2015 State of the Roadway Network in Huntsville

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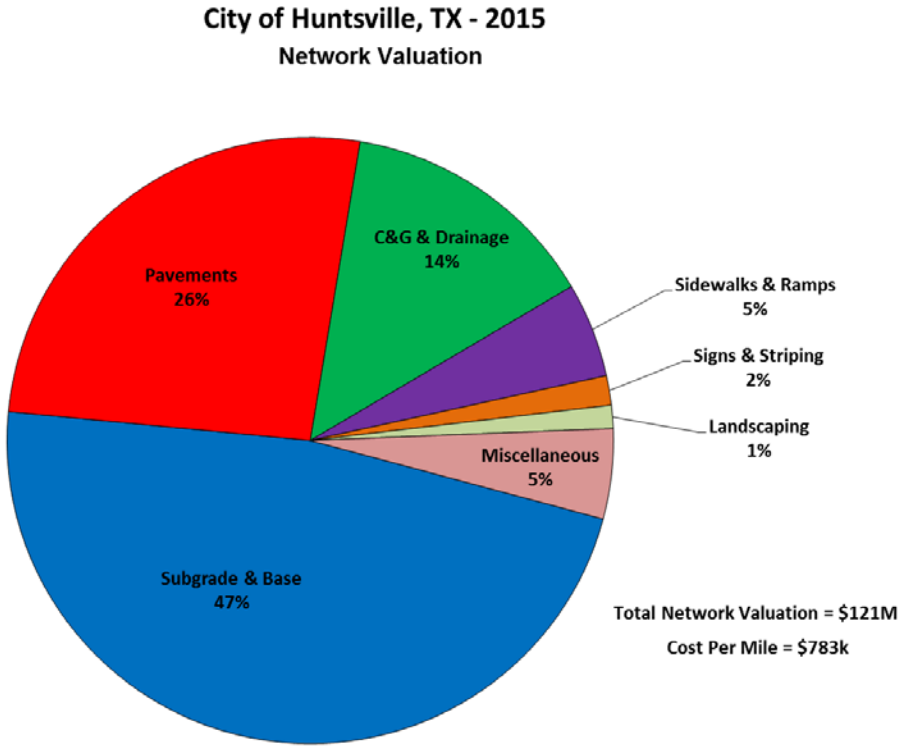
Scale of Investment….



~40,000 people
~155 CL miles of city owned roadways
22M square feet of pavement

Single largest City asset valued at $783K/mile or $121M total plus improvements and ROW
(not including the value of land, bridges, sidewalks, etc.)

Early look at the condition score:
PCI = 69 (Good)
Back log = 2% (target < 12%)
Rates as a solid B+

Concept of Pavement Management...

