Examples of Asset Management Using BMS Analysis Tools

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Outline

1 Introduction

2 Stantec BMS - Overview

3 Two Case Studies

4 Summary

5 Questions

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1 Introduction

Agencies are applying bridge management principles using new generation advanced BMS

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Introduction

Stantec BMS

- Developed following tradition of OBMS (c. 2000*) and MTQ BMS (2008*)
- BMS 2010 was 3rd BMS (2010*), and developed as a COTS platform (* published, refer to literature)
- Now Stantec BMS
- Provincial DOT, Major Cities, Municipalities, Regional Municipalities, Energy/Power

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Introduction

Stantec BMS

- Used by agencies to manage inventory and inspections, perform prioritization, risk analysis, budgeting and work program development
- Inspections are performed by Agencies themselves and/or by consultants.
- Bridge management analysis performed by agencies or by Stantec on behalf of agencies
- Some smaller agencies implement the BMS and retain support to do inventory and inspection and analysis to provide full BM services externally.

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Introduction

Asset Management Plans and BMS

- Large and small agencies are preparing asset management plans using the BMS
- Asset management plans take different forms
  - Provincial DOT, major cities, municipalities, regional municipalities, energy/power
  - Goals are similar
  - BMS should be flexible to handle the different demands
- Not common to see results from BMS and how BMS are used.
- Share a few case studies

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2 Stantec BMS - Overview

Developed from OBMS and MTQ BMS
the latest BMS is Stantec's 3rd BMS

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Overview

Stantec BMS

- Complete bridge management solution
- Inventory
- Inspection - Element level, severity and extent, condition state
- Financial framework is based on LCCA and B/C

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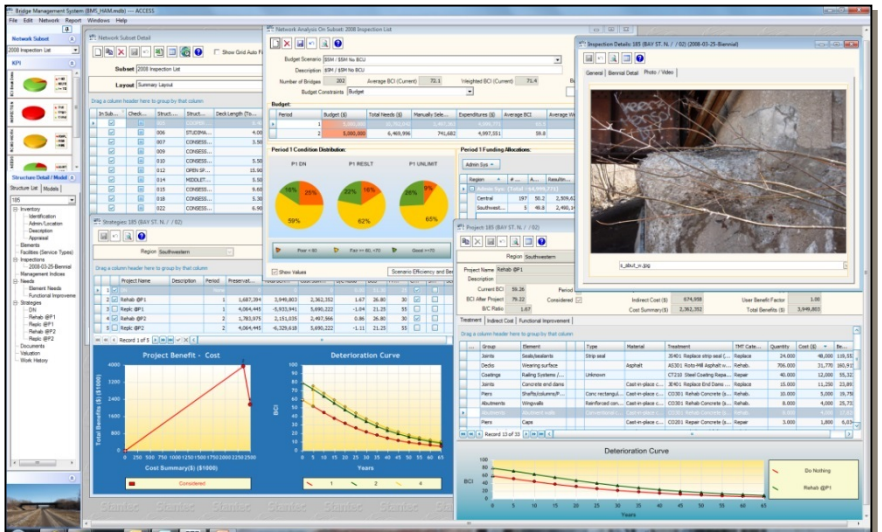
Overview

Stantec BMS

- 3 levels of analysis
  - Element (treatment and timing selection),
  - Project (combines elements and timings into projects with costs, benefits, B/C)
  - Network (unlimited budget scenarios and resulting prioritized work program with B/C)



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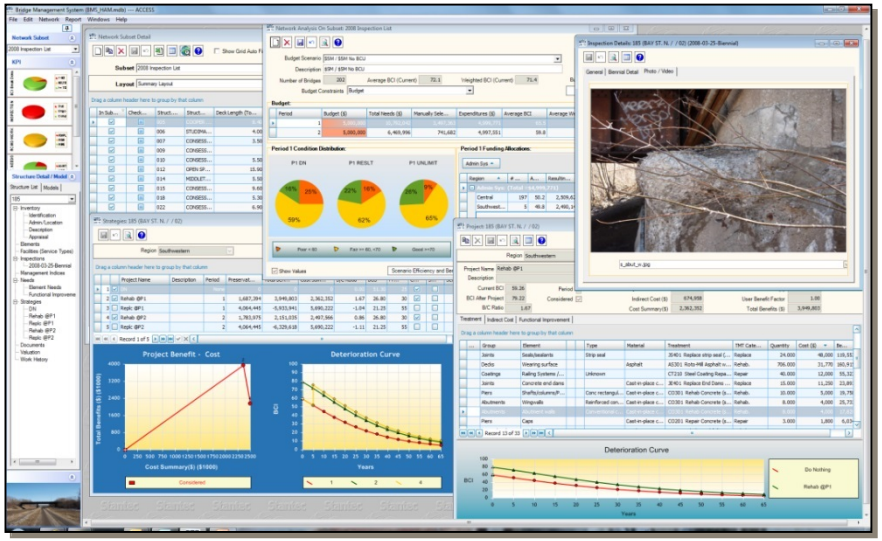
Overview

Stantec BMS

- Condition index (BCI similar to BHI in USA)
- Full capabilities for inspection and historical multimedia files, documents, etc.
- Built-in GIS mapping



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Overview

Stantec BMS

- Treatments – unlimited for each element
  - Different types of repair, rehabilitation methods
  - DN and Replacement
- Functional improvement models
  - Strengthening, widening, height restrictions
  - Based on traffic growth, truck distribution models
- Deteriorations models – forecast repair quantities, structure condition, and network condition

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Overview

Stantec BMS

- Analyses that are available
  - Budget scenarios and prioritized work program
  - Target condition(BCI) and prioritized work program
  - Funding allocation to districts/regions
  - Risk analysis (condition)

3 Two Case Studies

How different agencies use BMS to meet asset management goals

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1. Provincial DOT

Prince Edward Island DOT

- Using Stantec BMS since 2008
- Complete management of bridge management program for 1574 structures
- Currently inspections are by consultants who use check out database via web version of BMS
- Provide inspection data and recommendations
- Department uses BMS to determine BCI and Risk Profile
- Asset valuation is performed by the BMS automatically (RC, Written Down RC, and Depreciation)

