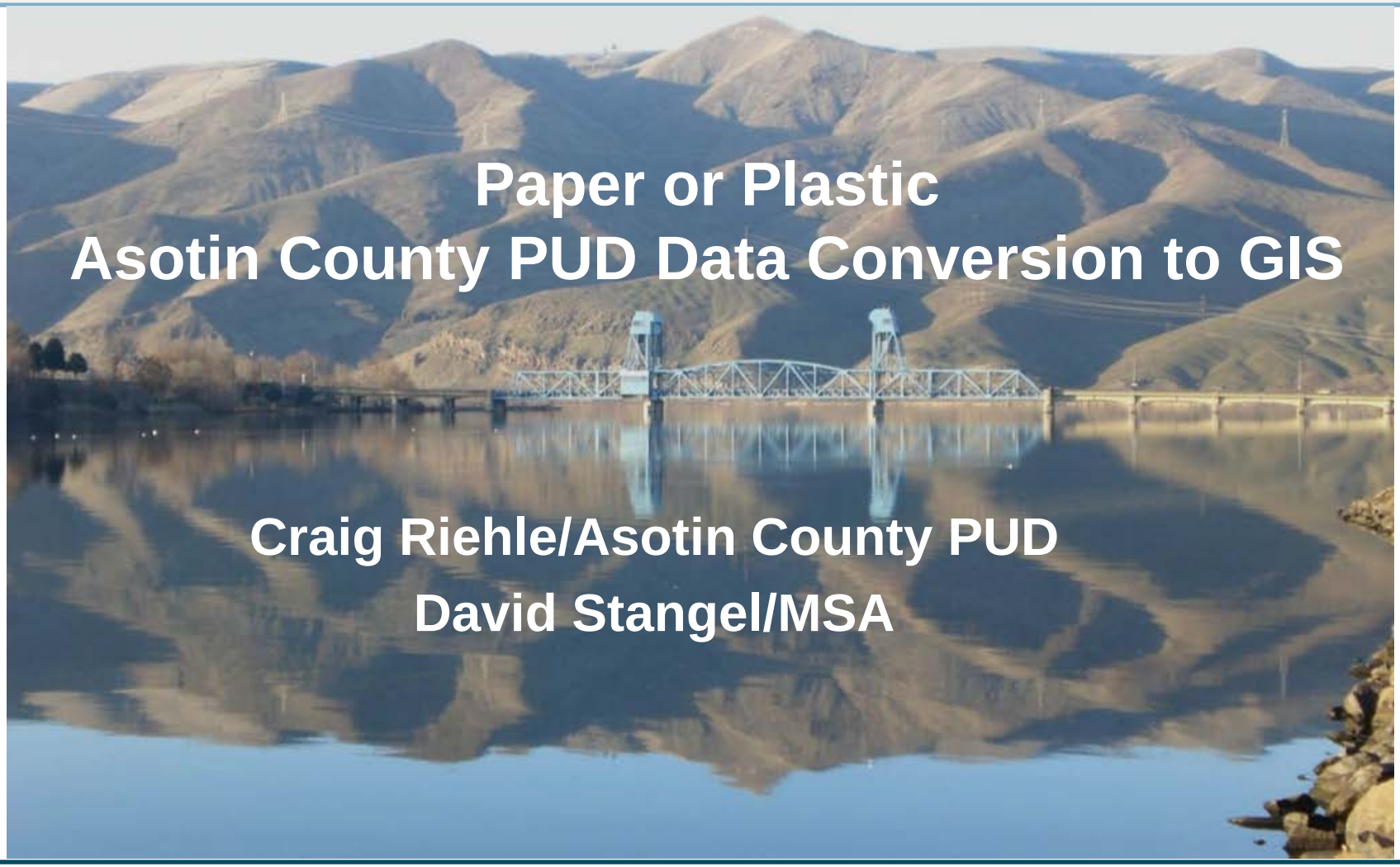


Paper or Plastic
Asotin County PUD Data Conversion to GIS

Craig Riehle/Asotin County PUD

David Stangel/MSA

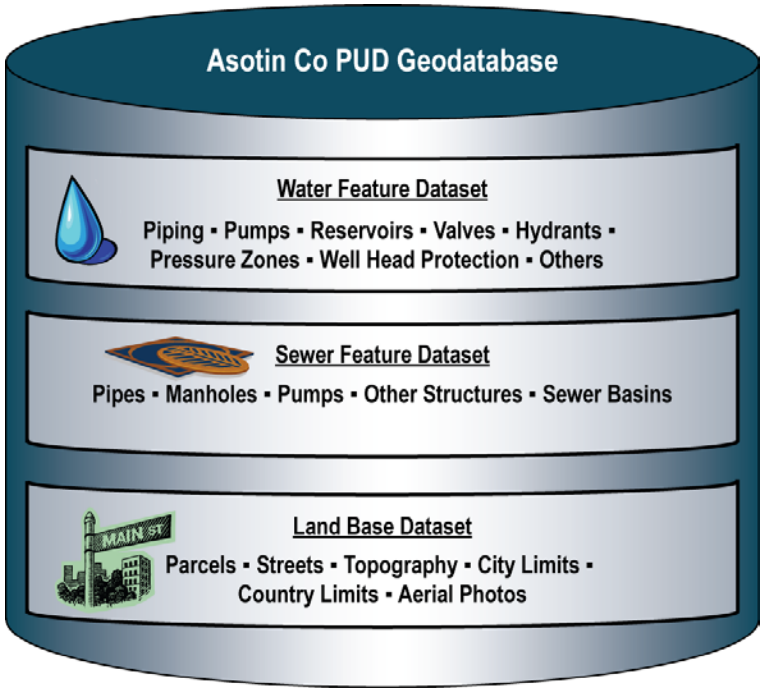
Public Utility District Asotin County

MSA Murray, Smith & Associates, Inc.

GSS Geo-Spatial Solutions Inc.

PROJECT OVERVIEW

- ❑ Project Goals
- ❑ Database Design
- ❑ Data Conversion
- ❑ Model Integration
- ❑ Maintenance
- ❑ GIS Customization
- ❑ Current Uses
- ❑ Future Plans
- ❑ Business Case
- ❑ Conclusions



PROJECT GOALS

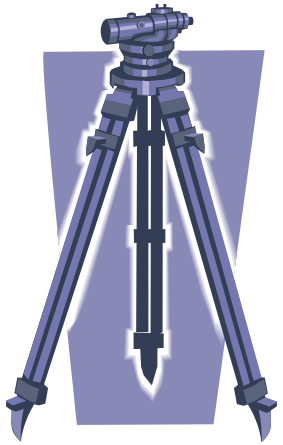
- **Project Components**
  - Develop GIS
  - Integrate GIS with Model

- **Project Goals**
  - Accuracy and Accessibility
  - Maintain Central Database
  - Field Crew Use
  - Mapping and Presentations
  - System Analysis

INITIAL STEPS

- **PUD Hired a GIS Coordinator**

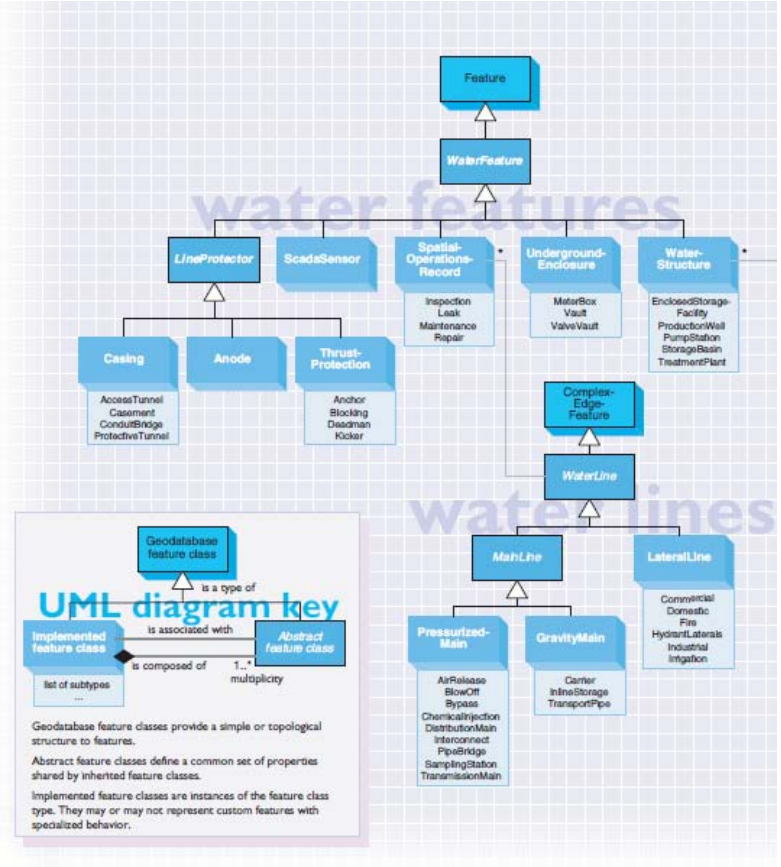
- **Hardware & Software Selection and Setup**
  - Office Computer for GIS Coordinator Use
  - Large Monitor/TV & Computer for Crew Use
  - Scanner for Hardcopy Data Conversion
  - Survey Grade GPS for Data Collection
  - Field Laptop for Crew Use
  - ArcEditor, InfoWater & InfoSWMM



