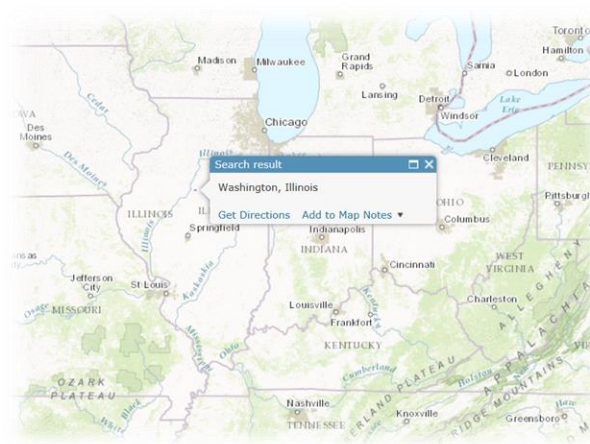


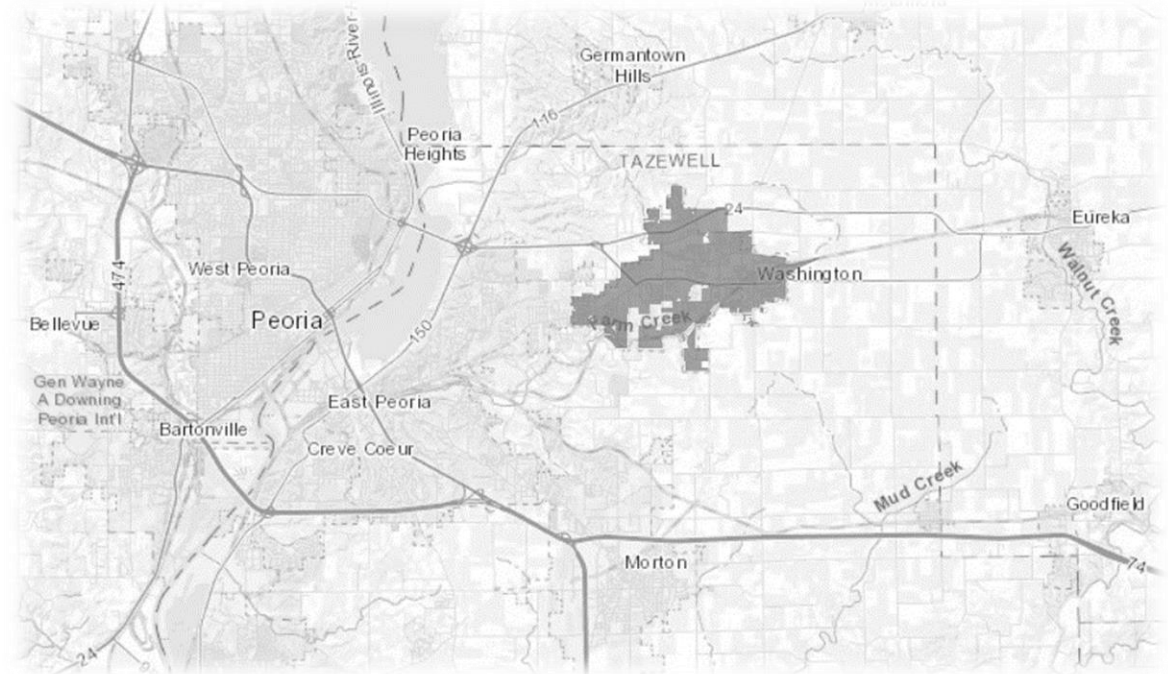
# Infrastructure Operations and Planning with GIS

Improving workflows and understanding the built world  
at the City of Washington, IL



