2016 State of the Roadway Network in Brookhaven

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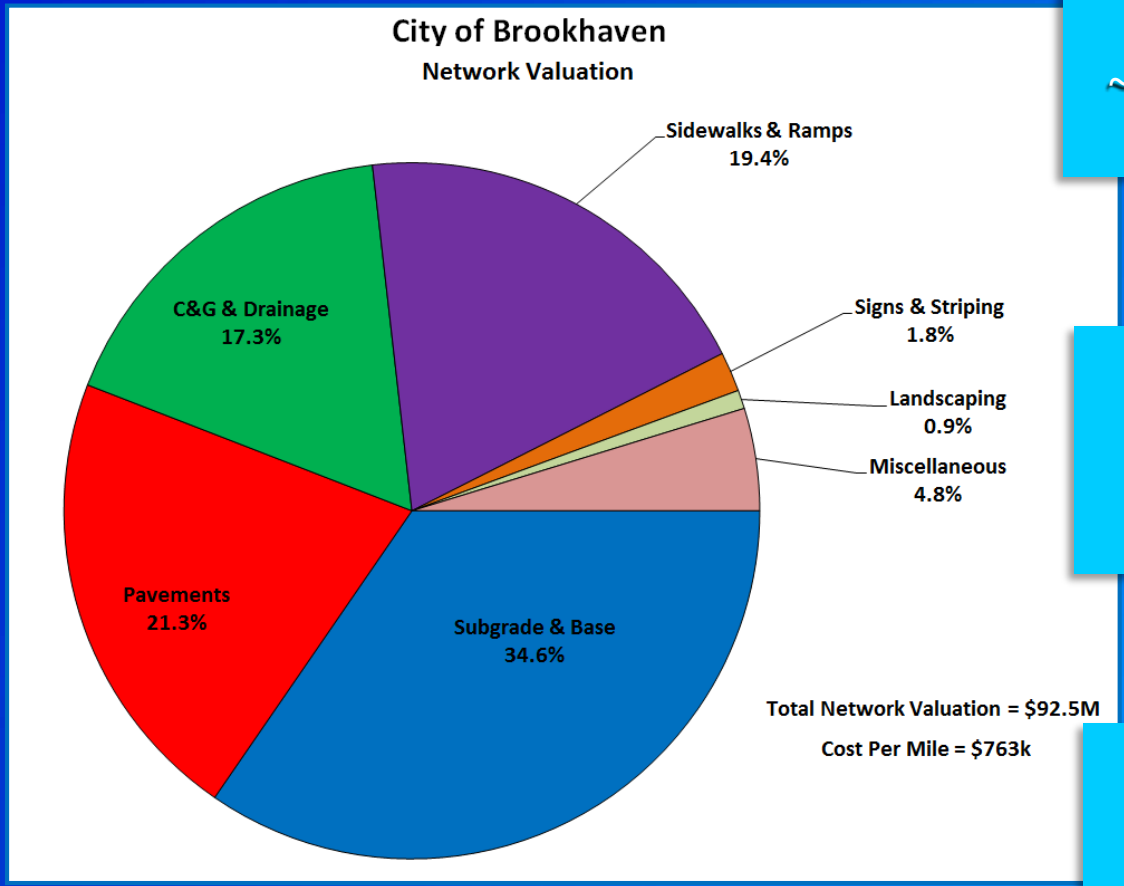
Scale of Investment….

