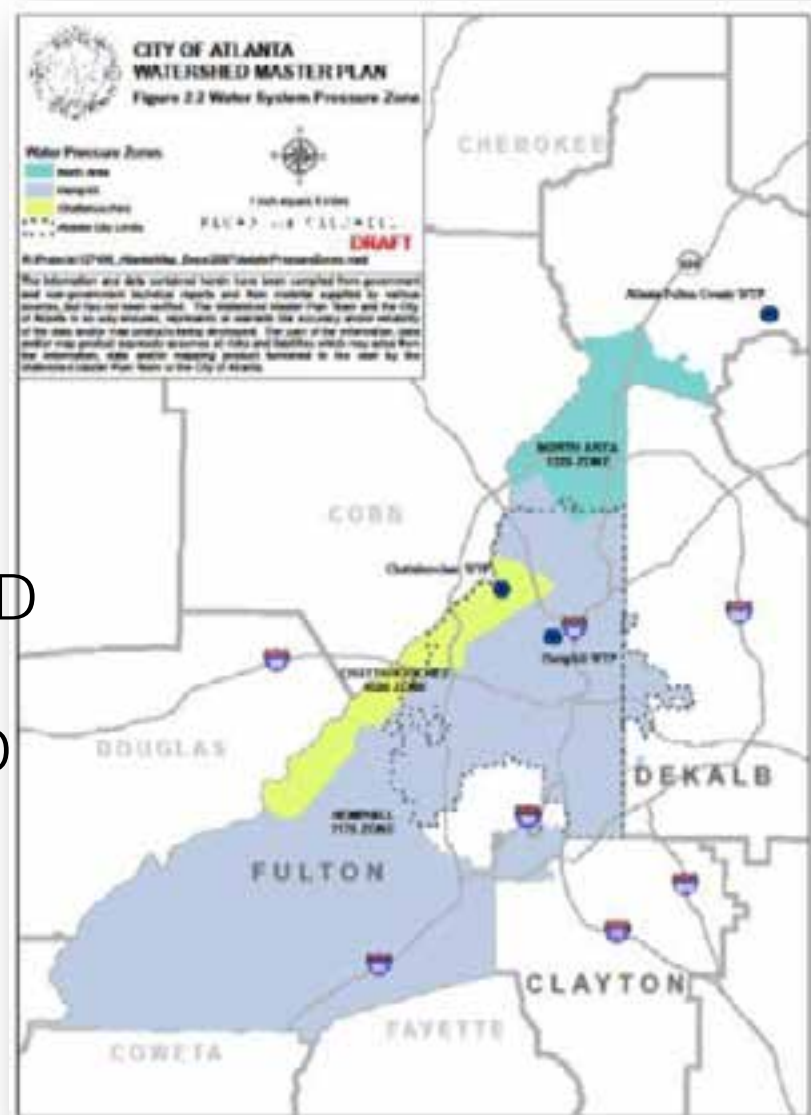
Plant Capacities:

North Area (AFC) WTP = 45 MGD


Hemphill WTP = 137 MGD

Chattahoochee WTP = 65 MGD


Total = 247 MGD



Hydraulic Models

- Existing Model (Calibrated)
 - Planning Model (Updated Model)
 - Water Quality Model (Summer & Winter) built from Calibrated Model
 - Build out Model (Year 2060 population projections)
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Drivers for the Project

- Increase in costs and effort to close valves to manage main breaks, fix leaks and support construction

