Pavement Management System

Concepts & Application

TULSA CITY COUNCIL

Capital Improvement Program Task Force

December 13, 2012

Pavement Management

The "right" treatment
At the "right" time
On the "right" project

City of Tulsa – Street Network

- Arterial Network: 1,356 lane miles
  - Arterials: 1,263 lane miles
  - CBD: 93 lane miles
- Non-Arterial: 3,038 lane miles
- Signalized intersections: 511
  - 90 Downtown

In other words, there are enough lane miles of streets in the City of Tulsa to stretch from New York to Los Angeles, and back to Tulsa – with 500 miles to spare . . .

In other words, there are enough lane miles of streets in the City of Tulsa to stretch from New York to Los Angeles, and back to Tulsa – with 500 miles to spare . . .

. . . with a signalized intersection every ten miles along the way.

City of Tulsa PMS history …

- *1980's Federal funding for municipal street maintenance disappeared*
- *Deteriorating pavements: limited funding – cost effective approach*
- *1988 City initiated a Pavement Management System (PMS)*
- *MicroPAVER: Developed by COE and APWA*

MicroPAVER

- *Systematic, consistent method: ID needs and priorities*
- *All streets inventoried – distresses are recorded and analyzed*
- *Representative / Sample areas*
- *Pavement Condition Index (PCI) assigned (100 being "excellent condition")*

"Right" Treatment depends on . . .

- ***Thorough Inventory of the pavements:***

(categorized into sections)

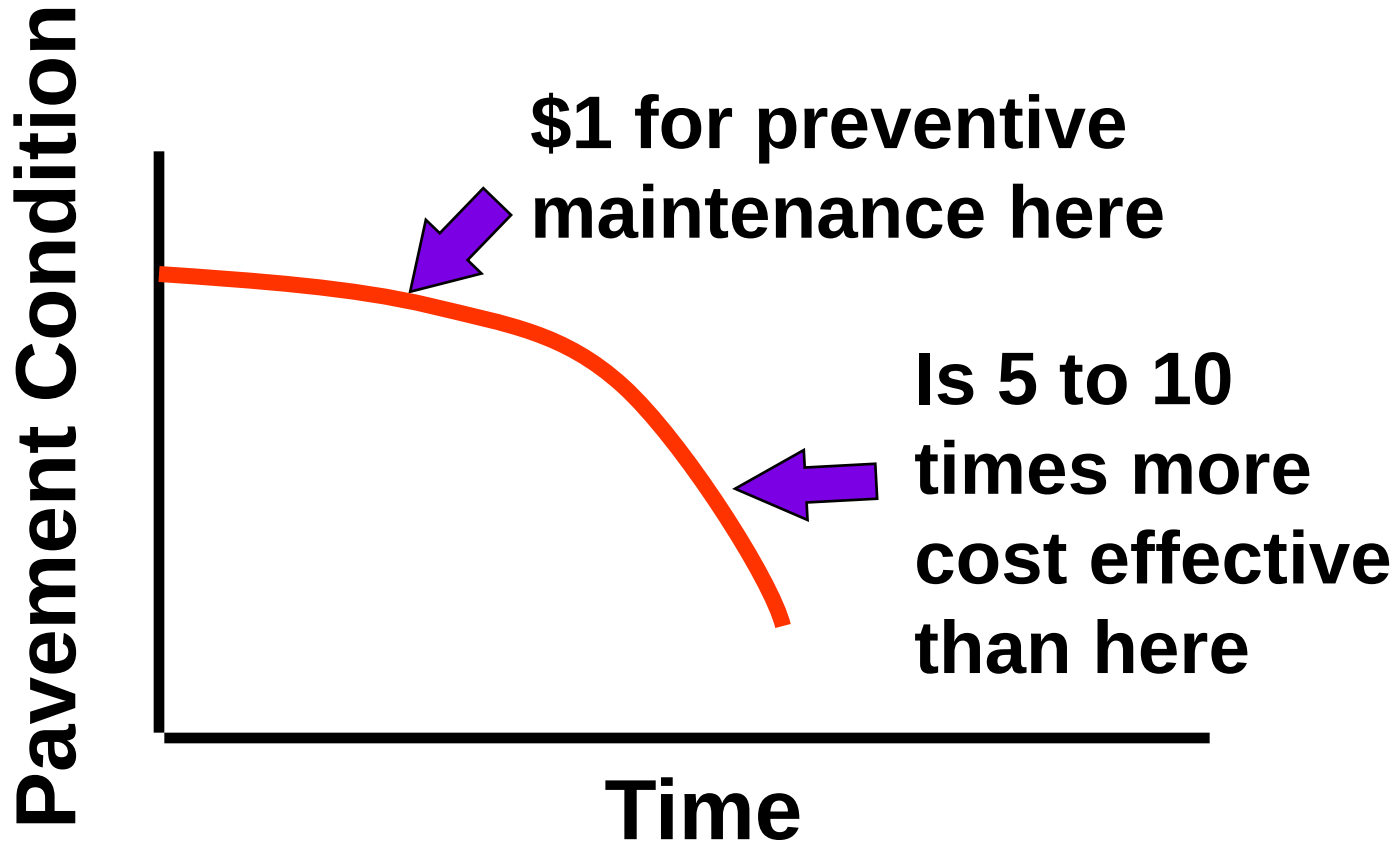
  - ***Type***
  - ***Age***
  - ***Location***
  - ***Rehabilitation history***
  - ***Similar distresses***

