

The Ins and Outs of a GIS System



Philip Ohlinger, GIS Manager



**Robert E. Lee
& Associates, Inc.**
Engineering • Surveying • Environmental Services

What is GIS?

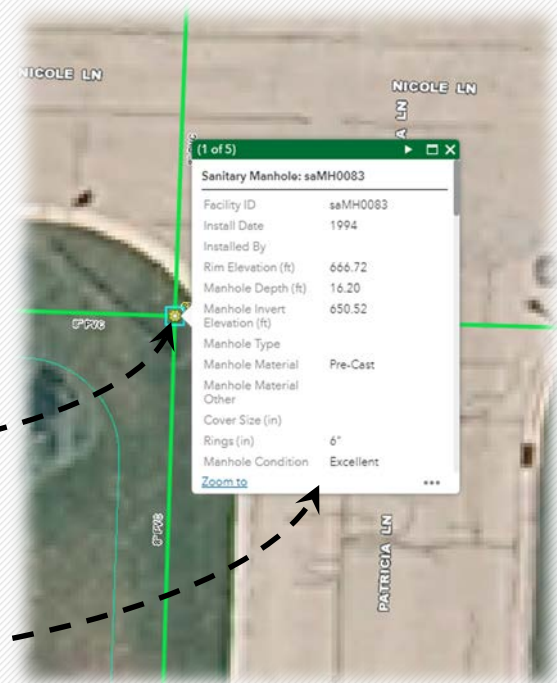


- A geographic information system (GIS) is a computer-based tool for capturing, storing, manipulating, analyzing, managing, and displaying all types of **geographical data**.

Some portion of the data is spatial – referenced to physical locations (x,y,z coordinates) on the Earth



- Spatial data (points, lines, and polygons on a map) are coupled with attribute data – additional information about each of the spatial features
- Example:
 - Spatial Data – Manhole Location
 - Point on map at latitude =44.3263, longitude=-88.1563
 - Attribute Data
 - ID
 - Rim Elevation
 - Invert Elevation
 - Date installed
 - Etc....



GIS For Utility System Asset Management



- GIS provides a central location for data relating to utilities, with the ability to integrate feature locations, attributes, inspection data, and historical documentation in one mapping application.

↑ **Efficiency** ↑ **Record Keeping** ↑ **Knowledge of System**

- Speeds up locating features in the system
- Improves report generation
- Provides quick and simple visualization of the system, and assists in planning and improvements to the system



