

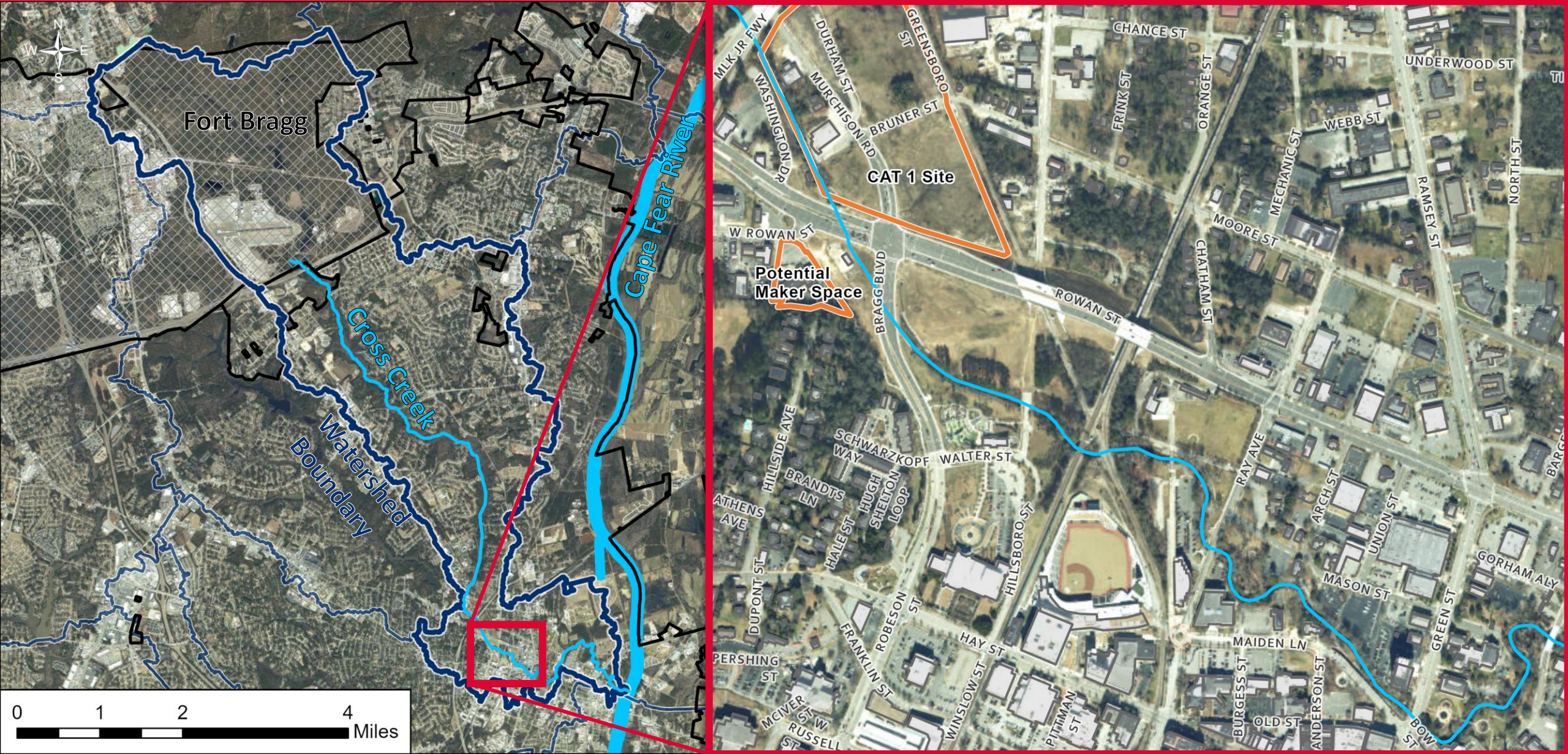


Cross Creek Watershed Study Downtown Area Update



- Background
- Existing Flooding Issues
- Flood Mitigation Toolbox
 - Detention
 - Diversion
 - Floodplain Buyout
 - Capacity Increase
- Next Steps





DOWNTOWN RIVERINE FLOOD STUDY REPORT



City of Fayetteville, North Carolina
FINAL – May 2021

Traffic Shift Needed for Rowan Street Bridge in Fayetteville



Published Date:

4/5/2019

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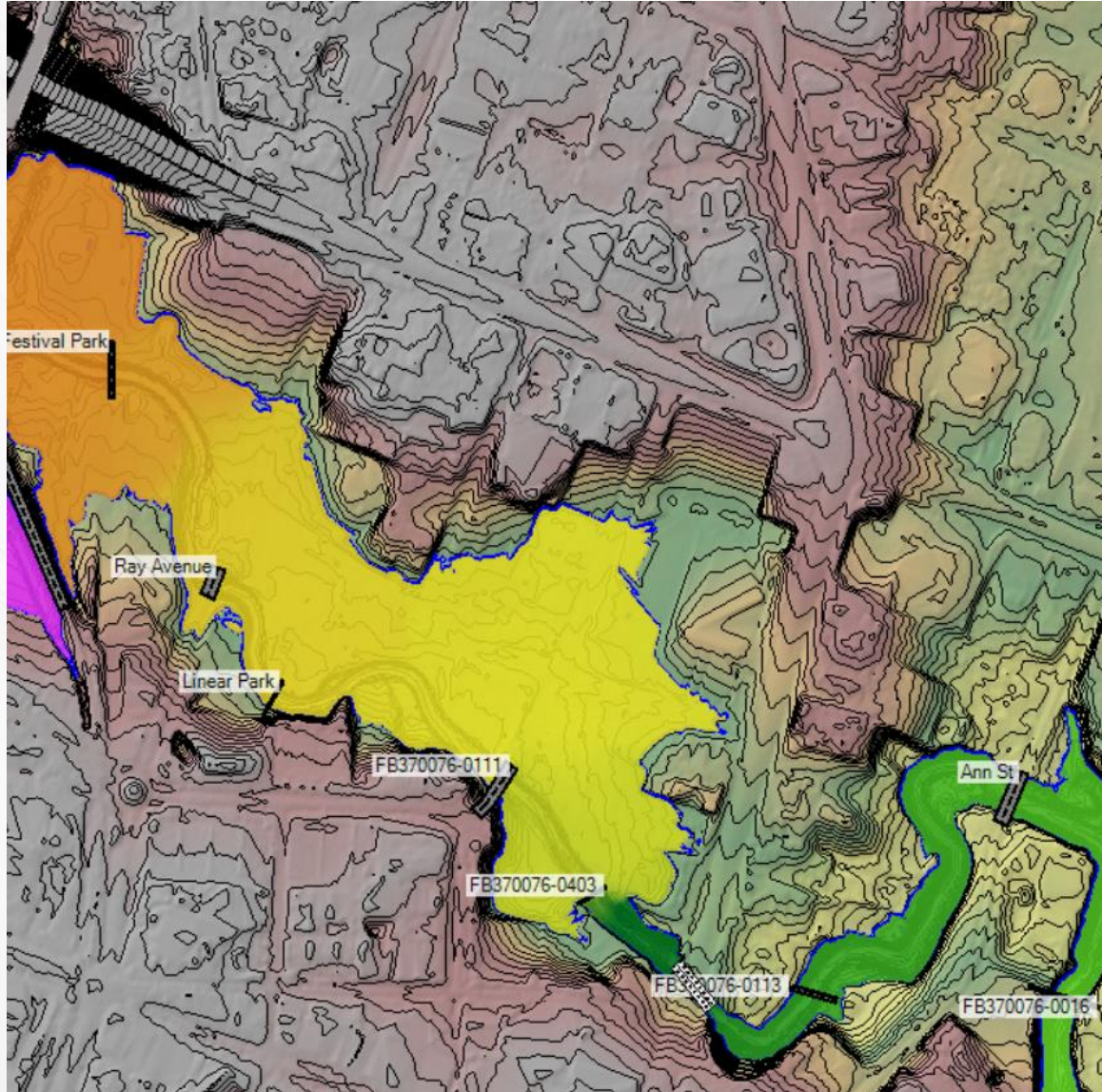
Progress on City Parks projects continues at Veteran's Park

Post Date: 10/04/2022 8:56 AM

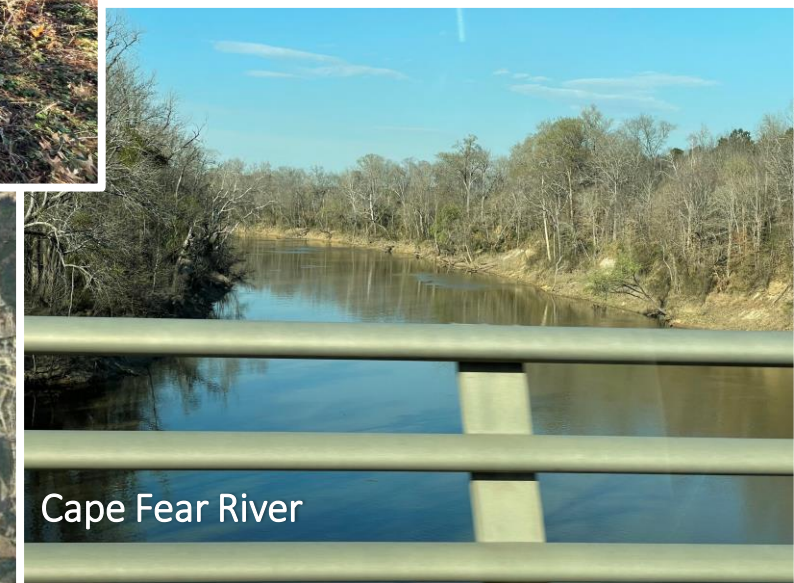
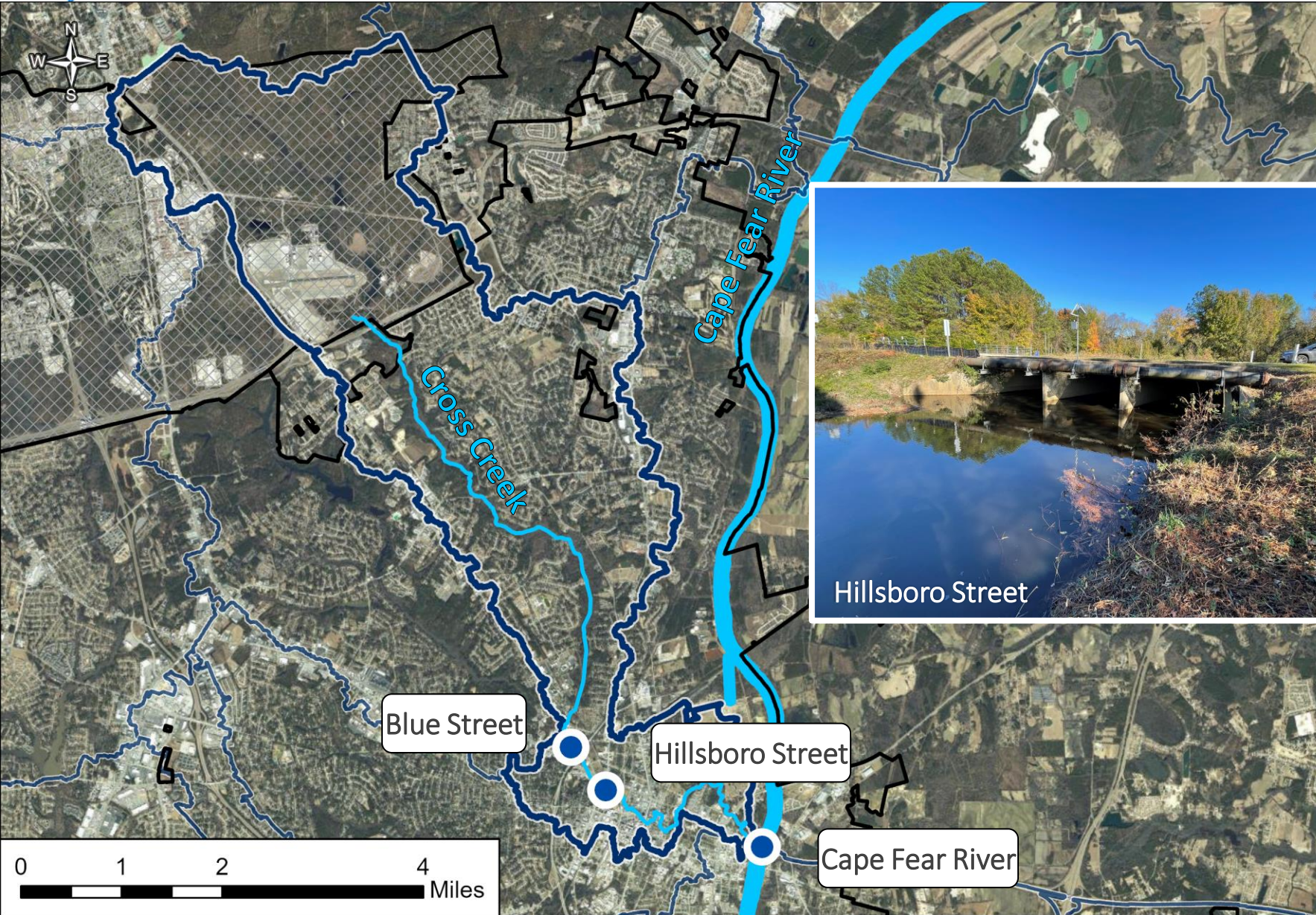
(Fayetteville, N.C.) – The City of Fayetteville has recently acquired the surplus land from the North Carolina Department of Transportation to be used for the expansion of Veteran's Park, a project known as Veteran's Park II. The 8 acres of the expansion site is located near the intersection of Bragg Boulevard, Rowan Street and Murchison Road. It became available after NCDOT replaced the Rowan Street bridge with the current structure.

The park's design phase is nearing completion and the City expects to begin construction in the coming months following the bid process. In preparation, preliminary grading work is now underway, a process that produces excess soil when leveling the ground. Maximizing all available resources, the City will be relocating the extra soil to several Parks & Recreation Bond projects in need of fill dirt such as Senior Center East, Mazarick Park Tennis Center and Mable C. Smith Park. Residents can expect to see this transfer of soil near the project sites during the next several weeks prior to the start of construction.

