Are you ready to implement a Computerized Maintenance Management System?

Bill Grant
Industry Manager – Public Works
Esri Canada

esri Canada

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- In Business since 1984
- Privately held since inception
- 16 offices across Canada
- Over 400 employees
- Over 10,000 Canadian Clients
- Exclusive distributor of Esri Software

- Exclusive distributor and implementation team for Cityworks – asset and maintenance management products since 2001
  - 25 Dedicated Cityworks Implementation Team members &

The Need for Enterprise Asset Management

- Infrastructure is a key driver of productivity and growth in the Canadian economy. It is a key contributor to community health, economic, and social development.
- Inadequate infrastructure investments results in increased costs for businesses leading to lower return on profits, taxation, fewer jobs, lower personal income affecting community quality of life.
- Municipal Assets worth $5.5 Trillion (NRC)
- Spending $15 Billion / yr.
- $123 Billion municipal infrastructure deficit and growing
- 2 Billion / yr. due to insufficient investments aging infrastructure (FCM). Total replacement cost of $172 Billion.
- Average condition of assets rank between “Fair” and “Very Poor” (FCM 2012 Infrastructure Report Card)

Asset Management Business Problem

- Typically, asset managers must make decisions about Maintenance & Replacement (M&R) alternatives based on sparse data about the current state/condition of their infrastructure assets, the relative risk of failure of these assets, the initial costs, and life cycle costs of maintenance.

- It is very difficult to optimize the selection of M & R investments each year in a short or a long planning horizon (e.g. 1,5 or 10 years).

Enterprise Asset Management Goals

- Align Asset Management activities to improve the accuracy and quality of asset information.
- The intent is to improve capital and operating budgeting, asset maintenance and performance, lifecycle planning, resource allocation and communication with the customer while minimizing risk and maintaining stable levels of service for the various types of assets the City maintains

Enterprise Asset Management Framework

3 Main Subject Areas

- **Centralized Asset Registry**
  - Esri GIS
- **Performance Management**
  - Level of Service
  - Asset Performance
- **Capital Investment Planning**
  - Short and Long Term Asset Capital Investment Planning
  - Asset Valuation
    - Asset Replacement Costs
    - Asset Netbook Value

Corporate Goals

Strategic AM Policies

Asset Management Plan
- **The Official Plan**
- **Long Term Financial Plan**
- **Infrastructure Master Plans**
- **Business Plans**
- **Capital Budget**
- **Legislation / Regulations**

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Your CMMS supports your AMS

- Centralized Asset Registry – Single source of truth
- Performance Management – Service levels and Work history
- Asset Condition – From condition inspections
- Total Asset Cost – Long range rehabilitation / replacement costs
- Asset Management – Adjust the plan to meet actual conditions

Your CMMS supports your AMS

Asset Registry

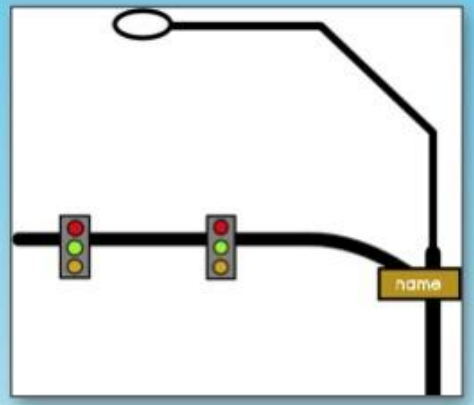
Asset Types

Points

Lines

Polygons

Non-Spatial/Related



Required Data Elements

Asset Attribute	Description
Installation Date	Construction date
Estimated Service Life (ESL)	Estimated asset useful life
Condition	Condition rating from field inspection (captured with CMMS)
Condition Date	Inspection date (captured with CMMS inspection)
Asset Cost	Market price for the asset
Residual Life	Estimated remaining useful life (calculated by model)
Estimated Replacement Cost	Projected replacement cost (calculated by model)
Estimated Replacement Date	Projected replacement date (calculated by model
% Service Life Consumed	% service life consumed (calculated by model)
Life Cycle Cost	Total maintenance & rehabilitation costs from current date until replacement (Captured with CMMS)
Revaluation Required	Flag indicating whether a financial revaluation needs to be performed (calculated by model)

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Performance Management

Information not Data

- Operational Information
  - Where is the effort being spent?
  - What work is being done?
  - How is our performance vs our plan?
  - Is scheduled work being completed on time?
  - What types of requests are coming in from the public?
  - What is the response time to investigate requests?