DATABASE DESIGN

❑ ESRI Industry Template as Starting Point

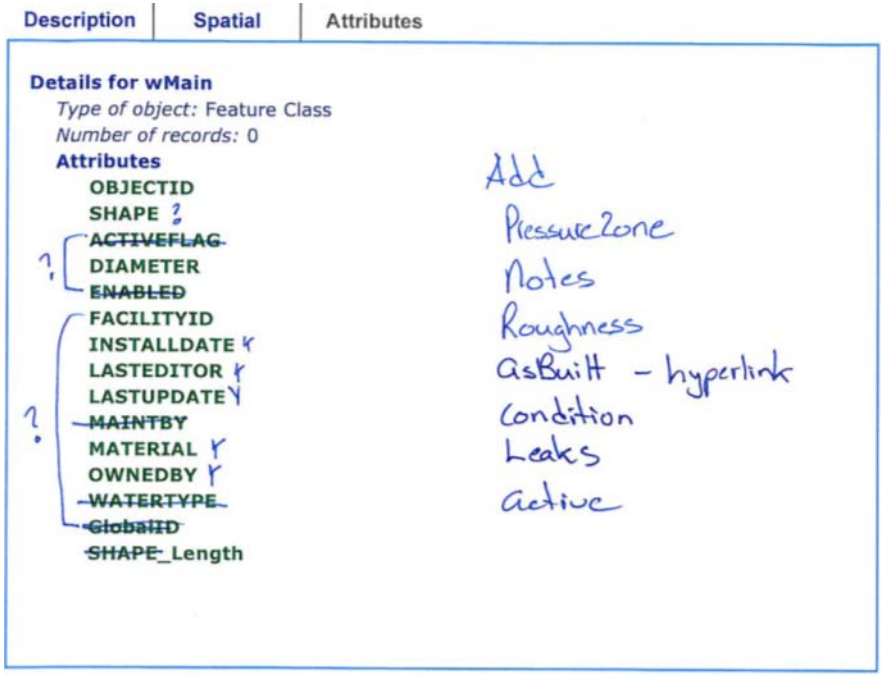
- Adapted to PUD's Systems and Needs
- Too Many Attributes for Some Features
- Not Enough Attributes for Others



DATABASE DESIGN

❑ Editing the ESRI Template

- Required Understanding of Goals and Use of Data
- Adapted Some as Project Progressed
- Edits Considered the Needs of the Modeling Software



ssGravityMain

Number of Records:

Geometry : Polyline

Data Origin: GPS Survey Grade

Dataset Type FeatureClass

Has M: Yes

FeatureType Simple

Has Z: Yes

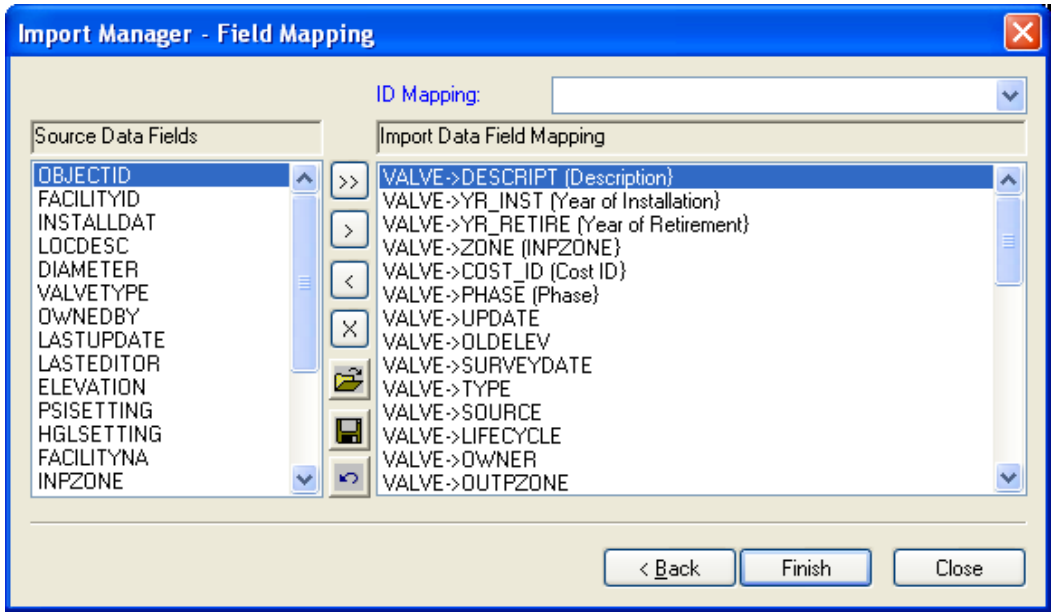
Field Name	Alias Name	Type	Length	Null	Description
OBJECTID	OBJECTID	OID	4	No	ArcGIS generated ID
SHAPE	SHAPE	Geometry	0	Yes	ArcGIS generated Element Type
FACILITYID	Facility Identifier	String	20	Yes	Master Unique ID
INSTALLDATE	Install Date	Date	8	Yes	Pipe Installation date
MATERIAL	Material	String	20	Yes	Pipe Material
DIAMETER	Diameter	Double	8	Yes	Pipe Diameter
MAINSHAPE	Main Shape	String	50	Yes	Pipe Shape (geometry)
LINEDYEAR	Year Lined	String	4	Yes	Year Liner Installed
LINERTYPE	Liner Type	String	20	Yes	Liner Type
OWNEDBY	Owned By	String	30	Yes	Owner Agency
LASTUPDATE	Last Update Date	Date	8	Yes	Date Element was updated
LASTEDITOR	Last Editor	String	50	Yes	Editor of last change
NOTES	NOTES	String	255	Yes	General Notes, up to 255 characters
MANNINGS	MANNINGS	Double	8	Yes	Mannings N Value
UPINVELEV	UPINVELEV	Double	8	Yes	Upstream Pipe Invert Elevation
DNINVELEV	DNINVELEV	Double	8	Yes	Downstream Pipe Invert Elevation
UPMHID	UPMHID	String	20	Yes	Upstream Manhole ID
DNMHID	DNMHID	String	20	Yes	Downstream Manhole ID
SLOPE	SLOPE	Double	8	Yes	(Upstream Invert Elev - Downstream Invert Elev)/Pipe Length
CONDITION	CONDITION	String	50	Yes	Condition of Pipe Based on CCTV
LIFECYCLESTATUS	Life Cycle Status	String	10	Yes	Life Cycle Status of asset
SOURCE	Source of Data	String	50	Yes	Typically will be CAD, Model or Other
GPSDATE	GPSDATE	Date	8	Yes	Date that upstream and downstream manholes were GPS'd
ENABLED	Enabled	Small Integer	2	Yes	For use with Geometric Network
SHAPE_Length	SHAPE_Length	Double	8	Yes	ArcGIS Generated Length

DATABASE DESIGN

- Maintain Flexibility Where Possible
- Find Balance Between What is Needed Now and What Might be Needed in the Future
- Future Additions/Deletions/Modifications can Always be Made, but Need to be Aware of Impact on Other Systems that Utilize the Data

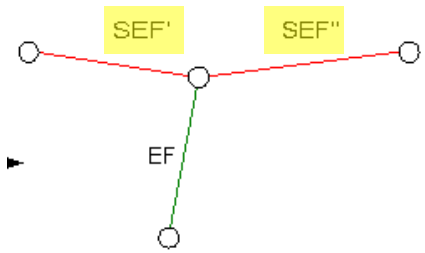
DATABASE DESIGN

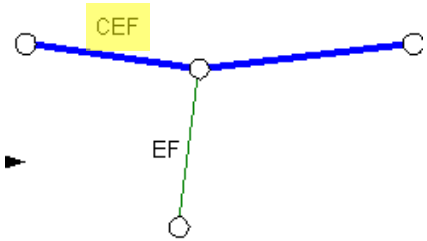
- **Consider Compatibility with Model**
  - Determine what to Include in Model
  - Unique IDs are Essential to Data Exchange



DATABASE DESIGN

- **Geometric Network**
  - Utilizes Geodatabase is the Base Data Structure
  - Allows Additional Rules and Connectivity Behavior
  - Complex vs. Simple Edges
    - Determines if Pipe Splits Into Two Features at Junctions
    - Determines Whether Service/Hydrant Laterals Split Mains
    - Important Consideration for Model Compatibility





DATABASE DESIGN

❑ Geometric Network (Continued)

- Connectivity Rules Established

		Line
		wLateralLine
Line	wCasing	
Line	wHydrantLateral	
Line	wLateralLine	
Line	wMain	Fitting (DEFAULT)
Point	wBoosterPump	
Point	wControlValve	
Point	wFitting	X
Point	wFlusher	X
Point	wHydrant	
Point	wLeak	X
Point	wMeter	X
Point	wNetworkStructure	X
Point	wSamplingStation	X
Point	wServicePoint	DEFAULT
Point	wSystemValve	X
Point	wTank	
Point	wTestStation	X
Point	wWellPump	

DATABASE DESIGN

Coded value domain
ssLineMaterial

Description	Sanitary sewer line materials
Field type	String
Split policy	Duplicate
Merge policy	Default value

Code	Description
AC	Asbestos Concrete
CIP	Cast Iron
CL	Clay
CO	Concrete
DIP	Ductile Iron
GP	Galvanized
HDPE	High-density Polyethelene
PE	Polyethelene
PVC	Polyvinyl Chloride
Wo	Wood
Unk	Unknown
Oth	Other

