

2017 State of the Roadway Network in Lynnwood, WA

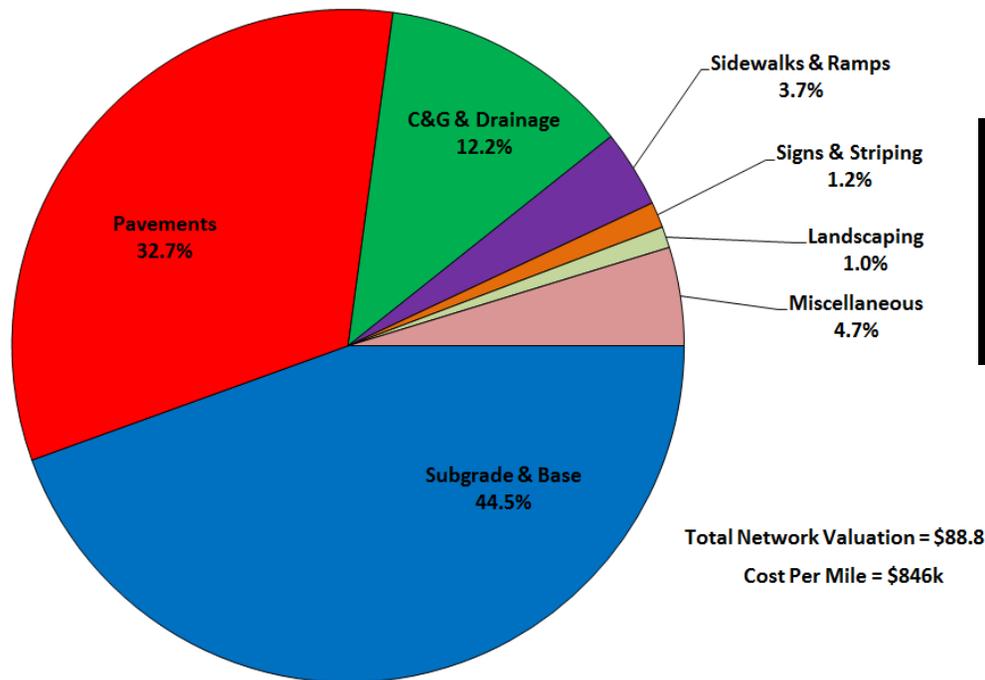


Stephen Smith, P.E., Project Principal
IMS Infrastructure Management Services

Scale of Investment....



City of Lynnwood, WA
Network Valuation



~36,485 people
~100 CL miles of City owned roadways
1.9M square yards of pavement

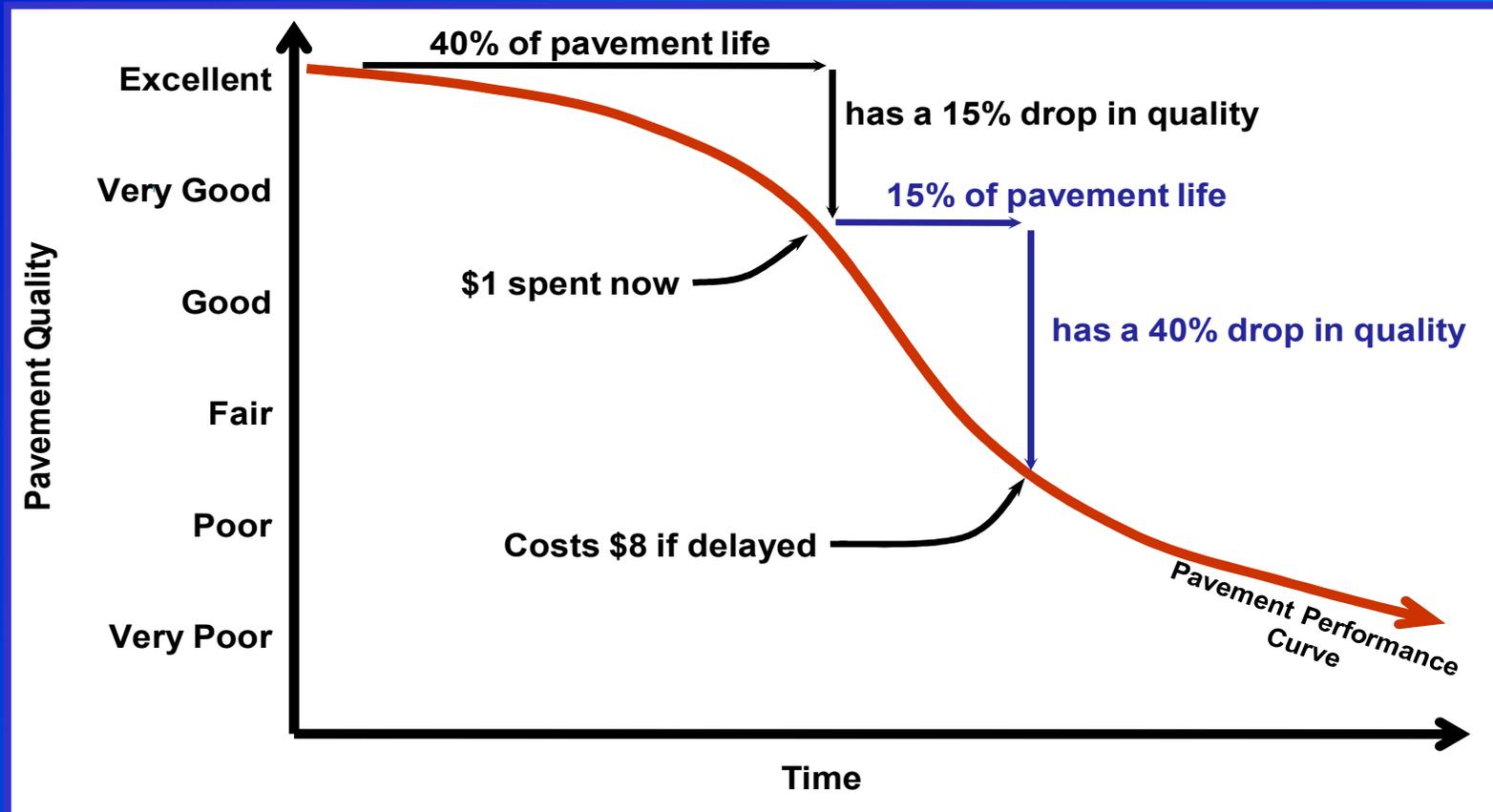
Single largest City asset valued at
\$846k/mile or \$88.8M total plus
improvements and ROW
(not including the value of land, bridges, etc.)

Early look at the condition score:
PCI = 67 (Above Average)
Back log = 4 % (target ≤ 10%)
Rates as a solid B+

Concept of Pavement Management...