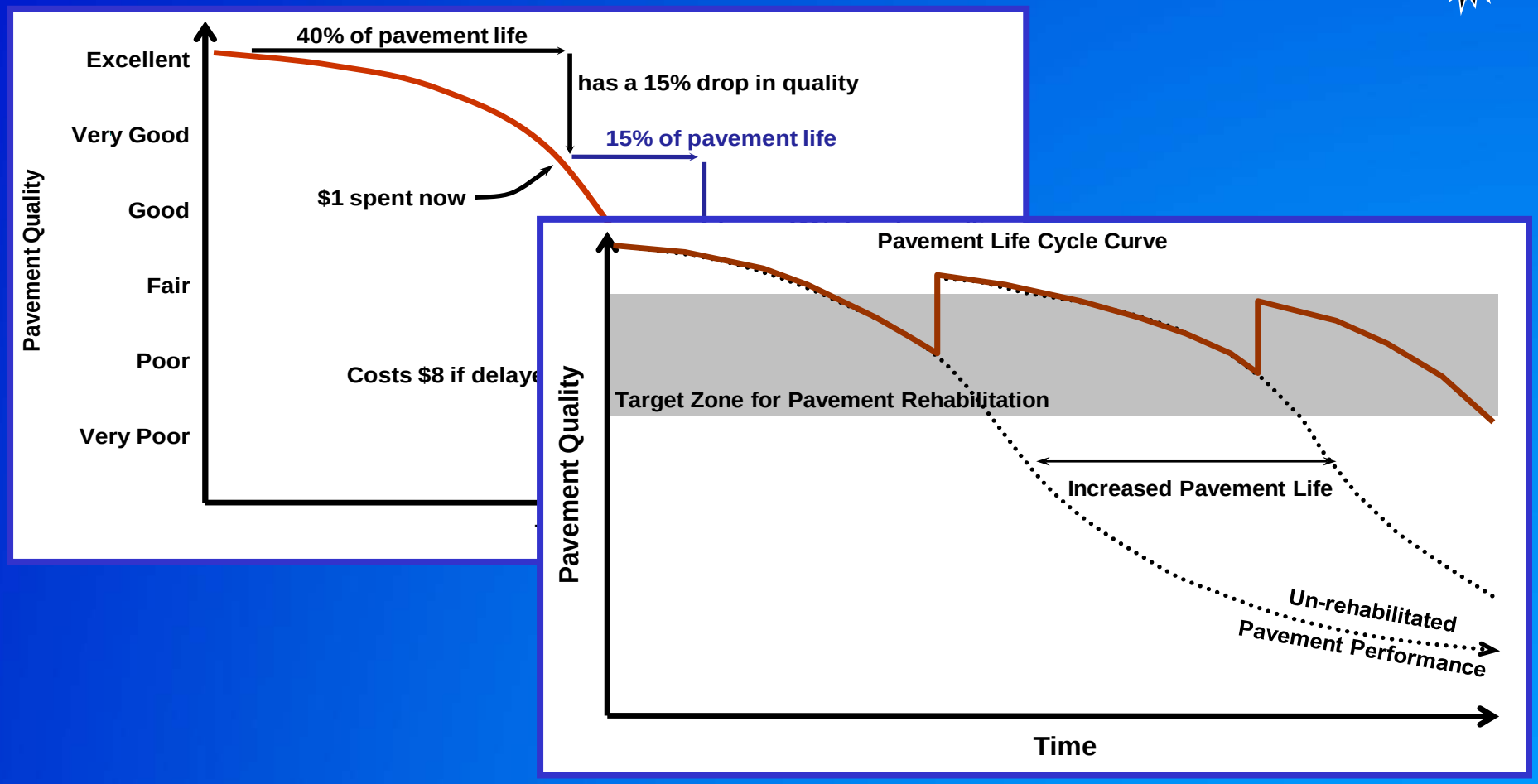


~51,910 people
~120.4 CL miles of City owned roadways
1.9M square yards of pavement

Single largest City asset valued at $763K/mile or $92.5M total plus improvements and ROW
(not including the value of land, bridges, etc.)

Early look at the condition score:
PCI = 66 (Good)
Back log = 16% (target ≤ 12%)

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

Concept of Pavement Management...

City
Objectives,
Policies & Budgets

Balanced Approach

Understanding of Condition

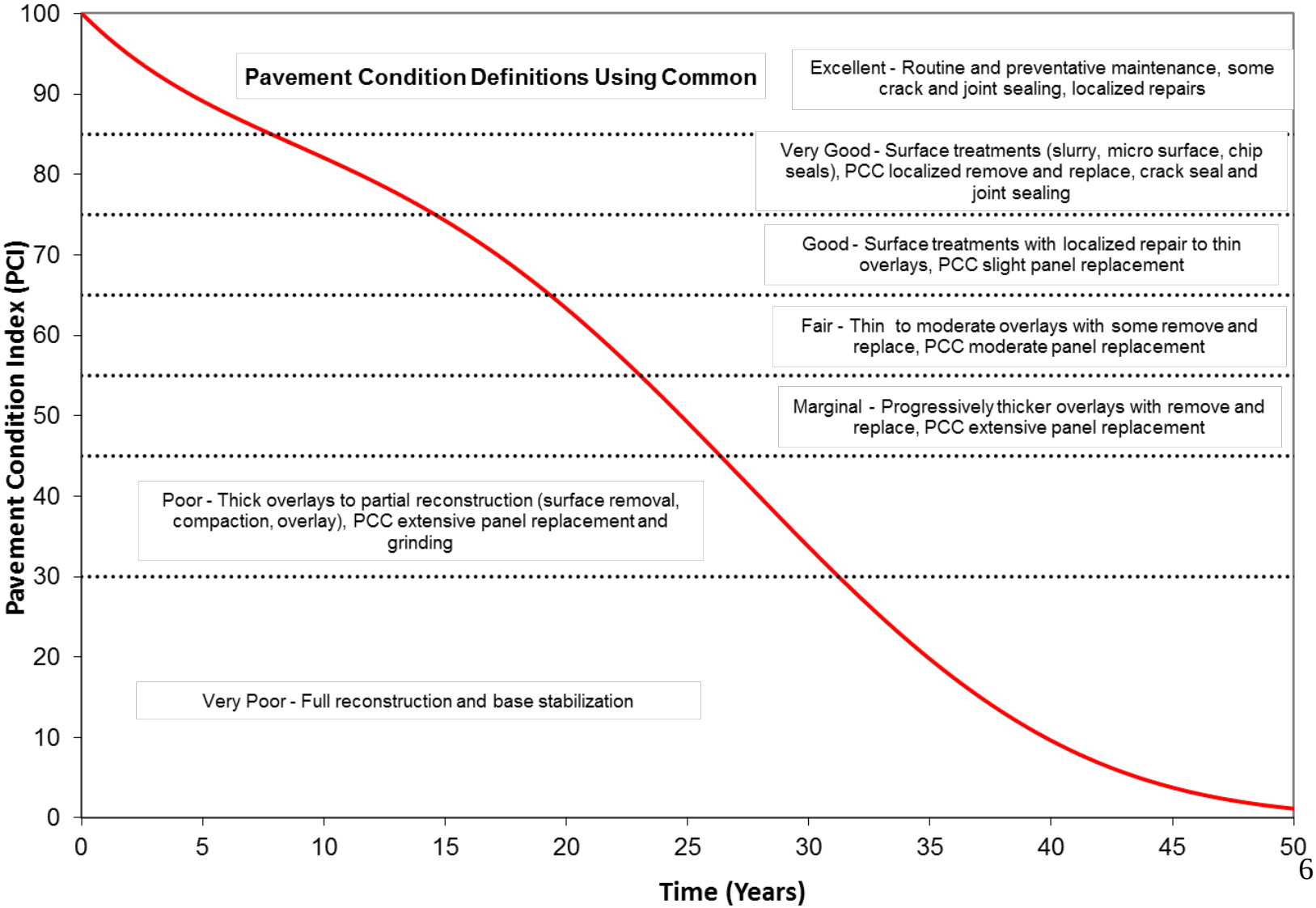
Priorities,
Analysis Techniques
& Reporting

Tools to Rate the Streets – Objective Surveys….

