

# Decision Matrix for Pavement Preservation

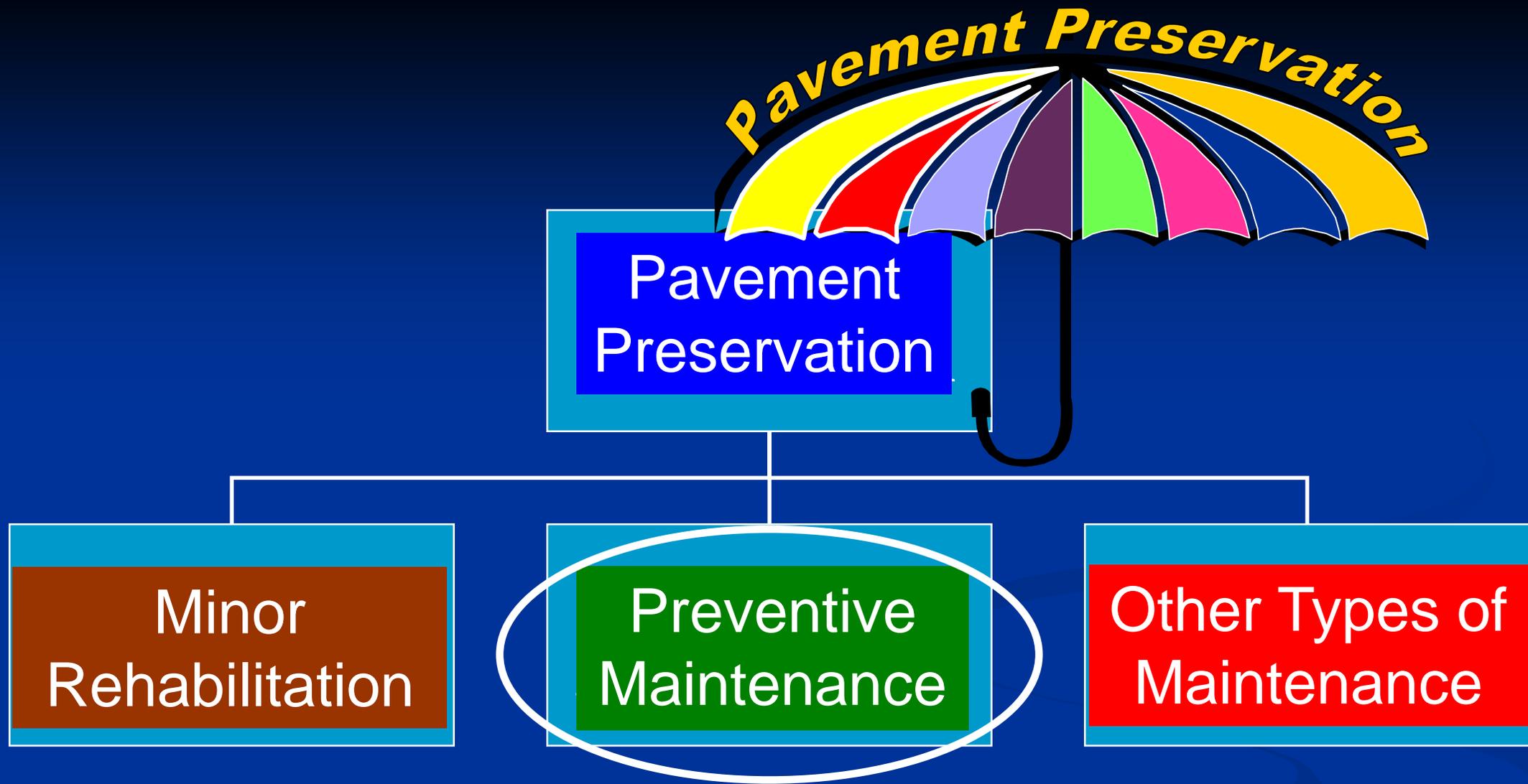


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# Outline

1. Concept of preventive maintenance
2. Effectiveness of treatments
3. Treatment selection



- It excludes major rehabilitation or reconstruction



