

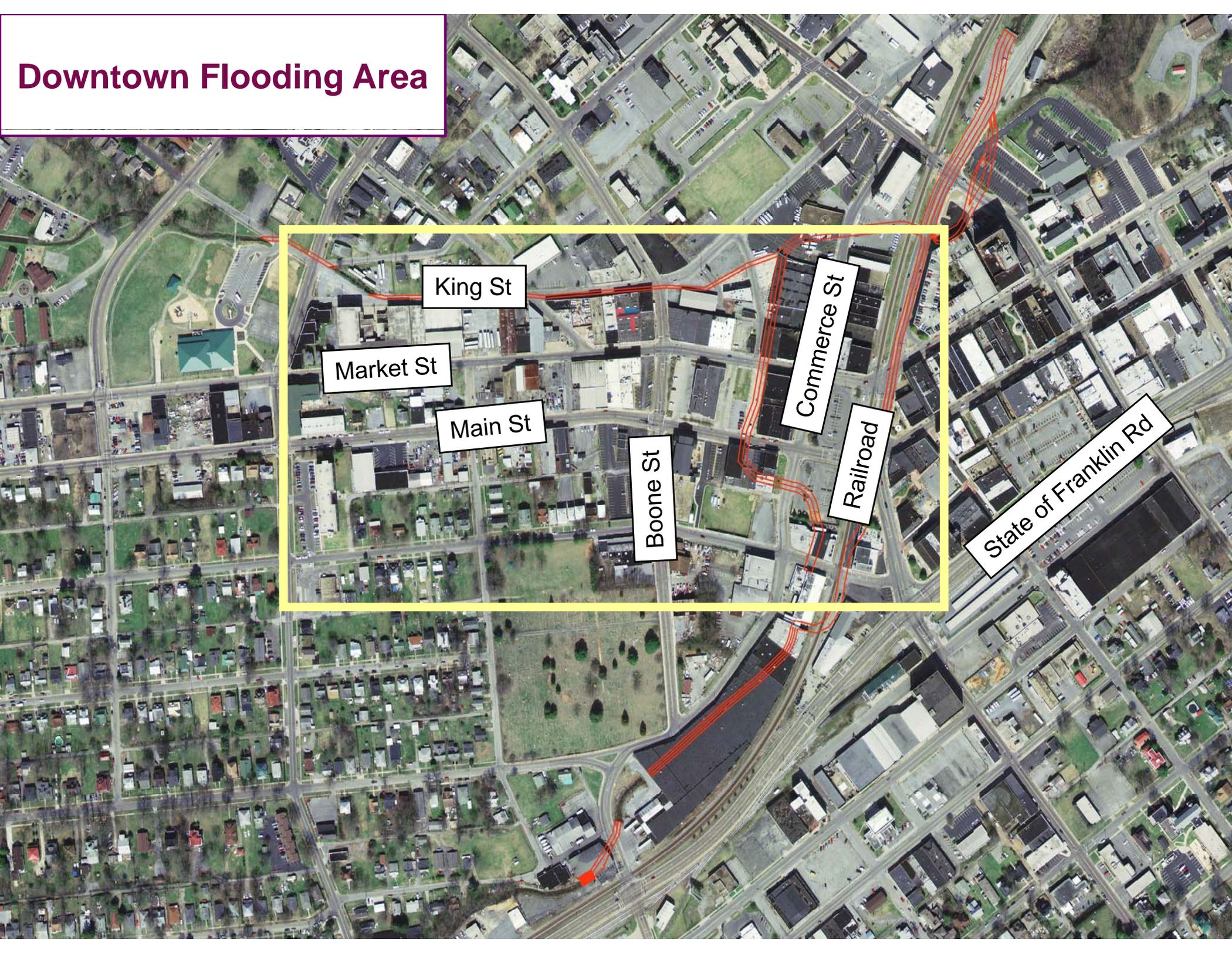
Downtown Drainage Improvements Study and Plan

Outline

- Downtown Flooding
- Concepts for Reducing Flooding
- Improvements Required to Significantly Reduce Flooding
- Redevelopment Concept
- Costs
- Questions and Comments