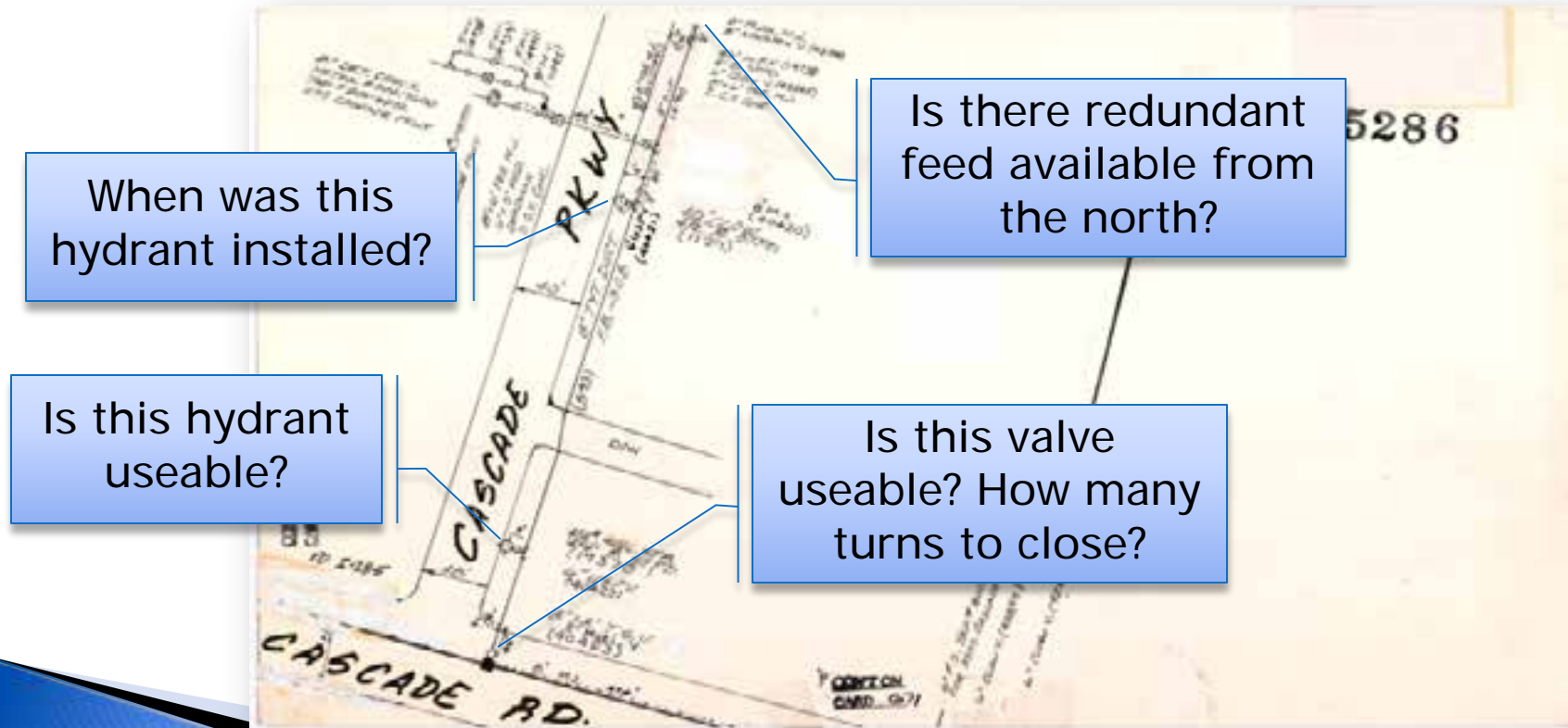


- ISO assessment challenges (hydrant usability and data) potentially increasing insurance premiums




Drivers for the Project

- Lack of useable data (accurate, meaningful and available) to support engineering, planning and operational decisions



Project Objectives

- Restore the City of Atlanta water distribution system, consisting of approximately 48,000 valves, 24,000 hydrants, and 24,000 hydrant isolation valves , to maximum operability
 - Develop a geographic information system (GIS) database that contains necessary water system transmission and distribution asset records and global positioning system (GPS) locations to meet water utility asset management and maintenance requirements
- 

Asset Inventory Results



- 59,000 valves inventoried, tested and documented, many repairs performed to restore usability