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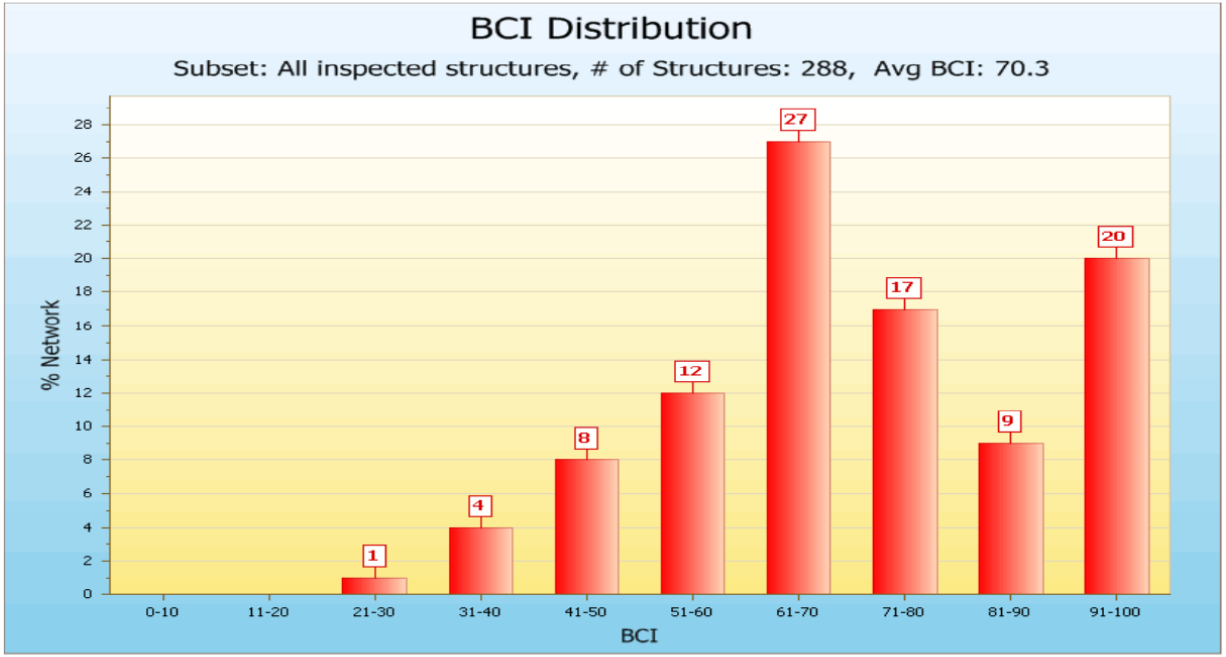
1. Provincial DOT

Prince Edward Island DOT

- Annual Report to Minister

Department of Transportation And Infrastructure Renewal

Key Performance Indicator Report



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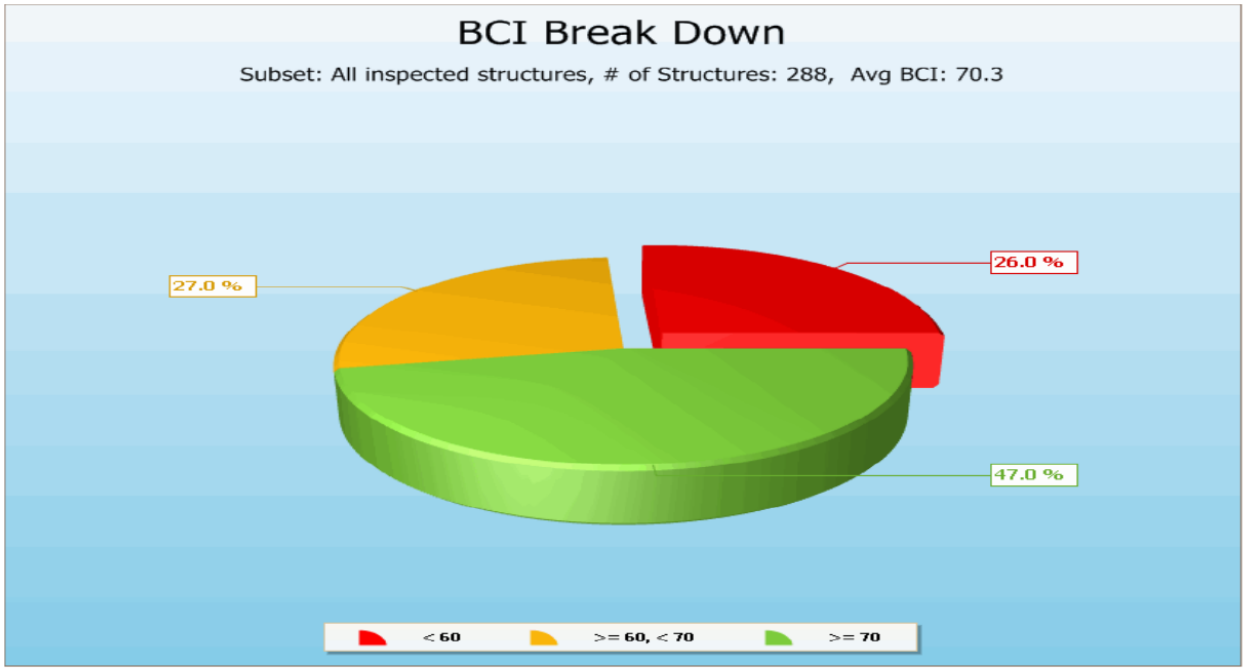
Department of Transportation And Infrastructure Renewal