# Storm Water Detention Basin Inventory

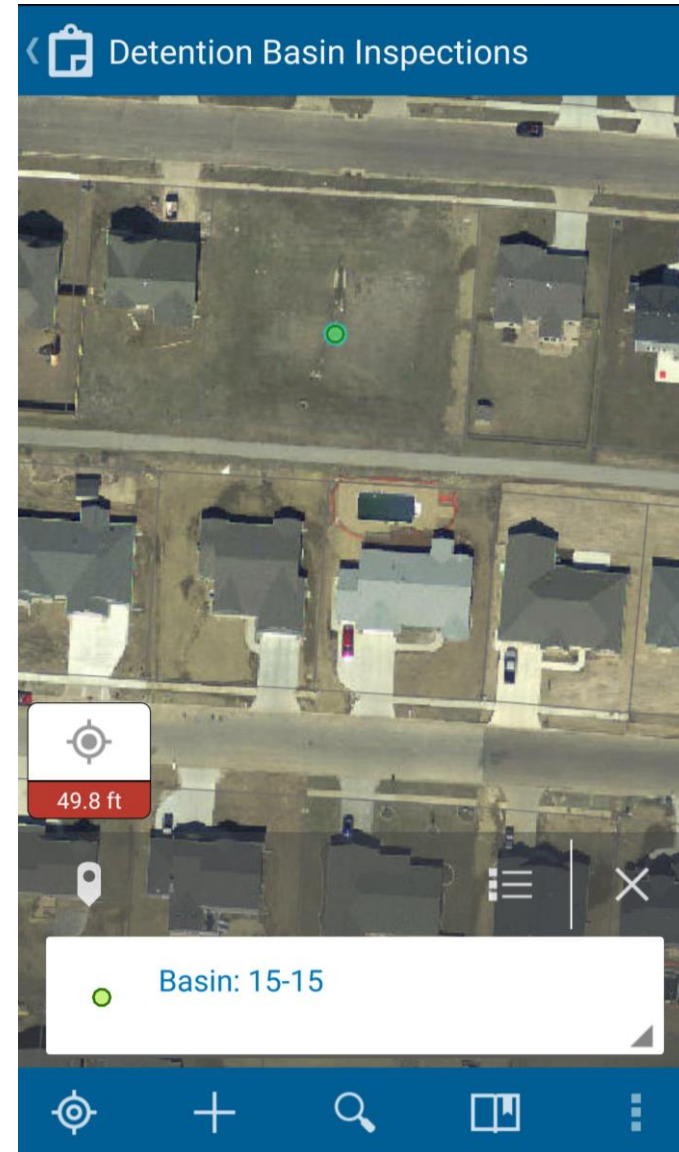
- Population 16,851
- 8.182 square miles
- 122 Storm Water Detention Basins
- Challenge was to update inventory, document maintenance, and provide basis for requesting maintenance on non-city basins



# Storm Water Detention Basin Inventory

Using Collector for ArcGIS

- Ease of Use
- Ease of Access
- Related Records
- Polygons to Point Locations



# Storm Water Detention Basin Inventory Using Collector for ArcGIS

## Collector in Action – Select Basin from Map

Must be set to Complete to turn point Green →

INSPECTION STATUS  
**Incomplete**

LOCATION DESCRIPTION  
**Steeplechase Sec 2 - 1612 Timber Rail behind rear yard**

OWNER  
**City**

CITY MAINTENANCE  
**Yes**

WET / DRY

PAVED DITCH  
**Yes**

COMMENTS

INSPECTIONS

⋮ **View**

⋮ **New**

⋮

These values can be updated as needed  
(Edit basin info below)