- **Data Domains**
  - Limits Attribute Values
  - Maintains Data Consistency
  - Facilitates Data Searches
  - Standardized Across Feature Classes Where Possible
- **Examples**
  - Material
  - Diameter
  - Pressure Zone

DATABASE DESIGN

Simple junction feature class
ssManhole

Geometry	Point
Contains M values	No
Contains Z values	Yes

Field name	Data type	Allow nulls	Default value	Domain	Prec-ision	Scale	Length	Field Description:
OBJECTID	Object ID							Geometry ID - Calculated automatically by GIS
SHAPE	Geometry	Yes						Geometry type - Calculated automatically by GIS
FACILITYID	String	Yes					20	Master unique ID
INSTALLDATE	Date	Yes			0	0	8	Date of installation
INVERTELEV	Double	Yes		ssElevation	0	0		Bottom of Manhole Elevation
MHTYPE	String	Yes		ssManholeType			15	Manhole Type
CONDITION	String	Yes		ssConditionAssessment			25	Manhole Condition
NEEDSCLEANING	String	Yes		YesNo			3	Does the manhole need to be cleaned?
LINED	String	Yes		YesNo			3	Has the manhole been lined?
OWNEDBY	String	Yes		AssetManager			30	Owner agency
LASTUPDATE	Date	Yes			0	0	8	Date feature was last updated
LASTEDITOR	String	Yes	PUD-CR	LastEditor			50	Editor of last change to feature
RIMELEV	Double	Yes		ssElevation	0	0		Elevation of Manhole rim
NUMINLETS	Short integer	Yes		ssManholeInOutlets	0			Number of Pipes entering manhole
NUMOUTLETS	Short integer	Yes		ssManholeInOutlets	0			Number of Pipes exiting manhole
MHDIAM	Short integer	Yes		ssManholeDiameter	0			Manhole Diameter
LINEDYEAR	String	Yes					8	Year Manhole was lined
MHMATERIAL	String	Yes		ssManholeMaterial			50	Manhole Material
LIFECYCLESTATUS	String	Yes	Active	LifeCycleStatus			10	Life Cycle Status of asset
SOURCE	String	Yes		DataSource			50	Primary source of data
GPSDATE	Date	Yes			0	0	8	Date GPS'd
Notes	String	Yes					255	General notes
ENABLED	Short integer	Yes	1	EnabledDomain	0			Enabled if flow is allowed - Geometric Network

Relationship class
ManholeHasHyperlinks

Type	Composite	Forward label	Get Hyperlinks
Cardinality	One to many	Backward label	Get Manhole
Notification	Forward		

Origin feature class	Destination table
Name ssManhole	Name ssManholeHyperlinks
Primary key FACILITYID	
Foreign key FACILITYID	

No relationship rules defined.

Table
ssManholeHyperlinks

Table which allows for hyperlinking to related documents for Manhole features

Field name	Data type	Allow nulls	Default value	Domain	Prec-ision	Scale	Length	Field Description:
OBJECTID	Object ID							Unique ID - Calculated automatically by GIS
FACILITYID	String	Yes					20	ID used to match to records to feature class
HYPERLINK	String	Yes					255	File system path of document
Description	String	Yes					50	Description of associated document

PUD Public Utility District Asotin County

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GSS Geo-Spatial Solutions Inc.

DATA CONVERSION

- Converted Two Systems: Water and Sewer

- Data Sources

Water	Sewer
•CAD (primary) •As-Builts •Hydraulic Model •Survey	•Some Digital Line Work •As-Builts •Survey (primary)

DATA CONVERSION

❑ Approach

Water	Sewer
•Convert CAD to GIS •Supplement with Previous Model, Hard Copies and Surveying as Needed	•Survey Every Manhole and Lift Station

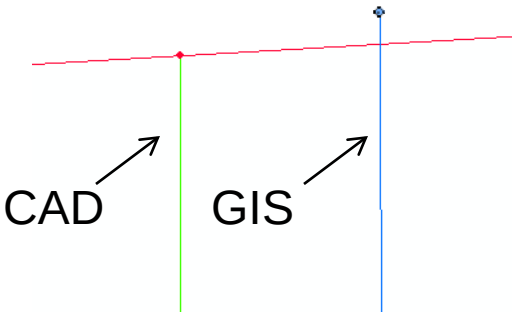
DATA CONVERSION

❑ Additional Considerations

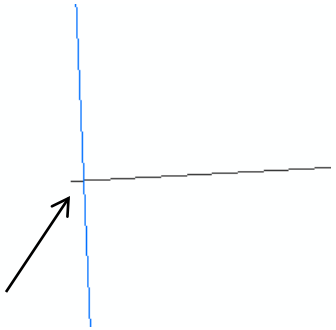
Water	Sewer
• How to "Clean-up" CAD Linework and Attributes • Preserve Link to Original CAD Source	• Tailor Survey and Data Collection to Populate GIS and Model Attributes • Example – Collect Manhole Condition Data During Survey

DATA CONVERSION

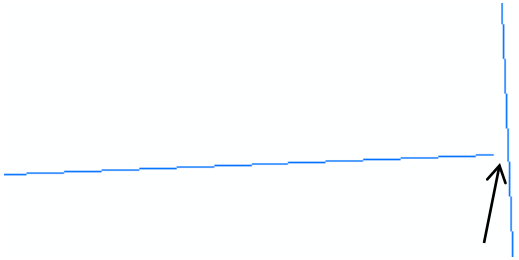
- **Spatial and Topology Issues Encountered Converting from CAD to GIS**



Shifting



Overlapping Pipe



Disconnected Pipe

DATA CONVERSION

CAD Attribute Issues

- ❑ **Attributes Were Saved as Annotation/Labels**
- ❑ **Annotation was Not Associated with Features**
  - Linework, Valves, etc
- ❑ **Annotation was Not All on Same Level/Layer**
- ❑ **Annotation was Not Consistently Entered**
  - I.E. CI, ci, Ci, Cast Iron, etc

DATA CONVERSION

Solution: Convert Attributes Where Economies of Scale Exist

- **Implement QA/QC to Remove Miscoded Items**
  - Examine over 7,500 Records with about 12 Different Fields (90,000 data points)
  - Sort Through Data that was Transposed
  - Parse Data that was Combined
  - Standardize Data so that they were Consistent in Format and Units

