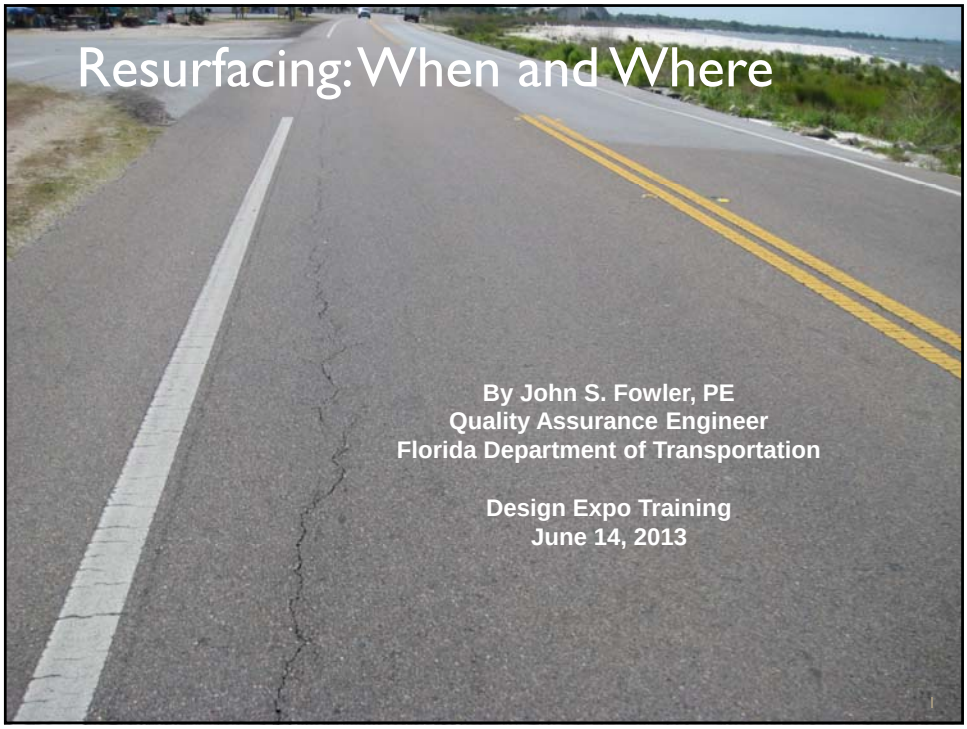


What is Pavement Management?

It is a management approach used by personnel to make cost-effective decisions about a road network.

AASHTO Pavement Management Guide (2001)

A **Pavement Management System** is a set of tools or methods that assist decision-makers in finding optimum strategies for providing, evaluating, and maintaining pavements in a serviceable condition over a period of time.

AASHTO Guide for Design of Pavement Structures (1993)

2

What is Pavement Management?: Plain Language Version

- When (This session)
- Which roadways (This session)
- What treatment (This session)
- How much money (Next session)
- System-wide planning (Next session)

To make these decisions, we must first know the "why"

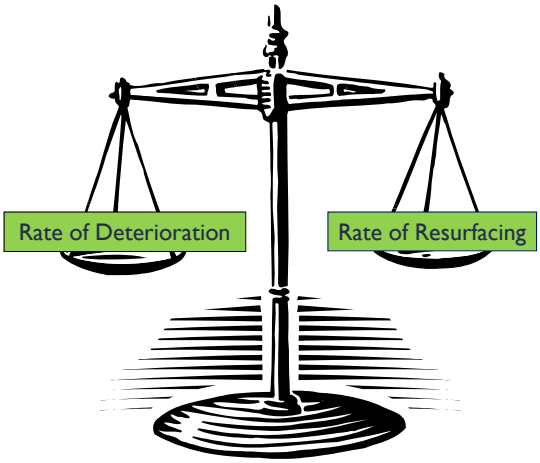
3

Why We Resurface Roads

- Long Range Objective – Preserve the State Highway System
- Short Range Objective – Through the Tentative Work Program, ensure that 80% of pavement on the SHS meets Department standards

4

Section 334.046 of Florida Statutes: "Ensuring that 80% of the pavement on the SHS meets Department Standards"



Achieved by balancing the rate of deterioration with the rate of resurfacing

5

Why We Resurface Roads

- Projects are chosen in accordance with the criteria of ***safety, preservation of the system*** (cracking or other structural deficiency), ***ride*** (roughness), or other as needed to maintain the System's integrity.

