FORT WORTH’S STORM DRAIN REHABILITATION PROGRAM -
COWTOWN’S APPROACH TO WRANGLING STORM DRAINS
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Presented By:
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AGENDA

- Background
- Program framework
- Initial assessment
- Condition assessment
- Prioritize
- Corrective action
- Lessons learned
STORM DRAIN REHABILITATION

BACKGROUND
STORM DRAIN REHABILITATION | BACKGROUND

SWMP (2016) AND ACCOMPLISHMENTS SINCE 2006
- Inventory and condition assessment – PRIORITY 1
- Flood reduction capital projects
- Maintenance
- Planning
- Development services
- Equipment and technology
- Public communications
STORM DRAIN REHABILITATION | BACKGROUND

BACKGROUND

Objective criteria
- Structural flood risk
- Level of service
- Criticality
- Cost efficiency
- Road hazard

Subjective criteria
- Public opinion
- Economic development impact
- Aesthetics
- Neighborhood impact

Prioritization Strategy:
Continue to expand the acquisition and effective use of data to inform programming decisions

Stakeholder Comment:
“I think you have to prioritize and achieve results over time without increasing budget/expenditures.”
STORM DRAIN REHABILITATION | BACKGROUND

BACKGROUND

- SD rehab is a Priority Initiative for TPW
- Genesis, drivers, goals
  - Enhance safety of Fort Worth
  - Proactive vs reactive O&M
  - Doing more with less
  - Improve level of service

![Image of pipe deformed with inset showing observations and measurements]

- AMH: Manhole/Downstream
- MIWL: Water Level, 5% of pipe
- RPDD: Repair Patch Defect
- CC: Crack Circumferential
- TB: Tap Break-In at 12 o'clock
- CL: Crack Longitudinal at 3 o'clock
- SAV: Surface Aggregate Visible from 4 o'clock to 8 o'clock
STORM DRAIN REHABILITATION | BACKGROUND

BACKGROUND

KEY TASKS

- Initial system assessment
- Assess storm drain pipe condition
- Prioritize storm drain pipes
- Rehab work order startup
- Build the program framework

Blanco State Park, Texas
### PROGRAM FRAMEWORK

- Define Level of Service (LOS) goals and Key performance indicators (KPIs)
- Program tasks
- Manpower

<table>
<thead>
<tr>
<th>Program Task</th>
<th>Manpower</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cleaning and access</td>
<td>SWFOs</td>
</tr>
<tr>
<td>Inspection</td>
<td>Contract initially, then in-house</td>
</tr>
<tr>
<td>Assessment, needs identification, prioritization</td>
<td>Consultant</td>
</tr>
<tr>
<td>Corrective actions</td>
<td>Contract and supplement with SWFO in opportunistic areas</td>
</tr>
</tbody>
</table>
STORM DRAIN REHABILITATION

INITIAL STORM DRAIN ASSESSMENT
INITIAL STORM DRAIN ASSESSMENT

- Initial project prioritization
  - COF-basis
  - Consideration of proximity to structures
  - Easement status
- Easement research and verification
- Staff knowledge workshop
  - Discussed and gathered institutional knowledge
  - System maintenance, rehab, failure
STORM DRAIN REHABILITATION

HOW TO ASSESS STORM DRAIN CONDITION?
HOW TO ASSESS STORM DRAIN CONDITION?

1. Criticality Prioritizes Data Collection
2. Cleaning SD/Prep for CCTV
3. Data Collection
4. Quality Check
5. Data Storage/Processing
6. Determine Action/Prioritize
7. Perform Corrective Action
8. Update Inventory

CCTV Process
HOW TO ASSESS STORM DRAIN CONDITION?

- Equipment - Options for effective pipe condition assessment
- Staffing - Initially contract CCTV
- Future goal to implement in-house CCTV
- Approaches, benefits, and limitations – PACP, Quick Score, streamlined (4’s and 5’s)

PACP Quick Rating

- A shorthand way of expressing the number of occurrences for the two highest severity grades
- A four character score
HOW TO ASSESS STORM DRAIN CONDITION?

