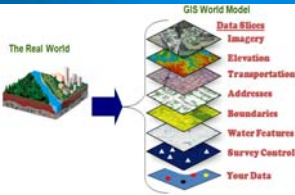


FLEIS & VANDENBRINK
Surveyors. Engineers. Planners.

SURVEY & SAW THE GIS BRIDGE

Max George, PS, CFM | FLEIS & VANDENBRINK | MSPS ANNUAL CONFERENCE 2018


Bottom Line




- GIS is a useful tool.
- Surveyors should be in charge of GIS. While recognizing other professionals roles in using it.
- The challenge is to embrace it and change the GIS landscape.

The Problem

- Infrastructure doesn't last forever.
- Current mindset – build it and forget it.
- Public funds to repair are limited.
- Public expectations are high.






The Problem

- Public works are built to address today's needs for the most part.
 - What about 15 years from now?
 - Growth or shrink?
- Repair vs. Replace vs. Fix
- Elected officials respond to the public – the squeaky hinge gets oil.
 - Vocal minority vs. DPW / professional opinion
 - Kick the can


Time for a Change

- Governor Snyder – Business Background
- Infrastructure = Public Assets
- Assets:
 - Have monetary value.
 - Have a life cycle.
 - Have to be maintained. (maintenance has a cost.)
 - Must be replaced at some point. (comes at a cost.)



Time for a Change

- Before we buy goods, we consider things like:
 - Available funds
 - Maintenance funds
 - Expected product life
- Change the mindset and processes regarding infrastructure.
- Use the \$ better, make it go farther.
- Science / engineering based vs. emotion / gut reaction.






How to Change

- Change is great if we want it.
- How do we get others to change?
 - Persuasion – get on the train.
 - Force
 - Physical
 - Economic

What can be Used to Encourage the Desired Change?

- National Pollution Discharge Elimination System (NPDES)
- State Administrators – permit required for wastewater treatment facilities to discharge.
- Require municipalities to have a plan in order to get a permit.




Asset Management Plan


- Inventory – What & Where
- Condition
- Goals & Objectives
- Cost / Method / Priority of Repairs
- Cost / Method / Priority of Replacement
- Payment Plan



Unfunded Mandate

- Tell units of government to do something and don't provide the resources.
- Perspective:
 - Isn't this the right thing and shouldn't they do it anyway?
 - Make funds available.
- Created a Grant Program – SAW
 - Storm and wastewater
 - Statewide lottery
 - 450 grants since 2013






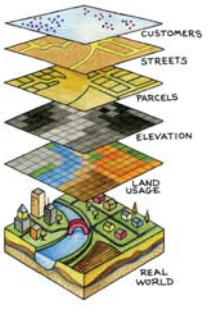
Creating an AMP

- Collect, organize and review information on hand.
- Determine:
 - What information you need to collect?
 - Who is going to collect it?
 - How you are going to keep work flow and data organized.
 - How the data will be analyzed.
 - How to translate data and information into "English" – something useable.
- Go and do the above things.

Starting Point – What Do We Know?

- General system information – typically scattered and not very comprehensive.
 - DPW personnel/Consultants change
 - Resources to maintain records vary
- The need for a system to organize records becomes very obvious quickly.
- Open source information available.







GIS is Not an Object

- GIS is a tool – everyone owns a portion.
- The best tool to organize data that has a location component.
- Engineering – Initial Planning
 - Areas to televise are based on ground water and depth of sewers.
- GIS Professionals – Who are they?
 - Provide products – translate data to English.
- Surveyors – Organizing and Planning
 - Keepers of records

GIS is Not Utopia


- Lots of disciplines need the tool and it's products.
- Someone has to be in charge – who should that be?
 - Engineers?
 - GIS Professionals?
 - Surveyors?
 - City Managers?
 - DPW staff?
- We will return to this question later.





The SAW Grant

- After review of initial information the next two tasks are:
 - Inventory system assets.
 - Condition assessments of the assets.



Step 1: Inventory

- What do you have?
- Sanitary Sewer Systems:
 - Sewer pipes
 - Manholes
 - Lift stations
 - Force mains
 - Relief valves
 - connections
 - WWTF – another whole set of things



Inventory

- Storm Sewers Systems
 - Sewer pipes
 - Culverts
 - Outlets
 - Man holes
 - Catch Basins
 - Retention/detention basins
 - Dams




Inventory

- What about water systems?
 - Not part of SAW grant.
 - Water system AMP req'd now but no funding.
 - Critical infrastructure
- Systems include:
 - Hydrants
 - Valves
 - Service connections
 - Mains
 - Wells/intakes
 - Storage



Where is it?