Safety: Wheelpath Rutting, Friction

Preservation: Cracking, Delamination, Potholes, Spalling, Raveling, Patching, Depressions

Ride: Rippling, Faulting, Utilities, Public Complaints

6

Project Eligibility Criteria

- Projects are programmed to correct deficient segments.
- The Pavement Condition Survey (PCS) rates pavement segments on a scale of 0 (worst)-to-10 (best).
- Flexible pavements are rated for rutting, cracking, and ride.
- Rigid pavements are rated on defect and ride.
- Pavement segments having any rating <= 6.4 are classified as deficient.
  - Exception: A segment with a posted speed limit of < 50 mph and whose ride rating is between 5.5 and 6.4 while its other ratings are greater than 6.4.

7

Project Eligibility Criteria

Work Program Instructions:
Construction phases for pavement segments rated 7 and projected to be deficient by the year of construction may be gamed for adoption in the third year of the new five-year work program.

However, due to the variability in pavement deterioration rates, *it is not recommended* that construction phases be gamed for non-deficient sections in the last two years of the work program.

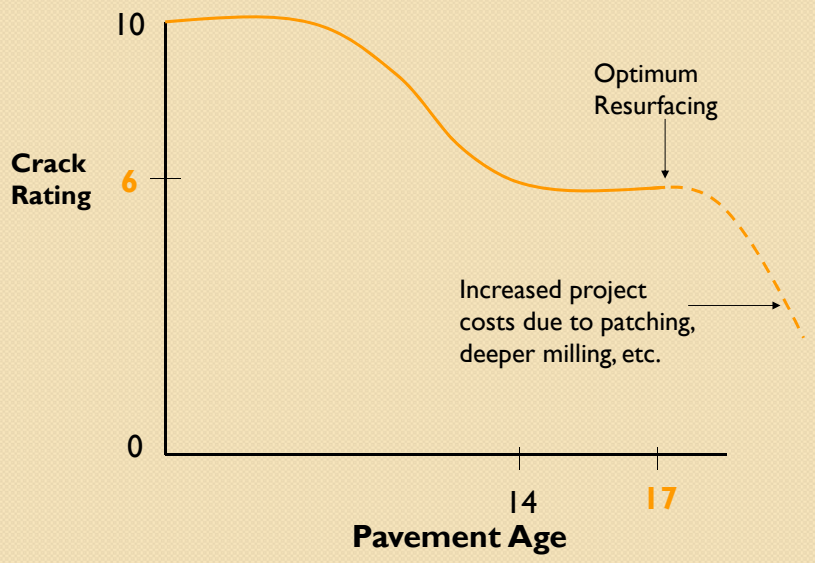
8

When to Resurface

- New resurfacing projects are programmed for the new 3rd year of the 5 year work program.
- Pavement condition deterioration typically accelerates with time.
- In order to resurface pavements at the ***optimum time,*** they need to have been identified, gamed in the work program, and designed prior to reaching that critical stage.

9

Graph Showing Typical Optimum Time for Resurfacing



10

Which Roadways?

- Complicated process involving many factors
  - Pavement Condition Ratings
  - Type of Distress
  - AADT
  - Truck Volume
  - Age
  - Surface Type
  - Location
  - Maintenance Issues

Ultimately, the decision to rehabilitate a roadway segment comes down to engineering judgment, based on the available information and experience.

11

Which Roadways?: Pavement Condition Ratings

- Good starting point:
  - Easily identify deficient roadways
  - Easily identify good performers
  - Allows initial screening:
    - Definitely needs to be resurfaced
    - Maybe needs to be resurfaced
    - Definitely does not need to be resurfaced
- Not nuanced enough for complete picture
- Sorting through the "maybes" requires other analysis

12

Which Roadways?: Pavement Condition Ratings

- Type of Distress:
  - Wheelpath Rutting:
    - Most critical concern, least prevalent distress
    - Safety issue at high speeds
  - Cracking:
    - Most common distress
    - Allows infiltration of water into pavement structure
    - Left untreated, can lead to reconstruction
  - Ride Quality:
    - Forms public opinion
    - Poor ride leads to user costs in the form of vehicle maintenance

