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Designing and Implementing a GIS Conversion

November 5, 2004
ESRI Wisconsin User Group
Madison, WI

Waukesha Water Utility

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Presentation Overview

- Introductions
- Project Overview
- Implementation Process
- Lessons Learned
- Questions and Answers

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Introductions

Kyle Belott

GIS Coordinator

Kim Wirth

GIS Specialist

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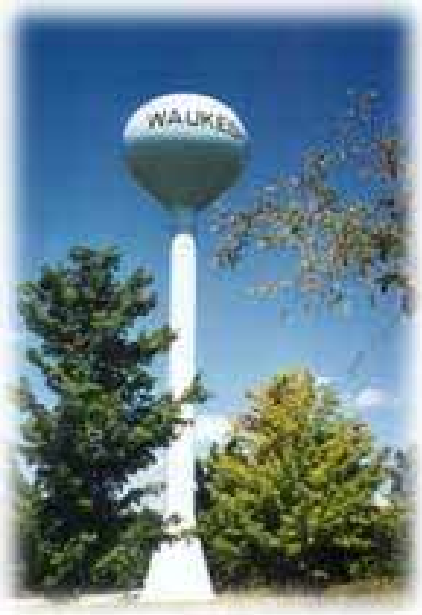
System Overview



Serving Waukesha since 1886

Serving a population of approximately 65,000

Over 17,000 customers and 22 square miles

Over 1.3 Million Feet of main

Over 2800 hydrants

8 wells

8 MGD

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Project History

- Initial Conversion Project – 1999/2000
- Technology Issues - ArcInfo Coverages
- Communication – Good at beginning of Project then tapered off
- Unrealistic expectations
- Project setbacks - Stopped updating maps at this point
- Utility went through personnel changes

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Project Goals

- Improve access to data
- Update technology
- Promote modernization and automation of tasks
- Integrate data with existing databases (work order management, utility billing, city's GIS)
- Provide a comprehensive database for feature-wide analysis
- Assign data stewardship responsibilities

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Project Team

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Implementation Process

- Functionality Requirements
- Implementation Planning
- Database Design
- Hardware/Software Procurement
- Pilot Project
- Full Data Conversion
- On-Site Installation
- Training
- Asset Management System Integration
- System Maintenance

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Database Design

- Collaborative Effort with Utility, R.A. Smith and Varion Systems
- Enhancement of ESRI data model Subtypes & domains
- Connectivity Rules (worksheet)
- Work Order Management and other future applications

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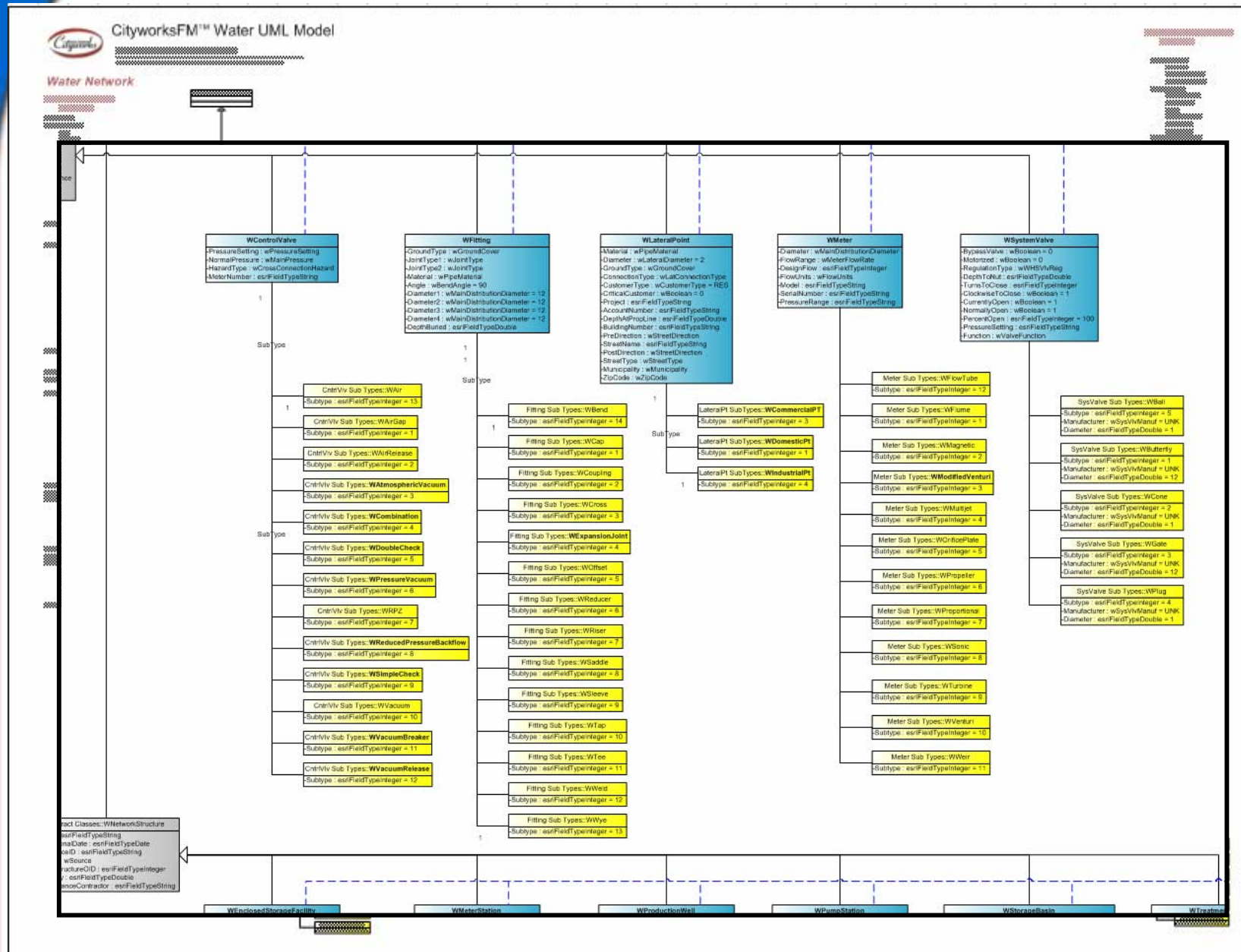
Database Design