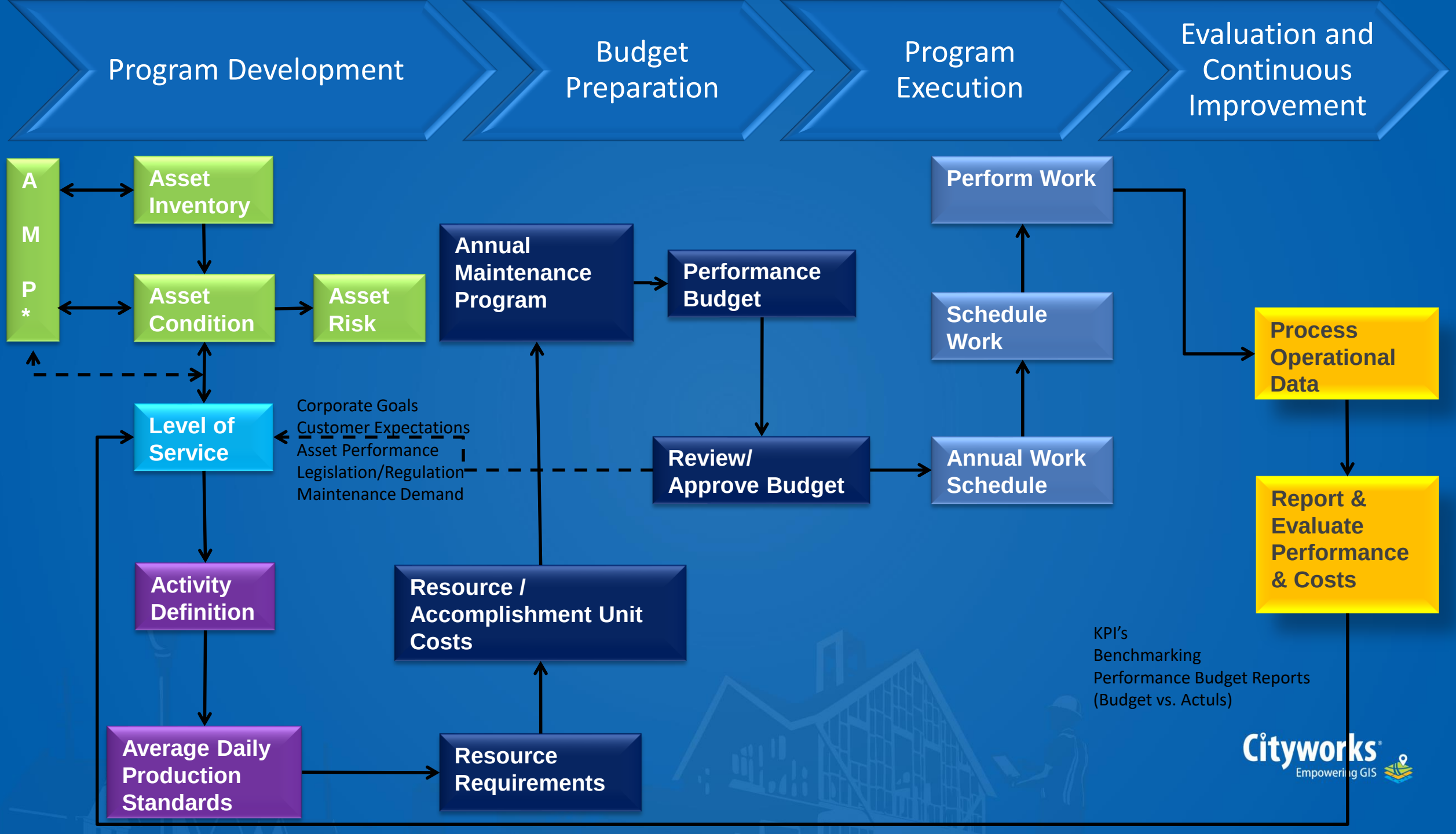
Information not Data

- Management Information
  - What is Council asking?
  - What do I need to support my budget request?
  - How well are we servicing the public?
  - What is the cost of performing an activity?
  - What is the cost of maintaining this asset/facility?
  - What went into the cost of maintaining the asset/facility?
  - Are we doing what it takes to maintain our assets?

Information not Data

Key Performance Indicators (KPI's)

- Number of Service Requests over 3 days
- Number of Work Orders in progress over "X" days
- Number of Inspections completed within "X" days of schedule
- Number of water quality Service Requests and where
- Analysis of when graffiti SR/WO occurs