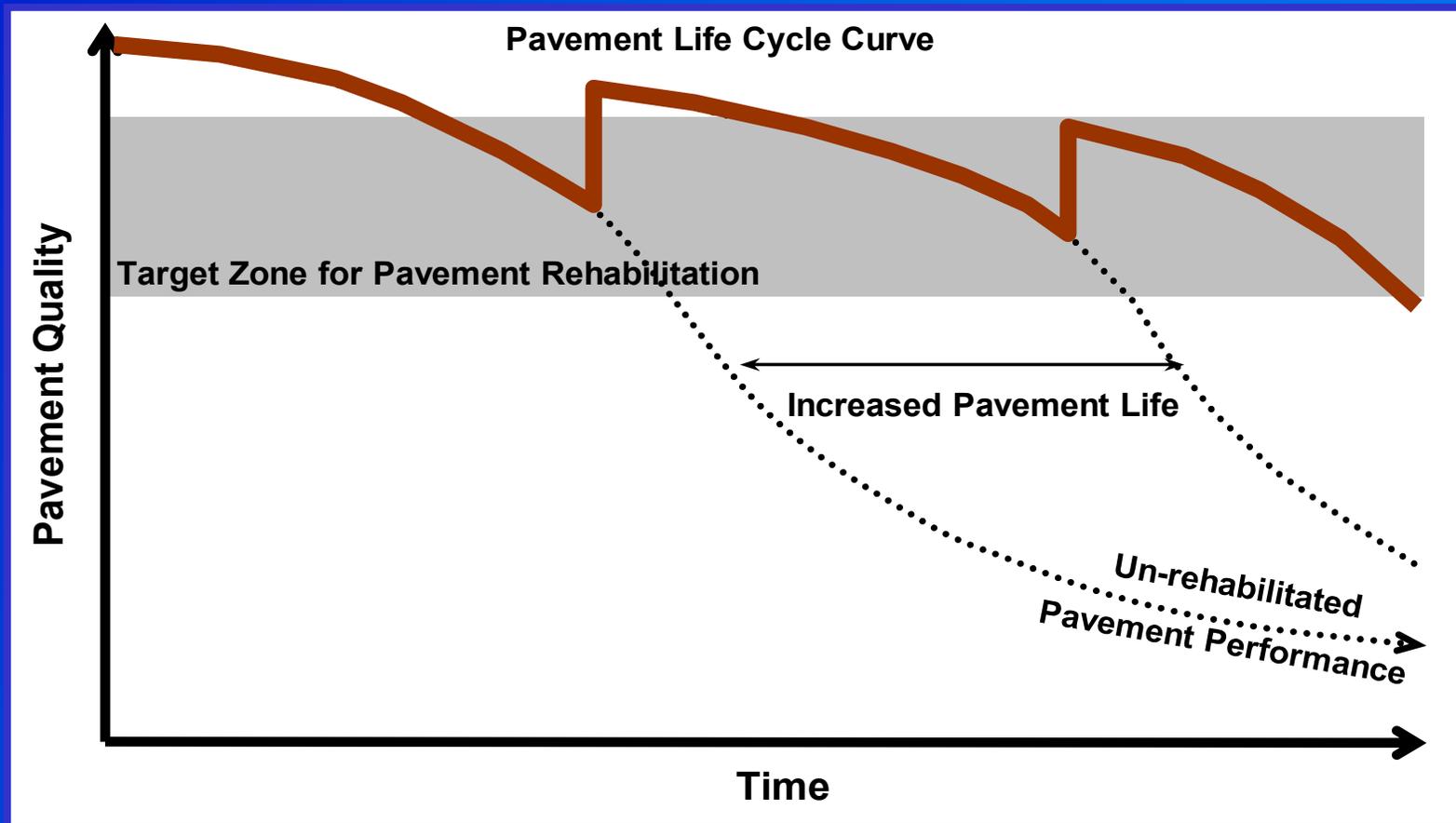


Why do Pavement Management?....



A pavement management system is a set of tools or methods that assist decision makers in finding optimum strategies for providing and maintaining pavements in a serviceable condition over a given time period

Why do Pavement Management?....



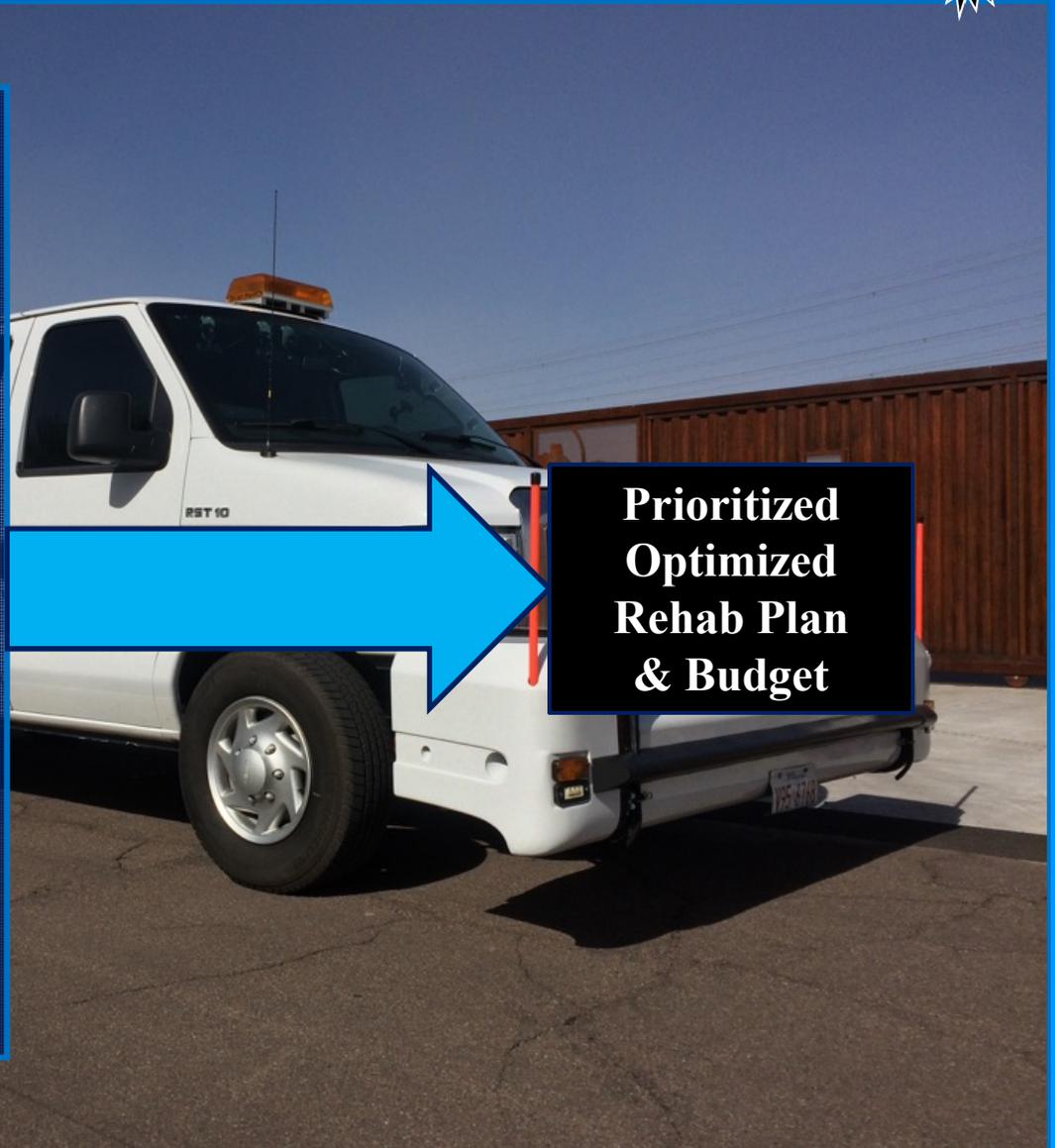
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Tools to Rate the Streets – Objective Surveys....



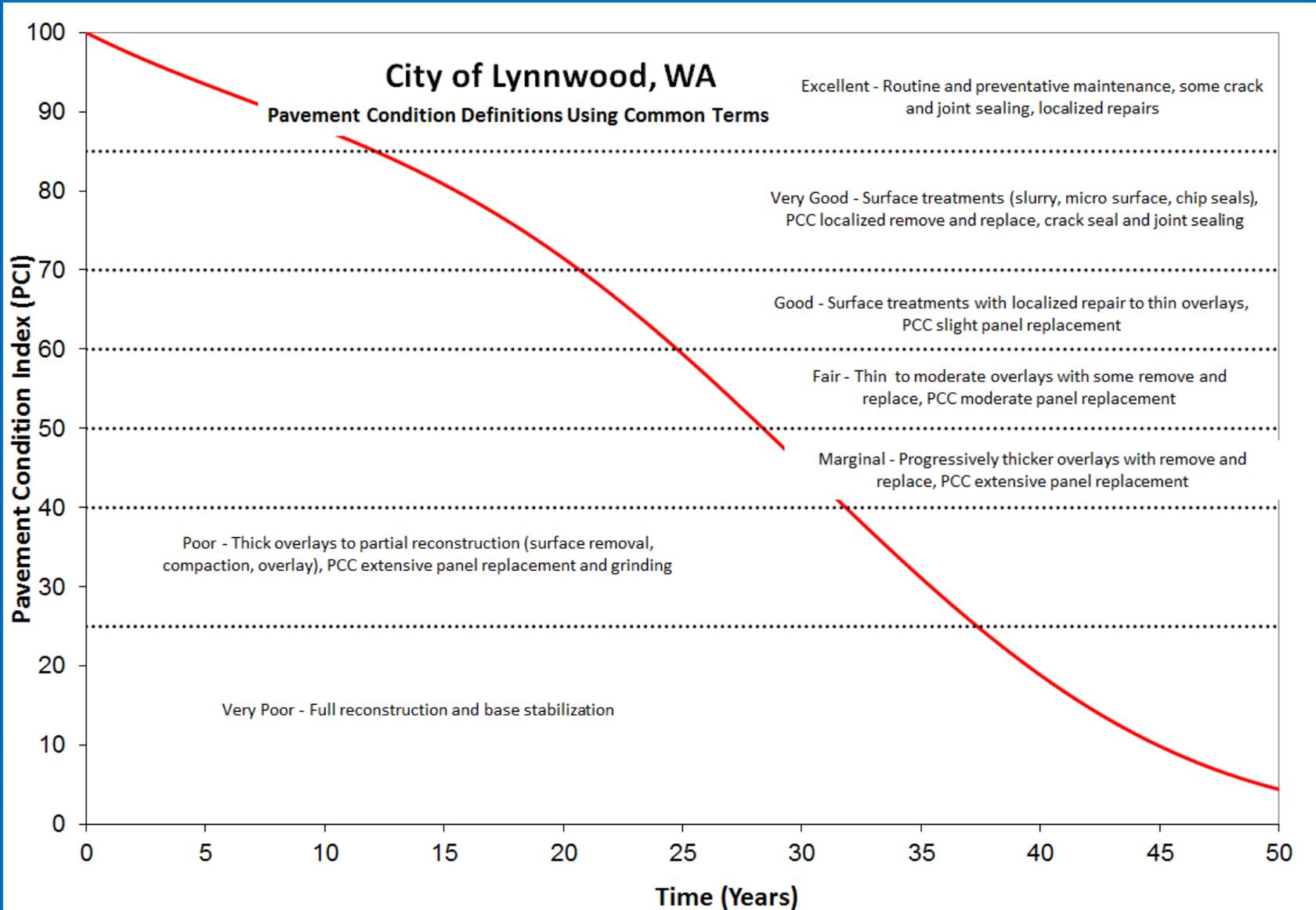
Condition Focuses On:

**Roughness – Deterioration
Pavement Strength (Arterials)
Fatigue/Alligator Cracking
Wheel Path Rutting
Cracking
Distortions & Weathering
Patching & Potholes
Raveling
Divided/Shattered Slab
Faulting
Joint Spalling/Sealant Damage
Corner Breaks/D Cracking
Scaling**



**Prioritized
Optimized
Rehab Plan
& Budget**

Understanding the Pavement Condition Index....



Understanding the PCI...Very Poor (0 – 25)



LYNNWOOD
WASHINGTON

GISID: 1247
Image: LYNN003_000445_0002_CF.jpg

36th Ave W



**Base &/or Structural Failures
Rutting
Excessive Cracking**

GISID: 22
Street Name: SHERMAN AVE
Image: ORCH007_000864_0003_CF.jpg



**Past point of overlay based
rehabilitation and/or panel
replacements.**

**Rehabs often driven by citizen
complaints.**

**Safety becomes a concern at very
low PCI.**

Understanding the PCI...Poor to Marginal (25 – 50)



LYNNWOOD
WASHINGTON

GISID: 148
Image: LYNN003_000444_0008_CF.jpg

36th Ave W



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2016/05/26 16:39:11

IMS

**Localized base failures
Rutting at intersections
Extensive cracking
Extensive patching**

GISID: 243
Image: LYNN004_000670_0002_CF.jpg

172nd St SW



201

IMS

Tired streets due for a thicker overlay, possibly a surface removal and replacement on ACP roads. Extensive joint, panel replacement, and grinding on PCC roads.

High priority to avoid reconstruction

Understanding the PCI...Fair (50 – 60)



LYNNWOOD
WASHINGTON

Progressive cracking
Few base failures
Localized distresses

GISID: 214
Image: LYNN005_000788_0007_CF.jpg

176th PI SW



GISID: 239
Image: LYNN005_000839_0012_CF.jpg

177th PI SW



Optimum timing for thin – moderate overlay or moderate panel replacement on PCC roads.

Many benefits to selecting these streets: early lower cost – greater return, less grinding, drainage

Understanding the PCI...Good (60 - 70)



GISID: 164

Image: LYNN004_000658_0010_CF.jpg

172nd St SW



Few localized distresses
Minimal base failures

Good candidate for slight panel replacement on PCC roads.
If distressed due to loading on ACP roads, may need thin overlay, otherwise crack seal and surface treat (micro/chip seal/slurry).

Greatest cost benefit:

Thinner strategies
Less crown build-up
Less intrusive rehab
Maintain existing drainage

IMS

Understanding the PCI...Very Good (70 - 85)



GISID: 1024

Image: LYNN005_000754_0008_CF.jpg

169th St SW



**Very few distresses
No rutting
No base failures**

**Crack seal with surface
treatment on asphalt roads.
Joint reseal and localized rehab
on concrete roads.**

**Maintains existing drainage.
Extends pavement life at lowest
cost**

IMS



Understanding the PCI...Excellent (85 - 100)



