

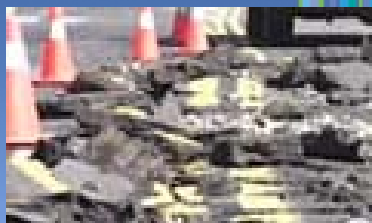
Assessing Water Systems and Developing a Renewal Plan Using the InfraGuide Best Practices

MED/MMCD Seminar
Nov 24th, 2006

Christine McCormack, P. Eng.



Infrastructure Deterioration: Do you have a problem?



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Infrastructure Deterioration: A National Priority

“Canadian cities are beginning to show severe signs of strain after decades of rapid economic and population growth. In many cities, water systems, sewers, and public transportation all require massive new investment, but cash strapped municipalities — who have been asked to take over a growing number of responsibilities from the federal and provincial governments in recent years — are in no position to deliver.”

A Choice Between Investing in Canada's Cities or Disinvesting in Canada's Future, TD Bank Financial Group, April 2002

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InfraGuide



- Infrastructure Canada, the Federation of Canadian Municipalities and the National Research Council joined forces to help solve the growing infrastructure deficit in Canada.
- InfraGuide is a national network of experts offering the best in Canadian experience and knowledge of infrastructure.
- Port Moody Council endorsed InfraGuide September 13, 2005

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Introduction to City of Port Moody

- 28,000 people
- 26 km²
- 117km of pipe
- Average age 29 years
- Preference for Ductile Iron since 1975
- Past suburban growth, in future only room for densification



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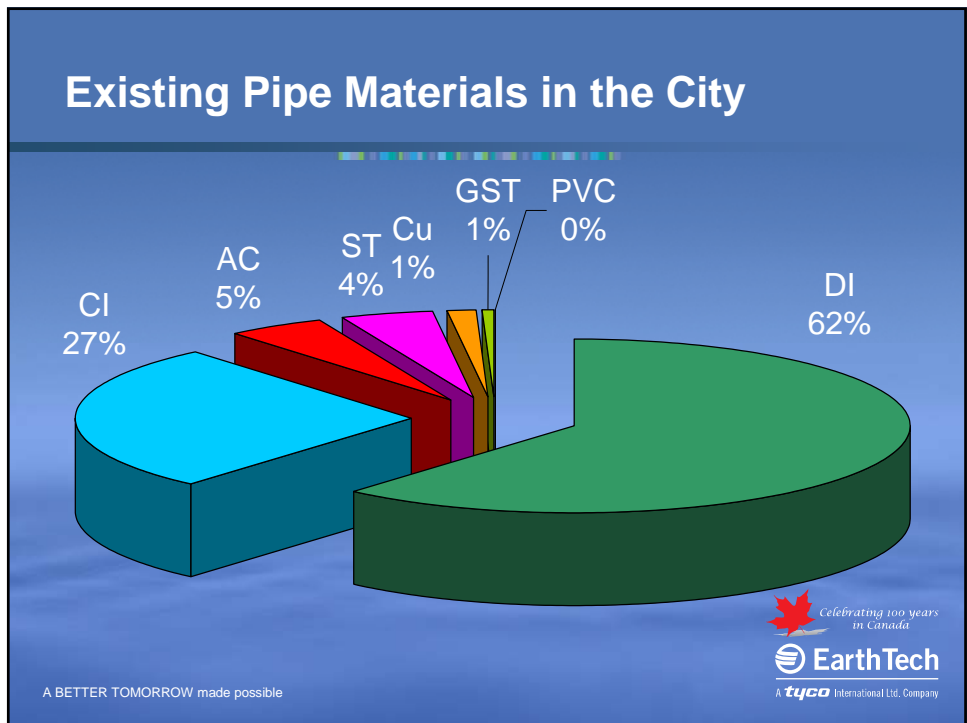
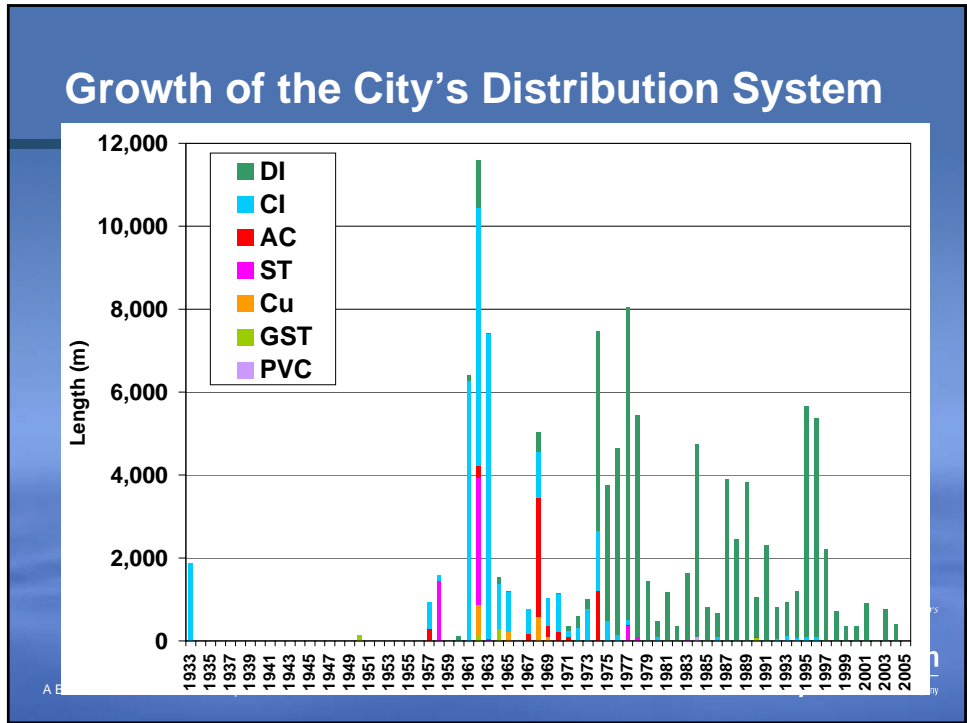