Program Development
Budget Preparation
Program Execution
Evaluation and Continuous Improvement
A
M
P
*
Asset Inventory
Asset Condition
Asset Risk
Level of Service
Corporate Goals
Customer Expectations
Asset Performance
Legislation/Regulation
Maintenance Demand
Activity Definition
Average Daily Production Standards
Resource Requirements
Resource / Accomplishment Unit Costs
Annual Maintenance Program
Performance Budget
Review/ Approve Budget
Annual Work Schedule
Schedule Work
Perform Work
Process Operational Data
Report & Evaluate Performance & Costs
KPI's
Benchmarking
Performance Budget Reports
(Budget vs. Actuls)
Cityworks
Empowering GIS

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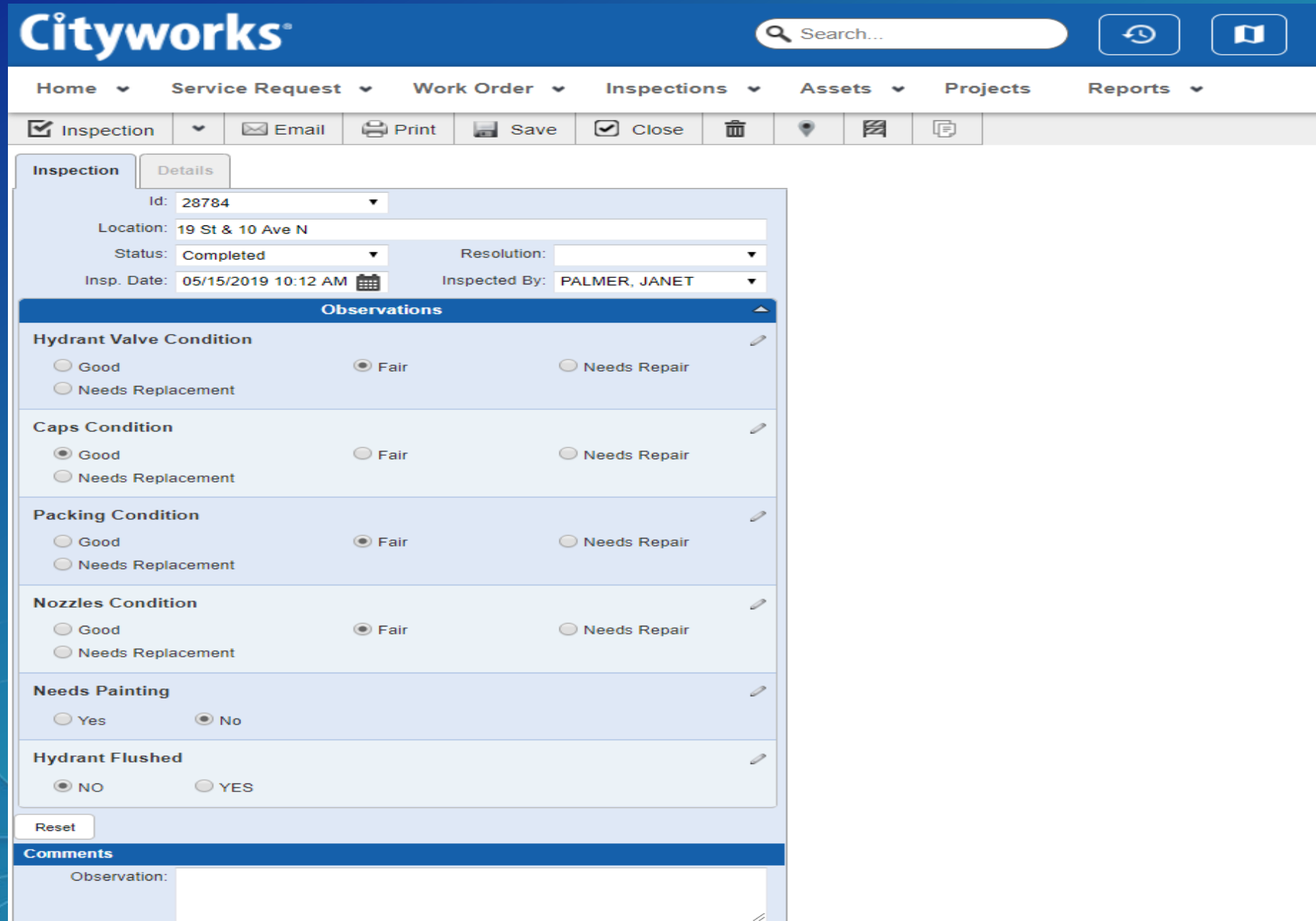
Asset Condition