Project tools
- Summary of defects and specific considerations by pipe
- Recommendations of appropriate rehabilitation methods
- Map with defects referenced; Profile with defect linear referencing based on as-built and CCTV data
STORM DRAIN REHABILITATION

HOW TO PRIORITIZE STORM DRAINS?
HOW TO PRIORITIZE STORM DRAINS?

- Establish strategic, program approach to manage storm drain infrastructure
- Develop criticality to prioritize
  - Condition assessment
  - Evaluation
  - Corrective action
- Software framework
  - ESRI
  - Accela
  - ITPipes
- Risk prioritization toolbox
- Refine prioritization

<table>
<thead>
<tr>
<th>Probability of Failure</th>
<th>Weight (%)</th>
<th>Consequence of Failure</th>
<th>Weight (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percent Consumed</td>
<td>30%</td>
<td>Size</td>
<td>40%</td>
</tr>
<tr>
<td>Capacity</td>
<td>30%</td>
<td>Buildings</td>
<td>20%</td>
</tr>
<tr>
<td>Operating Environment</td>
<td>20%</td>
<td>Roads</td>
<td>20%</td>
</tr>
<tr>
<td>Material</td>
<td>20%</td>
<td>Critical Service</td>
<td>20%</td>
</tr>
<tr>
<td>TOTAL</td>
<td>100%</td>
<td>TOTAL</td>
<td>100%</td>
</tr>
</tbody>
</table>
HOW TO PRIORITIZE STORM DRAINS?

- Develop risk prioritization tools in ArcGIS
- Perform initial/baseline prioritization
- Leverage condition data to refine prioritization approach and assumptions
HOW TO PRIORITIZE STORM DRAINS?

- Risk tools demonstration - baseline
STORM DRAIN REHABILITATION

HOW TO IMPLEMENT CORRECTIVE ACTION?
HOW TO IMPLEMENT CORRECTIVE ACTION?

- Prioritize critical storm drain pipes
  
  Severity per CCTV x Consequence of failure (critical areas) = "Risk"

- Best-value rehabilitation bidder ranking and selection

- Select corrective action - rehab methods matrix*(trenchless preferred)

<table>
<thead>
<tr>
<th>Spray-on (EPOXY)</th>
<th>Spray-on (CEMENTITIOUS)</th>
<th>CIPP</th>
<th>Slip-lining</th>
<th>Pipe bursting</th>
<th>Spiral-wound</th>
</tr>
</thead>
<tbody>
<tr>
<td>A spray-on or hand troweled lining (epoxy) is applied to a cleaned and dried existing pipe crack, joint or wall.</td>
<td>A spray-on lining (cementitious) is applied to a cleaned and dried existing pipe wall.</td>
<td>An impregnated liner is inserted inside of an existing pipe and cured with water or steam.</td>
<td>A new pipe is inserted while bursting or splitting the existing pipe.</td>
<td>New pipe is inserted while bursting or splitting the existing pipe.</td>
<td>Above ground spool feeds PVC profile to the winding machine, which forms the new pipe by spirally interlocking</td>
</tr>
</tbody>
</table>

*LA Tech TAG-R, NASSCO, Najafi, et al research text
STORM DRAIN REHABILITATION

LESSONS LEARNED
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- Strategic, high-level planning builds the program foundation
- Structure the program for measurable success
- Keep in mind stakeholder priorities and metrics
- Evaluate the information you have and get started—asset inventory is the logical Step One
- Detailed condition assessment of all assets is not needed to start
- Storms drains differ from sanitary sewers—defects, failure modes, condition scoring
- Begin to collect the “right” data today for data-driven evaluation tomorrow
- Prioritization should look at risk factors (POF and COF) but also “constructability”
THANK YOU

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