A New Way of Stormwater Management – Applying Asset Management to a Stormwater Program
Emerging Business Conditions
Approach
Future Investment Needs (Example)
Asset Management Takeaways
Emerging Business Conditions

Emerging Business Conditions

- Increasingly stringent regulations
- Aging infrastructure
- Flood planning disconnected from water quality planning
- Integrated water resources
- Climate change and adaptation
- Customer base not aware of all services provided
- Changing Boards and Councils
- Limited resources
- Key employees are retiring
- Renewed focus on accountability
What is Asset Management?

- Clearly communicates
  - What needs to be done & why it needs to be done
  - Long term funding needs to sustain the services
  - Consequences & risks
- Sound basis for prioritizing work
- Transparent, balanced
Value of Asset Management

• Powerful tool for communicating budget needs
  • Supports budget requests – City’s budget increased from $30M in 2013 to $50M in 2018
  • Management and elected officials better understand LOS vs. compliance
• Helps demonstrate efficient use of funds – Prioritization of activities based on risk
• An essential tool for IPF
Risk-based Planning Represents New Focus

OLD

- Backward Looking
  - Budget based on last year
  - Little knowledge of system risks

- Reactive
  - Projects determined as problems arise during the year

- Budget Constrained
  - Do as many projects as you can afford each year

- Ignores asset and system risks
  - Money is spent but overall risk may not have been reduced much

NEW

- Forward Looking
  - Based on asset risk scores and cost

- Proactive
  - High risk assets slotted for renewal before failure occurs

- Risk or Budget Constrained
  - Budget could be determined based on agreed risk targets for system

- Focused on risk management
  - High risk assets addressed first
  - Budget may rise or fall to meet risk targets
Total Asset Management Plan

Steps 1 – 5: Asset Registry & Levels of Service

Step 6: Business Risk Evaluation

Steps 7, 8, & 9: Optimize Investments and Fund
Mission, Goals, and Core Principles

**MISSION**
To protect and improve water quality and to reduce flood risk through efficient storm water management

**GOAL A**
Restore and Maintain Clean Beaches, Streams and Bays

**GOAL B**
Use Best Available Science, Best Practices, and Stakeholder Engagement to Advance Storm Water Management

**GOAL C**
Manage Storm Water as a Resource

**GOAL D**
Provide Flood Risk Management for the Protection of Public Safety, Property and Infrastructure

**GOAL E**
Comply with Regulatory Requirements

**TRANSPARENCY**

**INNOVATION**

**COLLABORATION**

**COST EFFICIENCY**
Program Integration “Holistic Approach”

Watershed Asset Management Plan
1. What do we own / manage?
2. What is its required level of service?
3. Which assets are critical?
   a. Condition
   b. Business Risk Exposure
4. What are my optimized management strategies?
   a. What needs to be done?
   b. When?
   c. Costs?
5. What do I need to do to fund it?

**Asset Management Overview**

- **Inventory Assets**
- **Identify Failure Modes**
- **Determine Residual Life**
- **Determine Replacement Costs**
- **Set Target Levels of Service**

- **Assign Risk Rating (Criticality)**
- **Determine Management Strategy**
- **Determine Appropriate CIP**
- **Fund Your Strategy**
- **Build the AMP**

**Approach**
Transportation & Storm Water

Asset Register

**Natural**
- Right-of-Way
- Receiving Water*
- Runoff / Discharges
- City Property*
- Canyons*

* These are assets Storm Water Division does not own. However, the Division may either be partially responsible for them or need them to achieve other LOS.

**Human-Made**

### Hard Asset Classes
- Storm Drain System
  - Conveyance
  - Structures
  - Pump Stations
- Public Structural or LID BMPs
- Private Structural or LID BMPs
- Equipment (> $5,000)
- Non Storm Water Division City property drainage systems

### Soft Asset Classes
- City Department Behavior
  - Municipal Non Structural BMPs
- Public Behavior
  - Non structural BMPs
- Regulatory Policy
- Good will, Relationships, Credibility
- Policy & Procedures for other City Depts
- Ordinances, Standards, Requirements

Approach
Example Hard Assets
Example Soft Assets

Approach

Transportation &
Storm Water

June 14, 2019
Example Natural “Future” Assets
Asset Definition & Hierarchy

All Asset Management Decisions Made at Most Appropriate Level

- Stormwater Division
  - Tijuana Hydrologic Unit 911
    - Tijuana Valley Hydrologic Area 911.1
      - Hydrologic Subarea 911.1X
        - Mainstem Outfall Drainage Area
          - Canyons
            - City Property & Land
              - Runoff / Discharges
                - Non SW division City property drainage systems
                  - Public Structural or LID BMPs
                    - Private Structural or LID BMPs
                      - Storm Drain System

- Receiving Water
  - City Department Behavior
    - Municipal Non Structural BMPs
      - Public Behavior
        - Non structural BMPs

- Good will, Relationships, Credibility
- Policy & Procedures for other City Depts
- Ordinances, Standards, Requirements
- Equipment – Monitoring, Maintenance >= $5K

This is the lowest level at which asset data is to be collected and organized.

City Property & Land

Managed at this Level

Asset Type (Natural, Hard, Soft)

Asset Class

Assets
Levels of Service

- Cost of Service
- Risk
- Levels of Service
- Customer Expectations

Approach
What is Failure?