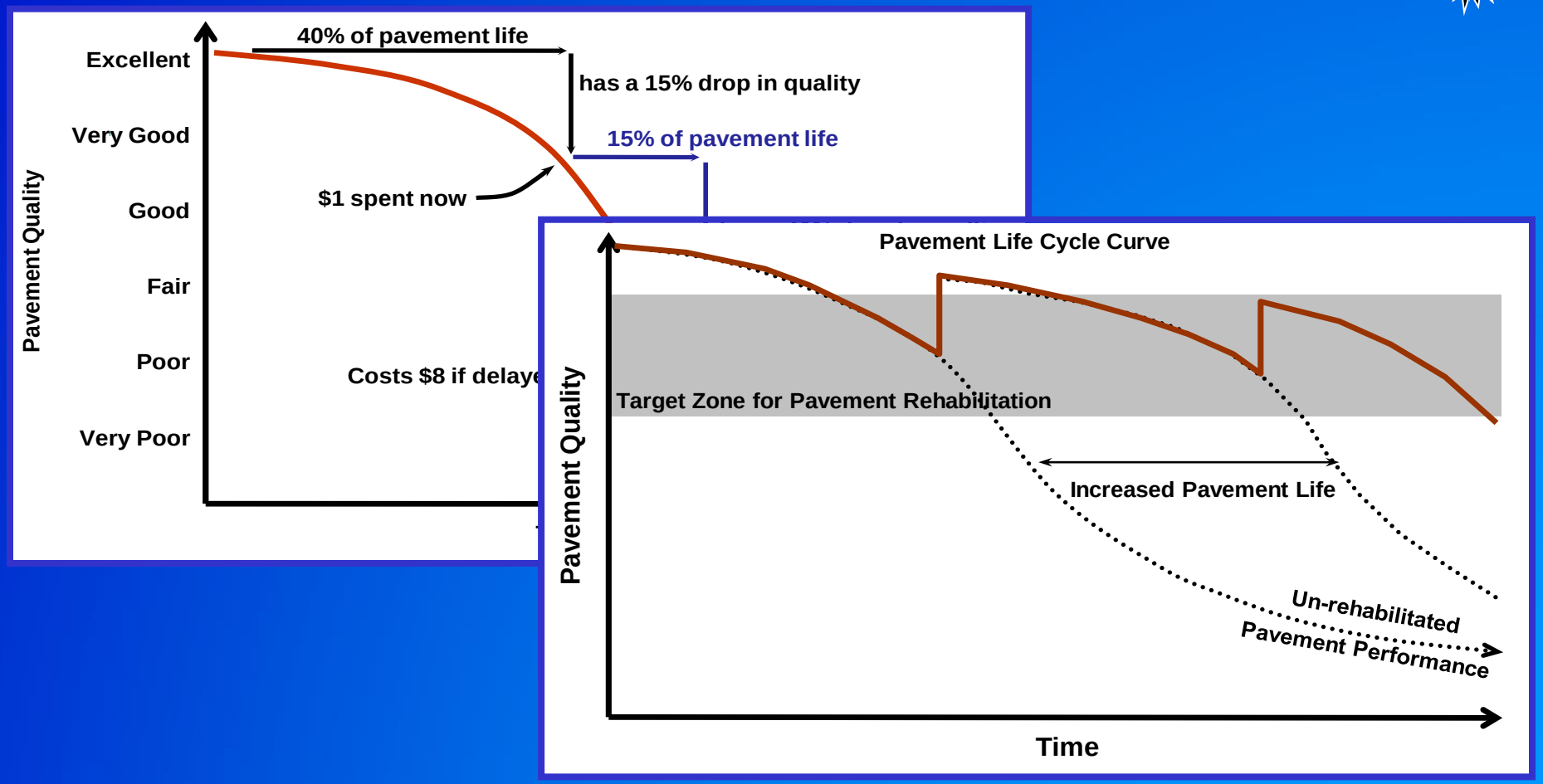
City
Objectives,
Policies & Budgets

Balanced Approach

Priorities,
Analysis Techniques
& Reporting

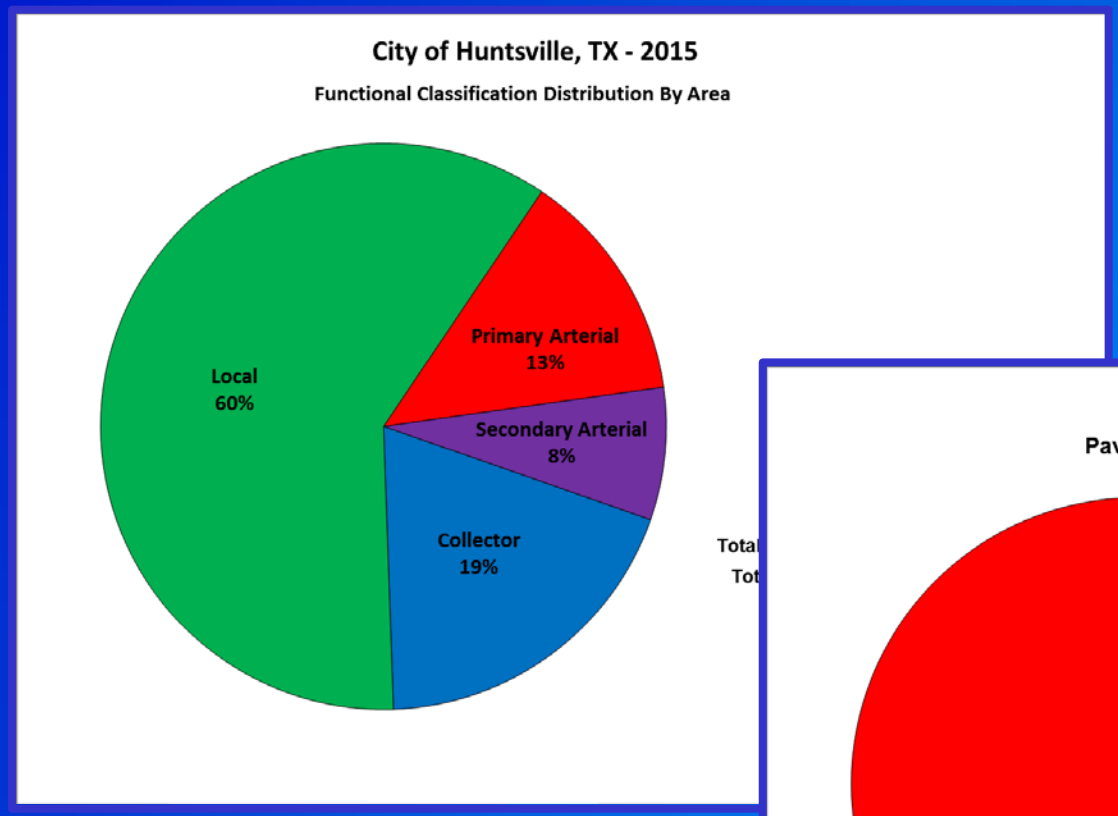
Understanding of
Condition

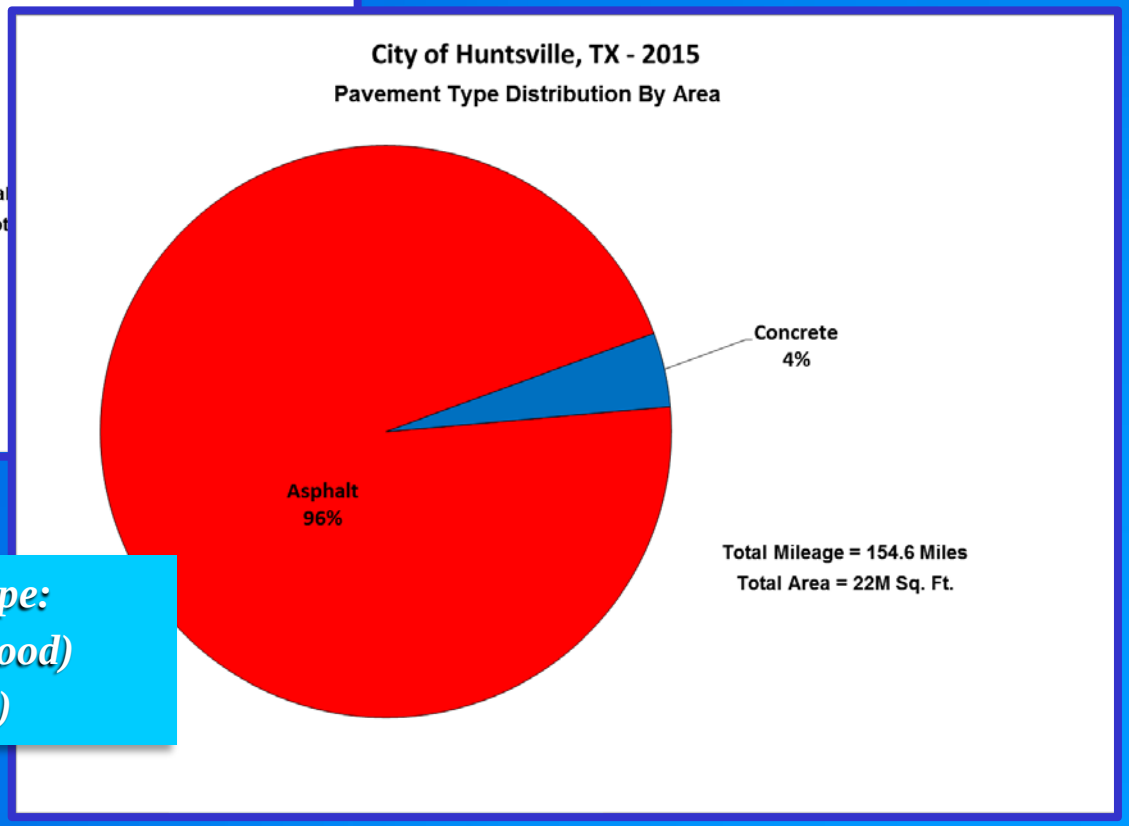
Why do Pavement Management?….



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

Functional Class & Pavement Type….





Condition by Pavement Type:
Concrete PCI = 80 (Very Good)
Asphalt PCI = 68 (Good)

Tools to Rate the Streets – Objective Surveys….

Condition Focuses On:

Fatigue/Alligator Cracking

Wheel Path Rutting

Cracking

Distortions & Weathering

Patching & Potholes

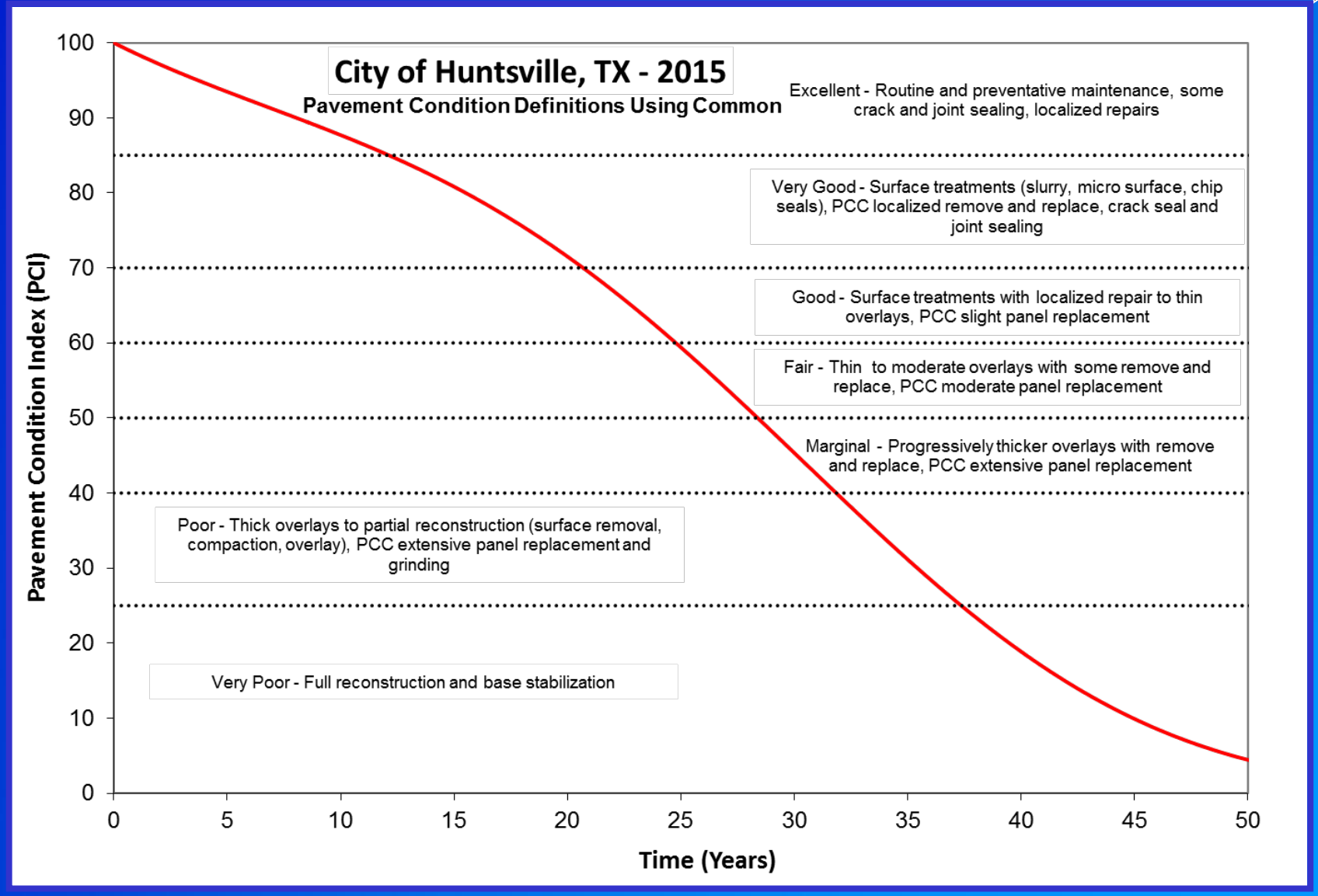
Roughness

Raveling

Bleeding

PCI = 33% Roughness + 67% Surface Distress

Understanding the Pavement Condition Index….