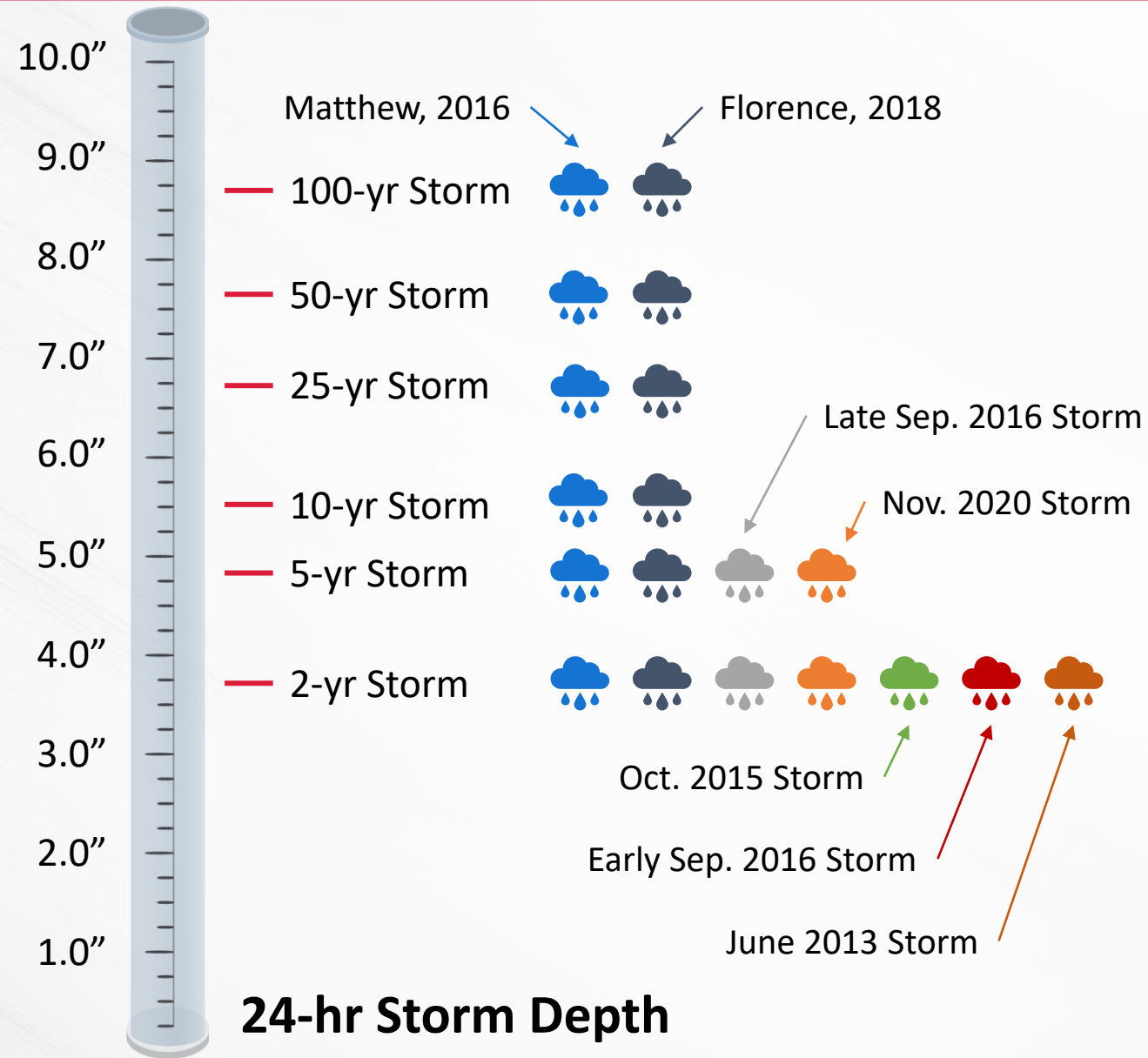




Use of Gages





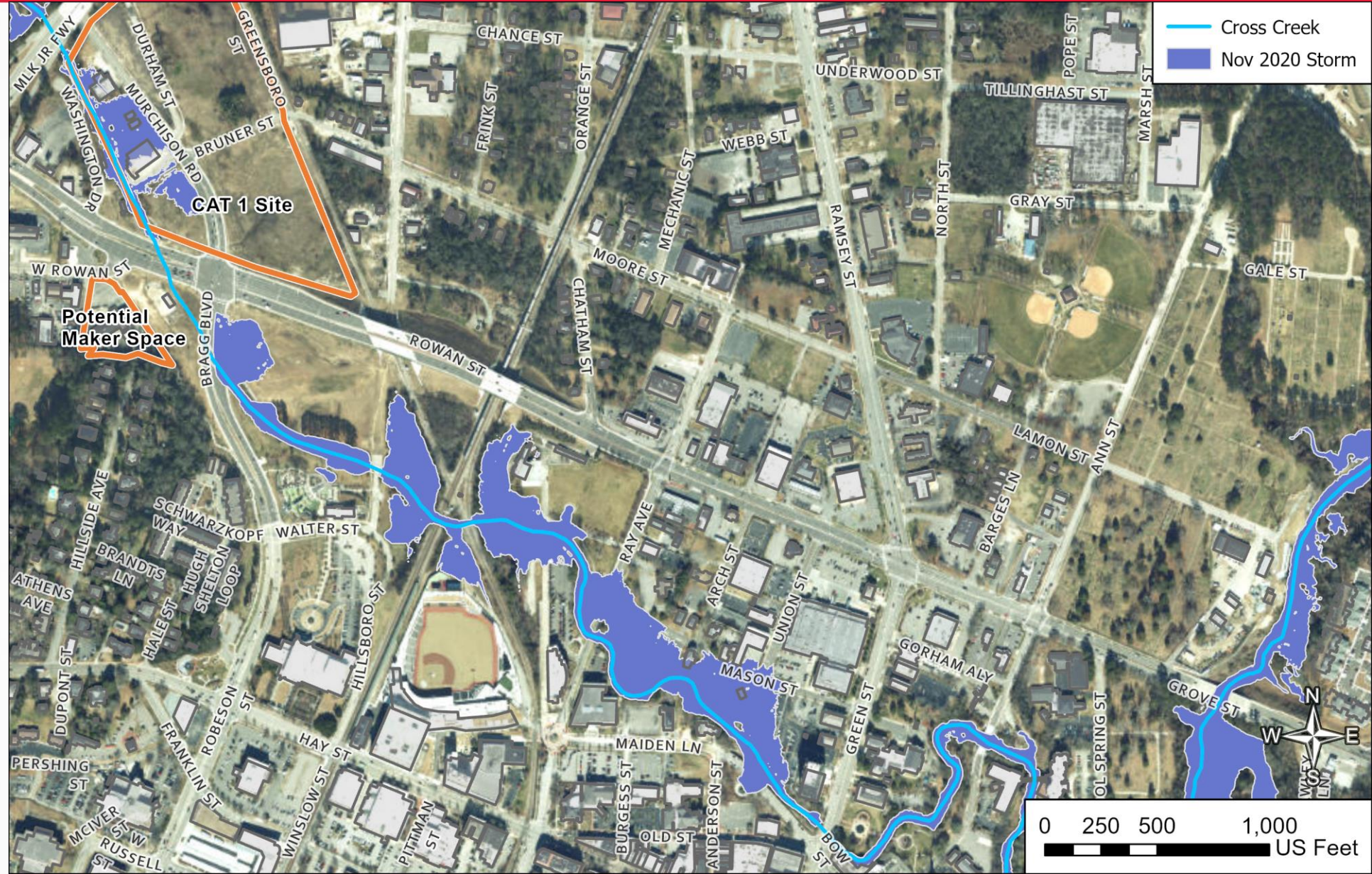
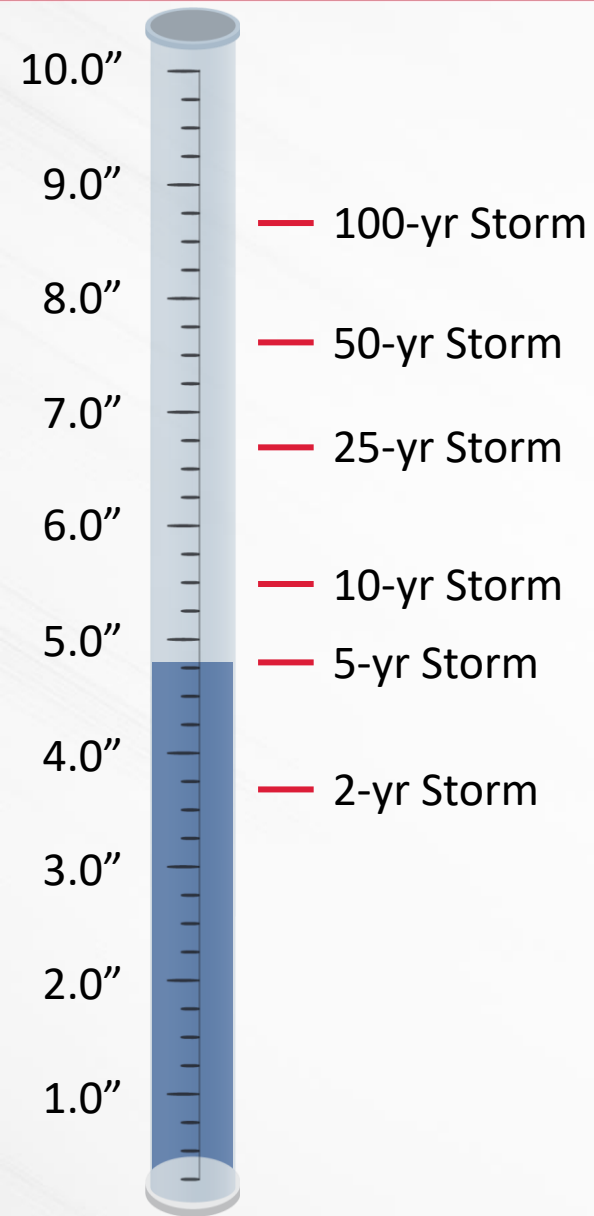