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Connectivity Rules

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SERVING WAUKESHA SINCE 1886

Connectivity Rules Matrix

	Distribution Main	Interconnect	Transmission Main	Commercial	Domestic	Fire	Hydrant Laterals	Industrial	Fire & Domestic	Public
DistributionMain	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Interconnect	Yes	Yes	Yes							
TransmissionMain	Yes	Yes	Yes				Yes			Yes
Commercial	Yes			Yes			Yes		Yes	
Domestic	Yes				Yes					
Fire	Yes					Yes			Yes	
HydrantLaterals	Yes		Yes	Yes			Yes			
Industrial	Yes							Yes	Yes	
Fire & Domestic	Yes		Yes	Yes		Yes		Yes	Yes	
Public	Yes		Yes							Yes
ARV	Yes			Yes				Yes		
Ball	Yes			Yes	Yes	Yes	Yes	Yes	Yes	
Butterfly	Yes	Yes	Yes	Yes						
BlowOff	Yes	Yes	Yes							
Bypass	Yes									
Corporation	Yes				Yes					
CurbStop	Yes			Yes	Yes	Yes	Yes	Yes	Yes	Yes
DoubleDetector						Yes				
DoubleDisc	Yes	Yes	Yes							
Gate	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
GateARV	Yes			Yes				Yes		
GateBypass	Yes	Yes	Yes	Yes				Yes		Yes
GateCutting	Yes									
GateTapping	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
OS	Yes									

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Project Documentation

- Creation of Procedures Manual
  - Data Design
  - Symbol template
  - Plotting Layout
  - Plotting Standards
  - System Configuration Information
  - Data Hierarchy
  - Data Conversion Procedures
  - Metadata

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Pilot Project

- Section 11
  - Old/New subdivisions
  - 2 Pressure Districts
  - Booster Station
  - Variety of data formats (CAD, paper and some database)