- Desired Condition
- Minimum Standard
- Constructed Assets
- Natural Assets

Condition vs. Time graph
## Four Major Failure Modes

<table>
<thead>
<tr>
<th>Mode</th>
<th>Definition</th>
<th>Tactical Aspects</th>
<th>Management Strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Capacity</td>
<td>Volume of demand exceeds design capacity</td>
<td>Growth, system expansion</td>
<td>Redesign</td>
</tr>
<tr>
<td>2. LOS</td>
<td>Functional requirements exceed design capability</td>
<td>Codes/permits: OSHA, water quality, life safety, ecosystem services, service, delays, etc.</td>
<td>Redesign</td>
</tr>
<tr>
<td>3. Mortality</td>
<td>Consumption of asset reduces performance below an acceptable minimum level</td>
<td>Physical deterioration due to age, usage (including operator error), acts of nature</td>
<td>O&amp;M, Renewal</td>
</tr>
<tr>
<td>4. Efficiency</td>
<td>Performs ok, but cost of operation exceeds that of feasible alternatives</td>
<td>“Pay-back” period</td>
<td>Replace</td>
</tr>
</tbody>
</table>
What’s the Risk Associated with My Assets?

• Business Risk Exposure (BRE) Analysis:
• The most powerful element in asset management!
• Not all assets are equal!
• Used for prioritization of activities with limited funding

![Diagram](Approach)
Triple Bottom Line for CoF

- Balanced
- Transparent
- Recognizes all concerns
- Doesn’t borrow from future generations
Business Risk Exposure

- **High Risk Zone**
  - Strategy: Plan for asset renewal and/or risk mitigation

- **Medium Risk Zone**
  - Strategy: Mix of reactive and proactive strategies - dependent on owner preferences and site specific issues

- **Low Risk Zone**
  - Strategy: Reactive strategies (operate to failure)

- **Consequences of Asset Failure (e.g., Dollars)**
  - **Low**: Probability of Asset Failure (e.g., 0 to 1)
Fundamental Management Decisions

• What are my staff doing, where are they doing it, and why?
• What projects should be done, and when?
• When should I repair, when should I rehabilitate, and when should I replace, and when are new BMPs needed to comply?
• When should I negotiate and when should I comply?
How Does It All Fit Together?

System Assessment and Planning Model

Decision Model

<table>
<thead>
<tr>
<th>Consequences of Failure</th>
<th>Probability of Failure</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Economic Impact</td>
<td>• Historical Failures</td>
</tr>
<tr>
<td>• Operational Impact</td>
<td>• Installation Approach</td>
</tr>
<tr>
<td>• Environmental Impact</td>
<td>• Visual Inspection</td>
</tr>
<tr>
<td>• Social Impact</td>
<td>• Material Tests</td>
</tr>
</tbody>
</table>

Assessment Tools:
• Opportunistic Exposure
• Corrosivity Analysis

Planning Tools:
• Deterioration Models
• "What If?" Analysis
• Sustainable Funding Analysis
• Full Cost of Services

Response Toolbox:
• Emergency
• Urgent Action
• Planned Action
• Others...

Maintenance Program:
• Preventive
• Periodic
• Scheduled
• Others...

Inspection Program:
• Basic
• Advanced
• Desktop
• Others...
Next Generation Asset Management
Next Generation Asset Management

Enterprise Resource Planning

SAP Coordinates Day-to-Day Work Processes, Planning, and Work Execution

Approach
Where’s the Money Coming From?

What’s this gonna cost me?

How am I going to pay for this?

The Operations Manager

The Finance Manager
### Long-range Capital Needs By Asset Type

<table>
<thead>
<tr>
<th>Year</th>
<th>Asset Name</th>
<th>Action Type</th>
<th>Action Cost</th>
<th>Risk Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014</td>
<td>Metal pipes LIN-HAS-78</td>
<td>Replace</td>
<td>$340,000</td>
<td>25</td>
</tr>
<tr>
<td>2014</td>
<td>Metal pipes LIN-HAS-92</td>
<td>Replace</td>
<td>$176,000</td>
<td>25</td>
</tr>
<tr>
<td>2014</td>
<td>Metal pipes LIN-HAS-114</td>
<td>Replace</td>
<td>$49,000</td>
<td>20</td>
</tr>
<tr>
<td>2014</td>
<td>Pump #2 Oak St. PS</td>
<td>Rehab</td>
<td>$20,000</td>
<td>20</td>
</tr>
<tr>
<td>2014</td>
<td>GenSet Vine Rd. PS</td>
<td>Replace</td>
<td>$80,000</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>...</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Long-range Capital Needs By Watershed

- San Diego Bay: $7,460
- San Diego River: $4,225
- Mission Bay: $2,603
- Penasquitos: $3,701
- San Dieguito: $854
- Tijuana River: $1,134

Average Total: $199.8 M
Future Investment Needs

Long-term Financial Stability Through Integration of Capital and Financial Planning

- Interactive model that evaluates and compares alternative funding strategies and cost-recovery side-by-side
- Holistic multi-year financial management plan
- Integrates with asset management plans
Lessons-learned

• Culture shift – challenging to change from old practices to risk-based driven work

• Takes time

• Creates organizational challenges

• Need to better establish and memorialize improved business processes

• Advice to regulators:
  • Don’t get hung up on the Asset Management Document – it’s the process that provides value
  • Long-term management process – permits should incentivize asset management but not mandate it (grant eligibility and relaxation of regulatory milestones)
How to Get Started

• A basic inventory can give enough data to justify investment – data does not need to be 100% complete and accurate

• Asset management should not operate remotely

• Senior management understanding is critical to success

• Staff should be involved and included in developing the program and compiling data

• Software does not need be complex

• You can manage the program

• JUST GET STARTED!