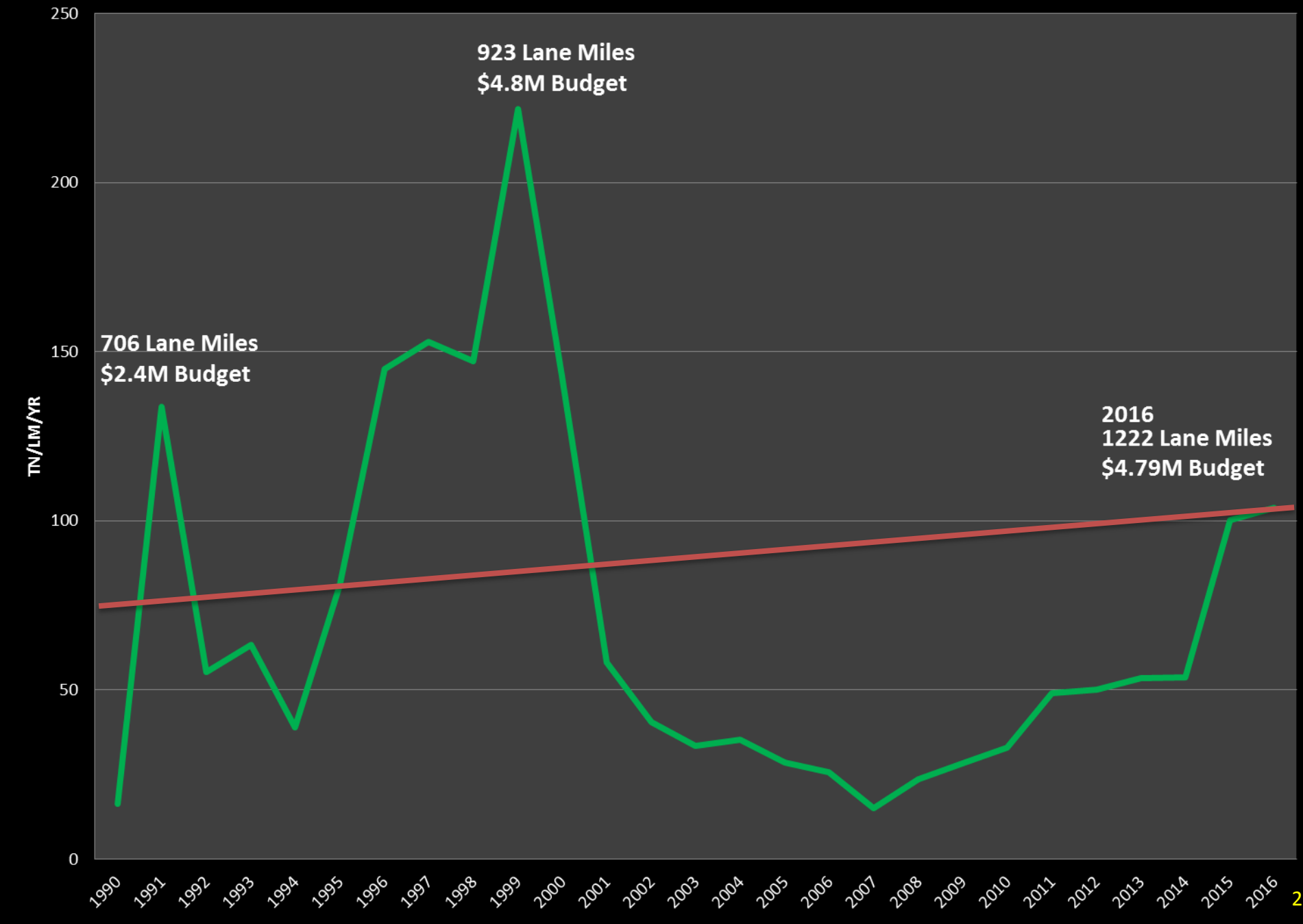
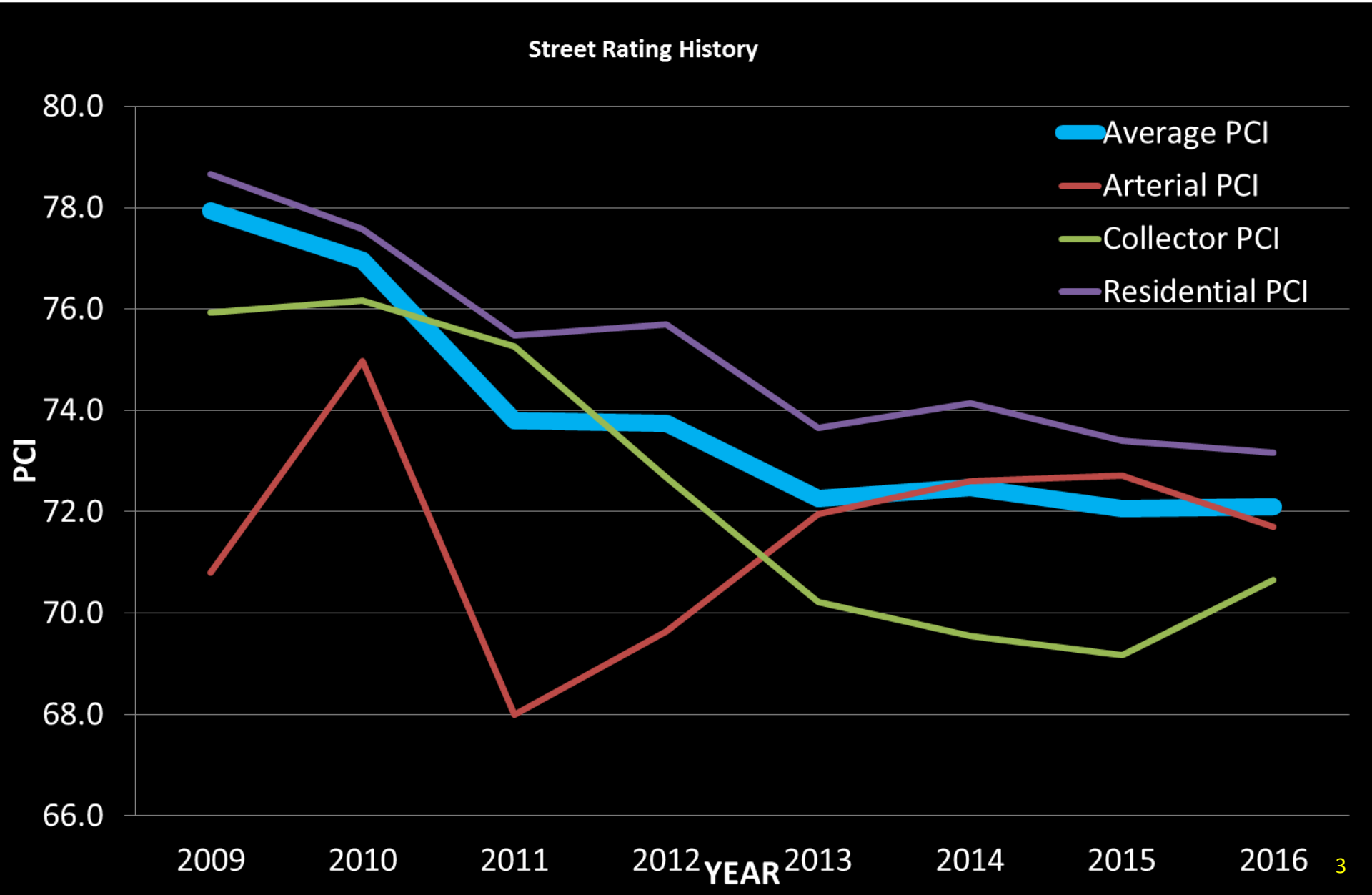
City of Thornton Street Rehabilitation