Andrew Craft, *The Fayetteville Observer*

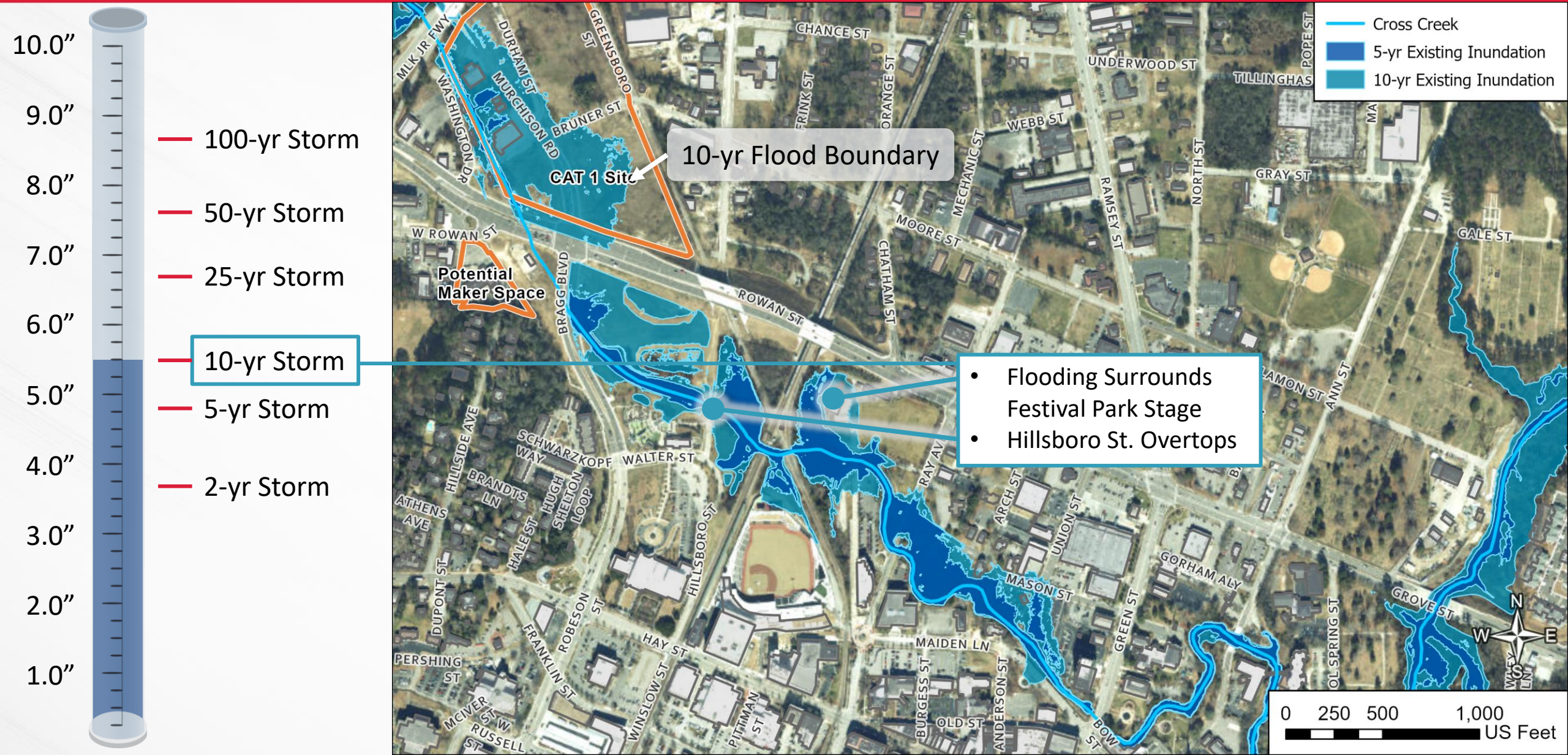
Existing Flooding: 5-yr Storm



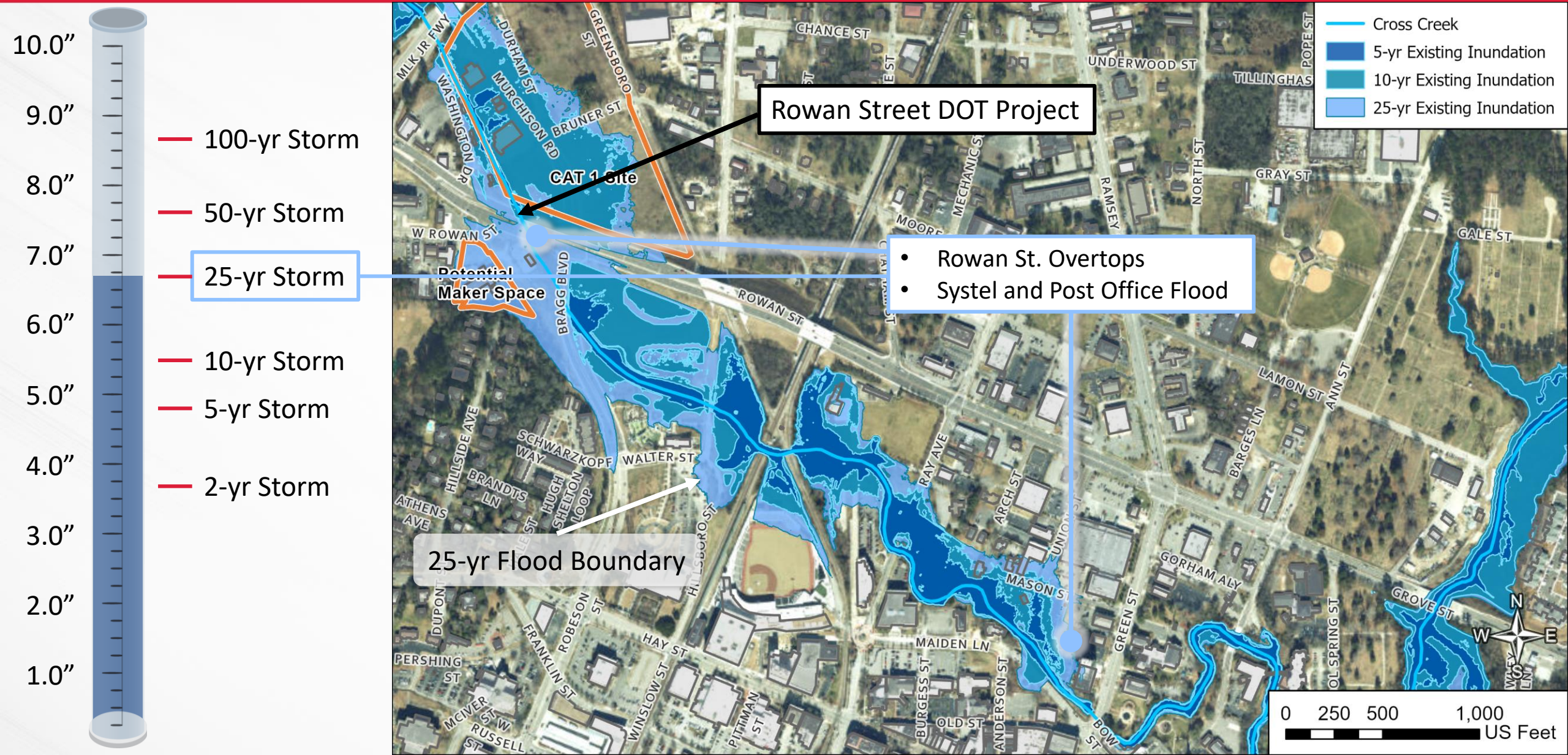
Existing Flooding: November 2020



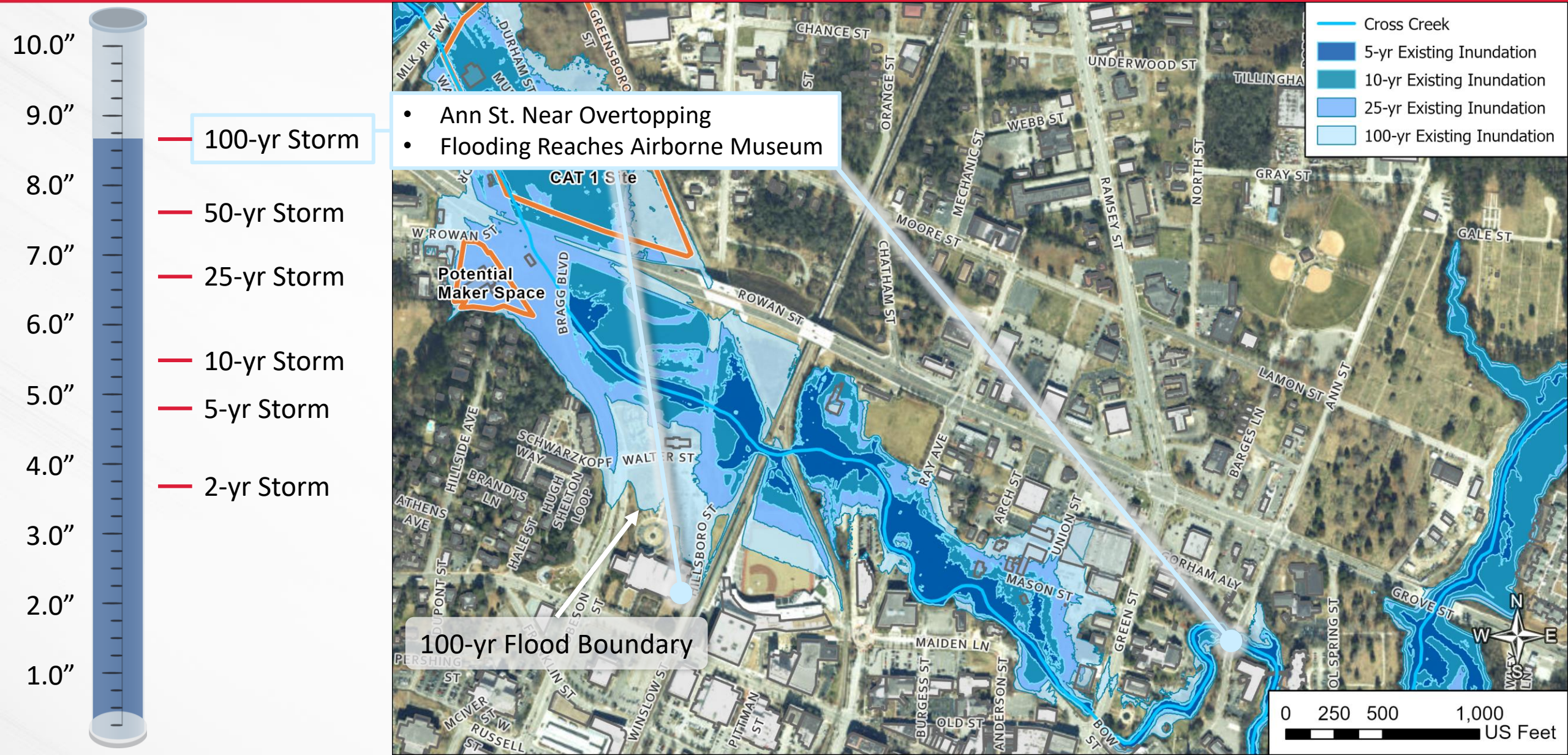
Existing Flooding: 10-yr Storm



Existing Flooding: 25-yr Storm



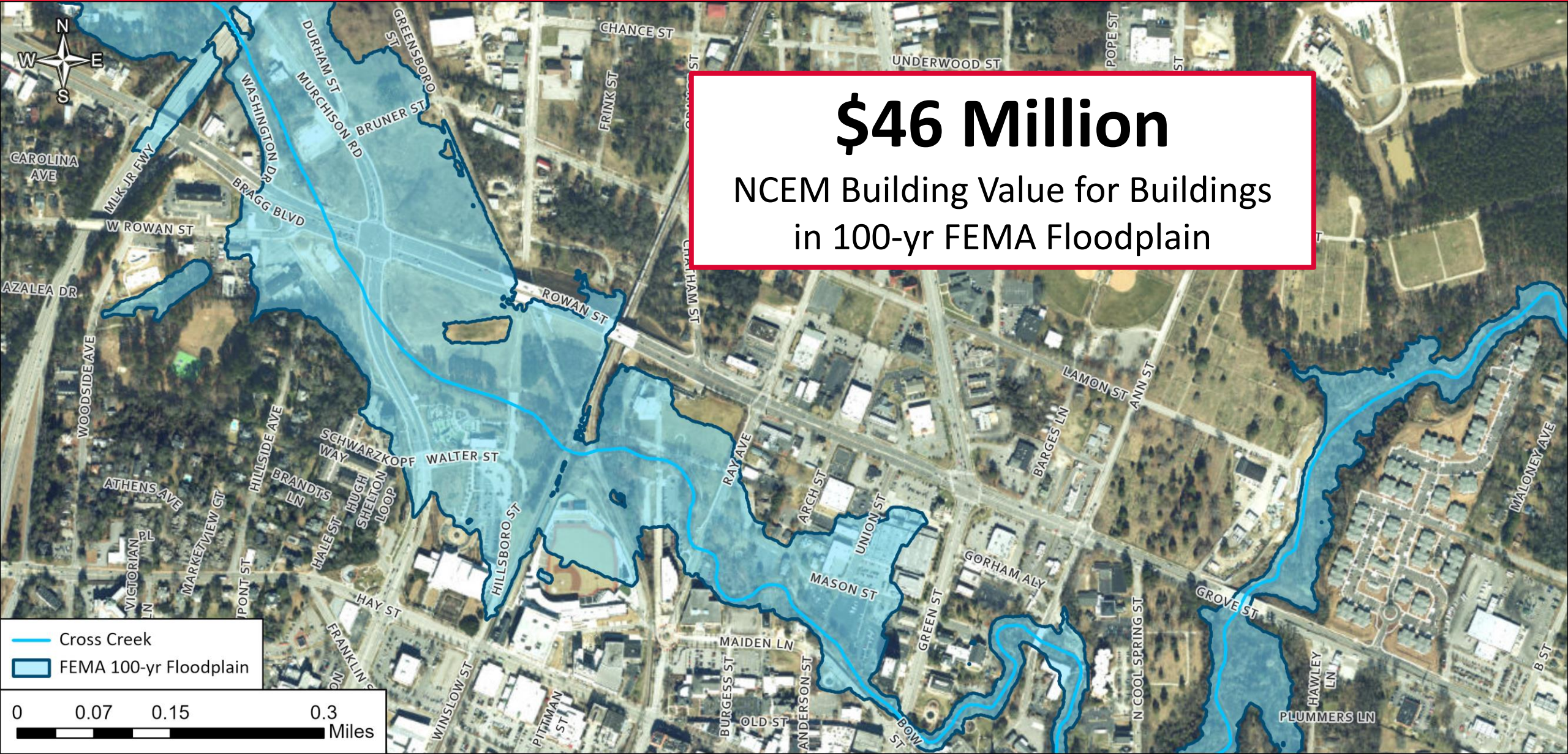
Existing Flooding: 100-yr Storm



Downtown Channel Geometry







Modeled Damage Estimates

Storm	Annual Probability	Event Damage	Annualized Damage
100-yr	1%	\$12,800,000	\$125,000
50-yr	2%	\$5,900,000	\$118,000
25-yr	4%	\$3,800,000	\$152,000
10-yr	10%	\$1,100,000	\$112,000
		Total Annualized	\$510,000
		Present Value	\$13,400,000

i = 2.87%
 Period = 60 years

Damage is due to direct flooding from Cross Creek, not including the secondary system
 Damage only accounts for structure and content damage; additional damages could be quantified in the future

