Getting Started with Stormwater Asset Management

Fall Conference
Broken Arrow, OK

September 17, 2018
How am I going to fund needed improvements?
How much do the improvements cost?
What improvements are needed?
What is the goal performance of the assets?
What is the current condition of the assets?
What are the assets?
Asset Management Balance

Cost

Performance

Risk
Asset Management Model

Organisational Strategic Plan

Scope of Asset Management

Risk & Review

Organisation & People

Asset Information

Asset Management Decision Making

Strategy & Planning

Lifecycle Delivery

Acquire
Operate
Dispose
Maintain

Customers
Legislation
Investors
Commercial Environment
Asset Management Subject Groups

**Group 1 - Strategy & Planning**
1. Asset Management Policy
2. Asset Management Strategy & Objectives
3. Demand Analysis
4. Strategic Planning
5. Asset Management Planning

**Group 2 - Asset Management Decision-Making**
6. Capital Investment Decision-Making
7. Operations & Maintenance Decision-Making
8. Lifecycle Value Realisation
9. Resourcing Strategy
10. Shutdowns & Outage Strategy

**Group 3 - Life Cycle Delivery**
11. Technical Standards & Legislation
12. Asset Creation & Acquisition
13. Systems Engineering
14. Configuration Management
15. Maintenance Delivery
16. Reliability Engineering
17. Asset Operations
18. Resource Management
19. Shutdown & Outage Management
20. Fault & Incident Response
21. Asset Decommissioning & Disposal

**Group 4 - Asset Information**
22. Asset Information Strategy
23. Asset Information Standards
24. Asset Information Systems
25. Data & Information Management

**Group 5 - Organisation & People**
26. Procurement & Supply Chain Management
27. Asset Management Leadership
28. Organisational Structure
29. Organisational Culture
30. Competence Management

**Group 6 - Risk & Review**
31. Risk Assessment & Management
32. Contingency Planning & Resilience Analysis
33. Sustainable Development
34. Management of Change
35. Asset Performance & Health Monitoring
36. Asset Management System Monitoring
37. Management Review, Audit & Assurance
38. Asset Costing & Valuation
39. Stakeholder Engagement

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Stormwater Management
Building an Asset Management Program

What is our current system?

STEP 1
Asset Inventory & Data Gathering

STEP 2
Condition & Criticality Scoring

STEP 3
Establishment of Levels of Service

STEP 4
Risk Based Analysis

STEP 5
Business Case for Projects/Activities

STEP 6
CIP Forecast & O&M Strategies
Storm System Features

Asset Inventory & Data Gathering
Field Inventory

Asset Inventory & Data Gathering
Water Quality Compliance

Asset Inventory & Data Gathering

Inventory
- Streams
- Outfalls
Water Quality Compliance, Maintenance

Inventory
- Streams
- Outfalls
- Drainage Network
- Asset Condition
Water Quality Compliance, Maintenance, CIP

**Inventory**
- Streams
- Outfalls
- Drainage Network
- Asset Condition
- Size and Material Invert Elevations
Asset Size

Asset Inventory & Data Gathering
## Assigning Pipe Condition Score

<table>
<thead>
<tr>
<th>Grade</th>
<th>Description</th>
<th>PACP* Defects</th>
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<tbody>
<tr>
<td>A- Very Good</td>
<td>Mild Defects</td>
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<td>Structural Defects &lt;= 10% Diameter. Minor Corrosion</td>
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<td>C- Fair</td>
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<td>E- Very Poor</td>
<td>Collapse or Imminent Collapse</td>
<td>Holes, Collapse, Missing Wall</td>
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*NASSCO Pipeline Assessment Certification Program*
Assigning Pipe Condition Score

A (Very Good)
B (Good)
C (Fair)
D (Poor)
E (Very Poor)
Criticality Assessment

Risk Based Analysis
What is the goal performance?

- Flood protection
- Biological natural habitat
- Recreational amenity
- Water quality treatment
Building an Asset Management Program

What are our priorities?

STEP 1
Asset Inventory & Data Gathering

STEP 2
Condition & Criticality Scoring

STEP 3
Establishment of Levels of Service

STEP 4
Risk Based Analysis

STEP 5
Business Case for Projects/Activities

STEP 6
CIP Forecast & O&M Strategies
Building an Asset Management Program

What are our priorities?