Condition Focuses On:

Roughness
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

Understanding the Pavement Condition Index….



Understanding the PCI….Very Poor (0 – 30)

Base &/or Structural Failures
Rutting
Excessive Cracking

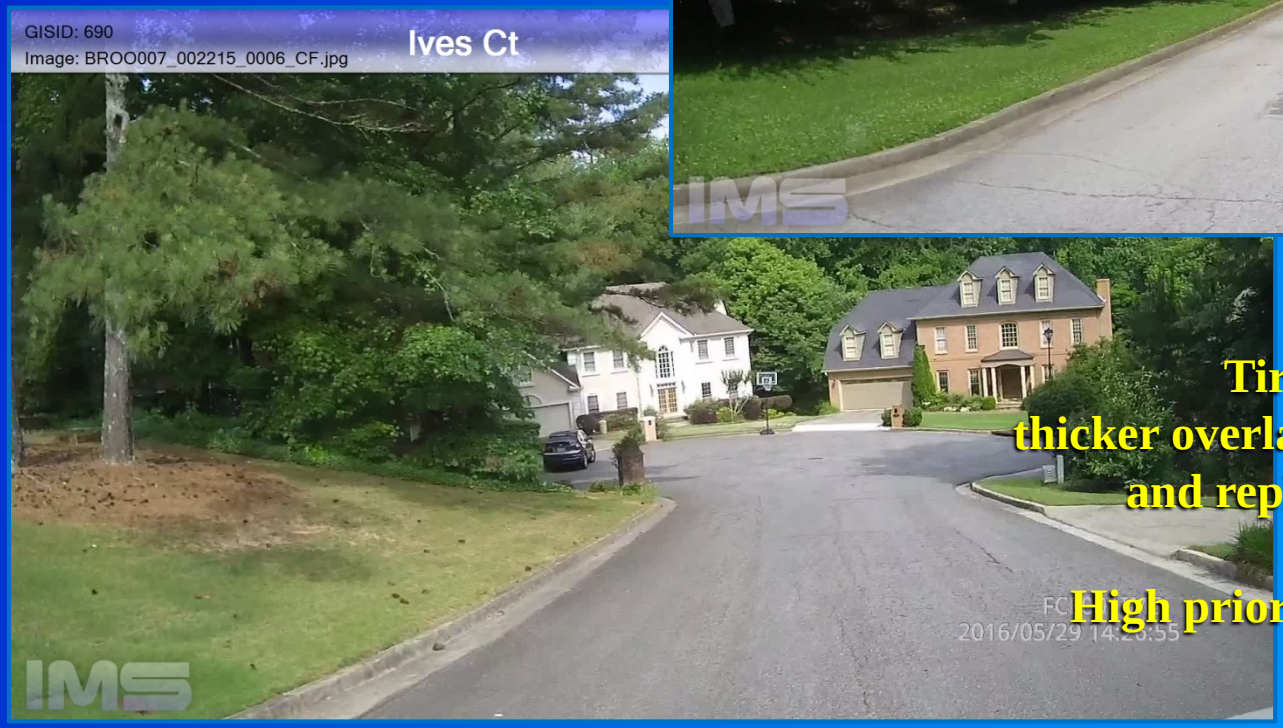
Past point of overlay based rehabilitation.

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 on ACP roads.

High priority to avoid reconstruction

Understanding the PCI….Fair (50 – 60)

Progressive cracking
Few base failures
Localized distresses

Optimum timing for thin – moderate overlay on asphalt roads.

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 treatment (micro/chip seal/slurry).

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.

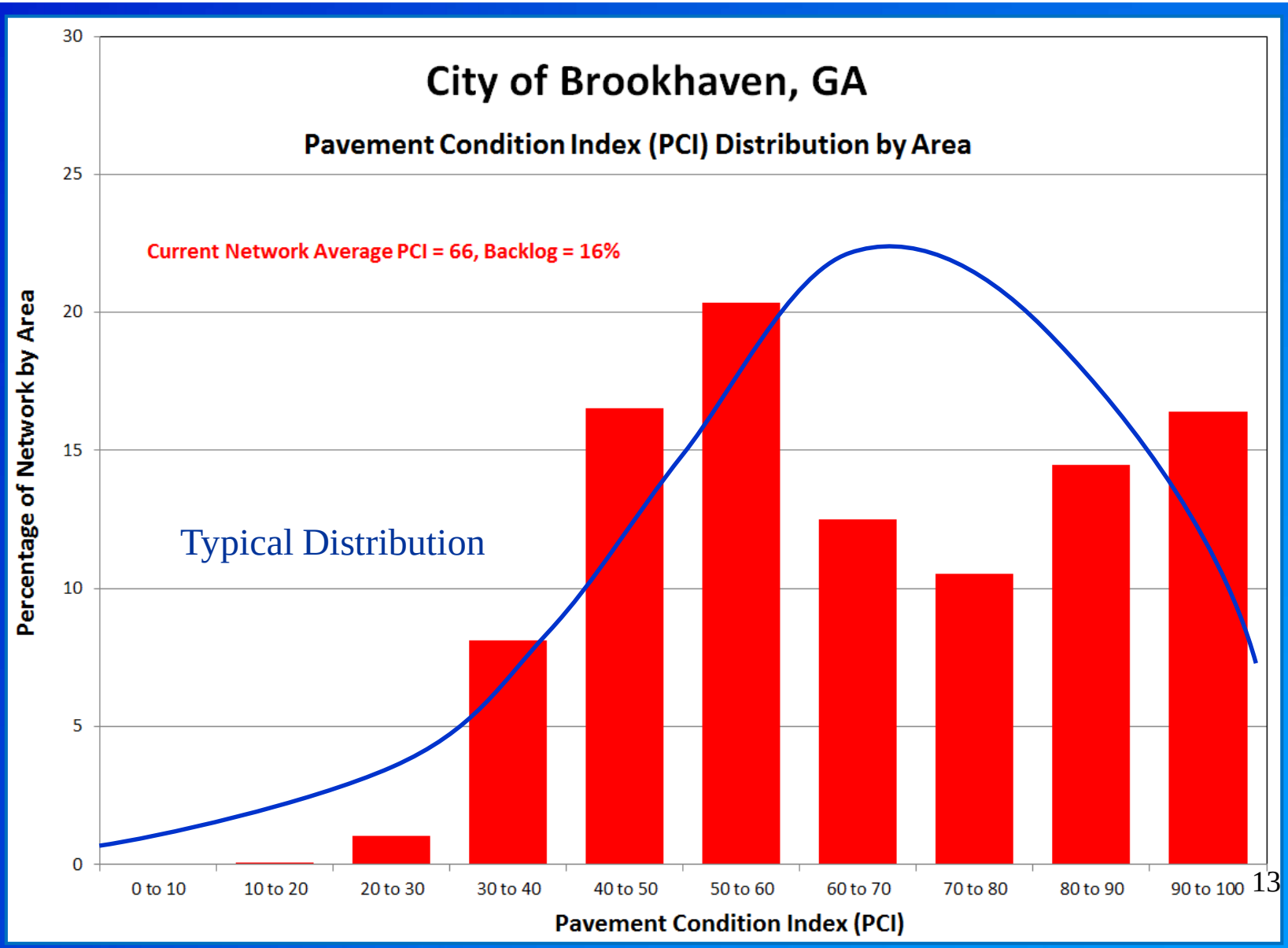
Maintains existing drainage. Extends pavement life at lowest cost