- More than 23,000 fire hydrants inventoried, tested and documented

Asset Usability Improvements

Valve Repairs	Completed	To Be Completed	Total	
CANNOT LOCATE	2,678	3,028	5,706	→ 12%
COVERED OVER	12,999	717	13,716	} 84%
NEED TO RAISE	11,542	70	11,612	
LID PROBLEM	11,739	58	11,797	
STRUCTURE DAMAGE	2,561	456	3,017	
PACKING LEAK	1,486	65	1,551	} 4%
FROZEN	150	0	150	
SPINS FREE	0	69	69	
STEM PROBLEM	0	53	53	
OPERATOR PROBLEM	0	78	78	
TOTALS	43,155	4,594	47,749	



Can I fully close it?

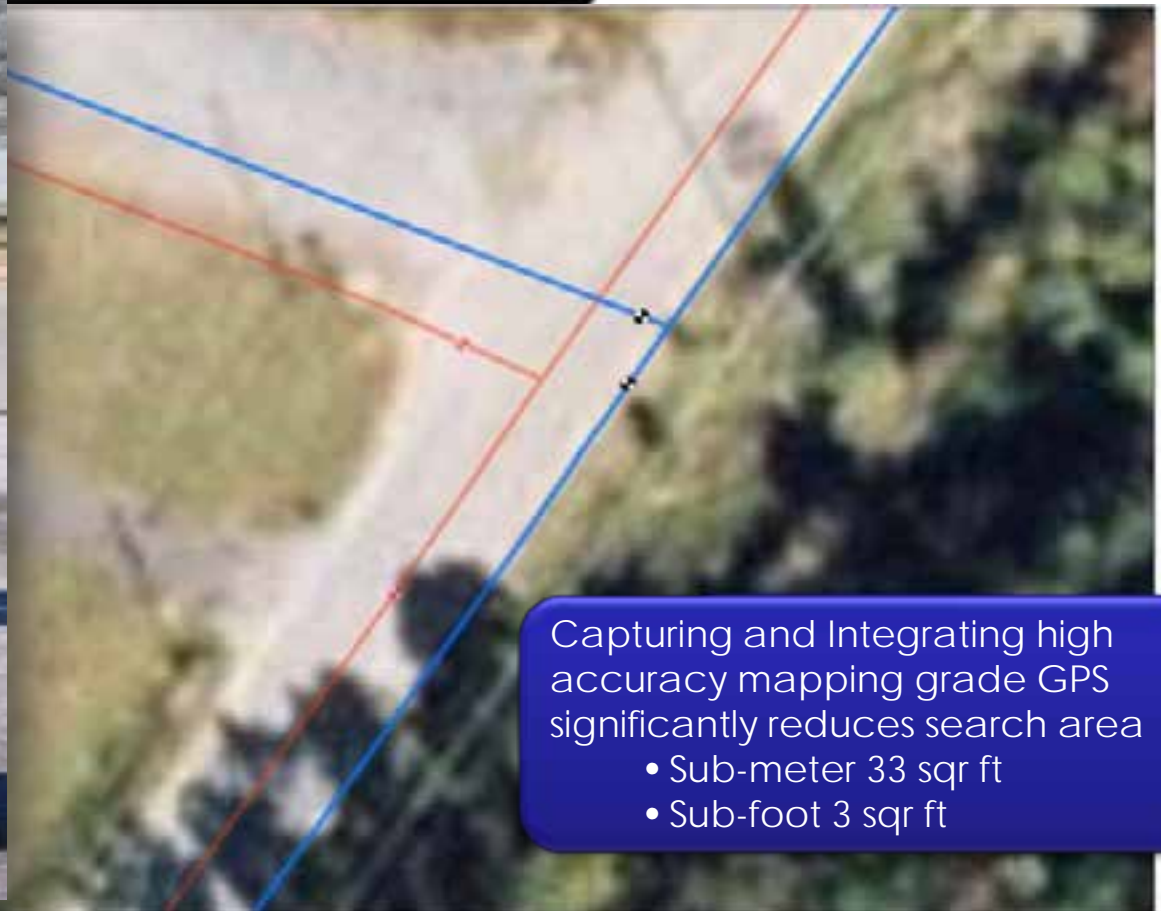


1 in 4 valve structures



Information Usability Improvements


- 50% attention to GPS for a patch area for an, 60% with Google Information Usability? ts