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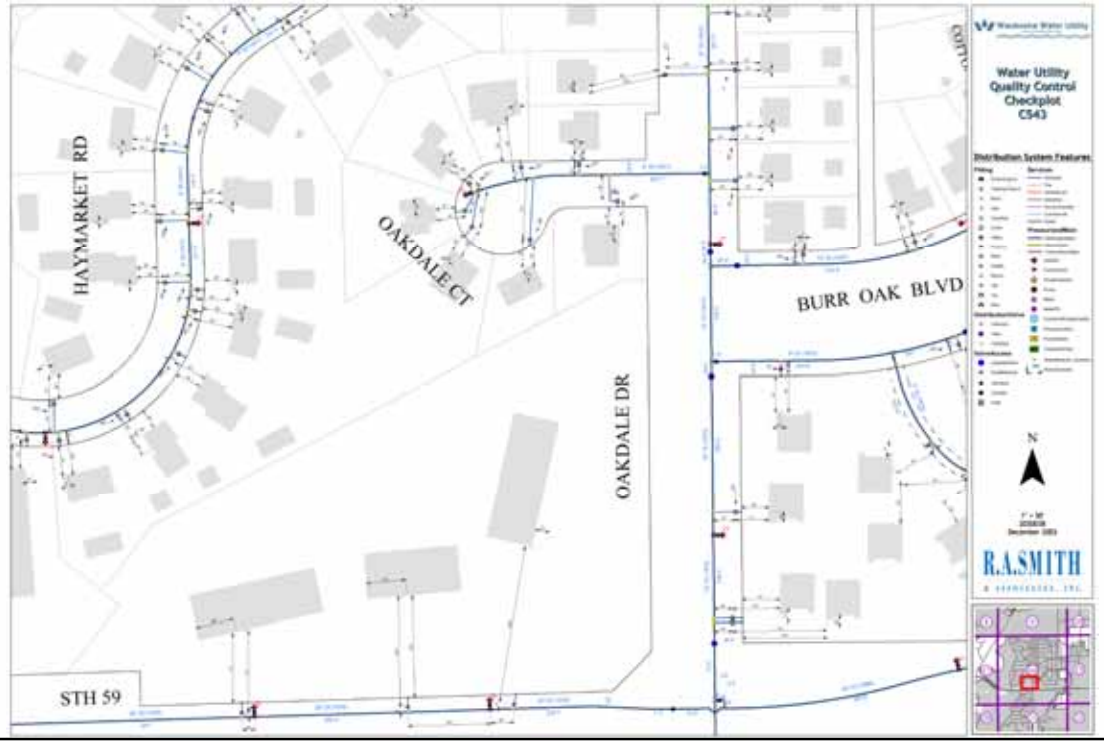
Pilot Project

- Validate production procedures
- Test QA/QC procedures
- Evaluate System Data model
- Establish Procedures Manual
- Submitted to Utility for approval
- Accepted when 100% correct



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QA/QC

- 98% accuracy – Project Accuracy Requirement
- QA/QC processes on both ends – R.A Smith and the Utility
- Conflict Resolution Procedures

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QA/QC

- Verify Connectivity
- Validate Features and Attributes
- Data Normalization
- Query Development
  - Conflicting Information
  - Duplicate Information
  - Incomplete Information

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QA/QC

- Reports submitted to Utility
  - Diameter conflicts
  - Feature summary
  - Missing Feature IDs

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QA/QC

- QA/QC at the Utility
  - Random 20% of the section selected ISO 9000 standard for data checking
  - Overlay on light table against mylars
    - Diameters, dimensions, text
  - Database Check of attributes
    - Such as fittings, etc…
  - Total Feature count for 20% of Section
  - Accept or Reject – Formal Letter

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Conversion Sources

- Conversion based upon precedence of use

Precedence of Use of Waukesha Water Utility Data Sources

		KEY : L=location, A=attribute							
Referenced As	**Period Covered or Last Update**	**MAIN**		**VALVE**		**HYDRANT**		**SERVICE LATERAL**	
		L	**A**	**L**	**A**	**L**	**A**	**L**	**A**
Water System Map (800 scale)	1998	4		5		5			
Hydrant Index Maps	2003					4	1		
Water Atlas (maylars) 1"=50'	1998	1	2	2		2		1	
Archive Ward Book Pages	1930?	3		4		3			
Intersection Book Pages w/Valve Index	1997			3	3		3		
Main Job As-Builts	1952-1992	2	1	4	4	3	3		
Inspection Reports & Maps	1993-1999	2	1	4	4	3	3		
Utility Service Lateral Worksheet	2003							2	2
City of Waukesha Streets	1998								
City of Waukesha Parcels	2003								
Utility Differential GPS data	2003			1		1		1	
Hydrant Database	2003						1		
Valve Database	2003				1				
Service Lateral Database	2003								1
Customer Info. System Database	2003								1
Archive Main Inventory List	1908-1930								
Hydrant Cards	1990						2		
Valve Cards	1990				2				
Customer Master Cards	2003							3	1