Table

CADpoints

OBJECTID *	Shape	Entity	Handle *	Layer	LyrHandle	Linetype	EntLinetype	LyrLnType	Elevation	RefName	
3500	Point Z	Insert	DE3B	PIPEREDUCER	D8B	Continuous	Continuous	Continuous	0	PIPERED	Water-T
3501	Point Z	Insert	DE40	PIPEREDUCER	D8B	Continuous	Continuous	Continuous	0	PIPERED	Water-T
3577	Point Z	Insert	E4F4	CUSTOMER	CDB	Continuous	Continuous	Continuous	0	CUSTL	Water-T
3578	Point Z	Insert	E4FC	VALVE	CBB	Continuous	Continuous	Continuous	0	GATEVALV	Water-T
3579	Point Z	Insert	E502	VALVE	CBB	Continuous	Continuous	Continuous	0	GATEVALV	Water-T
3580	Point Z	Insert	E508	6PIPECI	F9	6_INCH_CAST_IRON	6_INCH_CAST_IRON	6_INCH_CAST_IRON	0	YEARDEP	Water-T
3581	Point Z	Insert	E50D	6PIPECI	F9	6_INCH_CAST_IRON	6_INCH_CAST_IRON	6_INCH_CAST_IRON	0	YEARDEP	Water-T
3594	Point Z	Insert	E618	3QTRPIPE	134	Continuous	Continuous	Continuous	0	HYDRL	Water-T
3595	Point Z	Insert	E61F	VALVE	CBB	Continuous	Continuous	Continuous	0	GATEVALV	Water-T
3596	Point Z	Insert	E625	VALVE	CBB	Continuous	Continuous	Continuous	0	GATEVALV	Water-T
3599	Point Z	Insert	E635	2PIPEGI	9C	2_INCH_GALV_IRON	2_INCH_GALV_IRON	2_INCH_GALV_IRON	0	YEARDEP	Water-T
3611	Point Z	Insert	E71A	3QTRPIPE	134	Continuous	Continuous	Continuous	0	HYDRL	Water-T
3612	Point Z	Insert	E721	VALVE	CBB	Continuous	Continuous	Continuous	0	GATEVALV	Water-T
3613	Point Z	Insert	E727	VALVE	CBB	Continuous	Continuous	Continuous	0	GATEVALV	Water-T
3645	Point Z	Insert	E8C1	CUSTOMER	CDB	Continuous	Continuous	Continuous	0	CUSTL	Water-T
3646	Point Z	Insert	E8C9	CUSTOMER	CDB	Continuous	Continuous	Continuous	0	CUSTL	Water-T
3647	Point Z	Insert	E8D1	CUSTOMER	CDB	Continuous	Continuous	Continuous	0	CUSTL	Water-T
3648	Point Z	Insert	E8D9	VALVE	CBB	Continuous	Continuous	Continuous	0	GATEVALV	Water-T
3649	Point Z	Insert	E8DF	2PIPEGI	9C	2_INCH_GALV_IRON	2_INCH_GALV_IRON	2_INCH_GALV_IRON	0	YEARDEP	Water-T
3650	Point Z	Insert	E8EC	CUSTOMER	CDB	Continuous	Continuous	Continuous	0	CUSTL	Water-T
3651	Point Z	Insert	E8F4	CUSTOMER	CDB	Continuous	Continuous	Continuous	0	CUSTL	Water-T
3652	Point Z	Insert	E8FC	CUSTOMER	CDB	Continuous	Continuous	Continuous	0	CUSTL	Water-T
3653	Point Z	Insert	E904	CUSTOMER	CDB	Continuous	Continuous	Continuous	0	CUSTL	Water-T
3654	Point Z	Insert	E90C	CUSTOMER	CDB	Continuous	Continuous	Continuous	0	CUSTL	Water-T
3655	Point Z	Insert	E915	6PIPEAC	A2	6_INCH_ASB_CEMENT	6_INCH_ASB_CEMENT	6_INCH_ASB_CEMENT	0	YEARDEP	Water-T
3656	Point Z	Insert	E91A	6PIPEAC	A2	6_INCH_ASB_CEMENT	6_INCH_ASB_CEMENT	6_INCH_ASB_CEMENT	0	YEARDEP	Water-T
3657	Point Z	Insert	E91F	6PIPEAC	A2	6_INCH_ASB_CEMENT	6_INCH_ASB_CEMENT	6_INCH_ASB_CEMENT	0	YEARDEP	Water-T
3658	Point Z	Insert	E924	2PIPEGI	9C	2_INCH_GALV_IRON	2_INCH_GALV_IRON	2_INCH_GALV_IRON	0	YEARDEP	Water-T
3659	Point Z	Insert	E929	VALVE	CBB	Continuous	Continuous	Continuous	0	GATEVALV	Water-T
3660	Point Z	Insert	E937	FIREHYDRANT	CE0	Continuous	Continuous	Continuous	0	HYDRL	Water-T
3661	Point Z	Insert	E93E	VALVE	CBB	Continuous	Continuous	Continuous	0	GATEVALV	Water-T
3662	Point Z	Insert	E944	VALVE	CBB	Continuous	Continuous	Continuous	0	GATEVALV	Water-T
3663	Point Z	Insert	E94A	CUSTOMER	CDB	Continuous	Continuous	Continuous	0	CUSTL	Water-T
3664	Point Z	Insert	E952	CUSTOMER	CDB	Continuous	Continuous	Continuous	0	CUSTL	Water-T
3665	Point Z	Insert	E95A	CUSTOMER	CDB	Continuous	Continuous	Continuous	0	CUSTL	Water-T
3666	Point Z	Insert	E962	2PIPEGI	9C	2_INCH_GALV_IRON	2_INCH_GALV_IRON	2_INCH_GALV_IRON	0	YEARDEP	Water-T
3667	Point Z	Insert	E967	2PIPEGI	9C	2_INCH_GALV_IRON	2_INCH_GALV_IRON	2_INCH_GALV_IRON	0	YEARDEP	Water-T
3668	Point Z	Insert	E96C	2PIPEGI	9C	2_INCH_GALV_IRON	2_INCH_GALV_IRON	2_INCH_GALV_IRON	0	YEARDEP	Water-T
3669	Point Z	Insert	E971	6PIPEAC	A2	6_INCH_ASB_CEMENT	6_INCH_ASB_CEMENT	6_INCH_ASB_CEMENT	0	YEARDEP	Water-T
3670	Point Z	Insert	E976	VALVE	CBB	Continuous	Continuous	Continuous	0	GATEVALV	Water-T
3671	Point Z	Insert	E97C	6PIPEAC	A2	6_INCH_ASB_CEMENT	6_INCH_ASB_CEMENT	6_INCH_ASB_CEMENT	0	YEARDEP	Water-T

1 (0 out of 10569 Selected)

CADpoints

PUD Public Utility District Asotin County

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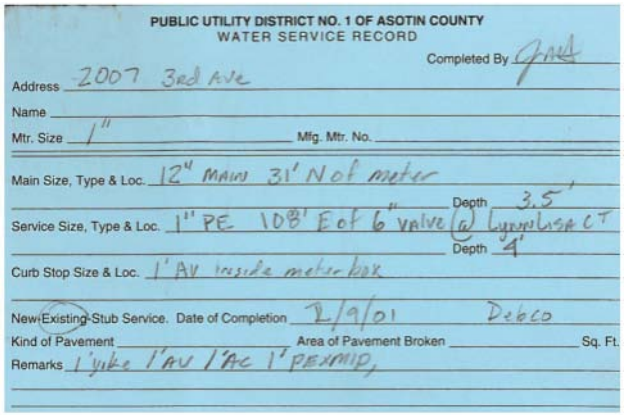
DATA CONVERSION

- **Relational Hyperlinking Allows Multiple Images to be Linked through Tables**
  - As-builts
  - Pictures
  - Movies



PUBLIC UTILITY DISTRICT NO. 1 OF ASOTIN COUNTY
WATER SERVICE RECORD

Completed By JAA

Address 2007 3rd Ave

Name

Mtr. Size 1" Mfg. Mtr. No.

Main Size, Type & Loc. 12" MAIN 31' N of meter

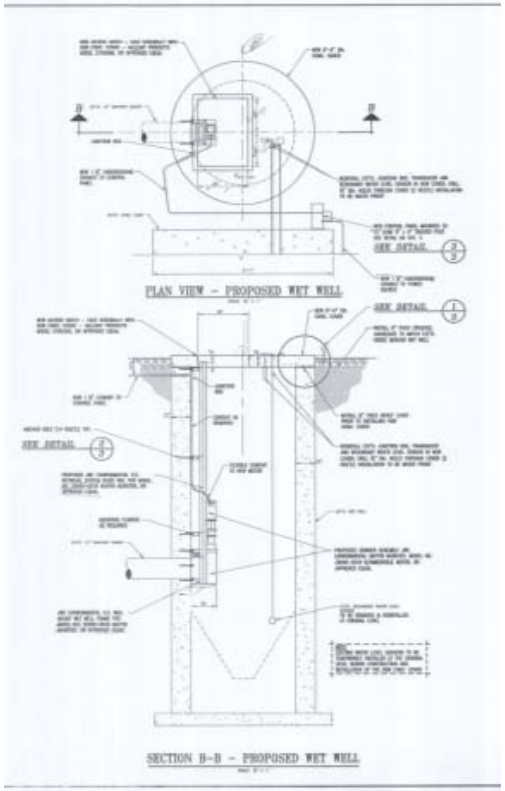
Service Size, Type & Loc. 1" PE 108' E of 6" valve @ Lynn Lisa CT Depth 3.5' Depth 4'

Curb Stop Size & Loc. 1' AV inside meter box

New Existing Stub Service. Date of Completion 12/9/01 Debco

Kind of Pavement Area of Pavement Broken Sq. Ft.

Remarks 1' like 1' AV 1' AC 1' PEXMIP,



DATA CONVERSION

Simple junction feature class
wBoosterPump

Geometry Point
Contains M values No
Contains Z values Yes

Field name	Data type	Allow nulls	Default value	Domain	Prec-ision	Scale	Length	Field Description:
OBJECTID	Object ID							Geometry ID - Calculated automatically by GIS
SHAPE	Geometry	Yes						Geometry type - Calculated automatically by GIS
FACILITYID	String	Yes					20	Master unique ID
INSTALLDATE	Date	Yes			0	0	8	Date of installation
LOCDESC	String	Yes					200	Location Description, address
ELEVATION	Double	Yes		wElevation	0	0		Pump Elevation - center of pump
INLETDIAM	Double	Yes		wMainDistributionDiameter	0	0		Pump Inlet Diameter
DISCHDIAM	Double	Yes		wMainDistributionDiameter	0	0		Pump Outlet Diameter
OWNEDBY	String	Yes	PUD	AssetManager			30	Owner agency
LASTUPDATE	Date	Yes			0	0	8	Date feature was last updated
LASTEDITOR	String	Yes	PUD-CR	LastEditor			50	Editor of last change to feature
PUMPHP	Float	Yes		wPumpHP	0	0		Pump Rated HP
HASGENERATOR	String	Yes		YesNo			3	Does the Pump have a generator?
GENERATORSIZE	String	Yes					25	The size of the generator in kW or MW
SHUTOFFHEAD	Long integer	Yes		HeadRange	0			Shut-off Head of Pump
DESIGNHEAD	Long integer	Yes		HeadRange	0			Design Head point of Pump
DESIGNFLOW	Long integer	Yes		FlowRange	0			Design Flow point of Pump
MAXHEAD	Long integer	Yes		HeadRange	0			Maximum Head point of Pump
MAXFLOW	Long integer	Yes		FlowRange	0			Maximum Flow point of Pump
LASTSERVDATE	Date	Yes			0	0	8	Date pump was last serviced or rebuilt
NOTES	String	Yes					255	General notes
INPZONE	String	Yes		PressureZone			50	Suction side pressure Zone name
OUTPZONE	String	Yes		PressureZone			50	Discharge side pressure Zone name
FACILITYNAME	String	Yes					50	Name for Pump-i.e.Orchard St Pump Station
VFD	String	Yes		YesNo			3	Is pump a Variable Frequency Drive?
VFDSETTING	Float	Yes		VFDSetting	0	0		Setting of VFD (0-1)
LIFECYCLESTATUS	String	Yes	Active	LifeCycleStatus			10	Life Cycle Status of asset
SOURCE	String	Yes		DataSource			50	Primary source of data
GPSDATE	Date	Yes			0	0	8	Date GPS'd
ENABLED	Short integer	Yes	1	EnabledDomain	0			Enabled if flow is allowed - Geometric Network

Relationship class
BoosterPumpHasHyperlinks

Type Composite
Cardinality One to many
Notification Forward
Forward label Get Hyperlinks
Backward label Get Booster Pump

Origin feature class	Destination table
Name wBoosterPump	Name wBoosterPumpHyperlinks
Primary key FACILITYID	
Foreign key FACILITYID	

No relationship rules defined.