Condition Inspection



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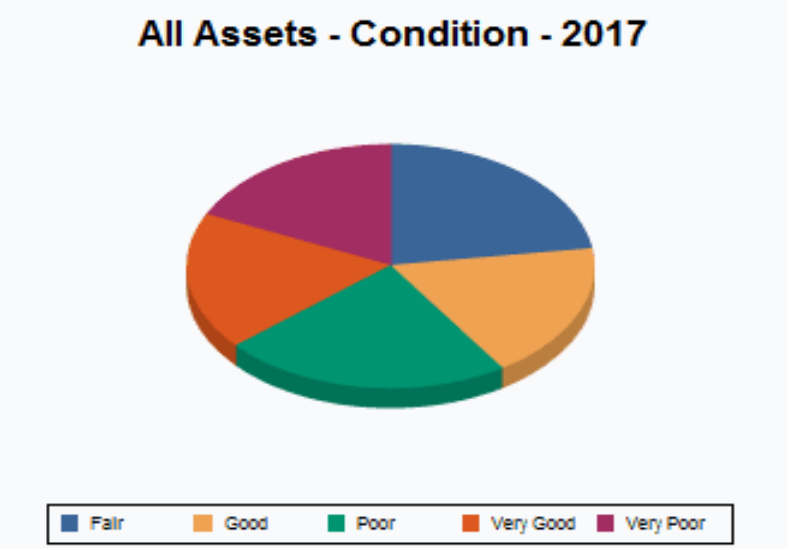
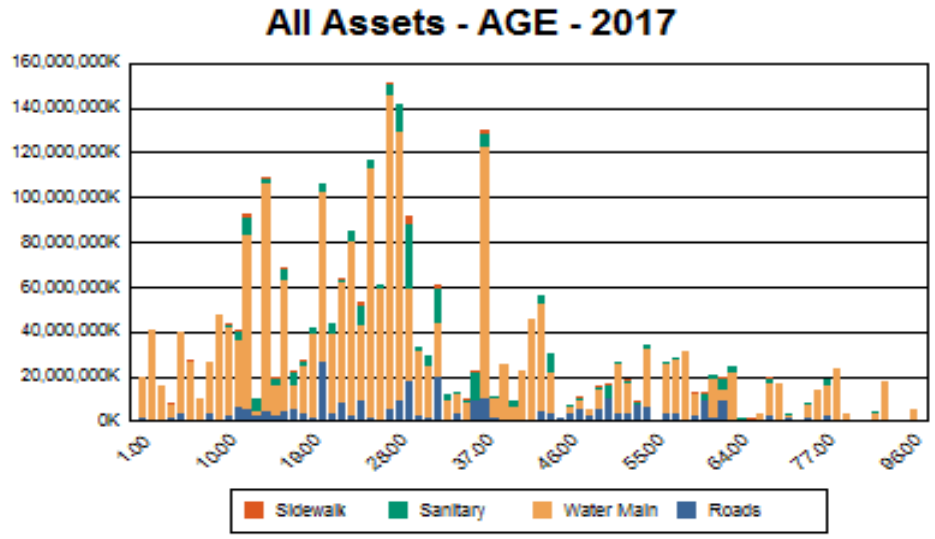
Asset Analytics