Add new inspection or view existing →

Edit Basin Information →

✓ Details

📍 📶 62% 11:12 AM

✎ 🗑️ ⋮

# Storm Water Detention Basin Inventory

Using Collector for ArcGIS

## Collector in Action – Fill Out Inspection Form

The screenshot shows a mobile application interface for storm water detention basin inspection. At the top, there is a status bar with icons for location, signal strength, and battery level (62%), and the time 4:32 PM. Below the status bar is a dark blue header with a back arrow and the word "Details". Underneath the header is a list icon and the text "Inspections: JLM". Below this is a smaller text line: "Edited by Public\_Works\_02 on 8/14/17 at 2:21 PM". The main content area lists several inspection categories with their corresponding values: "INSPECTOR" is "JLM", "INSPECTEDDATE" is "08/14/2017 2:19 PM", "TRASH/DEBRIS/SEDIMENT" is "Yes", "EROSION" is "No", "VEGETATION" is "No", "DAMAGE" is "No", and "PROBLEM STATUS" is "Resolved". Below these is a section for "CORRECTIVE ACTION TAKEN (IF ANY)" with the text "Cleaned paved area of basin with shovels." and a "NOTES" section. At the bottom of the screen is a dark blue footer with a pencil icon on the left and a trash can icon on the right.

INSPECTOR  
**JLM**

INSPECTEDDATE  
**08/14/2017 2:19 PM**

TRASH/DEBRIS/SEDIMENT  
**Yes**

EROSION  
**No**

VEGETATION  
**No**

DAMAGE  
**No**

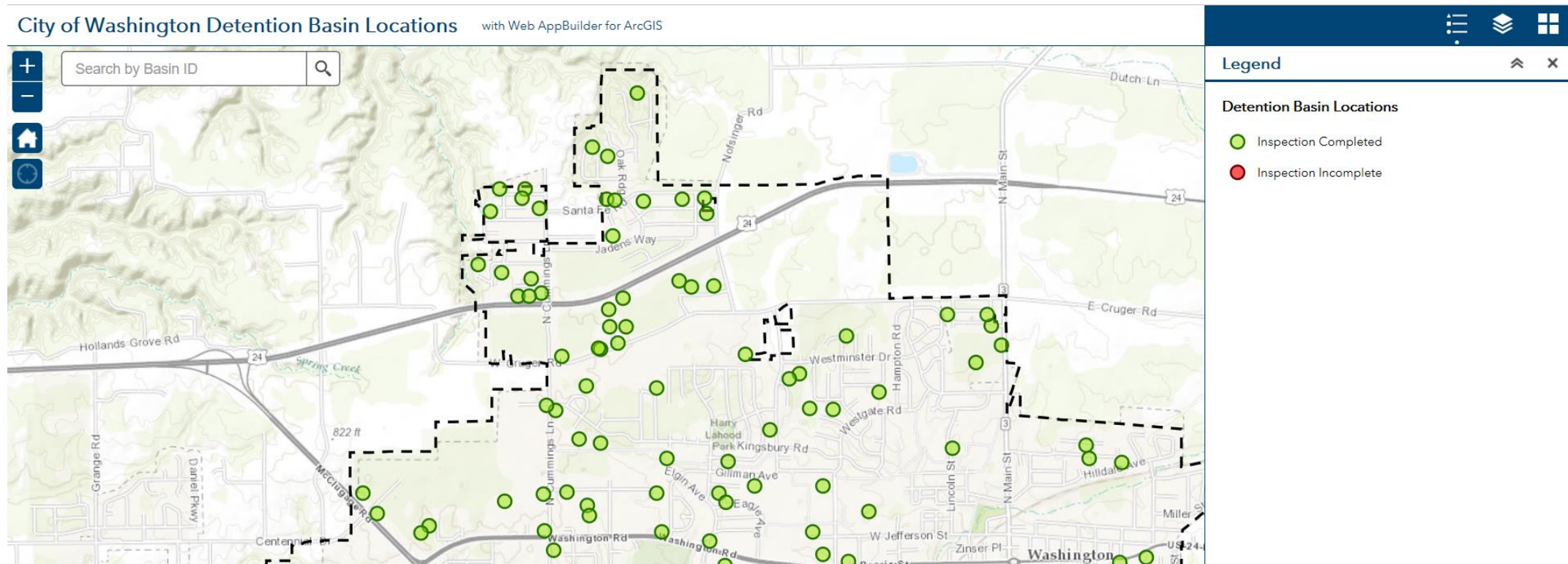
PROBLEM STATUS  
**Resolved**

CORRECTIVE ACTION TAKEN (IF ANY)  
**Cleaned paved area of basin with shovels.**

NOTES

# Web Application

- Viewing progress and documentation
- [Web App](#)