Understanding the PCI….Excellent (85 - 100)

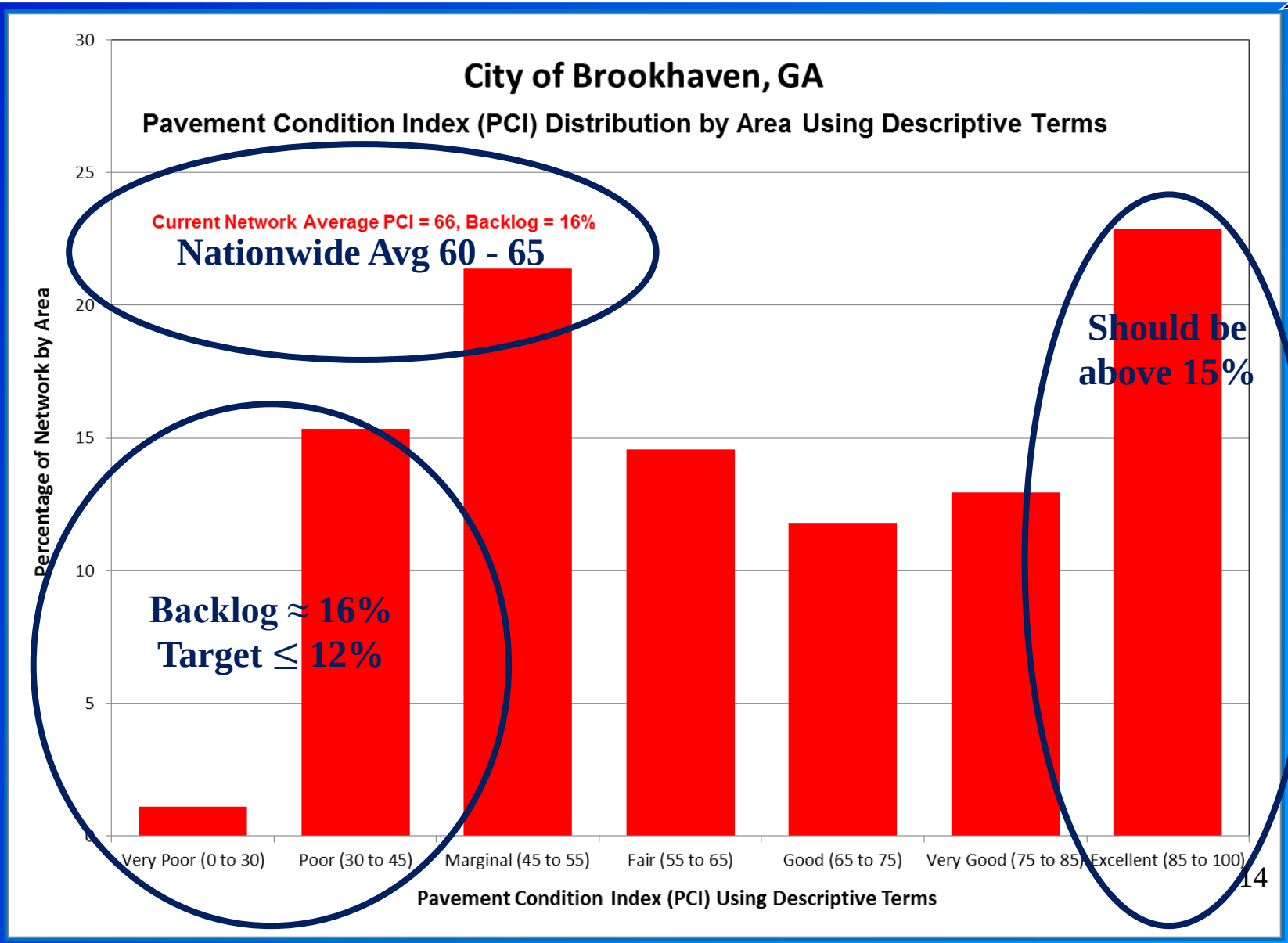
Like new condition
Very few minor distresses
Smooth ride, good drainage

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

Brookhaven PCI Results for 2016….