- Downtown Flooding

Downtown Flooding Area



King St

Market St

Main St

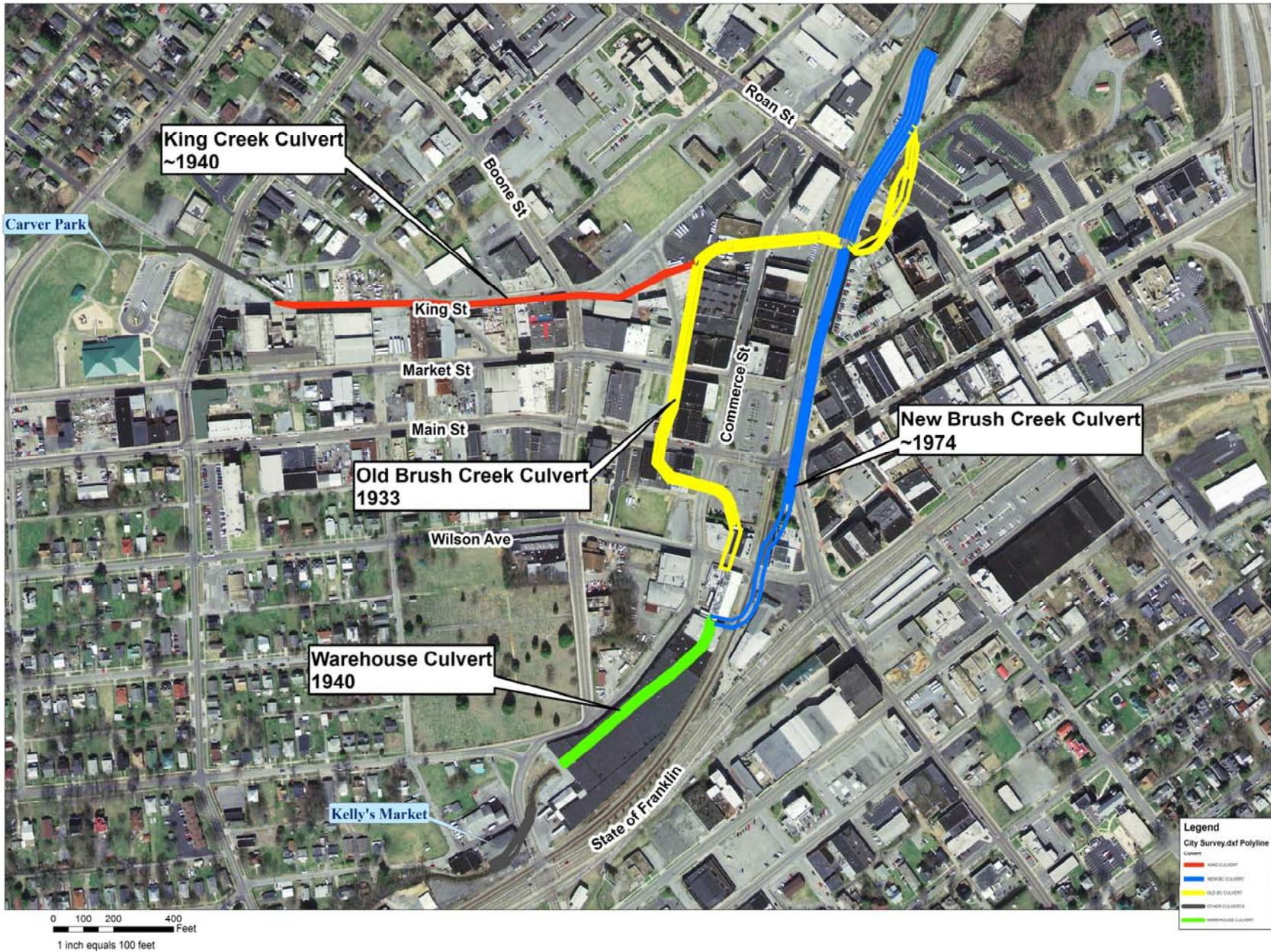
Boone St

Commerce St

Railroad

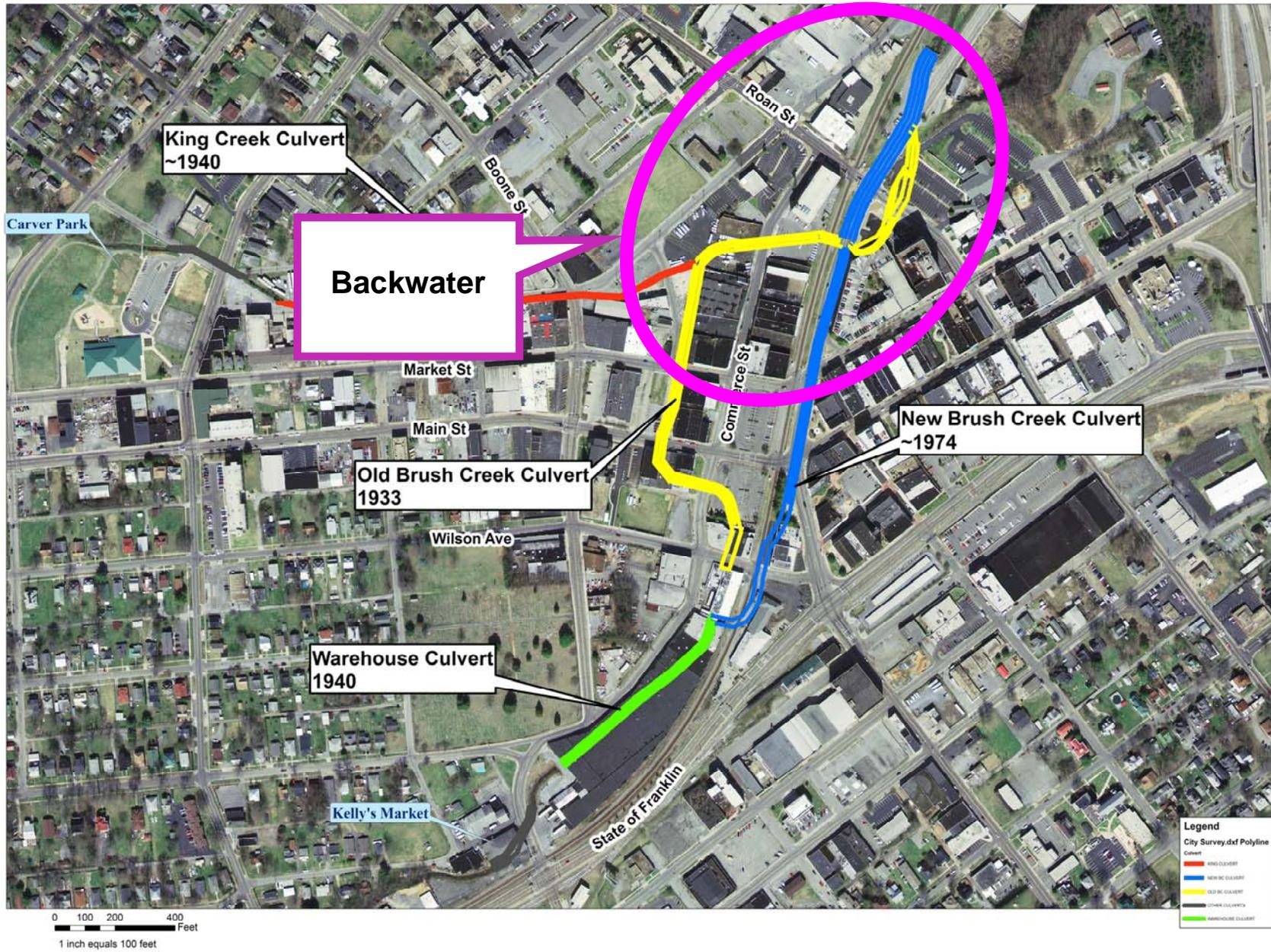
State of Franklin Rd

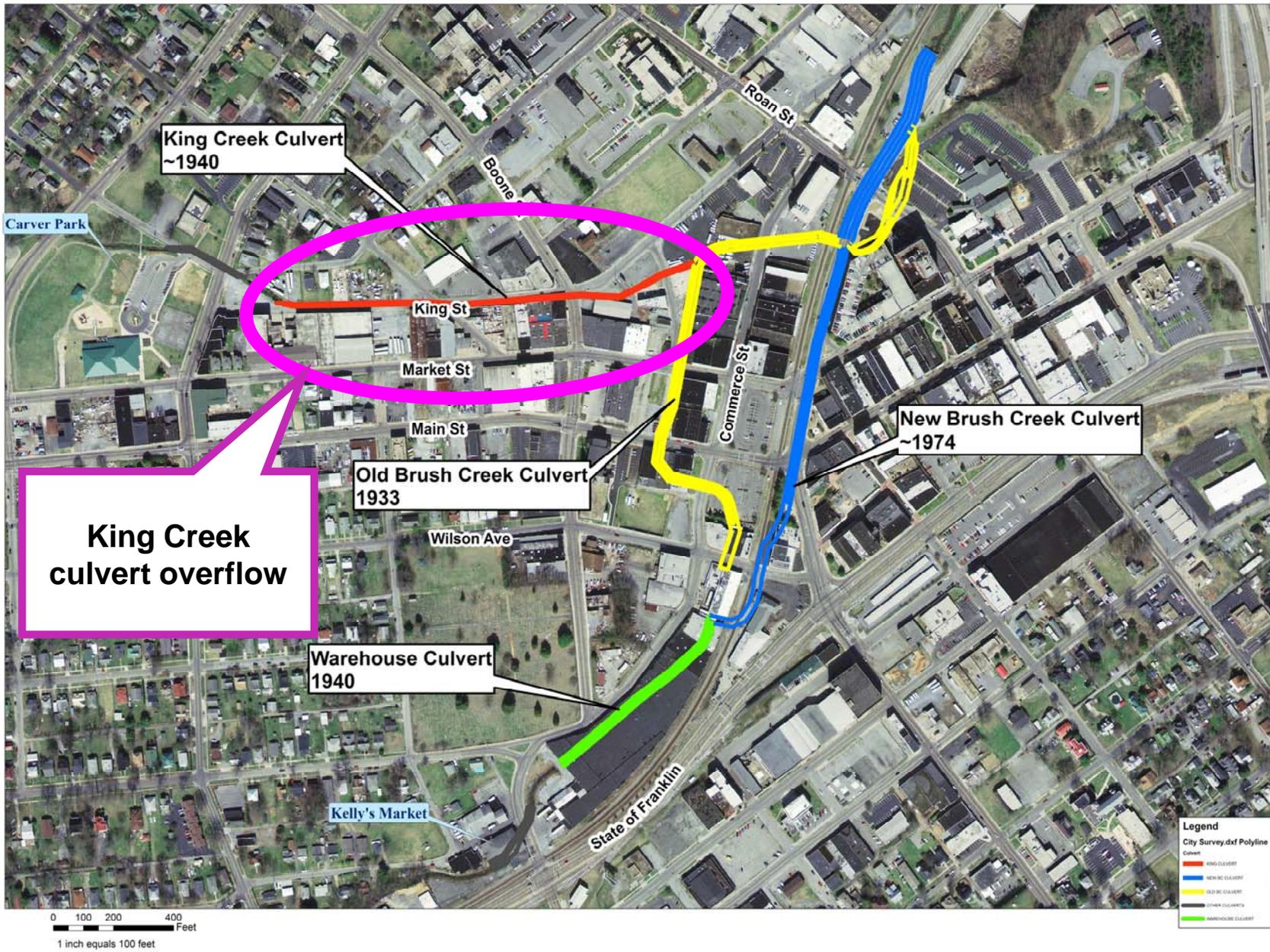
Current Drainage System



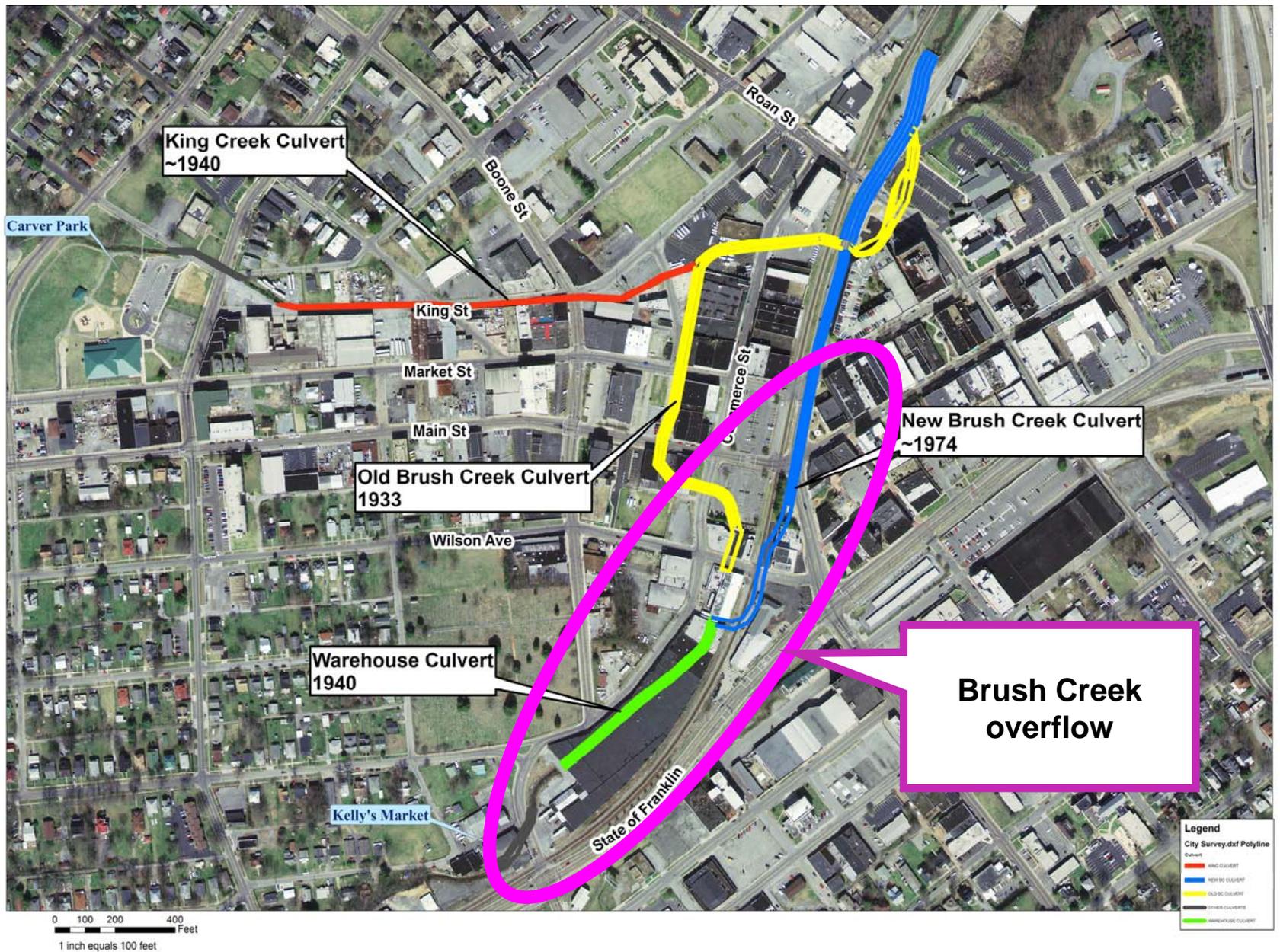
Causes of Flooding

- Backwater effects in Brush Creek culvert from downstream reduce capacity of culverts to move floodwaters out of downtown
- King Creek culvert is undersized
 - Floodwaters overflow the King Creek culvert and flow into the low area of downtown
- Brush Creek floodwaters overflow onto State of Franklin Road, and ultimately into downtown