Key Performance Indicator Report



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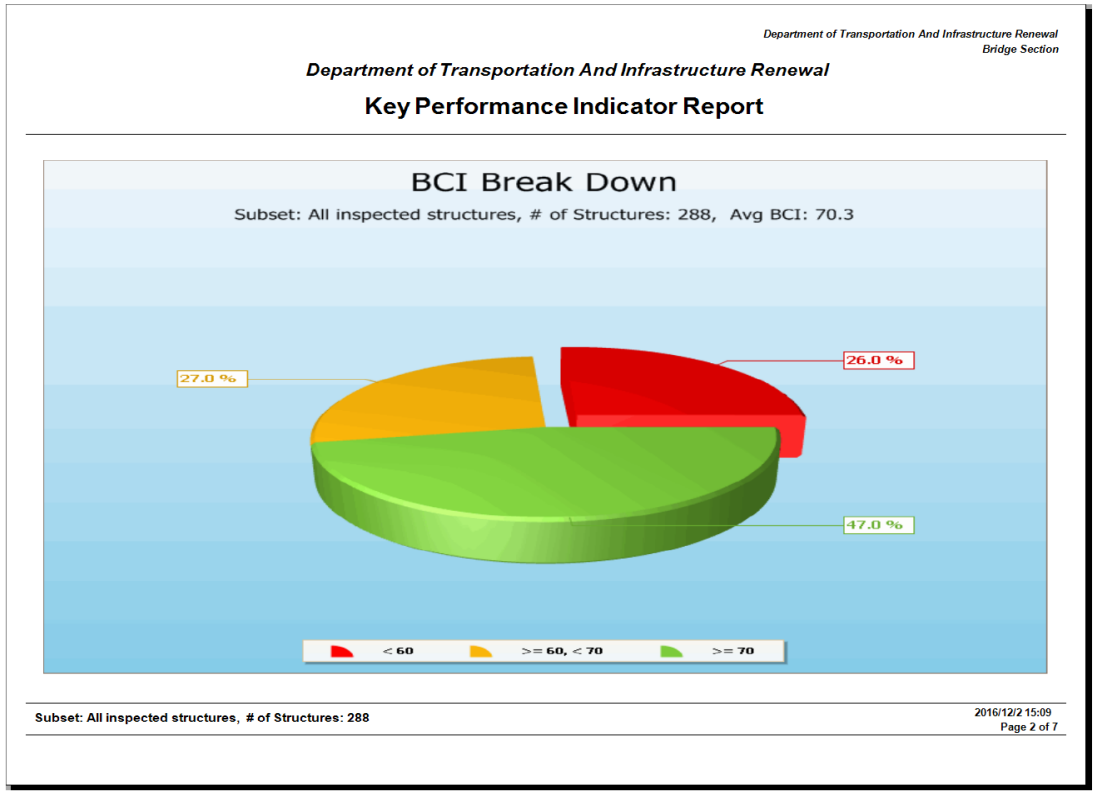
Justification of Bridge Management Program

- Improvement in average BCI, Good
- Reduction of Poor
- Demonstrates effectiveness



Network BCI Trend (%)						
Condition State	2011	2012	2013	2014	2015	2016
Good (70 < BCI)	35%	32%	37%	40%	43%	47%
Fair (60<BCI<70)	29%	28%	26%	31%	29%	27%
Poor (BCI < 60)	37%	40%	37%	29%	28%	26%
Average BCI	62.8	61.9	66.6	69	69.3	70.3

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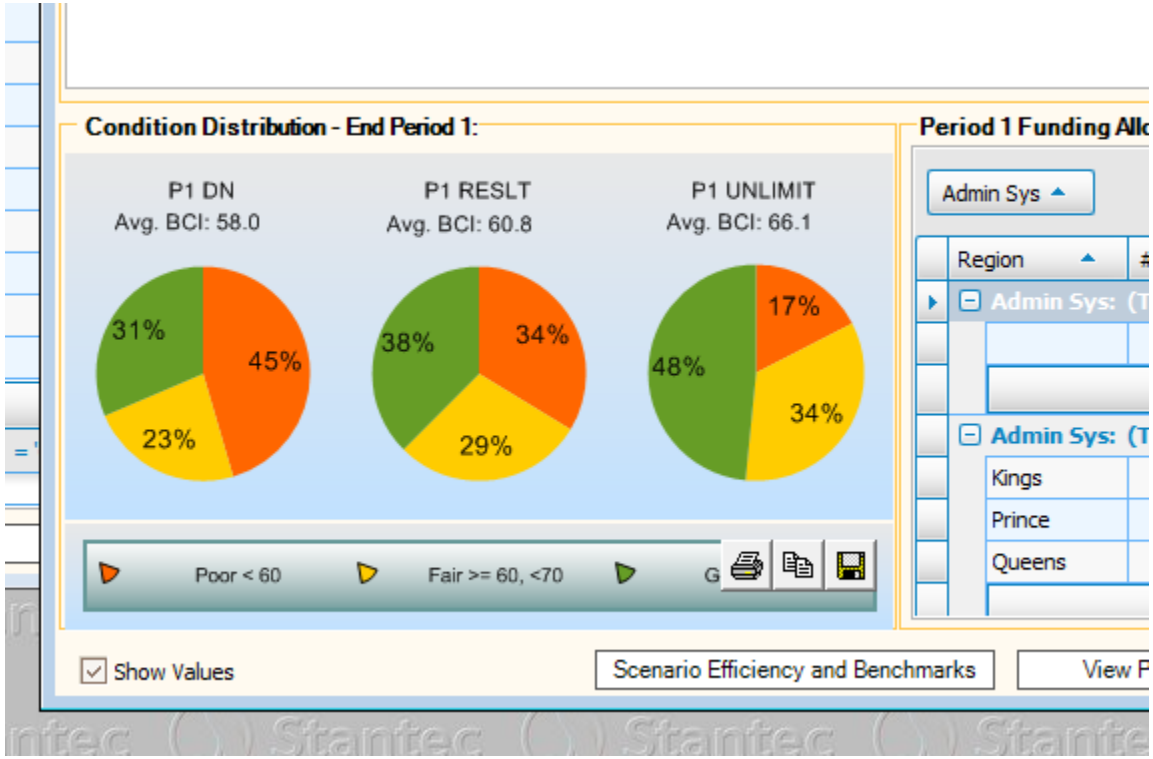
- **Justification of Budgets**

- Forecasted results 5 yrs
- Specified Budget plus:
- DN
- Unlimited Funds
- What does 70.3 become in 5 yrs?
- % Poor 26% becomes?