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

Base &/or Structural Failures
Rutting
Excessive Cracking

Past point of overlay based rehabilitation.

Rehabs often driven by citizen complaints.

Safety becomes a concern at very low PCI.

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

Localized base failures
Rutting at intersections
Extensive cracking
Extensive patching

Tired streets due for a thicker overlay, possibly a surface removal and replacement. High priority to avoid reconstruction

Understanding the PCI….Fair (50 – 60)

Progressive cracking
Few base failures
Localized distresses

Optimum timing for thin – moderate overlay or moderate panel replacement.

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

Understanding the PCI….Good (60 - 70)

Few localized distresses
Minimal base failures

If distressed due to loading, may need thin overlay, otherwise crack seal and surface treat (micro /chip seal).

Greatest cost benefit:

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

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

Very few distresses
No rutting
No base failures

Crack seal with surface treatment on asphalt roads.

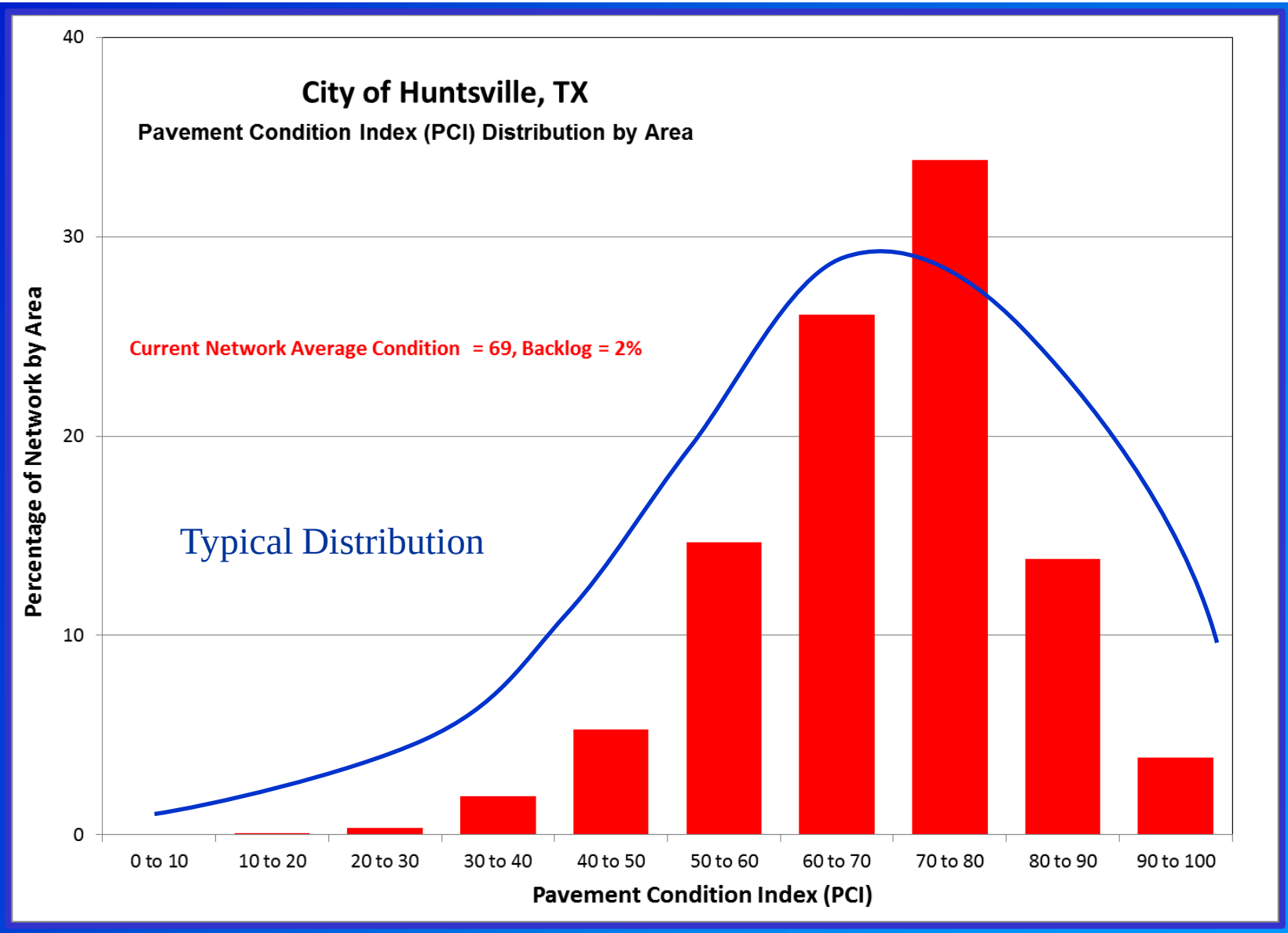
Maintains existing drainage. Extends pavement life at lowest cost

Understanding the PCI….Excellent (85 - 100)

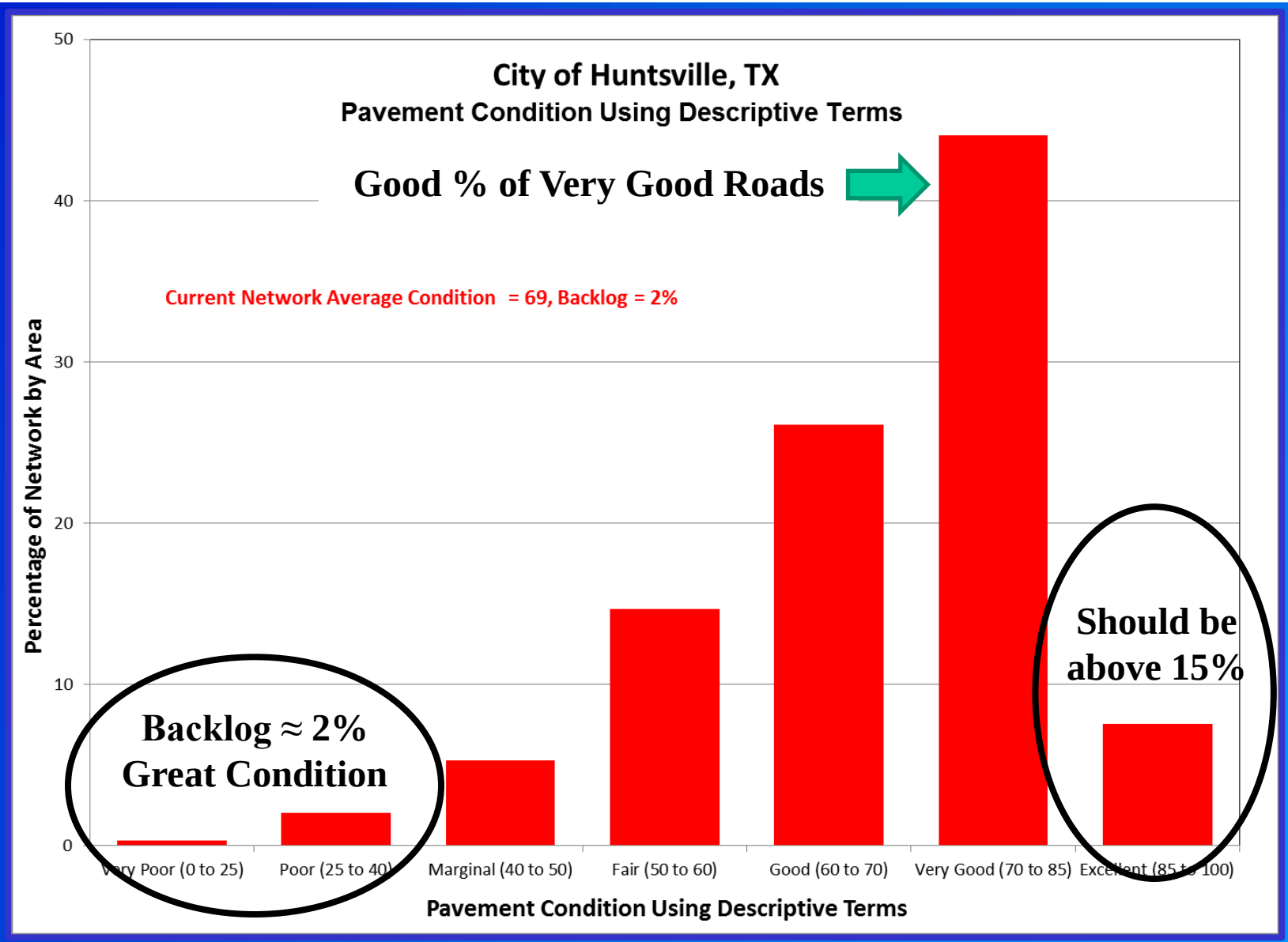
Like new condition
Very few minor distresses
Smooth ride, good drainage