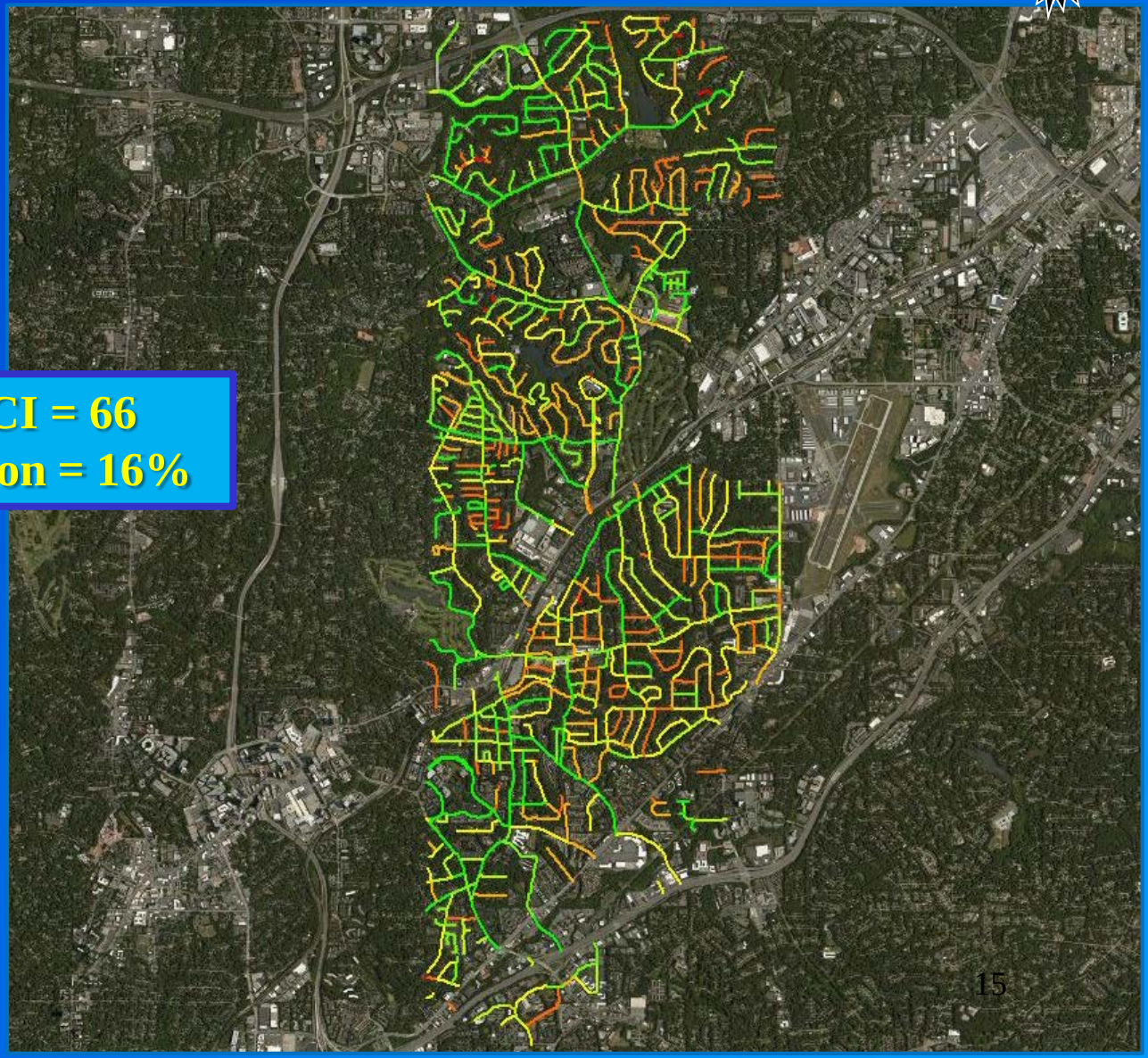


Brookhaven Results…. 3 metrics of health



Brookhaven Pavement Results….

Average Network PCI = 66
Backlog of reconstruction = 16%



City of Brookhaven Methodology….

1. Funding is not $0, nor is it unlimited
2. Brookhaven 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. Pavement management is priority based, not worst-first
7. No cost inflation

Brookhaven Annual Funding Estimates….

Estimate #1. - Based on Network Value Life Cycle Analysis

Pavement Type	Pavement Value ($)	Ultimate Life Span (yrs)	Life Cycle Annual Cost ($/yr)
Asphalt Network	91,557,000	75	1,220,000
Concrete Network	939,000	150	10,000
All Streets	**92,496,000**		**1,230,000**

Estimate #2. - Based on Current Condition Life Cycle Analysis

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	64	Mod Overlay (2.0 - 3.0)	14.35	18	6.7	230,000	1,550,000
Concrete Network	94	Routine Maintenance	0.25	2	0.2	10,000	0
All Streets							**1,550,000**

Brookhaven Annual Funding Estimates….