When Should We Fix Our Pavements?

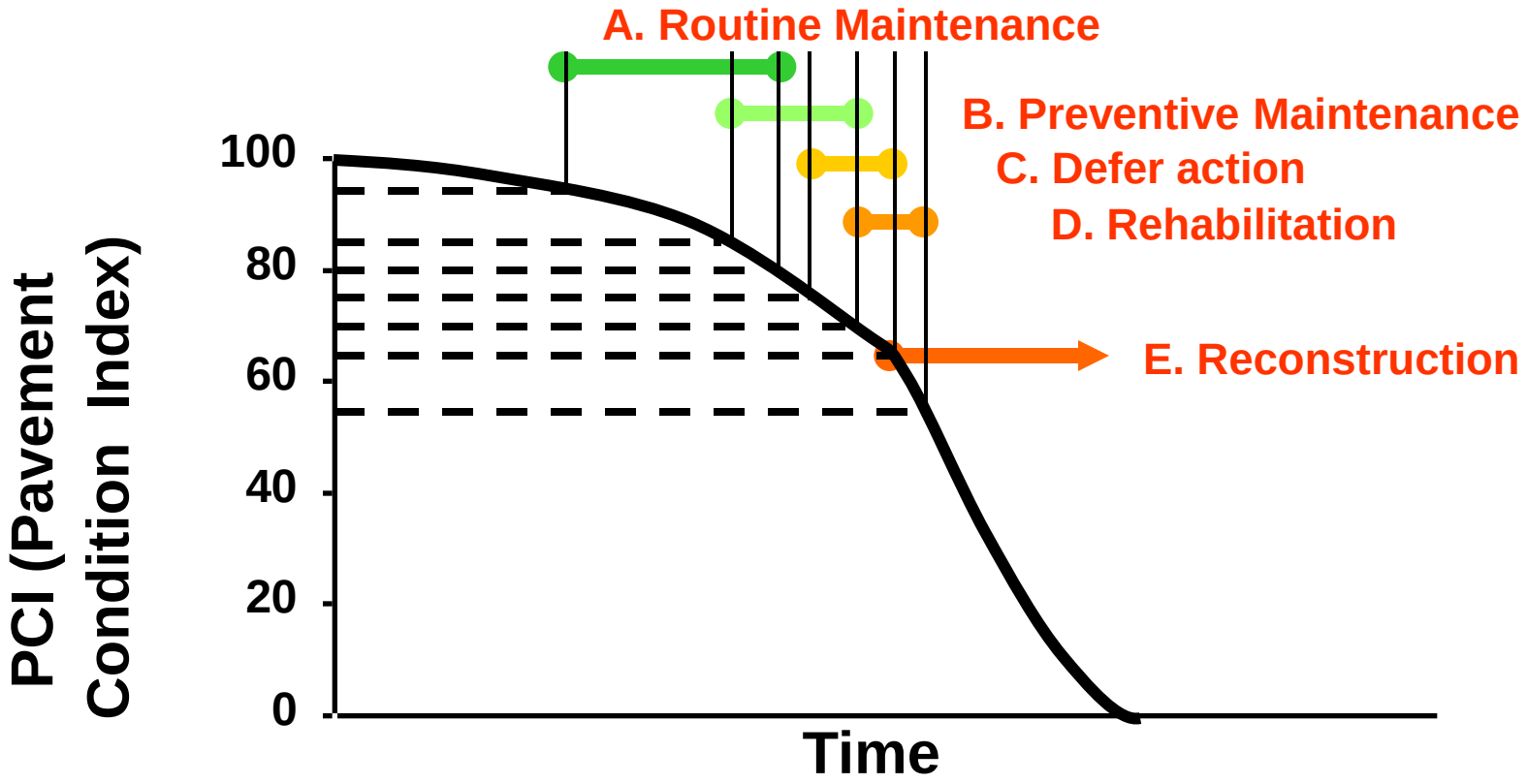
- ***Pavement Management - preserves good-condition pavement***
- ***4 Strategies:***
  - ***PRESERVATION: Routine and Preventive Maintenance***
  - ***CORRECTIVE: Rehabilitation and Reconstruction***
- ***Corrective Maintenance***