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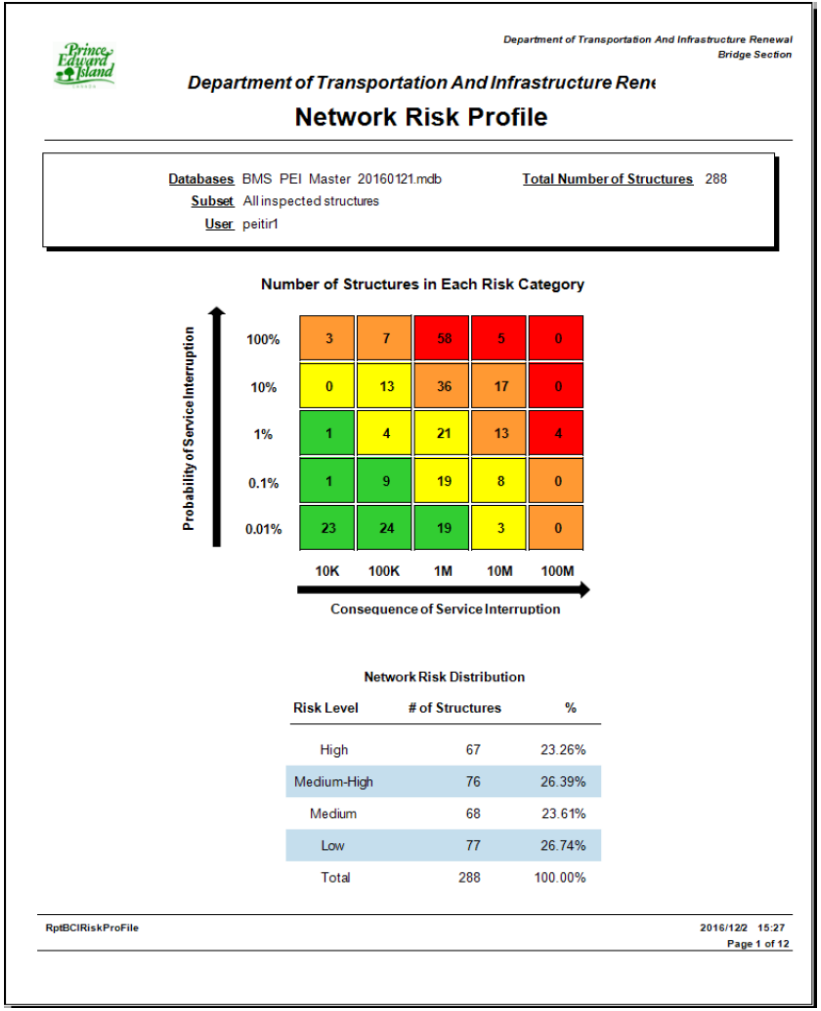

Department of Transportation And Infrastructure Renewal
Bridge Section

Department of Transportation And Infrastructure Ren

Network Risk Profile

Databases BMS PEI Master 20160121.mdb
Subset All inspected structures
User peitir1

Total Number of Structures 288

Number of Structures in Each Risk Category

Network Risk Distribution

Risk Level	# of Structures	%
High	67	23.26%
Medium-High	76	26.39%
Medium	68	23.61%
Low	77	26.74%
Total	288	100.00%

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Page 1 of 12

Network Risk Trend

	2012		2013		2014		2015		2016	
Risk Level	# of Struct	%	# of Struct	%	# of Struct	%	# of Struct	%	# of Struct	%
High	79	29.5	74	28.9	68	25.6	63	23.7	67	23.3
Medium-High	66	24.6	68	26.6	74	27.8	72	27.1	76	26.4
Medium	65	24.3	61	23.8	62	23.3	64	24	68	23.6
Low	58	21.6	53	20.7	62	23.3	67	25.2	77	26.7
Total	268	100	256	100	266	100	266	100	288	100

2. Medium Sized Municipality

City of Hamilton

- For structures, using Stantec BMS since 2005 (Lite Version)
- Complete management of bridge management program for about 400 City structures
- Currently inspections are by consultants who use check out database on field notebooks
- Provide inspection data and recommendations
- Department uses BMS to determine BCI and Risk Profile
- Retains Stantec to perform analysis for decision making, and reporting into the City's State of the Infrastructure Report

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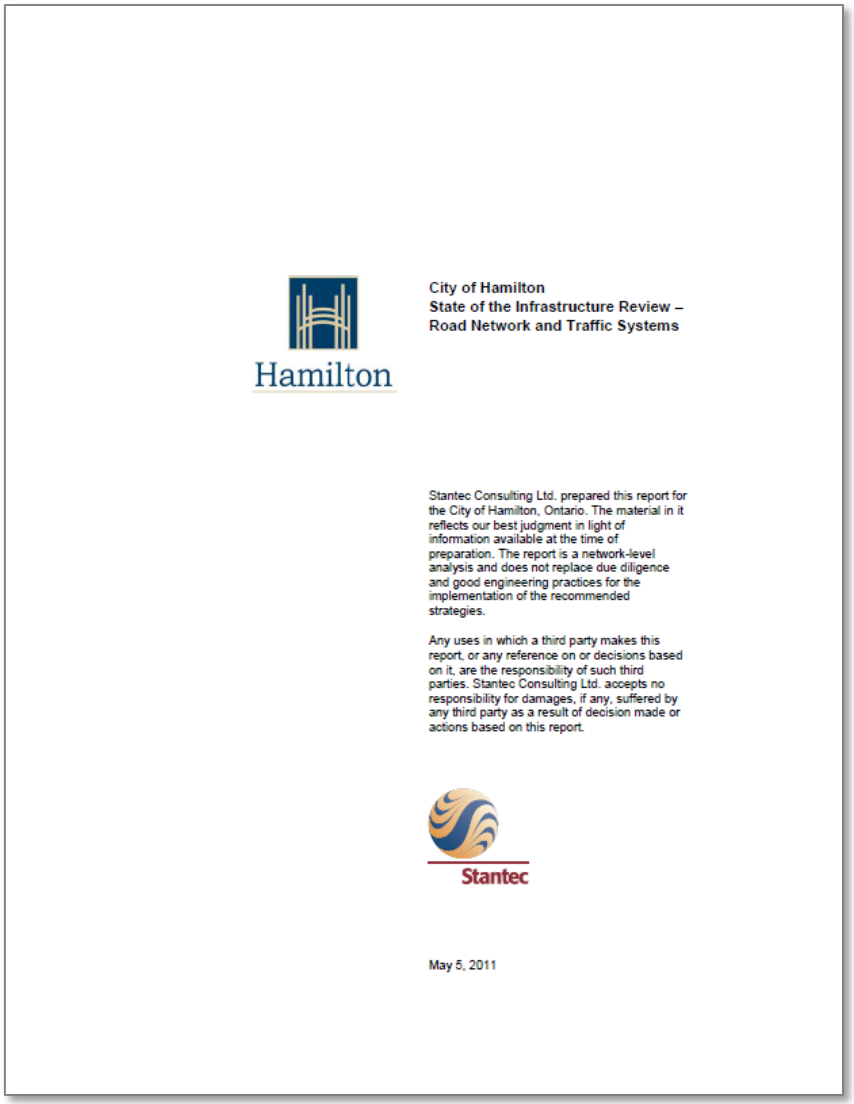
2010 State of the Infrastructure Report