LYNNWOOD
WASHINGTON

GISID: 1039
Image: LYNN004_000683_0008_CF.jpg

166th PI SW



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2016/05/26 18:27:23

IMS

Like new condition
Very few minor distresses
Smooth ride, good drainage

GISID: 1068
Image: LYNN004_000704_0007_CF.jpg

168th St SW

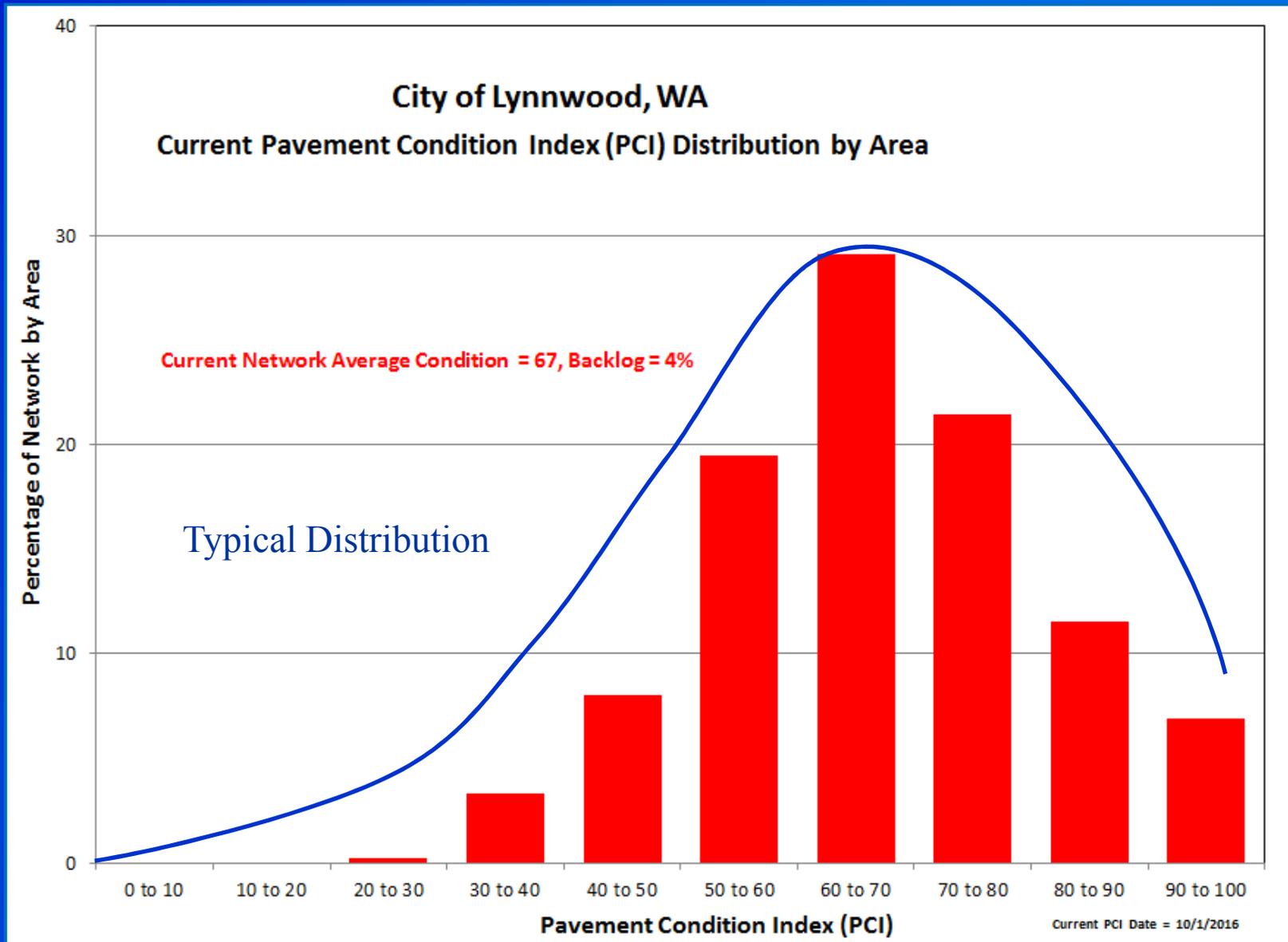


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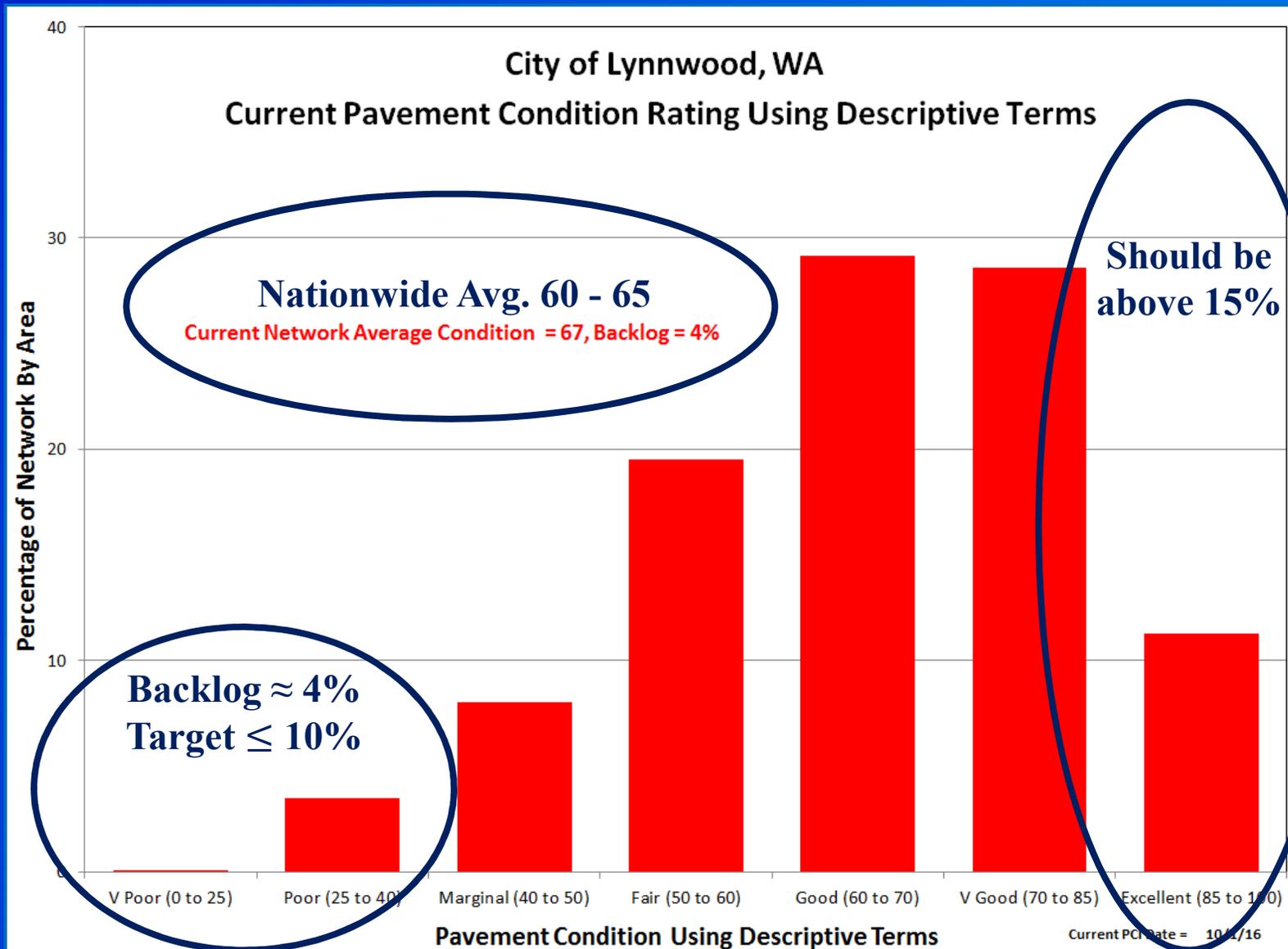
IMS

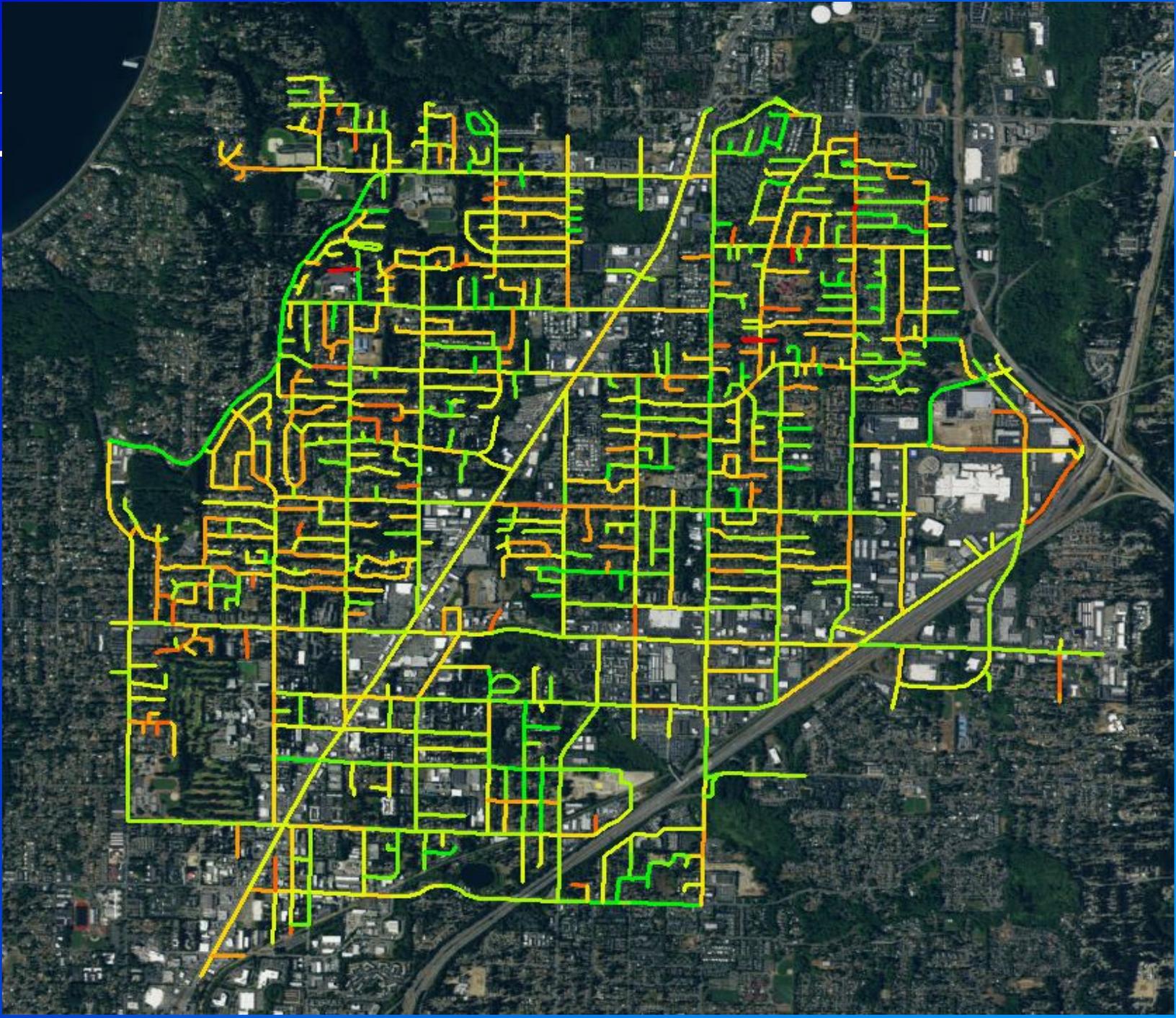
Should provide 5 to 10 years
prior to first rehabilitation
with routine maintenance