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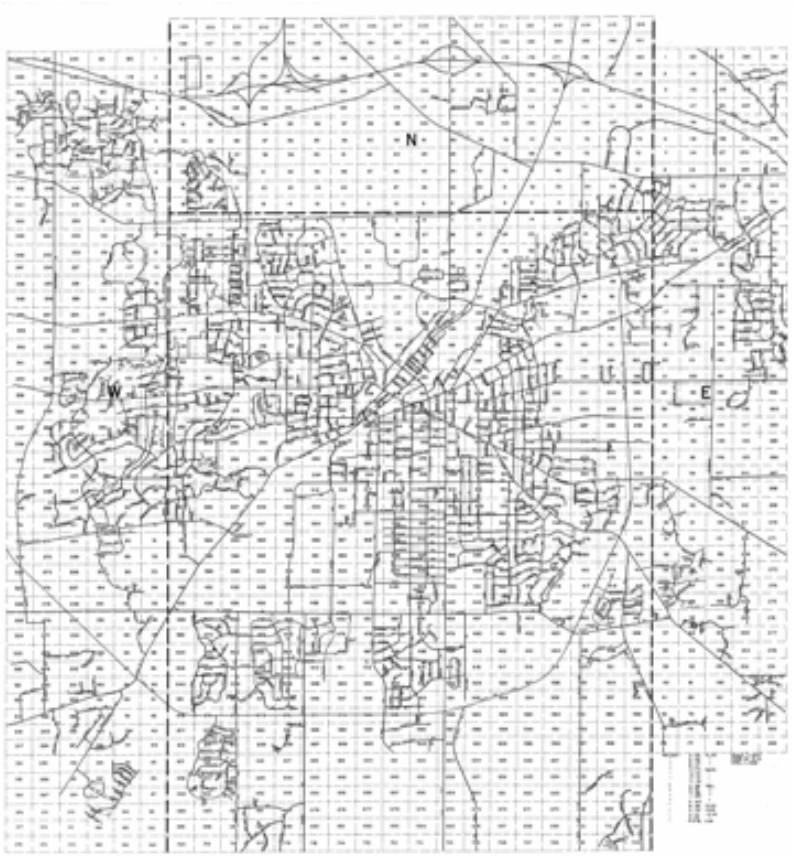
Conversion Sources

- Utility scanned mylars
- Find sheet by index map



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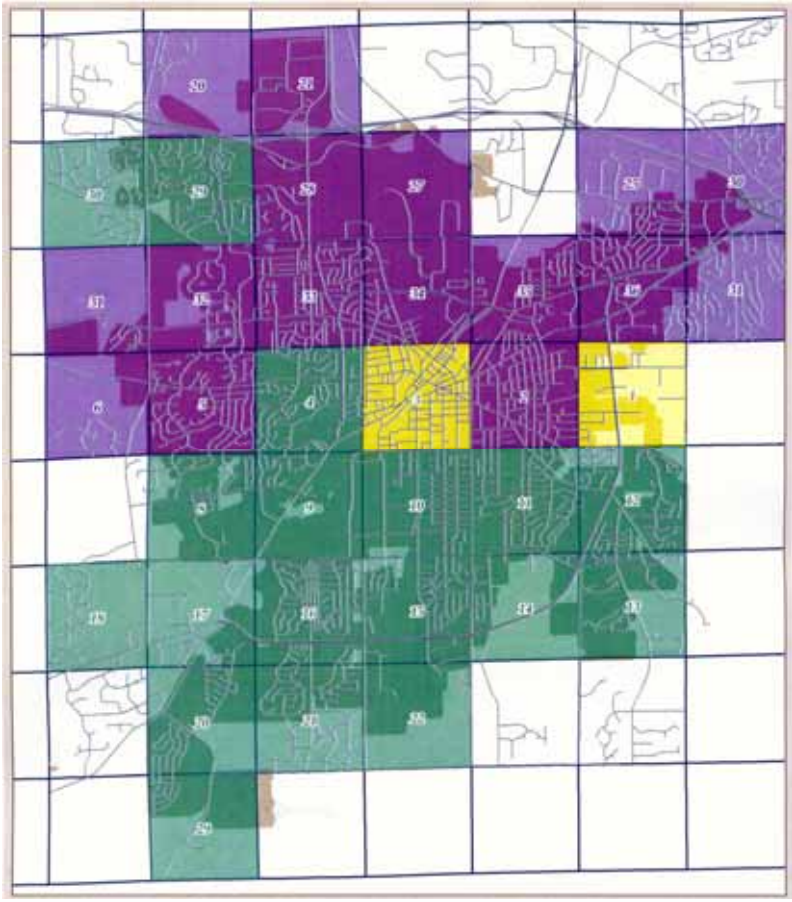
Full Conversion