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

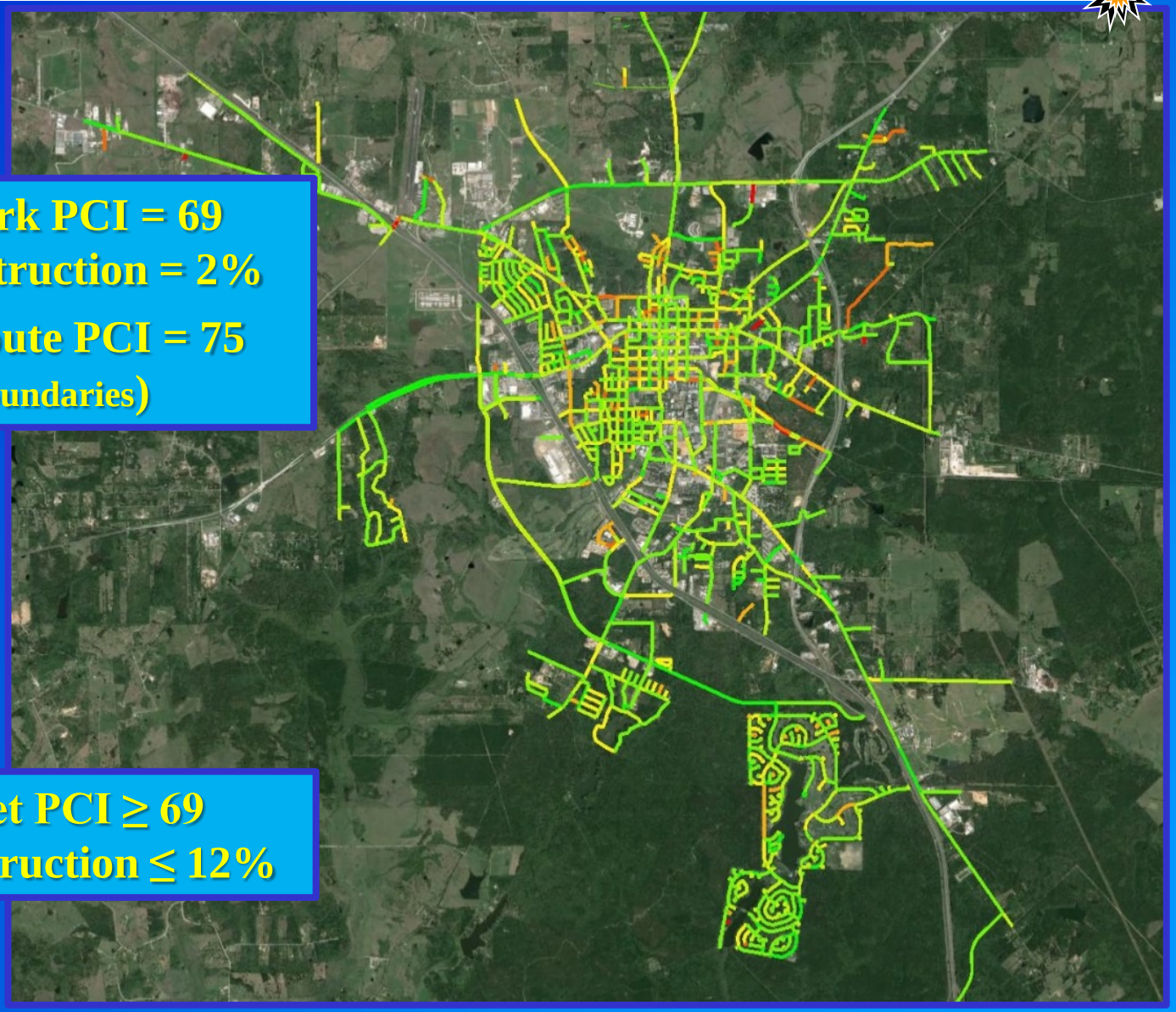
Huntsville PCI Results for 2015….



Huntsville Results…. some areas of concern and strengths



Huntsville Pavement Results….

