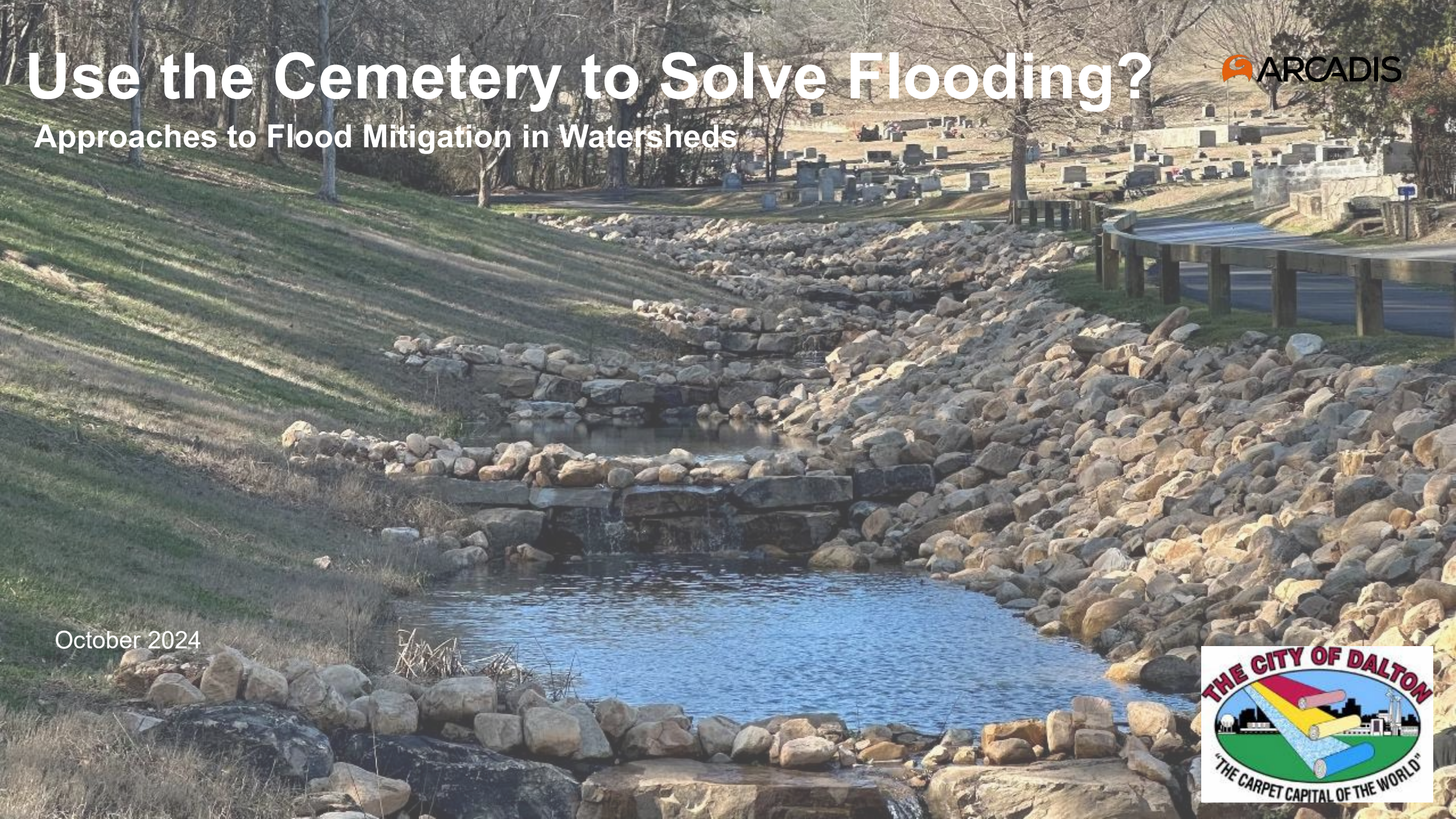
Use the Cemetery to Solve Flooding?

Approaches to Flood Mitigation in Watersheds



October 2024

- Location: Northwest Georgia
- Referred to as the “Carpet Capital” of the world, it is estimated that more than 85% of the US carpet and rug market produced world-wide is made within a 65-mile radius of Dalton.