Steps For Creating Utility GIS System

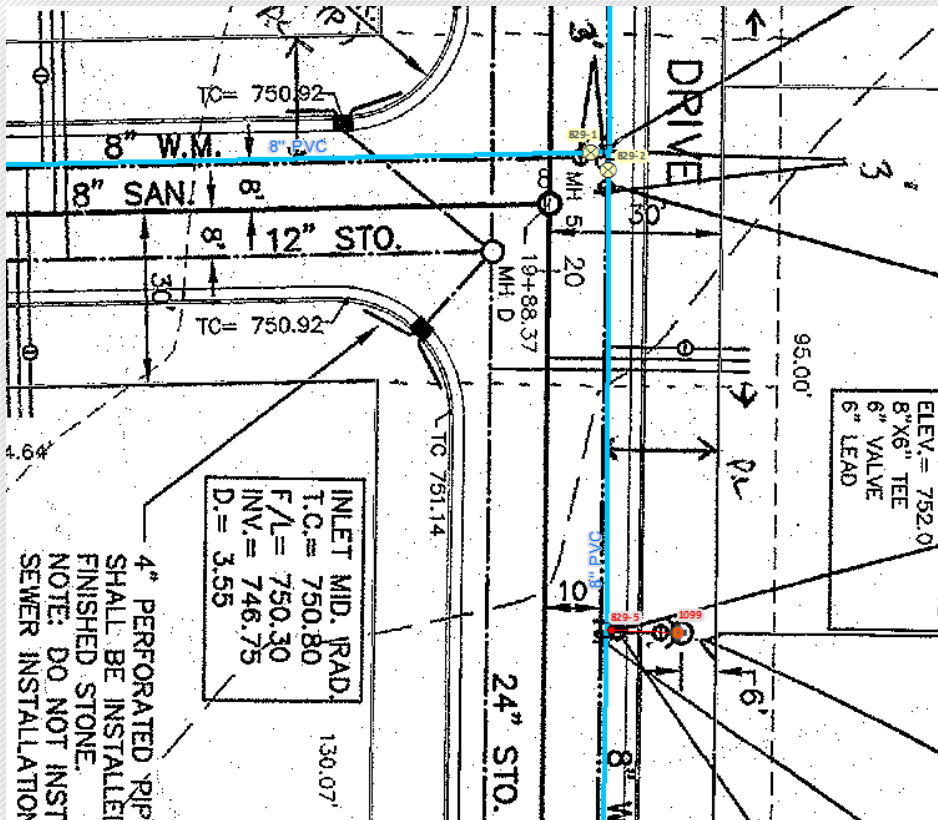


1. Field Locate Features / Gather Data

- Locations of above ground assets collected with GPS / Survey methods
 - Accuracy of feature location is crucial – if features are located inaccurately initially, the system will be useless for locating features in the field later on
- Additional attribute data may be collected in the field, such as manhole invert elevations, pipe sizes and materials, condition of features, or even photos of each feature
 - Utility staff could collect and input some of the attribute data to reduce overall cost of project



Steps For Creating Utility GIS System



2. Create Pipe Network

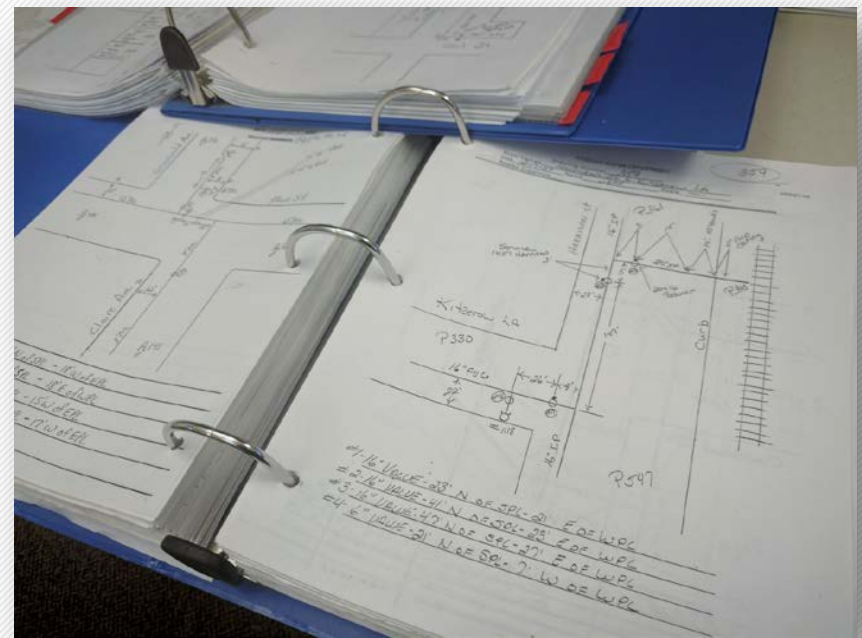
- Pipe network is created by connecting the surveyed feature locations, referencing as-built or plan drawings to accurately map the features
- Attributes such as pipe sizes and materials are input from paper drawings or imported from data collected in the field

Steps For Creating Utility GIS System



3. Archive Paper Documents

- Paper documents like as-built sheets, plans, lateral sheets, and hand drawings are scanned and attached to features in the GIS system
- Scanned documents can then be viewed simply by clicking on a feature in the GIS system that has a document attached



Steps For Creating Utility GIS System



4. Integrate Electronic Files

- Electronic files like photos, PDF's, televising videos and reports, maintenance reports, and manhole inspections can be attached into GIS system