A Sustainable Street Program

Rehabilitation History



Pavement Condition Index (PCI)



Current Conditions

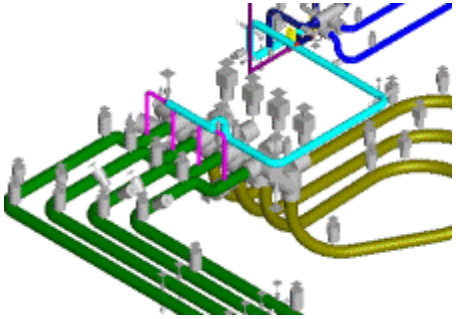
Current Conditions		Good (80-100)	Fair (45-79)	Poor (0-44)	Average PCI
2016	**All Streets**	**14.6%**	**85.4%**	**0.0%**	**72.1**
	Arterial	25.9%	74.1%	0.0%	71.7
	Collector	10.7%	89.3%	0.0%	70.7
	Residential	10.6%	89.3%	0.0%	73.2

Arterial

Collector

Residential

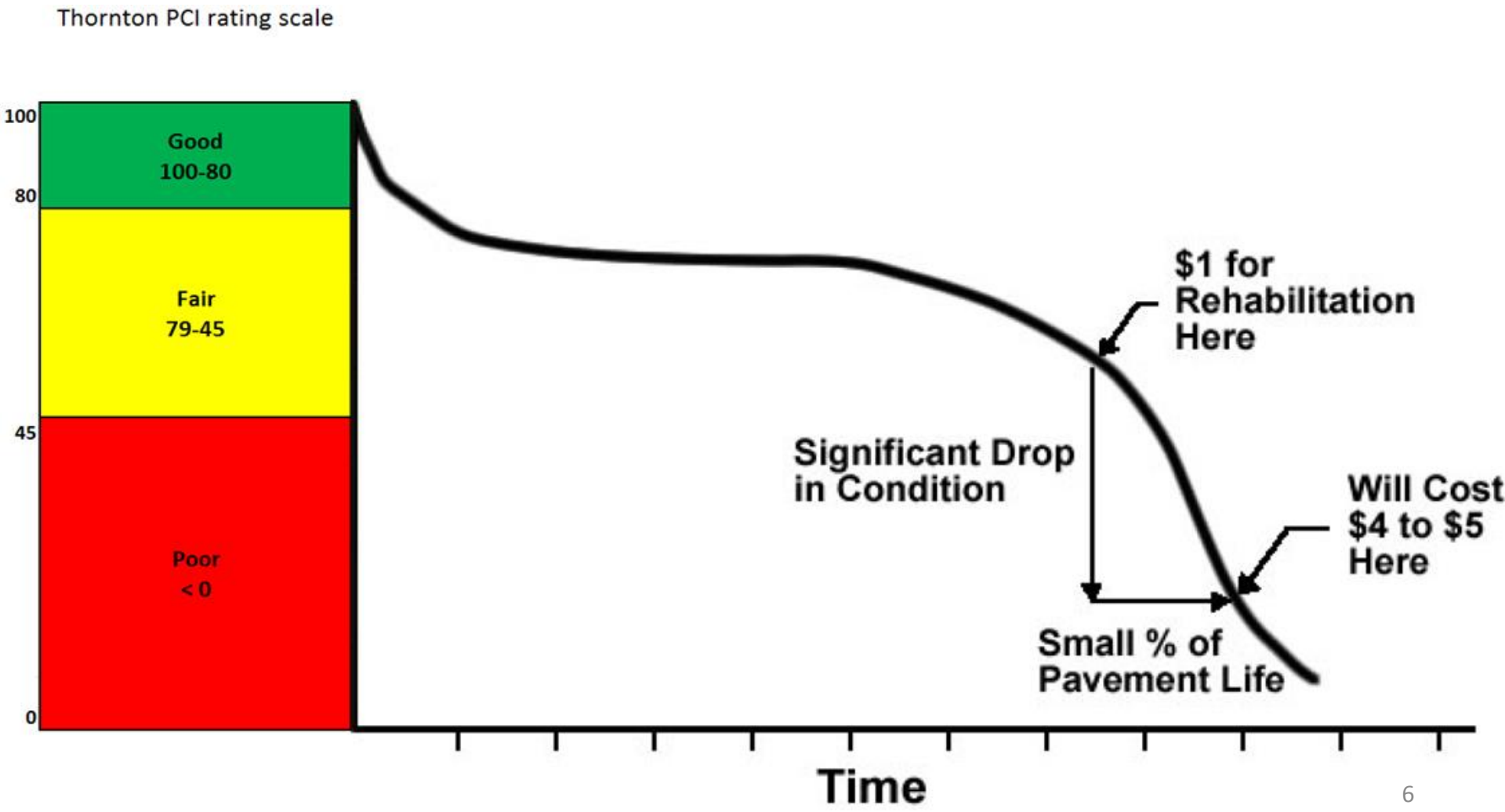
The Approach



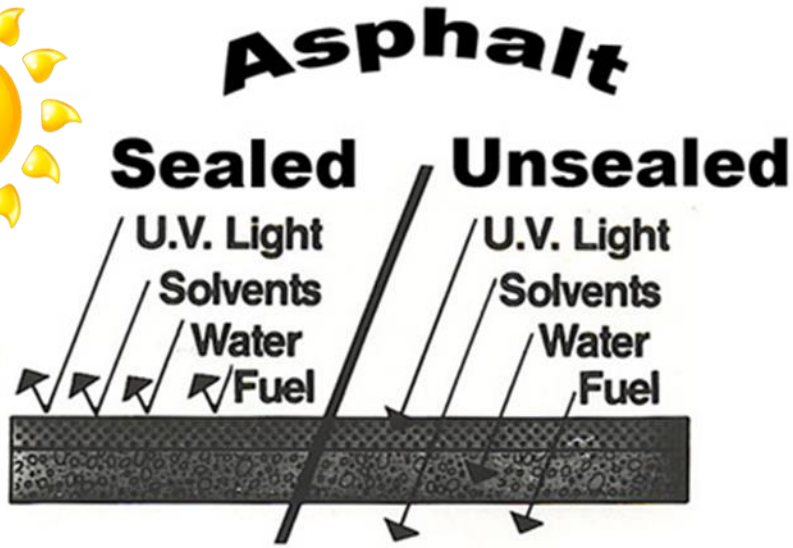
- Total Street Network Replacement Value: **$122,700,000**
- Current Value: **$89,000,000**

- **Pavement Management Coordinator Position**
  - Year-round coordination and attention to program.
  - More in-depth analysis of existing conditions and project future conditions.
  - Research alternative, cost-effective ways to maintain the streets.