Dalton is approximately 30 miles from the SESWA Annual Conference

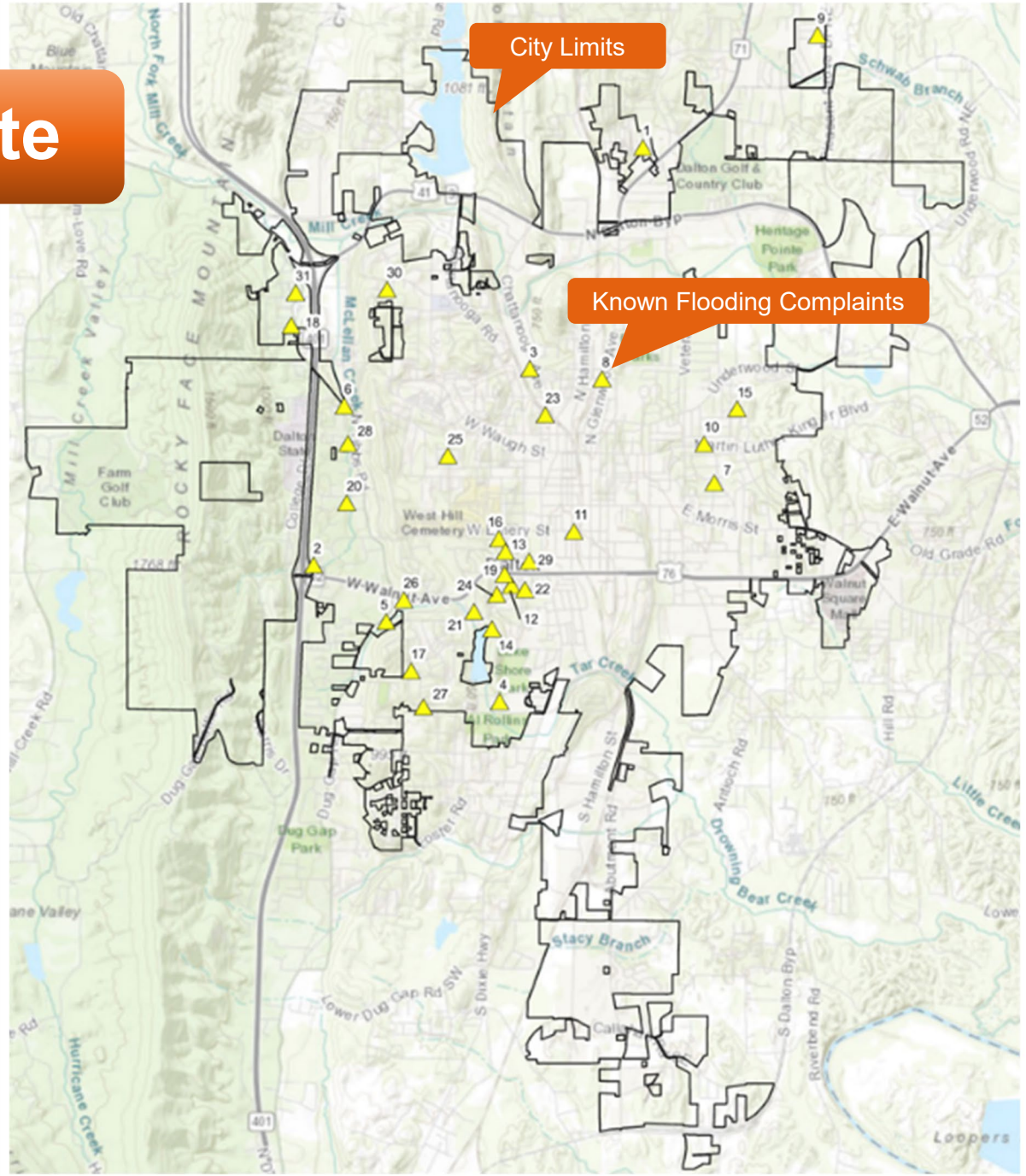
Challenges and a New Mandate

Major Challenges

- Historic Flooding Challenges
- Need for Policy Changes
- 1st Stormwater Ordinance - 2006
- Desire to Not Just Move the Problem

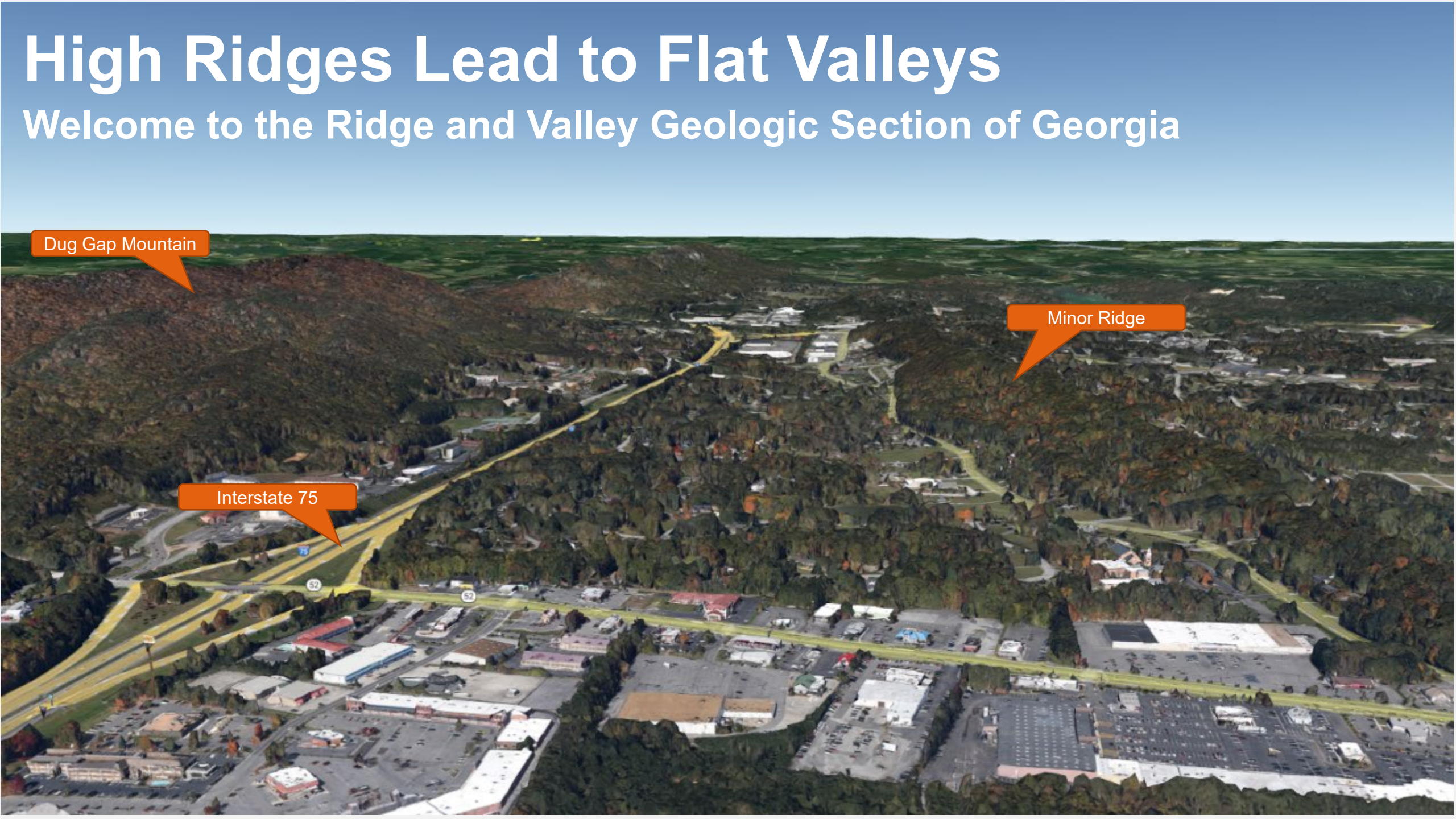
New Mandate

- In 2019, the Mayor challenged Public Works to address some of the historic flooding issues.