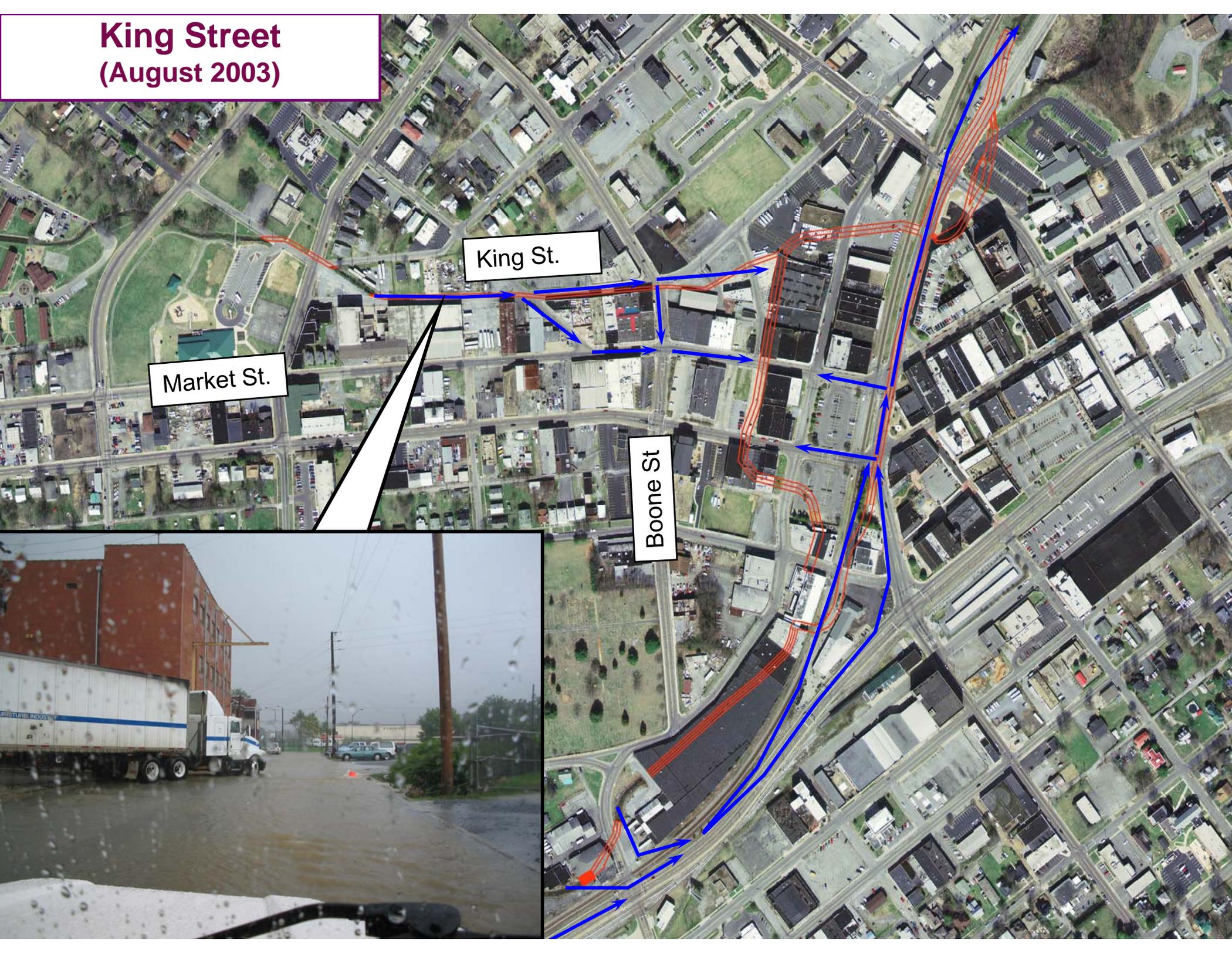




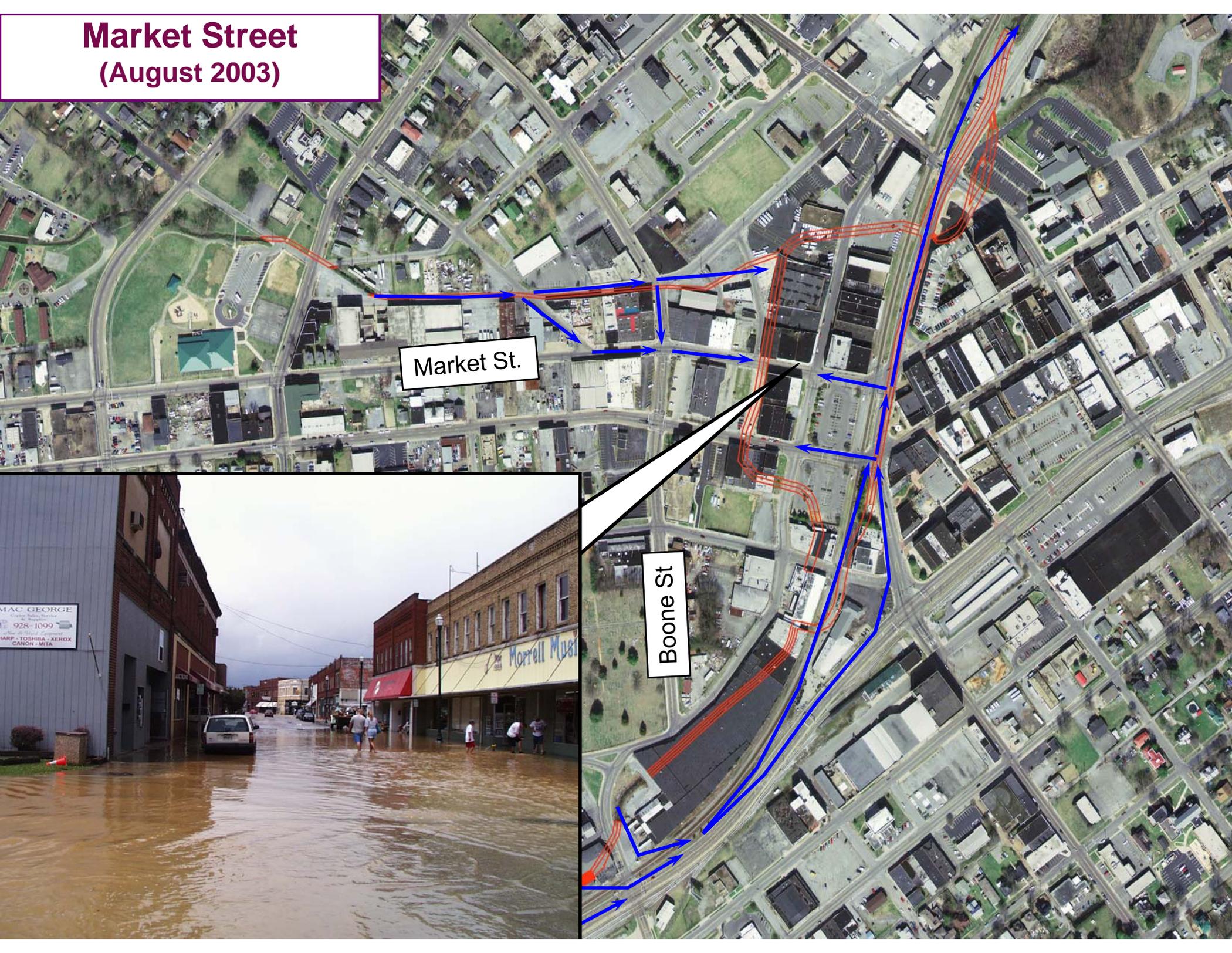
Current Drainage System



King Street (August 2003)



Market Street (August 2003)



Market St.

Boone St

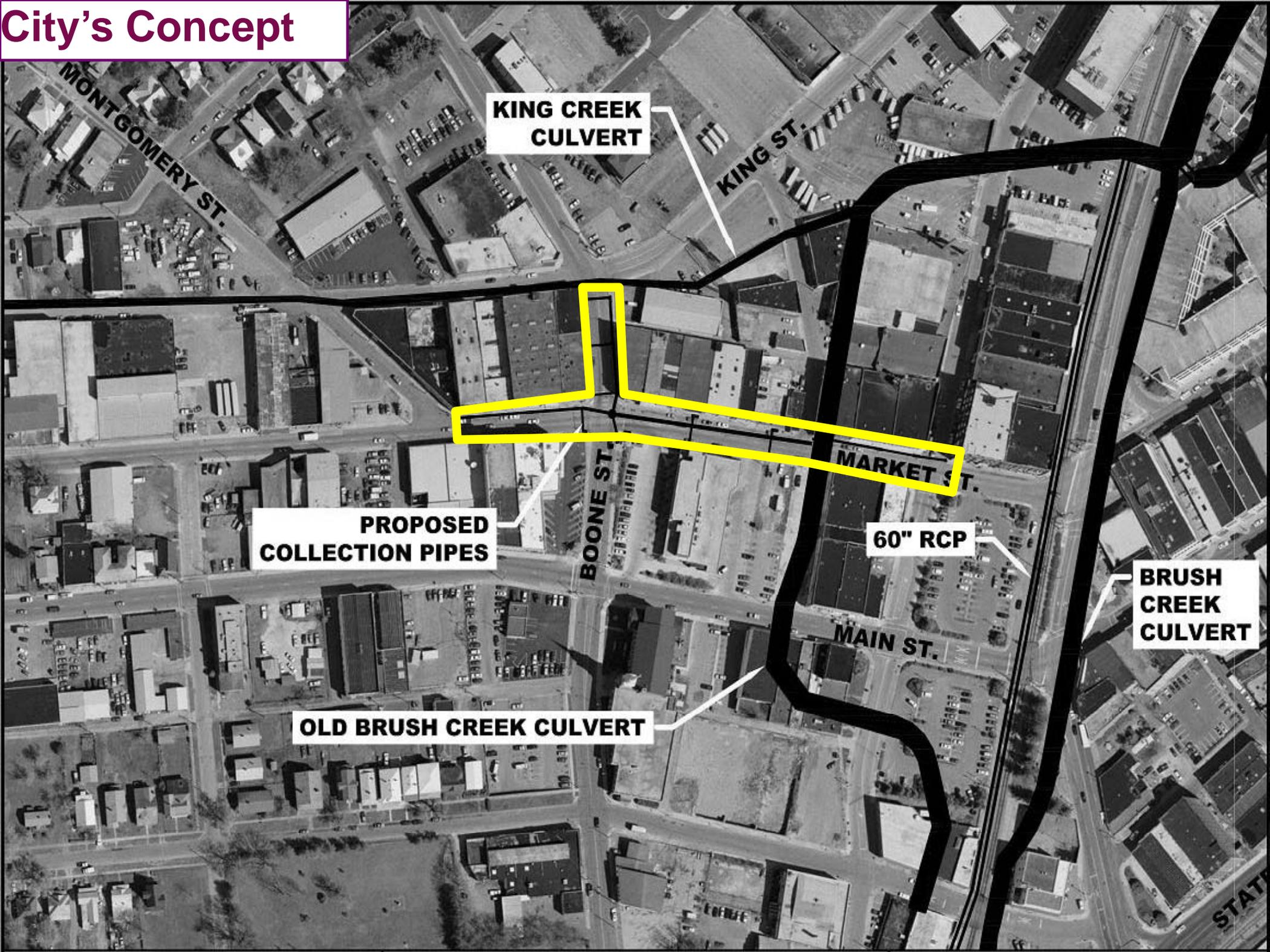


State of Franklin Rd and Buffalo St (August 2003)



- City Public Works Concept
 - relatively low cost, short-term approach
 - new inlets and storm sewers in downtown area
 - route collected flows to old Brush Creek culvert

City's Concept



KING CREEK CULVERT

PROPOSED COLLECTION PIPES

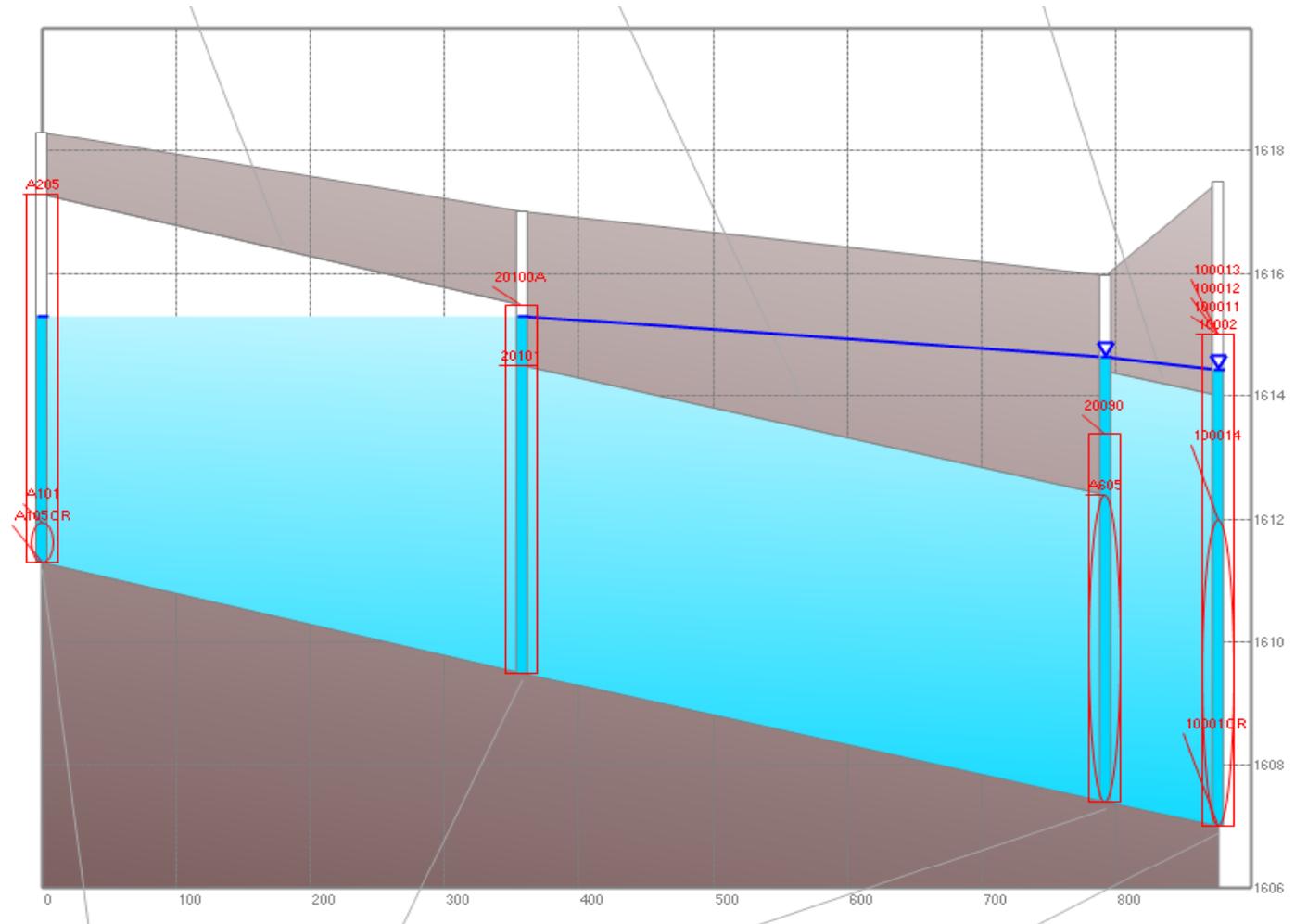
60" RCP

BRUSH CREEK CULVERT

OLD BRUSH CREEK CULVERT

City's Concept - Results

- Not hydraulically effective due to backwater effects



Models available

City's Concept - Results

- Repairing the Old Brush Creek culvert would be difficult and costly



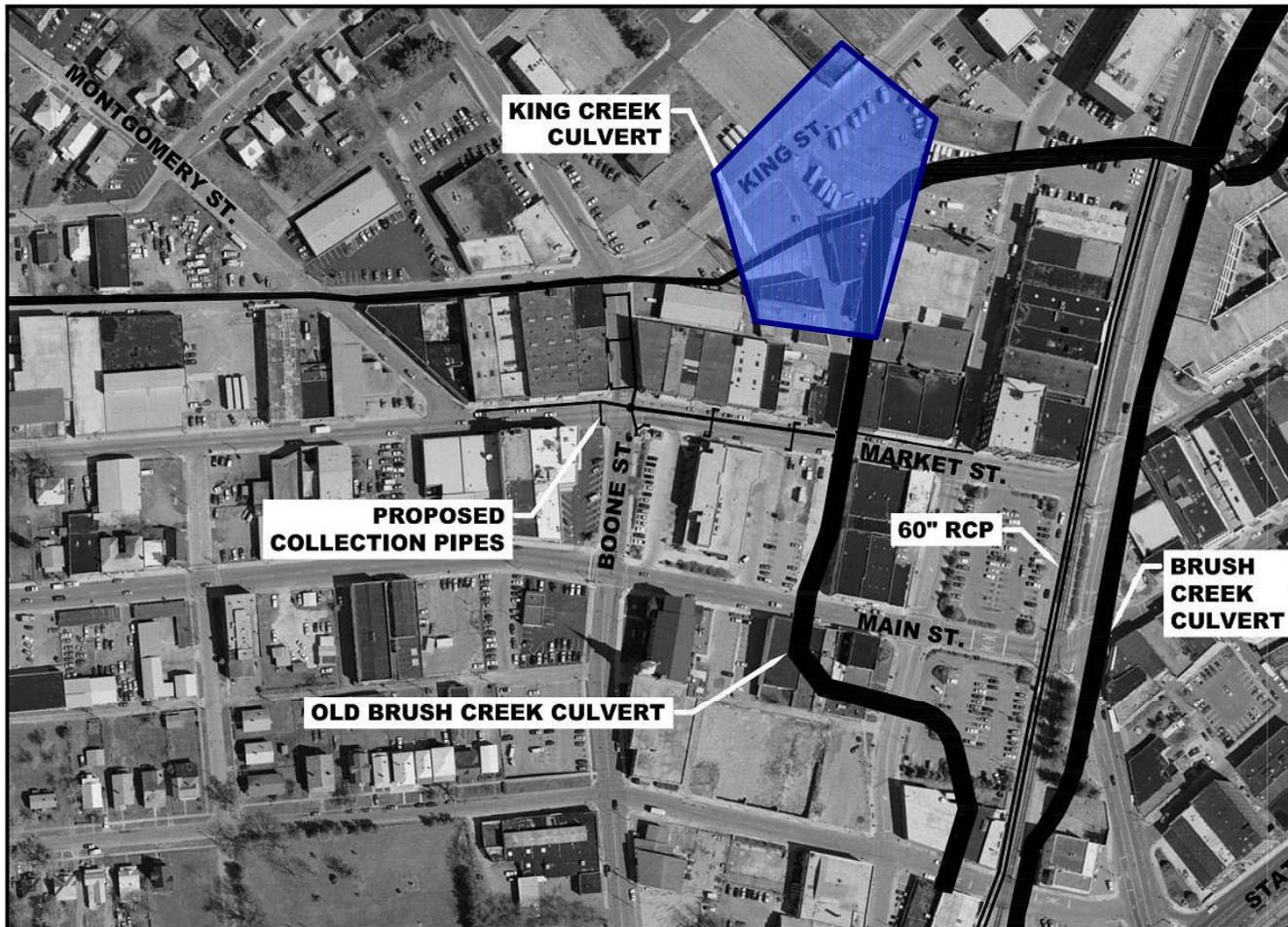
City's Public Works Concept – Conclusion