13

Which Roadways?: Other Factors

- AADT:
  - Increases the costs and benefits of resurfacing
  - Delays associated with resurfacing (lane closures)
  - Higher construction cost with higher AADT
  - Benefits of resurfacing reach a larger number of people
- Truck Volume:
  - Trucks contribute about 95% of all damage done to roadways
  - Higher truck volume tends to increase the rate of pavement deterioration

14

Which Roadways?: Other Factors

- Age:
  - Average non-deficient life for FDOT pavements: ≈ 14 years
  - Standard deviation: ≈ 5 years
  - Average age at resurfacing: ≈ 17 years
  - Older pavements are more likely to experience a sudden, dramatic decrease in functionality than new pavements
- Surface Type:
  - Dense-graded: Typical age ≈ 18 years
  - Open-graded: Typical age ≈ 12 years
  - OGFC more susceptible to raveling
  - OGFC more likely to have rim marks from large trucks

15

Which Roadways?: Other Factors

- Location:
  - South Florida pavements generally deteriorate at a slower rate than those in North Florida
    - surface proximity of limerock
    - soil variability
    - construction methods
  - Presence of muck or other unsuitable embankment material
- Maintenance Issues:
  - Recurring roadway patches
  - Depressions at cross drains
  - Standing water during heavy rains

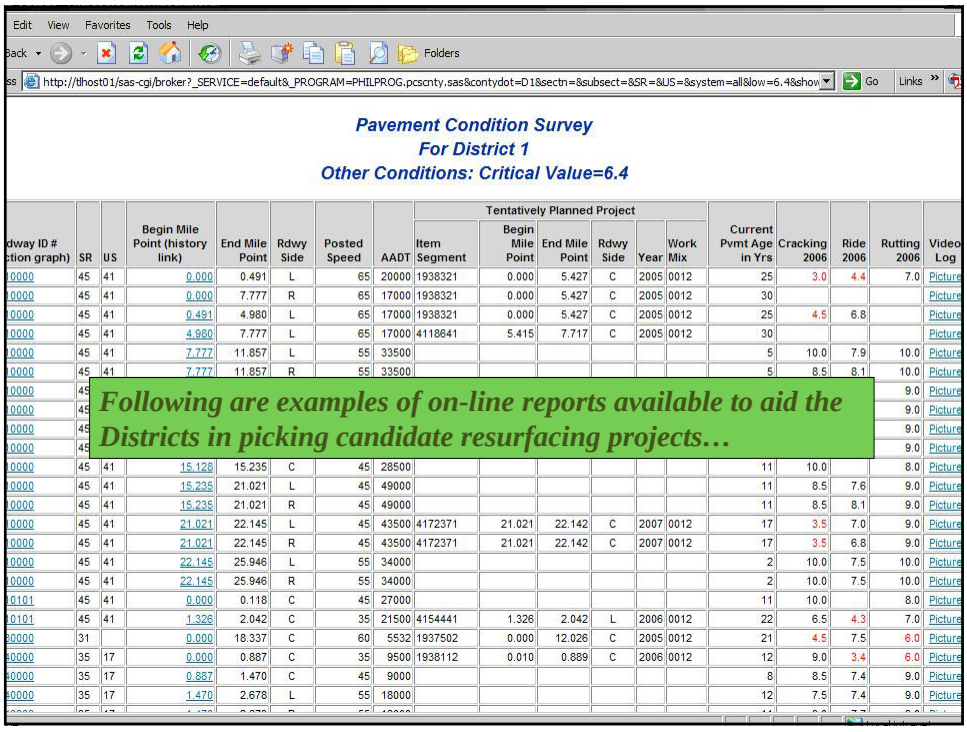
16

Which Roadways?: Finding Information

- Pavement Management Infonet
  - Numerous reports to provide necessary information
  - Includes data from PCS, RCI, Work Program, Construction, and Core Reports
  - Prepared reports issued in printer-friendly format
  - Dynamic reports allow specific, user-defined parameters

http://infonet.dot.state.fl.us/PavementManagement/

17



Edit View Favorites Tools Help

Back Folders

http://thost01/sas-cgi/broker?_SERVICE=default&_PROGRAM=PHILPROG.pcscnty.sas&contydot=D1&sectn=&subsect=&SR=&US=&system=all&low=6.4&show Go Links