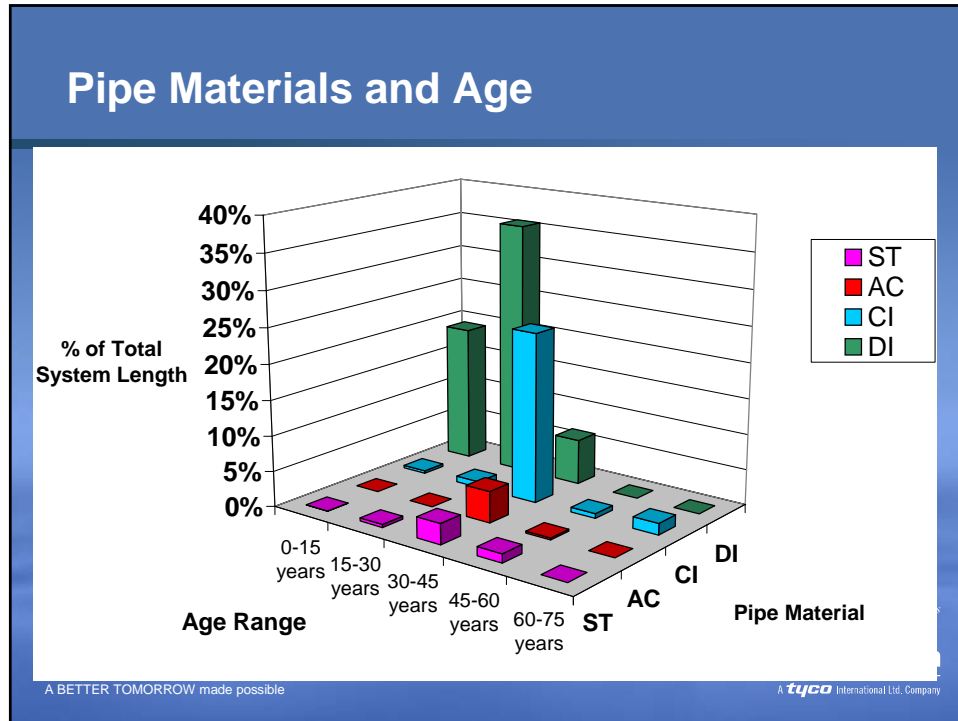
City of Port Moody's Approach


- Small but complex distribution system – 11 pressure zones & 5 pump stations
- Level 4 System (reservoirs, pump stations, PRV's)
- System maintained by 7 utilities operational staff (water & sewer) plus a water quality technician
- Looking for a simplified approach, relying on Best Practices
- Not looking for a complex asset management software solution