Table
wBoosterPumpHyperlinks

Table which allows for hyperlinking to related documents for Booster Pump features

Field name	Data type	Allow nulls	Default value	Domain	Prec-ision	Scale	Length	Field Description:
OBJECTID	Object ID							Unique ID - Calculated automatically by GIS
FACILITYID	String	Yes					20	ID used to match to records to feature class
HYPERLINK	String	Yes					255	File system path of document
Description	String	Yes					50	Description of associated document

PUD Public Utility District Asotin County

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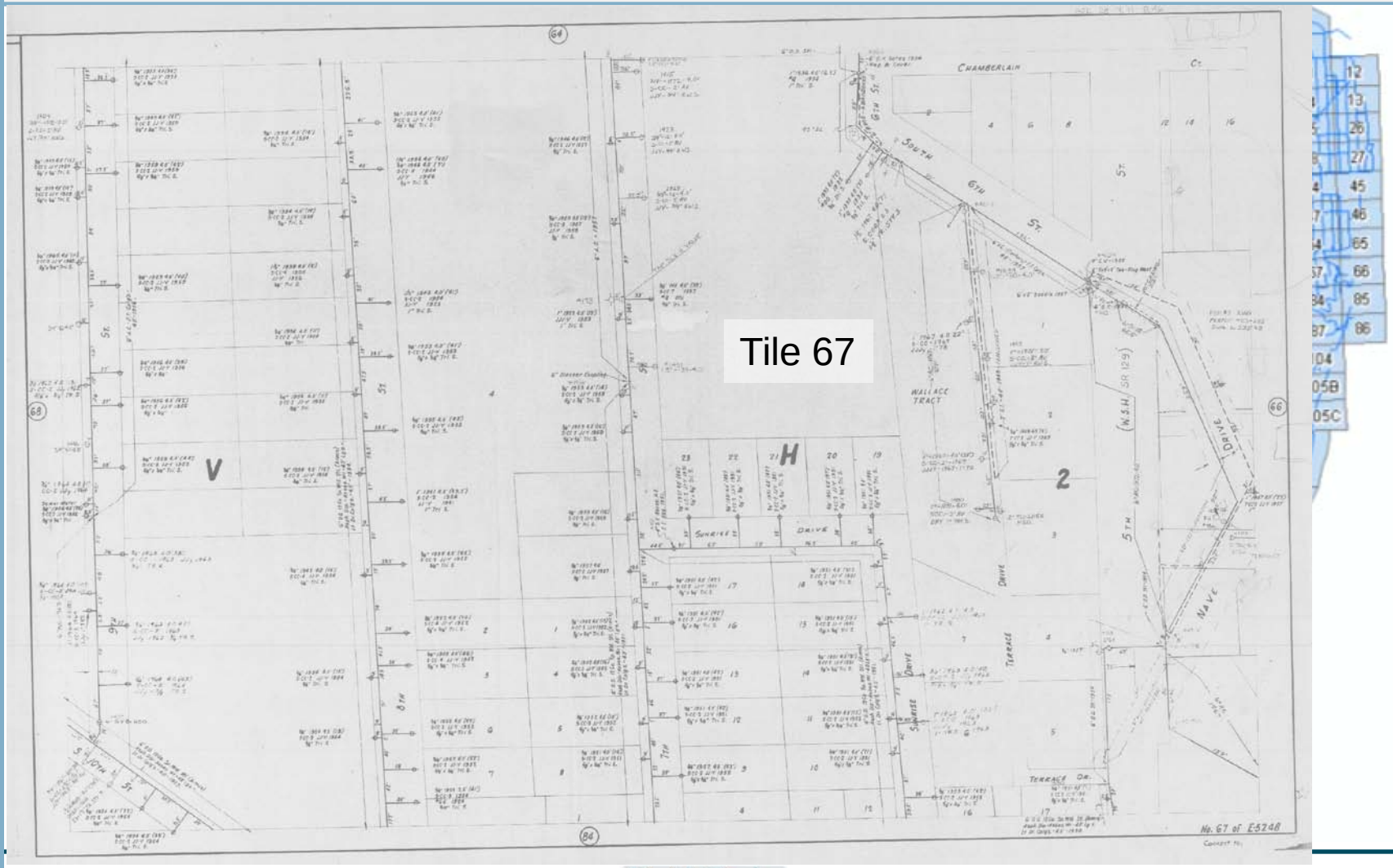
GSS Geo-Spatial Solutions Inc.

DATA CONVERSION



PUD PUBLIC UTILITY DISTRICT ASOTIN COUNTY

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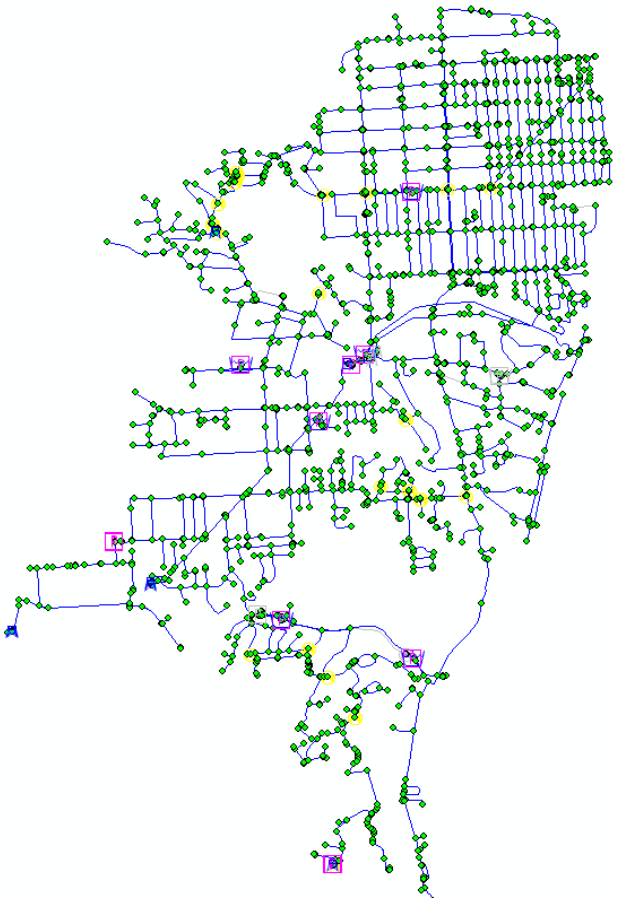
DATA COMPILATION

- **Identify and Collect Additional Base Data**
  - Aerials
  - Contours
  - Roadways
  - City and County Boundaries
  - Land Use
  - Water Features

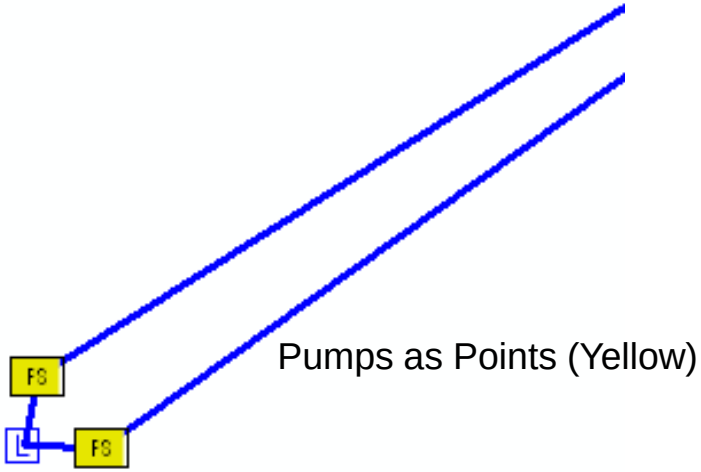
MODEL INTEGRATION



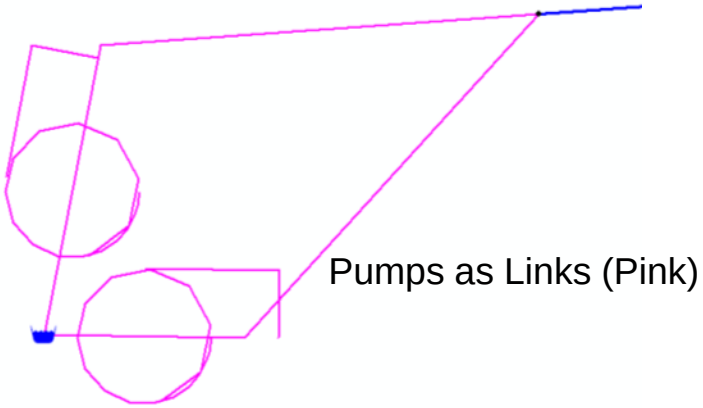
- **Unique Opportunity to Develop GIS and Model Concurrently**
  - Ensured database design and network structure were compatible with model
- **Model Provided an Additional QA/QC Tool**