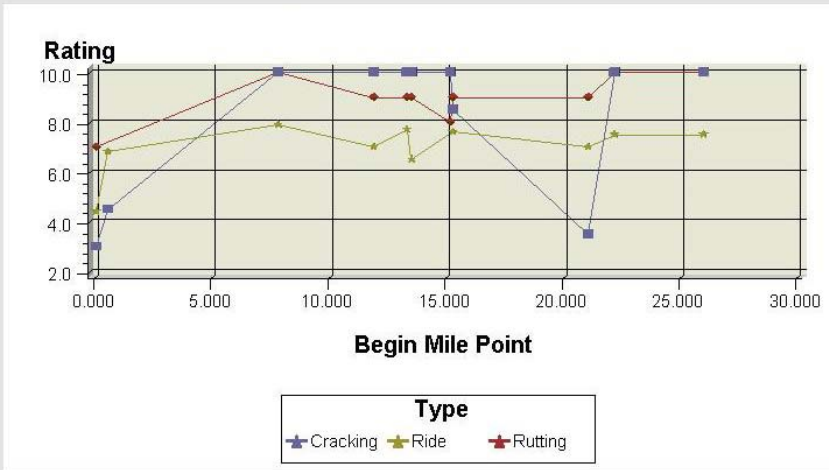
Pavement Condition Survey
For District 1
Other Conditions: Critical Value=6.4

dway ID # ction graph)	SR	US	Begin Mile Point (history link)	End Mile Point	Rdwy Side	Posted Speed	AADT	Tentatively Planned Project						Current Pvmt Age in Yrs	Cracking 2006	Ride 2006	Rutting 2006	Video Log
								Item Segment	Begin Mile Point	End Mile Point	Rdwy Side	Year	Work Mix					
0000	45	41	0.000	0.491	L	65	20000	1938321	0.000	5.427	C	2005	0012	25	3.0	4.4	7.0	Picture
0000	45	41	0.000	7.777	R	65	17000	1938321	0.000	5.427	C	2005	0012	30				Picture
0000	45	41	0.491	4.980	L	65	17000	1938321	0.000	5.427	C	2005	0012	25	4.5	6.8		Picture
0000	45	41	4.980	7.777	L	65	17000	4118641	5.415	7.717	C	2005	0012	30				Picture
0000	45	41	7.777	11.857	L	55	33500							5	10.0	7.9	10.0	Picture
0000	45	41	7.777	11.857	R	55	33500							5	8.5	8.1	10.0	Picture
0000	45																9.0	Picture
0000	45																9.0	Picture
0000	45																9.0	Picture
0000	45																9.0	Picture
0000	45	41	15.128	15.235	C	45	28500							11	10.0		8.0	Picture
0000	45	41	15.235	21.021	L	45	49000							11	8.5	7.6	9.0	Picture
0000	45	41	15.235	21.021	R	45	49000							11	8.5	8.1	9.0	Picture
0000	45	41	21.021	22.145	L	45	43500	4172371	21.021	22.142	C	2007	0012	17	3.5	7.0	9.0	Picture
0000	45	41	21.021	22.145	R	45	43500	4172371	21.021	22.142	C	2007	0012	17	3.5	6.8	9.0	Picture
0000	45	41	22.145	25.946	L	55	34000							2	10.0	7.5	10.0	Picture
0000	45	41	22.145	25.946	R	55	34000							2	10.0	7.5	10.0	Picture
0101	45	41	0.000	0.118	C	45	27000							11	10.0		8.0	Picture
0101	45	41	1.326	2.042	C	35	21500	4154441	1.326	2.042	L	2006	0012	22	6.5	4.3	7.0	Picture
0000	31		0.000	18.337	C	60	5532	1937502	0.000	12.026	C	2005	0012	21	4.5	7.5	6.0	Picture
0000	35	17	0.000	0.887	C	35	9500	1938112	0.010	0.889	C	2006	0012	12	9.0	3.4	6.0	Picture
0000	35	17	0.887	1.470	C	45	9000							8	8.5	7.4	9.0	Picture
0000	35	17	1.470	2.678	L	55	18000							12	7.5	7.4	9.0	Picture