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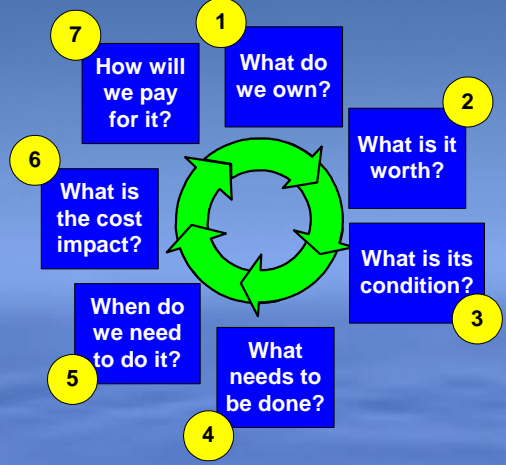






- ### Master Water Distribution System Asset Study Project Objectives:
1. Examine the long term financial requirements to ensure the system is sustainable;
 2. Identify individual system renewal requirements over the medium term;
 3. Identify opportunities to coordinate system renewal with other planned City works;
 4. Summarize recommendations to ensure financial sustainability and to reduce overall cost of renewal.
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InfraGuide Methodology: “7 Questions”



The diagram illustrates the InfraGuide methodology through seven numbered questions arranged in a circle around a central green circular arrow. The questions are: 1. What do we own? 2. What is it worth? 3. What is its condition? 4. What needs to be done? 5. When do we need to do it? 6. What is the cost impact? 7. How will we pay for it?

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Innovations and Best Practices
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“Best Practice for Developing a Water System Renewal Plan”

