Outline

- Flooding history and recent flooding
- Minimal expense flooding fix concept
- Structural evaluation of Old Brush Creek Culvert
- Performance of localized improvement concepts
  - Phased approach
- Performance of more regional concepts
- Opportunity to redevelop downtown along with drainage improvement
- Cost
- Financing
Causes of Flooding

- Upstream development after existing culverts were installed
- King Creek culvert is undersized
  - Flow enters King Street during a 2-year storm and flows into the depressed area of downtown
- Flow restrictions on Brush Creek, force flow into State of Franklin, and ultimately into downtown during a 5-year storm
- Backwater effects from downstream area
Surface Flow Paths and Aug. 2003 Pictures
Current 100-year Floodplain
AMEC was tasked to determine whether a small investment in new pipes along Market and Boone could empty minor flooding into the unused “Old Brush Creek Culvert”
Structural Evaluation of Old Brush Creek Culvert
Original Concept Results

- Didn’t work due to backwater effects
- Repairing the Old Brush Creek culvert would be difficult and costly
- Need for additional capacity downstream became obvious
Original Concept with Pond at U-Haul Results

- Showed little flood depth improvement due to backwater effects
- Removed several buildings with flooding problems
- The pond would serve to capture surface flow much more effectively than a number of very large inlets
Model was run to check what would happen if the culvert collapsed at the King/Old Brush junction.

Flood depths increased by up to ~2'
Additional Concepts

- Original concept was found to be ineffective
- Sent back to the drawing board to find a viable alternative
- The need for a bypass route was clear
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Concept 1: King Creek Bypass Results

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

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.
Concept 2: King Creek Bypass with Pond and Natural Channel Results

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

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.
Concept 3: Add Storage to Concept 2 Results

The flood storage volume at Kiwanis Park, Carver Park, and King Street do not significantly improve upon the flood protection of Concept 2.
Concept 4: Confine Overland Flow on King Street

Results

- The pond and lower bypass alleviate flooding in the downtown, however:
  - Walls to keep overland flow on King Street will increase flow depths by almost two feet
    - Safety concerns
    - Stormwater backflow
Concept 5: Separate King and Brush Creeks at Main Junction Results

- No appreciable improvement in flood levels due to backwater

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
Further Refinement

- The King Creek bypass and U-Haul pond provide flood protection only up to ~5-year storm, at significant expense.
- Further deterioration of the Old Brush Creek Culvert will necessitate significant expenditure for repair or removal in the near future.
  - Take the opportunity to restore Brush Creek to its original streambed and provide for additional flood protection in downtown.
- Redevelopment in the downtown area is necessary to justify the project expense.
- Center a downtown revitalization effort around the newly restored stream and pond.
- Solve drainage problem
- Financial responsibility
- Downtown blight
Recommended Approach

- **Phase I**
  - Install King Street bypass and new pond to serve as the focal point of redevelopment in the King St. area
  - Attract tenants adjacent to the pond to begin the redevelopment
  - Greenway connection to Carver Park
  - Provide flood protection for ~5-year storm

- **Phase II**
  - Restore Brush Creek through downtown and use the stream corridor as a new greenway
  - Work hand-in-hand with the private sector to ensure that City efforts coincide with restoration of properties adjacent to the corridor
  - Provide flood protection for a ~25-year storm

- **Phase III**
  - Install three regional detention basins upstream of downtown that will serve double-duty in the park system
  - Provide flood protection for a ~100-year storm
Phase 1 – Proposed Rendering

TREES HIDE A LOT - I WILL FADE THEM OUT AS THEY GO BACK TO NEW BUILDINGS FOR CLARITY

LIBRARY

LAKE WILL ALSO BE MORE VISBILE ONCE REFINED/COLORED

NEW BLDGS - WILL BE EASIER TO SEE ONCE ARTICULATED/COLORED

THIS VIEW SEEMS TO BE BEST TO CAPTURE SCALE OF EXIST. BLDGS TO REMAIN WHILE HAVING FOCAL POINT IN CENTER OF NEW BLDGS/LAKE/PLAZA/PEOPLE, ETC.
Phase II
25-Year Storm Structure Flooding

Legend
- Blue: 0.00000 - 0.66666
- Red: 0.66667 - 1.00000

Carver Park
King St
Market St
Main St
First Presbyterian
Wilson Ave
Kelly's Market
State of Franklin
Boone St
Roan St
Public Library
Commeroce St
Phase 2 – Proposed Rendering

- Maybe add new roof to exist. bldg?
- Icon tower? (Didn't give design much thought yet)
- I will add more detail to facade of market
- Gateway piers
- New building/office over retail?
Phase III Ponds

- Normal flow levels pass through
- Ponds are dry for all but the largest storms
- Reduce peak flows downstream
- Incorporate into the City park system
LP Auer Pond
Stream Restoration

- Dead stout stake
- Wire secured to stakes
- Brush mattress
- Live and dead stout stake spacing 2 feet on center
- 16 gauge wire
- Branch cuttings
- Live stake
- Live fascine bundle
- Geotextile fabric
- Baselflow
- Streambed

Dead stout stake driven on 2-foot centers each way, minimum length 2 1/2 feet.
Examples of Restored Streams
Examples of Restored Streams
Streams as Community Focal Points
Streams as Community Focal Points
Streams as part of the local Park System
Cost and Benefits

- **Phase I:**
  - $10M cost
  - XXX flood reduction benefit
  - Need XXX redevelopment tax base improvement

- **Phase II:**
  - $10M cost
  - XXX flood reduction benefit
  - Need XXX redevelopment tax base improvement

- **Phase III:**
  - $5M cost
  - XXX flood reduction benefit
  - Need XXX redevelopment tax base improvement
Cost of Doing Nothing

- Flooded area continues to deteriorate due to lack of investment
- Culverts collapse, causing severe flooding
- Buildings over culverts become unstable and are condemned
- Continued water quality issues
- Tax base loss
Possible Grant Sources

- **FEMA**
  - Hazard Mitigation Grant Program (HMGP) after a declared disaster
  - Flood Mitigation Assistance (FMA) and Pre-Disaster Mitigation (PDM) Programs to prevent future flooding
  - Severe Repetitive Loss (SRL) Program to remove structures that flood often
  - Property acquisition
  - Flood protection measures
  - Need to write a Hazard Mitigation Plan before FEMA will consider
  - 75% Federal cost share

- **TDEC**
  - 319 water quality grants
  - ~$200M annually
  - 60% Federal cost share

- **Clean Water State Revolving Fund (CWSRF) Loan Program**
  - Tennessee program loaned ~$75M last year
  - Current rate for Johnson City would be ~2.7% for 20 years

- **Corps**
  - Flood control measures
  - Corps backlog is very large
  - Study time and cost is significant
  - Political
Public Comment Period

- Comments will be taken tonight
  - Forms are found on a table at the back
  - Completed forms can be left in the box or sent to:
    Andy Best
    Public Works Department
    City of Johnson City, TN
    P.O. Box 2150
    209 Water Street
    Johnson City, TN 37605-2150

  abest@johnsoncitytn.org

- Comments must be received by next Wednesday to be incorporated into the Commission briefing packet