High Ridges Lead to Flat Valleys

Welcome to the Ridge and Valley Geologic Section of Georgia



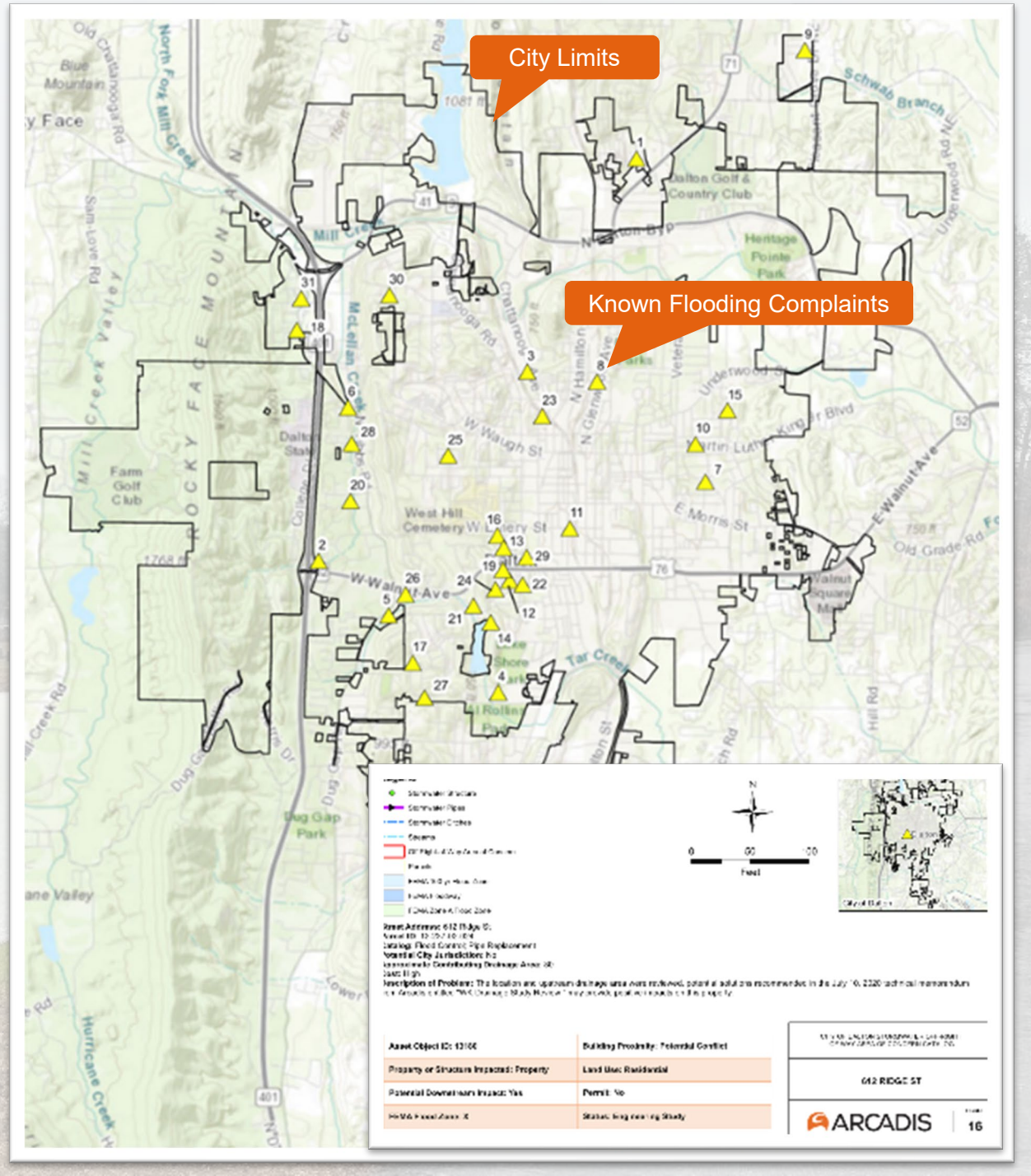
Mapping the Problem

Flooding Example

- Structural Flooding
- Majority of Drainage from City Property
- Private System on Residential Property
- What can the City do to Help

Off ROW Catalog

- Identify and Quantify Known Problems
- 31 Known Concerns Mapped



Constraining the Solutions
Where Should the City Work on Private Property?

ARCADIS

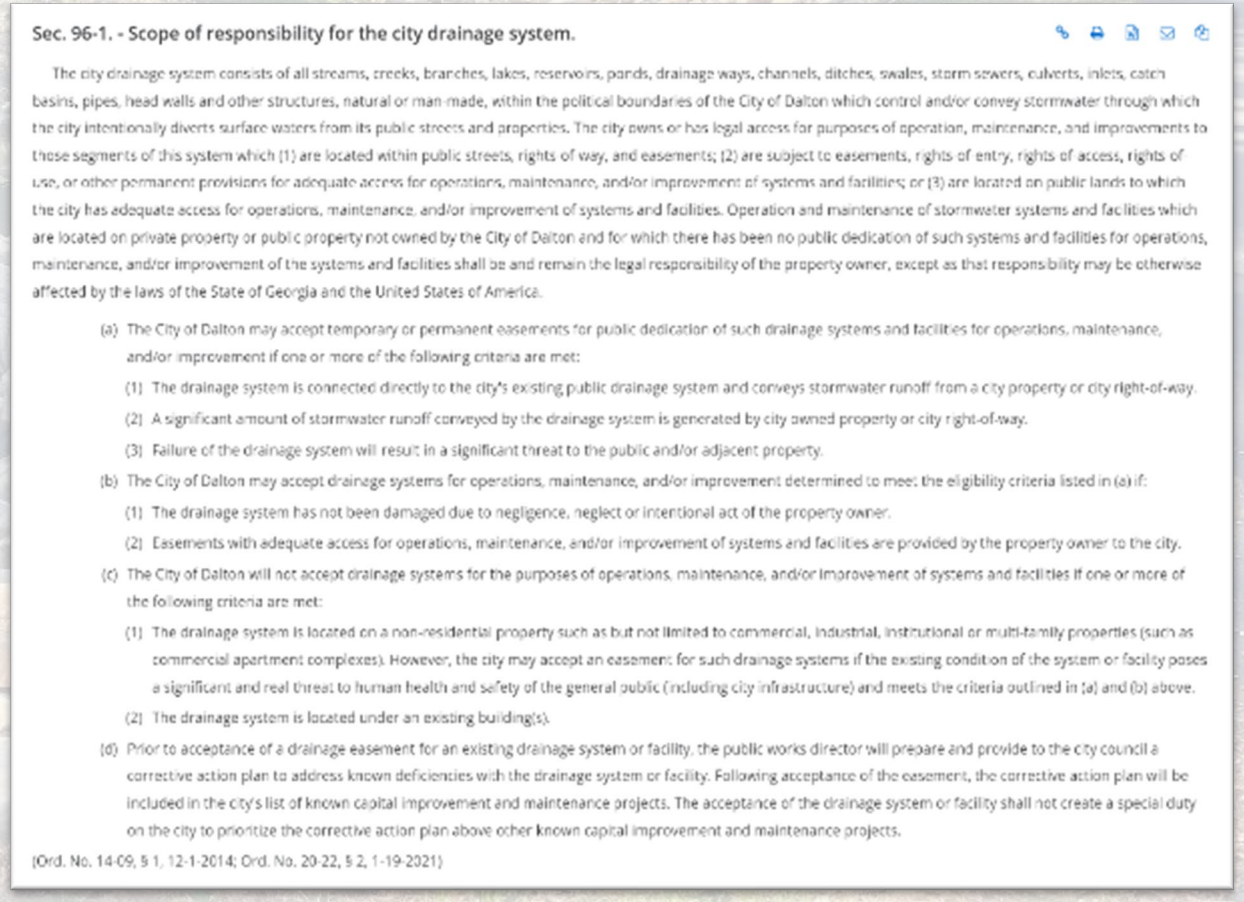
Sec. 96-1. - Scope of responsibility for the city drainage system.

