



TETRA TECH EBA

PAVEMENT MANAGEMENT PLAN

PRESENTED TO
Town of Ladysmith

November 2015

www.eba.ca



Project Background

Pavement Management History

- In 1998, first pavement management plan was developed in Ladysmith
- The 1998 study included a total of **42.8 km** of roads; 12.6 km of collector roads and 30.2 km local roads.

The objectives of this study:

- Current pavement condition assessment;
- Link data and condition results to GIS;
- Update analysis to reflect current construction pricing;
- Analysis of paved roads based on data collected in 2015;
- Determine the optimal annual funding level that will indefinitely sustain the quality and value of the pavement network.

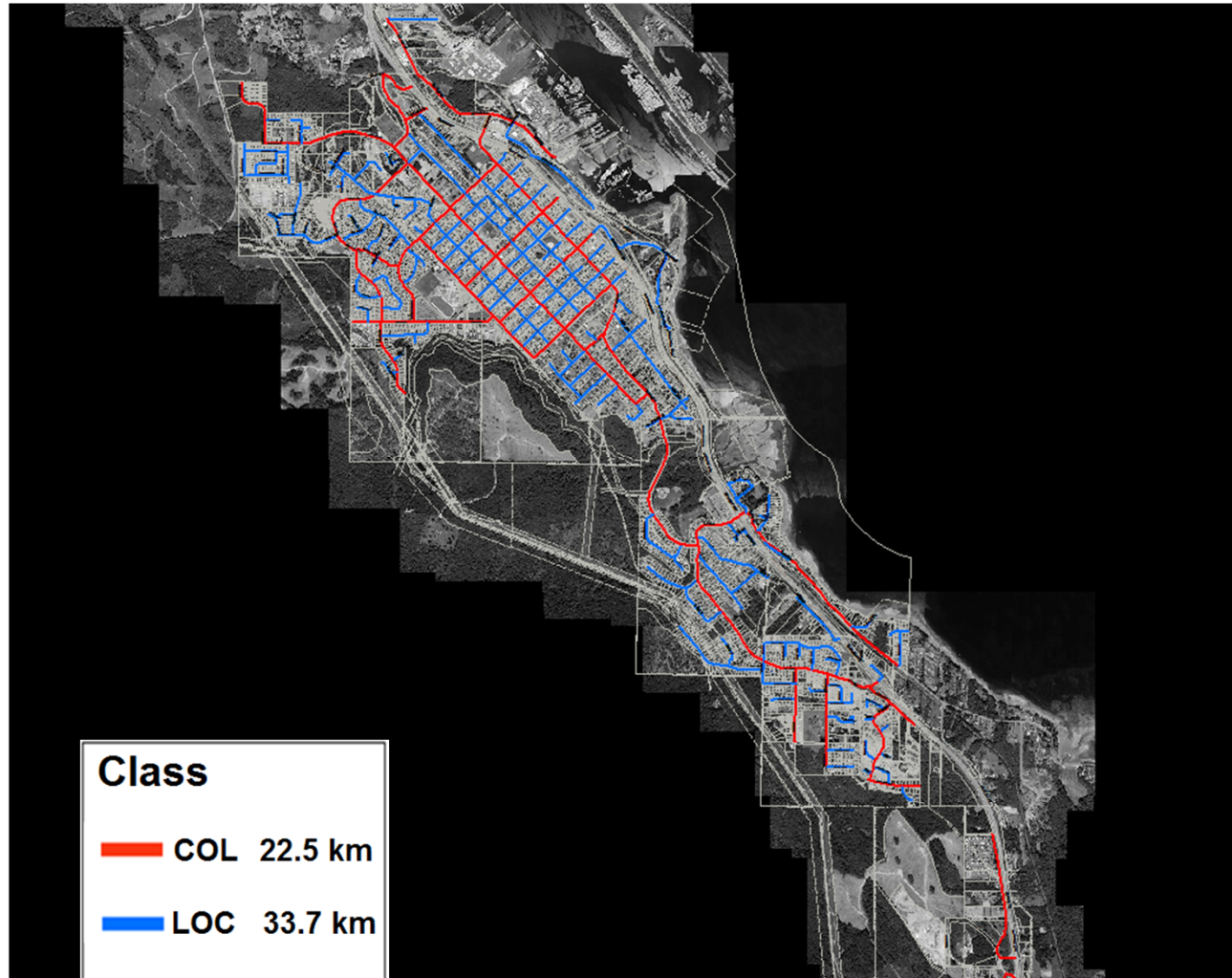
Project Definition

The Town of Ladysmith now has approximately **57 centreline-km** of streets consisting of **collector** and **local roads** (not including laneways and Provincial Highways)