# What's Next – Mailings and Other Inspections

- Used ArcGIS Pro to Join Feature Service Layers and Export to Excel
- Excel Contains Information to be used in Mail Merge
- Information will be mailed to owners where privately owned and maintained basins need attention.
- Completed in less than one month (!)
- **Next?** Hydrant Flows Recorded During Flushing, Pavement Ratings, NPDES Outfalls.

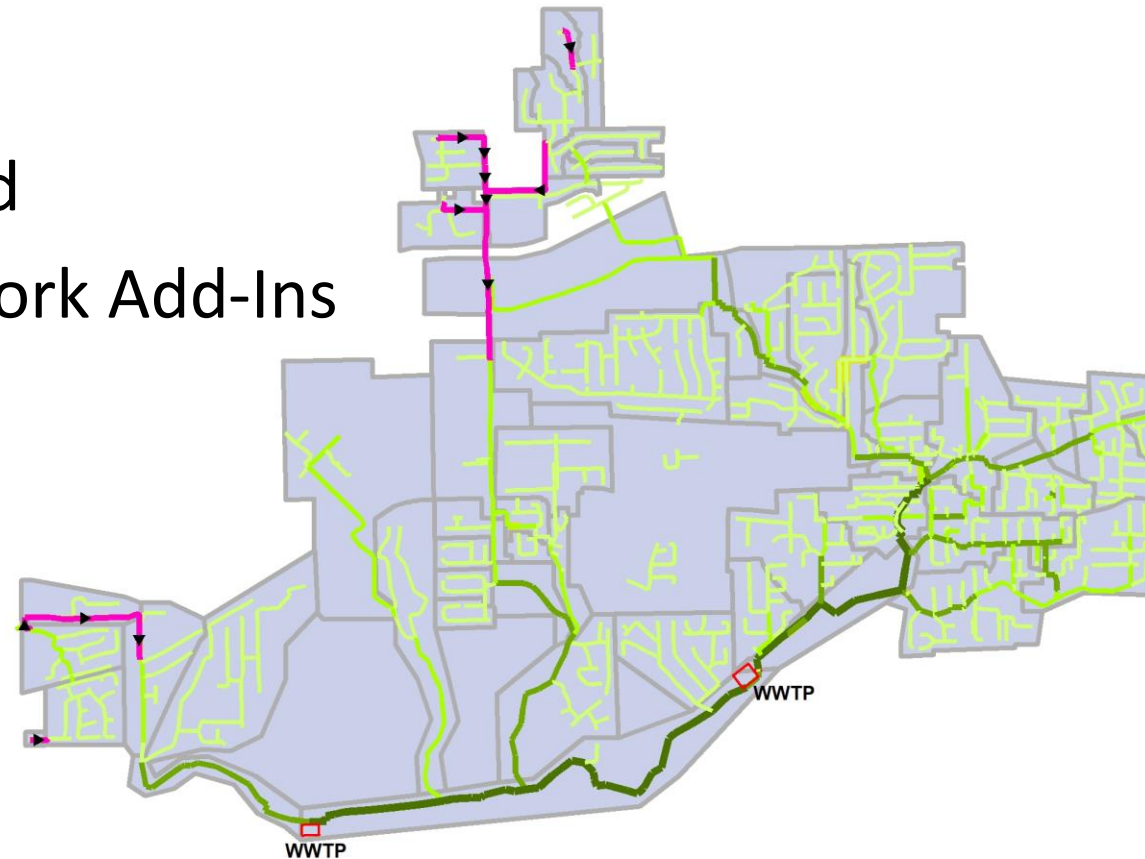
Bring it on.



