Abilene’s Master Drainage Plan

Curtis Beitel, P.E., CFM, ENV SP
HDR Engineering, Inc

Srikhes Valavala, MS, MBA, CFM
City of Abilene Stormwater Administrator

Background

Abilene, Texas - Has a long history of flooding

July 2002 flood...
Background

• Abilene drains from south to north
• Channels have a fixed capacity
• Very flat and numerous flash flood areas
• Low water crossings are prevalent
• Streets work as drainage ways

What Flooding Costs Abilene

• Property Damage
  • Residential
  • Commercial
• Contents Damage
• $18M average annually
• Vehicle Damage
• Potential Loss of Life
  • Residents
  • Visitors
  • First Responders
• Channel Erosion
• Water Quality

Abilene Master Drainage Plan (AMDP)

• Initiated development of Abilene Master Drainage Plan in 2015
• AMDP to:
  • Engage stakeholder discussions
  • Develop a long range plan to address City drainage
  • Identify list of potential drainage capital improvement projects
  • Assign priority to project implementation
  • Lay out a Road Map to reduce regional flood risk
• Stormwater utility fee was increased to fund AMDP in FY 2017
• City Council approved contract on February 09, 2017 authorizing the HDR Team to perform engineering services for AMDP
**Master Drainage Plan Process**

- Review Existing Data
- City Staff Workshop
- Stakeholders Meeting #1
- Creek Visit
- Identified 46 Problem Areas
- Site Reconnaissance
- Identified 20 Problem Areas
- Stakeholders Meeting #2
- CIP for Top 5 Problem Areas
- Scared 20 Problem Areas
- Meeting with FW USACE
- CIP for Top 10 Problem Areas
- Project Specific Criteria
- Financial Analysis
- Draft Road Map
- City Council Presentation

**Storm Water Stakeholders Committee**

<table>
<thead>
<tr>
<th>Name</th>
<th>Representing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duane Martin, AIA</td>
<td>Hendrick Health Services</td>
</tr>
<tr>
<td>Robert Calk</td>
<td>Senter Realtors</td>
</tr>
<tr>
<td>Gene Lantip</td>
<td>Lantip Homes / Big Country HBA</td>
</tr>
<tr>
<td>Joe Humphrey</td>
<td>Abilene ISO</td>
</tr>
<tr>
<td>Tai Filingan, P.E.</td>
<td>Jacob &amp; Martin</td>
</tr>
<tr>
<td>Kevin Phillips</td>
<td>Harris Abilene</td>
</tr>
<tr>
<td>Dana Schoening</td>
<td>City Planning</td>
</tr>
</tbody>
</table>

**All Drainage Problem Areas**

- 46 Locations
- 10 Stakeholder
- 3 FIS Profiles
- 3 City Staff
- 30 Creek Visits

**Watersheds**

- 9 Elm Creek
- 15 Cutline Creek
- 5 Little Elm Creek
- 13 Cedar Creek
- 2 Rainey Creek
- 1 Lytle Creek
- 1 Elm & Cedar
Top 20 Drainage Problem Areas

- Watersheds
  - 2 Elm Creek
  - 8 Catclaw Creek
  - 3 Little Elm Creek
  - 6 Cedar Creek
  - 1 Elm & Cedar

Problem Area Ranking Criteria

<table>
<thead>
<tr>
<th>Category</th>
<th>Points</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
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<tbody>
<tr>
<td>Residential</td>
<td></td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>9</td>
<td>10</td>
</tr>
<tr>
<td>Commercial</td>
<td></td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
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<td>9</td>
<td>10</td>
</tr>
</tbody>
</table>

- Structural Flooding
- Roadway Inundation
- Repetitive Losses

Site Reconnaissance - Top 20 Problem Areas

- Confirm initial criteria scores
- Develop and evaluate potential solutions
- Documented on forms
Top 10 Problem Areas

<table>
<thead>
<tr>
<th>Problem Area</th>
<th>Number of People at Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elm Creek Diversion Channel</td>
<td>17,000</td>
</tr>
<tr>
<td>Elm Creek overflows to Catclaw Creek</td>
<td>6,900</td>
</tr>
<tr>
<td>Structures in floodplain ($1.2 billion)</td>
<td></td>
</tr>
<tr>
<td>10,000+ in 500-year</td>
<td></td>
</tr>
<tr>
<td>6,900+ in 100-year</td>
<td></td>
</tr>
<tr>
<td>3,500+ in 25-year</td>
<td></td>
</tr>
<tr>
<td>100-year flood expected to cause:</td>
<td></td>
</tr>
<tr>
<td>$69 million damages</td>
<td></td>
</tr>
<tr>
<td>17,000 persons at risk</td>
<td></td>
</tr>
</tbody>
</table>

Elm Creek Diversion Channel

- USACE Interim Feasibility Study (2004-2007)
- Elm Creek overflows to Catclaw Creek
- Structures in floodplain ($1.2 billion)
  - 10,000+ in 500-year
  - 6,900+ in 100-year
  - 3,500+ in 25-year
- 100-year flood expected to cause:
  - $69 million damages
  - 17,000 persons at risk

Elm Creek Diversion Channel

- Large upstream dry detention or a bypass channel to Little Elm Creek
- Channel requires 18 parcels
- Calculated B/C = 1.67
- USACE also looked at buyout of entire neighborhoods
  - Structural inventory
    - Yellow houses = 2-year
    - Red houses = 5-year
    - Orange = 10-year
Input from City Council Workshop