Analysis: Lifecycle Modeling

Assets	Quantity	Average Age in 2017	Average Expected Life	Average Condition	Current Replacement Cost: Assets ($ M)	100 YR Average Per Annum Renewals Cost ($)
Roads	102.51	37.12	18.52	13.12	111.55	3,849,025.00
Sanitary	89.17	37.55	80.00	28.30	90.00	3,482,942.00
Sidewalk	105.52	30.77	25.00	29.20	13.63	1,278,883.00
Water	104.84	38.29	105.86	24.62	875.77	1,617,461.00





Multi Asset Replacement List

Replacement Cost Forecasting

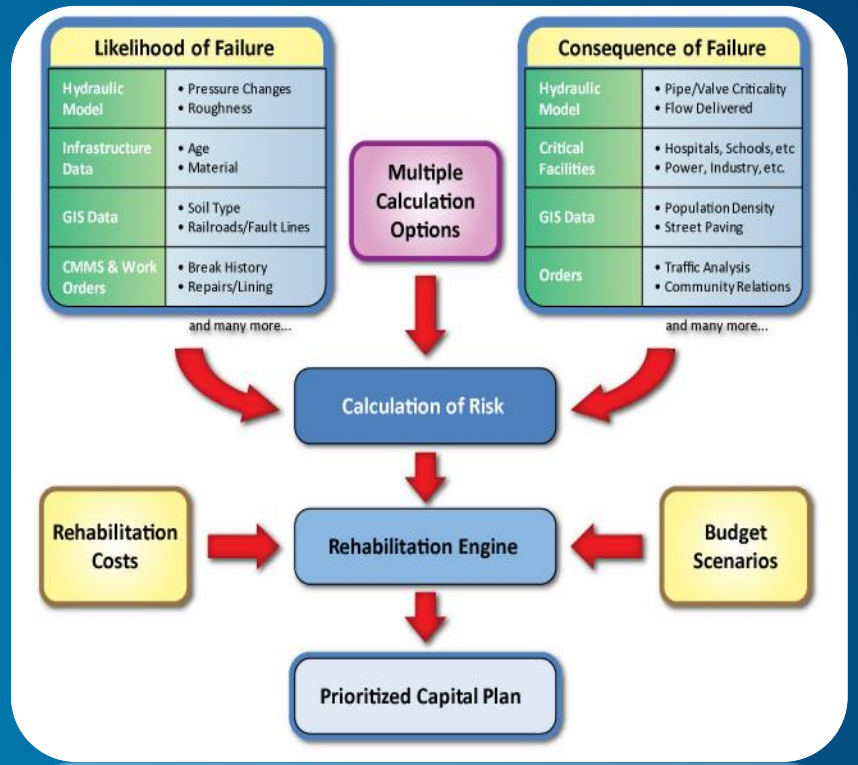
Capital Improvement and Maintenance Planning / Prioritization

Prioritization and Risk Mitigation

- Highest Business Risk Exposure
  - Worst condition
  - Oldest assets
  - Highest Life Cycle Cost
- Immediate Maintenance
- Proactive Assessments
- Programmed Rehab/Replace
- Monitor and Forecast

Risk based Framework for Prioritization

Likelihood of Failure \ Consequence of Failure	High	Moderate	Low
High	Immediate Rehab/Replace	Programmed Rehab/Replace	Repair/Replace on failure
Moderate	Immediate Rehab/Replace	Proactive Assessment	Monitor and Forecast
Low	Proactive Assessment	Opportunistic Assessment/ forecasting	Monitor and Forecast