- Structures (Bridges and Culverts)

Table 6.2: Road Network and Traffic System Condition Assessment

Asset		Individual Ratings 2009	Individual Ratings 2010	Overall Rating 2009	Overall Rating 2010	Trend
Road Network	Condition & Performance	D+	D-	D+	D+	↓
	Capacity vs. Need	C+	B			
	Funding vs. Need	D-	F			
Structures	Condition & Performance	C-	B-	C-	B+	↑
	Capacity vs. Need	B	B			
	Funding vs. Need	D-	A+			
Traffic System	Condition & Performance	D+	D+	D+	D+	→
	Capacity vs. Need	C+	C+			
	Funding vs. Need	F	F			


Hamilton

City of Hamilton
State of the Infrastructure Review –
Road Network and Traffic Systems

Stantec Consulting Ltd. prepared this report for the City of Hamilton, Ontario. The material in it reflects our best judgment in light of information available at the time of preparation. The report is a network-level analysis and does not replace due diligence and good engineering practices for the implementation of the recommended strategies.

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May 5, 2011

- Condition & Performance
  - Ave. BCI vs Target
- Capacity vs Need
  - Load capacity % posted
  - Traffic capacity (used roadway)
- Funding vs Need
  - Approximate in 2010, lacking data

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2016 State of the Infrastructure

- Structures (Bridges and Culverts)
- Condition & Performance
  - Ave. BCI vs Target
- Capacity vs Need
  - Load capacity % posted
  - Traffic capacity (used roadway)
- Funding vs Need
  - BMS budget and priorization analysis

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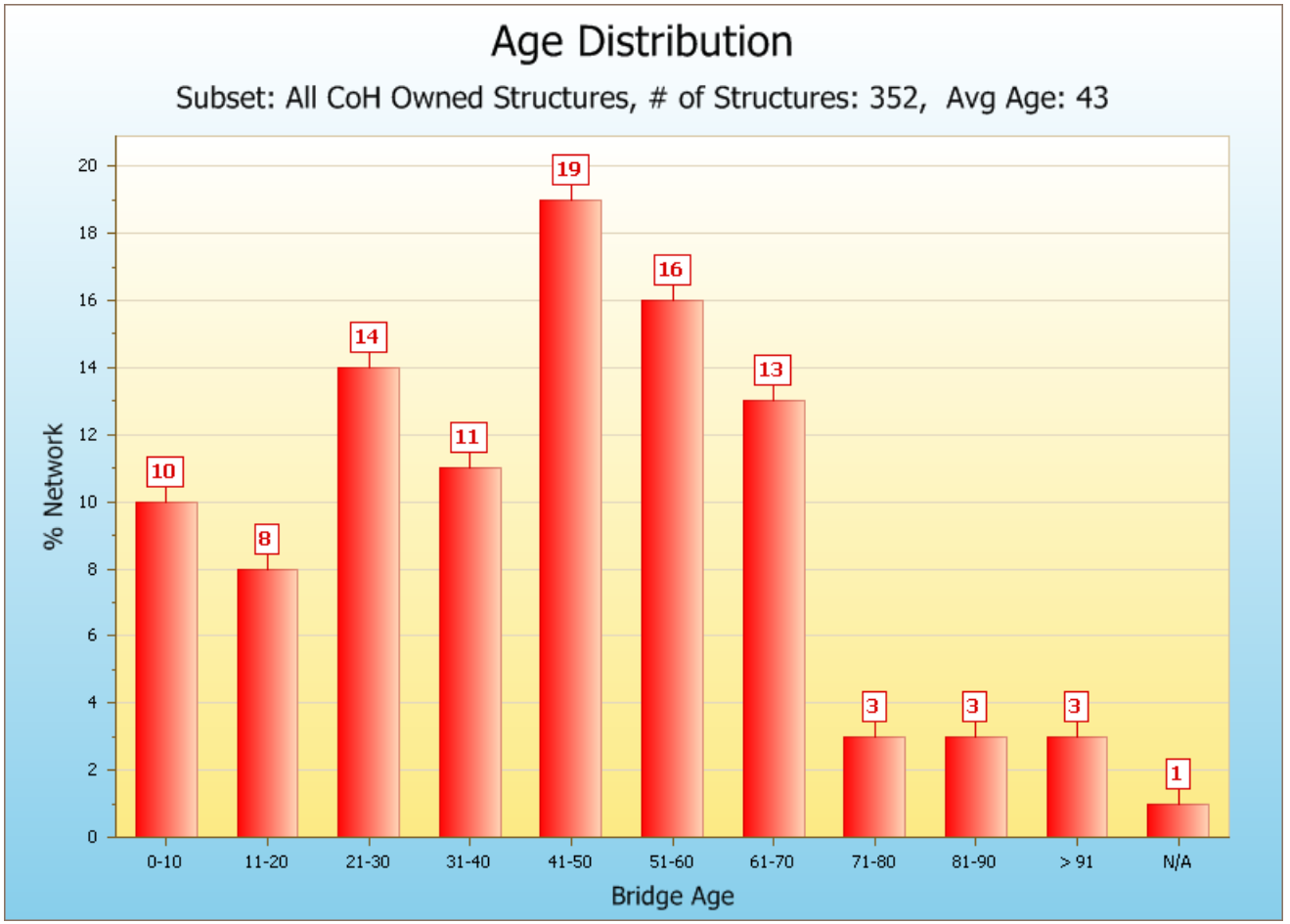
Inventory