Road Class	Road centreline-km			Road lane-km
	Asphalt	Gravel	Total	Total
Collector	22.5	0.13	22.6	45.4
Local	33.7	0.75	34.4	69.0
Network	56.2	0.88	57	114.4

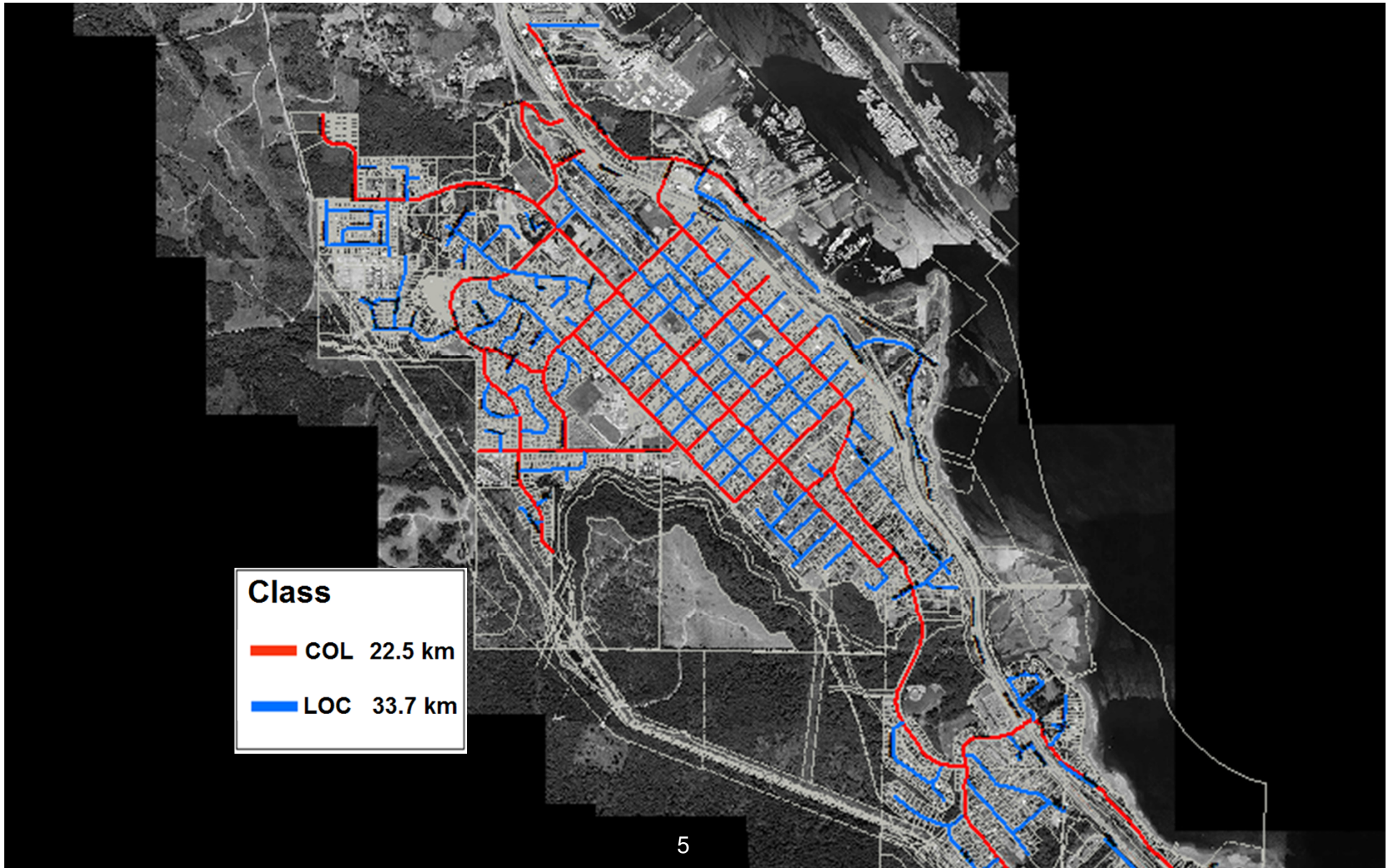
Project Definition

Paved Collectors and Local roads



Project Definition

Paved Collectors and Local roads



Pavement Data Collection

Tetra Tech EBA collected pavement condition data with the **Pavement Surface Profiler (PSP-6000)** vehicle on 78.7 lane-km of the Town's network in April 2015