- not a feasible solution to the downtown flooding problem due to:
 - Backwater Effects
 - Condition of the Old Brush Creek Culvert
 - Continued overflow from King and Brush Creek

Revised City Concept

- City Public Works Revised Concept
 - the City tasked AMEC to evaluate an alternative
 - add a pond (surface sump) in the downtown area
 - the pond would serve to capture surface flow much more effectively than a number of inlets

Revised Concept – Pond at U-Haul



- Showed little overall flood depth improvement due to
 - backwater effects
 - King Creek culvert overtopping
 - Brush Creek overflows upstream

City's Revised Concept - Conclusions

- Revised concept would be ineffective
- **No low cost, short-term solution to downtown flooding**
- Any significant improvement would require that
 - downstream backwater must be addressed
 - King Street culvert capacity must be increased
 - upstream overtopping of Brush Creek must be reduced
 - address the deterioration of the Old Brush Creek culvert

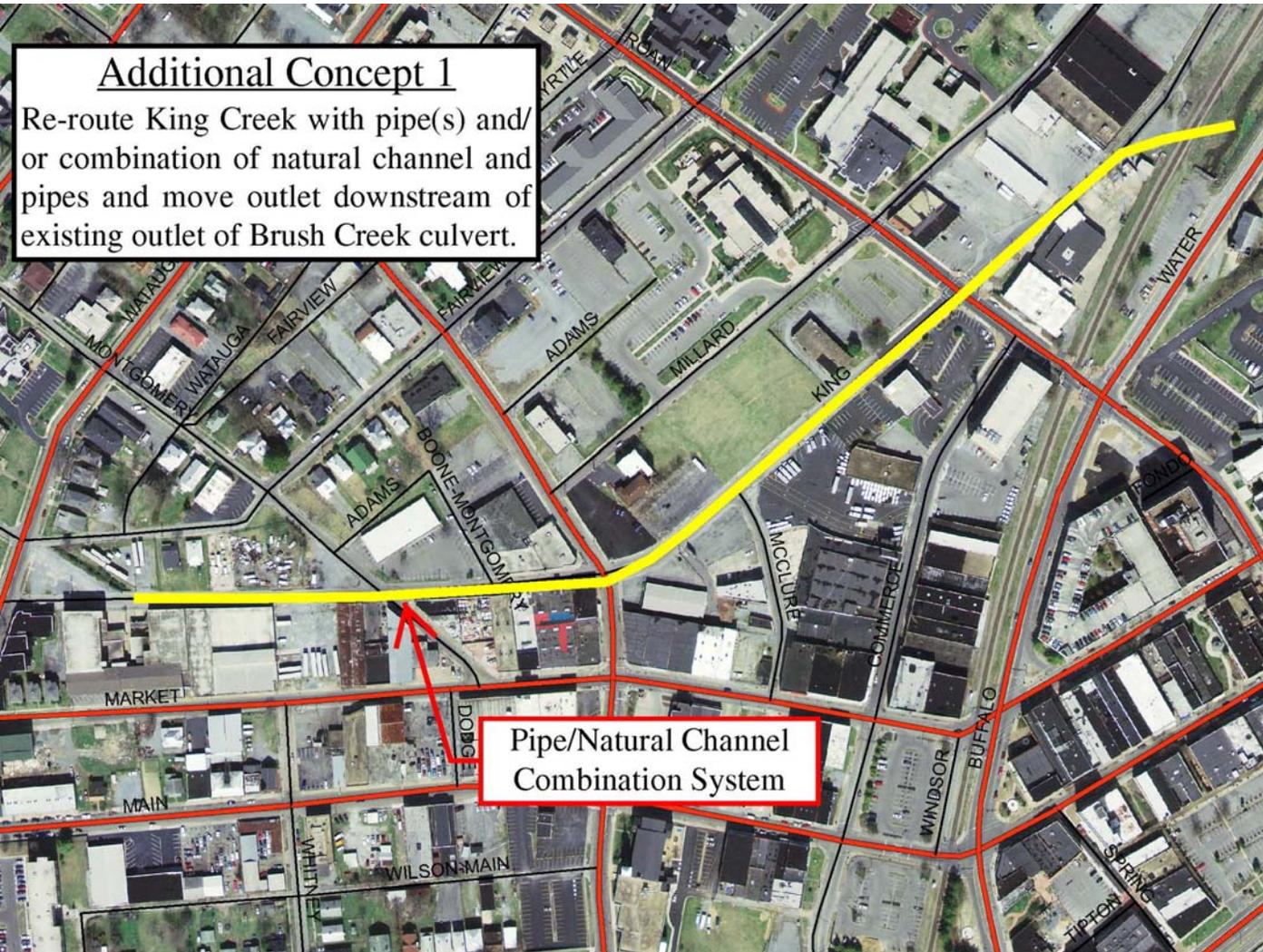
Additional Concepts

- City tasked AMEC with evaluating five additional concepts

Concept 1: King Creek Bypass

Additional Concept 1

Re-route King Creek with pipe(s) and/or combination of natural channel and pipes and move outlet downstream of existing outlet of Brush Creek culvert.

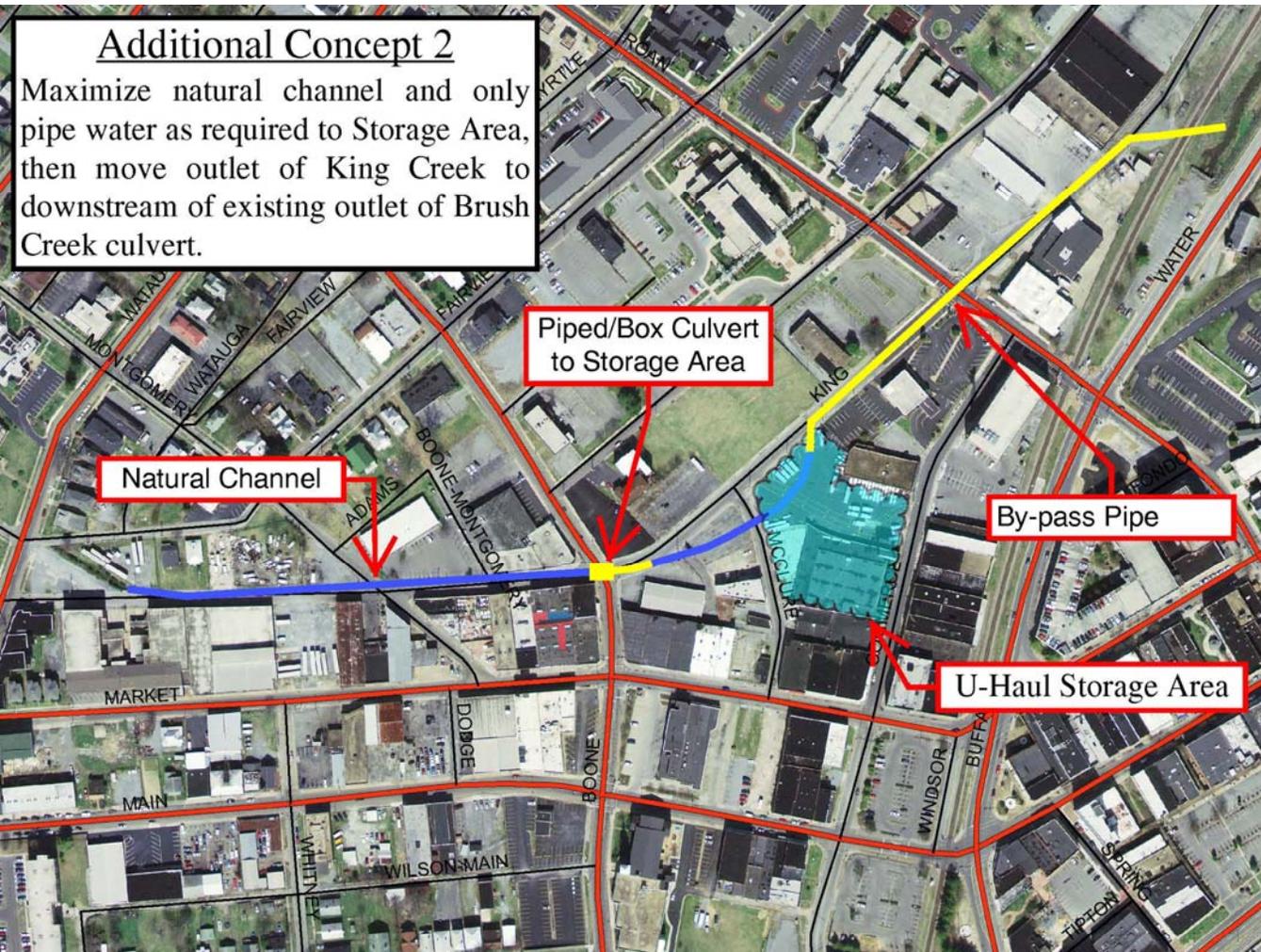


- Would keep downtown from flooding during 2-year storm by keeping flow from going overland at King Street and flowing into downtown