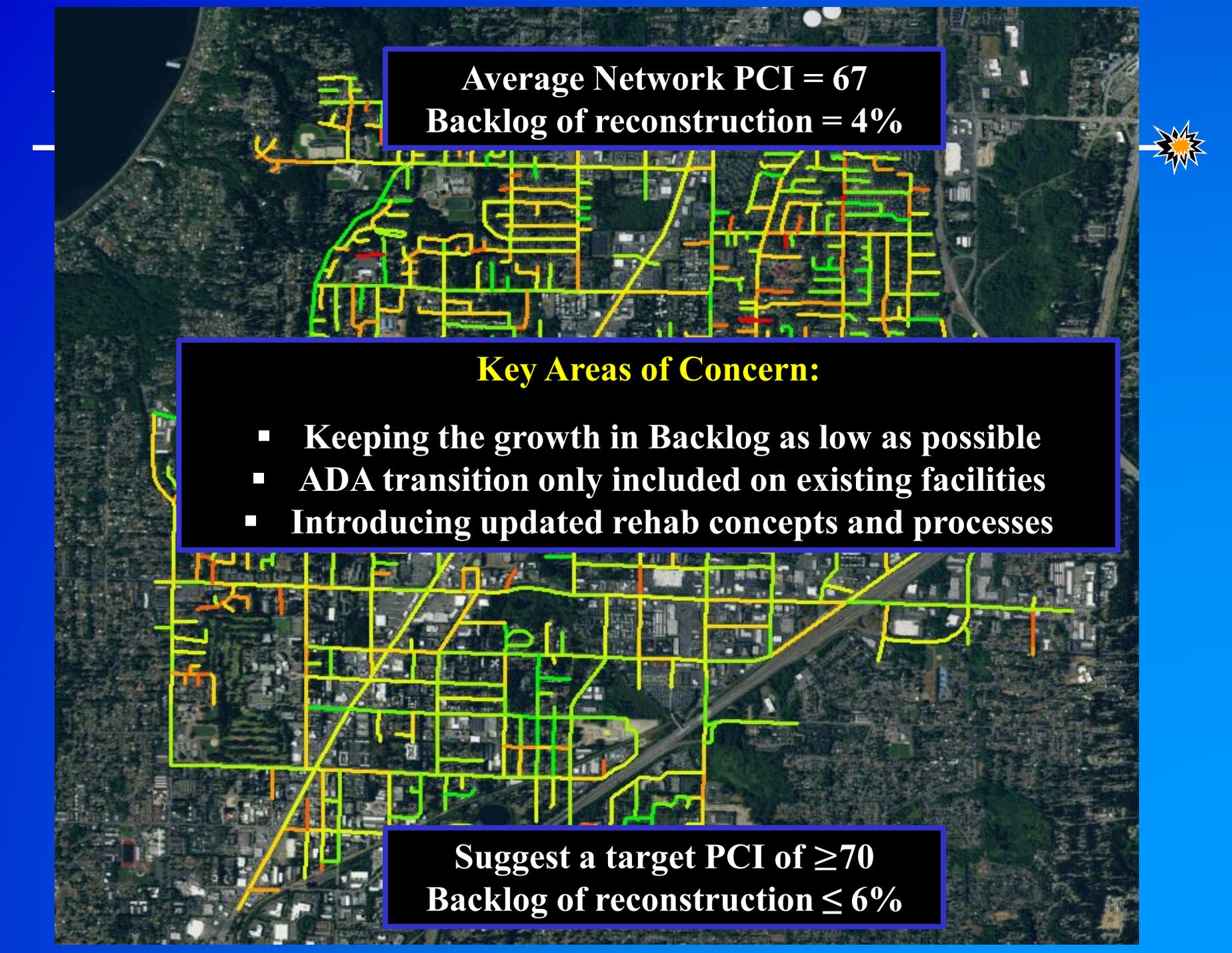
Lynnwood PCI Results for 2016....



Lynnwood Results.... 3 metrics of health







Average Network PCI = 67
Backlog of reconstruction = 4%

Key Areas of Concern:

- Keeping the growth in Backlog as low as possible
- ADA transition only included on existing facilities
- Introducing updated rehab concepts and processes

Suggest a target PCI of ≥ 70
Backlog of reconstruction $\leq 6\%$

City of Lynnwood Methodology....



- 1. Funding is not \$0, nor is it unlimited**
- 2. Lynnwood places a value on its roadway network**
Arterials – Collectors – Locals
- 3. Identify annual budget to maintain current PCI & Backlog**
- 4. Examine effects of current funding levels**
- 5. Prevent deterioration in pavement quality**
- 6. ADA compliance is included – but only on existing facilities**
- 7. Pavement management is priority based, not worst-first**
- 8. No cost inflation**
- 9. Complete streets not included in costs**

Lynnwood Annual Funding Estimates...



Estimate #3. - Based on Estimated Total Network Deficiency and Life Cycle Cost

Asphalt Deficiency	Total Cost (\$)	% of Total	PART	MnART	COL	RES	Life Cycle (years)	Life Cycle Cost (\$)
Reconstruction (Base)	13,000	0.0	0	13,000	0	0	50	0
Reconstruction (Surface)	3,465,000	9.2	0	997,500	131,200	2,336,300	30	116,000
FWM Thick Olay (> 2.0 - 3.0)	5,915,000	15.8	421,300	1,082,700	586,700	3,824,300	20	296,000
E/FWM Mod Overlay (2.0 - 3.0)	10,631,000	28.4	1,375,000	2,123,200	2,192,000	4,940,800	18	591,000
EM + Thin Overlay (1.5 - 2.0)	14,091,600	37.6	5,730,200	1,672,800	2,355,100	4,333,500	15	939,000
Surf Trtmnt / Chip/Fiber Seal	1,827,000	4.9	432,500	519,200	390,700	484,600	7	261,000
Slurry Seal	1,480,000	3.9	104,800	392,100	288,700	694,400	5	296,000
Routine Maintenance	65,900	0.2	500	21,700	7,300	36,400	2	33,000
Total Asphalt Network:	37,488,500	100	8,064,300	6,822,200	5,951,700	16,650,300		2,532,000
Concrete Deficiency	Total Cost (\$)	% of Total	PART	MnART	COL	RES	Life Cycle (years)	Life Cycle Cost (\$)
PCC Reconstruction	0	0.0	0	0	0	0	75	0
PCC Partial Recon	0	0.0	0	0	0	0	50	0
Extensive Pnl Rplcmnt	0	0.0	0	0	0	0	25	0
Moderate Pnl Rplcmnt	0	0.0	0	0	0	0	20	0
Slight Pnl Rplcmnt	0	0.0	0	0	0	0	15	0
Localized Rehab	0	0.0	0	0	0	0	10	0
Joint Rehab	0	0.0	0	0	0	0	5	0
Routine Maintenance	0	0.0	0	0	0	0	2	0
Total Concrete Network:	0	0	0	0	0	0		0
Total Network :	37,488,500		8,064,300	6,822,200	5,951,700	16,650,300		2,532,000

