Meeting No. 3
Typical Elements - Level of Service
Agenda

1. Meeting 2 Summary: Regulations and Existing Program
2. Stormwater Basic Terminology
3. Roadway Flooding Level of Service
4. Structural Flooding Level of Service
5. Erosion Level of Service
6. Pollutant Reduction Level of Service
7. Proposed Meeting Schedule

Meeting No. 2 Summary
Regulations and Existing Program

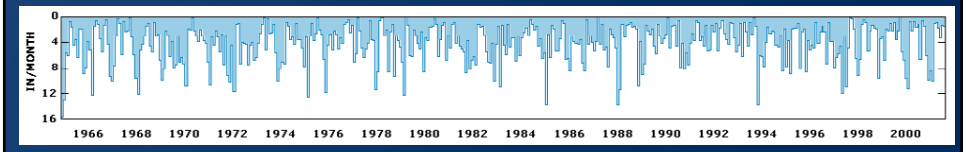
1. Stormwater Related Regulations
   - GA EPD, USACOE, FEMA, GSWCC
2. City Stormwater Functions

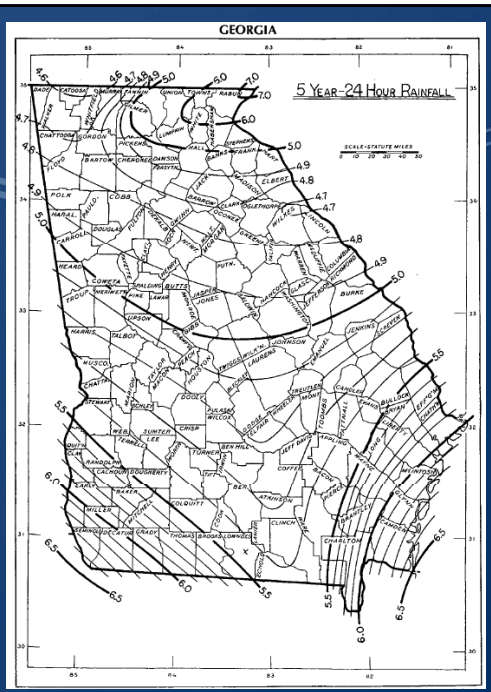
3. Quantity/Quality Level of Service

Stormwater Engineering Basics
and
Standard Terminology

Rainfall Records are the basis for the analysis

- Rainfall events are recorded with rainfall gages
- Data are compiled for many years
- Statistical Analysis determine the frequency (how often), intensity, and duration of storms throughout the period of record





Rainfall Statistics

- The Georgia Stormwater Manual compiled statistics for the entire state.

Intensity Duration Frequency Analysis

DESIGN STORM DEPTHS (inches)

Recurrence Interval	1 year	2 year	5 year	10 year	25 year	50 year	100 year
Annual Percent Chance	100%	50%	20%	10%	4%	2%	1%
1 Hour	1.85	2.09	2.49	2.78	3.21	3.55	3.88
6 Hour	2.76	3.24	4.08	4.68	5.46	6.00	6.66
12 Hour	3.00	3.84	4.80	5.52	6.48	7.2	8.04
24 Hour	3.60	4.32	5.52	6.48	7.68	8.4	9.12

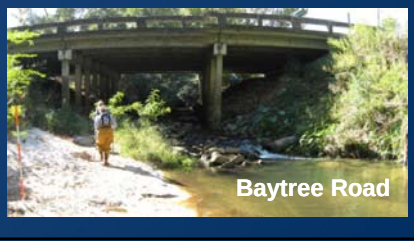
Source: Georgia Stormwater Management Manual

Field explorations provide insights regarding key watershed parameters

- Imperviousness
- Soil Infiltration Capacity
- Topographic Relief
- Existing Infrastructure

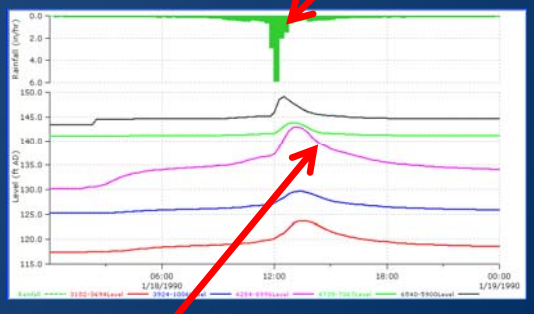
Channels, Bridges, Culverts and Pipes are surveyed and documented

- Conveyance
- Current Condition
- Roughness Assessment
- Erosion and Sedimentation