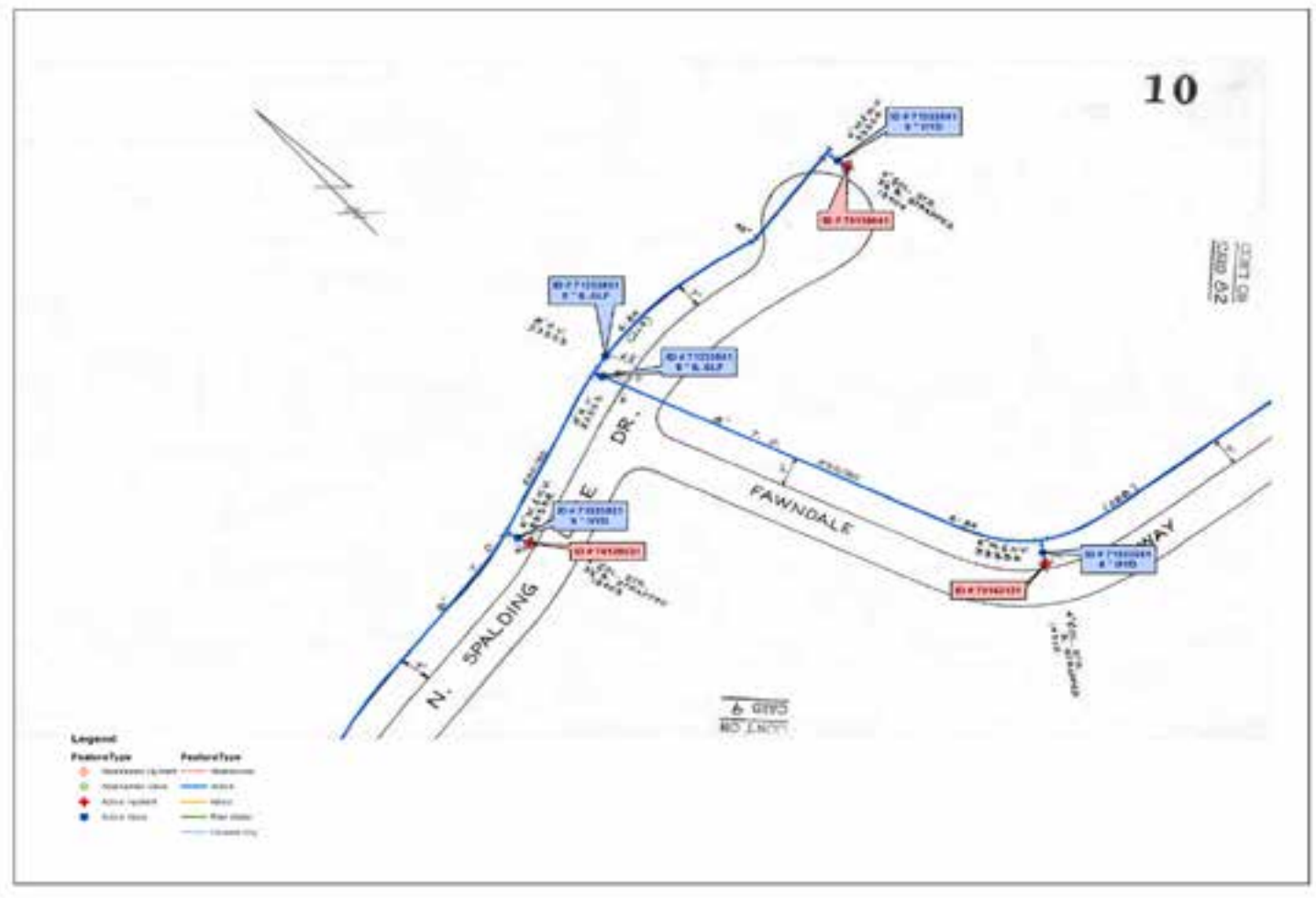
Capturing and Integrating high accuracy mapping grade GPS significantly reduces search area