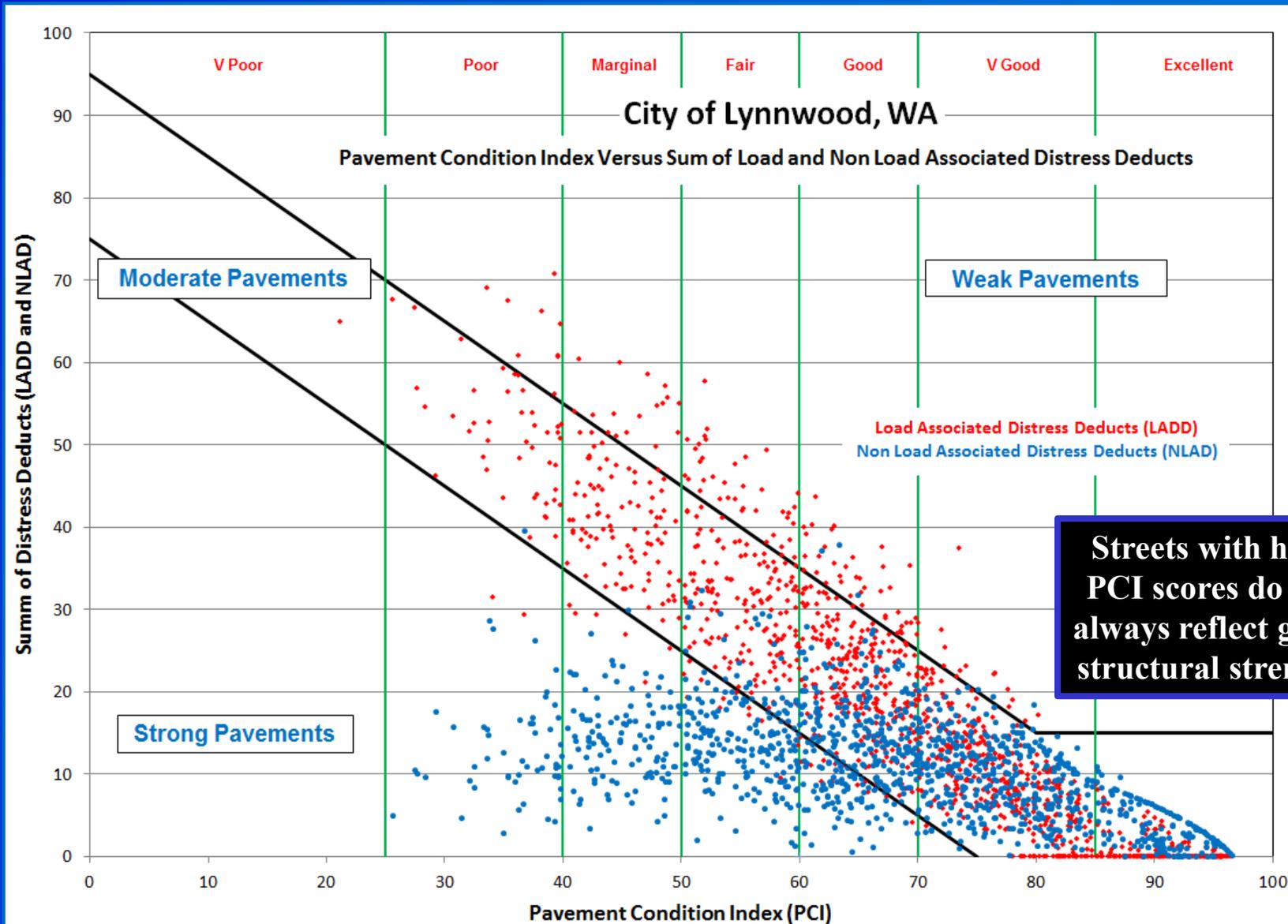
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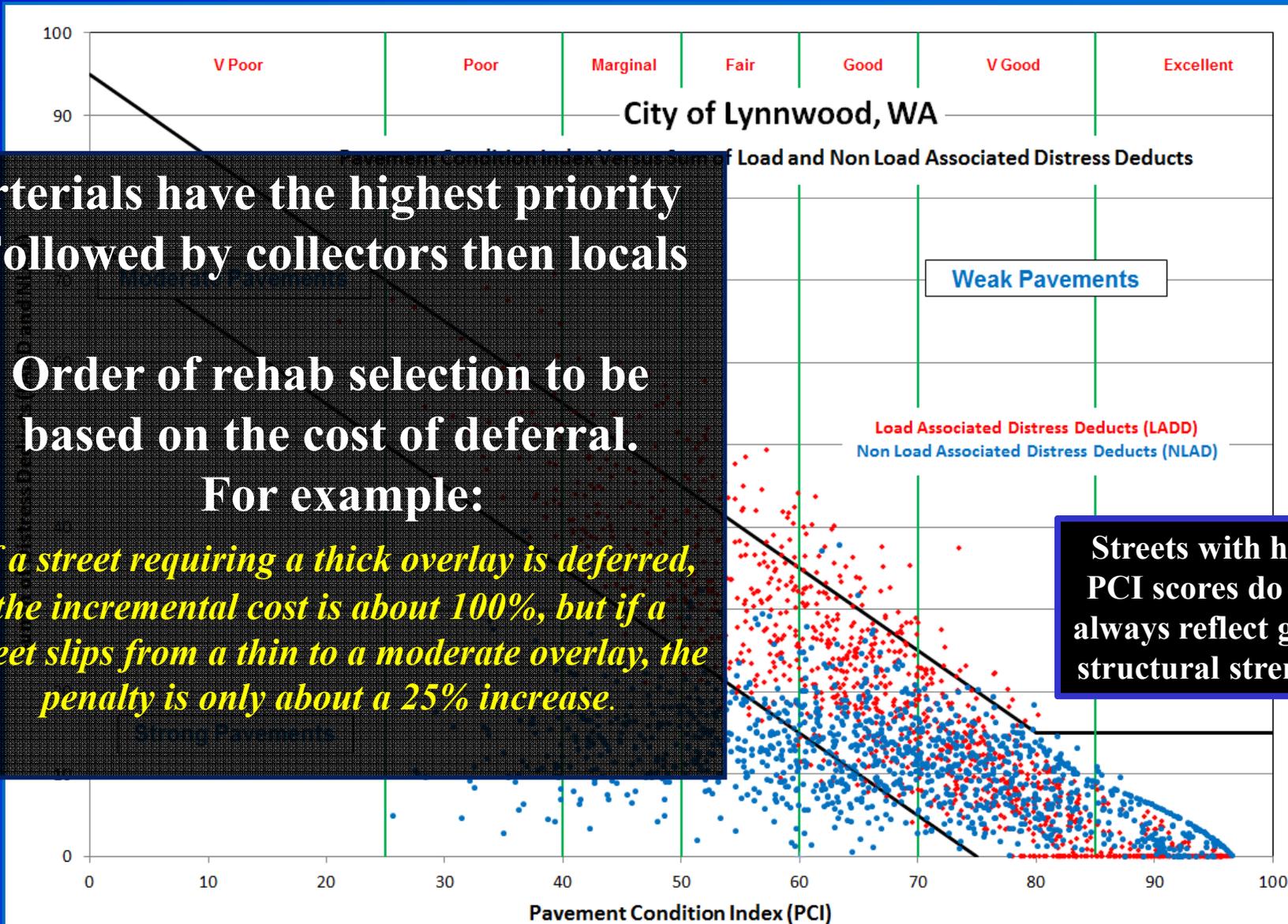
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Reconstruction (Base)	13,000	0.0	0	13,000	0	0	50	0
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FWM Thick Overlay (> 2.0 - 3.0)	5,915,000	15.8	421,300	1,082,700	586,700	3,824,300	20	296,000
F/FWM Med Overlay (2.0 - 3.0)	10,621,000	28.4	1,375,000	2,122,200	2,182,000	4,941,800	18	501,000
<p>Typical life cycle estimates show that Lynnwood would need approximately \$2.5M annually to maintain PCI (does not include routine maintenance activities, ADA compliance, culverts or ditch repair, signage, striping, bike lanes, or additional width)</p>								
Localized Rehab	0	0.0	0	0	0	0	10	0
Joint Rehab	0	0.0	0	0	0	0	5	0
Routine Maintenance	0	0.0	0	0	0	0	2	0
Total Concrete Network:	0	0	0	0	0	0		0
Total Network :	37,488,500		8,064,300	6,822,200	5,951,700	16,650,300		2,532,000

Lynnwood Rehabilitation Needs....



Lynnwood Rehabilitation Needs....



**Arterials have the highest priority
Followed by collectors then locals**

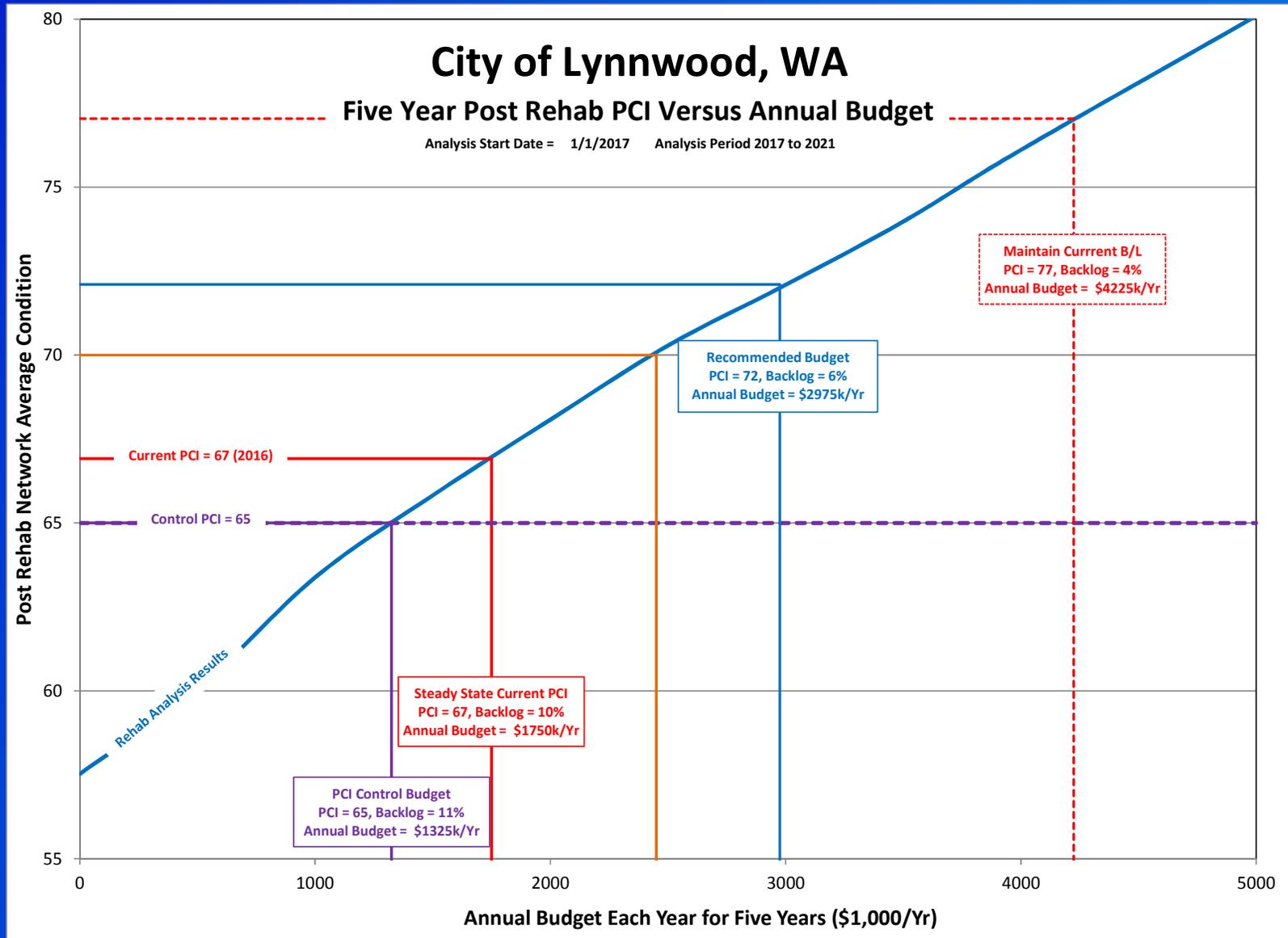
**Order of rehab selection to be
based on the cost of deferral.**