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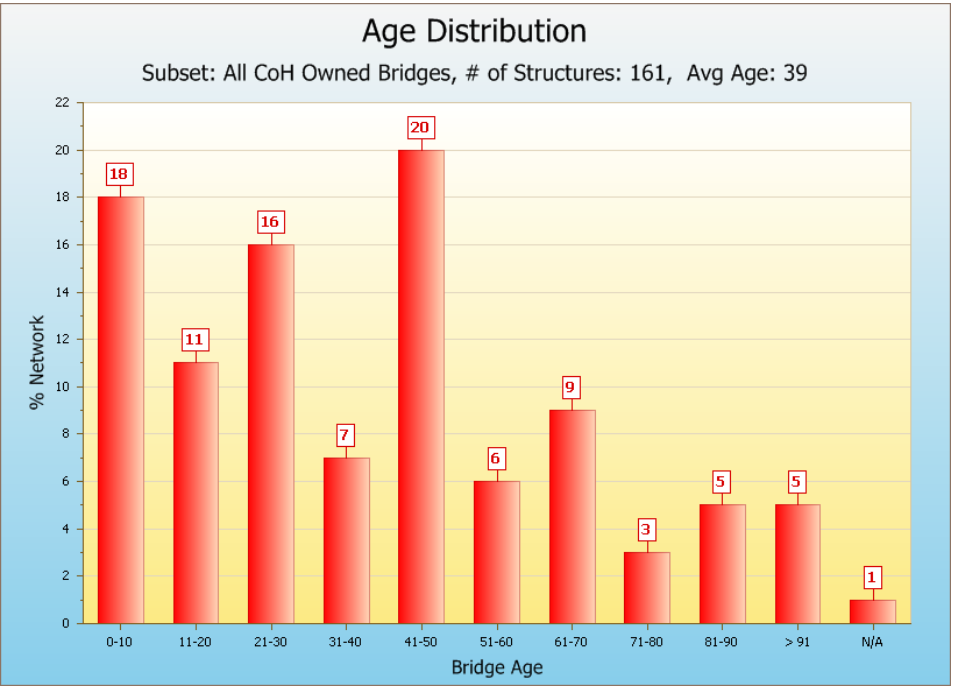
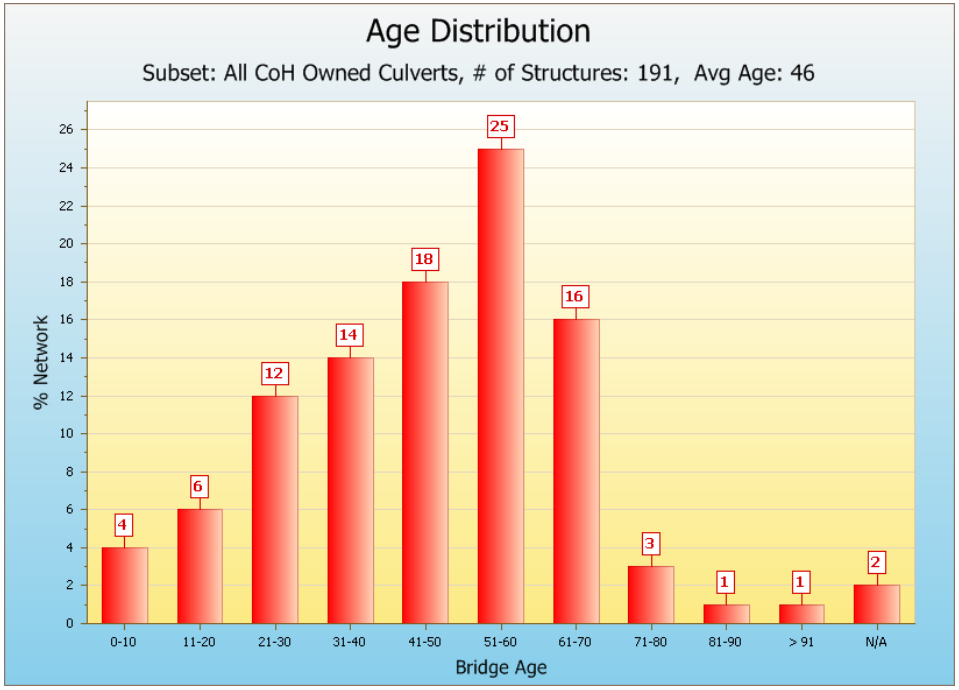
Inventory





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Condition

	# Structures	Ave BCI	Ave. Weighted BCI	Comments
2010 SoTI Report	360	73.7		
Bridges	234	74.1		
Culverts	126	73.1		
2016 BMS Update	352	70.8	77.0	More complete data
Bridges	161	73.7	77.7	
Culverts	191	68.3	70.5	

Average Condition Index

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Condition

	# Structures	Ave BCI	G (%)	F (%)	P (%)
2010 SoTI Report	360	73.7	70	23	7
Bridges	234	74.1			
Culverts	126	73.1			
2016 BMS Update	352	70.8	59	30	11
Bridges	161	73.7	69	24	7
Culverts	191	68.3	50	36	14