  - Analyze what has succeeded and what has failed from past programs.

PCI and Early Treatment



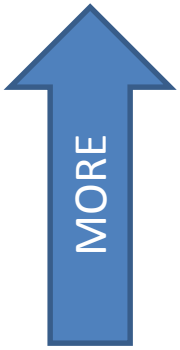
Pavement Deterioration 101



The Standard

- Setting a Target Pavement Condition Index (PCI)
  - Network PCI of 70
- Based on engineering/deterioration curves
- Expectations by citizens
- Consistent with other municipalities
- Allows for flexibility
    - Treatment
    - When to be treated
    - Budget restraints

Street Rehabilitation Program



- Preventative Maintenance
  - Crack Seal
  - Slurry Seal
  - Rejuvenator

- Less expensive
- Prevents further damage
- Minimal motorist impact
- Extended's road life

- Rehabilitation
  - Mill & Overlay
  - Hot Chip Seal
  - Hot In-Place Recycling

Preventative vs Reactive

Preventative (small cracks)

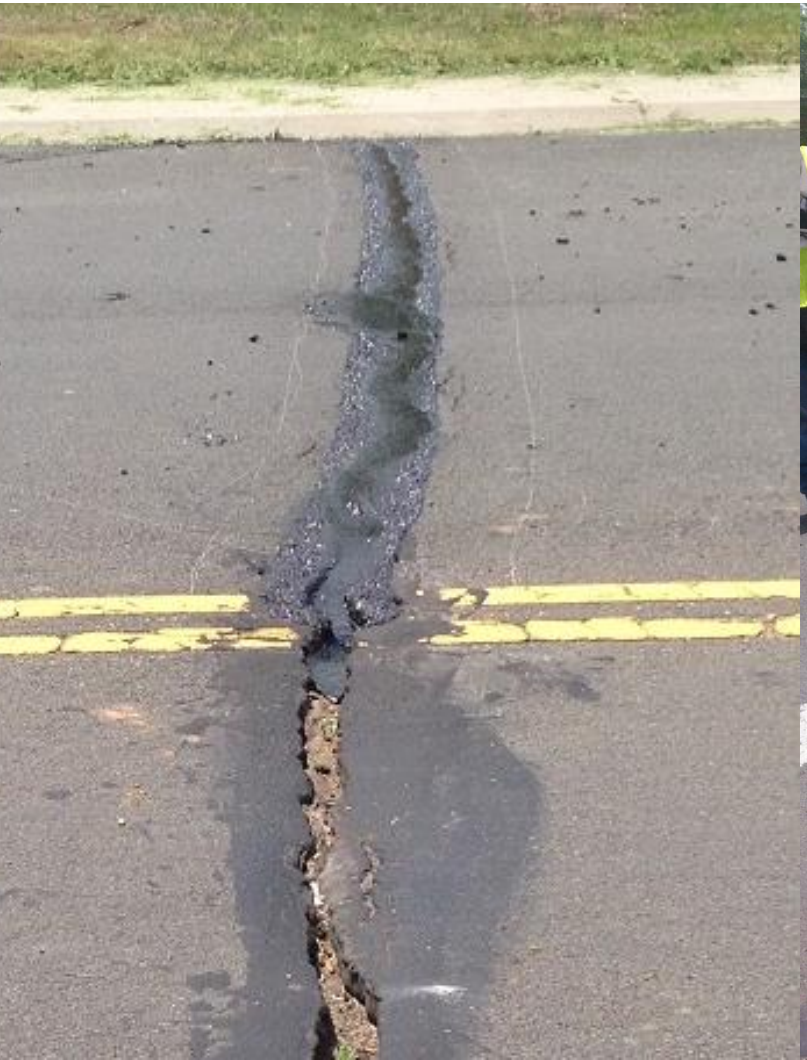
Reactive (large cracks)