For example:

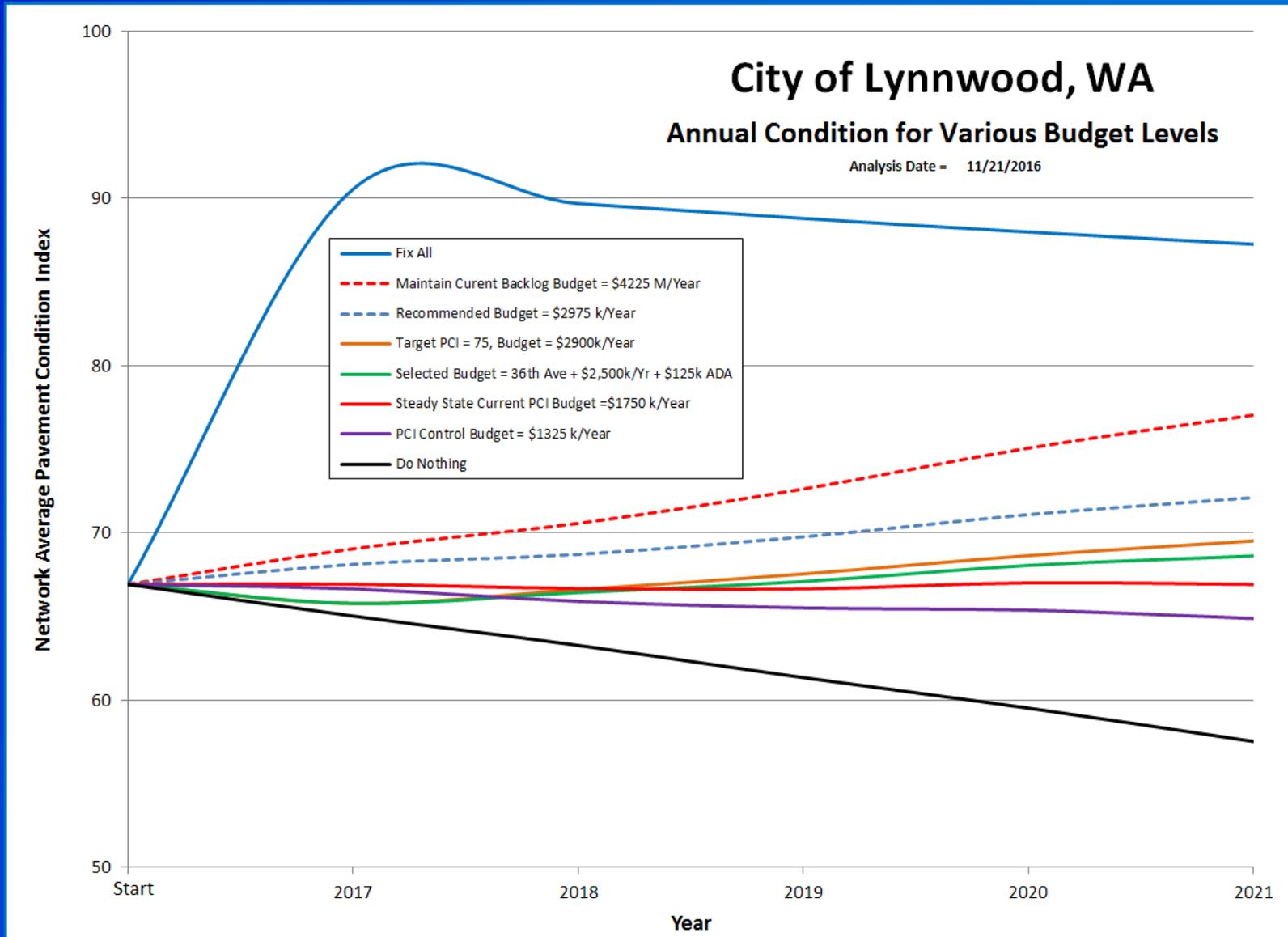
*if a street requiring a thick overlay is deferred,
the incremental cost is about 100%, but if a
street slips from a thin to a moderate overlay, the
penalty is only about a 25% increase.*

**Streets with high
PCI scores do not
always reflect great
structural strength**

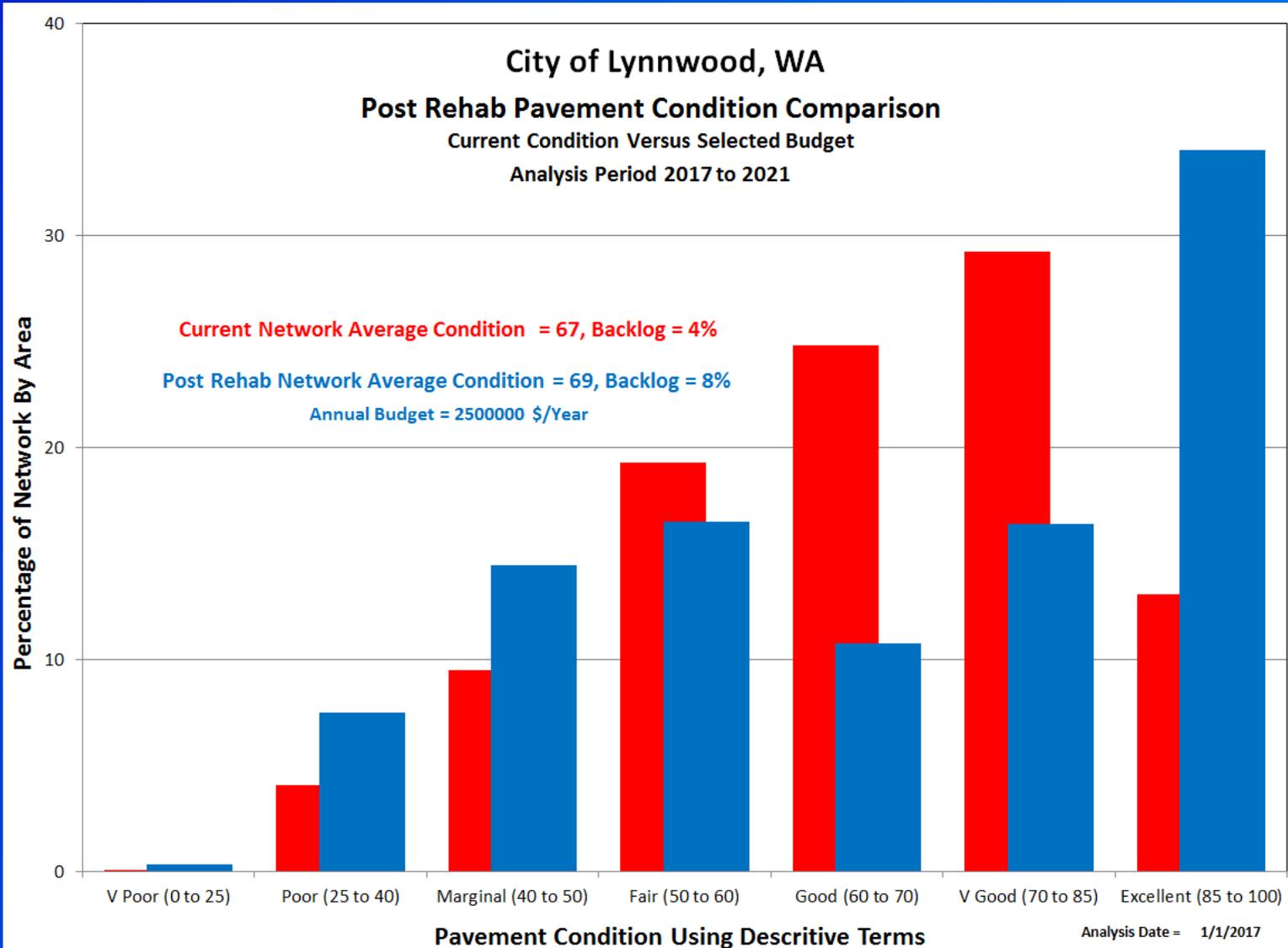
Post Rehab PCI & Annual Funding....