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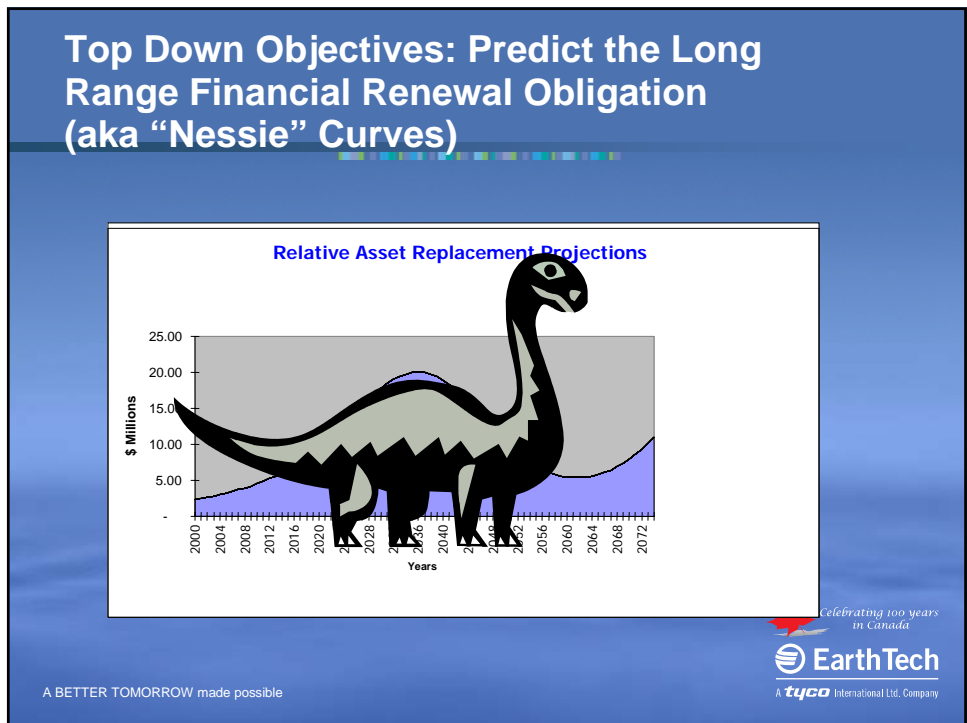
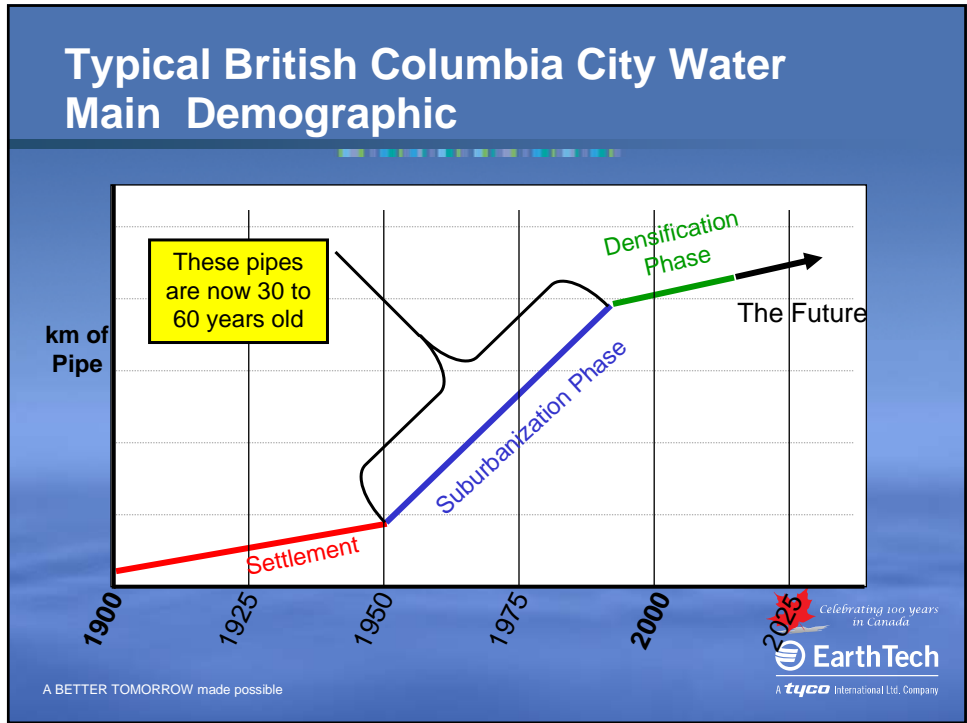
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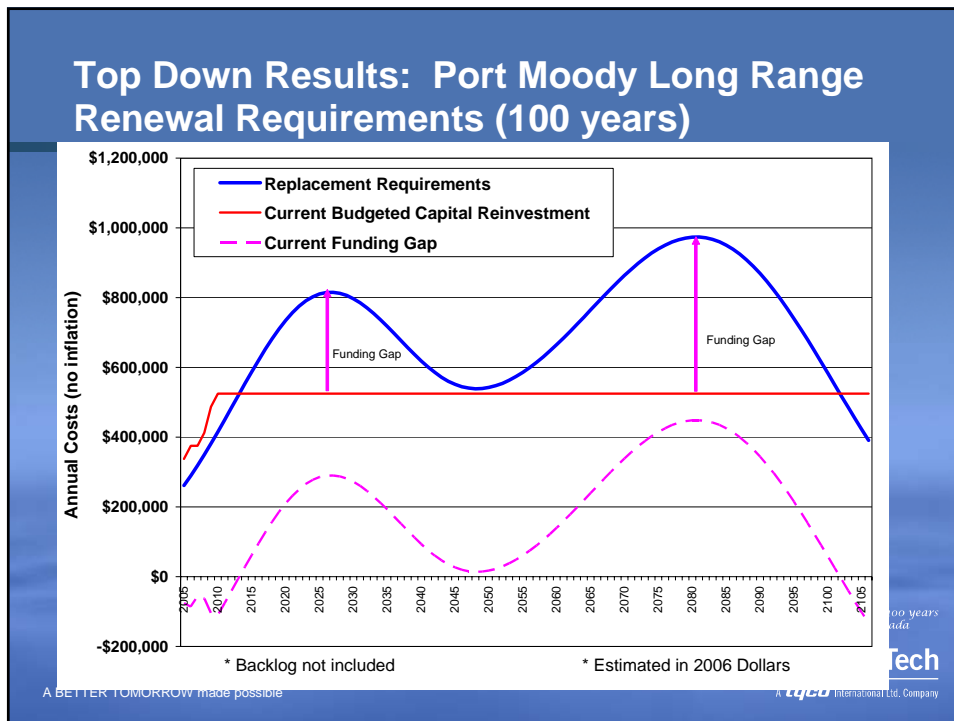
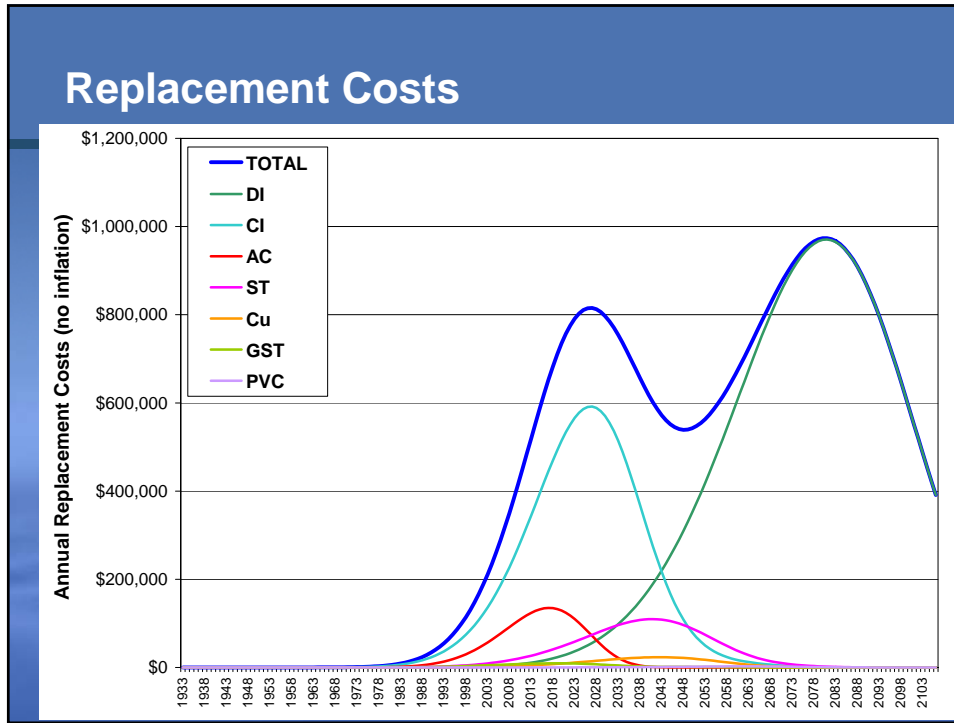
Two Phased Study