Detention

Diversion

Floodplain
Buyout

Increased
Capacity





Detention

- Roses Lake
- Glenville Lake
- Storage at CAT 1 Site



Diversion

- Single Tunnel
- Multi-Inlet Tunnel
- Pump Station



Floodplain Buyout

- Floodplain buyout



Increased Capacity

- Floodplain Widening
- Floodplain Berms




Gables Drive Dam


Civitan Lake

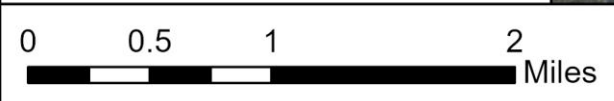
Country Club Lake

Roses Lake

Glenville Lake

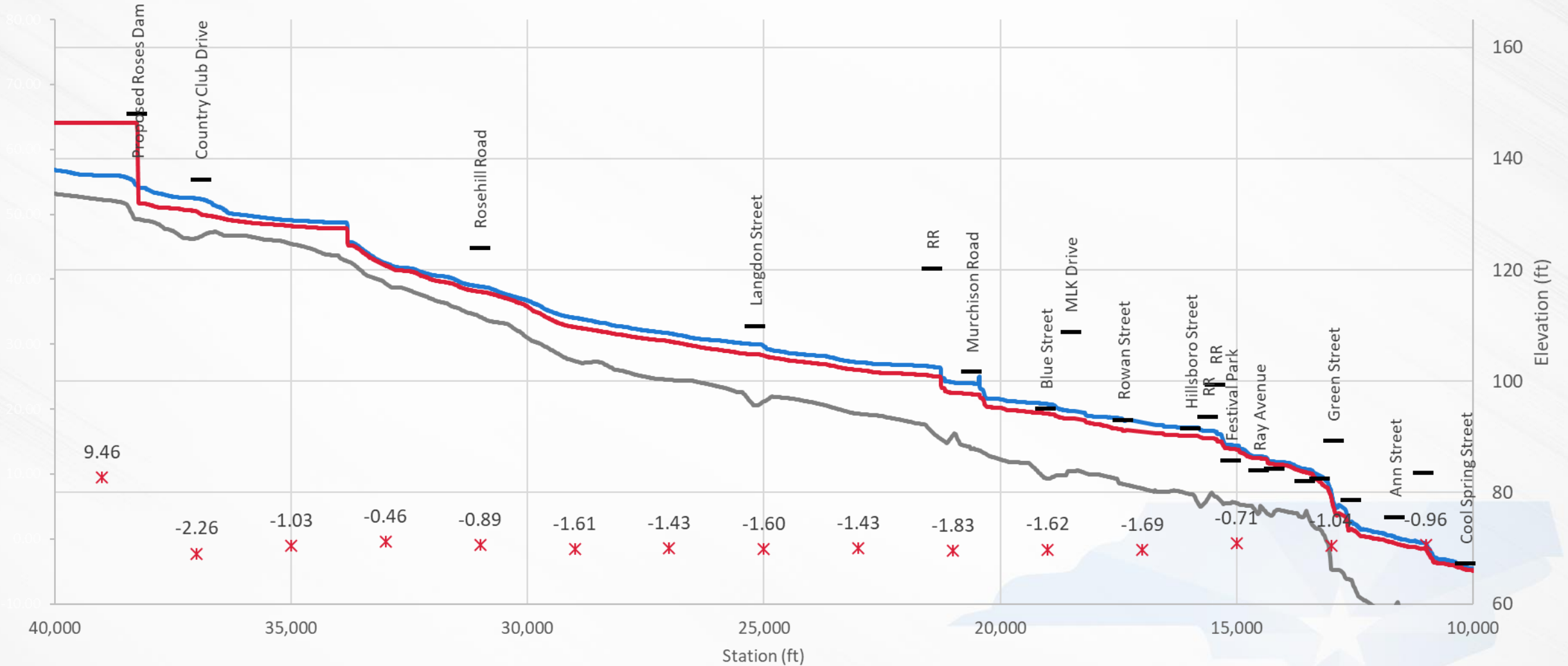
 Cross Creek

 Cross Creek Watershed Boundary

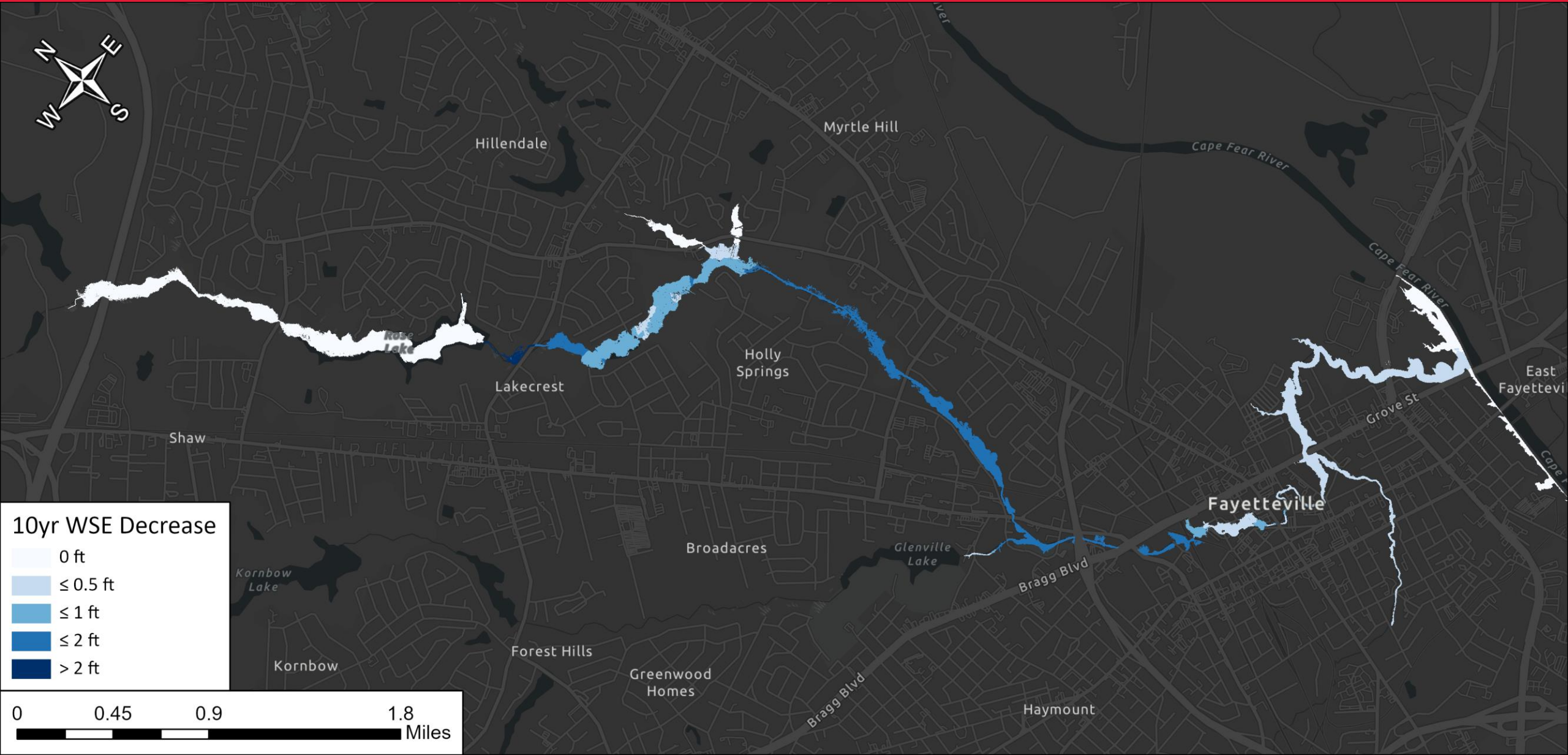




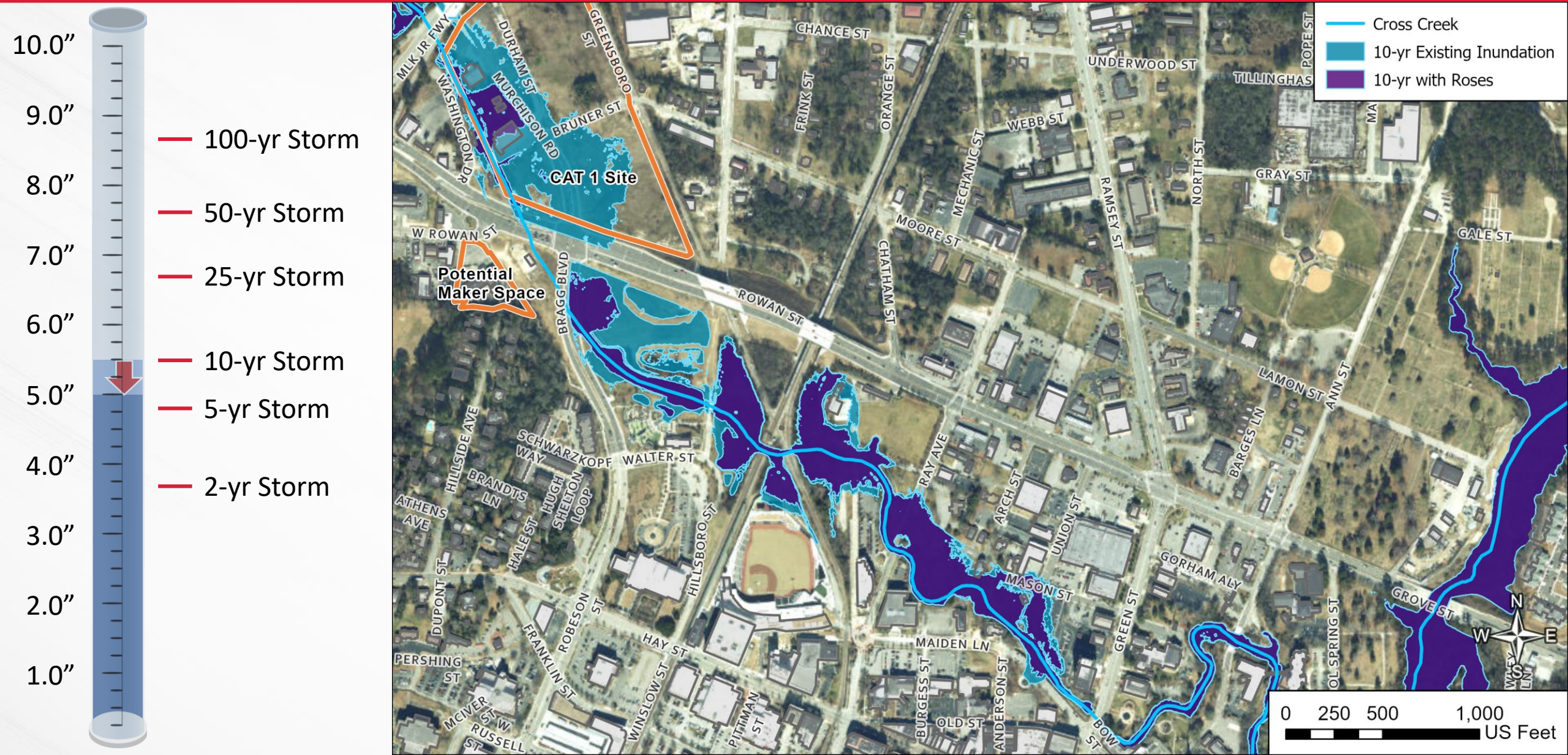
10-yr Storm Profile

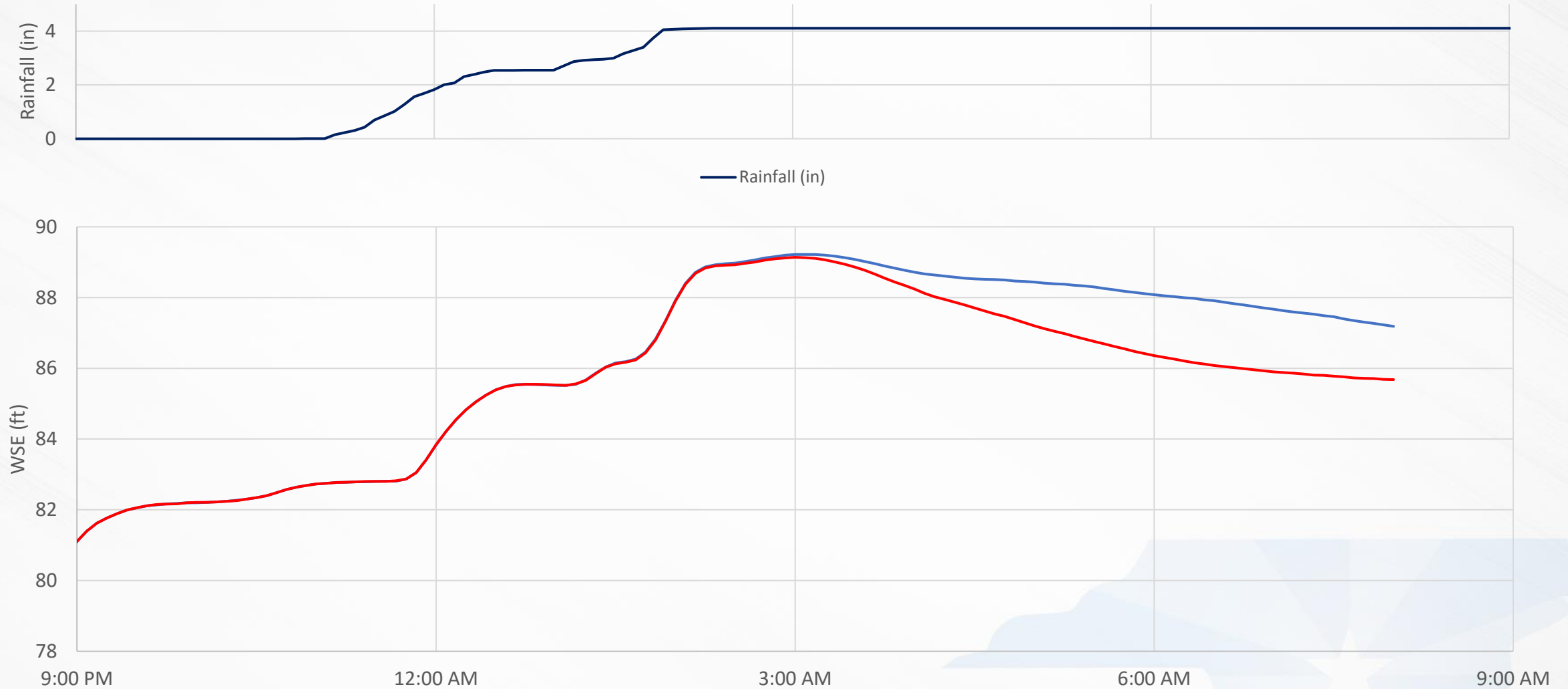


— Creek Crossings
 — Ground
 — Existing 10-yr
 — Roses 10-yr
 x Difference



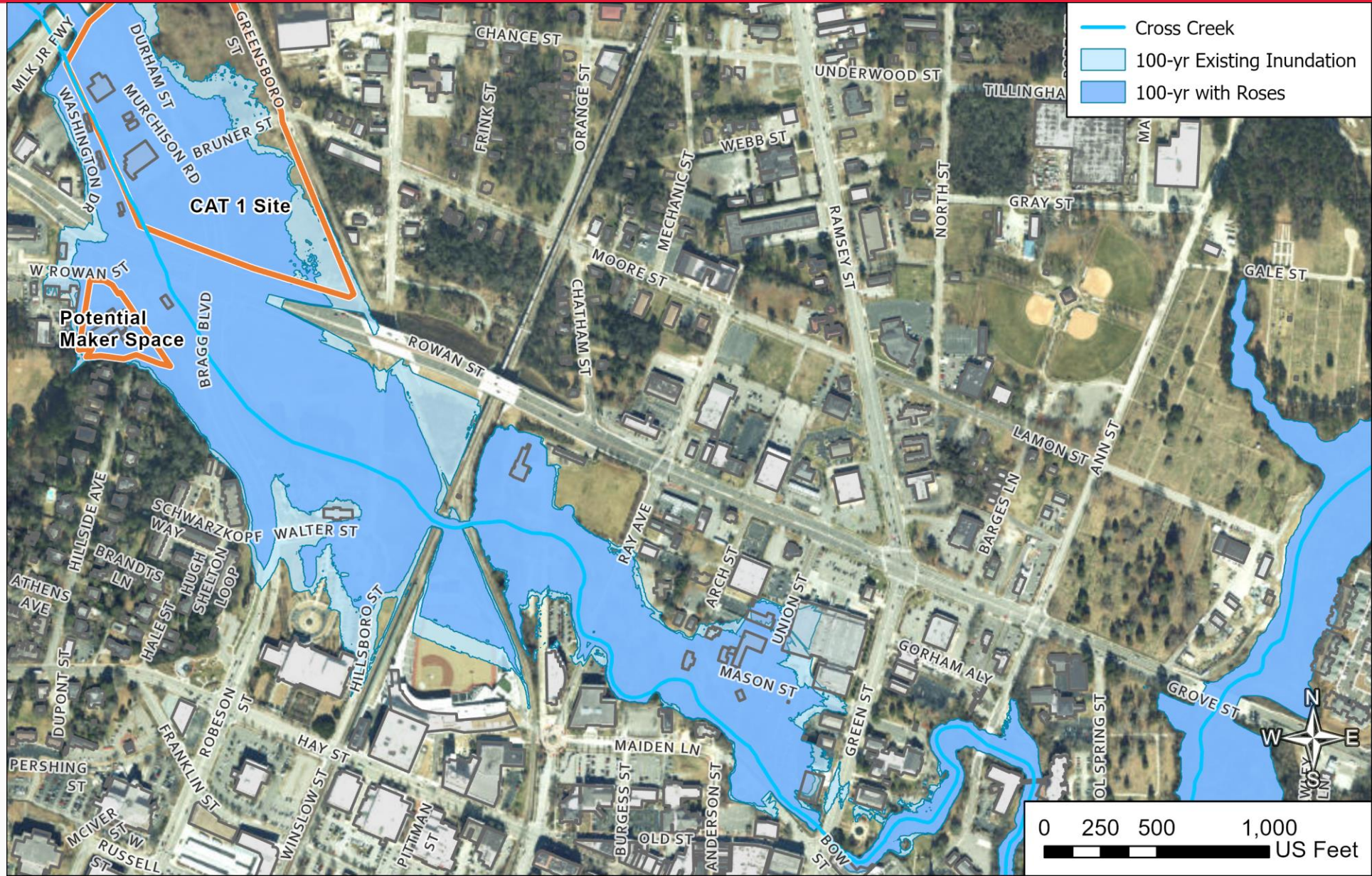
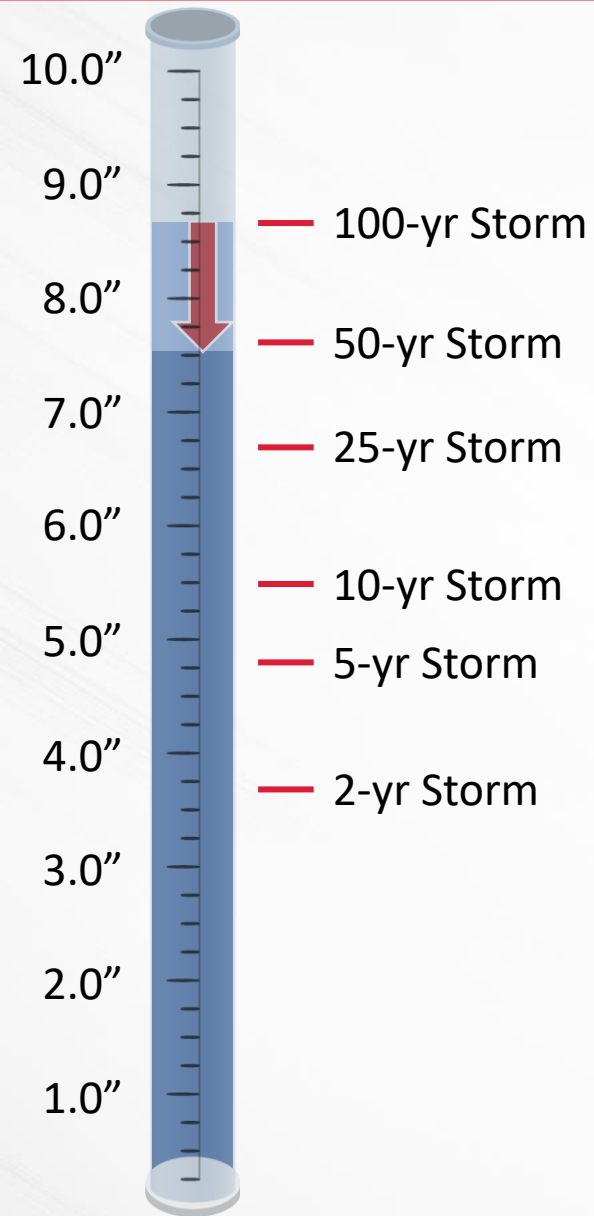
10-yr Roses Lake Impact





Roses Lake doesn't change the peak flood elevation but reduces the duration of flooding for this event

100-yr Roses Lake Impact





Key Advantages

- Leverages existing infrastructure
- Largely passive operation
- Reduces flood depth, extent, and duration for some events
- Could offset increased flows from other improvements

Key Limitations






- Doesn't address runoff closer to downtown
- Limited benefits for larger storm events

Co-Benefits

- Ecological and aesthetic amenities

Key Next Step

- Preliminary design

Cost	
Property Acquisition	
Operations and Maintenance	
Flood Reduction	
Co-Benefits	