Existing Policy

- City Right-of-Way
- City Property
- Dedicated and Accepted Easements

Where Should the City Acquire Easements

- Drainage Systems are Directly Connected
- Significant Amount of Runoff from City Property
- Failure is a Significant Threat to Public



Sec. 96-1. - Scope of responsibility for the city drainage system.

The city drainage system consists of all streams, creeks, branches, lakes, reservoirs, ponds, drainage ways, channels, ditches, swales, storm sewers, culverts, inlets, catch basins, pipes, head walls and other structures, natural or man-made, within the political boundaries of the City of Dalton which control and/or convey stormwater through which the city intentionally diverts surface waters from its public streets and properties. The city owns or has legal access for purposes of operation, maintenance, and improvements to those segments of this system which (1) are located within public streets, rights of way, and easements; (2) are subject to easements, rights of entry, rights of access, rights of use, or other permanent provisions for adequate access for operations, maintenance, and/or improvement of systems and facilities; or (3) are located on public lands to which the city has adequate access for operations, maintenance, and/or improvement of systems and facilities. Operation and maintenance of stormwater systems and facilities which are located on private property or public property not owned by the City of Dalton and for which there has been no public dedication of such systems and facilities for operations, maintenance, and/or improvement of the systems and facilities shall be and remain the legal responsibility of the property owner, except as that responsibility may be otherwise affected by the laws of the State of Georgia and the United States of America.

(a) The City of Dalton may accept temporary or permanent easements for public dedication of such drainage systems and facilities for operations, maintenance, and/or improvement if one or more of the following criteria are met:

(1) The drainage system is connected directly to the city's existing public drainage system and conveys stormwater runoff from a city property or city right-of-way.

(2) A significant amount of stormwater runoff conveyed by the drainage system is generated by city owned property or city right-of-way.

(3) Failure of the drainage system will result in a significant threat to the public and/or adjacent property.

(b) The City of Dalton may accept drainage systems for operations, maintenance, and/or improvement determined to meet the eligibility criteria listed in (a) if:

(1) The drainage system has not been damaged due to negligence, neglect or intentional act of the property owner.

(2) Easements with adequate access for operations, maintenance, and/or improvement of systems and facilities are provided by the property owner to the city.

(c) The City of Dalton will not accept drainage systems for the purposes of operations, maintenance, and/or improvement of systems and facilities if one or more of the following criteria are met:

(1) The drainage system is located on a non-residential property such as but not limited to commercial, industrial, institutional or multi-family properties (such as commercial apartment complexes). However, the city may accept an easement for such drainage systems if the existing condition of the system or facility poses a significant and real threat to human health and safety of the general public (including city infrastructure) and meets the criteria outlined in (a) and (b) above.

(2) The drainage system is located under an existing building(s).

(d) Prior to acceptance of a drainage easement for an existing drainage system or facility, the public works director will prepare and provide to the city council a corrective action plan to address known deficiencies with the drainage system or facility. Following acceptance of the easement, the corrective action plan will be included in the city's list of known capital improvement and maintenance projects. The acceptance of the drainage system or facility shall not create a special duty on the city to prioritize the corrective action plan above other known capital improvement and maintenance projects.

(Ord. No. 14-09, § 1, 12-1-2014; Ord. No. 20-22, § 2, 1-19-2021)

Walnut North Drainage Basin

Challenges

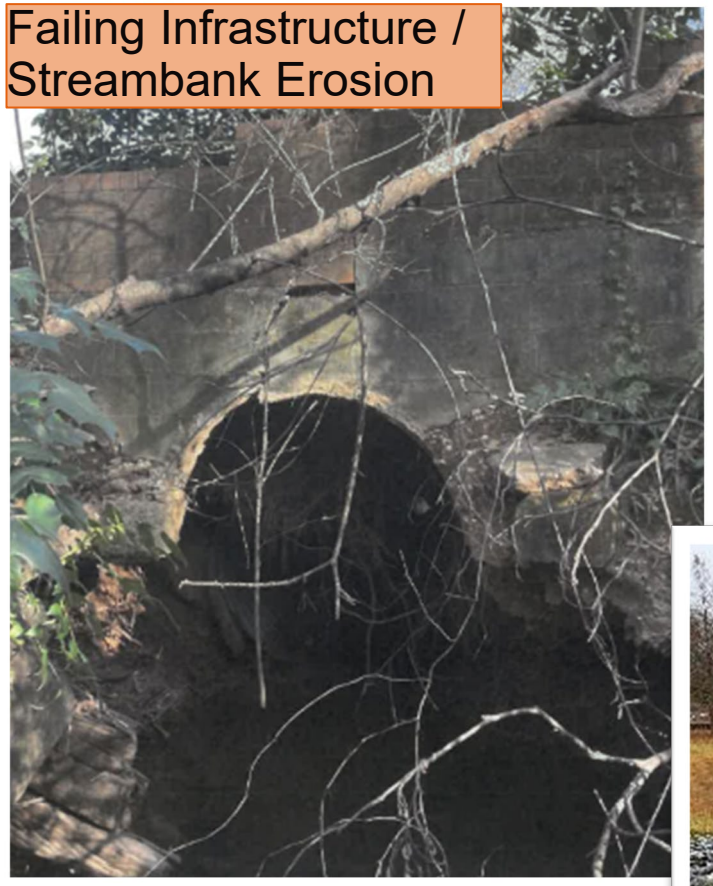
- Structural Flooding
- Failed / Failing Private Infrastructure
- Stream Bank Erosion