- “Top Down” Assessment to determine the high level long range projection of water system renewal requirements (100 years).
- “Bottom Up” Assessment to determine a prioritized list of individual water system renewal-related capital projects (15 years).

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Observations Regarding Port Moody's 100 Year Projection

- Like almost every city in Canada, an infrastructure reinvestment funding gap does exist;
- Water rates will have to rise to meet renewal requirements, but not in the immediate future (the City has time to plan);
- The system is not presently at risk of major deterioration related failure.
- A detailed renewal plan is required to guide reinvestment over the next 15 years.

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Phase 2 "Bottom Up" Questions (Detailed Renewal Plan)

- What are the specific concerns regarding pipe condition, degrading water quality, and water leakage that will drive water pipe replacement projects?
- How will community growth impact the need to replace water mains due to capacity?
- Are there opportunities to coordinate water, sewer and road renewal projects?

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City of Port Moody: System Knowledge

- No GIS or CMMS.
- Good CADD System, with a generally complete pipe system inventory (length, diameter, material, installation date). Some areas of discrepancy regarding inventory.
- Spreadsheet record of recent water system defects (since 1991)

Required a strategy to gather system condition data to complete the analysis

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System Condition Knowledge Strategy

- Detailed system knowledge exists within senior system operators.
- An individual operator who retired a few years ago was happy to assist project team to rebuild and record main break history from the early 1960s.
- Resulted in a good high-level overview of system condition at minimal expense.
- Many Canadian communities must commit themselves to gathering and recording this information before it is permanently “deleted”

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Review of Port Moody's System

Risk-based analysis based on capacity, criticality, age, history of breaks and pipe material; determine priorities for water main renewal projects:

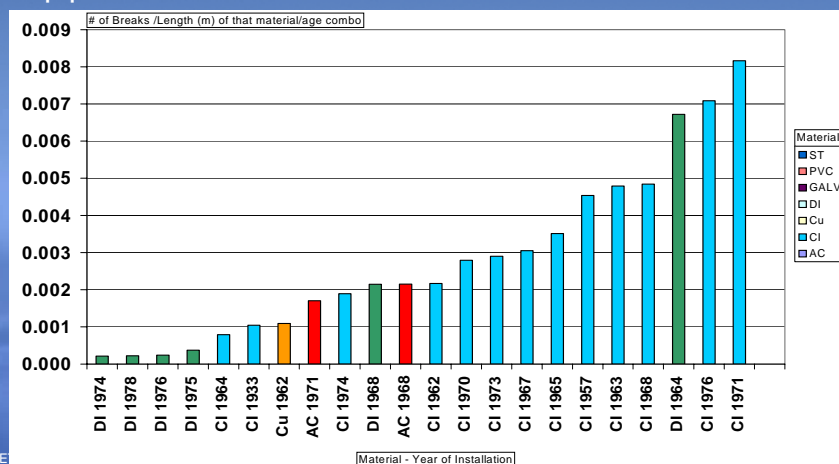
Priority	Description
1	Mains with insufficient capacity or those that have already experienced a significant number of breaks (i.e. more than 1 break per 500 metres).
2	Mains that have not experienced a significant number of breaks but have a medium-high risk of failure
3	Mains that have not experienced a significant number of breaks but have a medium risk of failure
4	Mains that have not experienced a significant number of breaks but have a medium-low risk of failure
5	Mains that have not experienced a significant number of breaks but have a low risk of failure
6	Remaining mains which have the lowest risk of failure



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Review of Port Moody's System

- Main break frequency is highest amongst the cast iron pipes installed in the 1960s and 1970s



6" CI circumferential break



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100 years
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Hydro-excavating the main



A BB

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Pitting on outside of 6" CI main



"Blow-out" on 10" CI main on loco Rd



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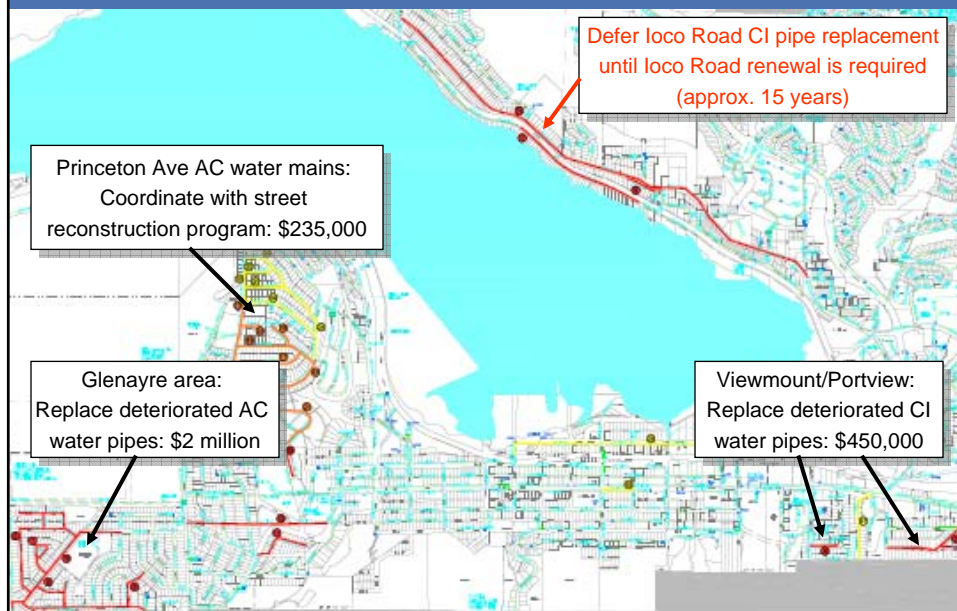
“Bottom Up” Conclusions

