Connecting Strategic & Tactical Asset Management: Peel’s Approach
Agenda

- Peel’s CAM Strategy
- Primary Components of the Strategic AM System
- W&WW Program Planning at Peel
- Recent Tactical Asset Management Improvements
- Bringing Tactical AM Improvements into the Strategic AM model
- Key Takeaways
Corporate Asset Management Strategy
The Region of Peel

- 1.3 million people
- Over $23B in capital assets:
  - Water and Wastewater vertical & linear assets
  - Roads Infrastructure
  - Waste Management Processing
  - Long Term Care Centers
  - Paramedic Stations
  - Heritage Museum & Art Gallery
  - Affordable Housing
  - Regional Administration Offices
  - Works Yards
  - Shelters
  - Child Care Centers
What is the Role of CAM?

1. **Ensure Consistency of Organizational AM practices**
   - Maintain AM policy
   - Life Cycle strategies
   - Asset levels of Service
   - Asset Risk management

2. **Strategic Evaluation of Infrastructure needs and priorities**
   - Investment Needs
   - Infrastructure priorities & risks
   - Reporting (Internal & External)

3. **Corporate “challenge” function**
   - Are Programs investing in the right areas/right levels?
   - Appropriate levels of service/risks?
   - Appropriate asset management planning?
   - Is data sufficient/accurate?
The Core Principle

We only own assets to support the delivery of services!
Peel’s Asset Management Strategy

Transportation  Housing Support  Long Term Care  Water Supply  Wastewater

Levels of Service

Consequence & Likelihood

Not meeting LOS Targets

Variance from LOS Targets & Level of Risk

RISKS

NEEDS

PRIORITIES

DECISIONS
Strategic Asset Management System Components
Asset Classes

A group of Assets which:

- Support the same Service
- Share Similar levels of Risk to Service
- Share Level of Service metrics and Targets
- Are managed using Similar Lifecycle Strategies
Levels of Service

Customer Levels of Service (CLOS)

- Describe what a Customer expects from a service: e.g.
  - Portable water which means or exceeds all regulations
  - Reliable and consistent water pressure and flow

Asset Levels of Service (ALOS)

- What is required of an Asset to provide the CLOS

Performance measures (Are the right assets in the right place?): e.g.
  - Firm capacity for all pump stations “Largest pump can be removed from service”
  - Redundant power supplies and standby power
  - Sufficient filtration system technology & capacity

Condition measures (Are the assets in a good state of repair?): e.g.
  - Small distribution mains do not exceed 7 breaks per km over life.
Lifecycles

Forward Works

- ALOS
- Time
- Forward Works Plan
- Index
- Reinvestment

Lifecycle Curve

- ALOS
- Time
- Reinvestment
- Condition

Estimated Service Life

- ALOS
- Time
- Reinvestment
- Remaining Life

No Predictable Change

- ALOS
- Time
- Current Score
Risk

Consequence  ×  Probability

Residual/Target (Min) Risk
Reasonable Mitigation in place
Asset is Meeting ALOS Targets
Min. Asset Risk to Service

Inherent/Gross (Max) Risk
No Risk Mitigation in place
Asset is Failing ALOS Targets
Max. Asset Risk to Service
From Customer Level of Service To Budget

**Customer Levels of Service**

Potable water at an appropriate pressure and quality.

Efficient delivery of water services.

**Asset Levels of Service**

- Maintain Equipment at a Condition Rating = B (Good)
- Backup capacity for all critical equipment
- Provide Standby Power
- Redundant power supply
- Capacity and technology to produce water of suitable quality
- Automated monitoring systems in place

**Prioritize Needs**

- By Value of Asset Classes: 78%, 22%, 1%
- By Number of Asset Classes: 75%, 20%, 5%

**Measure Risk and Identify Needs**

<table>
<thead>
<tr>
<th>Asset Classes</th>
<th>Low</th>
<th>Medium</th>
<th>High</th>
<th>Severe</th>
<th>Capital Plan</th>
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<tbody>
<tr>
<td>PW &amp; Corporate Light and Medium Duty Vehicles</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$19.8M</td>
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<tr>
<td>PW &amp; Corporate Heavy Duty Vehicles and Equipment</td>
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<td>$22.0M</td>
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<tr>
<td>PW &amp; Corporate Standard Equipment</td>
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<td></td>
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<td></td>
<td>$2.8M</td>
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<tr>
<td>Operations Support Facilities Site Elements</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$3.6M</td>
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<tr>
<td>Collection Severs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$216.3M</td>
</tr>
<tr>
<td>Sub Trunk Severs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$122.8M</td>
</tr>
<tr>
<td>Trunk Severs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$150.5M</td>
</tr>
<tr>
<td>Wastewater Treatment Automation Systems (SCADA)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$0.0M</td>
</tr>
<tr>
<td>South Peel - Plant Wide Support Systems</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$4.0M</td>
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</table>