Following are examples of on-line reports available to aid the Districts in picking candidate resurfacing projects…

Pavement Condition Survey

For Rdwyid = 01010000, Left Side, Year = 2006



Pavement Condition Survey

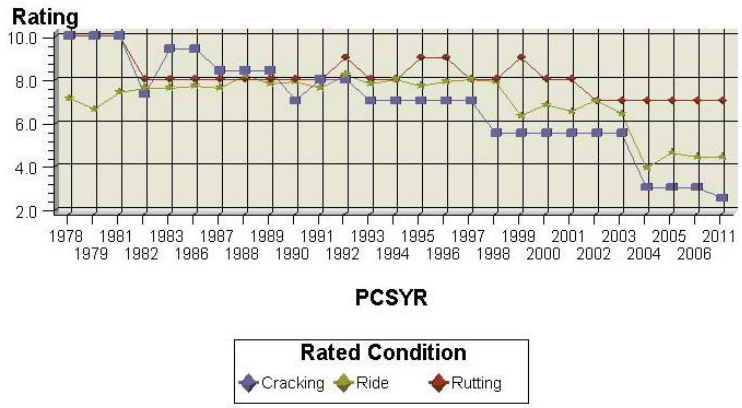
For Rdwyid = 01010000, Right Side, Year = 2006

19

Pavement Condition Survey

History for Roadway ID 01010000

Milepoints 0 to 0.491, Roadwayside = L

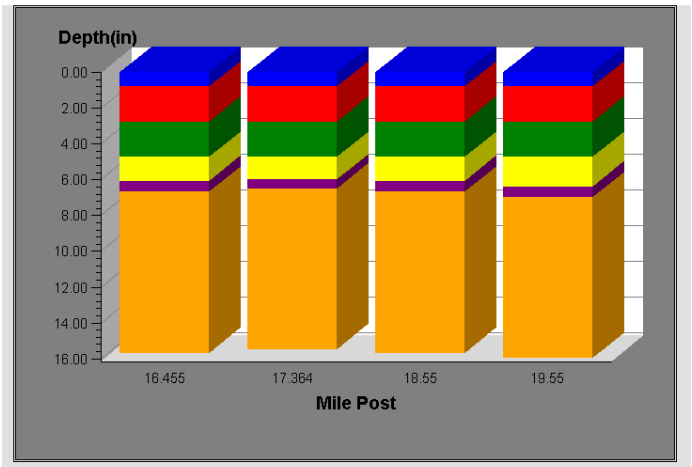


2011 forecast created using simple linear regression.

Pavement Condition Survey Detail Listing

20

Existing Pavement Structure
Project # 222596 -1 -31 -01 / Roadway ID # 55320000
Lane: L2



Layer Types

FC5 | SP125DM | SP125DM. | T2 | CRL | CONC

View this projects As-Built report View this projects core report

Download Graph Data to Excel

21

FLORIDA DEPARTMENT OF TRANSPORTATION

13:13 W

INTERSTATE SYSTEM PAVEMENT CONDITION FORECAST

PAVEMENT IMPROVEMENT PROJECTS IN FM WPA TENTATIVE PLAN -- 2008 - 2013, EXTRACTED ON 06/04/2008

SORT BY RDWYID MILEPOST R ASCENDING L DESCENDING

DISTRICT = 5 COUNTY = SUMTER

RDWYID	BMP	EMP	RW	SYS	TYP	SPD	DISTRESS	SURVEYED YEAR												FUTURE
RDWYI SR INTE ITMSI CONTI ITMSI	DISTRESS RATINGS ========	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995						FUTURE
		1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2013 (REG)					
18130 93	CRACKING	10.0			10.0	9.4	9.4	9.4	9.4	10.0	7.0	7.0	7.0	7.5						
	RIDE	8.7			8.8	8.9	8.3	8.0	8.6	8.6	8.2	8.4	8.7	7.9						
	RUTTING	10.0			8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	9.0						
	CRACKING	5.5*	4.5*	3.5*		10.0	10.0	10.0	9.0	9.0	9.0	9.0	9.0	8.0	7.5					
	RIDE	7.7	7.7	7.7		9.0	9.1	9.1	9.0	8.6	8.5	8.3	8.1	7.9	7.2					
	RUTTING	9.0	9.0	9.0		10.0	10.0	9.0	10.0	9.0	9.0	9.0	9.0	9.0	8.0					
2426331		0.000	14.480	C	1997		0012									8.3	9.1	9.1	9.2	8.2	8.6	8.6	8.5	8.4	8.3	7.7
RANGER CONSTRUCTION INDUST(2000)																8.0	9.0	10.0	9.0	9.0	9.0	9.0	8.0	9.0	8.0	