MODEL INTEGRATION

- **Data Model Inconsistencies**
  - **Pumps as Points vs. Pumps as Links**



GIS



Model

MODEL QA/QC

- **Model Includes Tools to Validate Data**
  - Connectivity

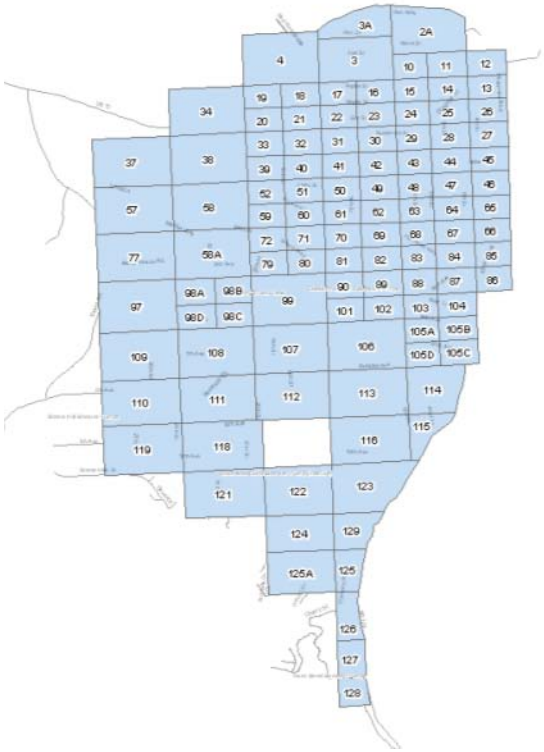
  - Splitting

  - Intersecting

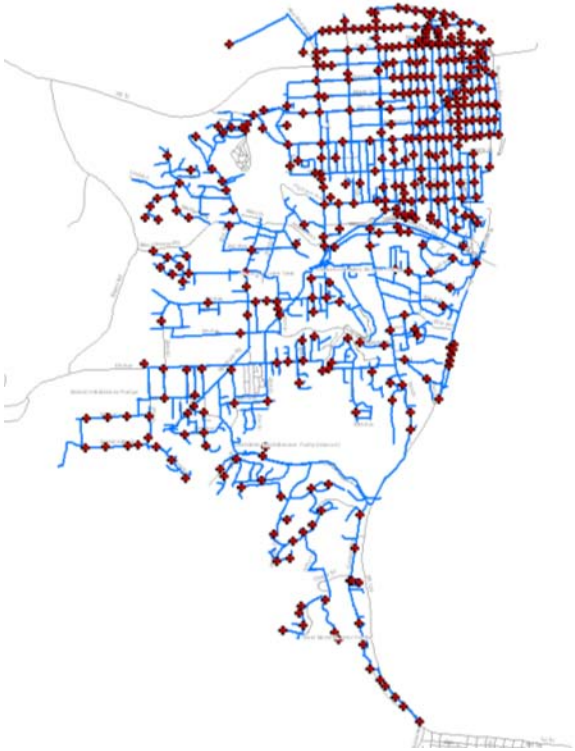
MAINTENANCE

❑ Process for Collecting Additional Data

By Area



By Feature



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MAINTENANCE

- **Process for Updating GIS and Model**
  - Continue to Refine through Survey Data
  - Import Survey Data to GIS
  - Connectivity Rules Enforced through Geometric Network
  - Coordinate with Other Entities (City and County)
  - GIS Update to Model

MAINTENANCE

❑ Process for Updating GIS and Model (Continued)

- Import Updated Geometric Network into Model
  - Linked by Unique Facility ID
    - Custom Unique ID Generator
  - Changes Tracked by “LastUpdate” and “LastEditor” Attributes
    - Custom Editor and Edit Date Generator

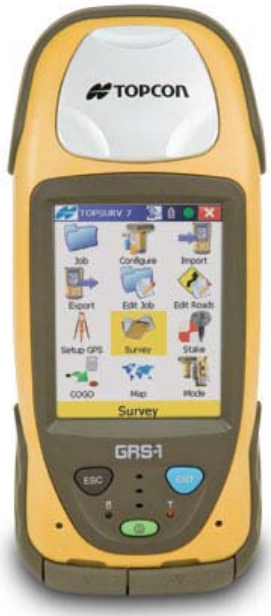
Complex edge feature class
ssLateralLine

Geometry Polyline
Contains M values Yes
Contains Z values Yes

Field name	Data type	Allow nulls	Default value	Domain	Prec-ision	Scale	Length	Field Description:
OBJECTID	Object ID							Geometry ID - Calculated automatically by GIS
SHAPE	Geometry	Yes						Geometry type - Calculated automatically by GIS
FACILITYID	String	Yes					20	Master unique ID
INSTALLDATE	Date	Yes			0	0	8	Date of installation
MATERIAL	String	Yes		ssLineMaterial			20	Lateral Line Material
LINETYPE	String	Yes		ssLateralLineType			30	Type of Lateral Line
LOCDESC	String	Yes					50	Location Description
DIAMETER	Double	Yes		ssLateralLineDiameter	0	0		Diameter of Lateral Line
LIFECYCLESTATUS	String	Yes	Active	LifeCycleStatus			10	Life Cycle Status of asset
OWNEDBY	String	Yes		AssetManager			30	Owner agency
MAINTBY	String	Yes		AssetManager			30	Agency maintaining facility
LASTUPDATE	Date	Yes			0	0	8	Date feature was last updated
LASTEDITOR	String	Yes	PUD-CR	LastEditor			50	Editor of last change to feature
Length	Float	Yes			0	0		Pipe Length
NOTES	String	Yes					255	General notes
SOURCE	String	Yes		DataSource			50	Primary source of data
ENABLED	Short integer	Yes	1	EnabledDomain	0			Enabled if flow is allowed - Geometric Network
SHAPE_Length	Double	Yes			0	0		Geometry length - Calculated automatically by GIS

MOVING DATA TO SURVEY ACCURACY

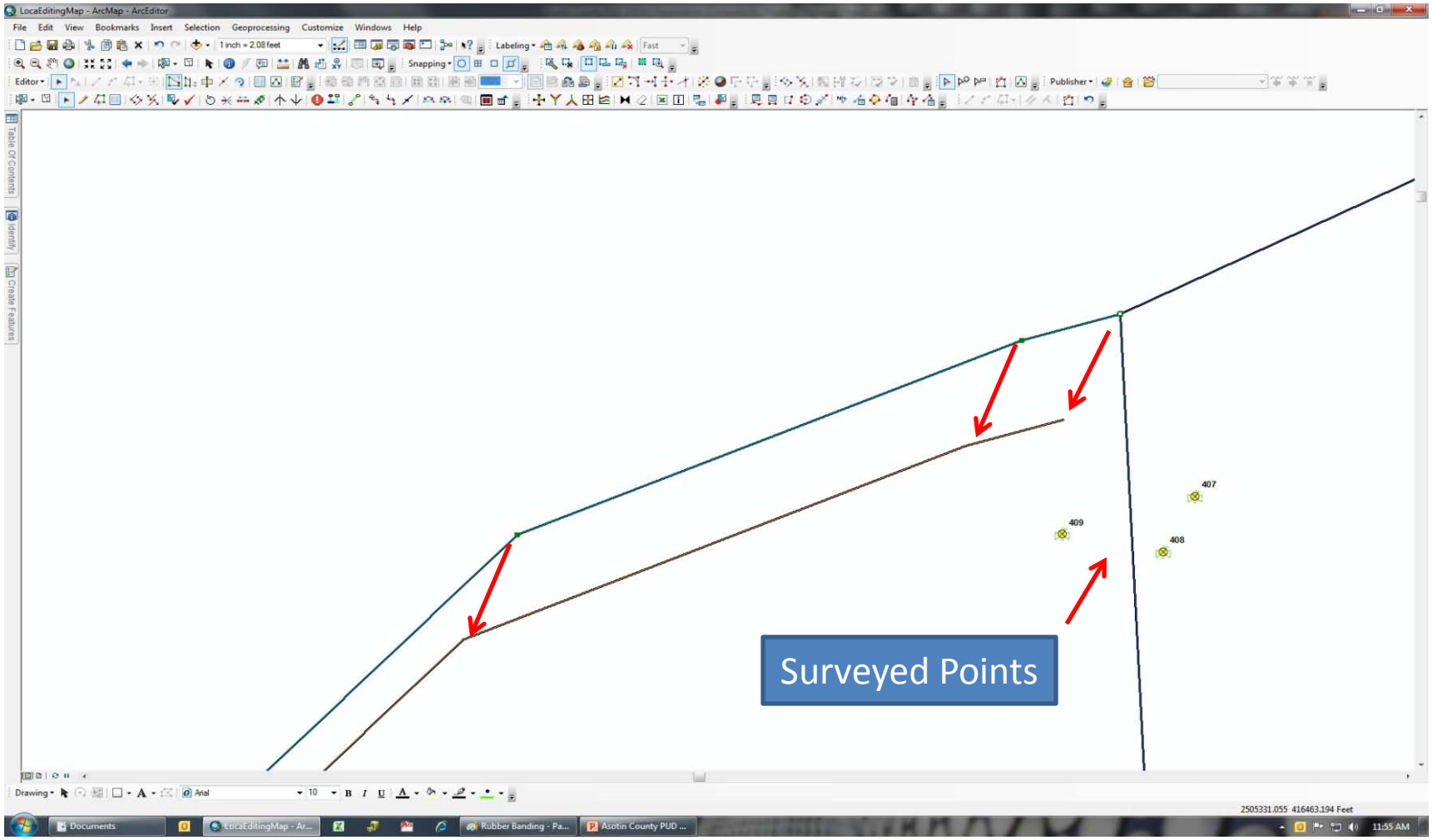
- **Field Survey Codes & Layers**
  - Water Network- Valves, Hydrants, Meters, Fire Service Points, Pipe Vertex
  - Problems- Notes, Crew Needed, Asphalted, Flagger Needed, Detector Needed
- **Topcon GRS-1**
  - TopSURV Software
    - GIS Capabilities with RTK Accuracy
      - 1/10th of a foot X, Y - 2/10th of a foot, Z
    - Limited Compatibility with Geodatabase
      - Field Tools for ArcPad Extension
      - .TSJ > .SHP > .GDB