- Sub-meter 33 sqr ft
- Sub-foot 3 sqr ft

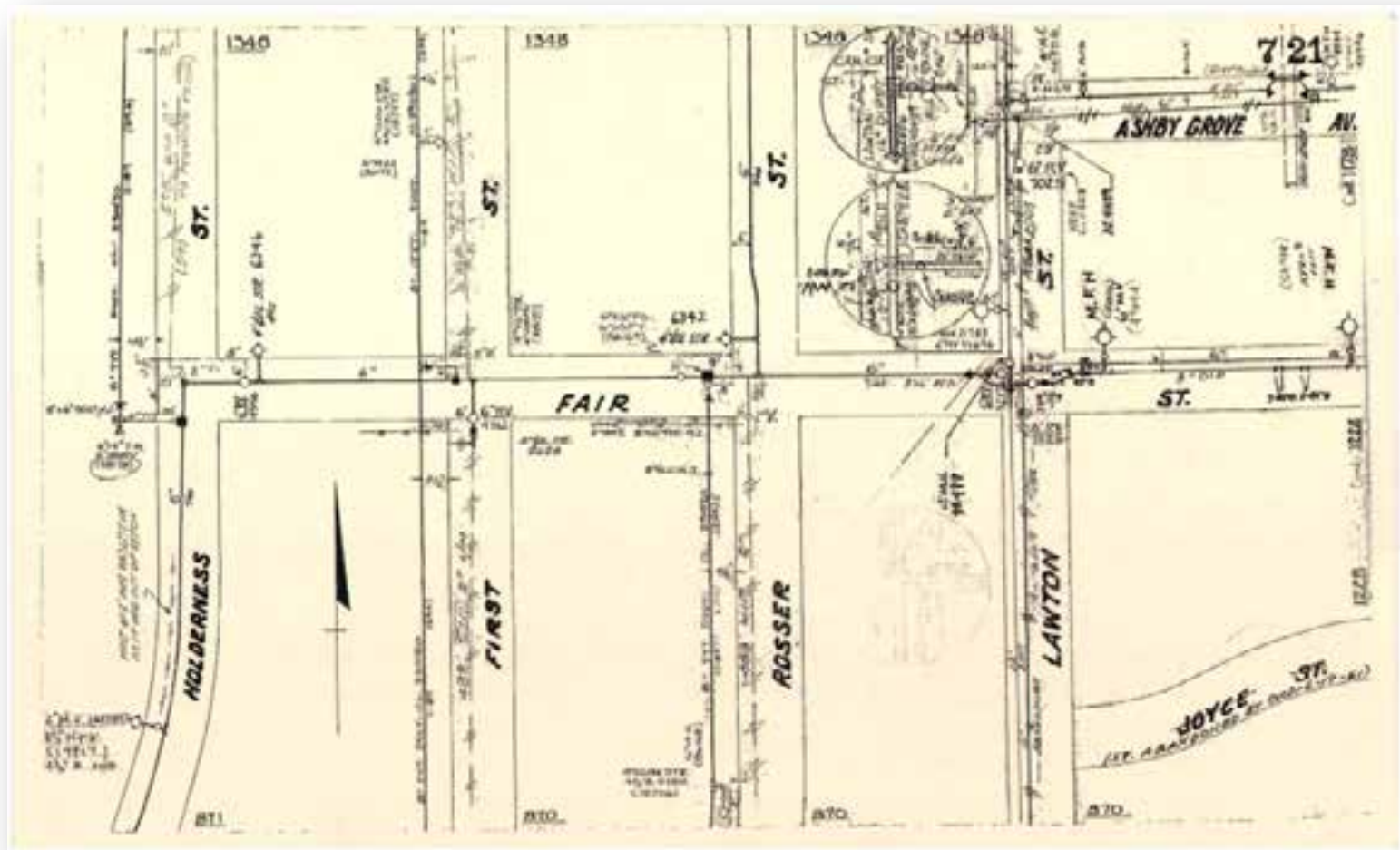
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GIS Implementation Objective