STEP 1
Asset Inventory & Data Gathering

STEP 2
Condition & Criticality Scoring

STEP 3
Establishment of Levels of Service

STEP 4
Risk Based Analysis

STEP 5
Business Case for Projects/Activities

STEP 6
CIP Forecast & O&M Strategies

CONDITION
Building an Asset Management Program

1. Asset Inventory & Data Gathering
2. Condition & Criticality Scoring
3. Establishment of Levels of Service
4. Risk Based Analysis
5. Business Case for Projects/Activities
6. CIP Forecast & O&M Strategies

What are our priorities?
## Probability of Failure

<table>
<thead>
<tr>
<th>Consequence of Failure</th>
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<td>Low Impact</td>
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<table>
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<td>Very High Impact</td>
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</table>

- **Low Risk**
- **Medium Risk**
- **High Risk**
Risk-Based Assessment

Risk = \text{Criticality} \times \text{Condition}

**Consequence of Asset Failure**
- Loss of service
- Impact to public health/safety
- Impact to property
- Impact to other infrastructure
- Compliance impact
- Repair difficulty
- Public image

**Probability of Asset Failure**
- Age
- Physical condition
- Performance
- Available capacity
- Maintenance history

**Probability of Failure**

<table>
<thead>
<tr>
<th>Condition</th>
<th>Very Good</th>
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<th>Fair</th>
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Criticality Assessment

Risk Based Analysis

High Risk
What are our strategies for asset service?
Project Prioritization System

City Criteria

Level of Service Goals

Council Goals

Benchmarks

Property Damage

Life Safety

Environmental Impact

Project Readiness

Project Cost

Fiscal Efficiencies

Sustainable Practice

Economic Impact

Business Case for Projects/Activities
# Project Prioritization System

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<th>Criteria</th>
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## Business Case for Projects/Activities

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# Property Damage

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<td>Project has no relation to property damage</td>
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<td>Project provides protection for property or infrastructure with an estimated tax value of &lt;$200,000</td>
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<td>High</td>
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<td>Project provides protection for property or infrastructure with an estimated tax value of &gt;$5,000,000</td>
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Business Case for Projects/Activities
## Project Prioritization System

### Overall Ranking

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<th>Final Rank</th>
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<th>Project Name</th>
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<th>Fiscal Efficiencies</th>
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<th>Project Practice</th>
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<td>151 S Page St - Pipe Replacement</td>
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## Business Case for Projects/Activities

### One Page Report

**Watershed Baseline**
- **Assessment:** 2B - Lower Channel Improvements and Culvert Replacements

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<tr>
<th>Database ID</th>
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**Reduction Alternatives Database:**
- **Alternative ID:** 12 |
- **Cost:** $2,153,163 |
- **BCR:** 0.3 |
- **Description:**
  - **Description:** Channel improvements from Village Creek Dam to the existing channel drop near Carrolls Bridge. The alternative also includes channel improvements at Dilworth Street and Edison Road. Increased conveyance capacity is needed to accommodate increased stormwater flows. A channel improvement is needed to reduce the high peak flows and improve the capacity of the system.
  - **Cost:** $2,153,163 |
  - **BCR:** 0.3 |

### Summary

- **Cost:** $2,153,163
- **BCR:** 0.3

**Maps:**
- **Location:** Dilworth Street and Edison Road
- **Channel Improvements:**
  - **Description:** Channel improvements from Village Creek Dam to the existing channel drop near Carrolls Bridge.
  - **Cost:** $2,153,163
  - **BCR:** 0.3

---

**Business Case Communication**

**FREES NICHOLLS**
Building an Asset Management Program

What are our strategies for asset service?

STEP 1: Asset Inventory & Data Gathering
STEP 2: Condition & Criticality Scoring
STEP 3: Establishment of Levels of Service
STEP 4: Risk Based Analysis
STEP 5: Business Case for Projects/Activities
STEP 6: CIP Forecast & O&M Strategies

Staffing
Building an Asset Management Program

What are our strategies for asset service?

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Staffing
- Equipment
- O&M Approach
- Capital Projects
- Funding Strategy
- Monitoring, Review
- Update and Improvement
Whole-Life Cost Planning

• When is the right time to replace a particular asset?
• Optimize planned investments to realize the greatest value from assets based on financial constraints, risk tolerance, and performance obligations
Stormwater Budget Allocation

- Flood Mitigation: 44%
- Maintenance: 37%
- Water Quality: 13%
- Flood Warning: 5%
- Storm Drain Rehab: 1%

CIP Forecast & O&M Strategies
Conceptual Allocation in Dry Years

- Storm Drain Rehab: 32%
- Maintenance: 30%
- Flood Mitigation: 20%
- Water Quality: 13%
- Flood Warning: 5%

CIP Forecast & O&M Strategies
Conceptual Allocation in Wet Years

- Flood Mitigation: 51%
- Maintenance: 30%
- Water Quality: 13%
- Storm Drain Rehab: 1%
- Flood Warning: 5%

CIP Forecast & O&M Strategies
After High Impact Flood Event

Flood Mitigation: 72%

Water Quality: 5%

Maintenance: 20%

Storm Drain Rehab: 1%

Flood Warning: 2%
Asset Management Drivers

- improved **financial performance**
- better informed asset **investment decisions**
- better **managed risk**
- improved **services and outputs**
- improved **efficiency and effectiveness**
- demonstrated **compliance**
- enhanced **reputation**
- improved organizational **sustainability**
- demonstrated **social responsibility**
Getting Started with Stormwater Asset Management

Fall Conference
Broken Arrow, OK

September 17, 2018