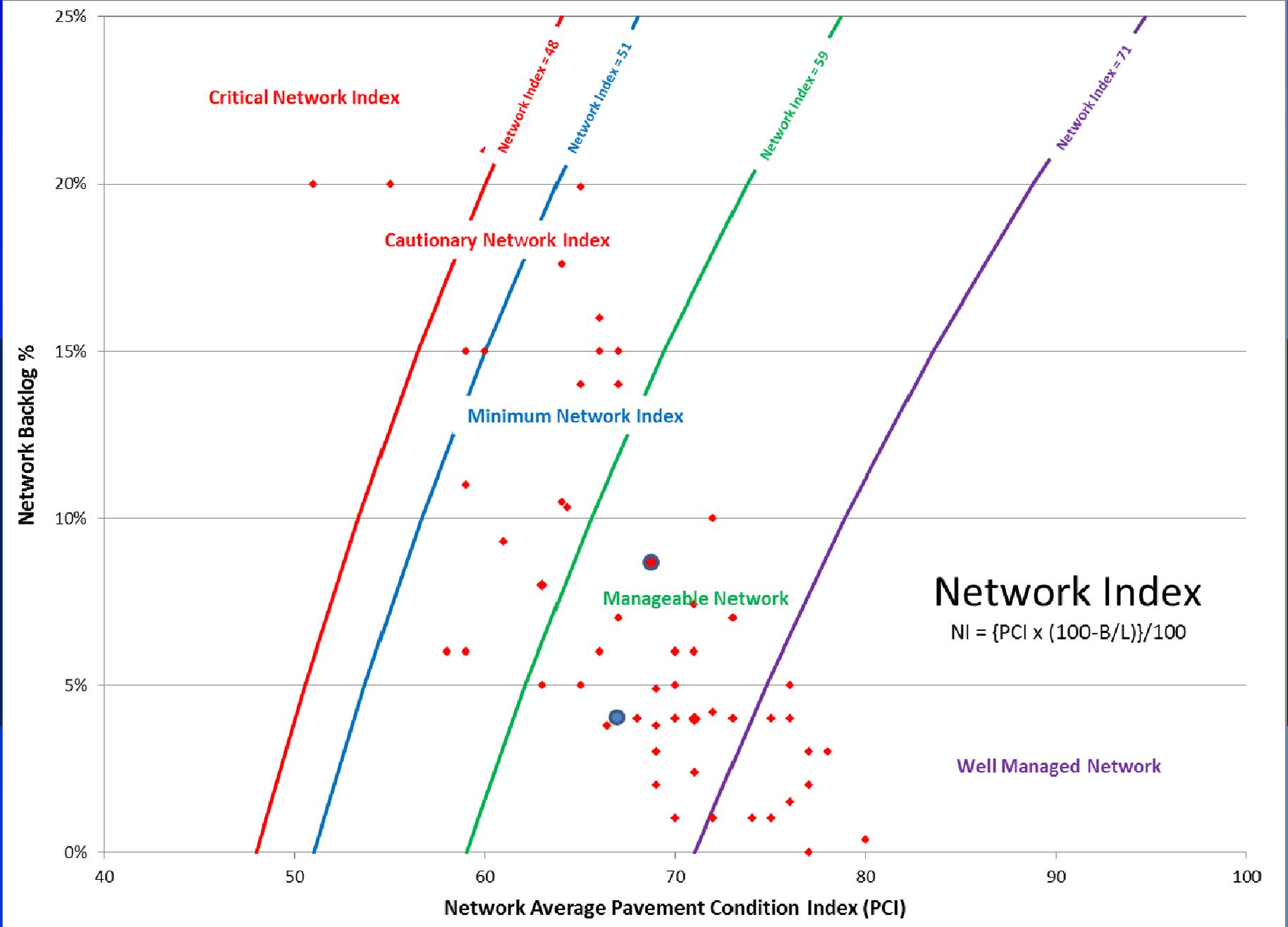


5 Year PCI Budget Analysis...



5 Year PCI Budget Analysis...





25%

20%

15%

10%

5%

0%

40

50

60

70

80

90

100

Network Average Pavement Condition Index (PCI)

City of Lynnwood Recommendations...



1. **Maintain PCI at or above 70 with a backlog below 6% for entire roadway network.**

A budget of \$2.5M plus \$125K of ADA will result in a network PCI of 69 and backlog of 8% over the next 5 years.

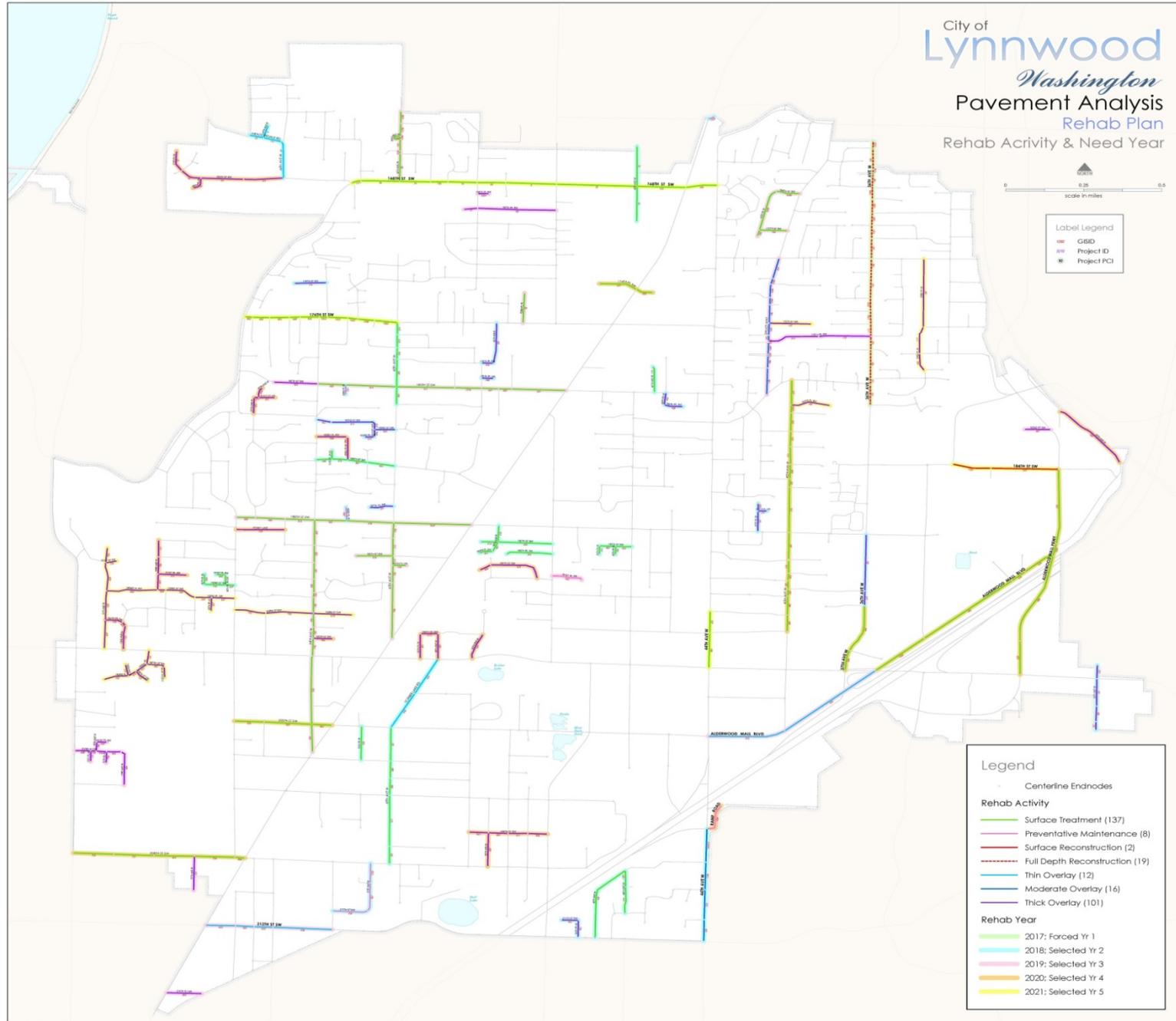
2. **Use of a full suite of rehabilitation strategies reviewed on an annual basis.**
3. **Steady – effective rehabilitation and maintenance on an annual basis saves the City money over deferred maintenance.**
4. **City should resurvey their streets every few years to update the condition data and rehab program.**

City of
Lynnwood
Washington
Pavement Analysis
Rehab Plan
 Rehab Activity & Need Year



Label Legend

- GSD
- Project ID
- Project PCI



Legend

- Centerline Endnodes

Rehab Activity

- Surface Treatment (137)
- Preventative Maintenance (8)
- Surface Reconstruction (2)
- Full Depth Reconstruction (19)
- Thin Overlay (12)
- Moderate Overlay (16)
- Thick Overlay (101)

Rehab Year

- 2017; Forced Yr 1
- 2018; Selected Yr 2
- 2019; Selected Yr 3
- 2020; Selected Yr 4
- 2021; Selected Yr 5

Questions?....