BCI Breakdown G/F/P

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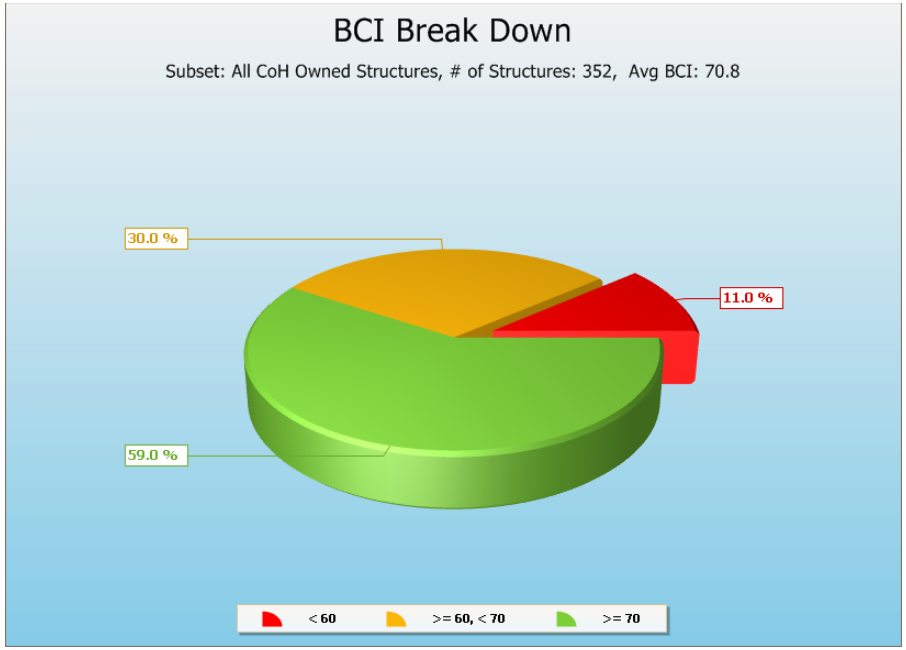
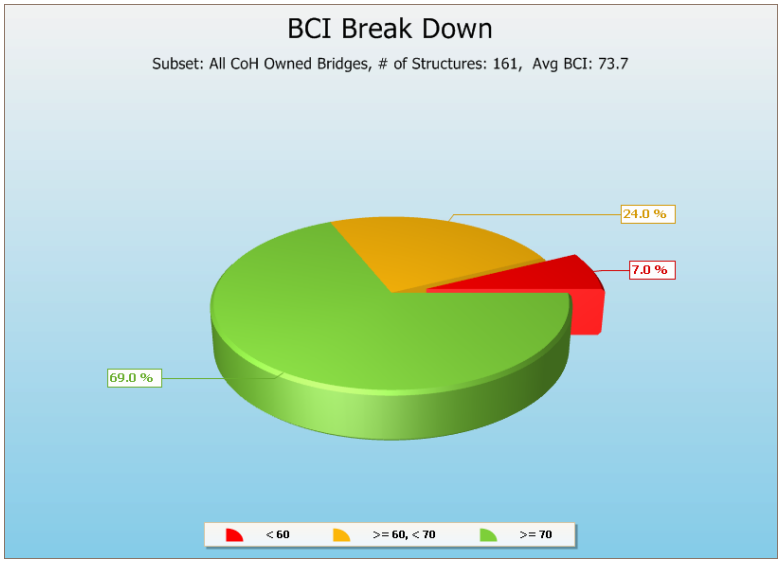
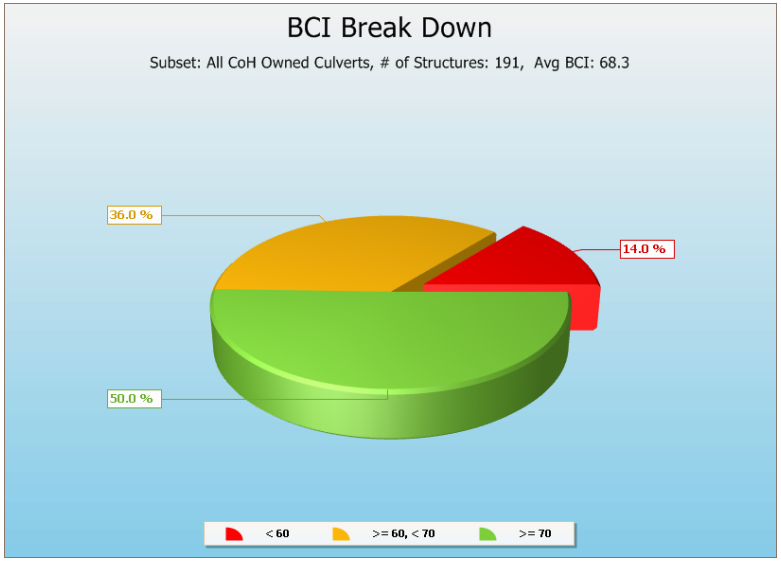
Condition