Preventative: Crack Seal

- **Seals surface from moisture**
- **Prevents potholes**
- **Lowest cost/ Highest impact**

Preventative: Mastic Crack Seal

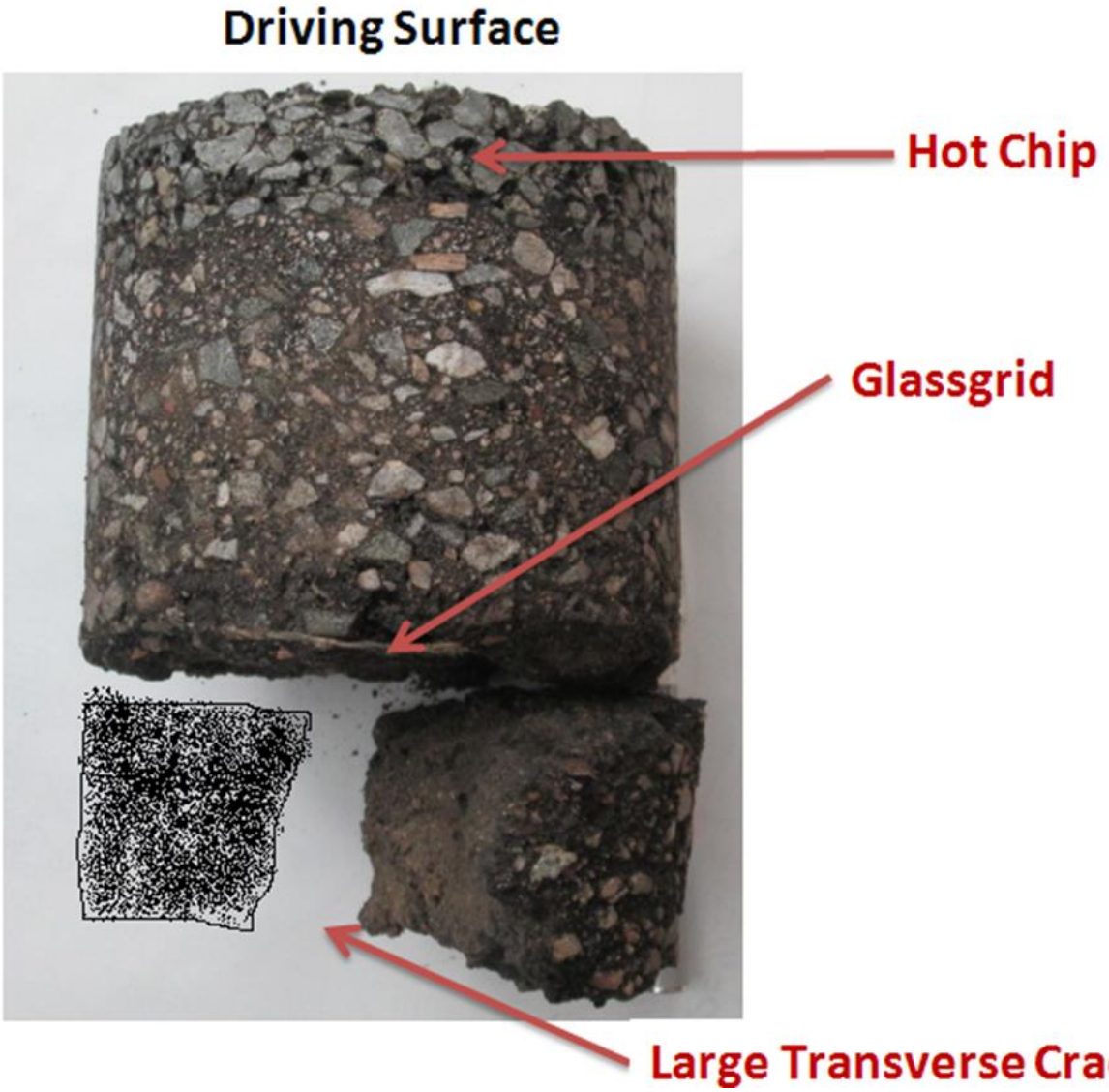
- Long lasting durable repair
- Levels sunken areas
- Improves ride



