Applying Asset Management Strategies to Traffic Signal and Street Lighting Systems in Portland, Oregon, USA

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Presented by

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City of Portland, Oregon
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But first introductions

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Asset Manager for Portland Office of Transportation
Let’s start from the BIG picture ...

Portland, Oregon is here:

And KC, MO is here:

1,500 miles!
Finally in to our base map

9.6 mi.

12.7 mi.

Population: 530,000
We have Volcanoes!
Two within 100K of Portland!!

Portland, Oregon
A typical day in Portland!
Mount St. Helens Volcano – erupted in 1980

Assets sometimes manage us!
Outline for Today’s Talk

• Portland’s overall Asset Management (AM) program
• Signals & Street Lighting AM issues
• Portland’s Signals & Street Lighting AM plans
• Revised signal reconstruction strategy
• Lessons learned – future directions
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Challenges for Transportation Asset Management in Portland

- Over 568,000 assets in 29 feature classes
- Over 233,000 operating locations
- Hierarchical and layered location structure
- Closely spaced assets
- Spatially-referenced work instructions
- Limited resources
- Many short turnaround work tasks
- Need for accurate condition and maintenance history at asset level.
Replacement Value of Transportation Assets

- Streets, $4.8B (improved lane miles)
- Sidewalk system, $954M
- Structures, $297M (hardware only)
- Street lights, $37M
- Traffic signals, $90M (hardware only)

Signals and St. Lighting - not a big piece of the “pie”.
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- **Signals & Street Lighting AM issues**
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Signals & St. Lighting

AM Issues

- Signals and street lights are comprised of numerous elements for each infrastructure item
- Difficult to assess condition and determine when to replace each asset since standards and specifications are continually changing.
- Technical obsolescence
  - Have you tried to buy an 8-bit microprocessor for a traffic controller recently? (Question is … why?)
Signals and Street Lighting Elements

Signals and street lights have several common elements types:

• support structures (poles),
• electrical wires,
• underground conduits, and
• electrical service panels.

Street lights have unique elements such as:

• luminaires and photo cells
Signals have unique elements such as:

- traffic controllers,
- Vehicle and pedestrian indications,
- vehicle detection equipment, and
- communication networks.

Since these assets have many elements, how do we determine condition and useful life?
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• Portland’s overall Asset Management (AM) program
• Signals & Street Lighting AM issues

⇒ Portland’s Signals & Street Lighting AM plans
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Signals and Street Lighting Condition

Historically used aged based system in years:

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Working on condition rating / life expectancy based on field inspections.
Tracking Condition since 1986

- Used aged based system.
- Update changes in intersection age every year.
- Use spreadsheet to predict future condition based on various replacement rates.
- Provides management with long term trend information.
Table 2. Sample Table for Tracking Aging Inventory
NUMBER OF INTERSECTIONS WITH SIGNAL HARDWARE REACHING USEFUL LIFE

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NOTES:
1. Assumes a 25 year life.
2. The "Diff" column shows how many intersections are beyond their rated life during that year.
3. The total number of intersections in the City is 879.

Source: Signal Inventory Database, City of Portland, Bureau of Transportation Systems Management, July 2004

s:/inventory/stat_con/2004/Table 19 only 20050523.xls
Clearly shows predicted good, fair, and poor values based on various replacement rates.
But nothing works like pictures!

Percent in “poor condition” now exceed percent in “good condition”
Outline of the plans

Now developing more thorough AM plans.

- Asset Trends & Updates – Where are we?
- Standards & Current Service Level – How do we do work and what did we do?
- Update on Effectiveness/Efficiency – How are we doing?
- Update on Forecasted Conditions – Where are we headed?
- Update on Next Steps – What should we do?
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Signal reconstruction

- Up to 3 years ago, did complete replacement with mast arms.
- Due to budget constraints aging infrastructure, we needed to change tactics.
- We now complete approximately four partial reconstructions for what one full replacement would have cost.
Partial signal reconstruction

- Typically we replace spans and unsound strain poles.
- Intersection ends up with new indication and cable.
- Estimated life extension of 25 years.
- New mast arm installation should last 50 years.
• Portland’s overall Asset Management (AM) program
• Signals & st. lighting AM issues
• Portland’s signals & st. lighting AM plans
• Revised reconstruction strategy

→ Lessons learned – future directions
Lessons learned

- Asset management requires an ongoing management commitment to be effective. Asset management requires time and effort to collect, analyze, and present information.
- Demonstrate a technical knowledge of the asset and an understanding of the management process in order to obtain the credibility needed to be successful in obtaining necessary resources.
- Find ways to demonstrate what happens when the assets are not replaced as needed. Take props like old, rusty signal equipment into budget discussions.
- Explain “useful life” to bureau directors and politicians, which is difficult for a complicated asset like traffic signals.
Finally, I hope that we are all ready to sink our teeth into asset management!
The end.