City of Fort Worth
TPW Asset Management Journey

Presented by: Michael Owen, P.E., PMP and Elizabeth Young, GISP
City of Fort Worth TPW
September 17, 2020
Asset Management in City of Fort Worth – Keeping it Simple and Bringing Folks Along for the Ride

Presented by:
Michael Owen, P.E., PMP
City of Fort Worth TPW Department
May 21, 2019
Last Year’s Topics

• Benefits of Asset Management
• Key definitions
• Asset Management Framework
• Obstacles/pitfalls we had encountered
• How to keep it simple
• How to get others to come along for the ride
Continuation of TPW’s Asset Mgmt JOURNEY
Focus on the following:

- Asset Mgmt impact in TPW
- TPW “Asset Management” efforts to date
- Practical Applications
- Next steps
Asset Management Impact
Elements of an Asset Management Program

1. Asset Inventory
   - Asset Inventory & Data Management

2. Asset Criticality
   - Identify Critical Assets (PoF & CoF)

3. Service Levels
   - Establish Performance Standards

4. Asset Condition
   - Rate Assets

5. Optimal Maintenance
   - Plan & Execute PM

6. Life Cycle Costing
   - Apply R&R Decisions

- Identify Critical Assets (PoF & CoF)
- Establish Performance Standards
- Plan & Execute PM
- Apply R&R Decisions
- Asset Inventory & Data Management

- Asset Criticality
- Service Levels
- Asset Condition
- Optimal Maintenance
- Life Cycle Costing
Asset Management Timeline in TPW

- **2006**: Pavement Management Implements Asset Management Software
- **2007**: Stormwater Asset Inventory (5 years)
- **2008**: Streets Develops Internal Asset Management Software
- **2009**: Streets/Traffic Asset Inventory (1 Year)
- **2010**: Stormwater Condition Assessment Program Kick-Off
- **2011**: Traffic Work Order System Go-Live (15 Months)
- **2012**: Stormwater Work Order System Go-Live (2 Years)
- **2013**: Stormwater Work Order System Go-Live (11 Months)
- **2014**: Street Work Order System Go-Live (3 Years)
- **2015**: Street Work Order System Go-Live (11 Months)
- **2016**: Condition & Inventory Update (Tentative)
TPW Asset Management Efforts to Date

• Asset Inventories/Data Management - GIS
• Work Order Systems – CMMS (Accela and VueWorks)
• Condition Assessments (Ex. Pwmt Maint Program)
• Initiatives (Ex. SD Rehab Program)
• Education/Training
  • 23 City/12 TPW staff - attended 5-day AM IAM Cert Course
  • 21 City/16 TPW staff - attended 1-day AM Overview Course
TPW Asset Management Data - Inventory

### Streets
- **Bridges**
  - 437 Assets
  - 0 Attributes
  - 437 Data Elements
- **Curb & Gutters**
  - 300,138 Assets
  - 23 Attributes
  - 6,694,388 Data Elements
- **End of Road Barricades**
  - 1,112 Assets
  - 22 Attributes
  - 24,298 Data Elements
- **Guardrails**
  - 166 Assets
  - 19 Attributes
  - 3,54 Data Elements
- **Pavement**
  - 34,110 Assets
  - 83 Attributes
  - 2,810,380 Data Elements

### Traffic Management
- **Poles**
  - 120,340 Assets
  - 11 Attributes
  - 1,276,407 Data Elements
- **Sidewalks**
  - 50,768 Assets
  - 15 Attributes
  - 701,665 Data Elements
- **Signs**
  - 129,385 Assets
  - 30 Attributes
  - 3,842,820 Data Elements
- **Signal Intersections**
  - 958 Assets
  - 9 Attributes
  - 8,577 Data Elements
- **Street Lights**
  - 65,347 Assets
  - 33 Attributes
  - 2,129,127 Data Elements
- **Traffic Signals**
  - 4,814 Assets
  - 38 Attributes
  - 179,550 Data Elements

### Stormwater
- **Channel Features**
  - 7,547,725 Assets
  - 7 Attributes
  - 271,509 Data Elements
- **Inlet**
  - 39,803 Assets
  - 41 Attributes
  - 1,631,431 Data Elements
- **Manhole**
  - 10,295 Assets
  - 31 Attributes
  - 319,145 Data Elements
- **Channels**
  - 15,890 Assets
  - 17 Attributes
  - 270,521 Data Elements
- **Pipes**
  - 70,392 Assets
  - 17 Attributes
  - 1,196,664 Data Elements
- **Pipe Features**
  - 38,784 Assets
  - 7 Attributes
  - 271,509 Data Elements

**Assets in Inventory – 992,373**
- **Storm Water**
- **Streets**
- **Traffic Management**

**Data Elements - 20,512,839**
- **Storm Water**
- **Streets**
- **Traffic Management**

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<table>
<thead>
<tr>
<th>Rank</th>
<th>Program Element</th>
<th>Stormwater</th>
<th>Streets</th>
<th>Traffic</th>
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<tbody>
<tr>
<td>1</td>
<td>Asset Inventory &amp; Data Management</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
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<tr>
<td>2</td>
<td>Asset Criticality</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
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<tr>
<td>3</td>
<td>Service Levels</td>
<td></td>
<td>✔</td>
<td>✔</td>
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<td>4</td>
<td>Asset Condition</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
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<td>5</td>
<td>Optimal Maintenance</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
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<td>6</td>
<td>Life Cycle Costing</td>
<td></td>
<td>✔</td>
<td>✔</td>
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Practical Applications

- Pavement Condition Assessment

- SW Storm Drain Rehabilitation Program
Pavement Condition Assessment/Inventory

- 2016 Inventory
- 3200 lane miles
- Additional assets:
  - Streetlight
  - Traffic Signals
  - Sidewalks
  - Pavement Markings
Pavement Condition Index (PCI) is a numerical index between 0 and 100, which is used to indicate the condition of a specific section of road pavement.