Preventative: Asphalt Rejuvenator

- Rehydrates asphalt oils
- Closes hairline cracks
- Increase bond to aggregate

Creating A Perpetual Pavement



Rehabilitation: Hot Chip Process

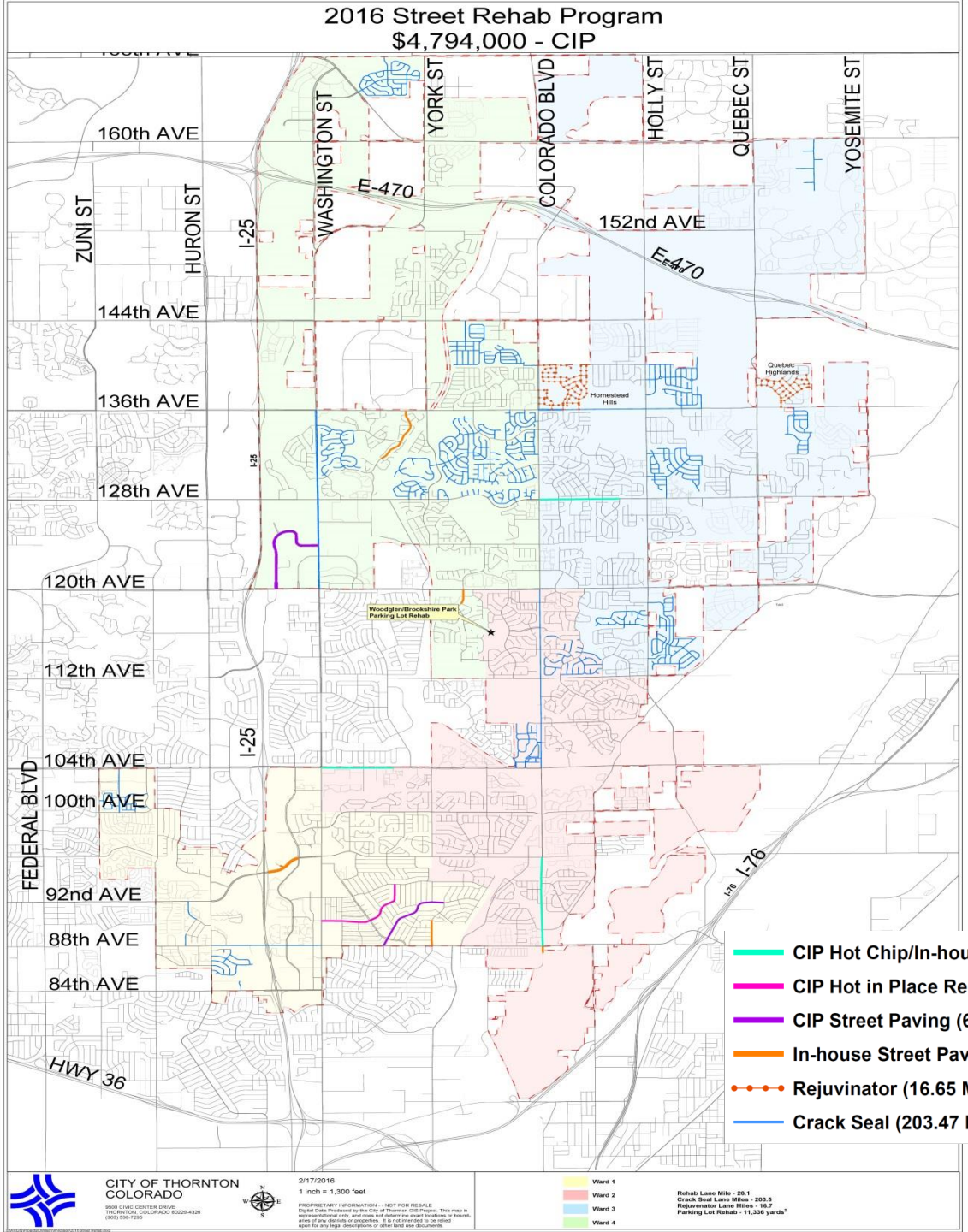
- Durable riding surface
- Open graded paving sheds water
- Inexpensive paving option

Rehabilitation: Hot In Place Recycling

- Recycles bottom 1” of Asphalt
- Places 1” new asphalt as top lift (riding surface)
- 1 pass process

Rehabilitation: Mill and Overlay

- Remove 2”-3” of old asphalt
- Overlay with new asphalt
- Used when large areas would need patching


2016 Street Rehab Program
$4,794,000 - CIP
160th AVE
152nd AVE
144th AVE
136th AVE
128th AVE
120th AVE
112th AVE
104th AVE
100th AVE
92nd AVE
88th AVE
84th AVE
HWY 36
ZUNI ST
HURON ST
I-25
WASHINGTON ST
YORK ST
COLORADO BLVD
HOLLY ST
QUEBEC ST
YOSEMITE ST
E-470
FEDERAL BLVD
I-76
Homestead Hills
Quebec Highlands
Woodglen/Brookshire Park Parking Lot Rehab
CIP Hot Chip/In-house Mill/Patch (11.71 Miles)
CIP Hot in Place Recycling/In-house Mill/Patch (2.58 Miles)
CIP Street Paving (6.92 Miles)
In-house Street Paving (4.9 Miles)
Rejuvinator (16.65 Miles)
Crack Seal (203.47 Miles)
CITY OF THORNTON
COLORADO
2/17/2016
1 inch = 1,300 feet
Ward 1
Ward 2
Ward 3
Ward 4
Rehab Lane Mile - 26.1
Crack Seal Lane Miles - 203.5
Rejuvenator Lane Miles - 16.7
Parking Lot Rehab - 11,336 yards²

2014 Municipality Survey

Rank	Municipality	Avg. PCI	
1	Wheat Ridge	82.00	
2	Greenwood Village	78.00	
3	Westminster	77.00	
4	Castle Rock	76.73	
5	Centennial	75.00	
6	Denver	75.00	
7	Northglenn	73.00	
8	Thornton	72.50	
9	Fort Collins	70.91	
10	Aurora	70.00	
11	Longmont	70.00	
12	Arvada	62.00	
13	Greeley	61.80	
	Broomfield	RSL = 12.06	Remaining Service Life
	Lakewood	Good 82%	*
	Loveland	71.8% Good	*

* Did not provide Average PCI number

2015 $/Lane Mile Rankings

- Program Cost: $4.6 Million
  - Includes funding for City Parking Lots
  - 5 year cycle for street treatment