MOVING DATA TO SURVEY ACCURACY

- **GIS Editing To Move Data**
  - Geometric Network
  - Stretching geometry proportionately (rubber banding)
  - Last Editor/Update Tool
- **Visual Problems For Field Crew**
  - Facilities Surveyed v. Facilities Not Surveyed
  - Close Proximity of Valves
    - Representation
    - Scale Dependent Interactive Map

EDITING- Stretching Geometry



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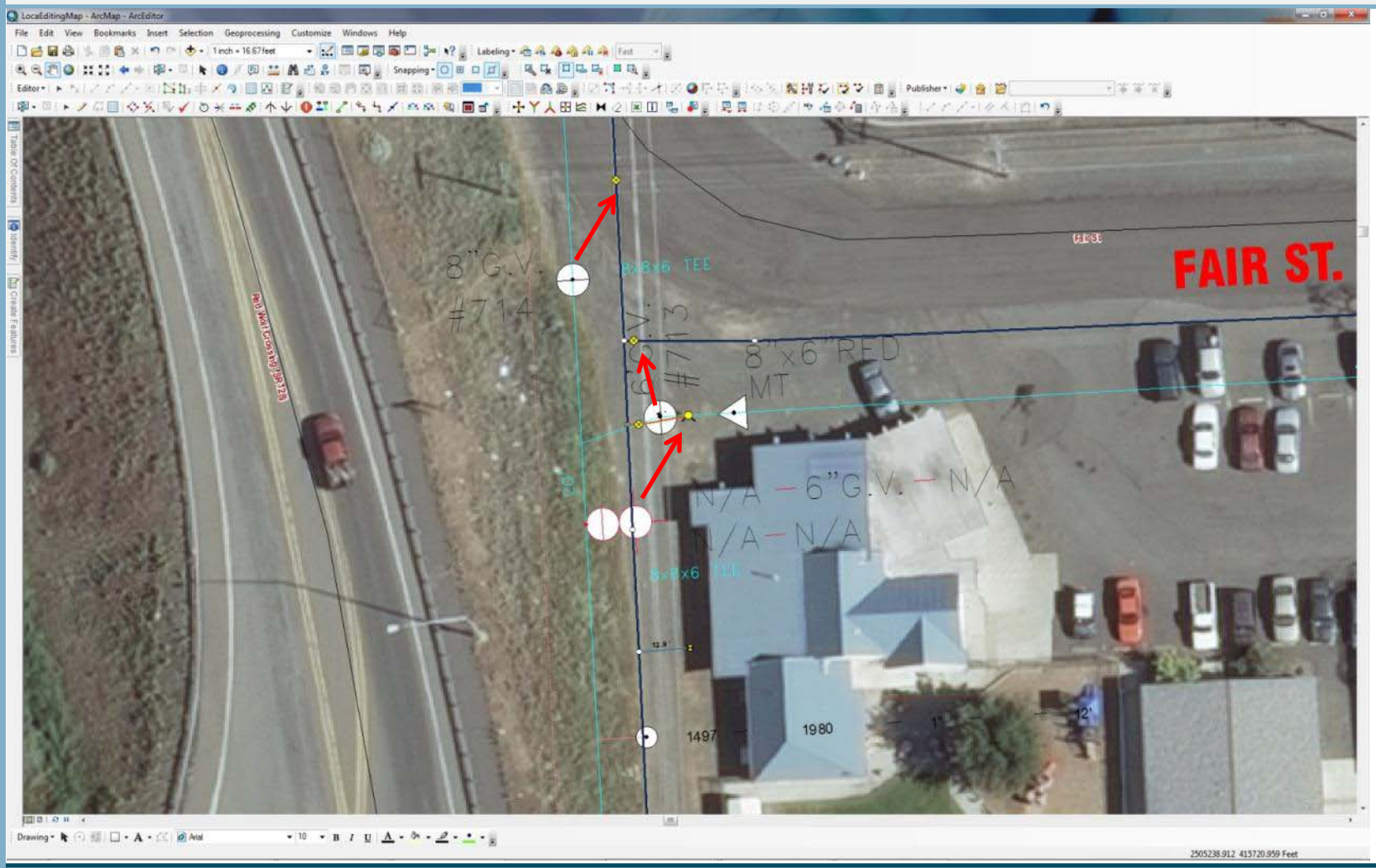
EDITING-Spatial Adjustment



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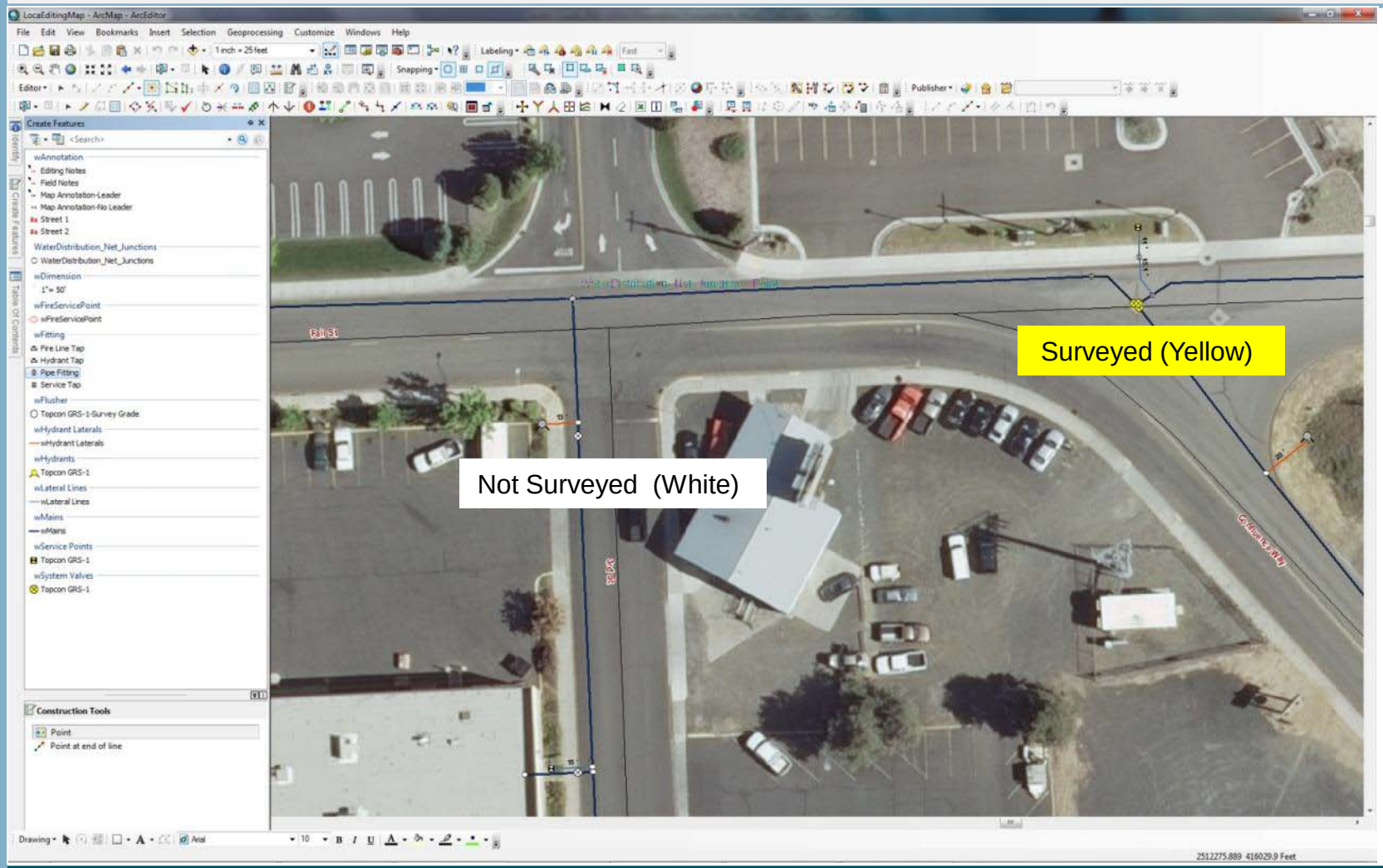
EDITING-Surveyed v. Not Surveyed