Source Data: Plat Cards



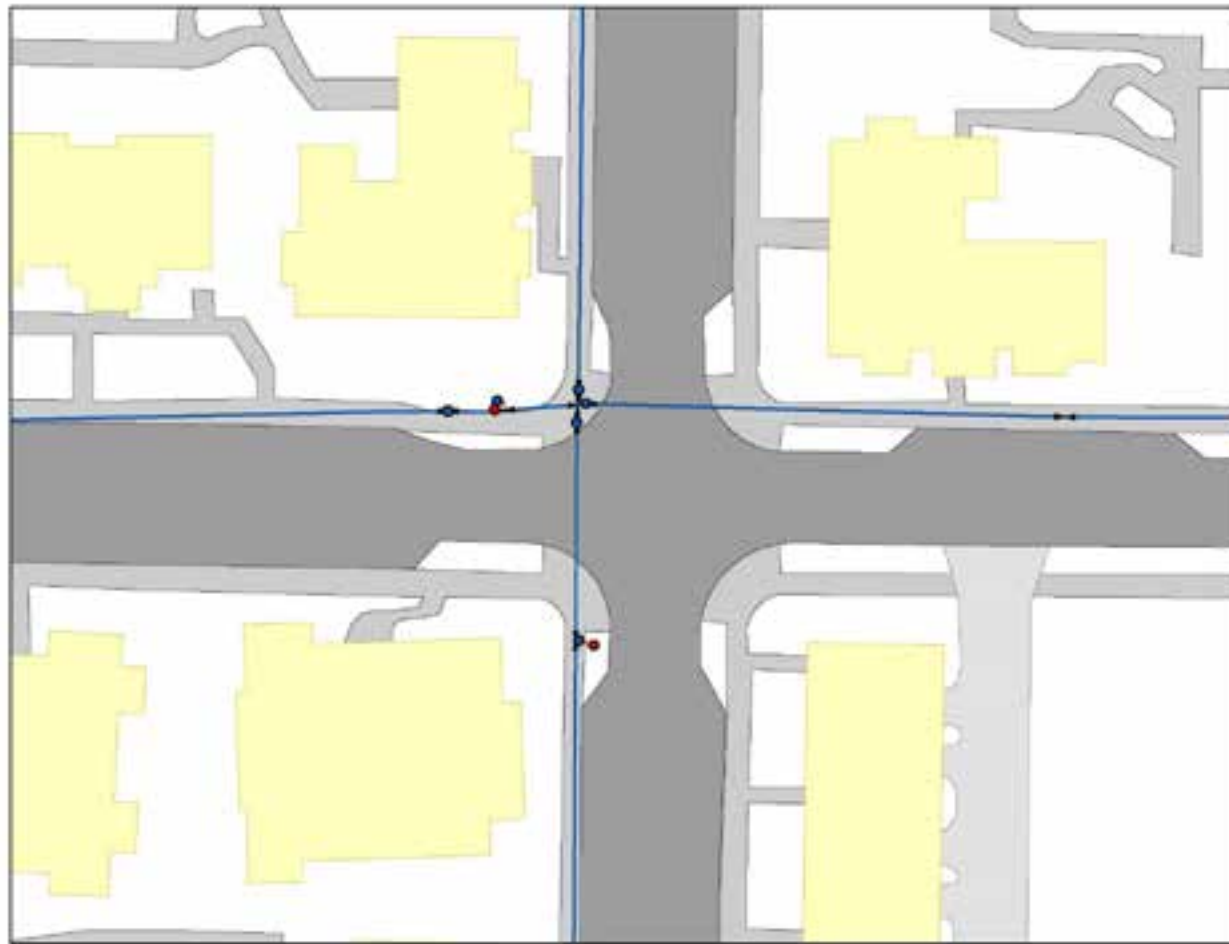
Source Data: Valve and Hydrant Asset Records