Concept 2: King Creek Bypass, Pond and King Street Open Channel

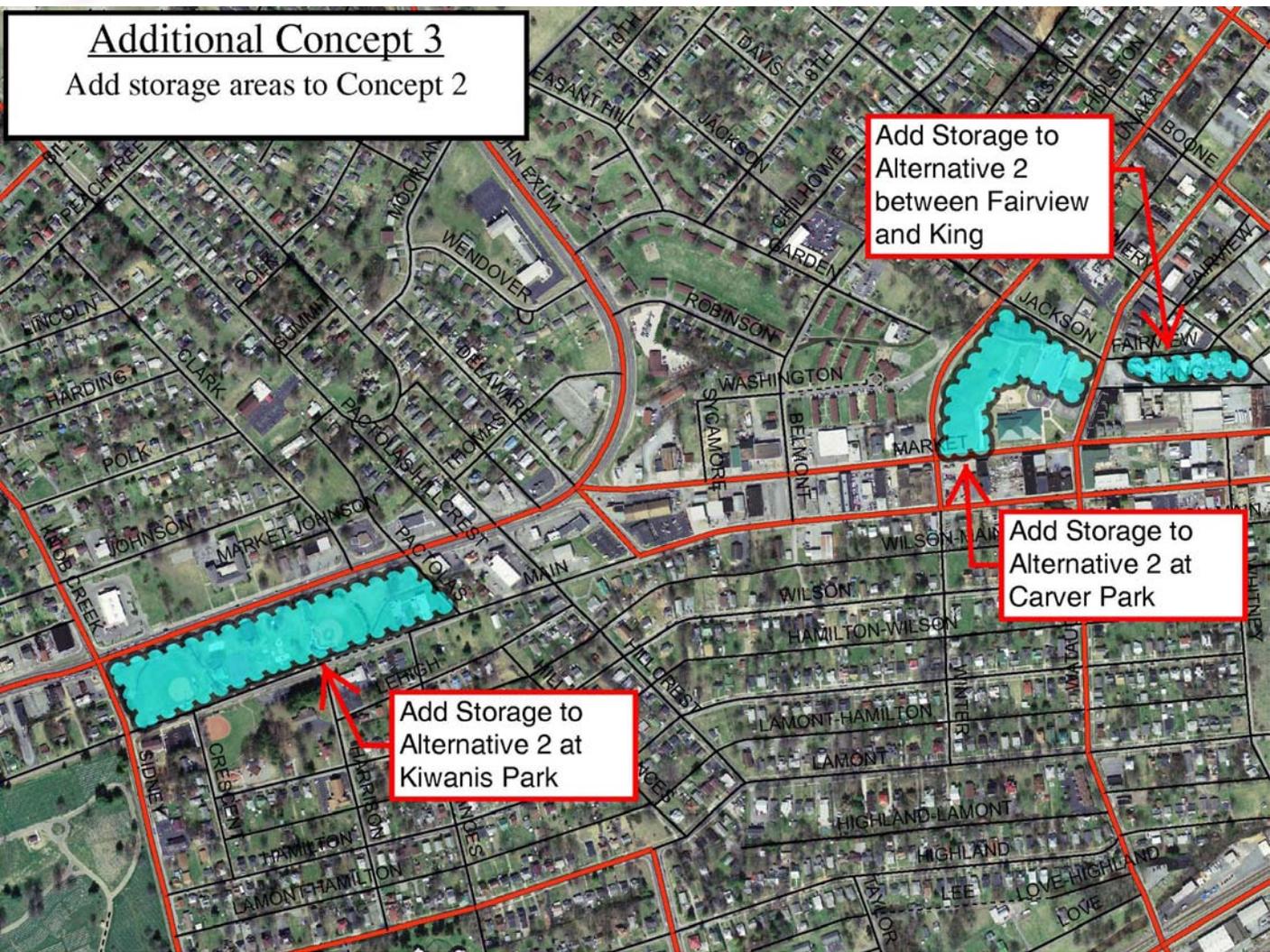
Additional Concept 2

Maximize natural channel and only pipe water as required to Storage Area, then move outlet of King Creek to downstream of existing outlet of Brush Creek culvert.



- Additional storage and better capture of overland flow improve flood protection to the 5-year storm level

Concept 3: Add Storage to Concept 2

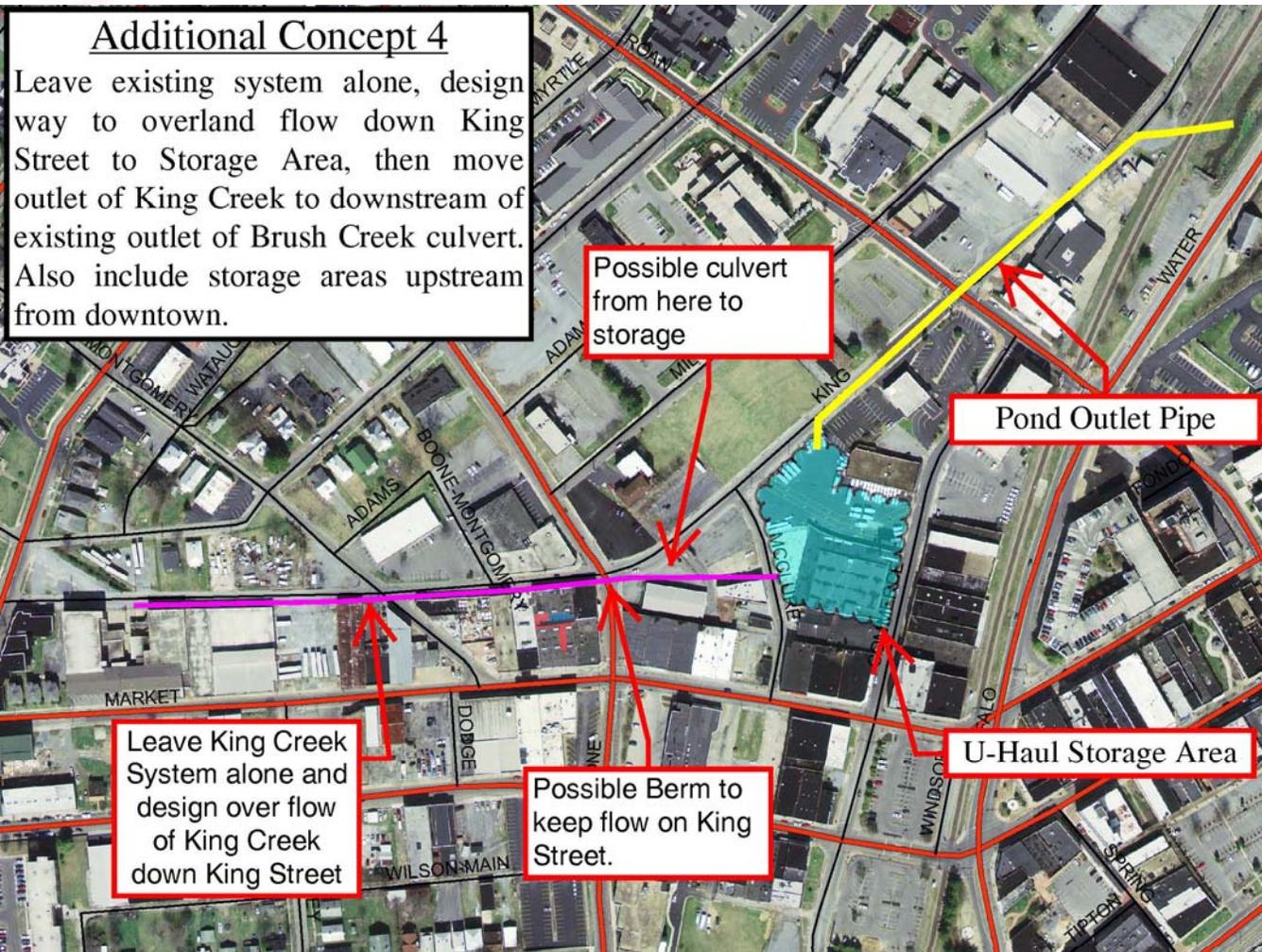


- The flood storage volume at Kiwanis Park, Carver Park, and King Street would not significantly improve the protection provided by Concept 2

Concept 4: Confine Overland Flow on King Street

Additional Concept 4

Leave existing system alone, design way to overland flow down King Street to Storage Area, then move outlet of King Creek to downstream of existing outlet of Brush Creek culvert. Also include storage areas upstream from downtown.



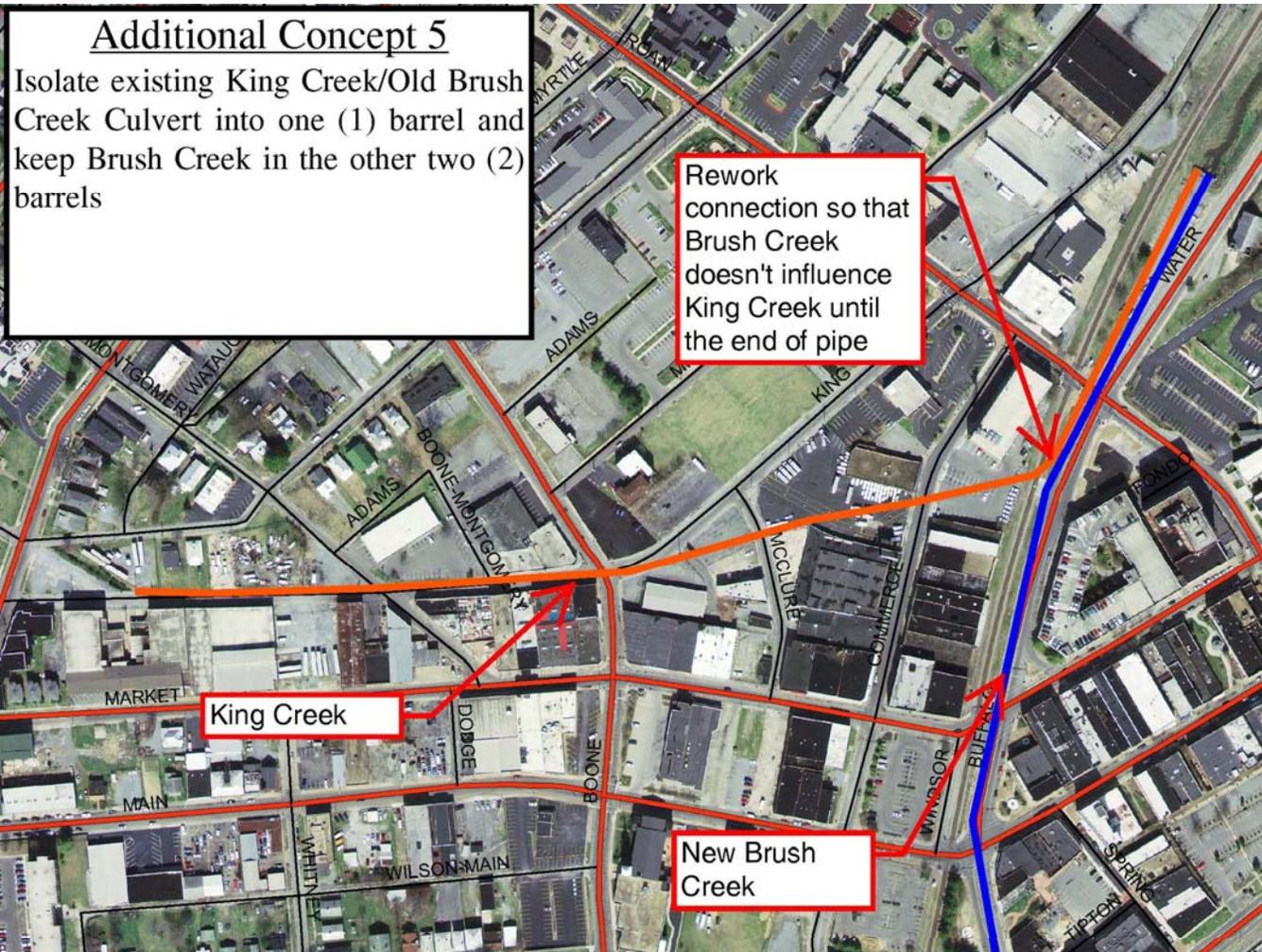
- The pond and lower bypass would alleviate flooding in the downtown, however:
- Walls to keep overland flow on King Street would increase flow depths by almost two feet on King
 - Safety concerns
 - Stormwater backflow

Concept 5: Separate King and Brush Creeks at Main Junction

Additional Concept 5

Isolate existing King Creek/Old Brush Creek Culvert into one (1) barrel and keep Brush Creek in the other two (2) barrels

Rework connection so that Brush Creek doesn't influence King Creek until the end of pipe



- No appreciable improvement in flood levels due to backwater

Additional Concepts - Conclusions

- By inspection, for all concepts studied the reductions in flooding would be minimal compared to the cost of the improvements
- Concept 2 (the King Street Bypass culvert and the U-Haul Pond) would be most beneficial, but still only provide protection for up to the 5-year flood
 - the recent storm of July 8th would not have caused flooding if Concept 2 had been in place