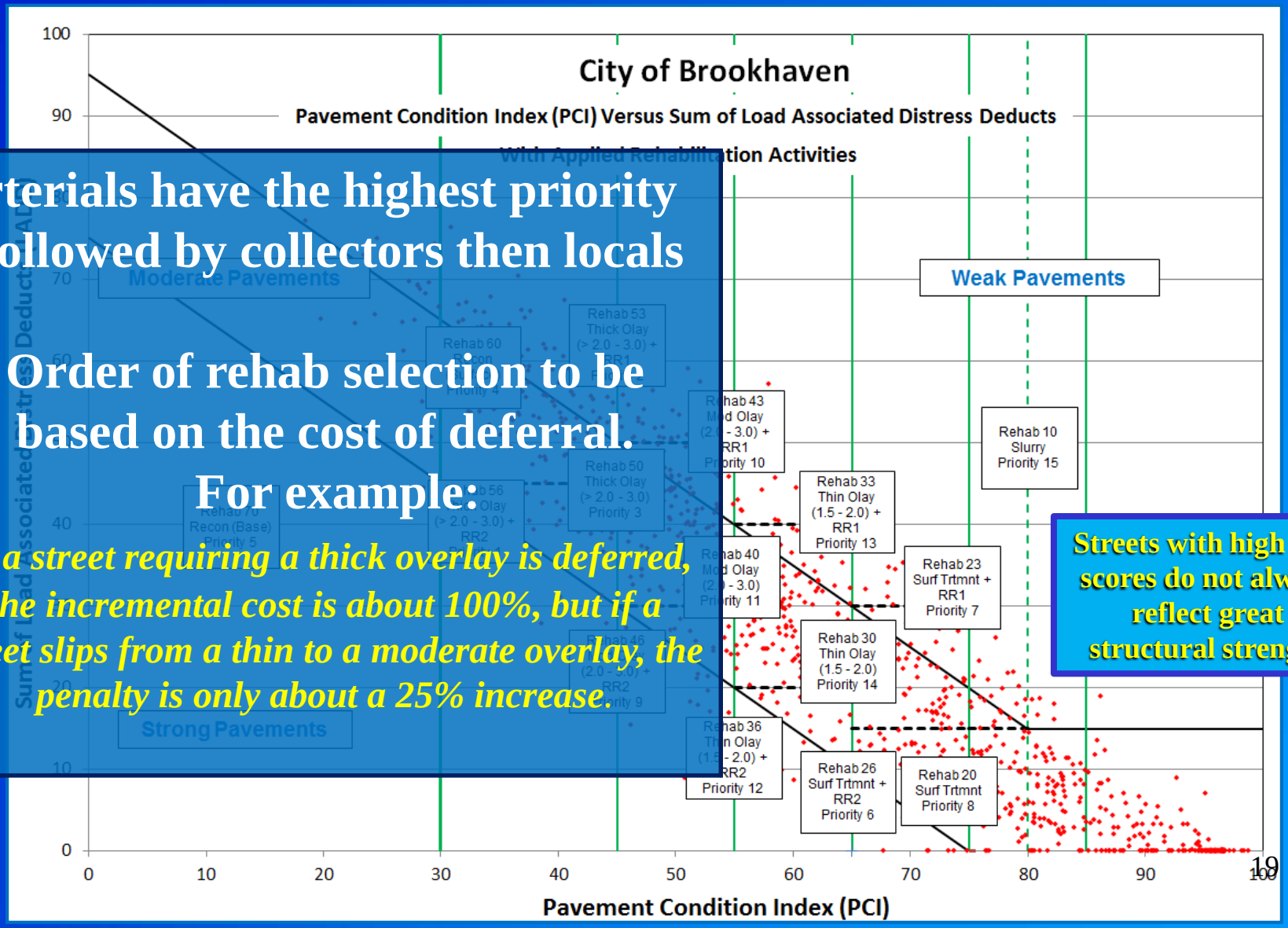
Estimate #3. - Based on Estimated Total Network Deficiency and Life Cycle Cost

Asphalt Deficiency	Total Cost ($)	% of Total	MART	MnART	COL	LOC	Life Cycle (years)	Life Cycle Cost ($)
Reconstruction (Base)	1,699,600	5.9	0	0	16,000	1,683,600	50	34,000
Reconstruction (Surface)	11,823,500	41.0	0	683,700	89,900	11,049,900	30	394,000
Thick Olay (> 2.0 - 3.0)	7,432,400	25.8	0	1,006,100	75,500	6,350,800	20	372,000
Mod Overlay (2.0 - 3.0)	4,408,400	15.3	0	1,082,400	371,100	2,954,900	18	245,000
Thin Overlay (1.5 - 2.0)	2,776,200	9.6	20,900	503,000	325,800	1,926,500	15	185,000
Surface Treatment	280,700	1.0	0	50,500	44,900	185,300	7	40,000
Total								1,378,000
Concrete Deficiency	**Total Cost ($)**	**% of Total**	**MART**	**MnART**	**COL**	**LOC**	**Life Cycle (years)**	**Life Cycle Cost ($)**
PCC Reconstruction							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	36,300	94.5	0	0	0	36,300	20	2,000
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	2,100	5.5	0	0	0	2,100	2	1,000
Total Concrete Network:	**38,400**	**100**	**0**	**0**	**0**	**38,400**		**3,000**
Total Network :	**28,856,600**		**20,900**	**3,391,900**	**1,003,200**	**24,440,600**		**1,381,000**

Typical life cycle estimates show that Brookhaven would need approximately $1.2M to 1.5M annually to maintain PCI

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

Brookhaven Rehabilitation Needs….