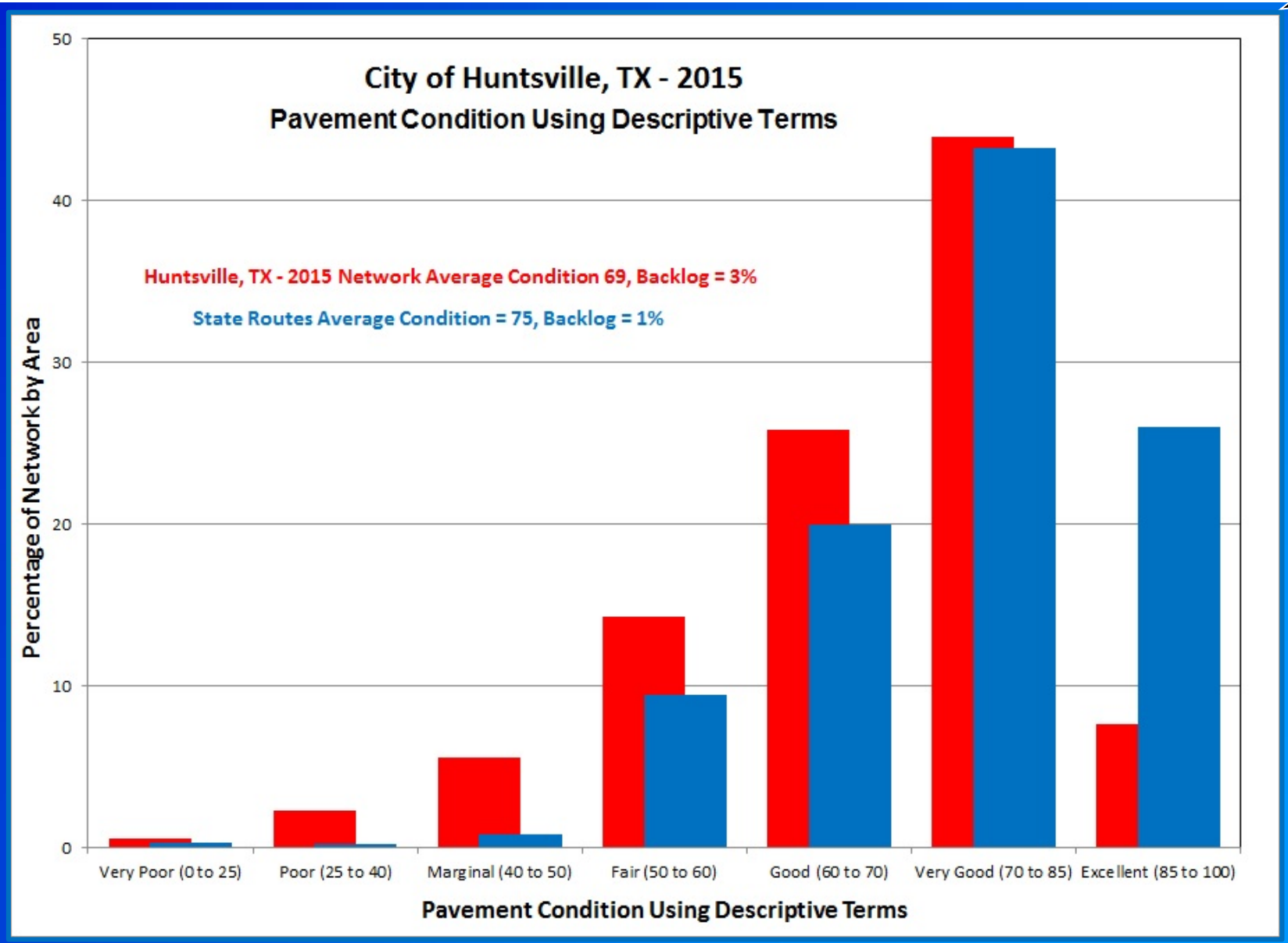


Average Network PCI = 69
Backlog of reconstruction = 2%

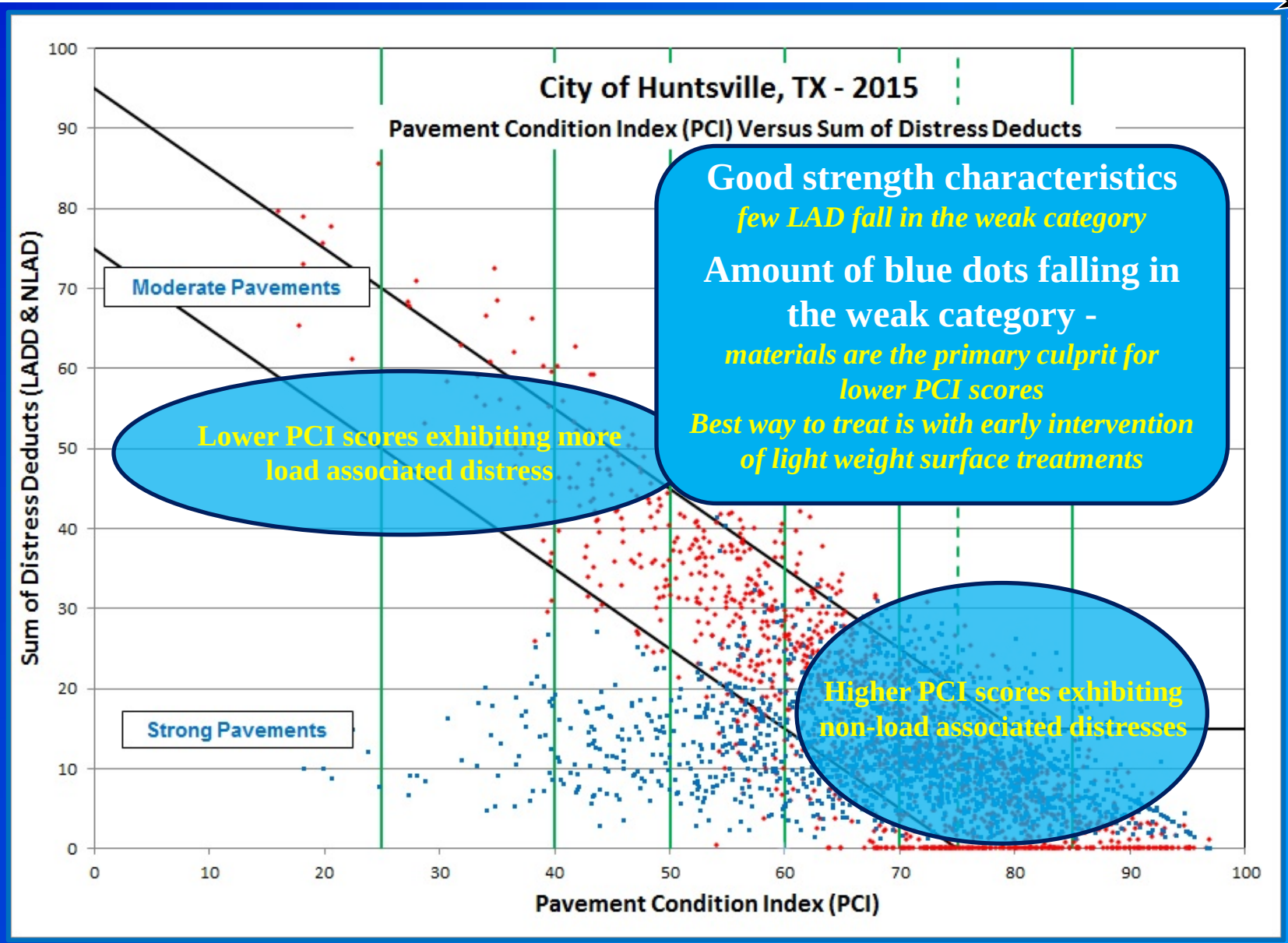
Average State Route PCI = 75
(within City boundaries)

Suggest a target PCI ≥ 69
Backlog of reconstruction ≤ 12%

City of Huntsville State Routes



Huntsville – Structural Characteristics



City of Huntsville Methodology….

1. Funding is not $0, nor is it unlimited
2. Huntsville places a value on its roadway network

   Arterials – Collectors – Locals
3. Identify annual budget to maintain current PCI
4. Examine effects of current funding levels
5. Prevent deterioration in pavement quality
6. ADA compliance not included
7. Pavement management is priority based, not worst-first
8. No cost inflation

Huntsville Annual Funding Estimates….

Pavement Type	Pavement Value ($)	Ultimate Life Span (yrs)	Life Cycle Annual Cost ($/yr)
Asphalt Network	111,827,000	75	1,490,000
Concrete Network	9,131,000	100	90,000
All Streets	**120,958,000**		**1,580,000**

Pavement Type	Pavement Condition Index (PCI)	Typical Rehab Based on Condition	Blended Rehab Unit Rate ($/yd2)	Average Rehab Life Cycle (yrs)	Miles To Do Each Year (mi)	Cost Per Mile ($/mi)	Life Cycle Annual Cost ($/yr)
Asphalt Network	68	Thin Overlay (1.5 - 2.0)	14.4	20	7.4	230,000	1,710,000
Concrete Network	80	Joint Rehab	1.55	5	1.2	30,000	40,000
All Streets							**1,750,000**

Huntsville Annual Funding Estimates….