- 3-4 Sections per month
- On-going review by Utility
- 60-Day Final Review

  and Approval



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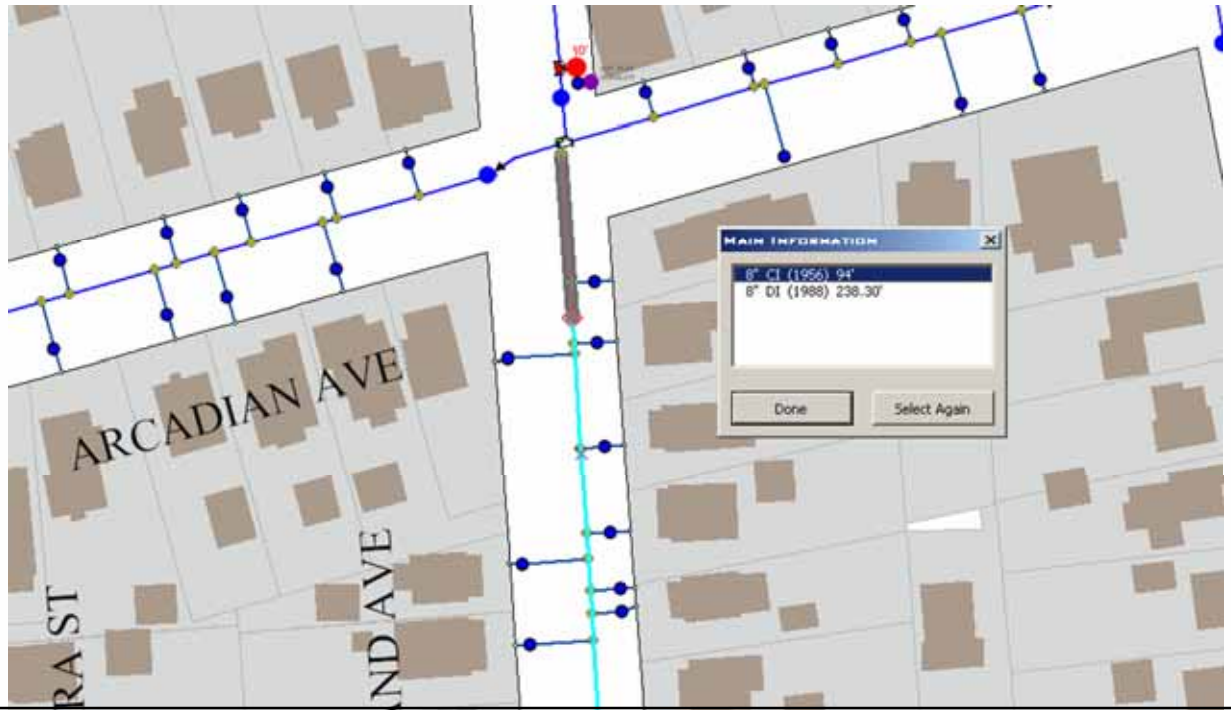
Full Conversion

- Custom tool required based on Utility crew feedback.
- Developed Main Information Tool
  - selected main flashes
  - displays formatted attributes



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On-Site Installation

- ArcSDE Software
- Geodatabase
- Connection to City

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Next Year

- Work Order Management Implementation
- Field Use
  - Hydrant and Valve Survey
  - Flushing program
  - Data Inquiries
- Enhancing data quality even further
  - Add in new infrastructure
  - Make modifications to each Section's remaining 80%
  - Work with Utility crews to verify data locations

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Project Success Factors

- Maintain management support – monthly progress maps to Water Commission
- Meet project goals and objectives
- Allocating sufficient resources
- Complete pilot project
- Listen and obtain feedback
- Assign stewardship responsibilities

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What did we learn?

- Organizing data upfront, will aid in the conversion process and help with resolving data discrepancies
- Team communication is essential
- Converting data will not ensure 100% data accuracy
- Management support is crucial

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Questions??

Feel free to contact us:

Kyle Belott

R. A. Smith & Associates, Inc.

kyle.belott@rasmith.com

Phone: 262-317-3364

Kim Wirth

Waukesha Water Utility

kwirth@waukesha-water.com

Phone: 262-521-5272

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