Surveyors name Avery DeJardin	Certificate Number U-108-6266	System Owner Village of Hobart	Survey Customer Village of Hobart	Drainage Area N13	Sheet 1
P/O No.	Pipeline Segment Reference	Date 20141111	Time 15:17	Location (Street Name and number) Thornberry Creek Dr	Locality Hobart
Further Location details		Upstream Manhole Number N13M063	Rim to Invert	Grade to Invert	Rim to Grade
Downstream Manhole Number N13M062	Rim to Invert	Grade to Invert	Rim to Grade	Use of Sewer Sanitary	Direction Downstream
Flow Control	Height 8	Width	Shape Circular	Material PVC	Ln. Method
Pipe Joint Length 13	Total Length 198.6	Length Surveyed	Year Laid	Year Rehabilitated	Tape / Media Number
Purpose F	Sewer Category	Pre-Cleaning Jetting	Cleaned 20141110	Weather Damp	Additional Information

Distance (Feet)	Code		Continuous defect	Value			Circumferential Location At / From To	Image Ref.	Struct. Grade	O&M	Remarks	
	Group/Descriptor	Modifier/severity		S/M/L	Inches							%
					1st	2nd						
0.0	AMH										Starting Manhole: N13M063	
0.0	MWL					5					5%	
35.1	TF	A		6			9					
143.4	TF	A		6			9					
145.1	TF	A		6			3					
190.1	MWL					10					10%	
198.6	AMH										End of Inspection at MH N13M062	

Segment	Structural					O & M					Overall													
	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Rating	Quick	Index	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Rating	Quick	Index	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Rating	Quick	
Thornberry Creek Dr N13M063-N13M062-20141111	0	0	0	0	0	0	0000		0	0	0	0	0	0	0000		0	0	0	0	0	0	0	0000



Steps For Creating Utility GIS System



5. Configure Maps and Data for Use

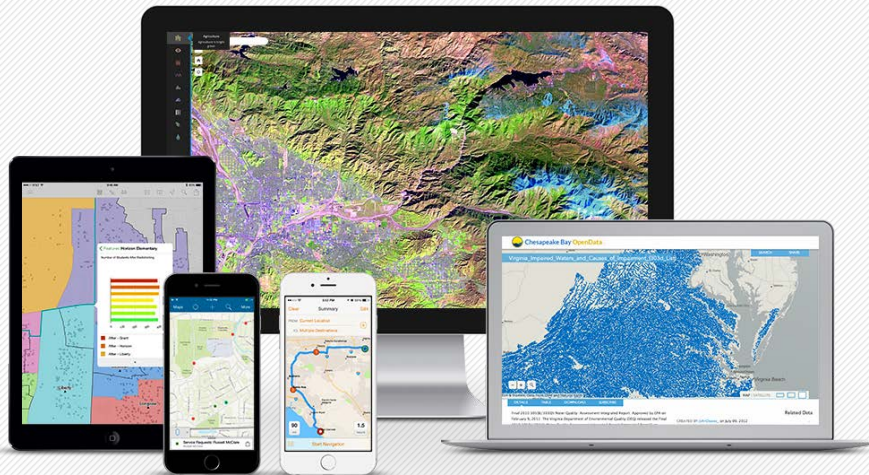
- Maps and data are published to ArcGIS online so they can be used by public works staff



GIS Software



- ESRI's ArcGIS software suite is the most widely used platform
- ArcGIS Online allows access to all maps and data on any device – desktop computer, tablet, or smartphone.



- **Easy to use, but powerful in capabilities**
- **No need to install software, or maintain updates**
- Data is always in sync no matter where it is accessed
- Set permissions for each user

GIS System Demonstration



Village of Wrightstown
Est. 1901

Online GIS System

Web App
Combined Utility System Map

Web App
Sanitary Utility System Map

Web App
Storm Utility System Map

Web App
Water Utility System Map

Village of Wrightstown Utility GIS system created and maintained by Robert E. Lee & Associates, Inc.
For assistance, contact Philip Ohlinger: pohlinger@releeinc.com

GIS System Demonstration



GIS System Created and Maintained By



Robert E. Lee & Associates, Inc.
Engineering, Surveying, Environmental Services

Not All GIS Systems Are Created Equal...



- **Basemaps**

- Custom basemaps **are a must!**
- Default basemaps by ESRI and other providers may be out of date, inaccurate, and don't include county provided data like parcels, addresses, etc.
- Using the default basemap may also limit zooming capabilities on map, not allowing you to see as much detail

Not All GIS Systems Are Created Equal...



Default Basemap



Custom Basemap



Not All GIS Systems Are Created Equal...