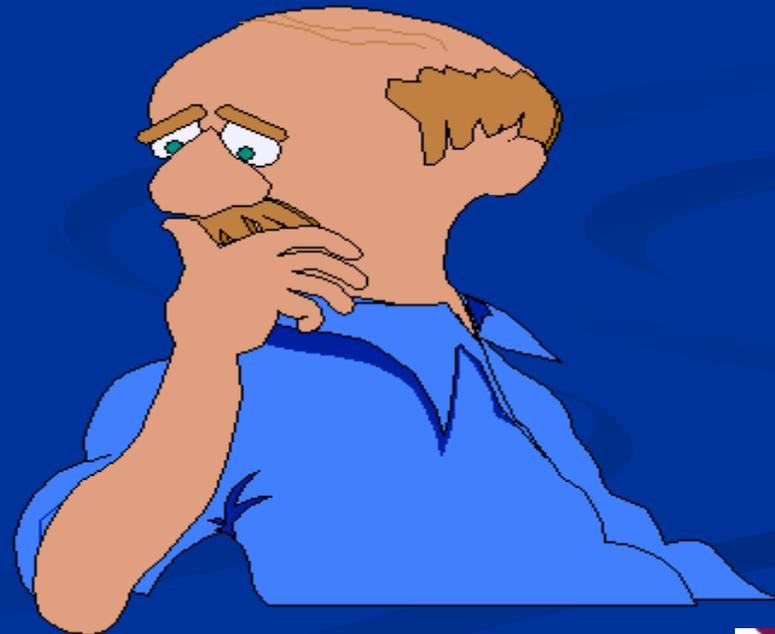
High Needs

Typically  
Low  
Budget

Preventive Maintenance Could  
be the Answer



When should a pavement preventive maintenance treatment be applied?



How much oil should a  
car burn before  
changing oil?



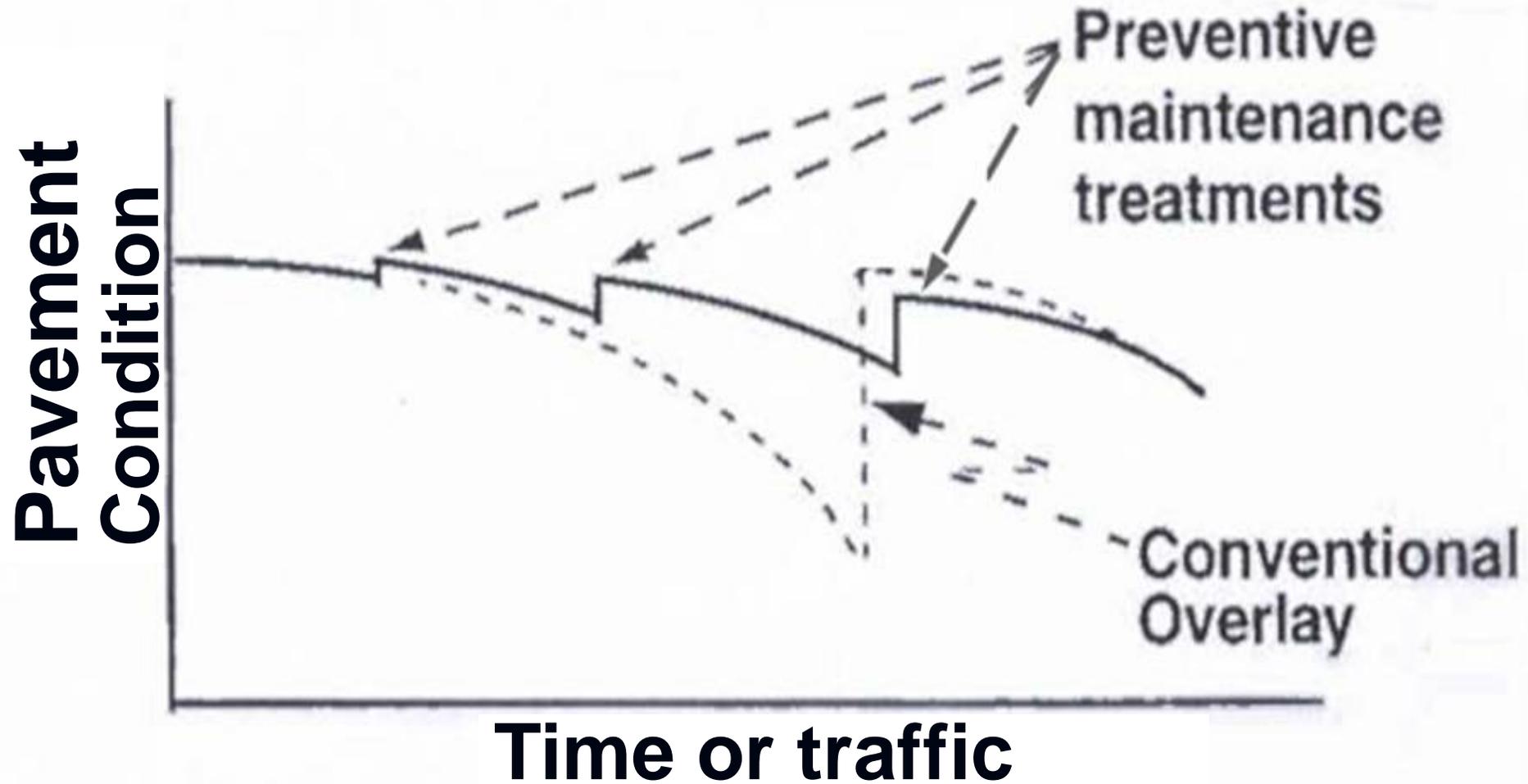
# What is Preventive Maintenance?