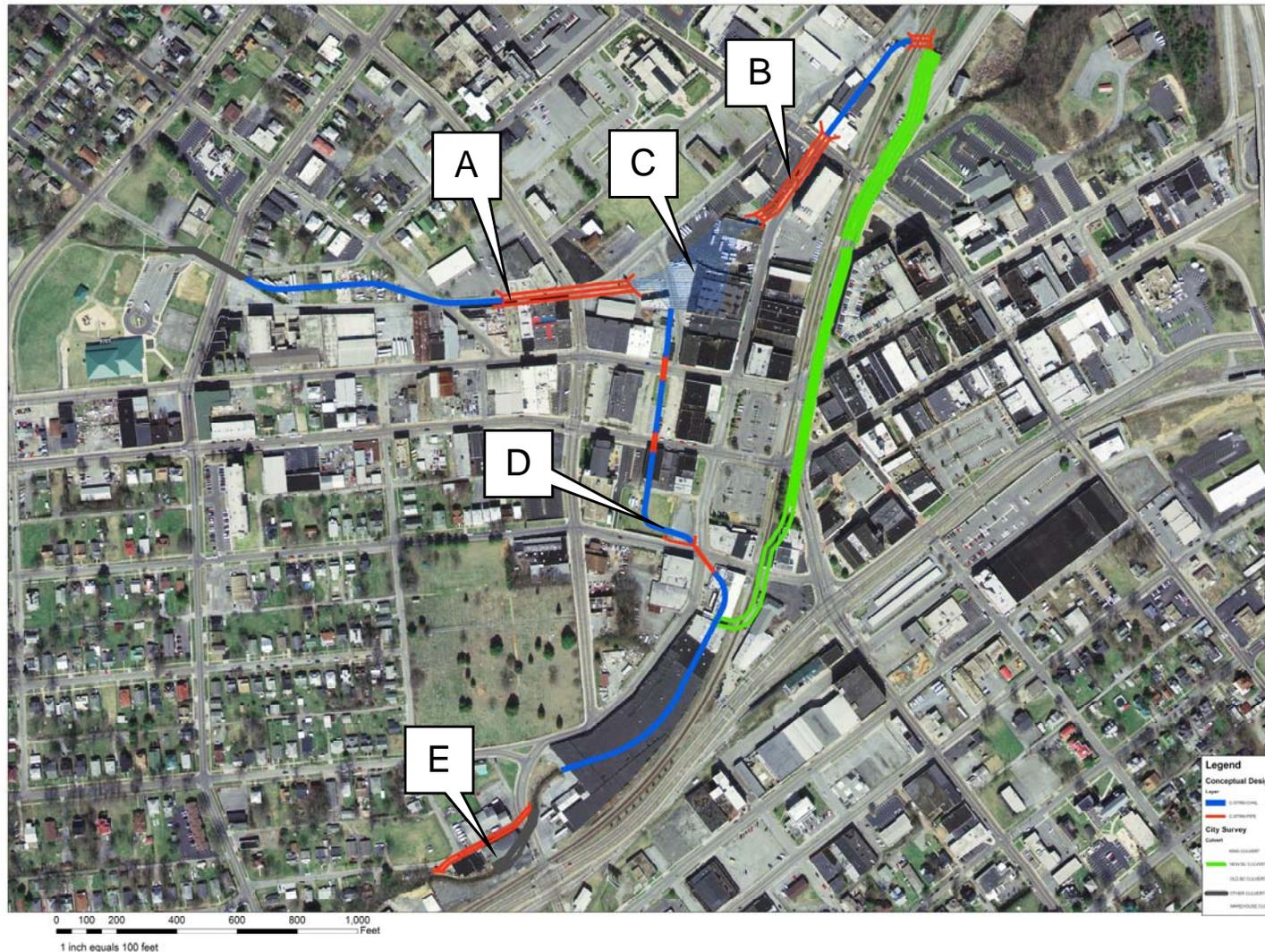
Overall Conclusion

- A large-scale project would be required to obtain significant flood protection

Requirements of an Effective Concept to Significantly Reduce Flooding

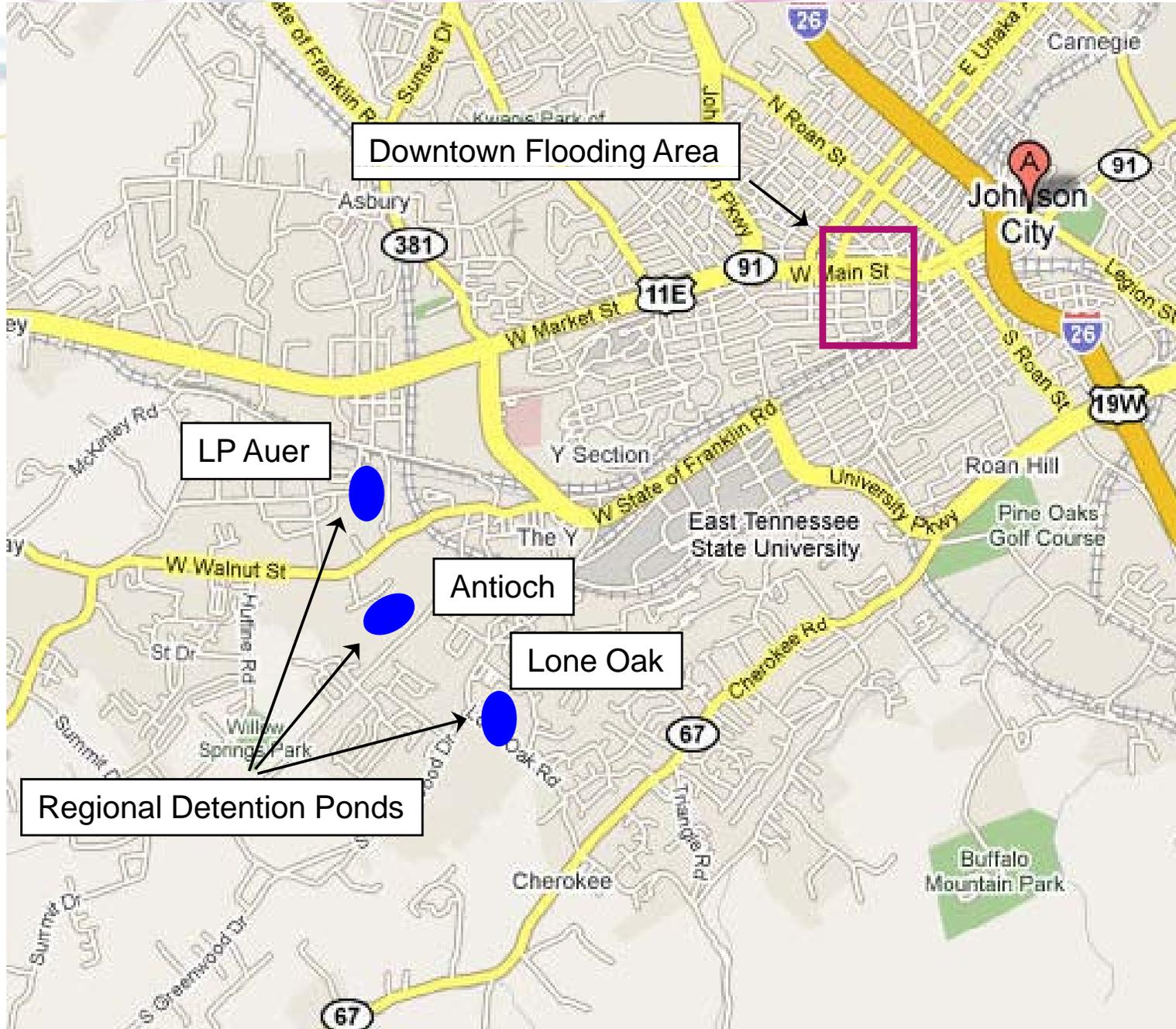
- The City tasked AMEC to develop a concept that would be effective in significantly reducing downtown flooding
- AMEC extended Concept 2 (bypass culvert and pond) to include:
 - an open channel to replace the Old Brush Creek culvert
 - additional culvert capacity at S. Commerce Street and Watauga Street
 - three large regional detention ponds in the headwaters of Brush Creek

Effective Concept - Downtown

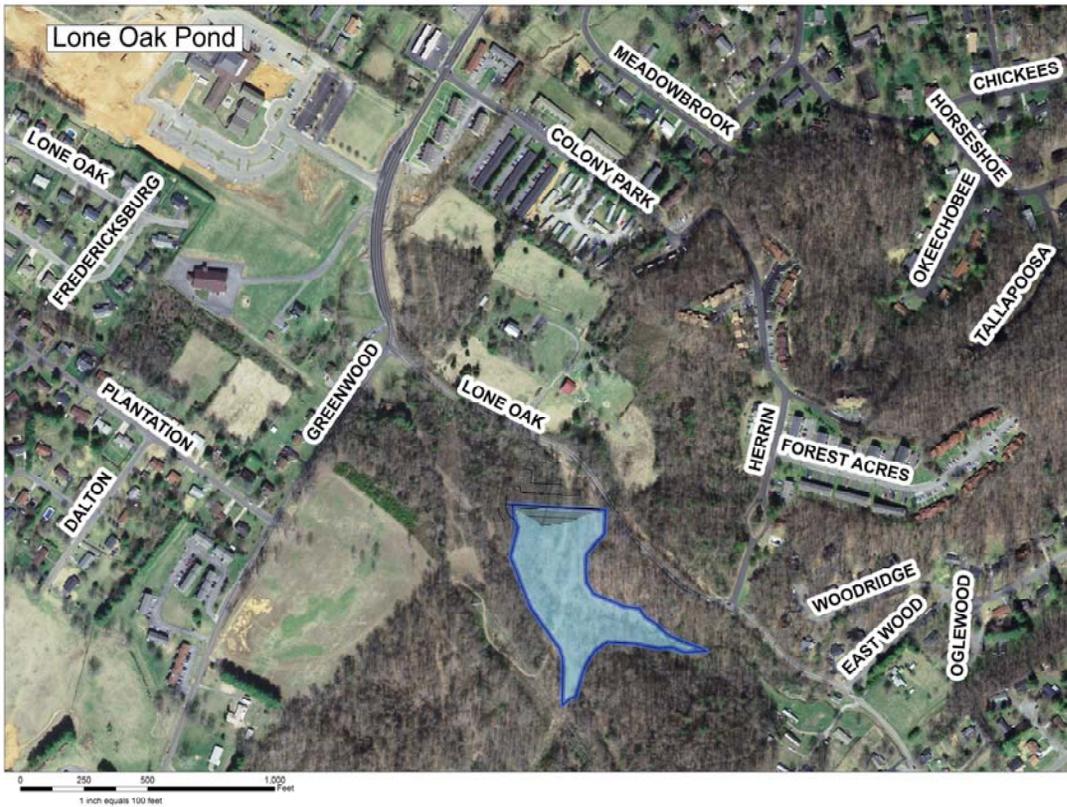
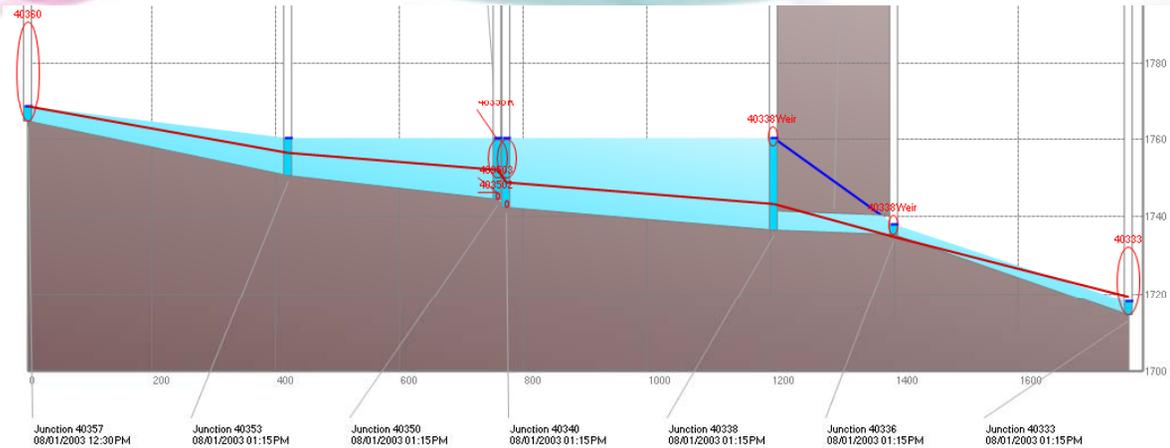


- A. King Street open channel and culvert
- B. King Street bypass culvert
- C. Pond at U-Haul
- D. Open channel along old Brush Creek culvert alignment
- E. Additional culvert capacity at South Commerce Street and Watauga Street

Effective Concept – Regional Detention Ponds



Lone Oak Pond



Effective Concept - Results

- **Phase 1.** Construct the King Street bypass culvert and the King Street collection pond (at U-Haul); would provide 5-year protection (a version of Concept 2)
- **Phase 2.** Replace the old Brush Creek culvert with an open channel and associated infrastructure improvements; would provide 25-year flood protection
- **Phase 3.** Add three regional detention ponds in Brush Creek watershed; would provide 50 to 100-year protection

Existing 50-Year Flood



0 100 200 400 600 800 1,000 Feet
1 inch equals 100 feet

50-Year Flood with Effective Concept



0 100 200 400 600 800 1,000 Feet
1 inch equals 100 feet

Effective Concept - Results

- **Phase 1.** Construct the King Street bypass culvert and the King Street collection pond (at U-Haul); would provide 5-year protection (a version of Concept 2)