**Annual Capital Budget and Forecast**

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Water & Wastewater Program Planning

Each One Impacts the Others
Water/Wastewater State of Good Repair Team

- Water Distribution/ Wastewater Collection

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State of Good Repair (SOGR) PM

Water
  - PM
  - TS

Wastewater
  - PM
  - TS
```
# Peel’s Collection & Distribution Stats

<table>
<thead>
<tr>
<th>Group</th>
<th>Length</th>
<th>Replacement Value</th>
<th>CAM 10 Year SoGR Recommendation</th>
<th>Program 10 Year SoGR Forecast</th>
<th>Program 2018 (1yr) SoGR CapEx</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sanitary Collection System</strong> (&lt;= 675 mm nominal diam.)</td>
<td>3,325 km</td>
<td>$6.5 B</td>
<td>$279 M</td>
<td>$329 M</td>
<td>$25 M</td>
</tr>
<tr>
<td><strong>Water Distribution System</strong> (&lt;= 600 mm nominal diam.)</td>
<td>4,244 km</td>
<td>$7.8 B</td>
<td>$755 M</td>
<td>$653 M</td>
<td>$50 M</td>
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</table>
Recent Improvements in Tactical Asset Management

Respond to CAM’s Corporate “challenge” function

Investing in the right areas/right levels?
Appropriate levels of service/risks?
Appropriate asset management planning?
Is data sufficient/accurate?
Peel’s Tactical AM for Distribution and Collection System

CAM Inputs

AM Risk Framework

AM Policy

Levels of Service

Program AM Projects

Risk

Long Term Capital Plan

Lifecycles

CCTV PACP SOGR Grading

No. of breaks per km of water main

Per Asset Risk $

Refined Levels of Service

CCTV Review Prioritization

Linear Asset Prioritization System

Mitigation Strategies

Capital Forecast

Current Condition

Rehab/Replace Program 1st cut

Replacement Program 1st cut

Program Decisions Support System

Prioritized Asset Enhancements

Prioritized SOGR Needs Year 1-3

Financing Strategy

Long Term SOGR Needs Year 4-10

Annual Program/Scoping Packages

Implementation

Capital Works

Significant Outputs & Capabilities

Current Condition Lifecycles

Refined Levels of Service Lifecycles

CCTV Review Prioritization

Linear Asset Prioritization System

Capital Forecast

Current Condition

Rehab/Replace Program 1st cut

Replacement Program 1st cut

No. of breaks per km of water main

Annual Program/Scoping Packages

Implementation

Capital Works
Enhancement to Current SOGR Planning Practices at Peel

I&I Reduction Strategy

Risk Assessments

Granite Scoring

CCTV Optimization

Operational Programming & Budgets

Long Term W/WW SOGR Plan

Capital Planning

Growth Master Plan

Financial Planning

Corporate Asset Management

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Asset Level Risk Approach | Risk Mapping & Mitigation

<table>
<thead>
<tr>
<th>Level</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Catastrophic</strong></td>
<td>Immediate action to prevent impact to LOS, Safety and environment</td>
</tr>
<tr>
<td><strong>High</strong></td>
<td>Gearing up for immediate action</td>
</tr>
<tr>
<td><strong>Moderate</strong></td>
<td>Monitoring Regime, response plan in place</td>
</tr>
<tr>
<td><strong>Low</strong></td>
<td>Management responsibility specified</td>
</tr>
<tr>
<td><strong>Insignificant</strong></td>
<td>Manage using routine procedures</td>
</tr>
</tbody>
</table>
The process envisioned by Peel is to be operationalized through an analytical system (DSS)

1. **Data From Field**

2. **Condition Summary**
   - Graphs and tables at each step
   - Process repeats each year
   - Ties together the work of each group

3. **Prioritization**

4. **Capital Program**

5. **Execution**

6. **Metrics**

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**Long Term Plan for Distribution and Collection Systems**
Long Term Plan for Distribution and Collection Systems

**Condition Information**
- CCTV data
- CMMS data (i.e. WM breaks)

**Maintenance Information**
- CMMS Data (complaints)
- Info from Staff

**Operating Info**
- Hydraulic model data
- Info from Staff
- Flow monitoring data

**Other relevant info**
- Expansion needs from a master plan
- Risk assessments

**Decision Support System**
### Scenarios – how bad is too bad?

<table>
<thead>
<tr>
<th>CoF Score</th>
<th>CoF category</th>