Needs

- Comprehensive Plan

Understanding the Problem

Failing Infrastructure / Streambank Erosion



Flood Inundation

Previous Mitigation Attempts

Private Property Impacts

Design Approach

Primary Improvement Goals:

- Reduce Structural Flooding
- Identify Infrastructure Improvements to Manage Runoff
- Extend Infrastructure Life Expectancy

Engineering Objective:

- Create Model to Test Improvement Scenarios

Primary Constraining Parameters:

- Achieve 100-YR Solution for Structural Flooding Areas
- Identify Solutions that Do Not Transfer the Problem Downstream
- Work within Extent of Service Policy

Design Approach

Surveying

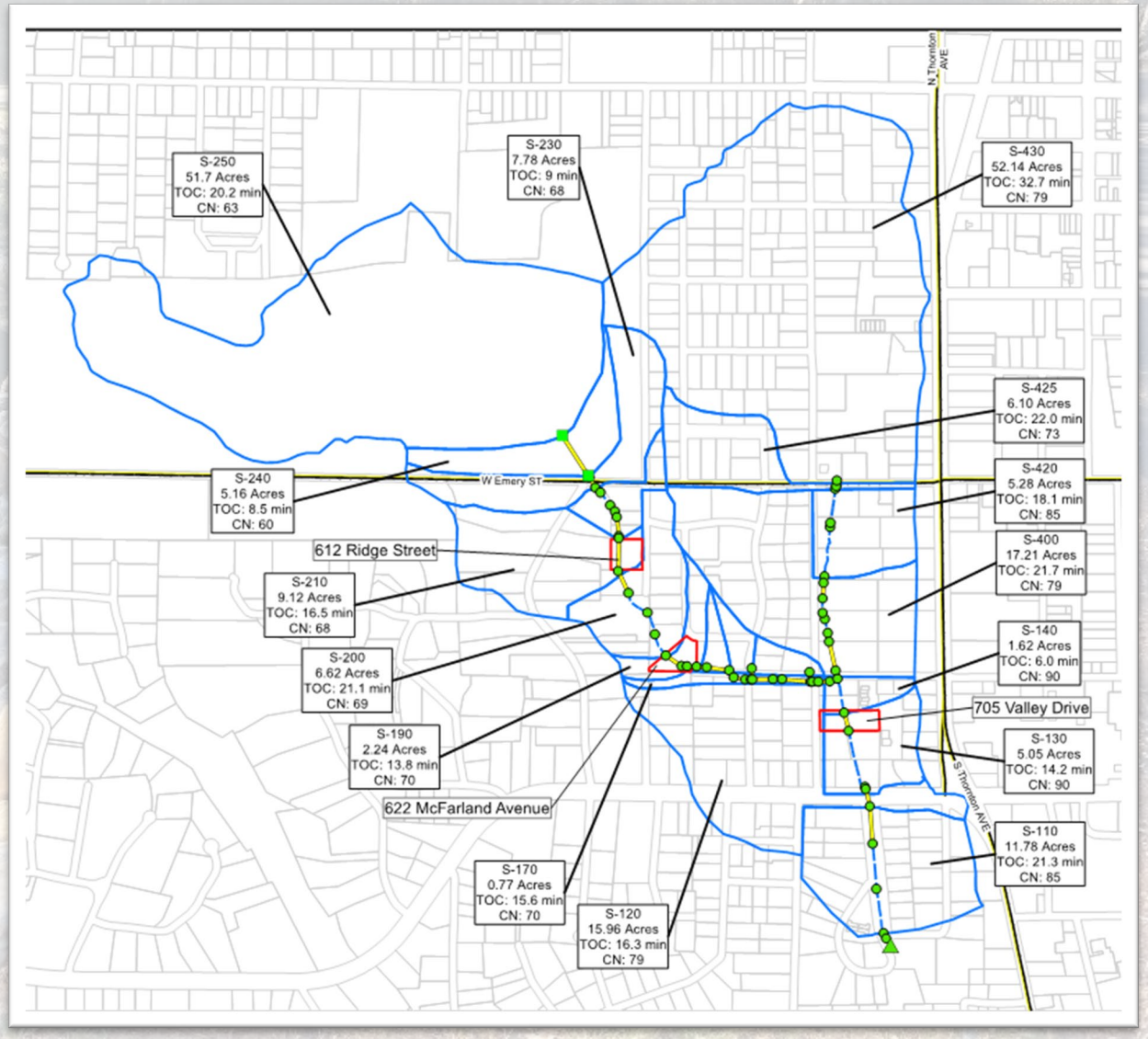
- Used Local Surveying Firm

Modeling

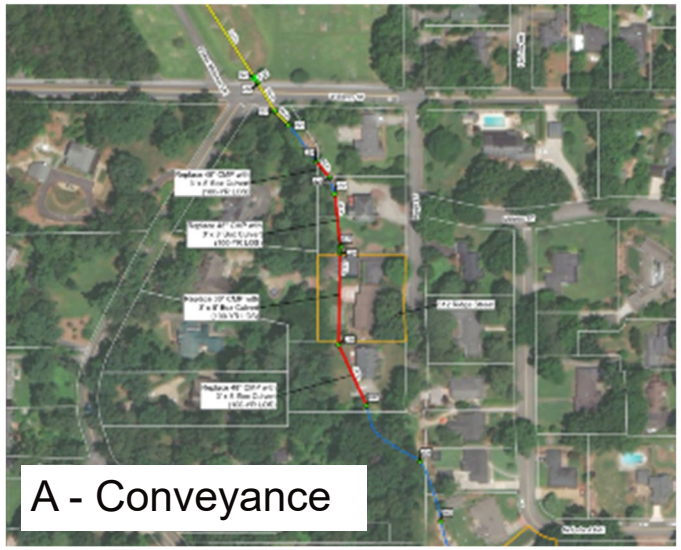
- PCSWMM
- Engineering Staff with Coastal Experience