GPS Data Processing

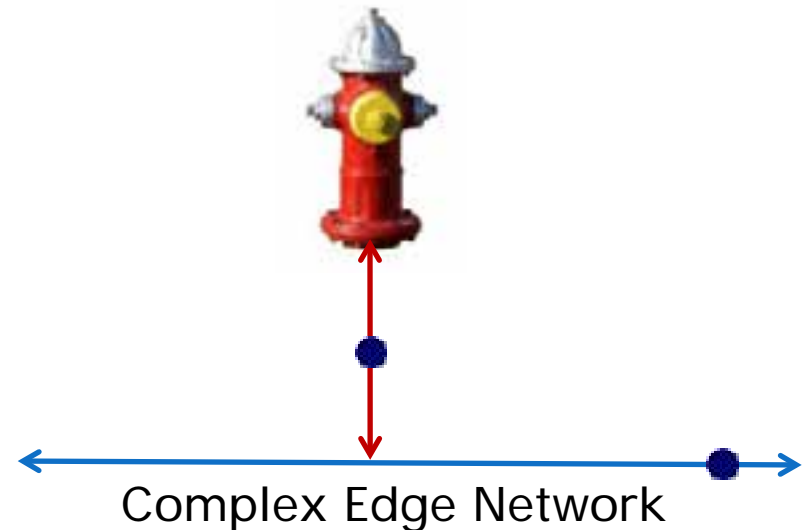
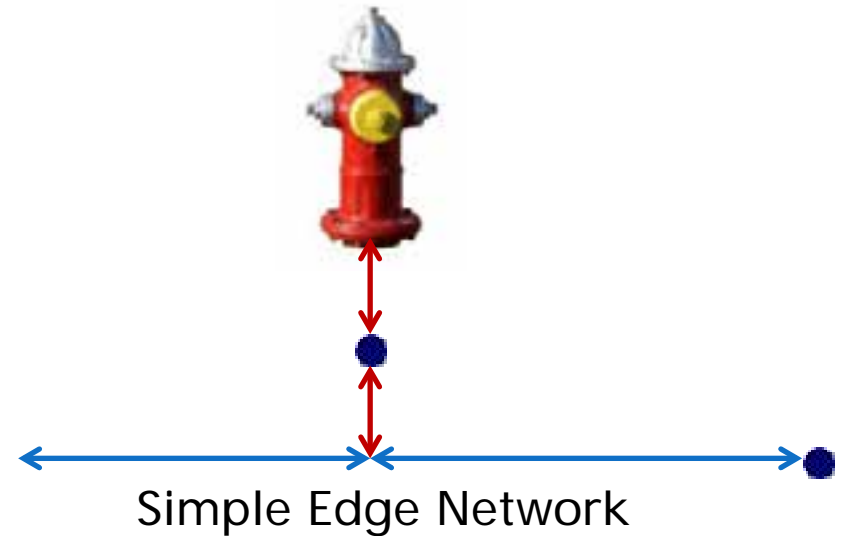
- Asset visits combined to create a single asset record
- Esri Local Government Information Model