BCI Breakdown G/F/P

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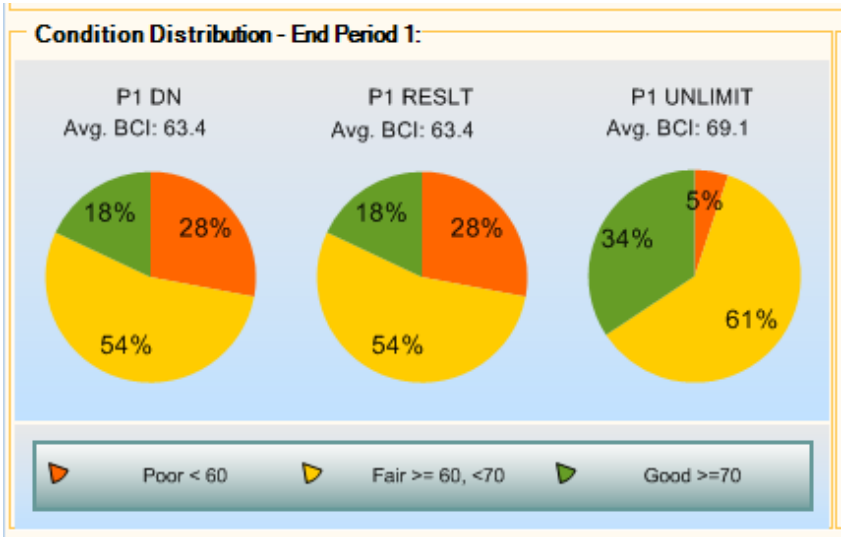
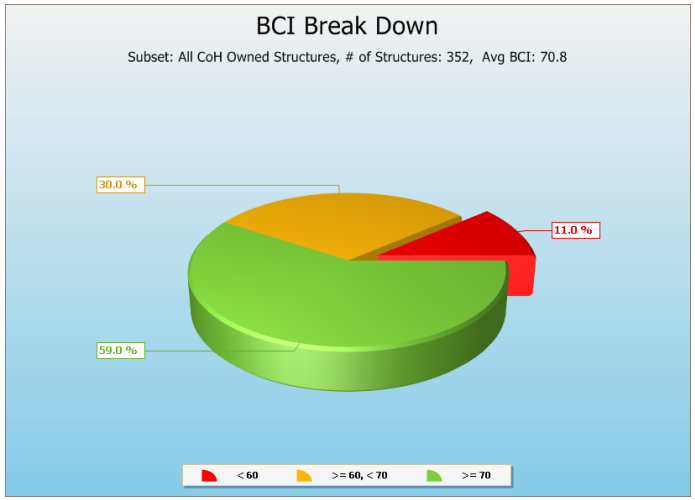
Condition – Forecasting

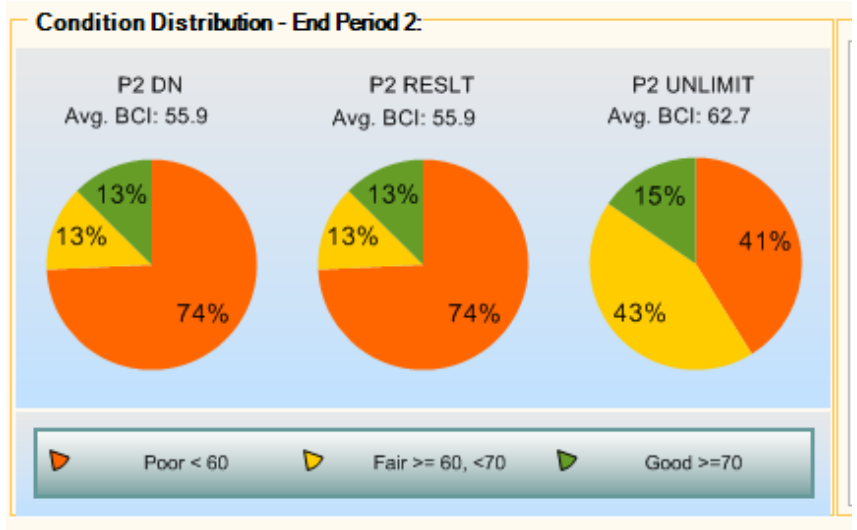
All City Structures (352)

Do Nothing $0 5Y and 10 Y

Ave BCI and BCI Breakdown G/F/P







Current BCI Distribution

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Needs Analysis

Scenarios

1. Do Nothing (Baseline #1)
2. Unconstrained(Baseline #2)
3. $8M per yr, larger projects
4. Other ? 50% budget for reference

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2016 State of the Infrastructure

- Structures (Bridges and Culverts) - used BMS to provide all inputs
- Condition & Performance
  - Ave. BCI vs Target – Network meets target. Overall keeping up. Bridges meet. Culverts do not meet. Overall good report card score.
- Capacity vs Need
  - Load capacity % posted – BMS reports load posting and load rating data
  - Traffic capacity (used roadway)
- Funding vs Need
  - BMS analysis – Budgets are keeping deterioration under control especially bridges, less so culverts. Funding is available to meet needs. Good report card score, slight improvement.

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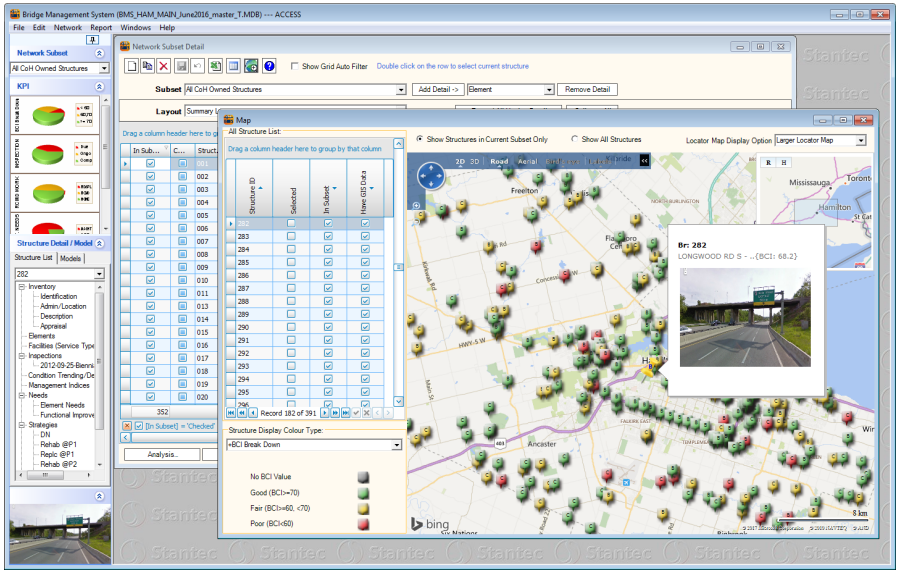
4 Summary

Summary

Overview of Stantec BMS

- Complete bridge management solution
- Capabilities useful for creating asset management plans, Annual Reports, Report Cards etc.
- BMS is not overly complex, easy to use, results easy to understand.



Summary

Two Case Studies

- BMS was used to provide the information for asset management plans
  - condition reports, performance measure reports
  - Asset Valuation
  - Risk Analysis
  - Needs Analysis, Budget Scenarios, and Prioritized work programs
  - Needs vs Funding
  - Asset Report Card

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Questions?

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Thank you!

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