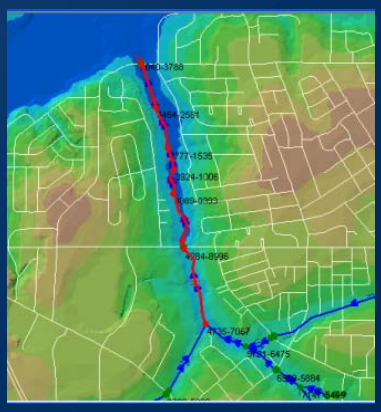


Engineers evaluate the watershed and channels to determine flood stages associated with design storms

Rainfall



Stream Stage

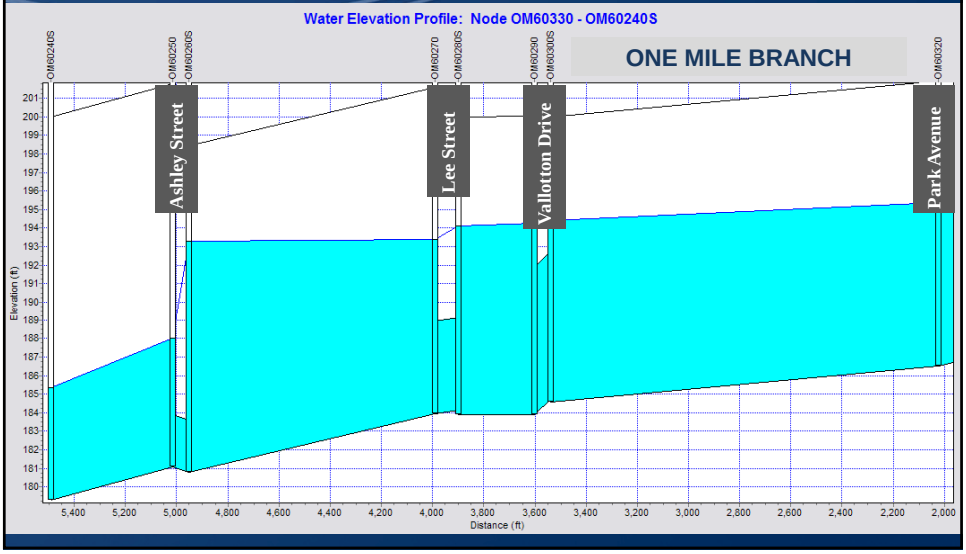


The Final Result is a table that shows the expected flood stages at specific locations within the City

Node	Road Name	Road Classification	Roadway Crown Elevation (ft-NAVD)	1.2 - inch Storm	5 - Year Storm	10 - Year Storm	25 - Year Storm	100 - Year Storm
One Mile Branch								
OM60250				184.2	187.3	187.4	188.1	188.9
OM60260S	N Ashley Street	Arterial Road	192.7	186.0	191.1	192.1	193.3	193.7
OM60265S				185.6	191.1	192.1	193.3	193.7
OM60270				188.1	191.5	192.3	193.4	193.9
OM60280S	Lee Street	Collector Road	193.3	188.1	192.4	193.2	194.2	194.6
OM60290				188.6	192.9	193.5	194.4	194.8
OM60300S	Vallotton Drive	Local Road	193.3	188.6	193.1	193.7	194.7	195.3
OM60320				191.1	194.9	195.4	196.2	196.9
OM60330				196.1	198.8	199.5	200.3	201.1

Draft Results from Current Ongoing Master Plan Update

The Engineer Model also predicts the peak velocities in different sections of the stream



The final objective of the engineering analysis is to determine the following

- Problem areas within the watershed
- Critical storms that flood roads
- Sections of the streams with erosive velocities
- Provide estimates of design parameters for future projects
- Determine the benefits/impacts of project implementation

The Parameters set in the Level of Service will provide a City wide metric to rank upcoming Stormwater Construction Projects

- Quantity Levels of Service Benefits
- Quality Levels of Service Benefits
- Preference for Joint use facilities
- Construction and Maintenance Costs