Pavement Data Collection

Tetra Tech EBA collected pavement condition data with the Pavement Surface Profiler (PSP-6000) vehicle on 78.7 lane-km of the Town's network in April 2015

- Pavement Surface Distress (All Network)
- Road Roughness (IRI) and Rut depth (Collector Roads)
- Right-of-Way (ROW) Image log (All Network)

Pavement Condition Indices

Pavement Cracking Indices

- Fatigue Crack Area – **AFCA** (%)
- Thermal Crack Area – **TCA** (%)
- All Crack Area (%) – **ACA** (%) = AFCA + TCA

Roughness and Rutting indices

- International Roughness Index – **IRI** (mm/m)
- Average Pavement surface ruts – **RUT** (mm)

Composite Indices

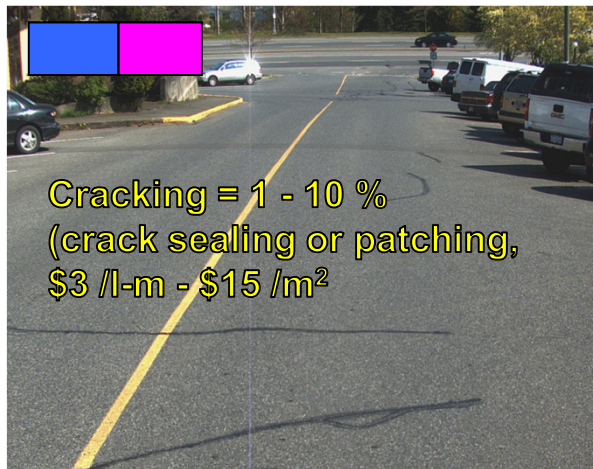
- Pavement Condition Index – **PCI**
- Pavement Asset Value Index – **PAVI**

Pavement Condition Indices

Index Ranges for Condition Descriptions

Rating	Cracking Index Range (%)	IRI Index Range (mm/m)	PAVI	Colour Code
Very Good	0-1	< 1.8	99-100	Green
Good	1-5	1.8 - 2.5	94-99	Blue
Fair	5-10	2.5 - 3.5	83-94	Magenta
Poor	10-30	3.5 - 6.5	60-83	Yellow
Very Poor	30-100	> 6.5	< 60	Red

} Backlog!



2015 Road Network Conditions

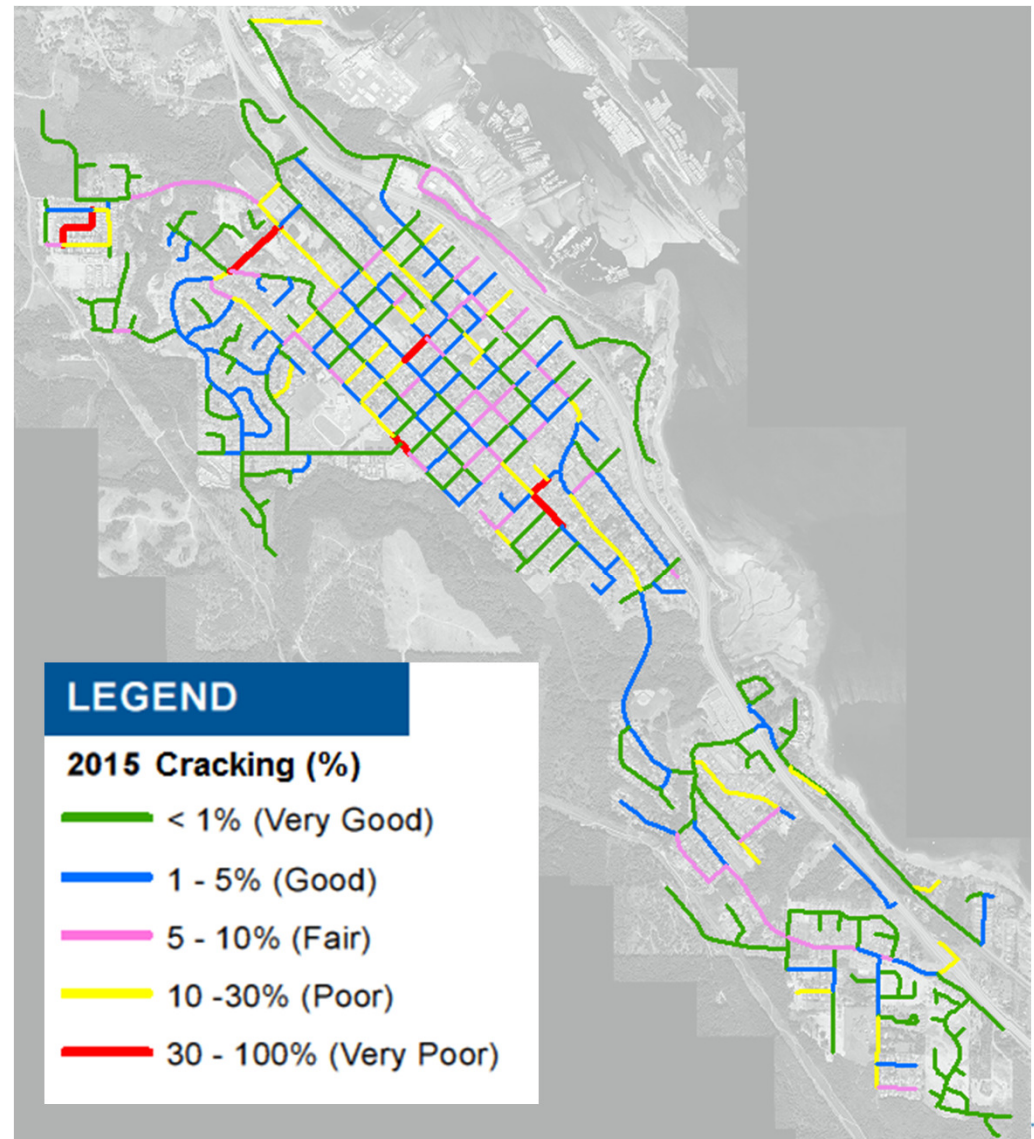
Average **PCI= 82.3** (Good condition)