Cost effective treatments that:

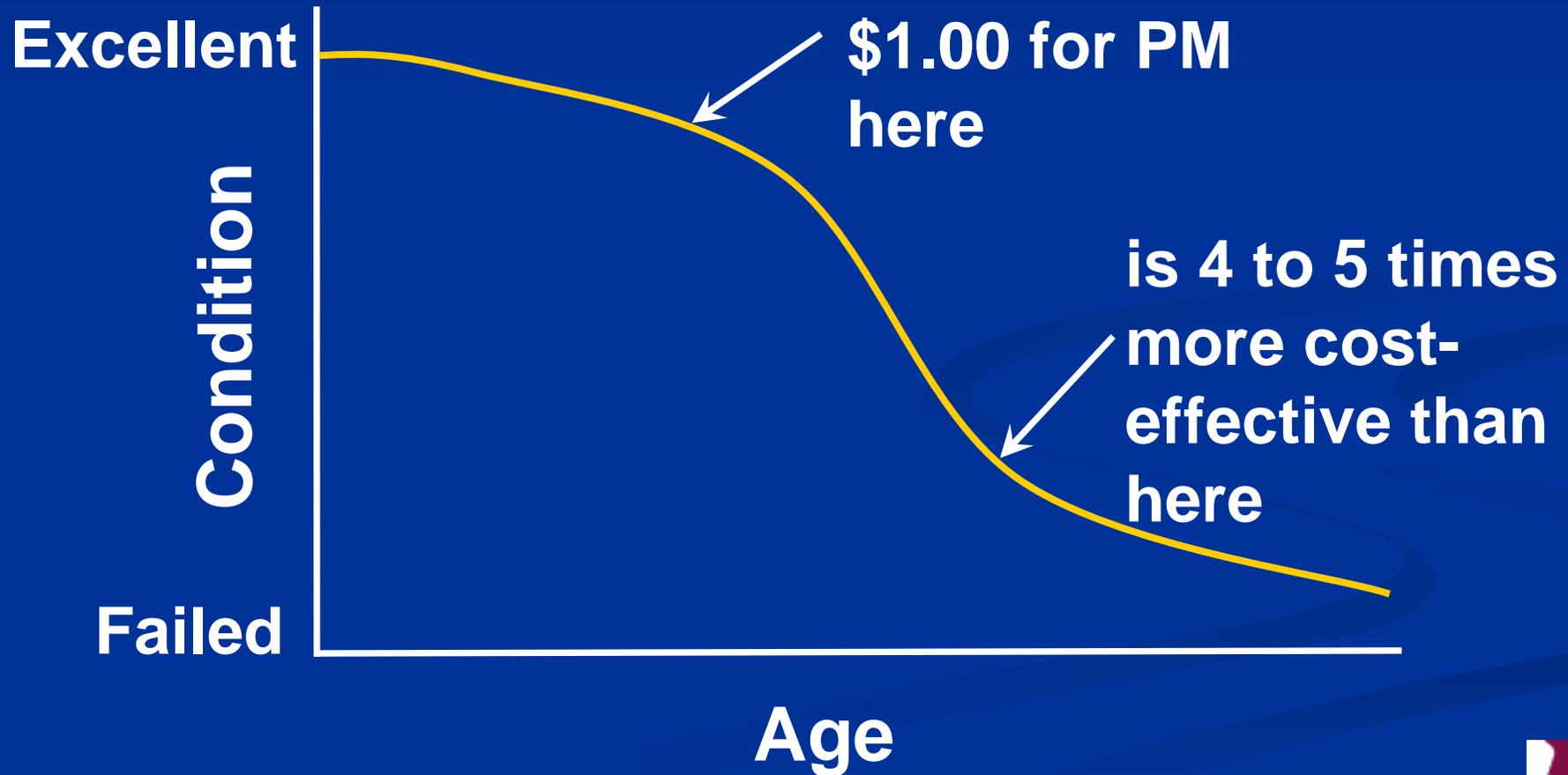
- preserve the pavement system
- retard future deterioration
- maintain or improve the functional condition (without increasing structural capacity)