- Inventory includes what & where.
- **Where** – more complicated than most realize.
- Can't really talk about "Where" without considering accuracy
 - Google earth
 - Pick from county/MISAIL aerial photo
 - Tablet/on line cloud based
 - Cell phone w/an app
 - Hand held "GIS" GPS receiver
 - Survey Grade GPS
 - Digital Level




Problems with "Where"

- Datum?
 - Vertical
 - Horizontal
- Sorting the Problems Out
 - What is data going to be used for now?
 - What might data be used for later on?
 - Who will be using data next? And How?


Step 2: Condition

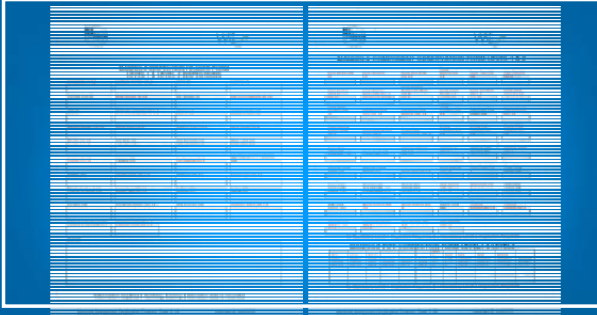
- What does condition assessment mean?
 - How close to perfect an asset is?
- Need a more holistic approach.
- Include broader factors:
 - Capacity/hydraulics
 - Infiltration
- Grant requires adhering to a standard.



NASSCO


- National Association of Sewer Service Companies
- MACP – Manhole Assessment and Certification Program
- Level 1 – general info and condition
- Level 2 – detailed info and defects – requires cameras or confined space entry






Step 3: Assessment

- Televising
- Above ground
- Smoke Testing
- Mass Flow Monitoring (F&V term)
- Organizing the data & the work






Who

Tasks:

1. Go through existing information and create the starting point.
2. Plan, organize, track and check field data and data gathering.
3. Review information and sort out the follow up requirements.
4. Plan / coordinate televising and analysis of data from televising.
5. Bring all the data together.
6. Analyze it.
7. Create the Asset Management Plan.



What it Looks Like in Action – Why “Who” Matters

- Lots of moving pieces
- Find structures not on system maps
- Televising finds things surface assessment didn't
- Smoke testing confirms connections that “can't be right”
- Locations don't match aerial images
- Slow spiral to “done”



Who is Available?

- Municipality / Client
- Field Technicians (Construction)
- Engineers / EIT's
- GIS Professionals
- Surveyors





Align Talents with Tasks

- Field Technicians – Assessments
- Surveyors – Location
- GIS Professionals – Mapping / Data
- Engineers / EIT's – Analysis, Direction, Plan
- Client / Project Manager

Assessment & Inventory are "Done" – Now What?

- Analysis of data – so what?
- What's good? What's bad?
- How to make bad better.
- What is the risk of inaction?
- What is the likelihood of failure?
- How bad will failure be?






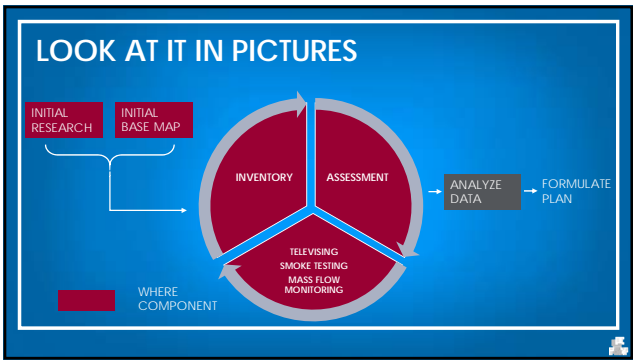
The Devil is in the Details


- You can analyze anything with any level of data.
- Things to consider that aren't in Level 1 or 2 forms:
 - Location in relation to other things can matter – i.e. water bodies, wetlands, railroads.
 - Methods and materials for repairs must vary from community to community.
- Consistent and defensible methodology is key.

Where Are We Now?

- We need a bunch of data that includes locations.
- We need someone to do the work in the field and the office.
- We need to keep it organized.
- The data needs to be available to use for analysis.
- The data needs to "live on" beyond the project.





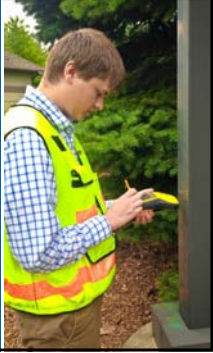


GIS is How to Make It Work

- Initial Map
 - Guides assessment and locations, televising.
- Interim Maps
 - Progress
 - Resolving Data Conflicts
 - Analysis
- Final Maps
 - Living Document
- Who is responsible for where?

The Surveyor

- Who should be sorting this all out?
- Someone who:
 - Understands the need to apply the right accuracies for the right job for today and tomorrow (you can't make something more accurate than what it was originally!)
 - Understands the tools available
 - Understands the data and how it fits with other types of data – interoperability of data
 - Understands the fieldcraft of mapping and it's needs
 - It should be you!



THANK YOU

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