Average all percent **cracking = 6.3%**

Average **PAVI =94.3**

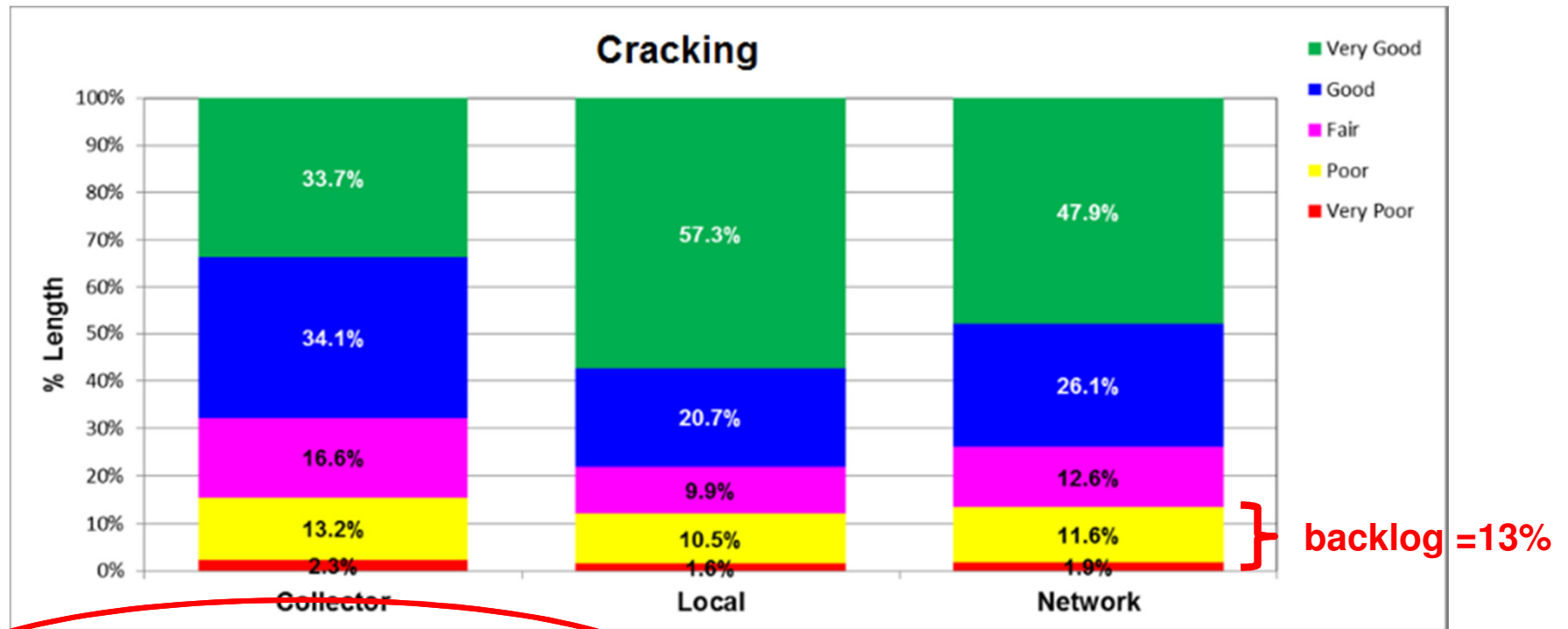
1998 PCI was about 85!