Planning Level Cost: ~\$10M

Prelim PV Damage Reduction: \$7M

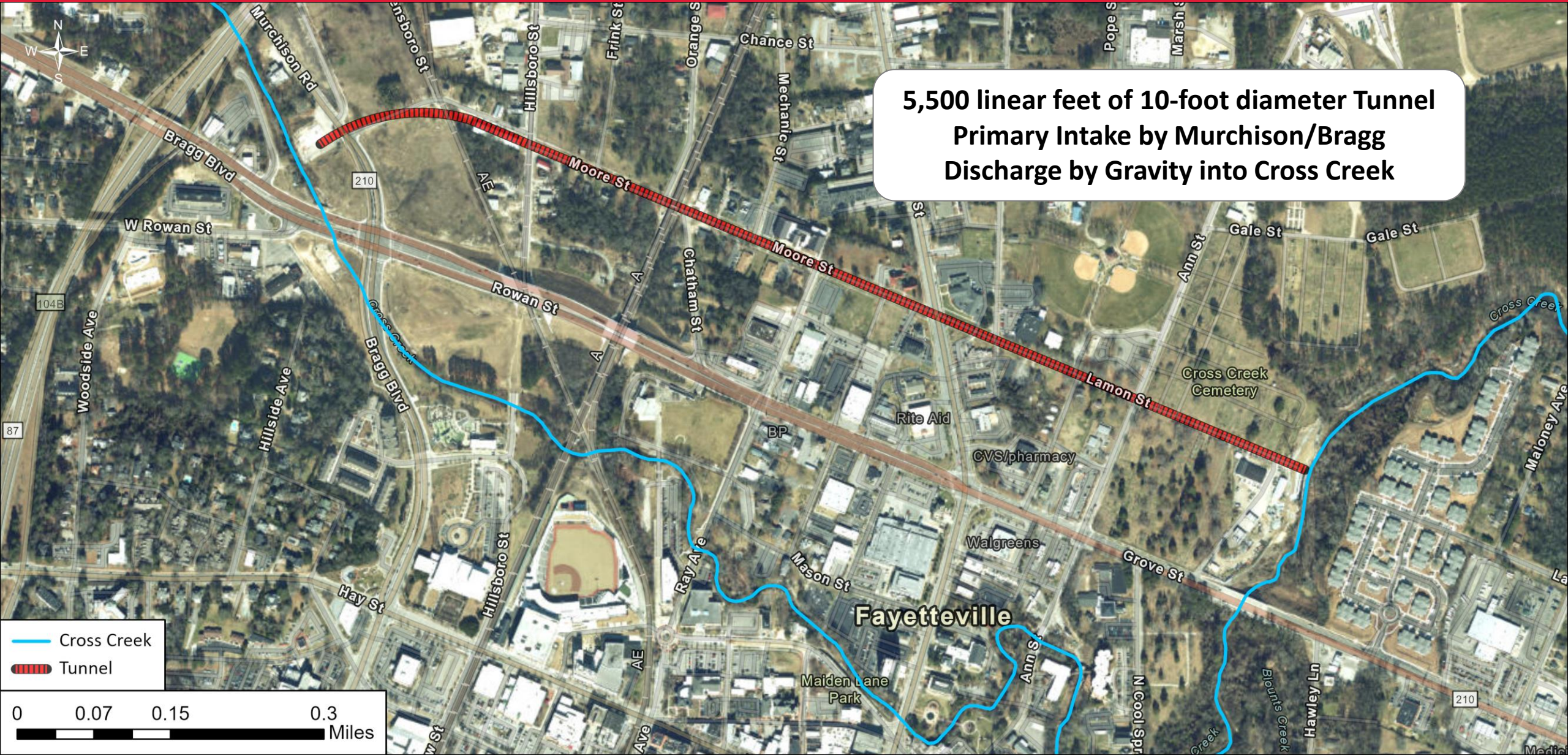
Prelim Benefit Cost Ratio: 0.75

Key Cost Considerations

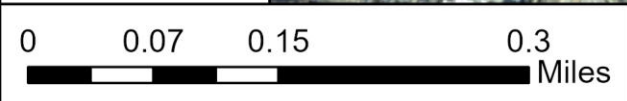
- Details of embankment replacement

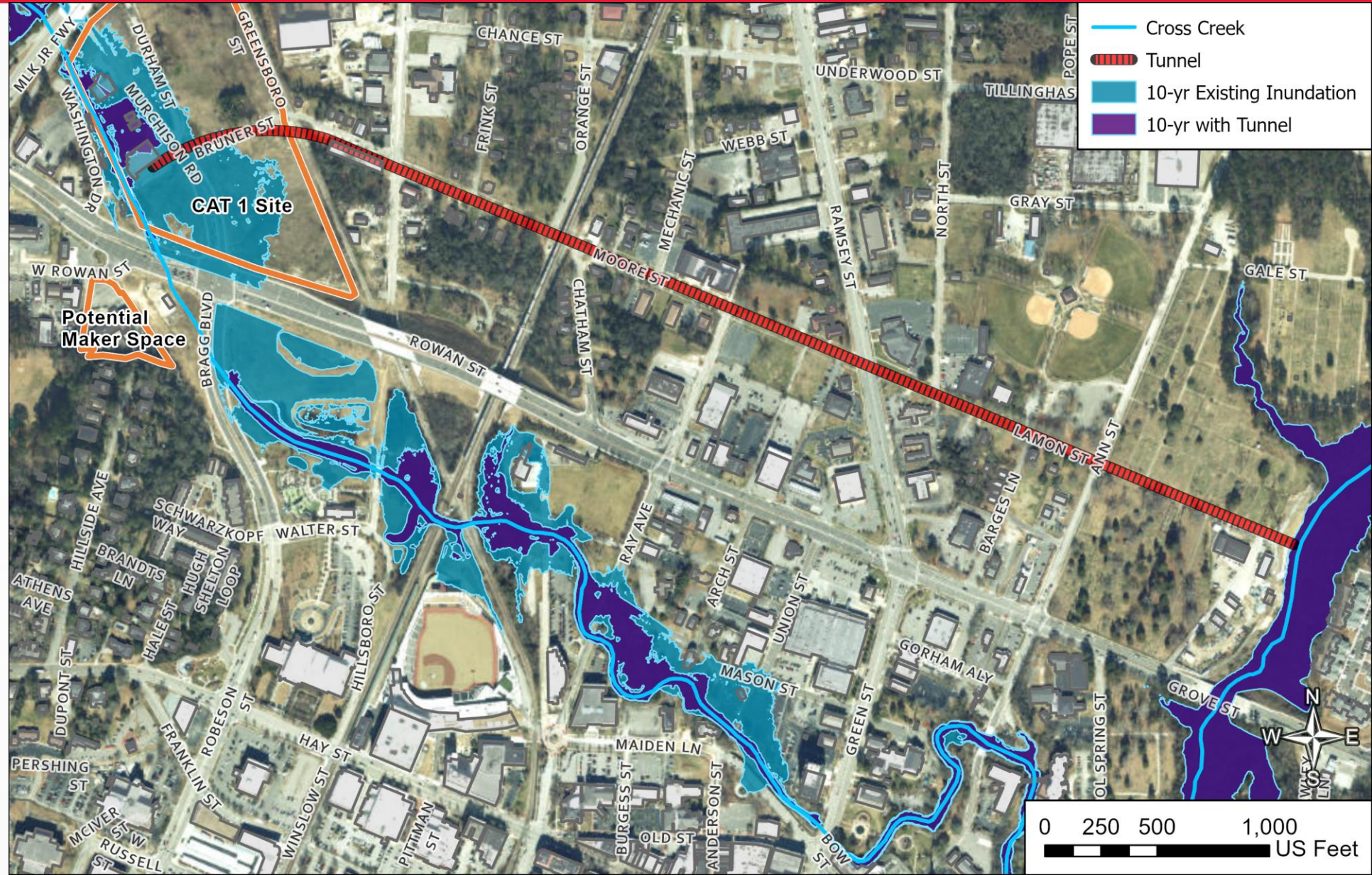
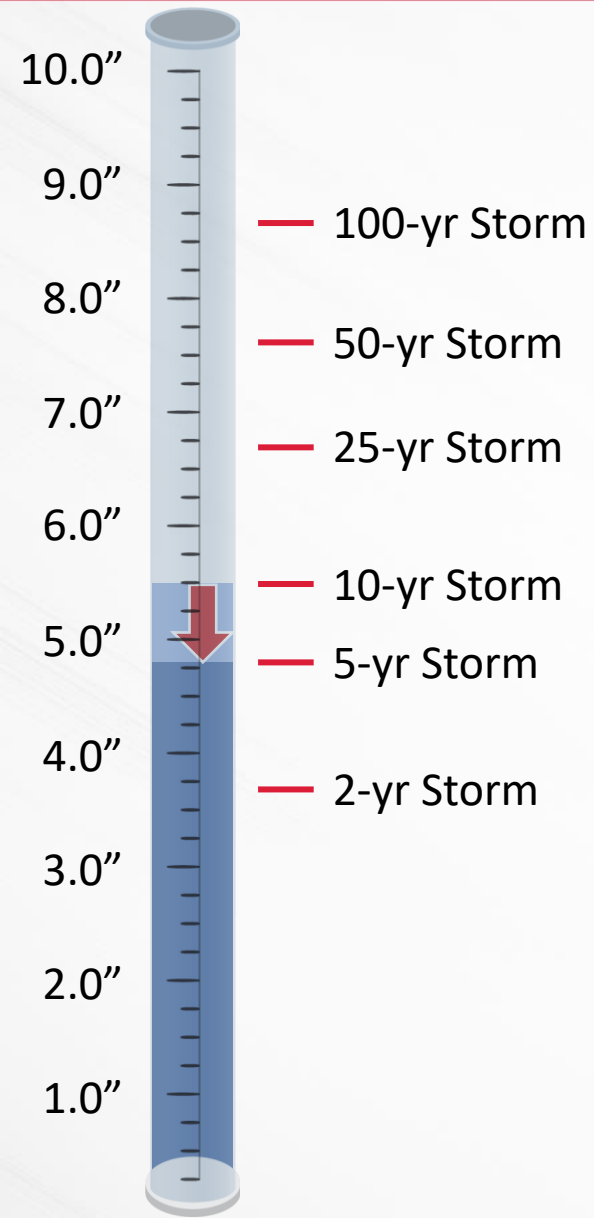


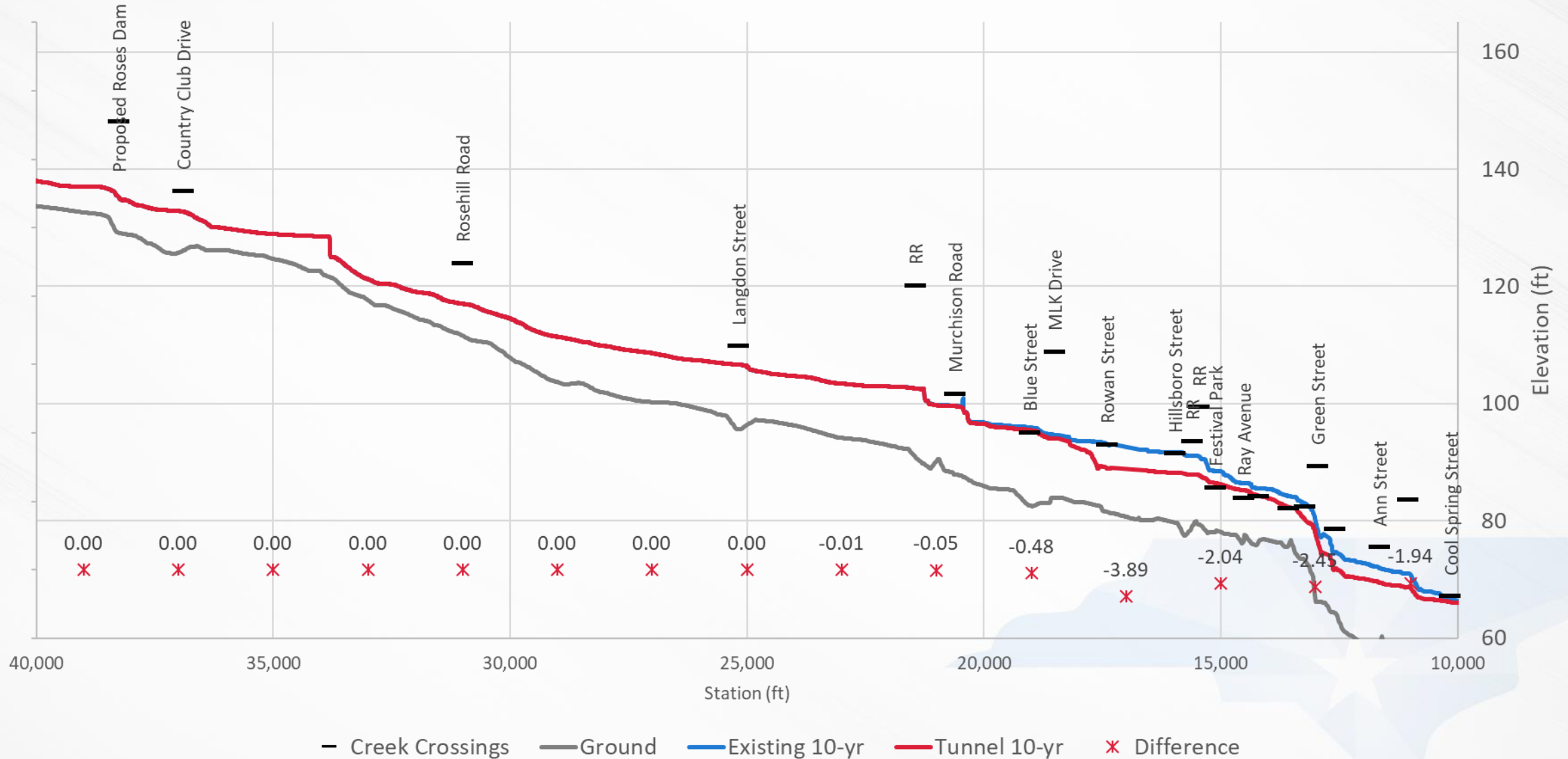
**5,500 linear feet of 10-foot diameter Tunnel
Primary Intake by Murchison/Bragg
Discharge by Gravity into Cross Creek**

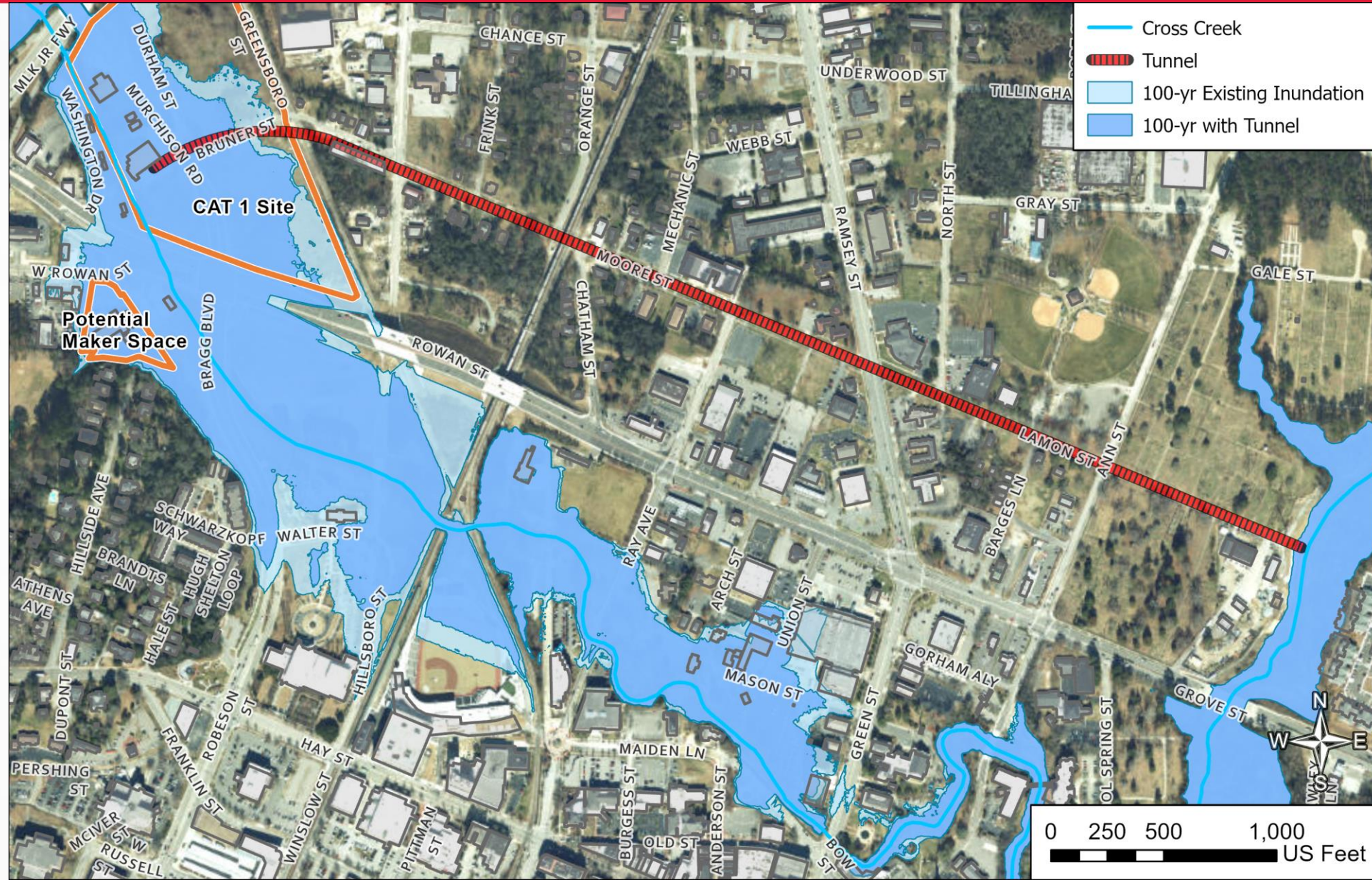
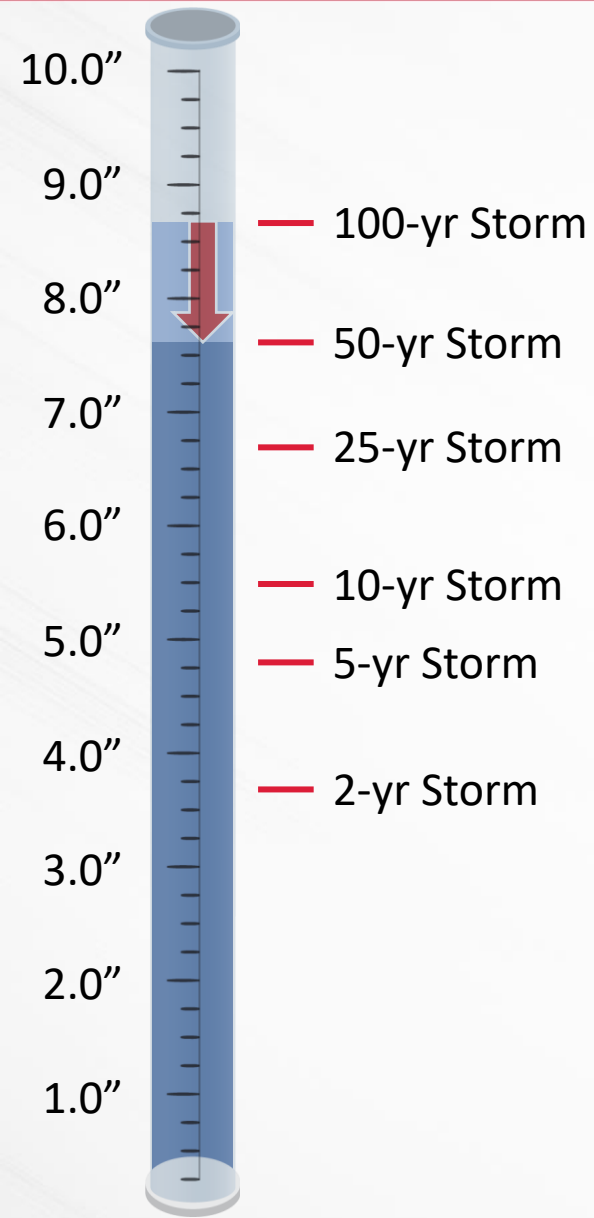


 Cross Creek
 Tunnel











Key Advantages

- Minimal disruption to downtown
- Diverts flow around worst flooding concerns
- Largely passive operation

Key Limitations






- Significant cost variability
- Doesn't address runoff from within downtown

Co-Benefits

- Few co-benefits

Key Next Step

- Geotech research
- Conceptual design and detailed hydraulic sizing

Cost	
Property Acquisition	
Operations and Maintenance	
Flood Reduction	
Co-Benefits	