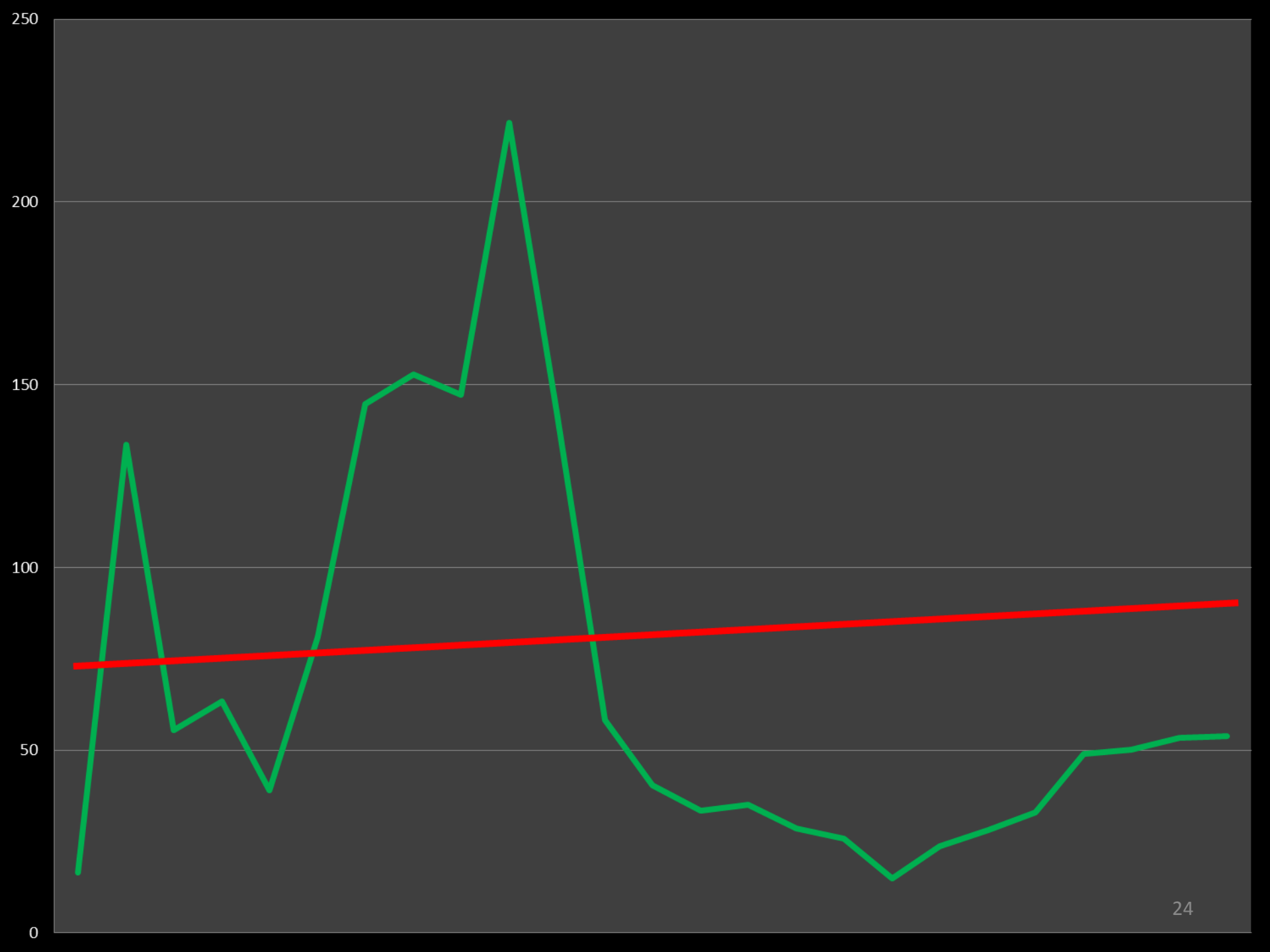
Rank	Municipality	Lane Miles	Centerline Miles	2014 Budget	$/Lane Mile
1	Greenwood Village	225	90	$3,600,000	$16,000
2	Fort Collins	1850	540	$13,550,000	$7,324
3	Aurora	2125	978	$15,499,600	$7,294
4	Lakewood	1332	487	$8,162,000	$6,128
5	Centennial	1066	430	$6,500,000	$6,098
6	Loveland	704	329	$3,994,000	$5,673
7	Castle Rock	564	243	$3,049,000	$5,406
8	Northglenn	231.75	102.83	$1,250,000	$5,394
9	Denver	6,000	2,105	$30,000,000	$5,000
10	Longmont	1123	330	$5,025,000	$4,475
11	Wheat Ridge	282	133	$1,200,000	$4,255
12	Arvada	1,473	427.65	$5,500,000	$3,733
13	Thornton	1209	398	$4,600,000	$3,804
14	Westminster	1100	357	$4,100,000	$3,727
	Broomfield	Not Given	249	$3,900,000	N/A
	Greeley	Not Given	390	$3,551,200	N/A

What does all of this mean?