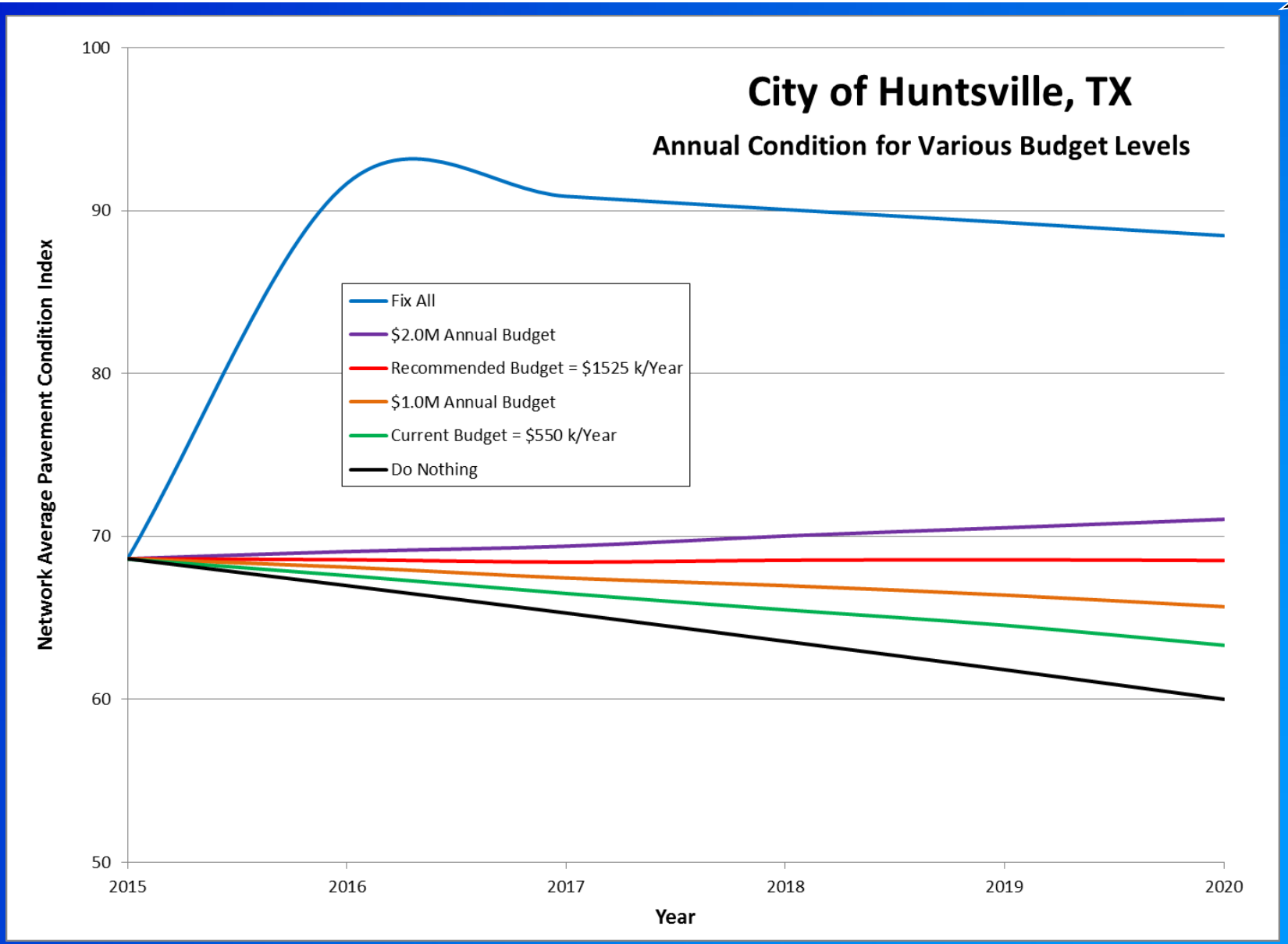
Asphalt Deficiency	Total Cost ($)	% of Total	PART	SART	COL	LOC	Life Cycle (years)	Life Cycle Cost ($)
Reconstruction (Base)	776,100	3.1	0	370,500	0	405,600	50	15,500
Reconstruction (Surface)	2,166,600	8.6	0	650,000	463,200	1,053,400	35	62,000
Thick Olay (> 2.0 - 3.0)	2,886,300	11.5	144,200	365,300	563,000	1,813,800	20	144,700
Mod Overlay (2.0 - 3.0)	6,167,800	24.5	1,377,800	645,200	1,107,400	3,037,400	20	308,600
Thin Overlay (1.5 - 2.0)	8,910,500	35.4	1,739,400	607,700	2,098,500	4,464,900	20	446,400
Surface Treatment	2,136,600	8.5	336,200	174,800	415,500	1,210,100	10	214,600
Slurry Seal	2,063,200	8.2	202,100	112,800	487,500	1,260,800	5	412,600
Routine Maintenance	71,500	0.3	15,300	1,600	4,700	49,900	2	38,200
Total Asphalt Network:	25,178,600	100	3,815,000	2,927,900	5,135,800	13,295,900		1,642,500

Huntsville's steady state budget is estimated between $1.0M to $1.7M annually

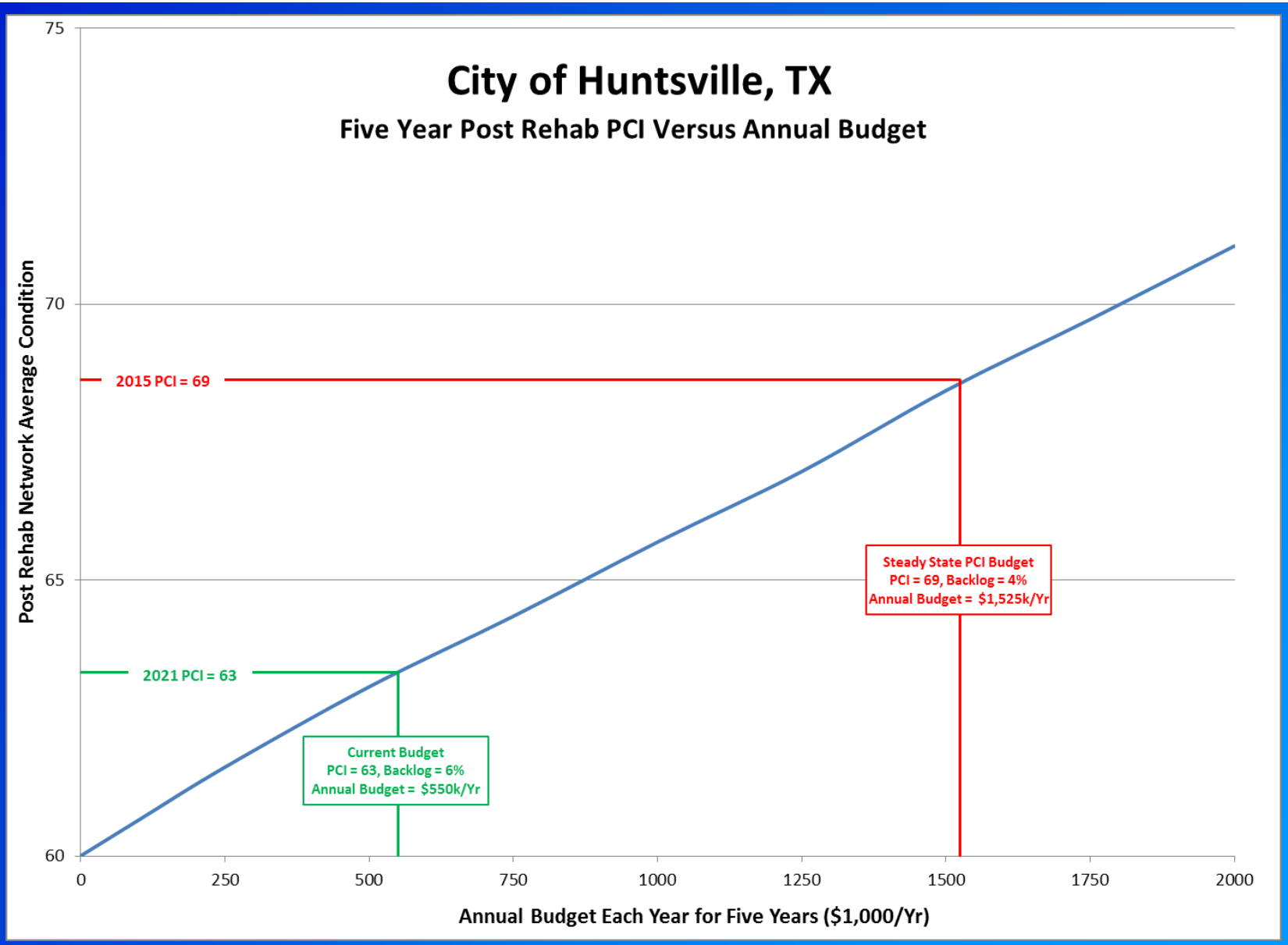
(does not include routine maintenance activities, ADA compliance, culverts or ditch repair, signage, striping, bike lanes, or additional width)

Concrete Deficiency	Total Cost ($)	% of Total	PART	SART	COL	LOC	Life Cycle (years)	Life Cycle Cost ($)
PCC Reconstruction	0	0.0	0	0	0	0	75	0
PCC Partial Rplcmnt	53,000	8.3	0	0	0	0	25	5,300
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	266,500	41.5	100,800	103,300	0	62,400	20	13,200
Localized Rehab	58,400	9.1	1,800	10,800	16,900	28,900	10	5,900
Joint Rehab	42,500	6.6	11,900	7,800	5,500	17,300	5	8,400
Routine Maintenance	10,700	1.7	300	400	0	10,000	2	6,100
Total Concrete Network:	**641,800**	**100**	**114,800**	**122,300**	**22,400**	**382,300**		**38,900**
Total Network :	**25,820,400**		**3,929,800**	**3,050,200**	**5,162,200**	**13,678,200**		**1,681,500**