Estimated Cost: \$11.2 million

- **Phase 2.** Replace the old Brush Creek culvert with an open channel and associated infrastructure improvements; would provide 25-year flood protection

Estimated Cost: \$9.7 million

- **Phase 3.** Add three regional detention ponds in Brush Creek watershed; would provide 50 to 100-year protection

Estimated Cost: \$4.8 million

Existing Conditions

- Property Statistics

- Total Assessed Value: \$ 14,277,200
- Property Tax Revenue: \$ 110,200

- Flood Damages

- Annual Cost: \$ 809,000

- Using FEMA limited-data methodology and existing assessed values

Effective Concept - Conclusions

- The concept would be effective in significantly reducing flooding in downtown
- However, the reduction in flooding would be achieved at a high cost
- It is apparent that the feasibility of any such project would require realization of substantial benefits other than flood protection for existing flood-prone properties



GREETINGS FROM

Goals of Redevelopment:

- Re-establish the downtown district as the city center
- Acknowledge the intrinsic value of a historic downtown
- Highlight “unique spaces”
- Provide range of uses and activities
- Combine new retail and residential opportunities
- Incorporate storm drainage systems into plan

King Street Area Plan



Public Library

Open Lawn

Playground

Public Plaza

Pond

Embarq

Future Development

E.MARKET STREET

E.MARKET STREET

W.MAIN STREET

N. ROAN ST.

W. MILLARD ST.

N. BOONE STREET

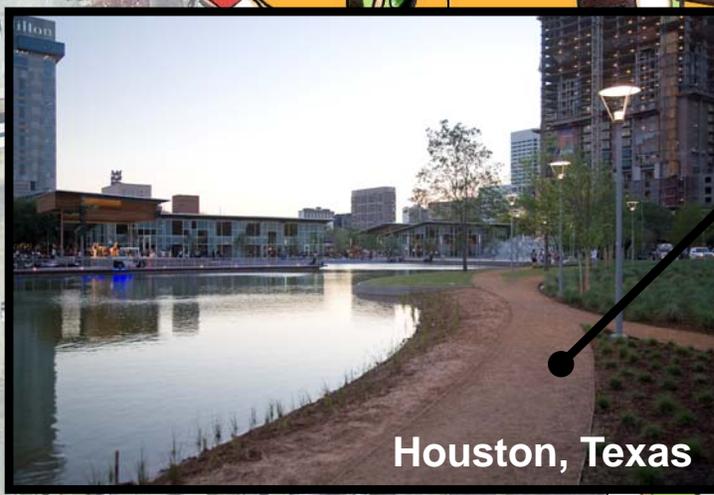
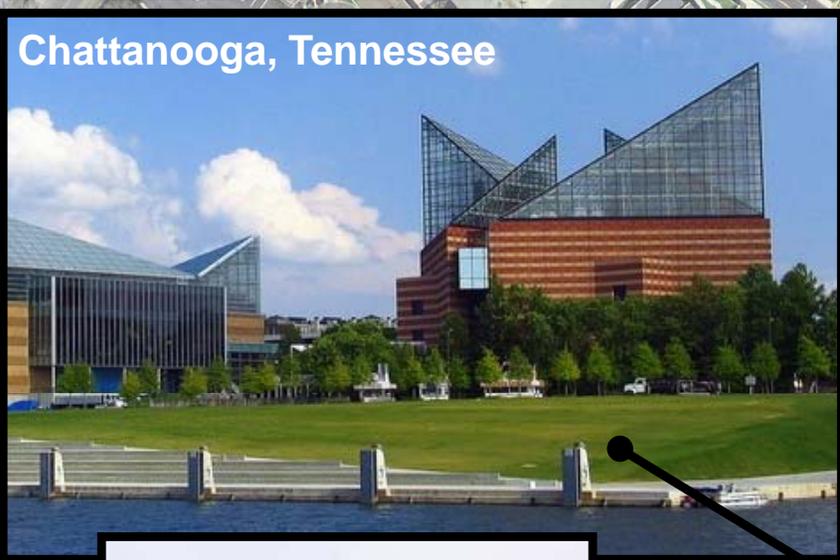
N. COMMERCE ST.