*BUT 30% new inventory,
represents about 10% drop in
average condition since 1998*



2015 Road Network Conditions

The road segments in **poor to very poor condition** are defined as “**backlog roads**”.



The Backlog was 2% in 1998

Analysis Methodology

Treatment Types and Costs

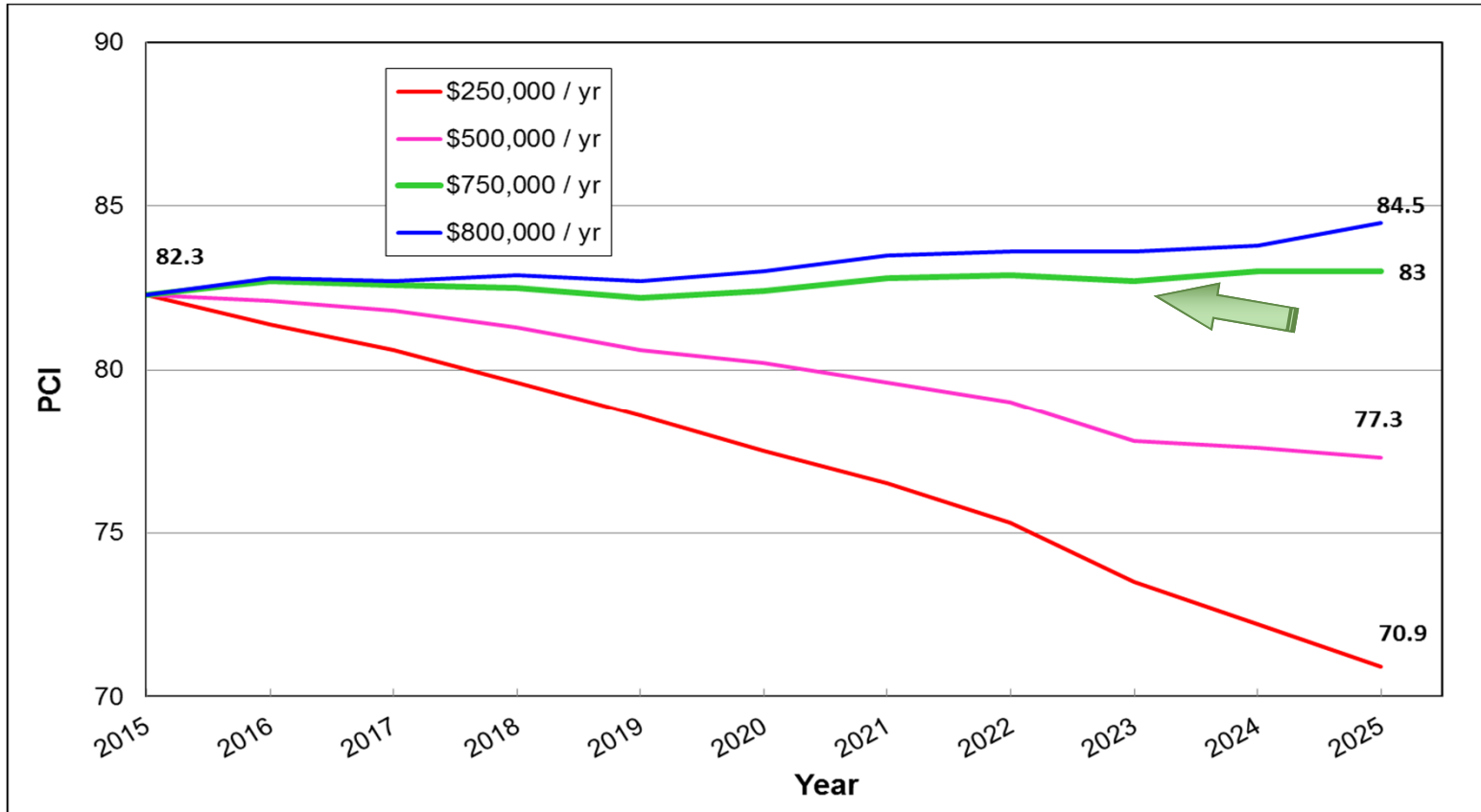
Treatment	Unit Cost
Crack Sealing	\$5/L-m
Shallow Patching	\$15/m ²
Overlay (50 mm)	\$22/m ² +(Crack Area Patching Cost*)
Mill and Fill (50 mm)	\$30/m ² + (Crack Area Patching Cost*)
Reclaim	\$50/m ²
Reconstruction	\$100/m ²
Subsequent Rehabilitations	\$22/m ² (no curb) or \$30/m ² (with curb)