Your CMMS supports your AMS

Asset Costs

Costs by Asset Life Cycle Stages Report

Asset Type: LWATER_DISTRIBUTION

Asset ID: 6890

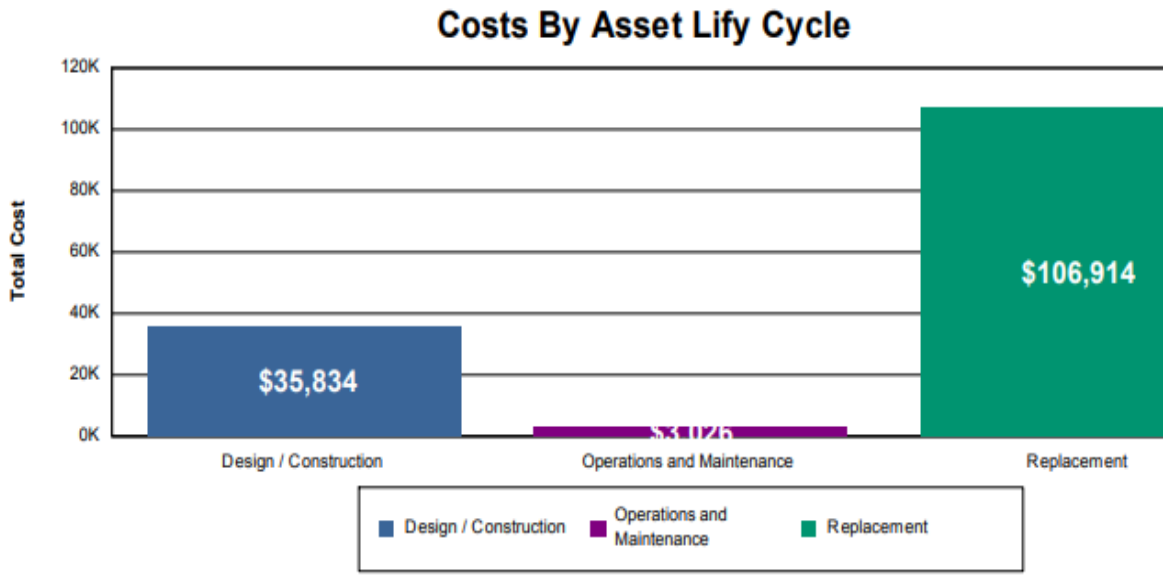
Total Work Orders: 4

Total Cost: $145,773.50

Equipment: $506.00

Labour: $2,479.50

Material: $142,788.00



Asset	WO ID	Description	WO Status	Work Order Category	Total Cost	Cost	
						Equipment /	Labour /
LWATER_DISTRIBUTION (4)							
6890	140088	Water Main Installation	CLOSED	Design / Construction	$35,834.00	$0.00	$0.00
6890	139316	Main Break Repair	REQUEST	Operations and Maintenance	$1,456.00	$160.00	$1,121.00
6890	139326	Main Break Repair	CLOSED	Operations and Maintenance	$1,570.00	$232.00	$1,198.00
6890	140089	Replace Water Main	SCHED	Replacement	$106,913.50	$114.00	$160.50