<th>Condition target</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 to 19</td>
<td>Insignificant</td>
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<tr>
<td>35 to 44</td>
<td>High</td>
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</tr>
<tr>
<td>45 to 50</td>
<td>Extreme</td>
<td>Rehab/replace before asset reaches fair condition</td>
</tr>
</tbody>
</table>
Mean time of transition, survival probability, and state probability

<table>
<thead>
<tr>
<th>Grade 0 - 1</th>
<th>Grade 1 - 2</th>
<th>Grade 2 - 3</th>
<th>Grade 3 - 4</th>
<th>Grade 4 - 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>88.5 years</td>
<td>10.7 years</td>
<td>11.0 years</td>
<td>8.8 years</td>
<td>22.1 years</td>
</tr>
</tbody>
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### WW Collection: Budget Scenarios

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**Annual Budget of:**
- $20M Replace
- $5M Rehab
Mapping Capabilities

All data is asset centric and can be shown for any year between 2018 and 2042, in isolation or combined in corridors.

- Combined corridor condition
- 2042 sewer condition (current budget scenario)
- Current Sewer Condition
Bridging the Gap – Improving Unit Costs

Watermain unit costs based on analysis of ~ 70 tenders
Bringing Tactical AM Improvements into The Strategic AM Process
Improvements to Alignment of Asset Classes

A group of Assets which:

- Support the same Service
- Share Similar levels of Risk to Service
- Share Asset Level of Service metrics and Targets
- Are managed using Similar Lifecycle Strategies

Program Planning’s Detailed Risk Project Will Identify:

- Cohorts of Assets within existing asset classes which are of higher or lower risk
- And therefore: May be managed to different Level of Service Targets and with different Strategies (Replace Sooner, Run to Fail, add a Rehab etc.)
Incorporate the Program’s detailed lifecycles into CAM’s model

• More accurate Current State of Infrastructure
• Improved Investment Needs Forecasting
  • Timing, Replace vs. Rehab etc.
• Improved Risk Modeling
Other Improvements

Improved costing frameworks!

A common data set!

Shared Data Set

- QA & Costing
- Asset Data
- CAM
- Corp. Needs & Priorities
- Capital Plan
- Council & Exec.
- Budget

W&WW Planning

Asset Management Line of Sight

Strategic Plan
Vision & Mission

Community For Life

Mission
Working with You to create a healthy safe and connected community

Area of Focus

Thriving

Water Supply

Service Category

Lake Based Water Treatment

Asset Class

Water Disinfection

Asset

Ozone Generator

Area of Focus Outcome

Communities are integrated, safe and complete

Service Outcome

Safe, reliable and high quality drinking water is available to Peel customers

Customer Levels of Service

• Potable water at an appropriate pressure and quality.
• Efficient delivery of water services.

Asset Levels of Service

• Asset Condition = B (Good)
• Sufficient Capacity to meet demand
• Backup Power Generator
• Backup Capacity for Critical Equipment
• Automated monitoring systems in place

Asset Information

• Asset Condition
• Installation Date
• Usage Data
• Replacement Cost
• Rehab Cost
• Asset Lifecycle
• Number/Redundancy
• Size/Capacity
• Suitability
What are the benefits?

- Clear & defensible information:
  - State of the infrastructure
  - Asset & service risks
  - Organizational asset needs & priorities
  - Financing requirements

- **Capital Plans** are aligning with **SoGR** needs, **Service Outcomes**, and **Corporate Goals**

- Puts the right information in the proper hands to make better decisions

**TRANSPARENCY** and **OBJECTIVITY**!!
CAM provides a **Strategic Asset Management** function across the organization and:
- Supports **Executive** decision making
- Allows broad comparisons of asset classes **across services**
- Provides consistency across the Region’s vast portfolio

W&WW Program Planning provides a **Tactical Asset Management** Function and:
- Supports **Program** level decision making
- Allows detailed comparisons of assets **within the service**
- Produces Capital Budgets

The two teams share improvements in data, risk models, asset lifecycles, and knowledge to continually improve the asset management practices at the Region of Peel.