Overall Condition Index (OCI) utilizes the PCI but also takes into account other factors such as, curb/gutter condition and missing curb.
Condition Scoring

<table>
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<th>PCI</th>
<th>Condition</th>
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<tbody>
<tr>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td>91</td>
<td>100</td>
</tr>
<tr>
<td>81</td>
<td>90</td>
</tr>
<tr>
<td>61</td>
<td>80</td>
</tr>
<tr>
<td>41</td>
<td>60</td>
</tr>
<tr>
<td>21</td>
<td>40</td>
</tr>
<tr>
<td>0</td>
<td>20</td>
</tr>
</tbody>
</table>

- Excellent: 30.54%
- Very Good: 30.14%
- Good: 25.61%
- Fair: 8.89%
- Poor: 4.27%
- Failed: 0.55%
Risk and Forecasting

Risk Manager

Filter is OFF - Current list contains 4 out of 4 Assets

Layer: Pavement  
Location: Cutter St (3300-3399 Foard St - Nolan St)  
Risk Calculation Date:  
Created: 01/23/2018  
By: Wade Goodman

Budget Scenario Wizard

Scenario Name: New Scenario 4

Scenario Description:

Step 1: Select Analysis Type
- Automated Budget Forecast where VUEWorks picks Assets and Jobs based upon your criteria
  - A multi-year budget estimate that meets threshold goals using a 'what-if' approach
  - A prioritized list of assets based on information from the Risk and Condition Modules
  - Jobs to be performed based on Risk, Condition, and Deterioration Information

- Budget Forecast where Assets and Jobs are specified in Projects
  - Analyze Projects from the Projects Module for long term costs
  - Selects Assets and Jobs as defined in Projects

- Project Analysis with Life-Cycle cost options to calculate Benefit/Cost ratios
  - Analyze Projects from the Projects Module for long term costs
  - Calculates Benefit/Cost ratios as a basis for Project comparison

NOTE: The Analysis Type can not be changed after a scenario is saved

Probability of Failure Ratings

Consequence  Rating  Weight  Severity

Risk Factor: NR  
Consequence Factor: NR  
Failure Probability: NR  
Criticality Factor: NR
Storm Drain Rehabilitation Program
Criticality of Stormwater Infrastructure

Probability of Failure x Consequence of Failure = Criticality
Storm Drain Rehabilitation – BRE Criteria

• Criteria: Probability of Failure (POF) and Consequence of Failure (COF)

\[
\text{POF} \times \text{COF} = \text{Business Risk Exposure (BRE)}
\]

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<thead>
<tr>
<th>Probability of Failure</th>
<th>Description</th>
<th>Weight (%)</th>
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<tbody>
<tr>
<td>Percent Consumed</td>
<td>remaining useful life</td>
<td>30%</td>
</tr>
<tr>
<td>Capacity</td>
<td>pipe capacity vs contributing runoff</td>
<td>10%</td>
</tr>
<tr>
<td>Operating Environment</td>
<td>zoning designation</td>
<td>20%</td>
</tr>
<tr>
<td>Material</td>
<td>pipe material designation</td>
<td>20%</td>
</tr>
<tr>
<td>Soils</td>
<td>expansive soils by geologic formation</td>
<td>20%</td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td>100%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Consequence of Failure</th>
<th>Description</th>
<th>Weight (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size</td>
<td>size as indicator of pipe flow and population</td>
<td>40%</td>
</tr>
<tr>
<td>Buildings</td>
<td>buildings served by pipes</td>
<td>15%</td>
</tr>
<tr>
<td>Roads</td>
<td>roads by class near pipe</td>
<td>15%</td>
</tr>
<tr>
<td>Critical Service</td>
<td>critical facilities served by pipes</td>
<td>15%</td>
</tr>
<tr>
<td>Sag Inlets</td>
<td>sag inlets connected to pipes</td>
<td>15%</td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td>100%</td>
</tr>
</tbody>
</table>
Storm Drain Rehabilitation – BRE Priority

- Low Risk: 73%
- Medium Risk: 19%
- High Risk: 8%
Storm Drain Rehabilitation

**ASSESSMENT**

Prioritize Map
Sheds for Condition Assessment
- BRE Score
- Coordination w/ upcoming improvements
- CD Balance

**Field Assessment/ Prep Work**
- Inspect/Pole Camera
- Provide Access
- Clean Pipe

**CCTV**
- Data collection
- QA/QC
- Pipe Scoring

**Corrective Actions**
- Identify
- Prioritize (Risk, equity & balance)

**Project Development**
- Prepare schematic P&P
- Recommend method (trenchless/open cut)
- Estimate cost
Storm Drain Rehabilitation

DELIVERY

Select “Program Delivery” Consultant
- Program delivery experience
- Trenchless technology experience
- Delivery focus

Recommend Delivery Method
- Unit Price Contract
- Competitive Bid

Identify Projects
- Priority (Risk, equity & balance)
- Rehab Method (trenchless/open cut)
- Locations

Design
- Easement Acquisition
- Minor design/details
- Prepare bid package

Construction
- Contractor
- Inspection
- Documentation
Asset Management Focus Areas
TPW Next Steps

Develop TPW-wide Asset Management “strategy” to guide ongoing and future Asset Management efforts

• Continue education/training efforts
• Engage Asset Management experts to assist
• Develop Asset Management Road Map
• Develop TPW Strategic Asset Management Plan
• Formalize Asset Management Plans for Asset Groups
Questions?
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