Planning Level Cost: ~\$100M

Prelim PV Damage Reduction: \$6M

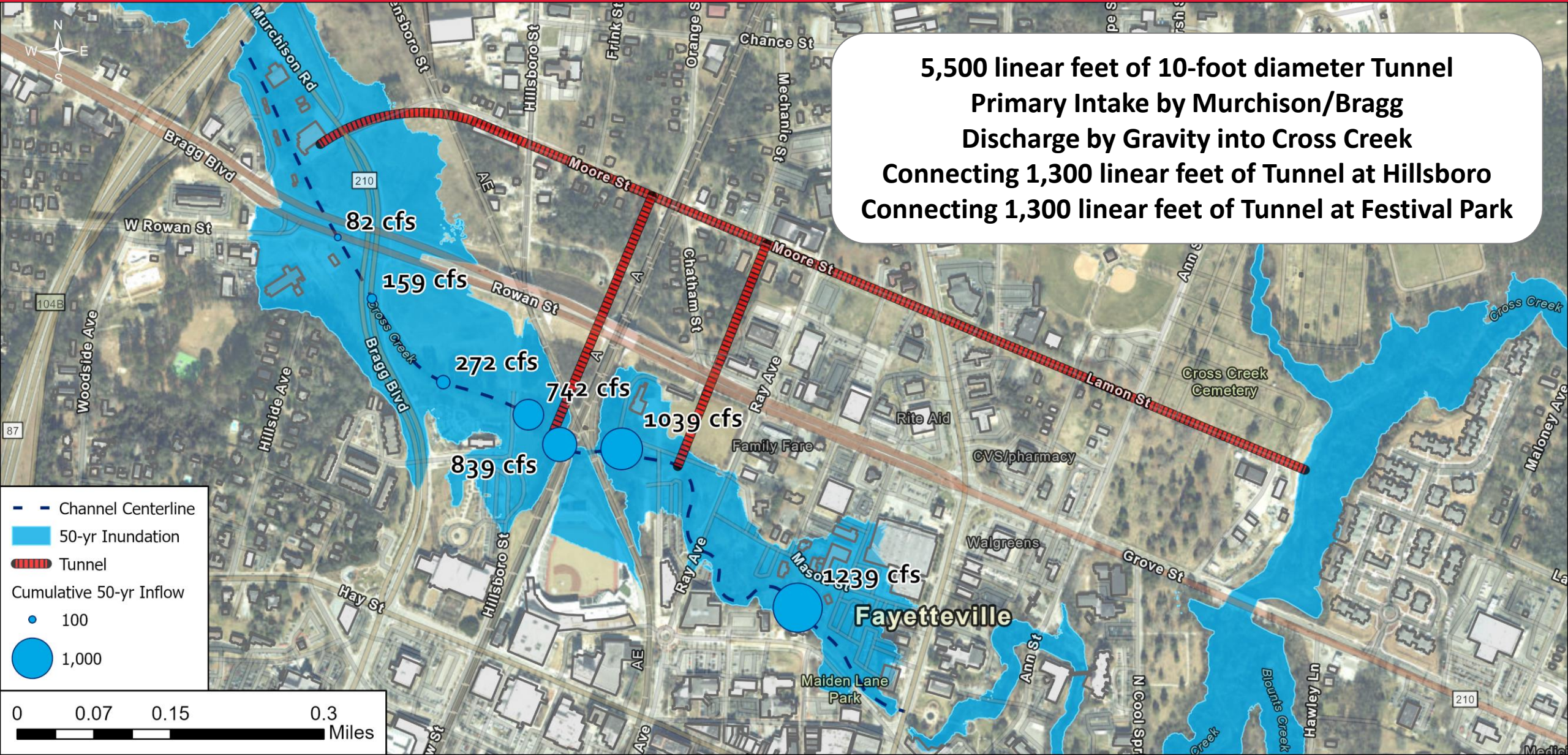
Prelim Benefit Cost Ratio: 0.06

Key Cost Considerations

- Geotechnical conditions
- Details of intake and discharge structures



5,500 linear feet of 10-foot diameter Tunnel
 Primary Intake by Murchison/Bragg
 Discharge by Gravity into Cross Creek
 Connecting 1,300 linear feet of Tunnel at Hillsboro
 Connecting 1,300 linear feet of Tunnel at Festival Park





Key Advantages

- Some disruption to downtown
- Diverts flow around worst flooding concerns
- Largely passive operation

Key Limitations






- Significant cost variability

Co-Benefits

- Few co-benefits

Key Next Step

- Geotech research
- Conceptual design and detailed hydraulic sizing

Cost	
Property Acquisition	
Operations and Maintenance	
Flood Reduction	
Co-Benefits	



Key Advantages

- Target at key problem area(s)
- Flexibility in routing discharge
- Site-scale options

Key Limitations






- Significant ongoing O&M
- Requires discharge routing

Co-Benefits

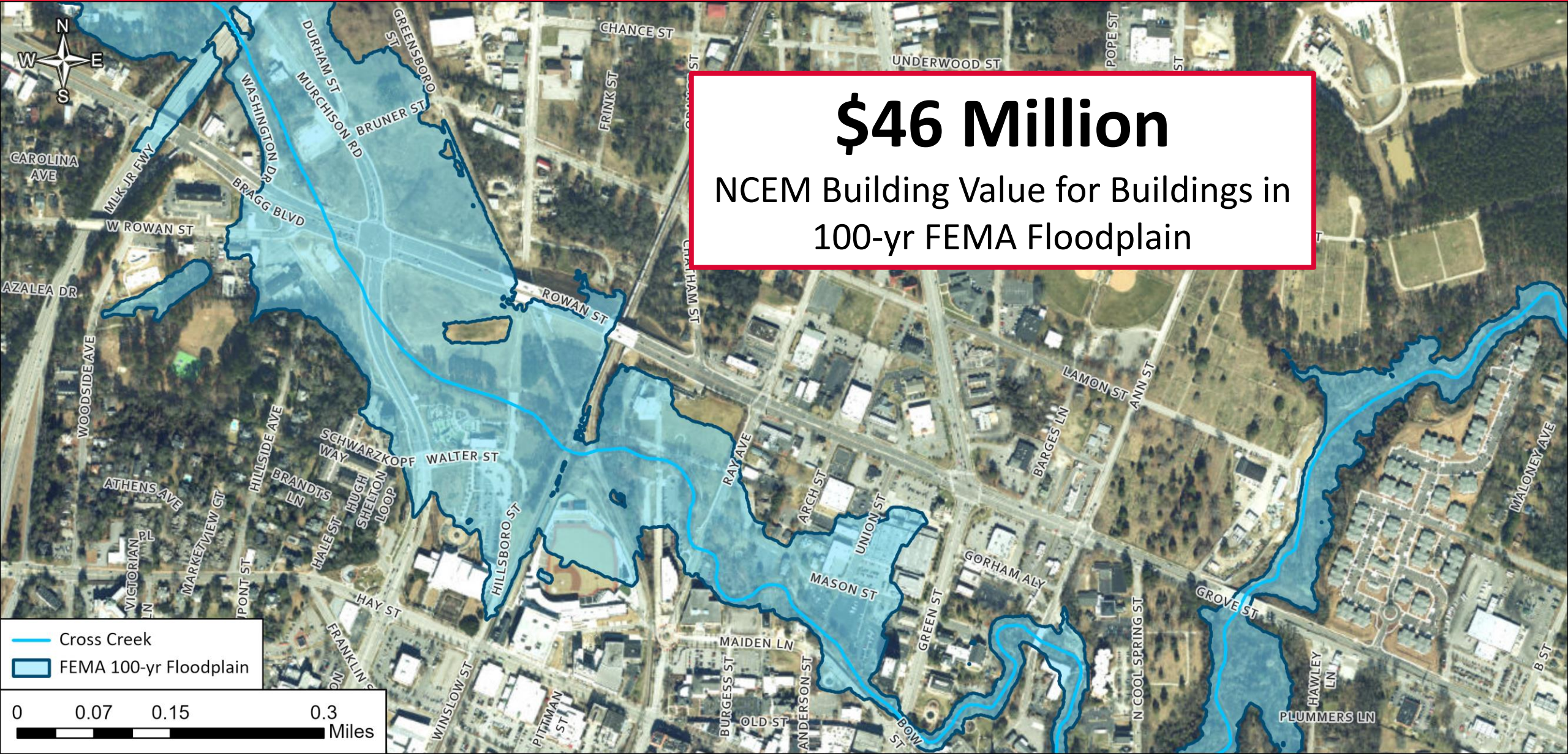
- Few co-benefits

Key Next Step

- Not recommended to advance

Cost	
Property Acquisition	
Operations and Maintenance	
Flood Reduction	
Co-Benefits	





Key Advantages

- No proposed infrastructure required
- Removes buildings from flood risk
- Could serve as a precursor to channel improvements

Key Limitations






- Property acquisition and building impacts
- Reduction in tax base for affected buildings

Co-Benefits

- Opportunity to incorporate recreational amenities

Key Next Steps

- Quantify specific building and property impacts

Cost	
Property Acquisition	
Operations and Maintenance	
Flood Reduction	
Co-Benefits	

Planning Level Cost
Property Acquisition

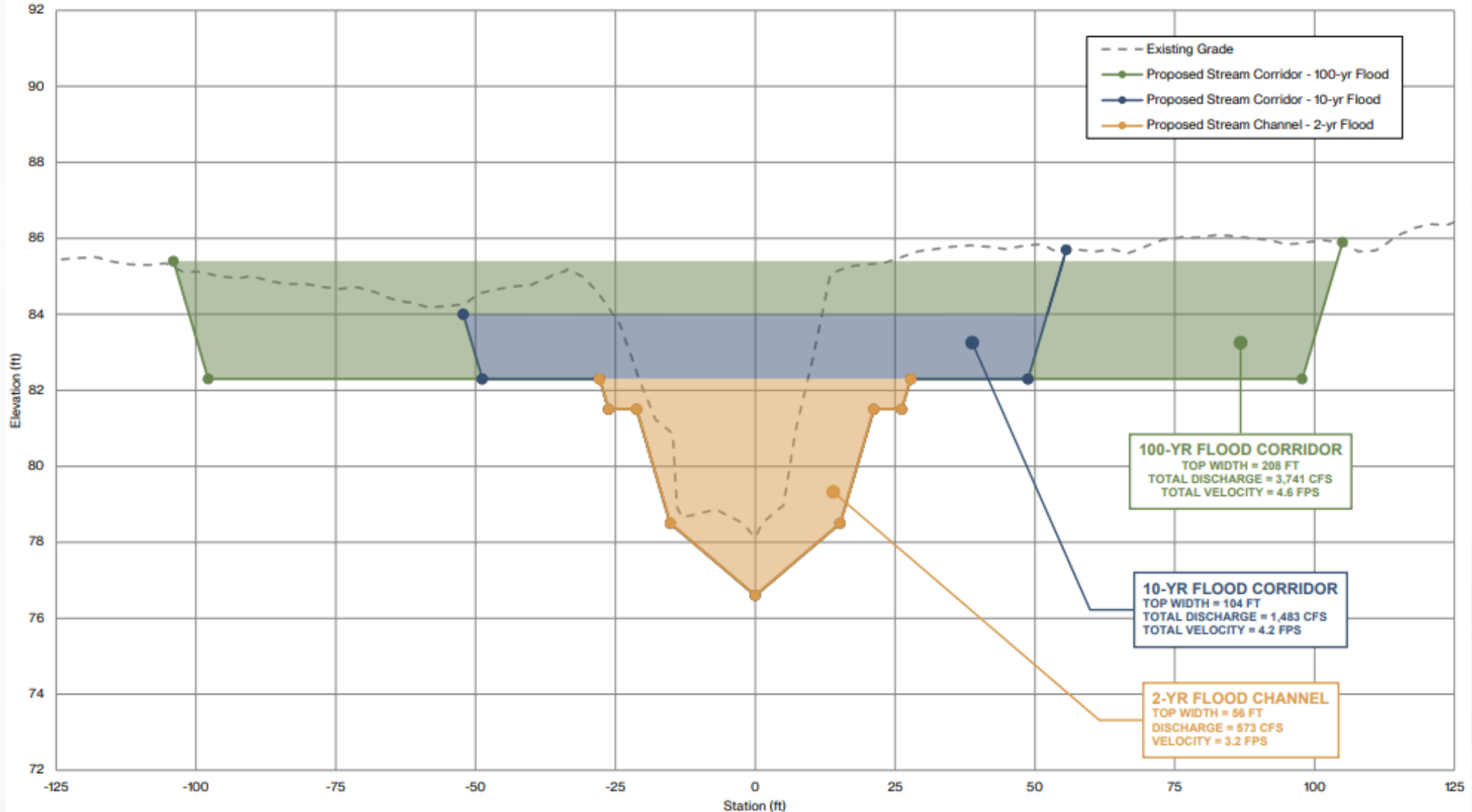
- Key Cost Considerations**
- What properties require full buy-out
 - True property acquisition cost

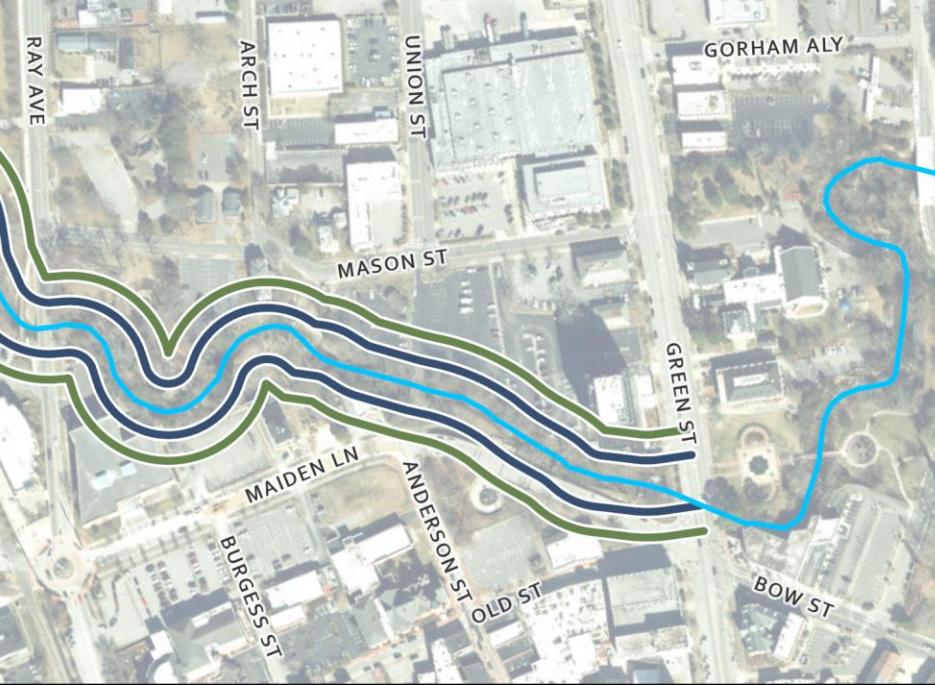
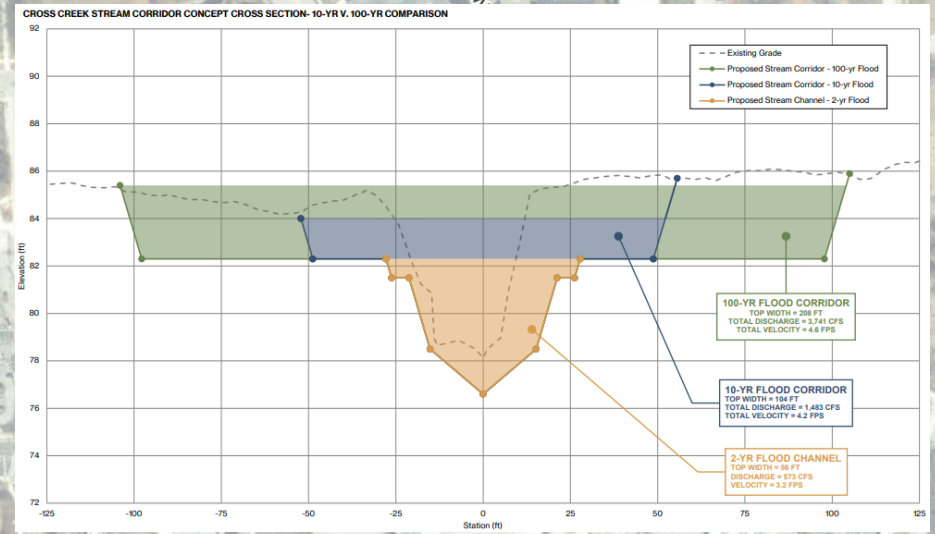
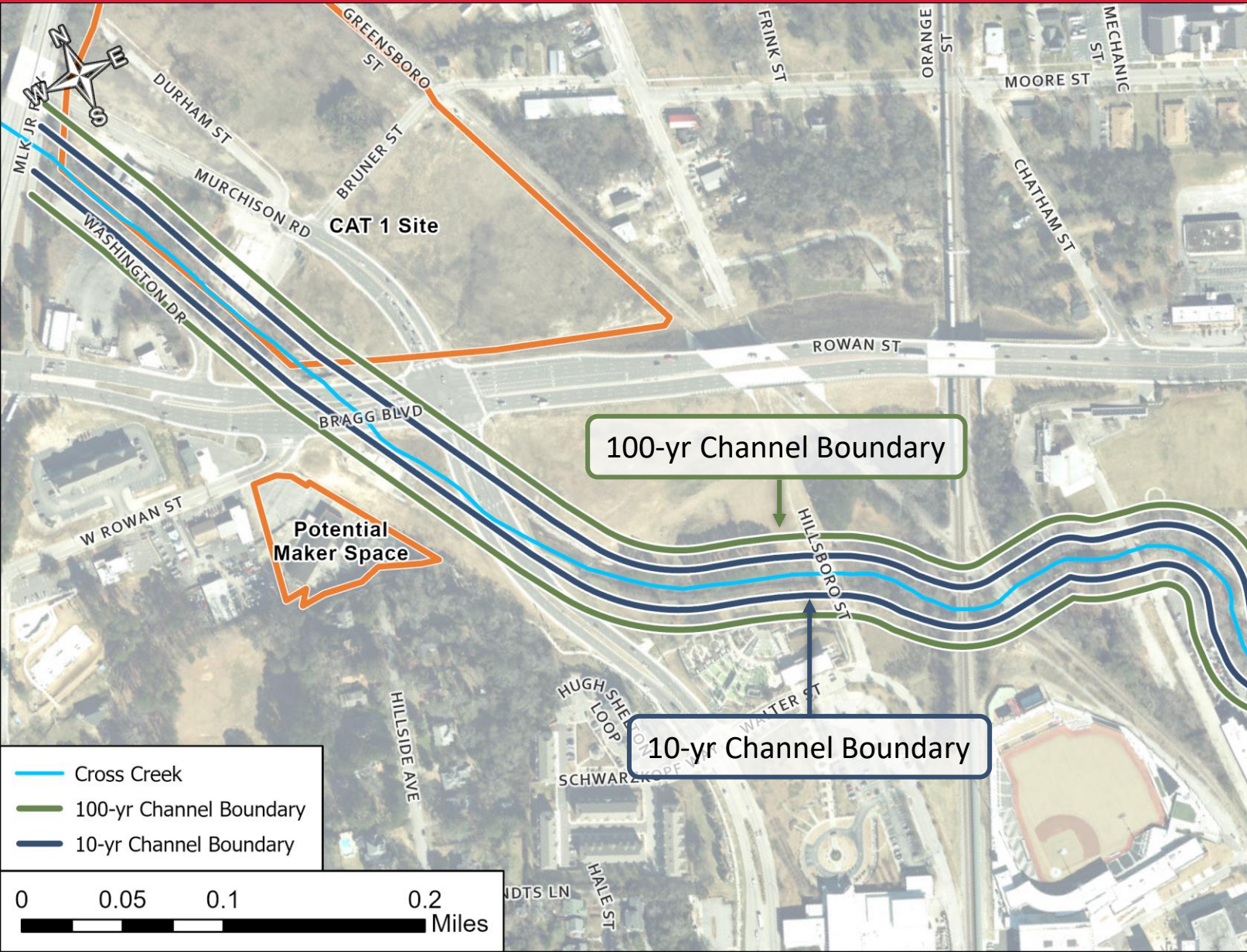
Downtown Channel Geometry