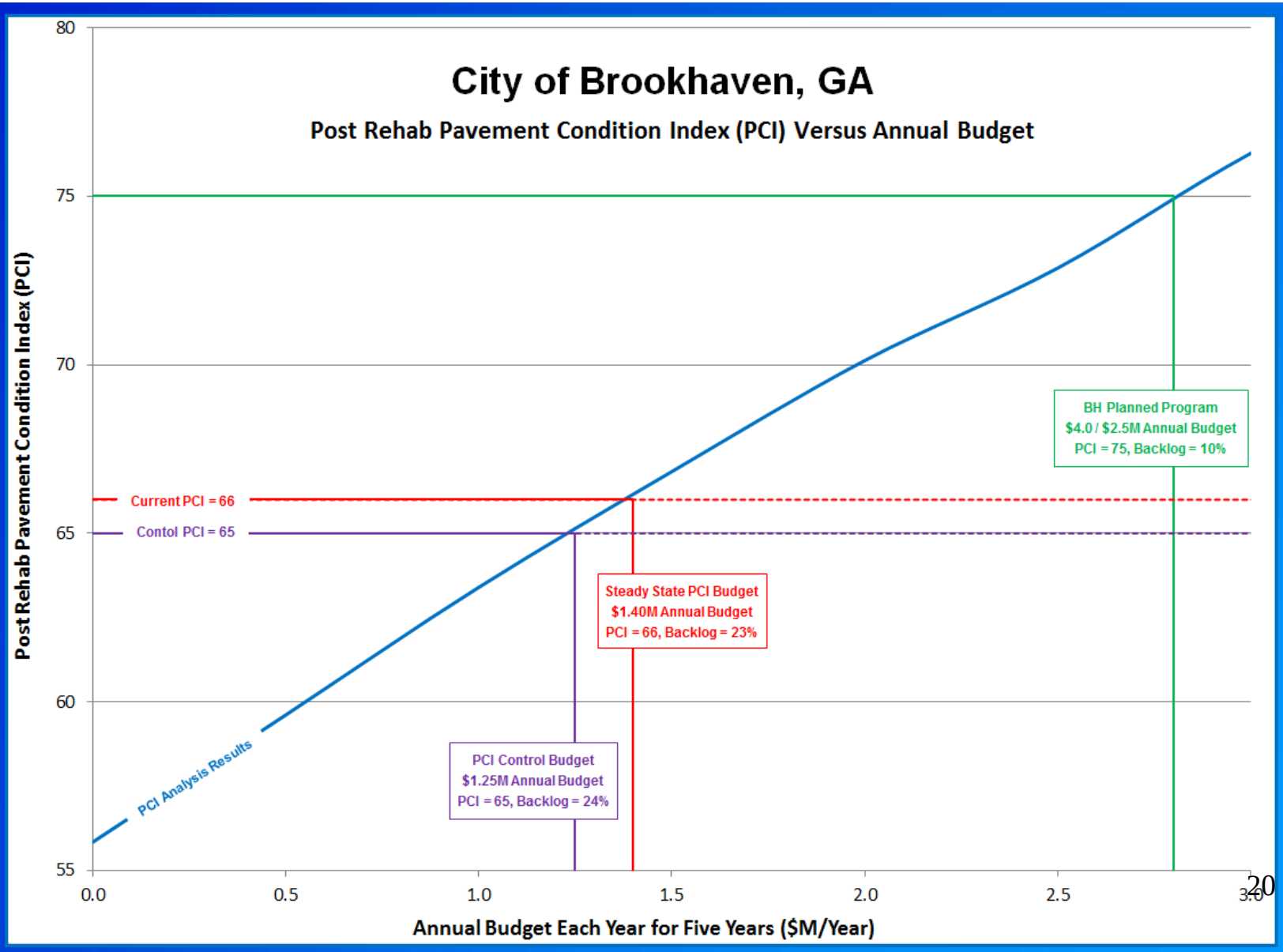
Arterials have the highest priority
Followed by collectors then locals

Order of rehab selection to be based on the cost of deferral.
For example:

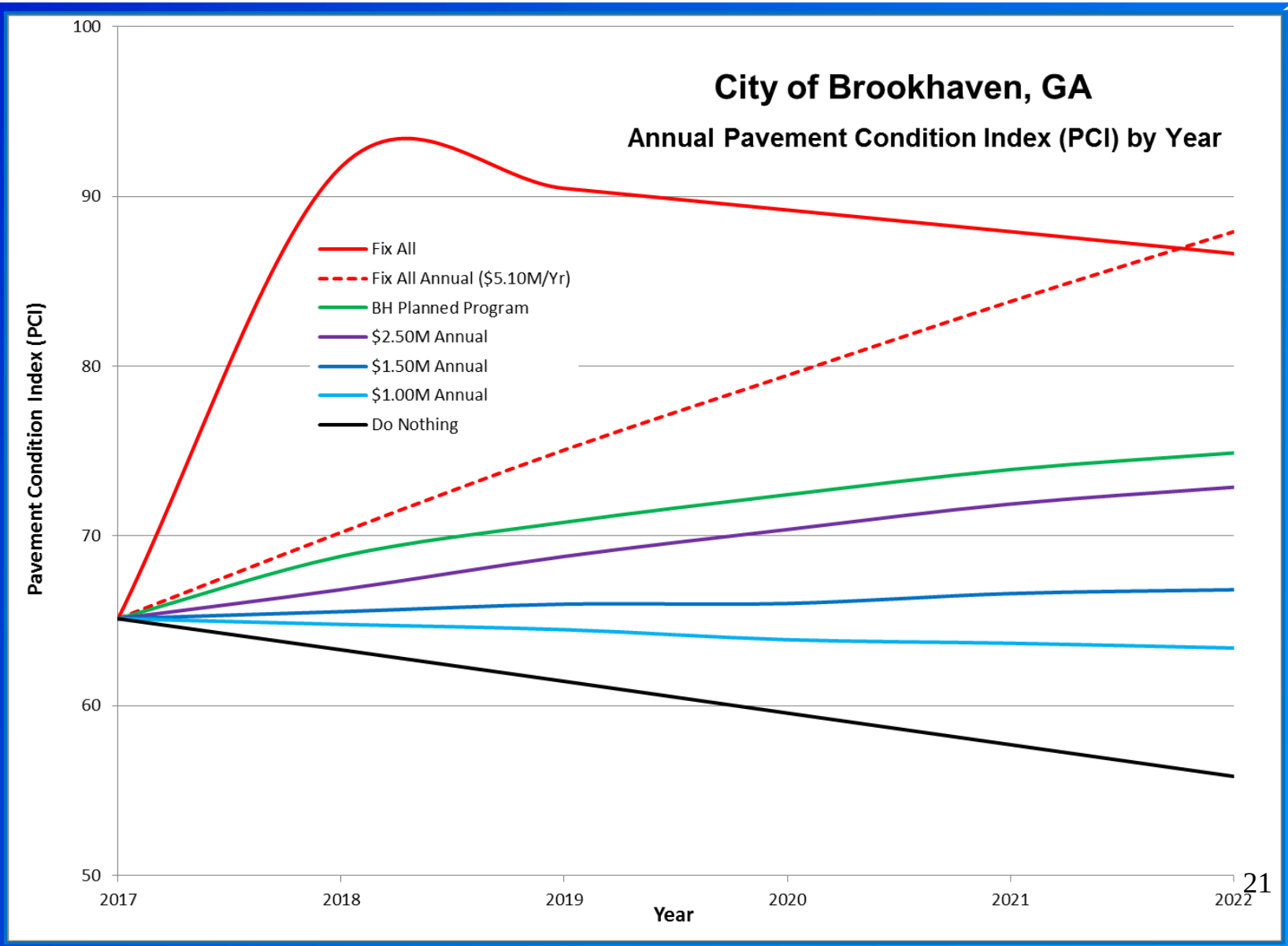
if a street requiring a thick overlay is deferred, the incremental cost is about 100%, but if a street slips from a thin to a moderate overlay, the penalty is only about a 25% increase.

