Shunganunga Creek
Topeka, Kansas
CAP, Section 205, Flood Control

OPEN HOUSE – PUBLIC MEETING
25 October 2018

Results are Preliminary
Agenda

- Why We are Here
- The City and COE Partnership
- COE Authorization
- Understanding the Problem
- Finding Ways to Solve the Problem
- Example COE Projects
- Alternatives Evaluated
- Summary of Results
Why We are Here

Fig 4--Flood of July 1957. Flooded area near 24th Street and College Avenue. Water had receded about one foot.
Why We are Here

Fig 5--Northeast Corner of Topeka Avenue and 20th Street. Looking north.
Why We are Here

Fig 7--South side of ticket office at Mid-America Fairgrounds.
Why We are Here

Fig 9--Northeast entrance to A. J. Stout Elementary School on College Avenue.
CHECKING A CREEK—The Shunganunga Creek flows thru this hole in one of the large check dams now being completed south and west of Topeka. The barriers will allow a regulated flow of water even when the Shunganunga backs up behind the two dams.

FINISHING UP SHUNGANUNGA DAM—A huge grader in the background puts finishing touches on the south dam on Shunganunga Creek as the flood control project nears completion. Another dam has been finished. At right is Harlan L. Hixson, of the firm which built the two earthen barriers.
Why We are Here

- In 2007 two sequential rain events produced water that filled the dams and overwhelmed Shunganunga Creek.
- Caused high risk to human life because the flooding happened quickly.
- Caused damages to houses and businesses.
- Without the dams, flooding would have been worse.
Why We are Here

2007 FILE PHOTOGRAPHS/THE CAPITAL-JOURNAL-Members of the Patton family are rescued from their home at S.W. 23rd and Washburn by Mission Township Water Rescue workers after 6 inches of rain fell in Topeka in a 24-hour period on May 7, 2007, causing flooding near the Shunganunga Creek.
Why We are Here

Figure 7: May 2007 Flood File Photograph from Flood Capital Journal Article (Image 2 of 3)
Why We are Here

Figure 8: May 2007 Flood File Photograph from Flood Capital Journal Article (Image 3 of 3)
City and COE Partnership

- Multiple Legal agreements (the Partnership)
  - Phase 1- Hydrology (rainfall/runoff)
    - How much rainfall & runoff is expected
  - Phase 2 – Hydraulics (river flow)
    - How high does the water get
    - Where does it flood
    - How quickly does the water rise
  - Phase 3 – Preliminary Flood Damage Reduction (current phase)
    - What solutions can be done to reduce flooding and flood risk
COE Authorization

- Continuing Authorities Program Section 205 of the Flood Control Act of 1948, as amended by the Water Resources Development Act of 1986
  - Feasibility Study Cost – split 50/50
  - Design & Construction Cost – split 65/35
  - Local Partner (Topeka) required to acquire all lands, easements, rights-of-way, relocations, and disposal locations (LERRD).
    - Costs associated with LERRD are credited to the 35% cost share reducing the Partner’s cash requirement.
  - Federal statutory per project limit of $10M (feasibility, design, and construction). Roughly equates to a total project cost of $15M
## Section 205 Program
### Project Phases & Durations

<table>
<thead>
<tr>
<th></th>
<th>Feasibility</th>
<th>Implementation Phase</th>
<th>O&amp;M</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Design &amp; Construction</td>
<td>Life of Project</td>
</tr>
<tr>
<td>Typical Duration</td>
<td>2-3 Years</td>
<td>1-2 Years</td>
<td>2-3 Years</td>
</tr>
<tr>
<td>Federal Share of Costs</td>
<td>50%</td>
<td>65%</td>
<td>0</td>
</tr>
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</table>

**Agreement:**
- FCSA = Feasibility Cost Share Agreement;  
- PPA = Project Partnership Agreement

BUILDING STRONG®
Understanding the Problem
(Hydrology – the Study Area)
Understanding the Problem
(Hydraulics – Area 1)
Understanding the Problem
(Hydraulics – Areas 2 & 4)

Shunganunga Creek 2007 Flood Inundation Areas

Blue Areas: 2007 Flood (Existing Conditions)
Black Areas: 2007 Flood without Wood Valley Dry Detention Facility
Finding ways to Solve the Problem – Federal Criteria

- Federal Criteria
  - The proposed remedy must solve the problem – i.e. must be technically effective and feasible
  - Economic benefits must exceed the project cost – i.e. monetary flood damages reduced exceed cost
  - Induced effects – i.e. can not cause significant flooding in another area or another community
  - Locally and environmentally acceptable
Finding ways to Solve the Problem – Federal Criteria

….Continued

► Must look at non-structural and structural alternatives
  
  • Non-structural (move people away from the flood)
  • Structural (move the flood away from the people)

► Federal Government may be able to help financially and with construction

► In order for the Corps to participate in a future COST SHARED construction project, federal criteria must be met.
Finding ways to Solve the Problem -

- Current efforts include investigating what can be done to reduce the flooding. (Feasibility Study)
Non-structural

SHUNGANUNGA CREEK FLOOD SCENARIO

NON-STRUCTURAL: RELOCATE PEOPLE/REMOVE HOUSES
Structural
(Levee or Floodwall)