Source Data: Existing Data and Aerial Imagery



Geometric Network Creation

- Simple edge network best represents the real world functionality of a water distribution system



Geometric Network Creation

- Attributes from plat cards used to populate pipe information
- Pipes cut whenever an attribute changed
- IT environment




Quality Control

- Attributes
- Visual
- Topology
- Geometric Network
- Infrastructure Reporting Toolbar


Testing



Results

- 4 GIS Specialists and 1 GIS Coordinator
 - 6 Months
 - Over 3,000 miles of water mains and lateral lines connecting over 80,000 valve and hydrant assets
 - Geometric dataset that is capable of performing isolation traces for shutdowns and flow modeling
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GIS Adding Value

- } Control: **Saves Money**
- } Asset Management: **Reduces Risk**
- } Hydraulic Modeling: **Targets Capital Investments**

GIS Increasing Control



Duration: 9 plat
cards

Duration: 7
valves

Footprint: 19 hydrants

GIS Increasing Control




Duration: 1
GIS


Duration: 1
valve (-6)

Footprint: 4 hydrants (-15)

GIS Data Supporting Asset Management

- Asset inventory for Infor Public Sector work management system
 - Pipe assessment and renewal strategy
 - Enhancing customer service - GIS is the foundation for 311 call center (tied to Infor)
 - Self-sustaining continuation of valve asset management on a 2 year cycle
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GIS Data Supporting Hydraulic Modeling

- Recalibration of Atlanta Water Models
 - Integrate water billing data and assign nodes
 - Integrate with SCADA data
 - Update & recalibrate the water quality models
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Esri Article

Esri News for Water & Wastewater

Summer 2012

Building Atlanta's GIS

By Cui-Rina, City of Atlanta, Department of Watershed Management, and Ryan McLean, Waste Utility Services

Atlanta, Georgia, the sixth largest metropolitan area in the United States, is one of the biggest and oldest water systems in the country. As such, the city delivers water to more than one million customers through a network of 2,300 miles of pipe. These water treatment plants (WTPs) serve the system. The service area consists of three previous zones. The system includes water mains ranging from 2 to 30 inches in diameter, and some of the pipes are 100 years old.

In a strategic effort to sustainably rehabilitate its aging system and ensure system availability, the city decided to implement a series of steps to fundamentally improve the Department of Watershed Management's (DWM) infrastructure and water flow of

integrating its GIS with its current legacy and enterprise systems. To accomplish this, DWM embarked on a series of major initiatives, which advanced the GIS program and allowed it to provide a platform not only for web-based viewing capabilities but also for real-time field reporting and updating. To achieve this goal, it first initiated an ambitious and multi-year project in 2009 with the Valve and Hydrant Asset Assessment Program.

Valve and Hydrant Asset Assessment Program 2009-2012

For the first phase of the project, DWM worked with Waste Utility Services (WUS) and Bentley Systems & Associates and used ArcGIS technology from Esri to focus on increasing

asset visibility. This included the inventory, repair, and documentation of 20,000 water valves and fire hydrants in the system. The first phase was completed in early 2012, and while it was widely regarded as successful, there remained an opportunity to increase information availability. Through 2012, the primary information system used was an off-the-shelf relational database. There had been a previous effort in the 1990s to migrate to a geographic information system (GIS), but data quality challenges prevented the idea from gaining wide acceptance, and it eventually fell by the wayside.

To make full use of GIS and asset data captured in the first phase of the project, DWM commissioned a team of professional

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† The City of Atlanta's web mapping application provides an easy way to view information.

Questions?

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Author: Dr. Rasheed Ahmed, RAhmad@AtlantaGa.Gov

Author: Dax Flinn, mflinn@AtlantaGa.Gov

Co-Author: Eric Glover, eglover@AtlantaGa.Gov

Co-Author: Andy Creek, Andy.Creek@arcadis-us.com

Co-Author: Ryan McKeon, rmckeon@wachsws.com