  When the pavement loses:
  - ***Load carrying ability (excessive deflection)***
  - ***Surface rutting***
  - ***Pavement distresses (severe cracking/potholes)***
  - ***Ride quality***

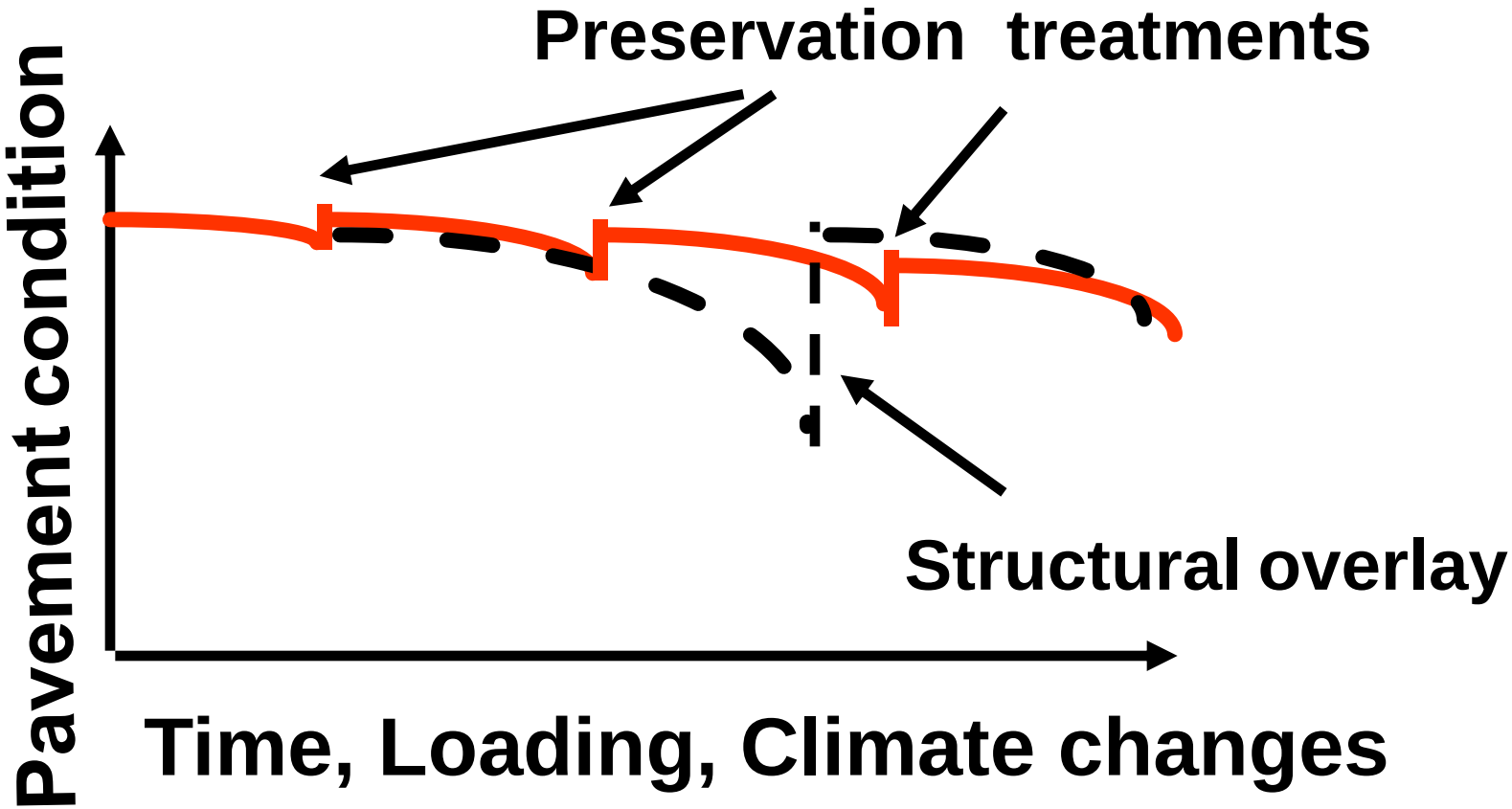
Effective, Preventive Maintenance (performance curves)