93 I 75	320.7	327.1	2	21.5	44532	RIDE	8.6									8.6	8.6	8.3	8.3	8.4	8.3	8.2	8.1	8.1	7.9	
FL TPK(21.7R)					FC2	RUTTING	9.0									7.0	8.0	8.0	8.0	8.0	8.0	7.0	7.0	8.0	8.0	
2426321	14.480	21.785	C	1997	0012	CRACKING	4.5*	3.5*								10.0	10.0	10.0	9.0	9.0	9.0	8.0	7.5	7.5	4.5*	3.5*
D.A.B. CONSTRUCTORS, INC (1999)					S	RIDE	7.7	7.9								9.1	9.1	9.0	9.1	8.9	8.4	8.3	8.2	8.0	7.8	7.1
4235661	15.329	21.730	C	2011	0012	RUTTING	8.0	7.0								10.0	9.0	9.0	9.0	9.0	8.0	8.0	8.0	8.0	8.0	7.0
18130000	21.740	28.996	R	4	1 70	CRACKING	10.0									10.0	9.4	9.4	9.4	9.4	10.0	7.0	6.5	7.5		
93 I 75	327.1	334.4	3	23.4	60500	RIDE	8.5									8.7	8.6	8.3	8.3	8.4	8.3	8.2	8.1	8.1		
FL TPK(21.8R)					FC2	RUTTING	10.0									8.0	8.0	8.0	8.0	8.0	8.0	7.0	7.0	8.0		
2426251	23.649	28.996	C	1994	0218	CRACKING			10.0	10.0	10.0	10.0	9.0	9.0	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	5.5*			
HUBBARD CONSTRUCTION COMPA(1997)					S	RIDE			8.0	8.6	9.0	8.9	8.9	8.9	8.8	7.8	7.7	7.3	7.3	6.7	6.4*					
4169391	21.730	28.996	C	2008	0012	RUTTING			10.0	10.0	10.0	9.0	9.0	10.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	8.0			
18130000	21.730	28.996	L	4	1 70	CRACKING	10.0									10.0	10.0	10.0	9.4	9.4	10.0	7.5	6.5	6.0*		
93 I 75	327.1	334.4	3	23.4	60500	RIDE	8.4									8.7	8.7	8.6	8.4	8.5	8.4	8.1	8.6	8.2		
					FC2	RUTTING	9.0									9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0		

22

Which Roadways?: Engineering Judgment

- Field Review:
  - Single most important factor
  - Don't let numbers cloud the way of good judgment
  - Video Log not adequate – often outdated
  - Walk alongside the roadway at various points, see what is happening
  - Many distresses are not visible from the cab of a vehicle at traveling speed, but can be easily spotted from the roadway shoulder
  - Experience leads to knowledge about how certain distresses are likely to worsen over time, and which ones are most critical

23

Example of typical top-down fatigue cracking

24

Beginning of crack spalling, typically after 3 years deficient

25

Severe spalling with extensive patching (i.e., waiting too long to fix).

26

Patching operations are expensive and inconvenient to the public.

27

What Treatment?

- Overlaps with Pavement Design
- Depends upon the distress
- Thin mill and overlay is typically used to treat surface distresses
- Deeper mill and overlay may be needed to address deeper cracking or unstable pavement layers that are causing rutting
- Reconstruction used in areas where the causes of pavement distress are deep within the pavement structure, including base and subgrade layers

28

What Treatment?

- Alternative Treatments:
  - Often applicable to a very specific set of conditions
  - FDOT studying a variety of different treatments:
    - Hot-in-place recycling
    - Bonded friction course
    - Microsurfacing
    - Full depth reclamation
    - Crack sealing
    - Crack relief layers
  - Can generally be constructed cheaper than conventional methods
  - Generally have a limited life-cycle, although some treatments may provide a longer life, but have other drawbacks

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Questions?

30