# Modeling Sanitary Sewer Capacity

- Challenge was to model pipe capacity and the effects of potential upstream inputs to system
- Data was spatially in good shape
- Geometric Network capabilities utilized
- Attribute Assistant, Water Utility Network Add-Ins

- Sanitary Pipe
- Sanitary\_Pipe
- Sanitary\_Pipe
- Force Main
- Capacity Status
- Normal Flow > Capacity
- Peak Flow > Capacity
- Capacity > Peak Flow





# Determining Capacity

- Diameter, Material, Slope inputs into additional equations:
- Area, Circumference , Hyd Rad, CFS
- Values calculated/updated with AA

DynamicValue				
Table Name	Field Name	Value Method	Value	Val
Sanitary_Pipe	Slope*	EXPRESSION	IF([USMH_Elev] > 0 AND [DSMH_Elev] > 0, ([USMH_Elev] - [DSMH_Elev]) / 100, 0)	
Sanitary_Pipe	Pipe_Area	EXPRESSION	(([Dia]/24)^2)*3.1456	
Sanitary_Pipe	Pipe_Circum	EXPRESSION	3.1456*([Dia]/12)	
Sanitary_Pipe	Hyd_Rad	EXPRESSION	[Pipe_Area] / [Pipe_Circum]	
Sanitary_Pipe	FullFlowCapac_cfs	EXPRESSION	(1.486 / [SubRoughnessFactor]) * ([Pipe_Area]) * ([Hyd_Rad] ^ 0.5)	
Sanitary_Pipe	GPD	EXPRESSION	[SUMFLOW] * 350	
Sanitary_Pipe	GPM	EXPRESSION	[GPD] / 1440	
Sanitary_Pipe	GPMx4	EXPRESSION	[GPM] * 4	
Sanitary_Pipe	FullFlowCapacGPM	EXPRESSION	[FullFlowCapac_cfs]*448.832566	

Attributes	
Sanitary_Pipe	
951	
Material	PVC
Diameter	10
Substitute Roughness Factor	0.01
Slope	0.004297
Full Flow Capacity cfs	1.86954
Full Flow Capacity GPM	839.110289
Direct_Connection	0
SUMFLOW	18
Avg PE x 100	350
GPD	6300
GPM	4.375
GPMx4	17.5
Comments	
SHAPE_Length	396.868081

# Determining Flow

- Each connection was considered an average 3.5 PE (350gpd)
- Upstream tracing allowed for a connections to be totalled at each segment along the system
- Connection totals controlled est. loading



Attributes	
Sanitary_Pipe	
951	
Material	PVC
Diameter	10
Substitute Roughness Factor	0.01
Slope	0.004297
Full Flow Capacity cfs	1.86954
Full Flow Capacity GPM	839.110289
Direct_Connection	0
SUMFLOW	18
Avg PE x 100	350
GPD	6300
GPM	4.375
GPMx4	17.5
Comments	
SHAPE_Length	396.868081

Demo

Output Example

# What's Next?

- **In Progress:** Fine-Tuning Number of Connections
- **In Progress:** Converting Connections into P.E. Values
- **Possibly:** Handling Network Loops
- **Possibly:** Invert Measurements
- **Possibly:** Accounting for Bends, Age Etc.
- **Likely:** ArcGIS Pro & the Utility Network...

# Takeaways

- This scenario was a first-pass, designed as a way to look at the bigger picture and determine usability.
- Requirements: Clean and Populated Data, ArcMap (Advanced Lic.), Geometric Network, Add-Ins
- While there are other programs out there, you can sudo-model systems in-house with your data

# Questions?

Thanks!

Paul Stephenson, GISP

Cloudpoint Geographics

[pstephenson@cloudpointgeo.com](mailto:pstephenson@cloudpointgeo.com)