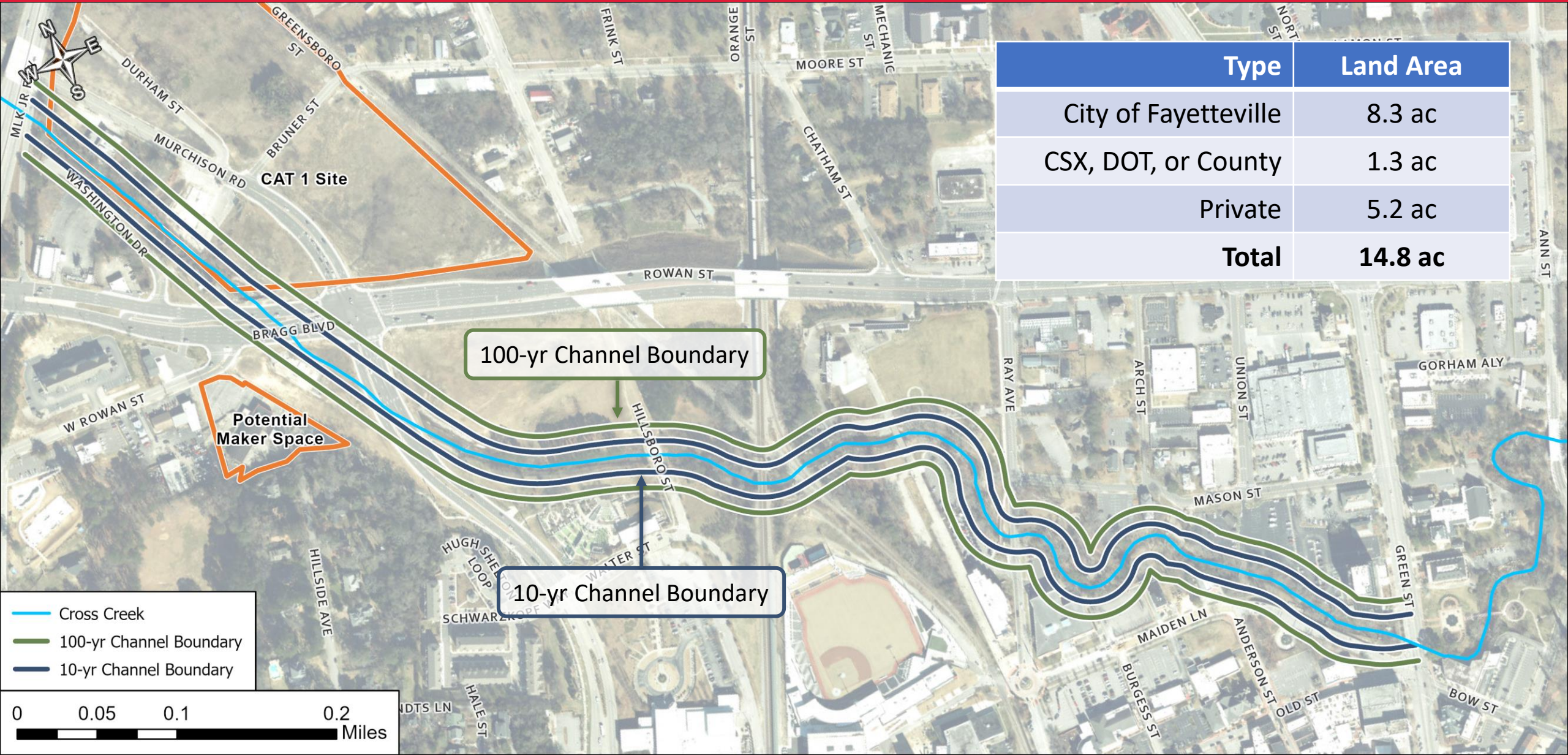




CROSS CREEK STREAM CORRIDOR CONCEPT CROSS SECTION- 10-YR V. 100-YR COMPARISON







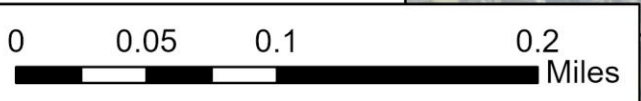
Type	Land Area
City of Fayetteville	8.3 ac
CSX, DOT, or County	1.3 ac
Private	5.2 ac
Total	14.8 ac