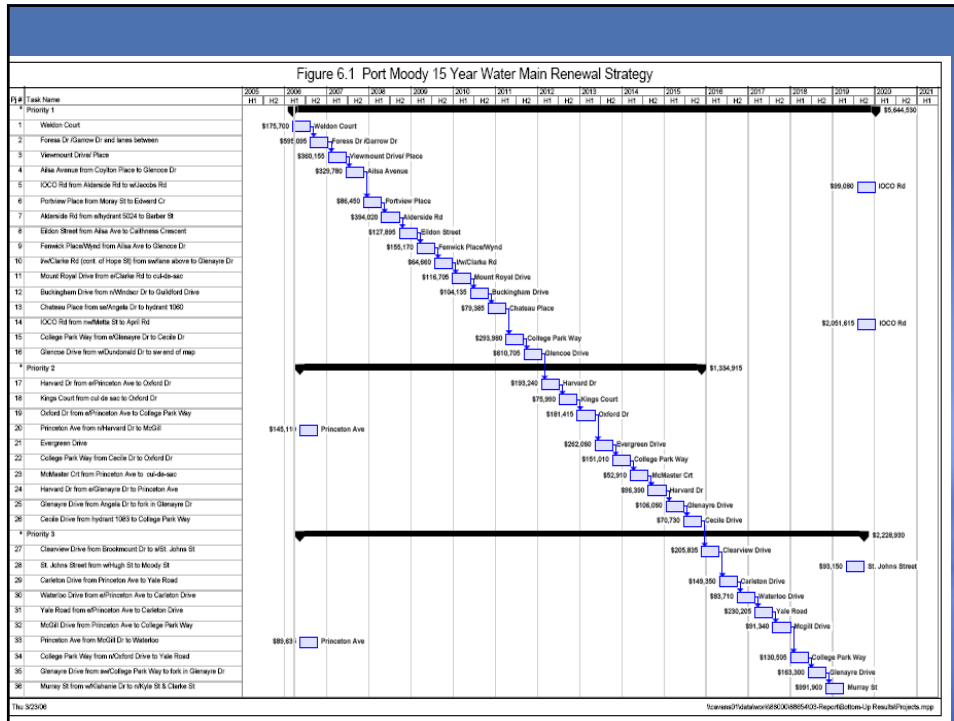
- The resulting 15 year water main renewal strategy has an estimated total cost of approximately \$9,208,000 (current year value).
- The gap between the replacement requirements and budgeted capital reinvestment over the next 15 years can be met through the use of the existing water reserve funds.
- However, taking advantage of other funding sources such as infrastructure renewal grants could reduce the need to deplete the water reserve funds at a time when the City’s water replacement needs will be ramping up.

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Water Main Priorities for Renewal





Recommended Methods for Pipe Renewal

- Because of the City's local conditions (high service connection density etc) the majority of pipe renewal projects should be done through standard open trench pipe replacement (lower cost than trenchless)
- Plan replacements to coincide with other linear system renewal projects (roads, sewers, etc.)

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Other Recommendations

- Study only included linear water assets. Need to incorporate other water system assets, eg reservoirs
- Recommend a similar review of all City infrastructure.
- City may need to address its asset information management strategy.
- Begin planning today for re-investment that may still be far in the future.
- Begin a Education and Communication Program regarding the need for reinvestment
 - ◆ Presentation to Port Moody City Council: September, 2006

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Congratulations to Port Moody

- Excellent demonstration of InfraGuide Methodology: This will be documented as an InfraGuide Case Study to assist other communities wishing to conduct a similar process.
- Commencement of a proactive strategy to ensure high quality service that is perpetually sustainable.

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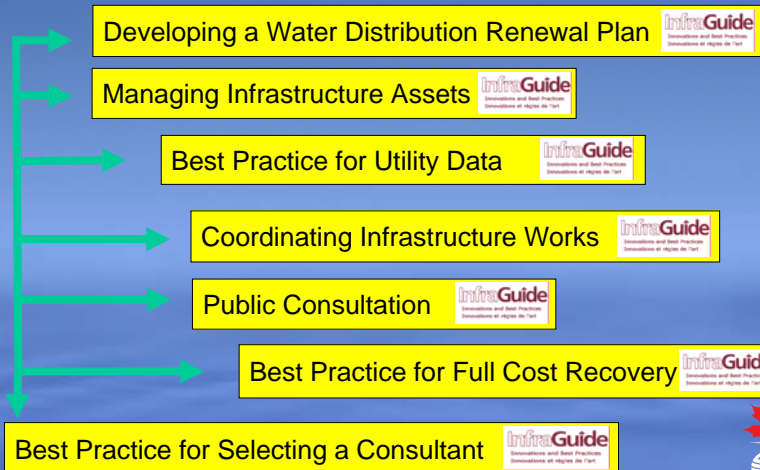
Is This the End?

- How do the procedures and related output of studies like this become part of an overall management process?
- If there is no action, this study is out of date within 12 months (e.g. construction costs are increasing very rapidly)
- Our experience is that this is the most challenging part of developing an Asset Management “Program” vs. an Asset Management “Snapshot”

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InfraGuide-Based Program Plan



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