Budget Scenarios

Budget Scenario	Average Annual Funding Average Over 10-Years		
	Rehabilitation	Maintenance	
\$250,000	\$130,000	\$120,000	48%
\$500,000	\$400,000	\$100,000	20%
\$750,000	\$670,000	\$80,000	11%
\$800,000	\$730,000	\$70,000	9%

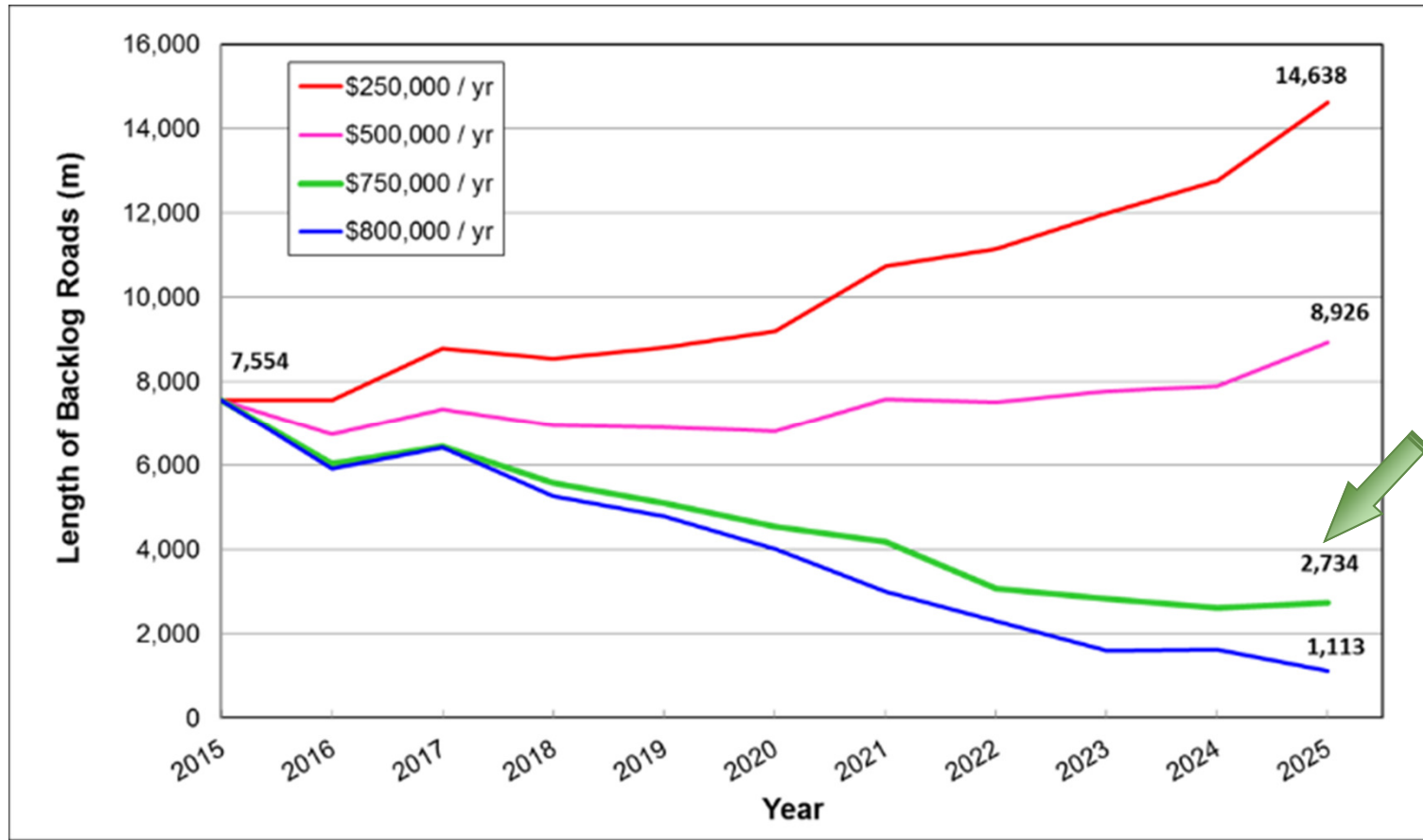
Analysis Results

Required Annual Budget Analysis



PCI is expected to remain about 83 with Annual Budget of **\$750,000**

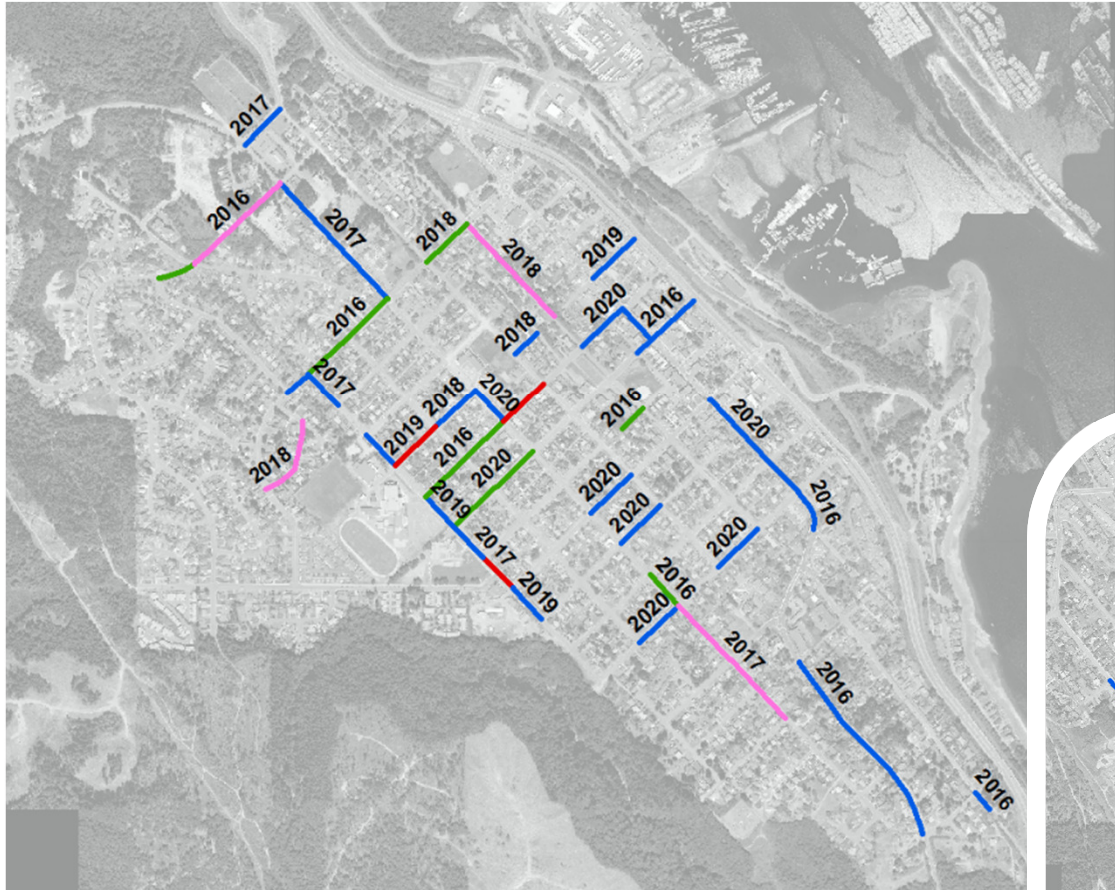
Required Annual Budget Analysis



The backlog length is reduced from **7.5 km** in 2015 to **2.7 km** in 2025 with **\$750,000** annual budget

5-year Rehabilitation Program (\$750,000 per year)

Analysis Results



Treatment Type

- Mill 50mm
- Overlay 50mm
- Reclaim
- Reconstruct



Pavement Program Summary

- Backlog
 - ❖ 7.5km of pavements requiring replacement, 15-20 year program required to clear backlog (to approx 2028 at \$750k/yr);
- Sustainable Repair/Replacement
 - ❖ **After backlog is cleared**, about \$500k/yr funding required to maintain pavement inventory at current state;
- Maintenance
 - ❖ \$100k/yr required for patching and crack sealing, \$60k in current budget;

Pavement Program Summary

- 5 Year Program

- ❖ 8.0km of pavements requiring replacement, 3.3 Million,
\$660k/yr;