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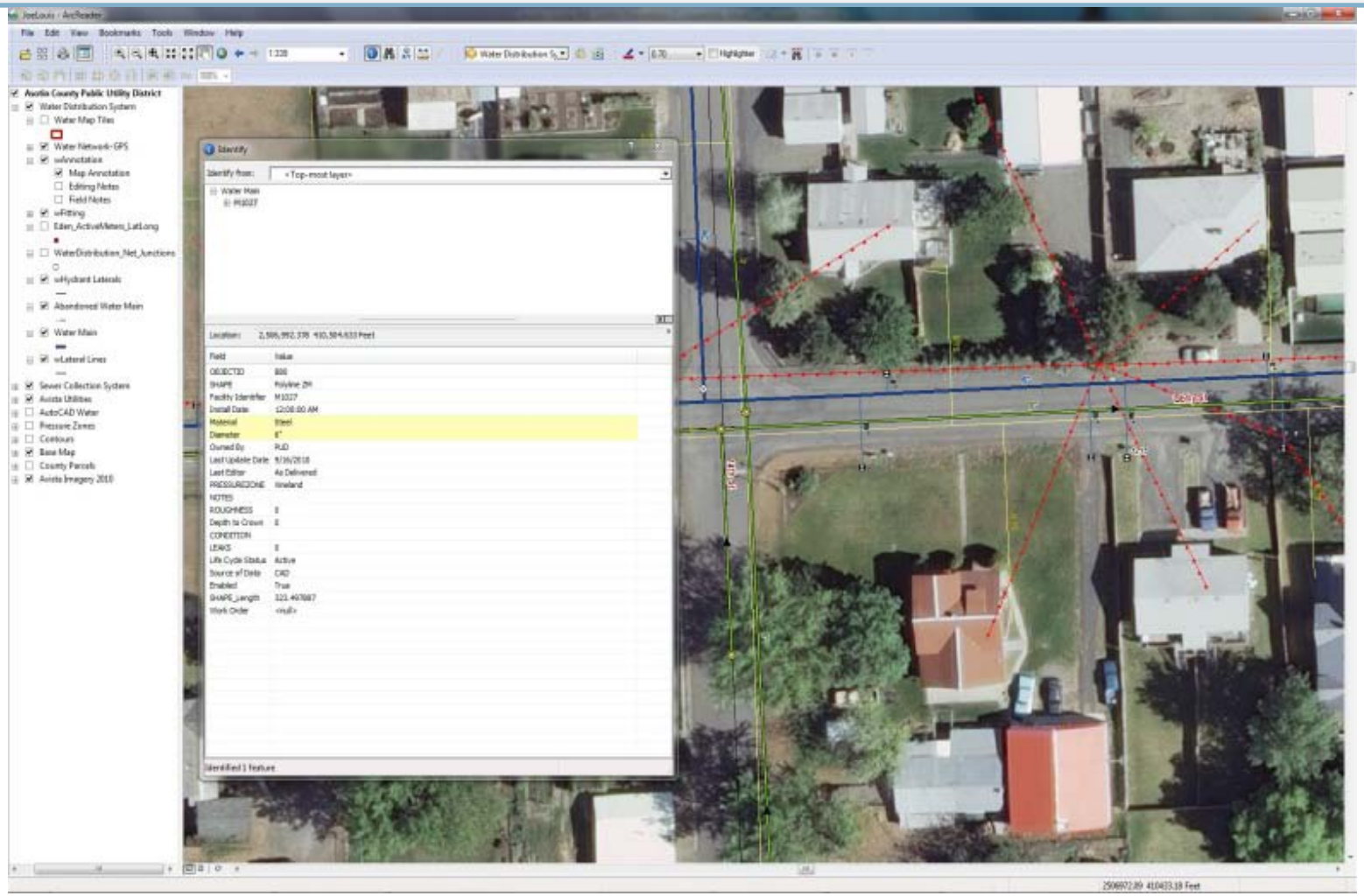
GIS IN THE OFFICE

- **47” Monitor Equipped with ArcReader**
  - Field Crew, Management, Customers, Contractors, Other Agency Leaders, PUD Commissioners
- **ArcReader On Personnel Computers**
  - General Manager, Foreman, Treasurer

GIS IN THE OFFICE



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NEW WORKFLOW PROCESS

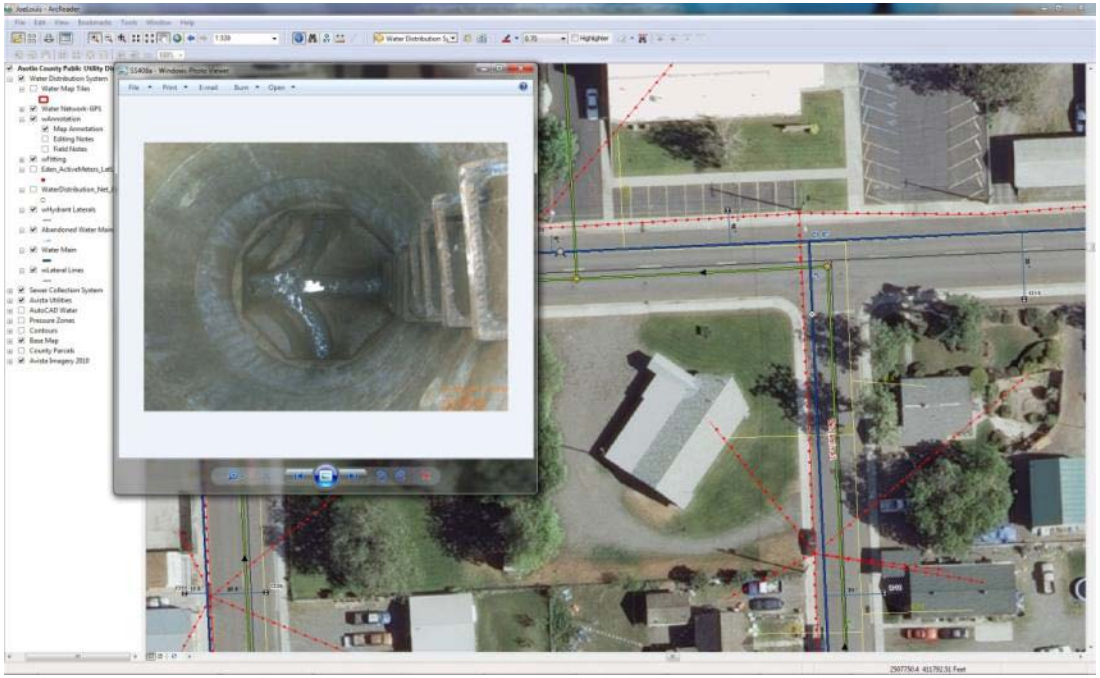
- **Attribute Data & Spatial Data**
  - Meter Replacements, PRV Adjustments, New Pumps
  - As-Builts/Pre-Construction Drawings
- **New Service Order Form**
  - Early Stages of Development
    - SharePoint Workspace, InfoPath, Email

GIS IN THE FIELD

- **Field Laptop For Crew Use**
  - Rugged Tablet PC
  - ArcReader
    - Measure Tool, Identify Tool, Markup Tool

GIS IN THE FIELD

- **Hyperlinking**
  - Scanned As-Builts
  - Old Water Maps
  - Pictures
  - Pump Curves
  - Manuals
  - Service Orders



FUTURE PLANS

- **Field Editing By Crew**
  - Scheduled Maintenance
  - Service Orders
- **WebGIS**
  - Greater Access to Data Outside of the Office
    - Public Access v. Internal Access
  - Smartphone Apps
    - Publish Maps to ArcGIS Online
- **PUD Prompted Regional Project to Create Parcel Basemap**
  - Parcel Mapping Valuable from Many Perspectives

BUSINESS CASE

Tim Simpson – Asotin County PUD General Manager

Reasons to Develop a GIS :

- An accurate map of our system
- An accurate inventory and database of our system
- A useful tool for maintenance and management of the system
- A useful tool for system operation
- A useful tool for working with customers, builders, developers and other agencies

LESSONS LEARNED

- **Be Clear on Purpose of Project**
- **Be Thorough in Initial Data Collection**
- **Pay Attention to Detail**
- **Anticipate the Process to Update/Edit Data**
  - What will be updated
    - Prioritize Data
    - Geometry
    - Attributes
      - Domains
  - Who will do the updates and to which data
    - One Person
    - Multiple People

LESSONS LEARNED

- **Anticipate the Process to Update/Edit Data (Continued)**
  - How will updates be tracked
    - Date Edited
    - Initials of Editor
  - How and when will updates be transferred between programs
    - GIS to Model
    - Model to GIS
- **How Will Data be Shared**
  - Within Organization
  - With Others (City, County, Customers, Consultants etc.)

LESSONS LEARNED

- Considering these Issues Upfront will Direct what Data is Contained in the GIS and Model and how that Data is Organized
- The Answers to These Questions Will Establish Protocol During the Project and for Future Use
- It is Crucial to Make Data Useful and Keep it Accurate for Future Use

SUMMARY & NEXT STEPS

- **PUD Goals for this Project and Future Uses**
  - Ensure Accuracy of Data
  - Populate Missing Attributes
  - Link GIS with Billing
  - Asset/Maintenance Management
  - Consistent Model Updating Process
  - Increasing Staff GIS Skills

Kudos to the PUD!

- **PUD is Providing Regional Leadership**
  - Hosting City Sewer Database
  - City & County Partnerships
  - Parcel Mapping

Thank You

- **Acknowledgements**
  - Tim Simpson – General Manager – Asotin Co. PUD
  - Rusty Merritt and Alex Friant – GeoSpatial Solutions
  - LaDonne Harris – MSA

Questions