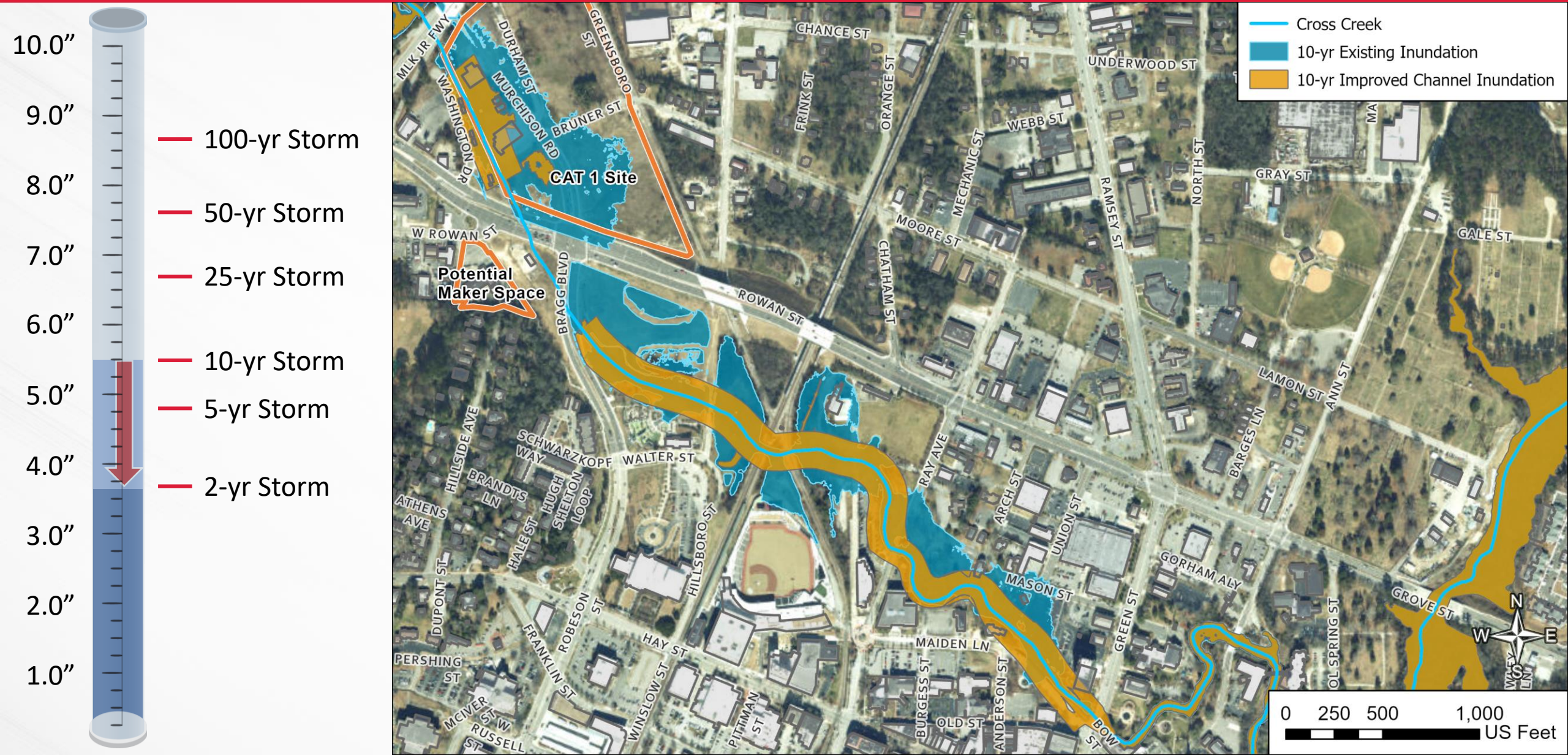
100-yr Channel Boundary

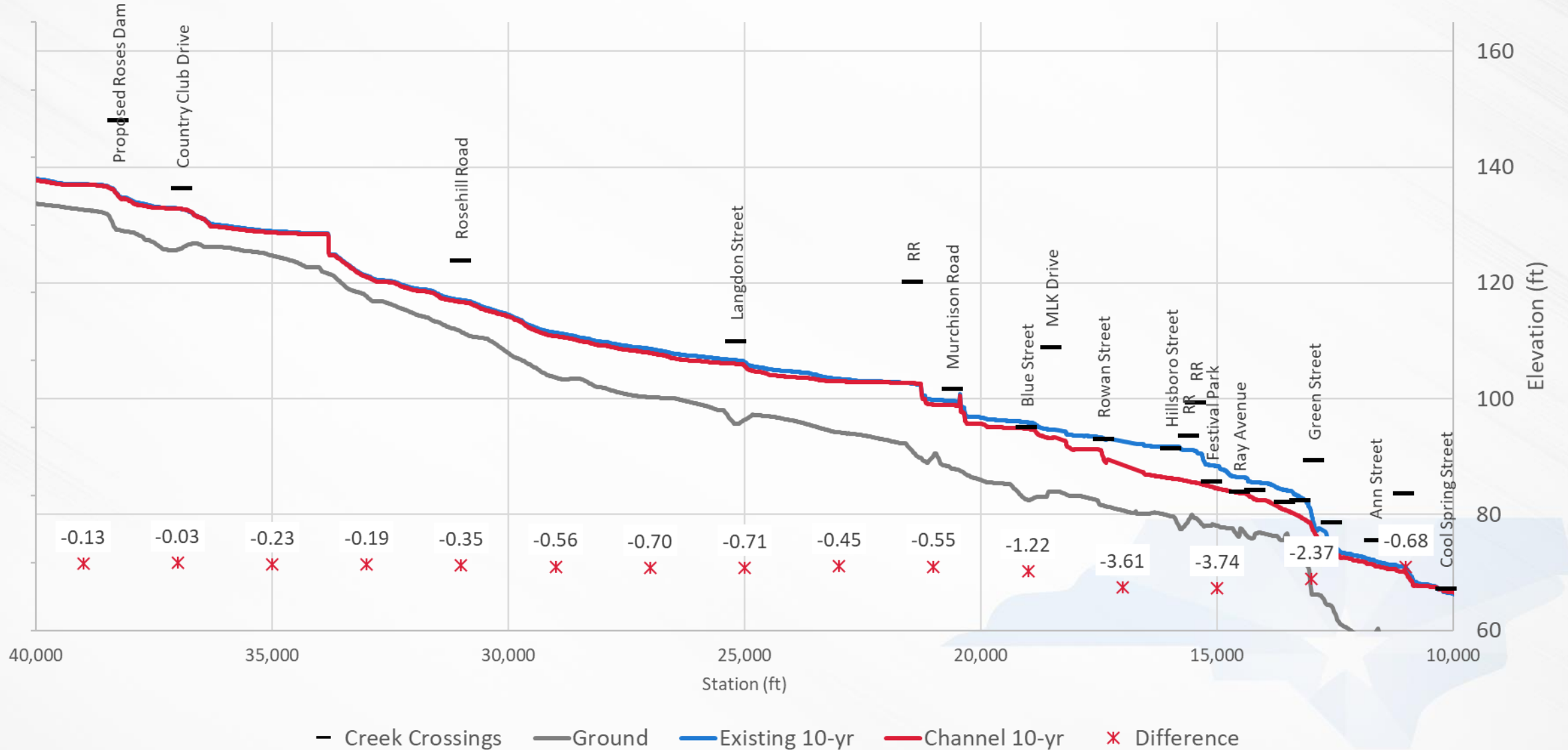
10-yr Channel Boundary

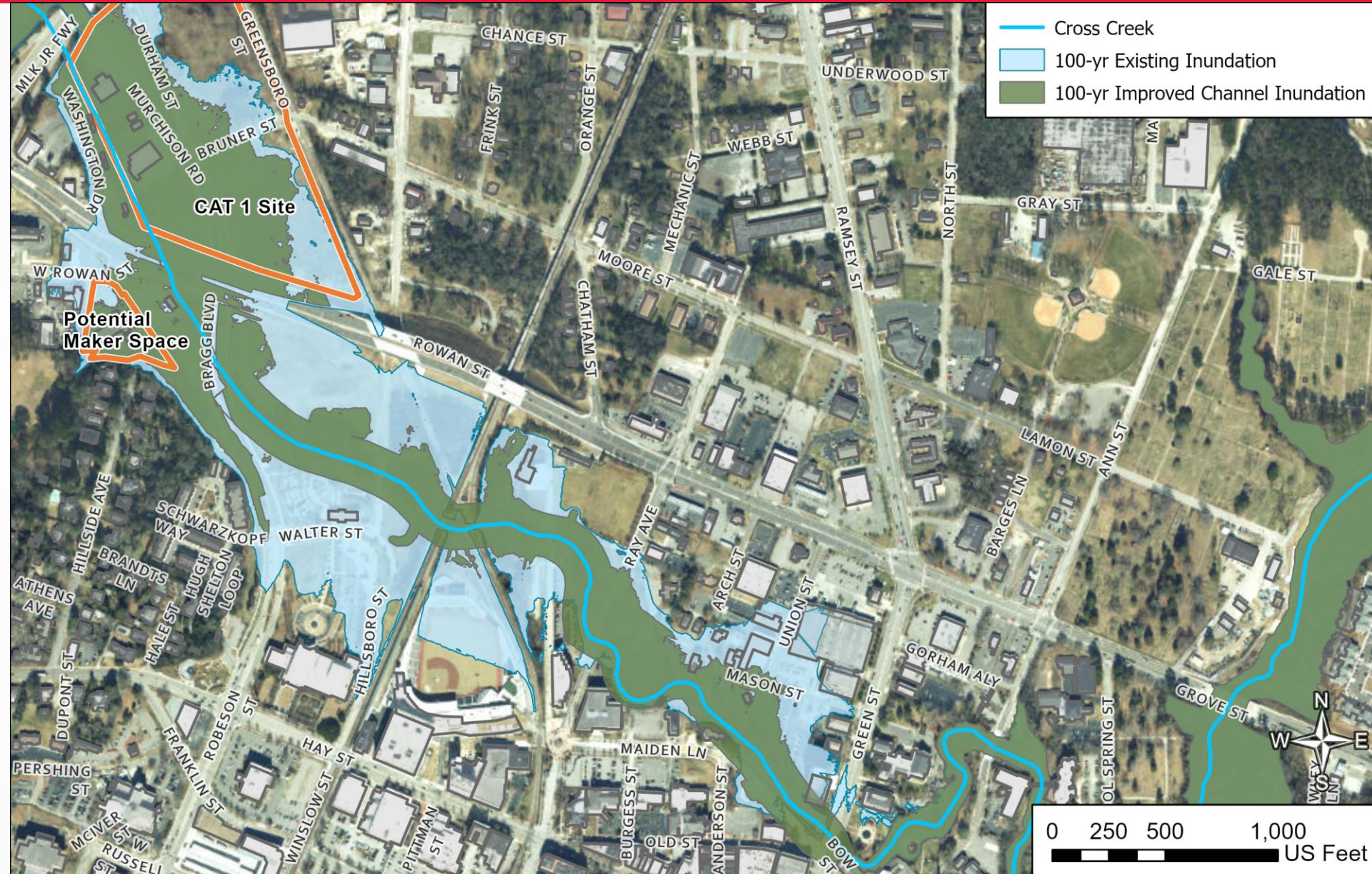
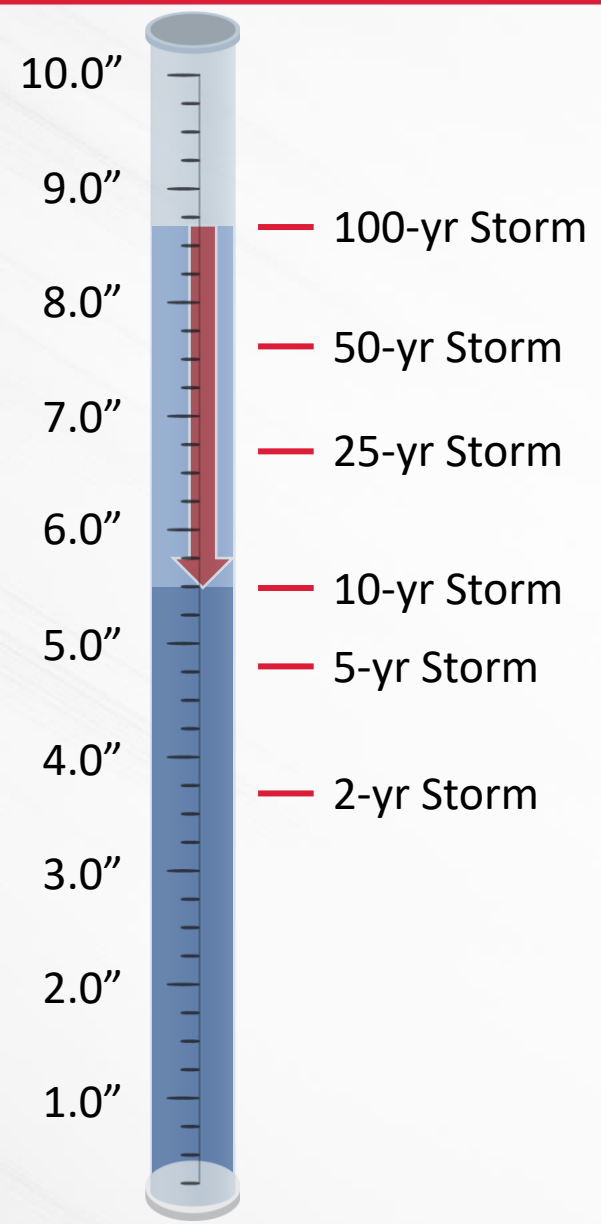
Potential Maker Space

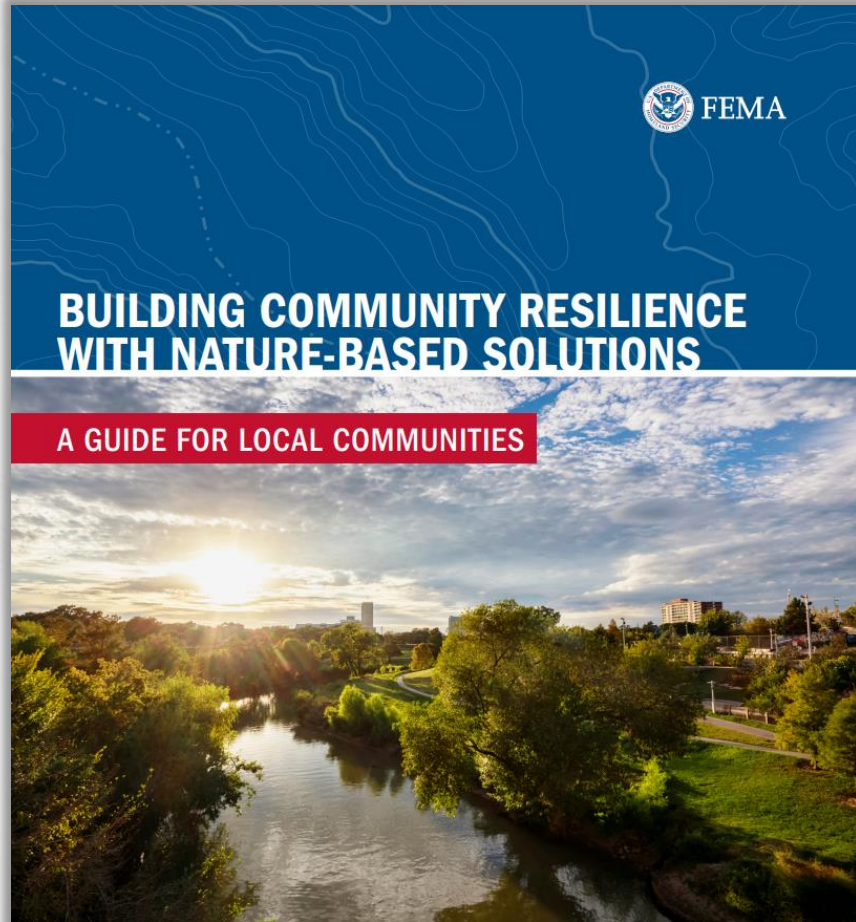
- Cross Creek
- 100-yr Channel Boundary
- 10-yr Channel Boundary













Key Advantages

- Directly address capacity limitation
- Scalable approach

Key Limitations






- Property acquisition and building impacts
- Requires multiple upsized culverts

Co-Benefits

- Opportunity to incorporate recreational amenities
- Potential water quality improvement

Key Next Steps

- Develop detailed alignment and grading
- Quantify specific building & property impacts

Cost	
Property Acquisition	
Operations and Maintenance	
Flood Reduction	
Co-Benefits	

Planning Level Cost: ~\$50M + Property Acquisition

Prelim PV Damage Reduction: \$8M

Prelim Benefit Cost Ratio: 0.17




Key Cost Considerations

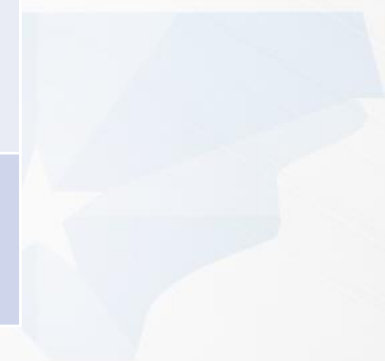
- Property acquisition along corridor
- Stream grading and restoration
- Culvert & bridge replacement

- Downtown flooding concerns significant with no simple solution
- Large-scale solutions are available and require further evaluation and planning
- Flood mitigation could coincide with other downtown improvements
- Options for incremental implementation



Primary System Summary

	Roses Lake Detention	Diversion Tunnel	Floodplain Buyout	Channel Improvements
Cost	 ~\$10M	 ~\$100M		 ~\$50M+
Property Acquisition				
Operations & Maintenance				
Flood Reduction				
Co-Benefits				

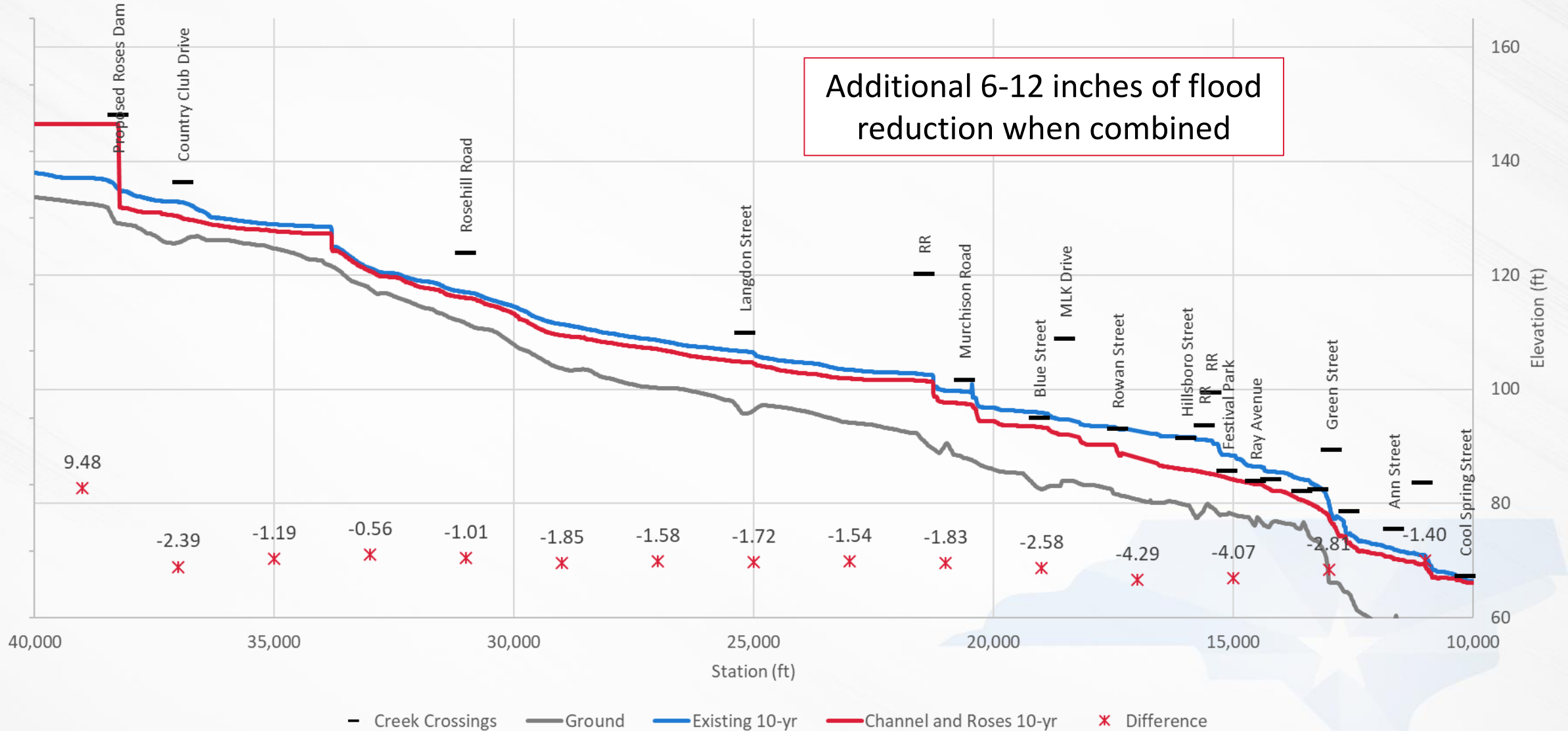


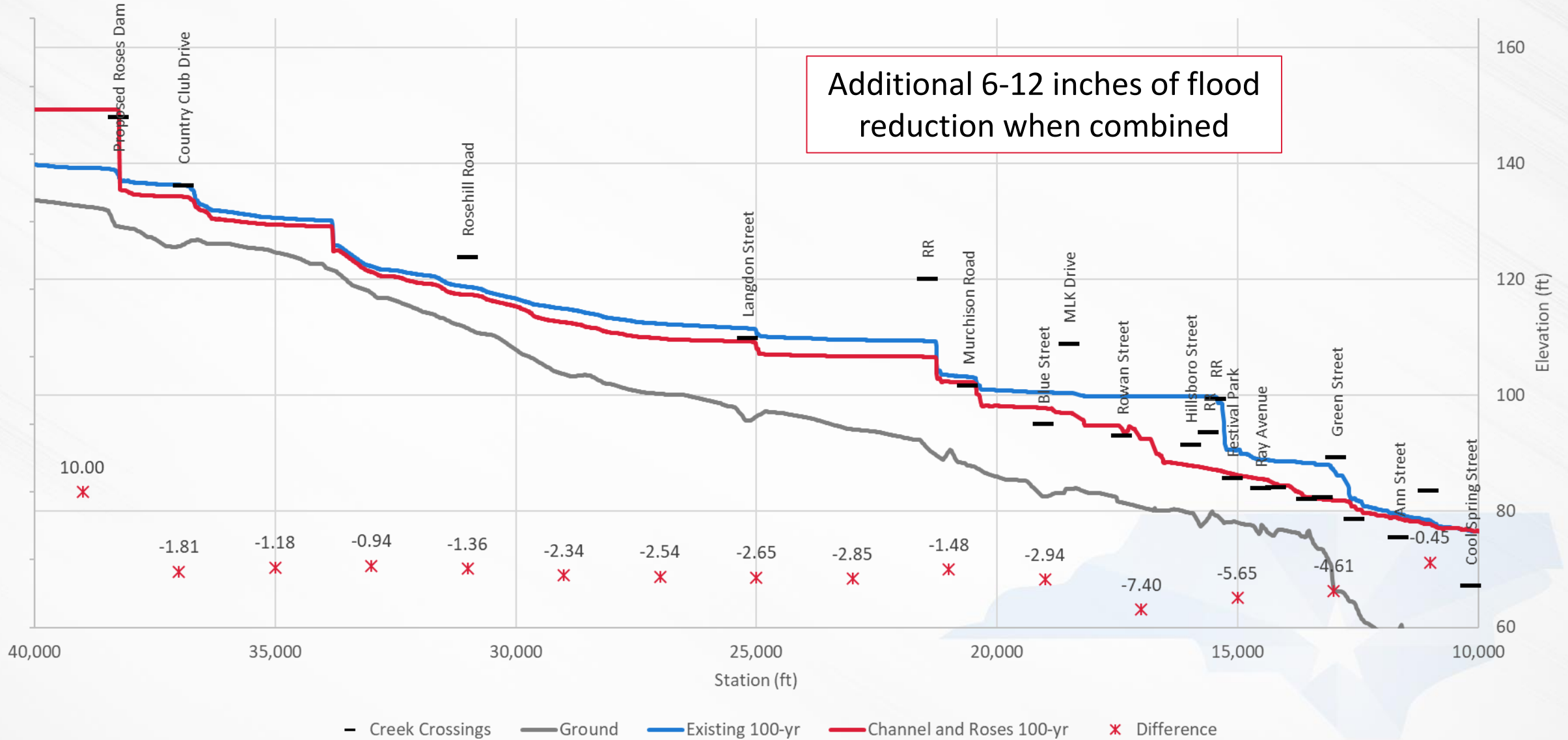
Roses Lake Detention

- Could be implemented in near term
- Cost is around \$10M
- Greatest benefits are upstream of downtown
- Does not fundamentally address flooding downtown
- Benefits depend on storm characteristics

Channel Improvement

- Likely 10+ years to implement
- Cost is around \$50M plus property acquisition
- Greatest benefits are downtown
- Flooding generally contained within new channel
- Opportunity to provide additional benefits beyond flood reduction





Roses Lake

- Conduct a more detailed benefit-cost analysis
- Advance concept into detailed design

Channel Improvement

- Develop advanced conceptual design
- Optimize geometry to minimize property impacts
- Establish project phasing options
- Assess eligibility for federal funding like BRIC
- Establish concept for greenway and other co-benefits



Options:

1. Staff seeks Council consensus to pursue funding sources to further develop advanced conceptual design for the Channel Improvement Option
2. Staff seeks Council consensus to pursue funding sources to continue to pursue Roses Lake as a dry detention option for potential flooding mitigation opportunities
3. Do not pursue funding sources for either the Channel Improvement or Roses Lake options

Staff Recommendation:

Staff recommends Council consensus to pursue funding sources for both the Channel Improvement and Roses Lake options



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FayettevilleNC.gov