Default Basemap



Custom Basemap



Not All GIS Systems Are Created Equal...



- **Software** – is it easy to use? Will it still be around in 5 years? Can you access your maps and data on whatever devices you want?
- **System Maintenance** – when new utilities are installed or removed, how will this be updated in the GIS system?



Arc**GIS** Online

Not All GIS Systems Are Created Equal...

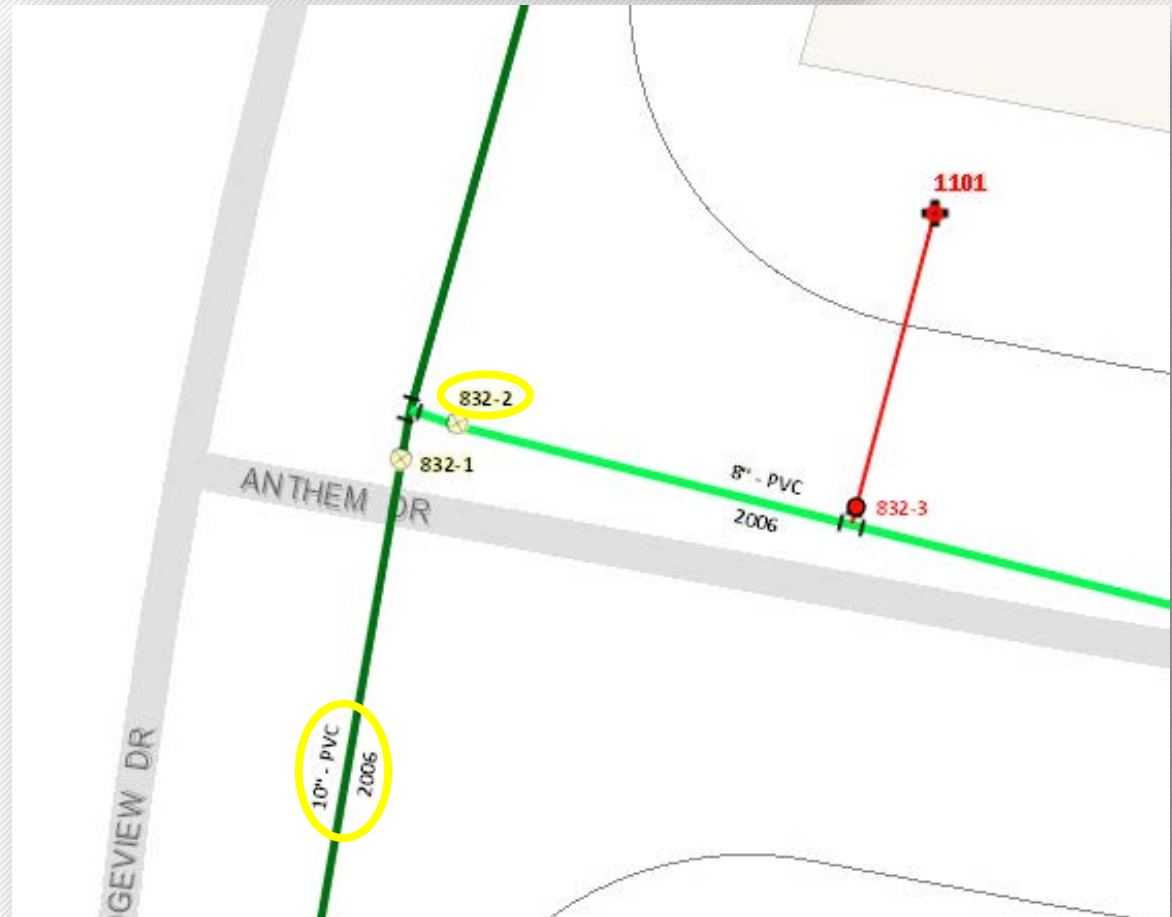


- **Custom Labeling**

- Provides quick information without having to click on map like ID numbers, pipe size, material, install date, etc.

- **Proper Symbolization**

- Color code pipe sizes, lateral types, valve types, etc.



Questions?



Philip Ohlinger

GIS Manager

920-544-4421

pohlinger@releeinc.com



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