Pavement Management Maintenance & Rehab Strategies



Strategy to minimize costs



Optimization for funds…

- ***Develop Maintenance Plan (5-year +)***
- ***Optimizes $ vs. Composite PCI increase***
- ***Optimizes $ vs. Composite Backlog Level***
- ***Needs Strategy: Backlog of all routine, preventive, rehab, and reconstruction (percent of city-wide needs)***

Objective

Keep pavement condition such that corrective maintenance is minimized

Lessons learned …

- ***Maintenance strategy must be consistent***
- ***Define logical termini***
- ***Predict pavement conditions for funding***
- ***Communicate work level vs. citizen expectations, I.e. routine vs. reconstruction***
- ***Logical termini reduces # of work areas***
- ***Must use all strategies, BALANCED, PROPORTIONAL APPROACH (sensitivity analysis)***

Benefits of Pavement Management

- Extended life or serviceability
- Lower life-cycle costs
- Better budget planning
- Public support
- Quantitative evaluation

Funding Package Project Selection Procedure

1. A potential project pool of rehabilitation / reconstruction projects not included in recent funding packages.
2. A potential project pool of routine / preventive projects included in recent funding packages.
3. PCI determined for each potential project.
4. Group potential projects to form logical termini.

Funding Package Project Selection Procedure (con't)

5. Project allocation goals for each Council District are determined based on the Pavement Management Summary Report – Backlog of Needs.
6. A preliminary project list prioritized by the PCI(s), work history, &/or other needs is developed for each Council District.
7. A proposed project list with alternates is developed based on the project allocation goals for each Council District and anticipated total funding for street rehabilitation.

Historical: Funding Levels

Fiscal Year	Funding Package	Non-Arterial	Arterial	Total
1994	94 Bond	$ 10,079,000	$ 9,930,000	$ 20,009,000
	96 ST	$ 27,431,000	$ 25,637,000	$ 53,068,000
	99 Bond	$ 80,110,000	$ -	$ 80,110,000
	01 ST	$ 46,995,000	$ 40,775,000	$ 87,770,000
	05 Bond	$ 69,400,000	$ 54,700,000	$ 124,100,000
2013	06 ST	$ 25,885,000	$ 32,250,000	$ 58,135,000
20 yrs	**TOTAL**	**$ 259,900,000**	**$ 163,292,000**	**$ 423,192,000**
Average Yr	**Funding**	**$ 12,995,000**	**$ 8,164,600**	**$ 21,159,600**
2014	**Fix Our Streets**	**$ 254,313,000**	**$ 159,450,000**	**$ 413,763,000**

Historical: Arterial PCI's

COUNCIL DISTRICT	1992 PCI	1997 PCI	2002 PCI	2006 PCI	2010 PCI
1	72	66	68	60	55
2	77	72	74	64	59
3	70	65	64	57	55
4	77	69	61	54	59
5	77	67	66	62	61
6	75	68	67	57	62
7	82	70	74	67	63
8	83	74	67	66	72
9	75	62	63	58	54
WT. AVG	76	68	67	60	60