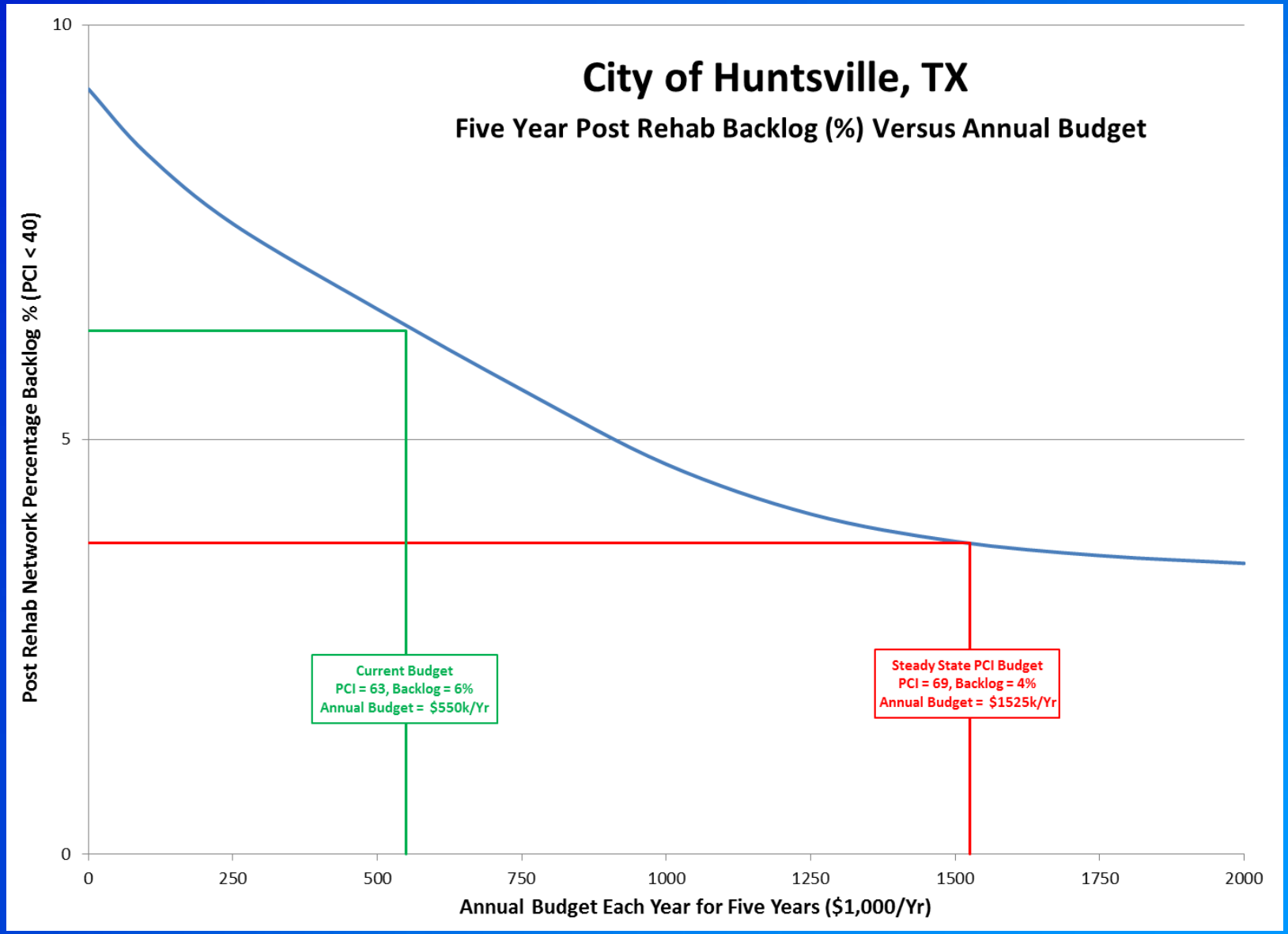
5 Year Budget Analysis….



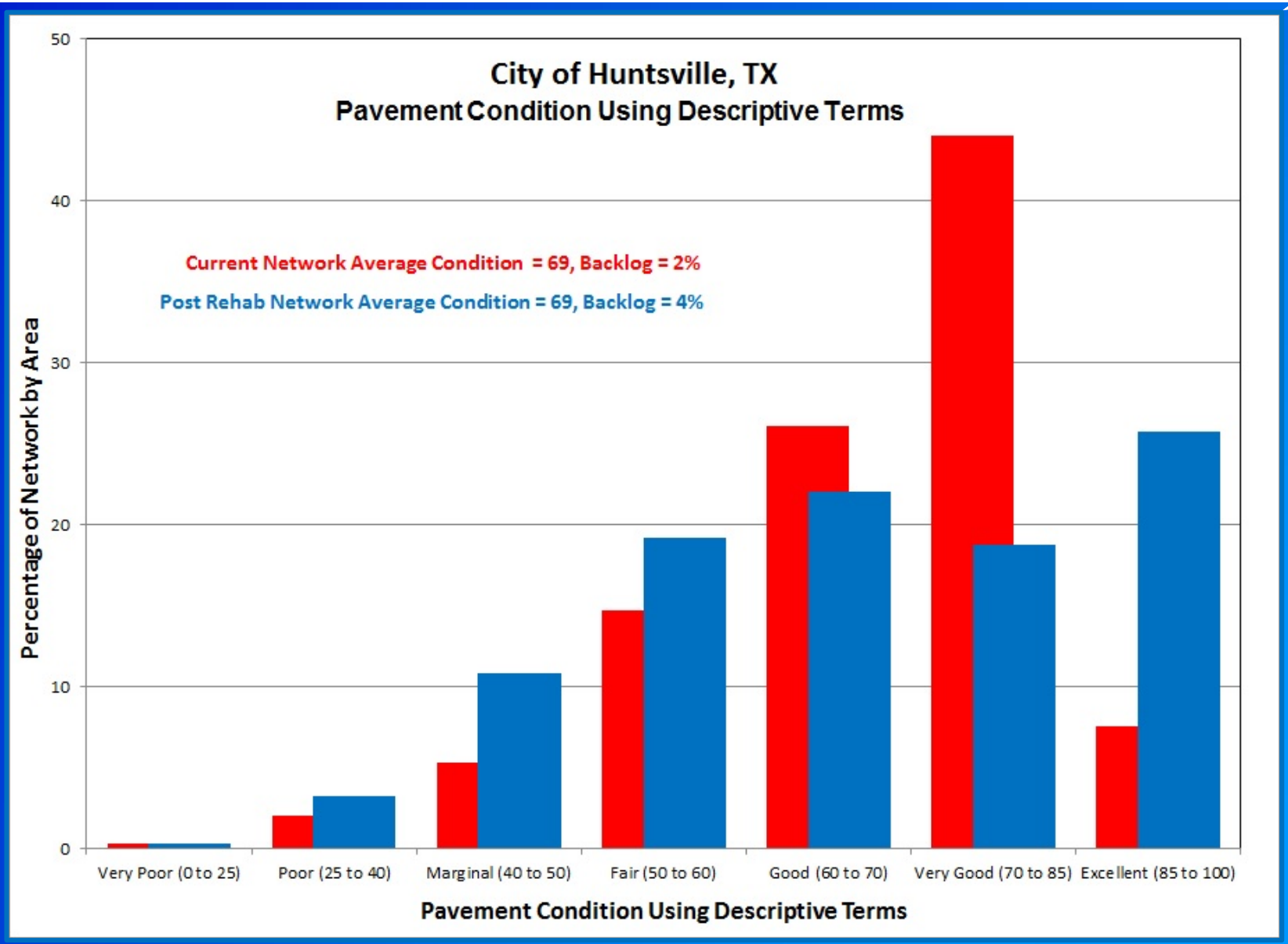
Post Rehab PCI & Annual Funding….