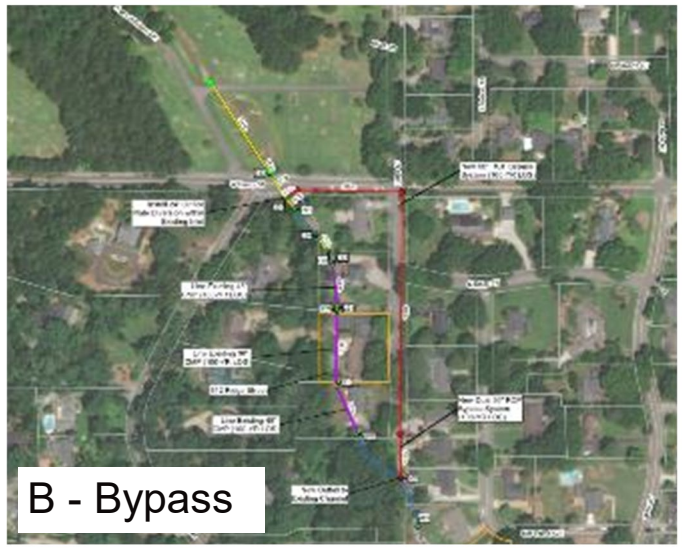
Replication of Conditions

- Seek Local Resident Verification



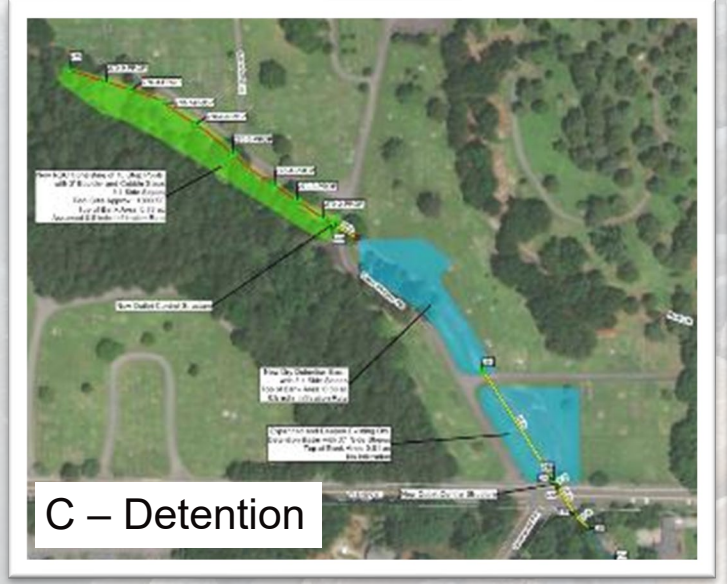
Design Evaluation

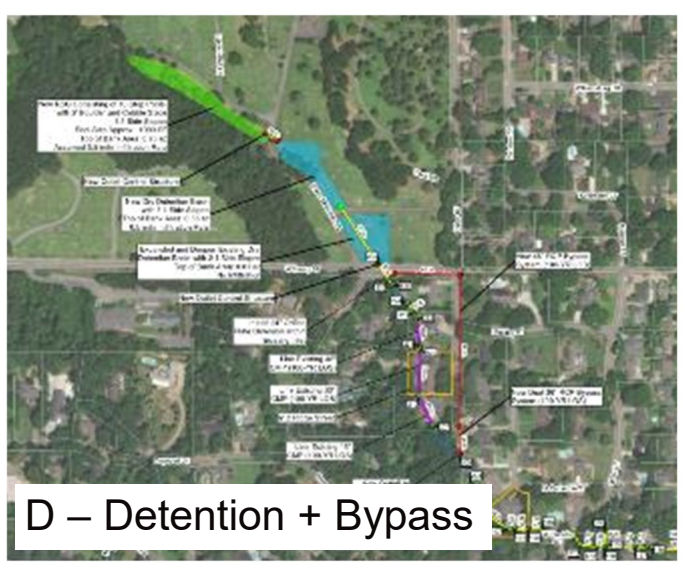

A - Conveyance

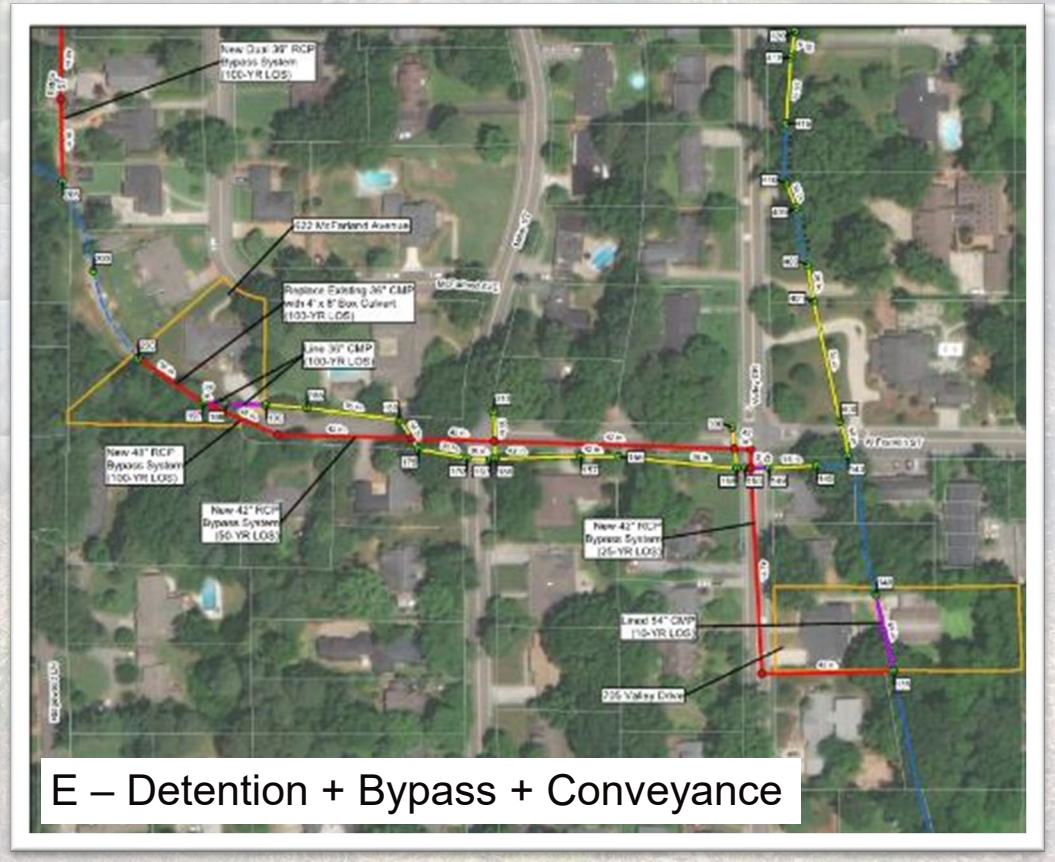

B - Bypass

Testing

- 5 Scenarios Were Tested
- Conveyance, Bypass, Detention


C – Detention


D – Detention + Bypass


E – Detention + Bypass + Conveyance

Design Evaluation

	Scenario A	Scenario B	Scenario C	Scenario D	Scenario E
Description	Conveyance	Bypass	Detention	Detention + Bypass	Detention + Bypass + Conveyance
Advantages	• Solves Flooding for Ridge St	• Solves Flooding for Ridge Street • Work on City Property	• All Work on City Property	• Solves Flooding for Ridge Street • Work on City Property • Does not Transfer the Problem