Selected Level of Service translates into construction and O/M costs

Stormwater Level of Service

Roadway Level of Service

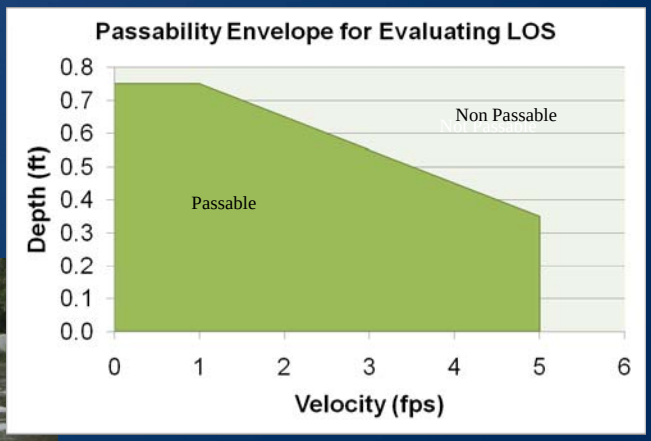
- Determination of frequency (how often) and severity (how deep) flood levels that are acceptable to the community

Roadway GA DOT Level of Service

- The Georgia Department of Transportation (DOT) has set standards for their infrastructure
- Example: A road with an Average Daily Traffic (ADT) of 300 should be designed 2 feet above the 10 year storm

Vertical Profile Clearance Based on High Water		
Facility	Designer's First Priority Roadway Base or Bridge Low Chord Clearance	
	Required Clearance	Design Flood Frequency
Interstate	2-ft	50-year
Hurricane Evacuation Routes	2-ft	50-year
Roads Designed as State Routes	2-ft	50-year
Roads Not Designed as State Routes		
ADT: 0-99	2-ft	5-year
ADT: 100-399	2-ft	10-year
ADT: 400-1,499	2-ft	25-year
ADT: 1,500 or more	2-ft	50-year
Driveways	2-ft	25-year
Temporary Detours	2-ft	10-year
Permanent Bridges	2-ft	50-year
Temporary Bridges		
Local Roads with ADT<400	2-ft	2-year
All Other Roads	2-ft	10-year

CDM has developed criteria specific to other locations to determine whether or not a road is passable



Roadway Levels of Service Examples

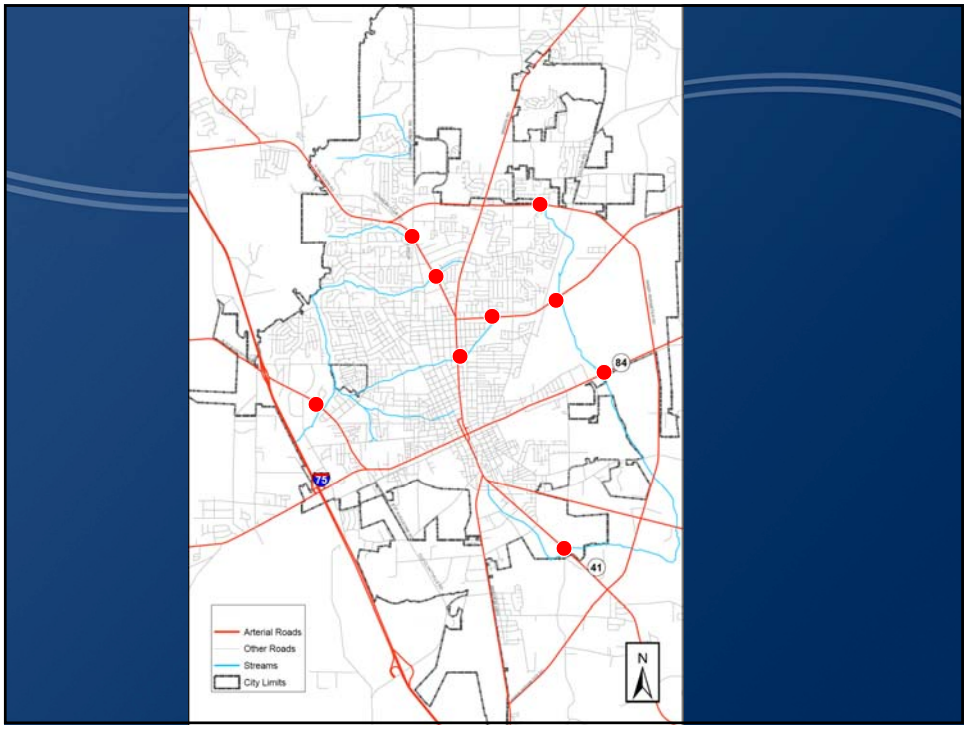
- East Point, GA
  - All roads shall be passable for the 25 yr/24 hour storm based. A determination is made based on flow depth and velocity
- Tallahassee, FL
  - All roads shall be passable for the 25 yr/24 hr storm
- Robinson Bayou, FL
  - Three different levels of service based on 10, 25 and 100 yr storms