- 18 Year Program

- 27.8km of pavements requiring replacement, 11.4 Million,
\$630k/yr;

GIS/Asset Management

- GIS
 - ❖ Geographic Information Systems (GIS) combine tabular data (pavement conditions) with geographic data (linear assets);
- Autocad/Excel
 - ❖ The Town has maintained some geographic (as-built) data for Sewer, Water, and Storm sewers in autocad, and basic condition data in excel over the last 5-10 years;
- Asset Management
 - ❖ In anticipation of the move to a GIS based asset management system, the autocad and excel utility data is in the process of being transferred to GIS, along with the new pavement management data;

GIS/Asset Management

- Why combine this data?
 - ❖ Allows the merging of different types of data into one environment;
 - ❖ Allows other types of analysis to be performed on the data without data duplication (i.e. sewer and water modelling);
 - ❖ Allows for a standardized method or policy of asset management;
 - ❖ Standardizes and simplifies training;
 - ❖ Is much easier to understand!

Other Utilities

In most of the projects contained in the 5 Year Paving Plan, other utilities will require replacement at the same time!

- Sanitary Sewers

- ❖ 19.3km out of 69.2km may need replacement (28%)

- Watermains

- ❖ 22.1km out of 84.3km will need replacement (26%)

- Storm Drainage

- ❖ ... In progress, data being transferred....

5 Year Infrastructure Improvement Plan

Draft 1 Nov 30, 2015

Project Group Number	Location	Paving	Water	Sanitary	Storm	(Paving and Storm)	Total Budget
1 Total	1st Ave: Gatacre - Forward Rd	\$158,453	\$213,579	\$0	\$211,828	\$370,281	\$583,860
2 Total	Walkem: 4th Ave - Stillin Dr	\$138,860	\$183,950	\$0	\$195,495	\$334,355	\$518,305
3 Total	4th Ave: Symonds - Walkem Rd	\$172,257	\$190,409	\$0	\$197,026	\$369,283	\$559,693
4 Total	Symonds: 4th Ave - Stillin Drive	\$151,045	\$64,451	\$0	\$240,412	\$391,458	\$455,908
5 Total	6th Ave: Buller - Symonds	\$84,707	\$170,215	\$0	\$105,659	\$190,366	\$360,580
6 Total	Buller: 6th Ave - 3rd Ave	\$228,474	\$173,852	\$0	\$205,193	\$433,667	\$607,518
7 Total	6th Ave: Baden Powell to Buller	\$277,821	\$201,507	\$0	\$210,807	\$488,628	\$690,135
8 Total	4th Ave : Belaire-White	\$93,296	\$153,440	\$26,950	\$147,004	\$240,300	\$420,690
9 Total	4th Ave Extension: Hambrook-Belaire	\$74,100	\$0	\$53,968	\$99,534	\$173,634	\$227,602
10 Total	Dogwood: Stevenson to Gifford	\$138,144	\$0	\$176,779	\$266,955	\$405,099	\$581,878
Grand Total		\$1,517,158	\$1,351,403	\$257,697	\$1,879,912	\$2,991,971	\$4,424,291
	Annual Cost: 3 Year progam	\$505,719	\$450,468	\$85,899	\$626,637	\$997,324	\$1,474,764
	Annual Cost: 5 Year program	\$303,432	\$270,281	\$51,539	\$375,982	\$598,394	\$884,858

5 Year Infrastructure - Capital "Placeholder" projects

Year	Paving	Water	Sanitary	Storm	(Paving and Storm)	Total Budget
2016	\$600,000*	\$200,000	\$300,000	\$300,000	\$900,000	\$1,400,000
2017	\$450,000	\$200,000	\$300,000	\$300,000	\$750,000	\$1,250,000
2018	\$500,000	\$200,000	\$300,000	\$300,000	\$800,000	\$1,300,000
2019	\$500,000	\$200,000	\$300,000	\$300,000	\$800,000	\$1,300,000
2020	\$500,000	\$200,000	\$300,000	\$300,000	\$800,000	\$1,300,000
Total	\$2,550,000	\$1,000,000	\$1,500,000	\$1,500,000	\$4,050,000	\$6,550,000
Average	\$510,000	\$200,000	\$300,000	\$300,000	\$810,000	\$1,310,000

** 4th Ave Reconstruction, slated for 2016, design in 2015*

Project Delivery Model

It is recommended that projects are:

- Organized into logical project groupings;
- Designed by a Consultant (RFP) in year one;
- Tendered conventionally, and constructed in year two.