to W Franklin	• Solves Flooding for Ridge Street • Work on City Property • Solves Flooding on W Franklin • Does not Increase Flows Downstream
Disadvantages	• Work on Private Property • Transfers Problem to W Franklin	• Transfers Problem to W Franklin	• Not Enough Detention to “Move the Needle”	• Does not Address Flooding Along W Franklin	• Most Expensive Option

The Plan (Scenario E)

Phase I – W Hill Cemetery

- Reduce Flow Rates to Facilitate Later Phases

Phase II – Ridge Street Bypass

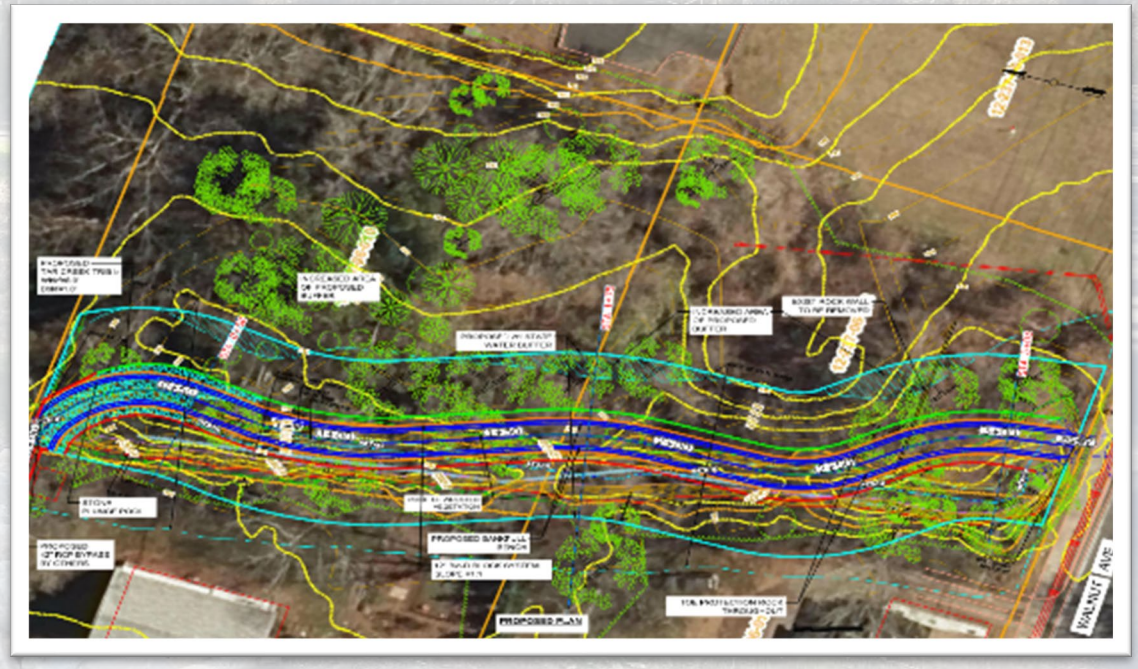
- Reduce Flooding Along Ridge Street

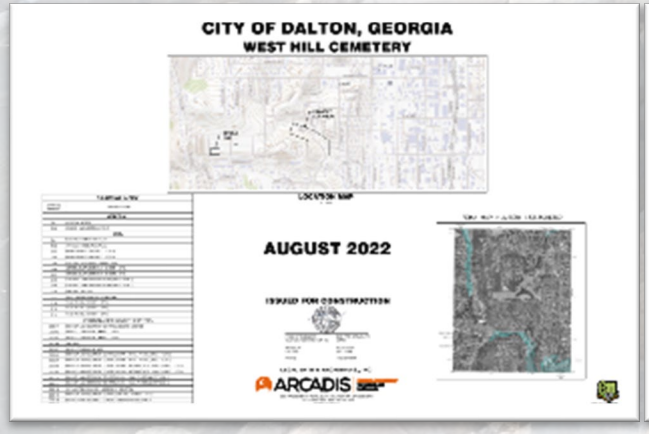
Phase III – W Franklin System

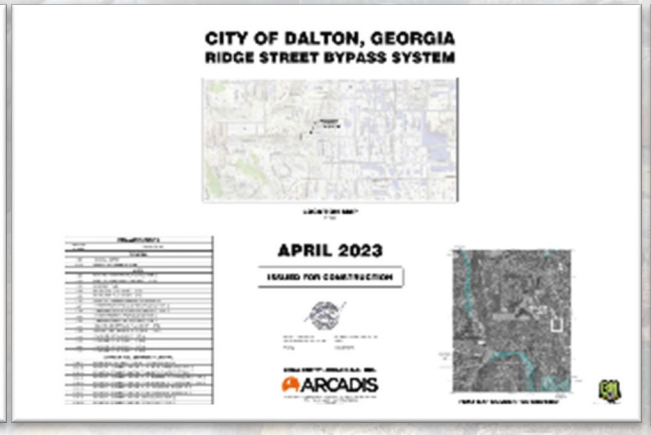
- Reduce Flooding Along W Franklin Drive

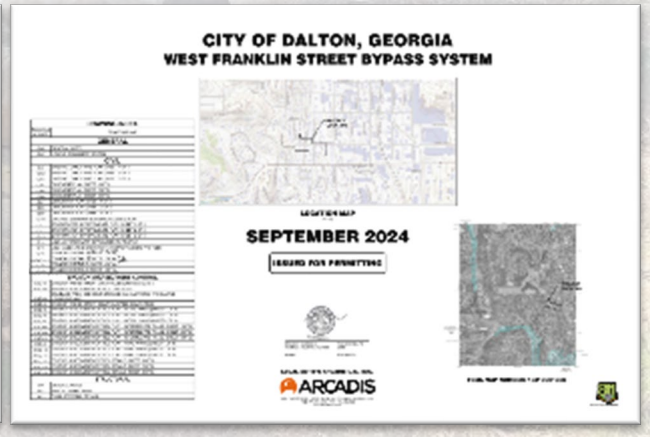
Phase IV – Valley Rd Stream Stabilization