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

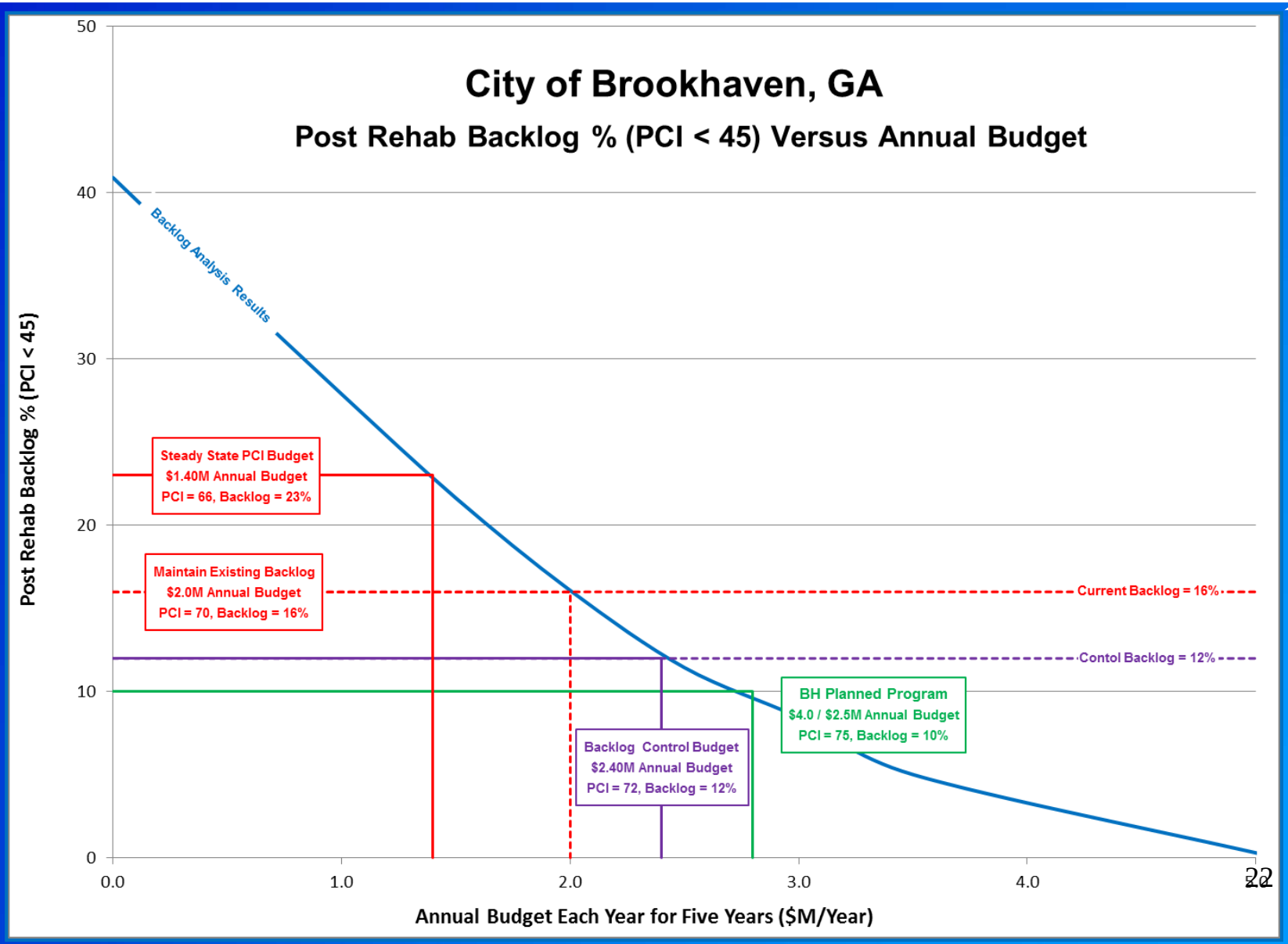
Post Rehab PCI & Annual Funding….



5 Year PCI Budget Analysis….



Post Rehab Backlog & Annual Funding….



City of Brookhaven Recommendations….

1. **Maintain PCI at or above 70 with a backlog below 12% for entire roadway network.**

A budget of $4M in 2017 followed by $2.5M annually will achieve this goal.

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 3 years to update the condition data, analysis models, and rehab program.**

Questions?….