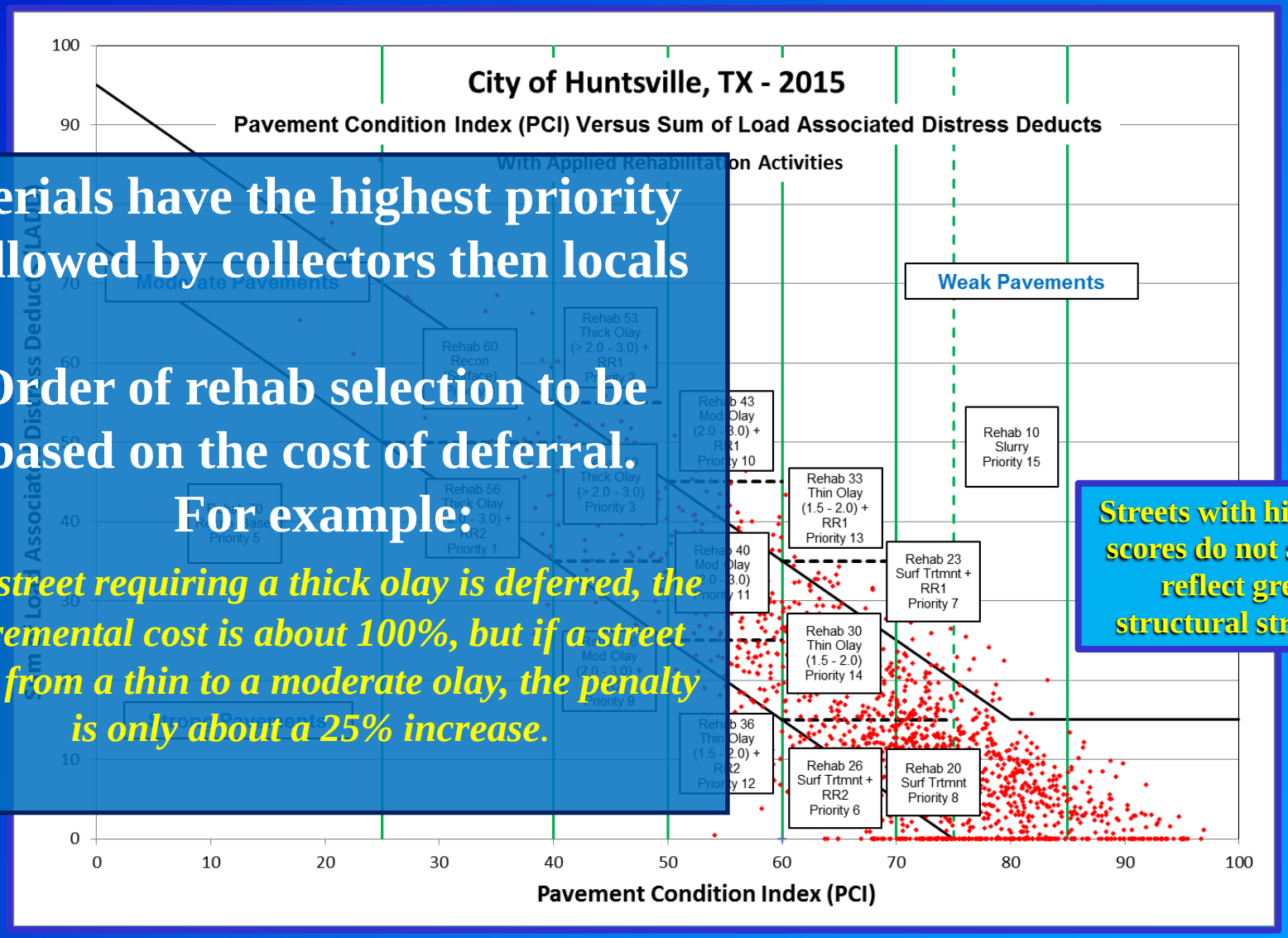
Post Rehab Backlog & Annual Funding



Condition At Steady State Funding…



Huntsville 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 olay is deferred, the incremental cost is about 100%, but if a street slips from a thin to a moderate olay, the penalty is only about a 25% increase.

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

Huntsville Annual Funding Comparison….

Agency Funding Comparison

Agency	State	Year	Mileage (mi)	PCI	Backlog	Steady State Budget ($M/yr)	Steady State Rate ($/mi)	Actual Funding ($M/yr)	Actual Funding Rate ($/mi)	Funding Ratio %	Comments
Agency CB	CA	2010	334	81	2%	3.40	10,000	3.40	10,000	100	Fully funded
Agency FW	WA	2011	231	79	4%	2.25	10,000	2.25	10,000	100	Fully funded, well structured
Agency L	NE	2012	338	77	9%	5.25	16,000	5.00	15,000	94	Slightly underfunded, majors only
Agency E	TX	2014	128	77	2%	0.80	6,000	0.80	6,000	100	Fully funded, excellent backlog
Agency ST	WA	2011	80	76	4%	0.90	11,000	2.25	28,000	255	Fully funded
Agency MF	OR	2014	270	76	2%	3.00	11,000	2.28	8,000	73	Slightly underfunded, very low backlog
Agency B	SD	2014	40	76	4%	0.35	9,000	0.35	9,000	100	Fully funded
Agency P	TX	2014	381	75	2%	3.75	10,000	0.43	1,000	10	Underfunded, but solid backlog
Agency GI	NE	2013	284	74	1%	2.50	9,000	3.00	11,000	122	Fully funded
Agency FT	CA	2015	504	73	7%	7.25	14,000	5.00	10,000	71	Slightly underfunded, low backlog
Agency F	ND	2012	438	72	9%	6.00	14,000	4.00	9,000	64	Underfunded
Agency SS	GA	2012	311	72	10%	4.75	15,000	3.20	10,000	67	Underfunded, does not do surface treatments
Agency G	AZ	2014	905	72	4%	7.50	8,000	2.83	3,000	38	Underf[illegible]ded, but solid backlog
Agency S	AZ	2015	896	72	1%	8.00	9,000	9.40	10,000	111	Wel[illegible]ded, looking to improve
Agency FS	CO	2014	60	70	1%	0.63	10,000	0.20	3,000	30	Unde[illegible]
Agency MC	SD	2014	353	69	4%	4.00	11,000	4.00	11,000	100	
Agency H	TX	2015	155	69	2%	1.53	10,000	1.00	6,000	60	
Agency Y	CA	2011	200	68	5%	1.60	8,000	1.00	5,000	63	
Agency LV	WA	2011	138	68	7%	2.80	20,000	0.55	4,000	20	
Agency SV	WA	2013	439	68	9%	7.25	17,000	2.00	5,000	29	Underfund[illegible]looking for alternate funding
Agency B	WA	2014	140	67	15%	1.50	11,000	0.60	4,000	36	Backlog[illegible] concern, Underfunded
Agency RC	OK	2015	156	67	4%	1.40	9,000	1.40	9,000	100	Fully funded
Agency C	CA	2011	56	66	12%	1.10	20,000	1.10	20,000	100	Fully funded, working to control backlog
Agency WF	TX	2012	170	66	15%	1.40	8,000	0.66	4,000	50	Underfunded, decreasing PCI
Agency L	CO	2014	160	66	15%	2.30	14,000	2.30	14,000	100	Backlog a concern
Agency B	OK	2015	121	66	6%	0.95	8,000	0.95	8,000	100	Fully funded
Agency KW	FL	2012	65	65	7%	0.75	12,000	0.75	12,000	100	Fully funded and working to increase PCI
Agency BV	OK	2012	152	65	11%	1.25	8,000	1.25	8,000	100	Fully funded
Agency C	CO	2012	443	64	12%	6.00	14,000	5.00	11,000	79	Slightly underfunded
Agency LC	NM	2012	455	63	17%	5.60	12,000	3.00	7,000	58	Underfunded and concerned about backlog
Agency PTC	GA	2015	111	63	5%	1.40	13,000	1.50	14,000	108	Fully funded, low backlog
Agency O	CA	2014	410	61	9%	7.50	18,000	5.10	12,000	67	Underfunded
Agency V	CA	2012	472	60	14%	7.50	16,000	2.50	5,000	31	Underfunded and concerned about backlog
Agency LB	CA	2014	786	60	21%	30.90	39,000	14.80	19,000	49	Severely Underfunded, High Backlog
Agency LC	PA	2012	102	59	15%	1.00	10,000	0.75	7,000	70	Underfunded
Agency CB	TX	2015	179	51	20%	2.00	11,000	0.50	3,000	27	Underfunded, concerning backlog

Good PCI & Excellent Backlog

City of Huntsville Recommendations….

1. **Target PCI of 69 and backlog well below 12% for entire roadway network.**

   This equates to a $1.525 million annual budget

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.**

Questions?….