Roadway Levels of Service Examples

- Jacksonville, FL
  - Arterial Roads
    - 9 inches for 100 yr storm
  - Local Roads
    - 3 inches for the 5 year storm
- Charlotte, NC
  - Local Roads: 25 yr storm
  - Arterial Roads: 50 yr storm
  - If tributary area is greater than 1 sq-mi, 100 yr + 1 ft freebord criteria

Currently in Valdosta roadways are classified based on traffic intensity

- Arterial Roads
- Local Roads
- Draft Consideration: Cross Drain Culverts shall be designed to provide at least 1.5 ft of freeboard between the 100 year ponding and the centerline of the road (LDR 332-22-e)



Roadway Level of Service

Arterial Road Flood Frequency

Local Road Flood Frequency

Home / Structural Flood Level of Service

Structural Flood Level of Service

- Determination of frequency (how often) and severity (how deep) of structural flooding (buildings, homes) standards

Critical Infrastructure should be operational during severe storms

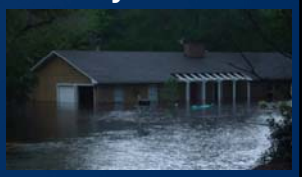
- Fire stations, Hospitals, Sewage pump stations are some examples of critical infrastructure
- In some instances the only solution is to flood proof these structures to ensure they are operational during severe floods

Structural Flood Levels of Service Examples

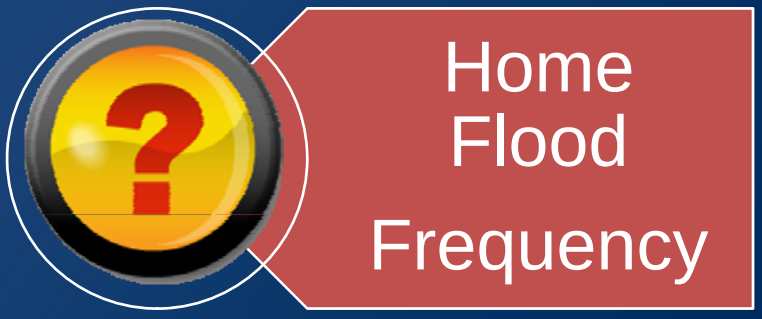
- East Point, GA
  - No structures should be flooded for the 100 year storm
- Tallahassee, FL
  - None
- Robinson Bayou, FL
  - Three different levels were set for the 10, 25, and 100 year storms

Structural Flood Levels of Service Examples

- Jacksonville, FL
  - No structures should be flooded for the 100 year storm
- Charlotte, NC
  - No structures should be flooded for the 100 year storm
- FEMA Regulations
  - No new development is allowed in the floodplain
  - If there is encroachment in the floodplain it is required to raise the structures and compensate for storage



Structural Level of Service



Erosion Level of Service

- Determination of the peak velocity that the City wants to maintain in natural channels
- High velocities are associated with loss of stream bank, trees, and threat to properties


Sugar Creek


Lamar Street Bank Stabilization

Erosion Level of Service Examples

- East Point, GA
  - None
- Tallahassee, FL
  - None
- Jacksonville, FL
  - Existing Channels: 3 feet per second for the 2.3 year storm
  - New Designed Channels: 2 feet per second for the 2.3 year storm
- Charlotte, NC
  - 14 fps for rip rap sections

Valdosta Erosion Level of Service

- 25 yr storm peak velocities compared to channel lining (LDR 322-22-f-6)

Erosion Level of Service

Water Quality Level of Service

- City has already a reduction goal of 98% for bacteria in Two Mile Branch
- Upcoming EPD regulations may enforce bacteria and nutrient total maximum daily loads (TMDL)

Quality Level of Service (LOS)

Pollutant Reduction

The City of Valdosta has the ability to determine its level of service and support the ranking of upcoming construction projects

Quantity Level of Service (LOS)

- Home Flood Frequency
- Arterial Road Flood Frequency
- Local Road Flood Frequency

Quality Level of Service (LOS)

Stream Peak Velocity

Pollutant Reduction

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Stormwater Committee (SWC) Meeting Dates

- Nov 17 2009 – Introduction
- Dec 1 2009 – Regulations and Existing Program
- Jan 19 2010 – Typical Elements - Levels of Service (LOS)
- Feb 23 2010 – Special Considerations and LOS Discussion
- Mar 23 2010 – Recommendations to Council
- Apr 20 2010 – Extra Meeting (if necessary)
- April 2010 – Final Recommendations to Council