Whole Asset Life Cycle Costs

Design/Construction, Operations and Maintenance, Replacement

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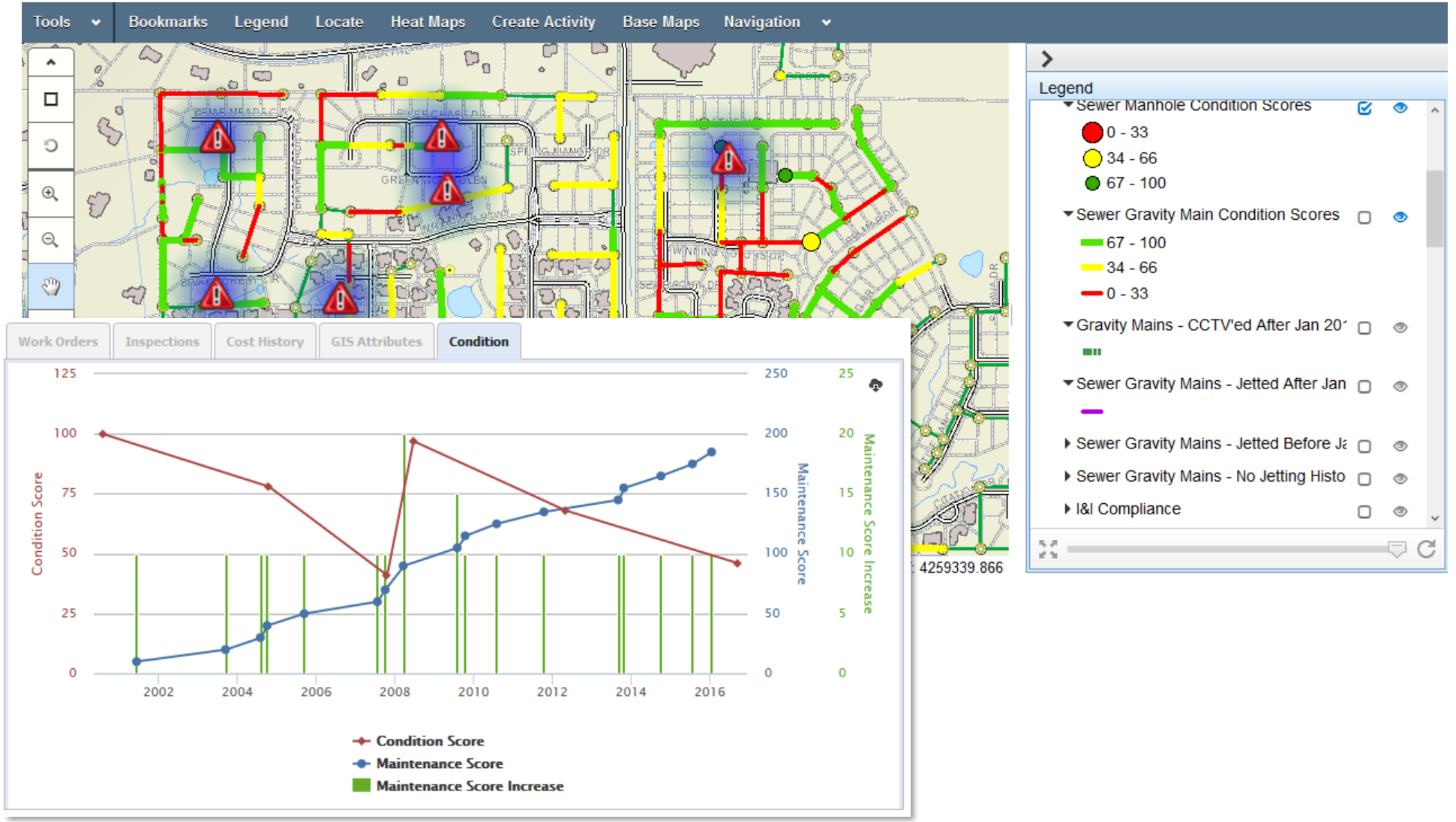
Asset Management

Long Range Asset Planning

- Asset Life Cycle Model
  - Remaining Service Life
- Asset Risk Model
  - Probability and Consequence of Failure
- Capital Project Decision Support
  - 5, 10, 20 year budget plans
  - Prioritize projects

Analyze Assets with Maintenance and Condition Scores

- **Engineers, Planners:**
- Use map to analyze data
  - Activity heat maps
  - Cost distribution
  - Condition heat maps
- Use Asset Analytics tool
- Compare Maintenance score with condition score
- Risk analysis
  - Probability of Failure
  - Consequence of failure
- Decide further treatment
- Schedule treatment work order
- Schedule as possible future capital project planning



Key Point: Define your own condition and treatment strategies

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Are you ready to implement a CMMS

Time to start is now!