Historical: Non-Arterial PCI's

COUNCIL DISTRICT	1990 PCI	1995 PCI	2000 PCI	2004 PCI	2008 PCI
1	65	55	64	66	61
2	75	57	64	71	64
3	70	63	59	67	59
4	68	60	62	69	59
5	71	62	58	60	56
6	72	65	64	66	63
7	71	59	59	63	57
8	86	77	73	75	70
9	74	64	65	69	62
WT. AVG	72	62	65	67	61

Modeling Scenarios – Evaluation(s) over time

1. **"Do Nothing" in addition to current funding**
2. **Fix Our Streets in 2008 – Multiple-Phase approach 5-yr plan vs. 12-yr program**
3. **Attain PCI 65 2020/2021**
4. **Attain PCI 70 2020/2021**

Current Funding: Arterial

Scenario	Current Funding	
Year	**Budget**	**Avg PCI**
2011	$24,173,040	**60**
2012	$44,430,310	61
2013	$22,816,930	61
2014	$58,908,550	**62**
Total:	$150,328,830	

Current Funding: Non-Arterial

Scenario	Current Funding	
Year	**Budget**	**Avg PCI**
2011	$63,777,920	**59**
2012	$86,030,540	60
2013	$49,438,760	60
2014	$50,866,430	**60**
Total:	$250,113,650	

PCI 2020: Arterial

Scenario	PCI 65 2020		PCI 70 2020	
Year	Budget	Avg PCI	Budget	Avg PCI
2015	$39,000,000	63	$60,000,000	65
2016	$39,000,000	64	$60,000,000	66
2017	$39,000,000	64	$60,000,000	68
2018	$39,000,000	64	$60,000,000	68
2019	$39,000,000	64	$60,000,000	69
2020	$39,000,000	65	$60,000,000	70
Total:	$234,000,000		$360,000,000	

PCI 2020: Non-Arterial

Scenario	PCI 65 2020		PCI 70 2020	
Year	Budget	Avg PCI	Budget	Avg PCI
2015	$55,000,000	61	$74,000,000	62
2016	$55,000,000	62	$74,000,000	65
2017	$55,000,000	63	$74,000,000	66
2018	$55,000,000	64	$74,000,000	68
2019	$55,000,000	64	$74,000,000	69
2020	$55,000,000	65	$60,000,000	70
Total:	$330,000,000		$430,000,000	

Fix Our Streets 2008 Program - 6 Year (FY 09-14)

Project/Program	Approved Funding	Percent of Total
Arterial Rehabilitation	$159,450,000	35.3%
Non-Arterial Rehabilitation	$254,313,000	56.3%
Bridge	$28,000,000	6.2%
Arterial Sidewalks	$2,000,000	0.4%
Non-Arterial Sidewalks	$1,000,000	0.2%
Local Match (Public / Private)	$3,000,000	0.7%
Trails	$1,000,000	0.2%
Railroad Crossings	$500,000	0.1%
Engineering / Testing / Inspection	$2,000,000	0.4%
TOTAL 2008 PROJECTS	$451,263,000	99.9%
Bond Issuance Costs	$365,000	0.1%
TOTAL 2008 PROGRAM	$451,628,000	100.0%

Fix the Streets 2008 Program - 6 Year (FY 09-14)

LANE MILES	ARTERIAL (LM)	NON-ARTERIAL (LM)
Rehab and Reconstruction	100	244
Routine and Preventive	138	328
Asphalt quantities	82%	
Concrete quantities	18%	
Project Sites		
Intersections	10	
Arterials Rehab & Recon	31	
Non-Arterials Rehab & Recon	79	
Bridges	17	
	Sales Tax	Bond Issue
Funding Sources	$ 166,628,000	$ 285,000,000

Project Funding & Schedule

FISCAL YEAR	$ AMOUNT
2009	$ 11,100,000
2010	$ 70,000,000
2011	$ 58,900,000
2012	$ 58,233,000
2013	$ 108,839,000
2014	$ 144,556,000
TOTAL:	$ 451,628,000

- **Project Schedule:**

www.cityoftulsa.org

OR

www.fixourstreetslive.com

Thank you...

Questions?

Pavement Management System:

CONSULTANT: Poe and Associates, Jim Hemphill, PE

CITY OF TULSA:

Project Manager - Chris Cox, PE, Transportation Infrastructure Manager

Section Manager - Matt Liechti, PE, Manager, Project Planning and Coordination

Dept. Director - Paul Zachary, PE