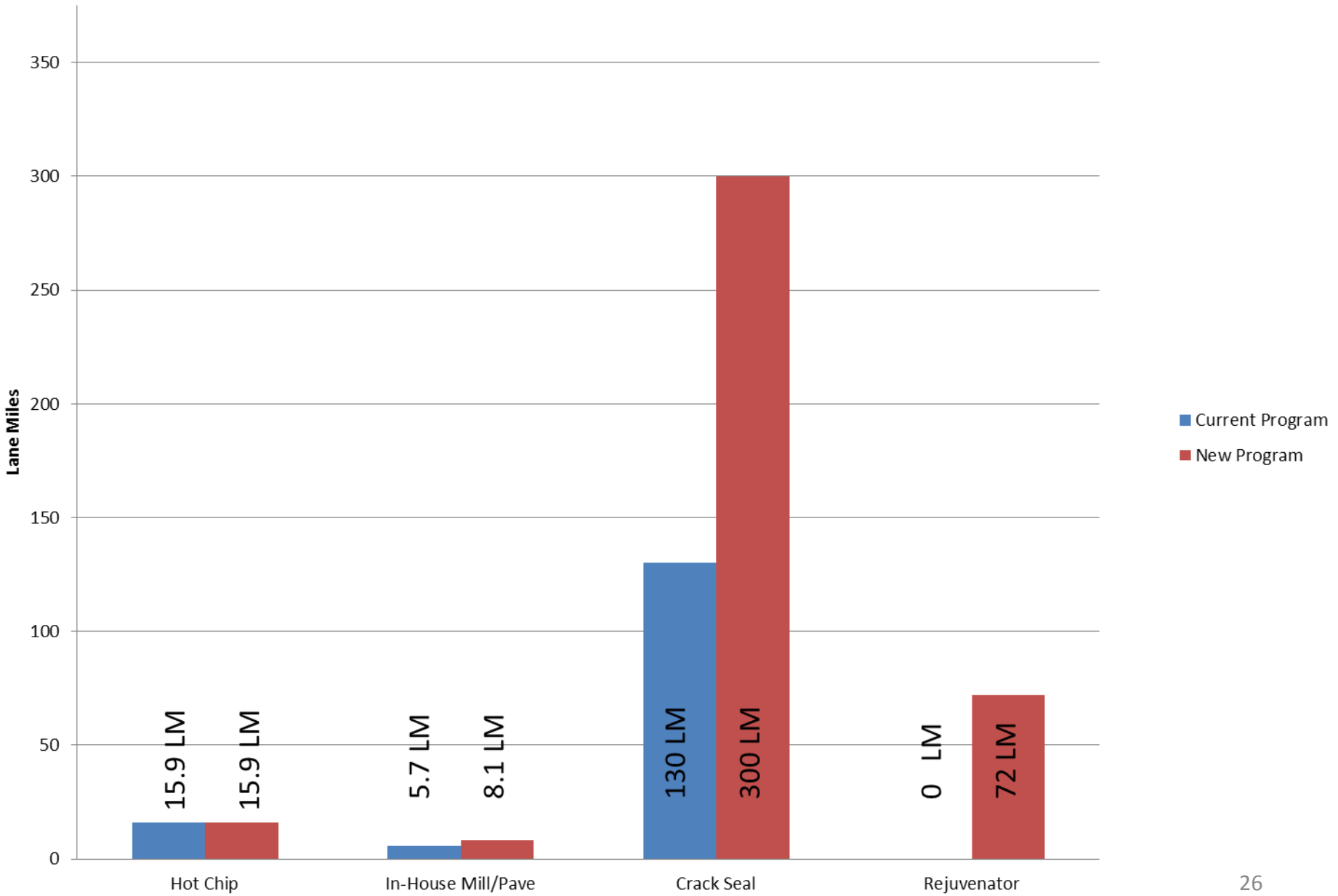
- Every street is “touched” every 5 years.
- Every parking lot is “touched” every 5 years.
- Problems aren’t allowed to grow as large.
- Faster permanent fixes instead of band aids.
- Higher than average PCI than other cities, yet lower funding level.

Any Questions?

DO NOT USE PAST THIS POINT


250
200
150
100
50
0
24

Existing vs. Future Programs



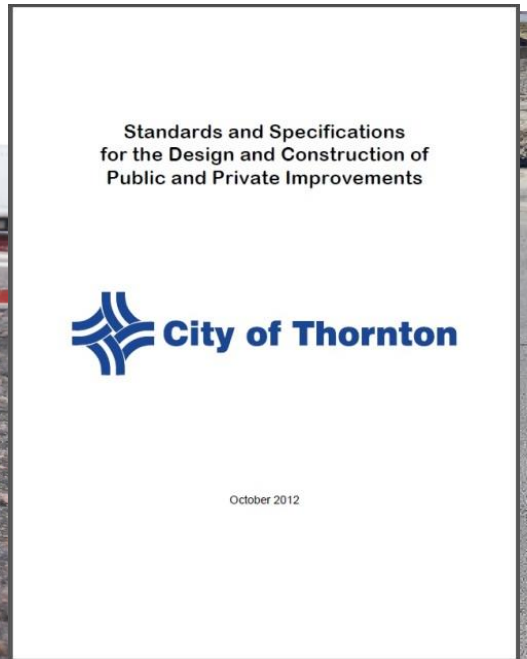
Revise Standards & Specifications

New Construction

- Concrete at all major intersections.
- Stone Matrix Asphalt (SMA) on Major Arterials
- Composite asphalt sections (not full depth asphalt)
- New Subdivisions- Require asphalt rejuvenator and crack sealing at two-year warranty expiration.

Capital Projects

- Concrete whitetopping at all major intersections.



Street Cuts

Street Cut Requirements

- Revise restoration requirements (detail on next page).
- Assess fee for damaging pavement to pay for future maintenance of cut.

- A fee is assessed for cutting into the pavement based upon the street condition and frequency of last treatment. The permittee is also charged up front for restoration of the street cut.

This pavement was stabilized using CST to inject polyurethane into the pavement without having to cut into the pavement section (non-invasive).

Spending $ More Effectively

- Approximately $600k saved each year using in-house crews in the street rehabilitation program.
- Utilize in-house crews were we are more cost effective and utilize contractors where they are more cost effective.
    - Examples:
        - Crack sealing- Contractor
        - Large continuous mill and pave- Contractor
        - Parking Lots- Contractor
        - Mill and patch- In-house crews
        - Street Repairs- In-house crews