- Levees / floodwalls tend to make the water higher upstream and could induce damages.
Structural (Channel Modification)

- Channel improvements tend to make the water higher downstream and could induce damages.
Structural (Create more Storage)

SHUNGANUNGA CREEK FLOOD SCENARIO

STRUCTURAL: CREATE MORE DAMS OR MAKE THE EXISTING ONES BIGGER
Example Corps Projects

- Structural solution
  - South Topeka floodwall improvements (currently under construction)
Example Corps Project

Floodwall structural improvements (completed)
Example Corps Project

Newbury riffle structure on the Blue River (completed)
Example Corps Project
Study Areas Considered

Approximate Number of Structures within the 1% ACE Floodplain

<table>
<thead>
<tr>
<th>Area</th>
<th>Structures</th>
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<tbody>
<tr>
<td>Area 1</td>
<td>210</td>
</tr>
<tr>
<td>Area 2</td>
<td>430</td>
</tr>
<tr>
<td>Area 4</td>
<td>230</td>
</tr>
</tbody>
</table>

Note: about 1,116 structures are within the existing 1/100 ACE (100yr) Shunganunga Creek floodplain identified in this study.
Alternatives Evaluated

**Structural**
- Levees / floodwalls
- Upstream detention (i.e. dams)
- Channel Modification

**Non-Structural**
- Buyouts / relocations
- Floodproofing

**Combination**

- Evaluate at different levels of flooding.
  - 4% ACE (25-year)
  - 2% ACE (50-year)
  - 1% ACE (100-year)
How the Alternatives were Evaluated

- Does it meet Criteria
  - Does the solution solve the problem – i.e. must be technically effective and feasible
  - Does the economic benefits must exceed the project cost – i.e. monetary flood damages reduced exceed cost
  - Does it have induced effects – i.e. can not cause significant flooding in another area or another community
  - Is it locally and environmentally acceptable
Induced Damages

- The interaction between combined Alternatives present tradeoffs.
  - Levees / floodwalls tend to make the water higher (i.e. induce damages) upstream
  - Channel improvements tend to make the water higher (i.e. induce damages) downstream
### Summary of Results

<table>
<thead>
<tr>
<th>Area</th>
<th>Levees &amp; Floodwalls (L&amp;F)</th>
<th>Channel Modifications (CM)</th>
<th>Combination L&amp;F + CM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area 1</td>
<td>Effective</td>
<td>Somewhat effective</td>
<td>Effective</td>
</tr>
<tr>
<td></td>
<td>Not affordable</td>
<td>Marginally affordable</td>
<td>Not affordable</td>
</tr>
<tr>
<td></td>
<td></td>
<td>induces damages</td>
<td></td>
</tr>
<tr>
<td>Area 2</td>
<td>Effective</td>
<td>Somewhat effective</td>
<td>Effective</td>
</tr>
<tr>
<td></td>
<td>Affordable</td>
<td>Not affordable</td>
<td>Not Affordable</td>
</tr>
<tr>
<td>Area 4</td>
<td>Effective</td>
<td>Effective</td>
<td>Effective</td>
</tr>
<tr>
<td></td>
<td>Not affordable</td>
<td>Affordable</td>
<td>Not Affordable</td>
</tr>
</tbody>
</table>

- Also evaluated:
  - Creating additional storage either through modification of existing dams or creating a new dam. Not affordable per COE standards, but provides benefit and may warrant consideration by others.
  - Non-structural solutions such as buy-out and relocations or flood proofing. Not affordable.
Summary of Results

Area 2: levee / floodwall
Area 4: channel modification
Area 5: waterproof spoil bank levee to mitigate induced damages from Area 4

Area 1: Dam upstream of Area 1 & channel work may be considered by others
Areas 2 and 3: Wood Valley dam improvements may be considered by others
Alternative 5

Area 2: Levee

Area 4: Channel Improvements

Considered Measures
- Remaining Study Areas
- Considered Measures
- Existing Federal Levee

Legend:
- 1
- 0.5
- 0
- 1 Miles
Alternative 5 – Key Points

Area 2 (levee) + Area 4 (Channel Improvements)

- Provides protection to for areas 2 and 4.
- Does not induce damages.
- Within the Section 205 per project limit with approximately a $30k Sponsor buy-up.
- Does not provide protection for area 1.
  - Could provide protection and mitigate damages to downstream area by Sponsor constructing a new dam and area 1 channel improvements
Measure N4

Area 4: Channel Improvements

Considered Measures
- Remaining Study Areas
- Considered Measures
- Existing Federal Levee

Scale: 1 0.5 0 1 Miles
Measure N4 – Key Points

Channel Improvements in Area 4

- Maximizes net benefits
- Is within the Section 205 per project limit
- Considered an incomplete project as it only provides benefit to one area.
Summary

- Results are Preliminary
  - Technical and Policy reviews are in progress
- Channel improvements are recommended for Area 4.
- Levee / floodwall are recommended for Area 2.
- A new dam upstream of Area 1 in conjunction with channel improvements provide significant economic benefit. Not viable as part of a Federal project, but warrants consideration by others.
- Wood Valley dam modifications would reduce flooding and provide significant benefit. Not viable as part of a Federal project, but warrants consideration by others.
Thank You