BUFFALO STREET

E.MARKET STREET

E.MAIN STREET

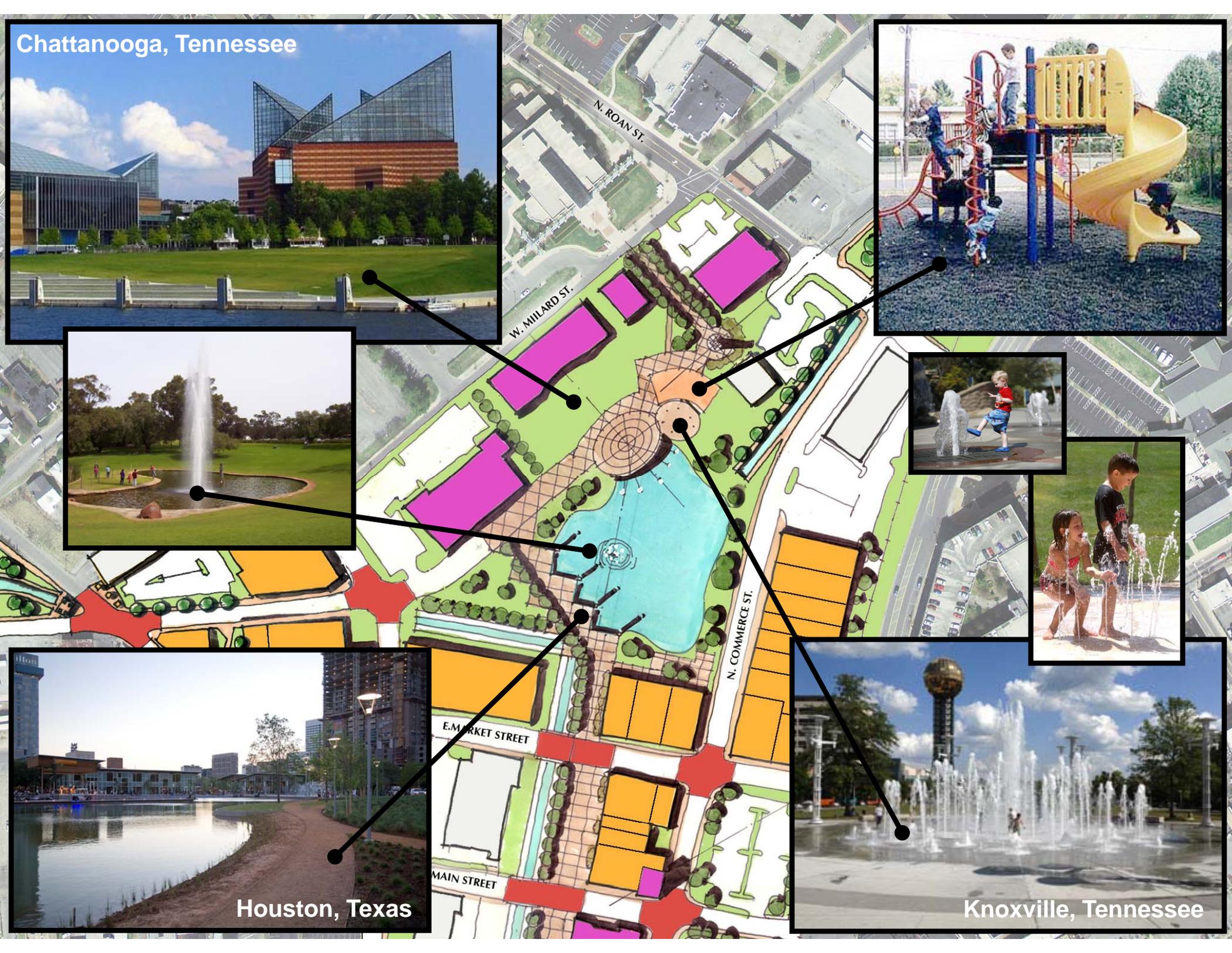
Chattanooga, Tennessee



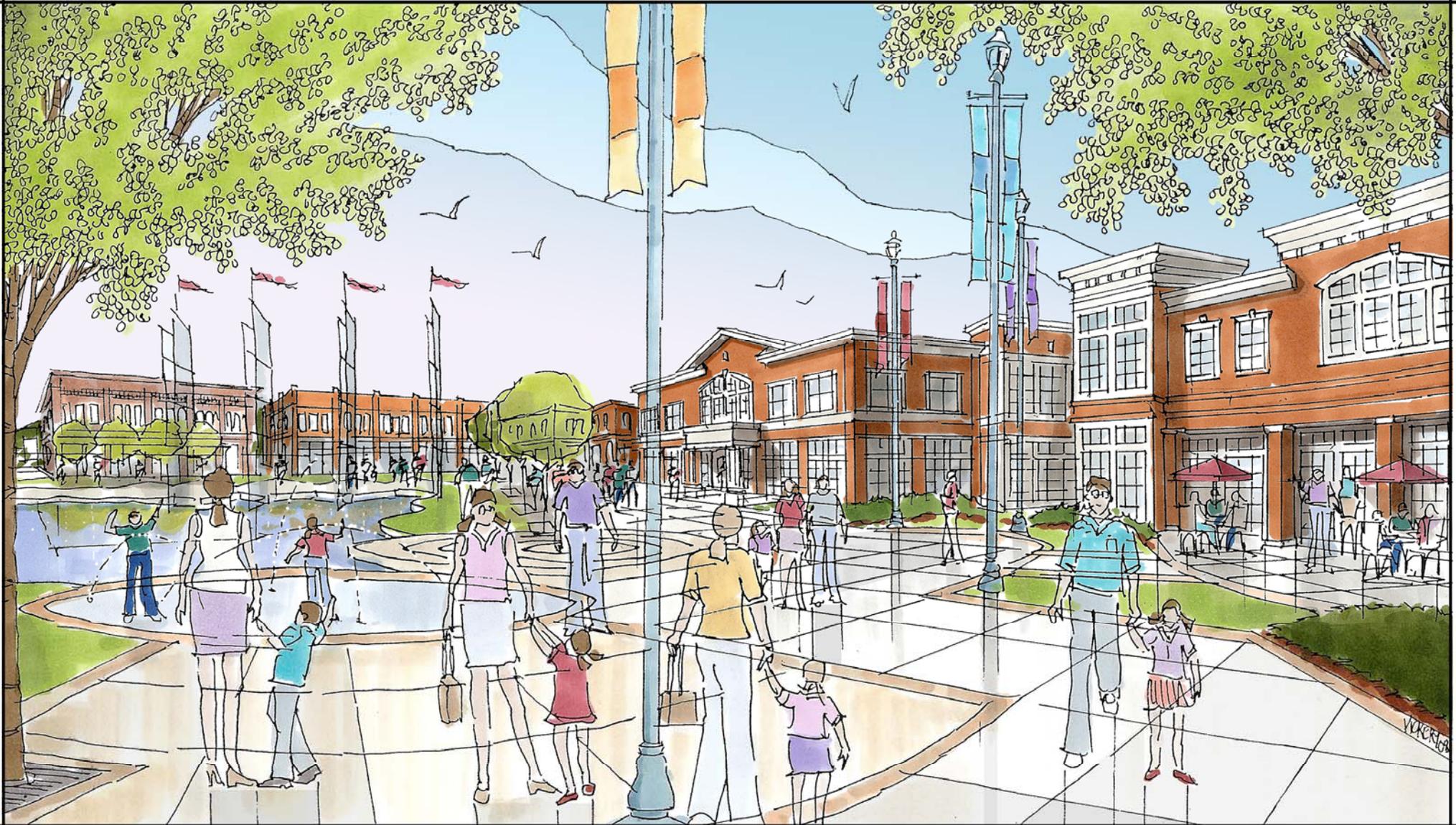
Houston, Texas

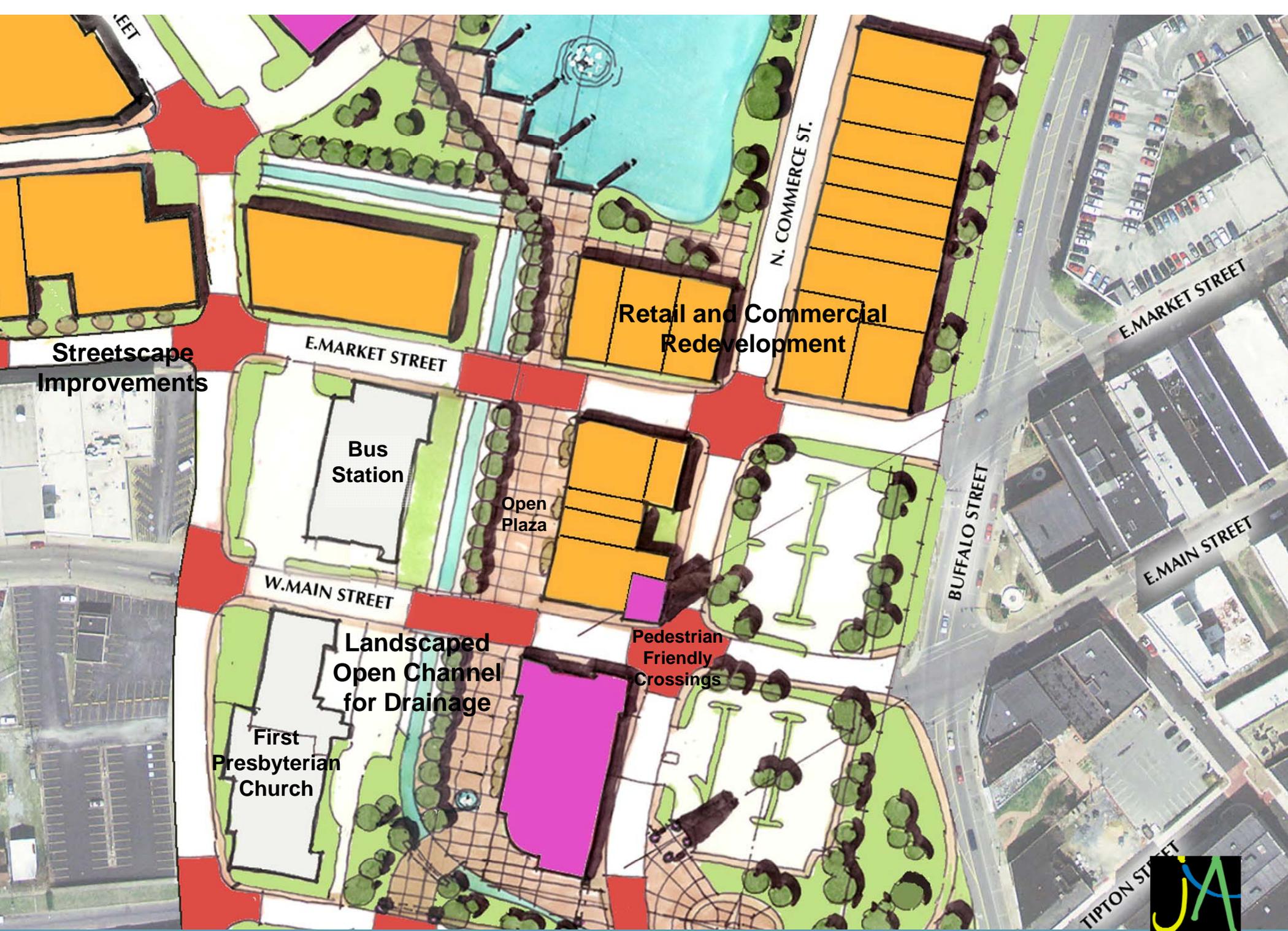


Knoxville, Tennessee



Conceptual View – King Street Area





Streetscape Improvements

Retail and Commercial Redevelopment

Bus Station

Open Plaza

Landscaped Open Channel for Drainage

First Presbyterian Church

Pedestrian Friendly Crossings

West Market Street and Commerce Street Area

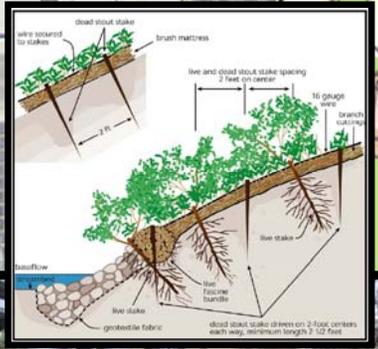


Johnson Architecture

Philadelphia, Pennsylvania



Bethesda, Maryland



Harvard Square

Conceptual View - West Market Street and Commerce Street Area



Wilson Avenue and West Main Street Area



Bethesda, Maryland



Charleston, South Carolina



S. BOONE STREET

WILSON AVE.

E. MAIN STREET

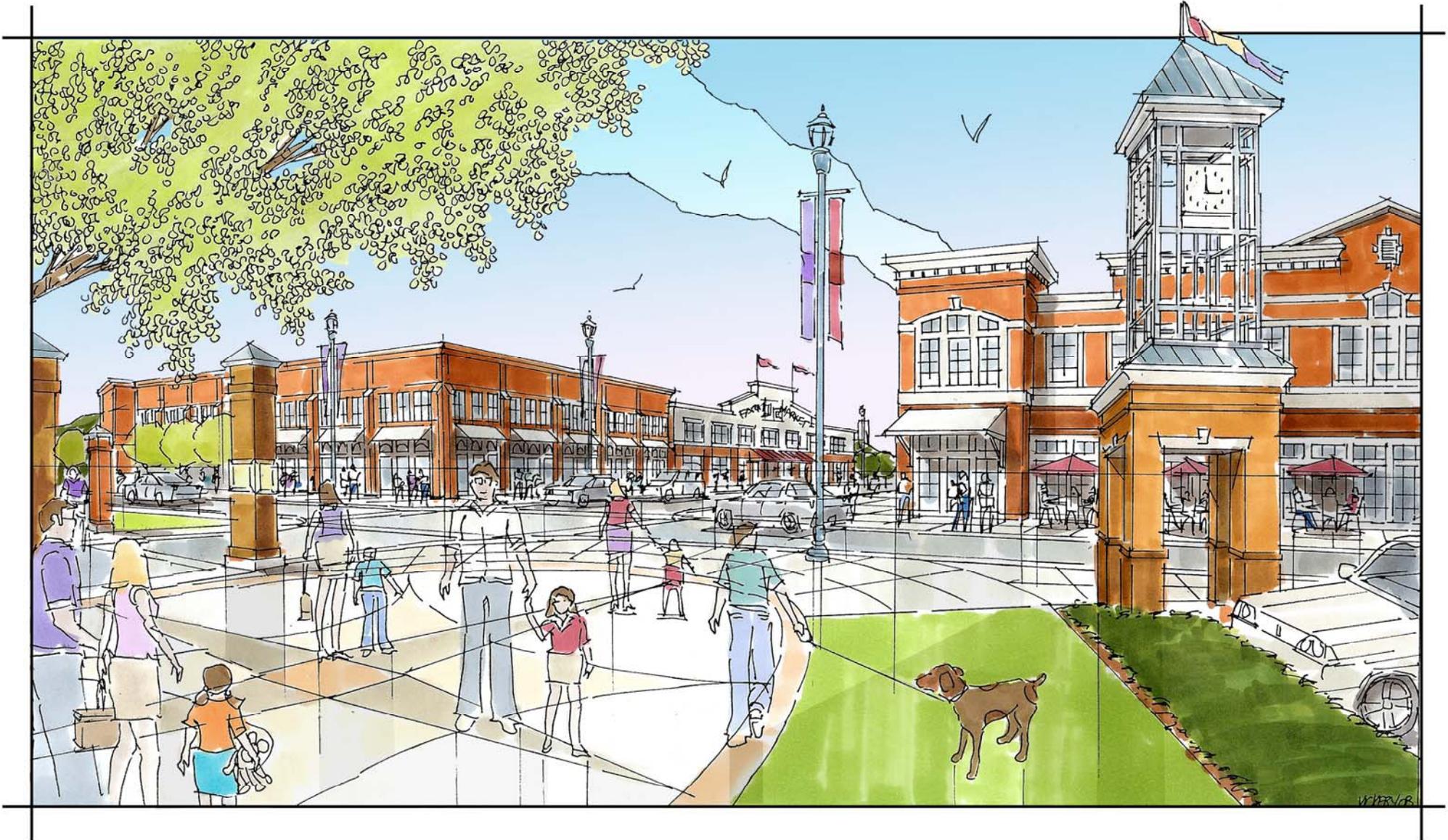
TIPTON STREET

STREET

Conceptual View – Wilson Avenue and West Main Street Area

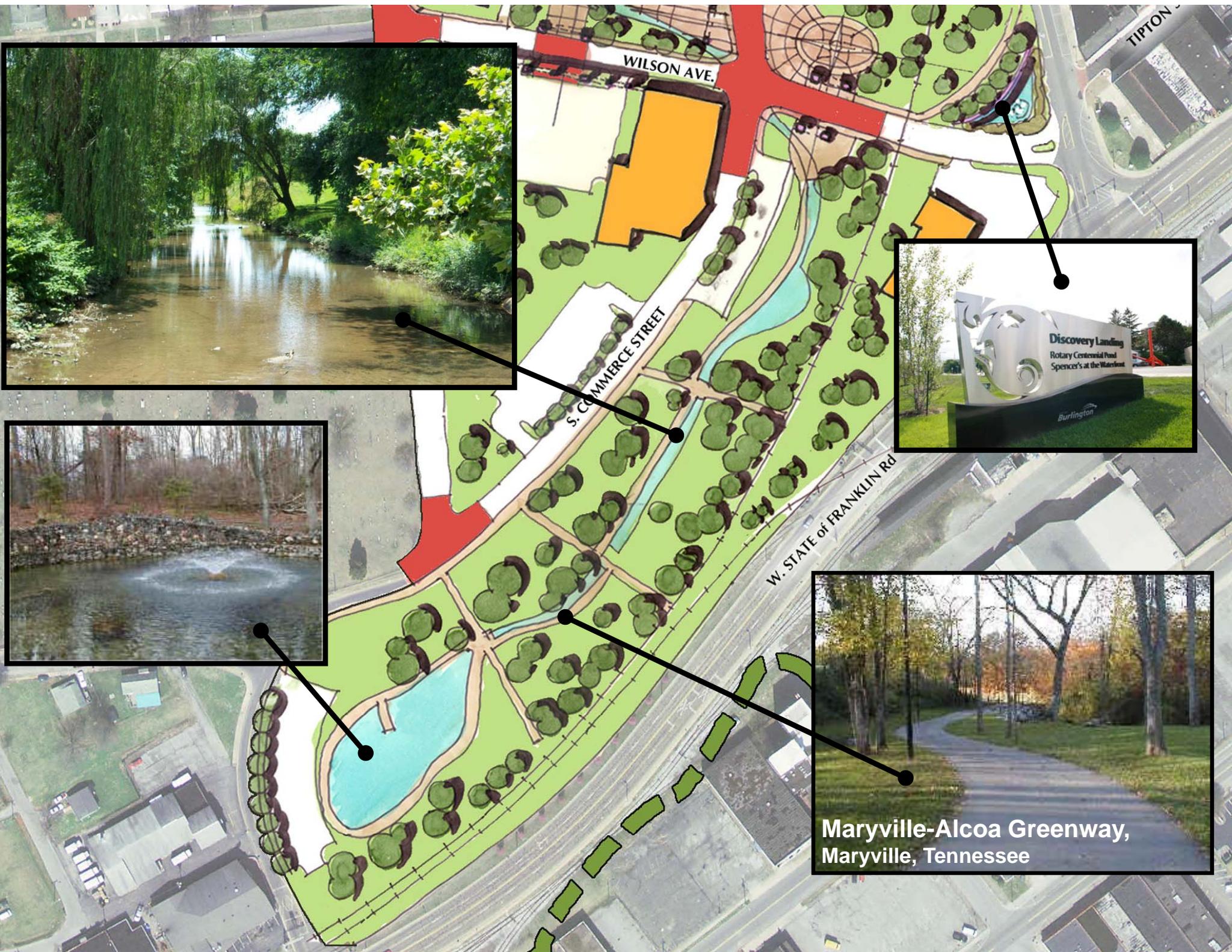


Johnson
Architecture





South Commerce Street Area



Maryville-Alcoa Greenway,
Maryville, Tennessee

Existing Conditions

- Property Statistics

- Total Assessed Value: \$ 14,277,200
- Property Tax Revenue: \$ 110,200

- Flood Damages

- Annual Cost: \$ 566,000

- Using FEMA limited-data methodology and existing assessed values

With Proposed Project

- Property Statistics

- Total Assessed Value: \$101,736,400
 - Property Tax Revenue: \$ 785,400

- Flood Damages

- Annual Cost: \$ 23,000

- Using FEMA limited-data methodology and redeveloped assessed values

Changes

■ Property Statistics

- Increase Assessed Value: \$ 87,460,000
- Increase Property Tax Revenue: \$ 675,200

■ Flood Damages

- Decrease Annual Cost: \$ 543,000