- Elm Creek Diversion Channel (not the Detention Pond #2)
  - $80 million total project ($20 million local match, mostly ROW)
  - Next step is preliminary investigation to confirm boundaries
  - Position for FEMA grant funding (HAGF or PDM)
  - Letter from USACE to confirm not interested in moving forward
  - Calculate B/C ratios using FEMA’s BCA Tool

- Downtown Railroad Underpasses is a lower priority
  - Lowered from priority #3 to #8
  - Investigate closer outfall for Treadaway / S 27th Street

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- Minimize additional property acquisition
  - Elm Creek Diversion Channel corridor
  - Detention on Little Elm Creek and Buttonwillow Creek

Phased and Resequenced CIP Solutions

- Additional phasing & prioritization of Top 9 CIP projects
  - Based on project specific details
  - Project Specific Criteria:
    - Calculated a score for each project phase
      - Sequenced CIP phases based on
        - Highest total point score
        - Completion of previous project phases

Phased CIP Projects for Easier Implementation
Phased CIP Projects for Easier Implementation

- Developed Financial Model for Stormwater Fund
- Forecasts revenues and expenditures out to 2048
  - Assumes 2% inflation on personnel / maintenance / supplies
  - Annual input of
    - Residential & Commercial Rates
    - Customer Count (growth)
    - Collections Rates
- Sequential CIP program
  - Assumes 3% inflation
  - Cash as you go
  - Bond financing (> $1 million)
    - 4.5% with 3.5% soft costs
- Tool for City staff to update and maintain going forward

Financial Analysis
Road Map – Complete CIP in 25 Years

- 1 or 2 project phases per year, completed in 2044

Abilene Master Drainage Plan Projects

<table>
<thead>
<tr>
<th>Priority</th>
<th>No.</th>
<th>Description</th>
<th>City Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>V/2</td>
<td>215th Creek from 5 1/2 to 5 7/8</td>
<td>$1,090,000</td>
</tr>
<tr>
<td>2</td>
<td>S-10</td>
<td>Operations of Lake Amor / Lake Kitty</td>
<td>$150,000</td>
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<tr>
<td>3</td>
<td>V/19</td>
<td>Little Elm Creek at 5 7/8 28</td>
<td>$5,933,000</td>
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<tr>
<td>4</td>
<td>C-9</td>
<td>Buttonwillow Creek Crossing</td>
<td>$1,304,797</td>
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<tr>
<td>5</td>
<td>V/10</td>
<td>Sin Creek Detention below Southwest Drive</td>
<td>$5,000,000</td>
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<tr>
<td>6</td>
<td>S-6</td>
<td>Treadaway and S 23rd Street</td>
<td>$699,400</td>
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<tr>
<td>7</td>
<td>C-1</td>
<td>Downtown Railroad Underpasses</td>
<td>$644,499</td>
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<tr>
<td>8</td>
<td>V/31</td>
<td>Buttonwillow Upland Detention</td>
<td>$3,942,175</td>
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<tr>
<td>9</td>
<td>V/2</td>
<td>Improve Curry Lane Detention Pond (v/18)</td>
<td>$4,746,000</td>
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Subtotal: Stormwater Utility CIP Projects $24,722,397

TWDB FIF Funding of CIP Solutions

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<td>S-5</td>
<td>215th Creek Drainage Channel (Revital. Mnt)</td>
<td>$35,985,000</td>
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<tr>
<td>2</td>
<td>V/7</td>
<td>215th Creek Blue 6 1/2 to 5 7/8</td>
<td>$2,450,000</td>
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<td>3</td>
<td>S-1</td>
<td>Operations of Lake Amor / Lake Kitty</td>
<td>$1,900,000</td>
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<td>Buttonwillow Creek Crossing</td>
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<td>6</td>
<td>V/12</td>
<td>Sin Creek Detention below Southwest Drive</td>
<td>$2,952,678</td>
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<td>7</td>
<td>S-6</td>
<td>Treadaway and S 23rd Street</td>
<td>$1,124,415</td>
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<td>C-1</td>
<td>Downtown Railroad Underpasses</td>
<td>$426,000</td>
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Subtotal: Stormwater Utility CIP Projects $24,722,397
Where AMDP Stands

• Final AMDP report submitted by HDR on January 30, 2020
• City Council adopted the AMDP Scenario 4, a 25 year execution without Elm Creek Diversion Channel Project
• On August 13, 2020, Council revised Stormwater Utility Rates and Charges Schedule for the upcoming 5 years

Where AMDP Stands

• Increased funding is available October 1, 2021
• Additional revenue generated this year (~$150,000) initiates AMDP implementation
• First project from AMDP advertised this month
• Long term planning to reduce flood risk in Abilene is kept in place
• Financial model projections/adjustments
• Complements Abilene’s progressiveness...
• Numerous challenges along the way of development

AMDP Moving Forward...

• Long road to travel, 2046 target
• Exploring grant funding opportunities
• Potential for federal infrastructure funding
• Upper Brazos Region 7 Flood Planning Efforts
• Looking opportunities to reduce burden on Abilene Tax Payer
• Prospecting to cut implementation timeline