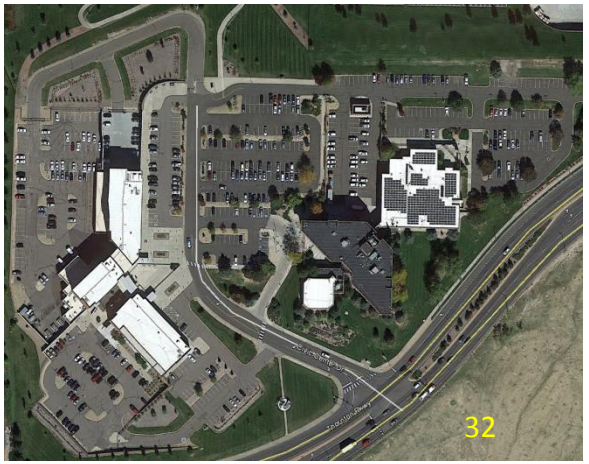
Spending $ More Effectively

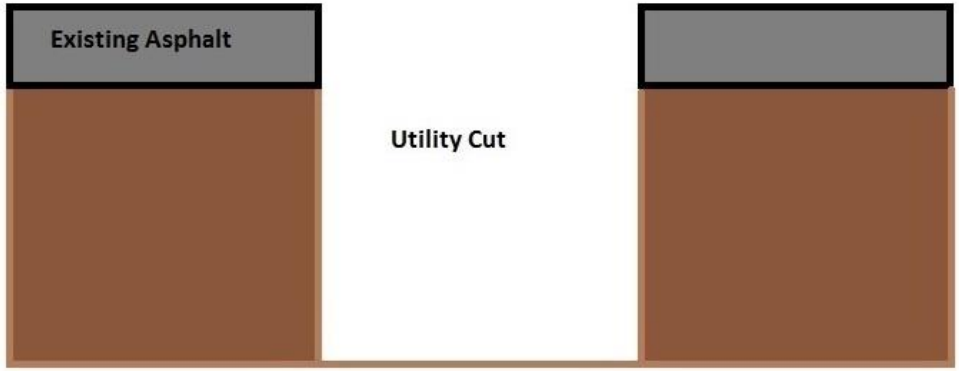
By utilizing a milling machine year round:

- Able to perform street repairs year-round as needed versus squeezing everything into a six-month program.
  - Allows for partial depth repairs instead of full depth repairs.
  - Saves time per location and inconvenience to motorists.
  - Reduces amount of material used per repair.
  - Material (millings) are reusable. Full depth materials does to the landfill.
  - Allows more repairs per year.
  - More easily able to correct grade issues.

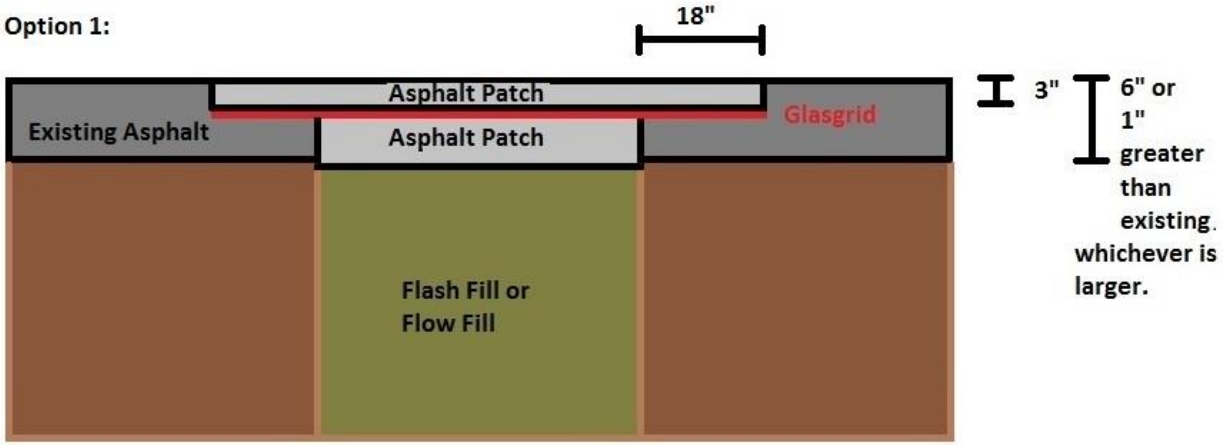
2016 Budget $4.76 Million

- Includes Maintaining
  - 1200+ Lane Miles of Streets
  - 4 Lane Miles of Alleyways
  - 320,000 Square Yards of Parking Lots

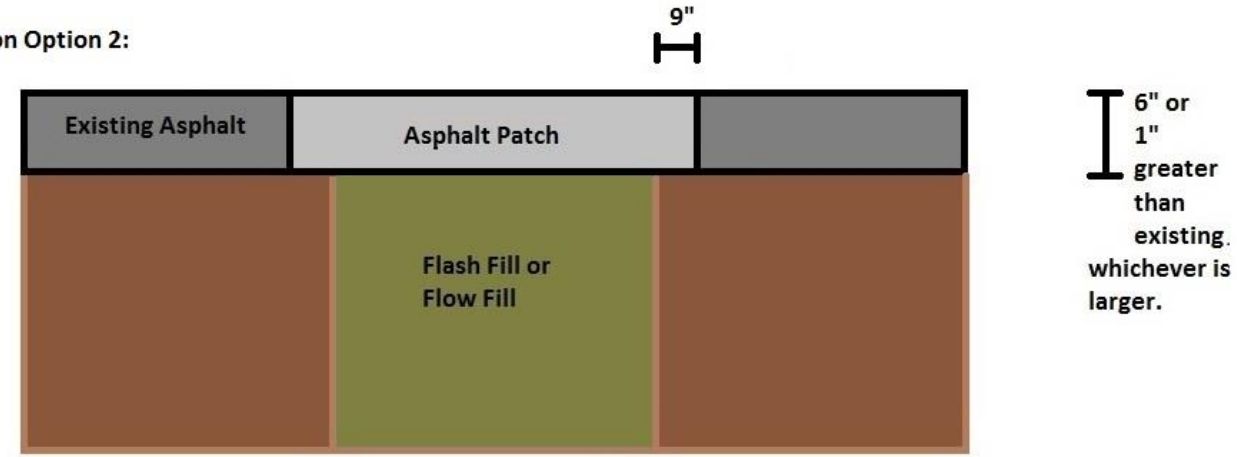




Restoration Option 1:



Restoration Option 2:



Additional Areas of Paving in New Program

- City Parking Lots
  - Touched Every 5 Years
- City Alleyways
  - Touched Every 4 Years
- Preventative, and Rehabilitation Treatments