- Address Property Damage / Loss from Erosion









Phase I – W Hill Cemetery (Constructed)

Challenges

- We're digging in a Historic Cemetery
- New Design Idea
- Will this Work (Public Perception)
- High Groundwater (wet)
- What to Do with this Dirt?
- Tennessee Field Stone
- Stabilization

Reception

- "Do we need to do Phase Resident Reaction

Phase II – Ridge Street Bypass (Constructed)

Challenges

- Resident Access / Traffic
- Deep Cut / Not Enough Cover
- Resident Expectations
- 30-inch Water Main
- Impacts from Storm Events
- Contractor Procurement
- Tennessee Field Stone

Immediate Testing

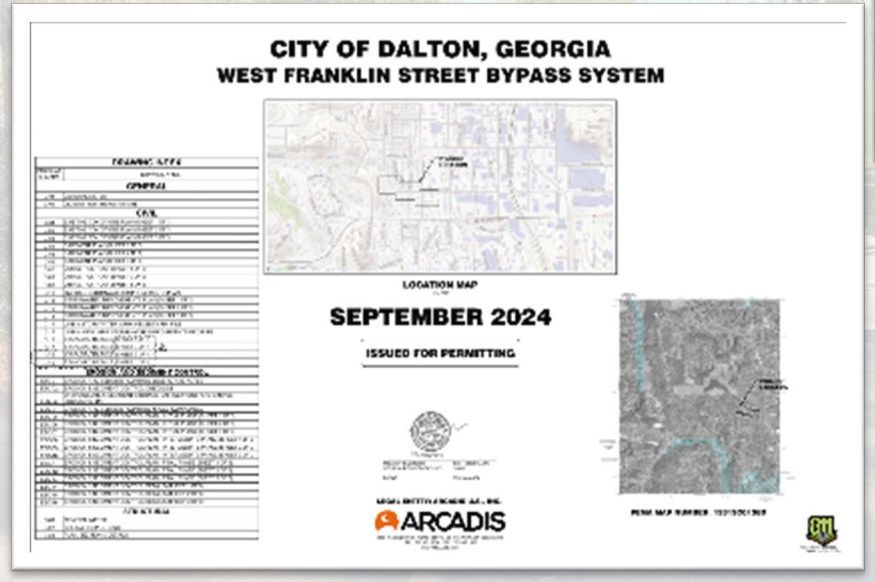
6-inches of Rain in 4 Hours

30-inch Water Main

Phase III – W Franklin System (Bidding)

Challenges

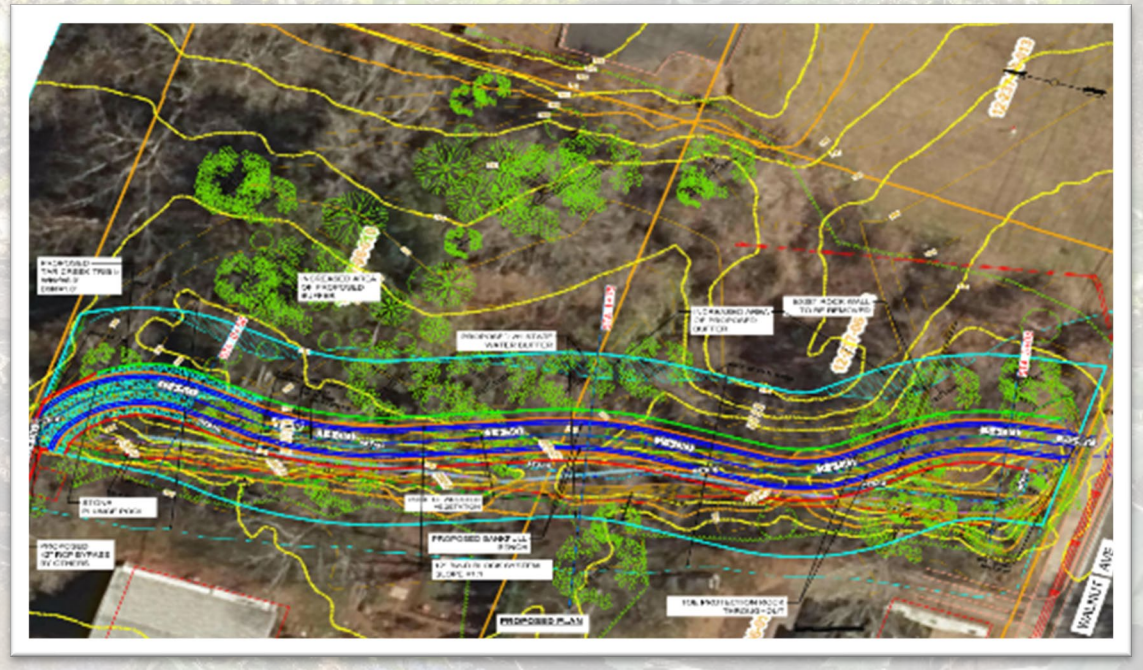
- R/W Challenges
- Utilities
- Resident Concerns / Expectations
- Tandem Project Coordination
- Off R/W Improvements



Phase IV – Valley Drive Stream Stabilization (Design)

Challenges

- First Design Build for Stormwater
- Permitting
- Resident Concerns / Expectations
- Tandem Project Coordination
- Easement Acquisition



Lessons Learned from the Field So Far…

Challenges / Lessons:

- Problem Identification
- Community Buy-In / Public Information Meetings
- Urbanized Development Constrictions
- Not All Issues can be Resolved
- Maintenance Aspects
- Constructability Challenges
- It Takes Time!

Benefits:

- Community Buy In
- Positive Press
- Credibility
- Side Benefits

Lessons Learned from the Field So Far…

- Problems can create solutions
- Approximately 5 years' worth of inventory created

What is the Cost of this Program?

Costs

- Phase I - $872,000 (Completed Construction)
- Phase II - $1,163,000 (Completed Construction)
- Phase III - $2,000,000 (Estimated)
- Phase IV - $589,000 (Estimated – Under Contract)

$4,624,000 – Total Construction

Still Looking for Opportunities…

Thank You!

Richard Greuel, PE
Richard.Greuel@arcadis.com