# Program Strategy



# Effective Preventive Maintenance



# Candidate for PM?



# Candidate for PM?

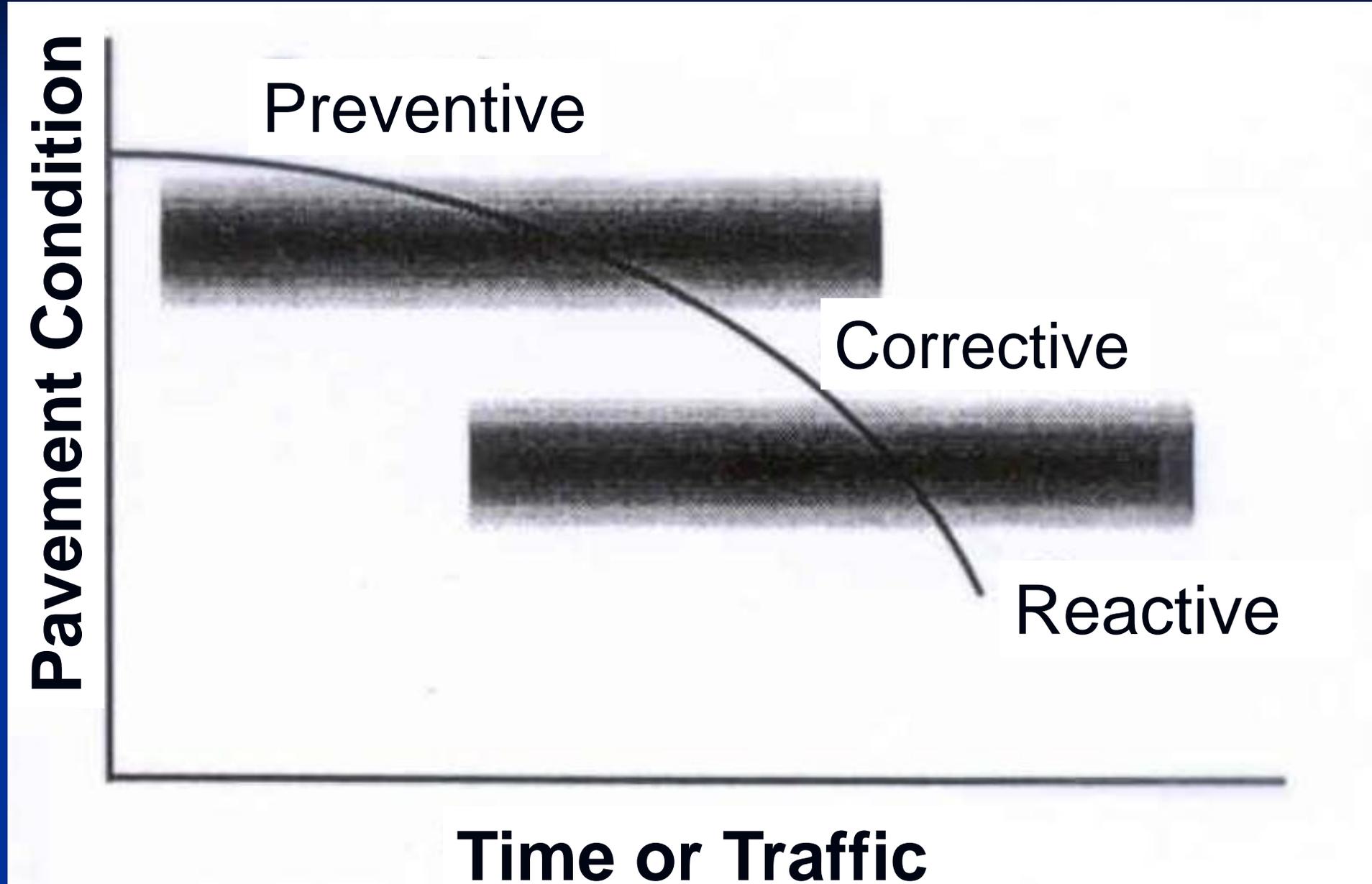


# Candidate for PM?

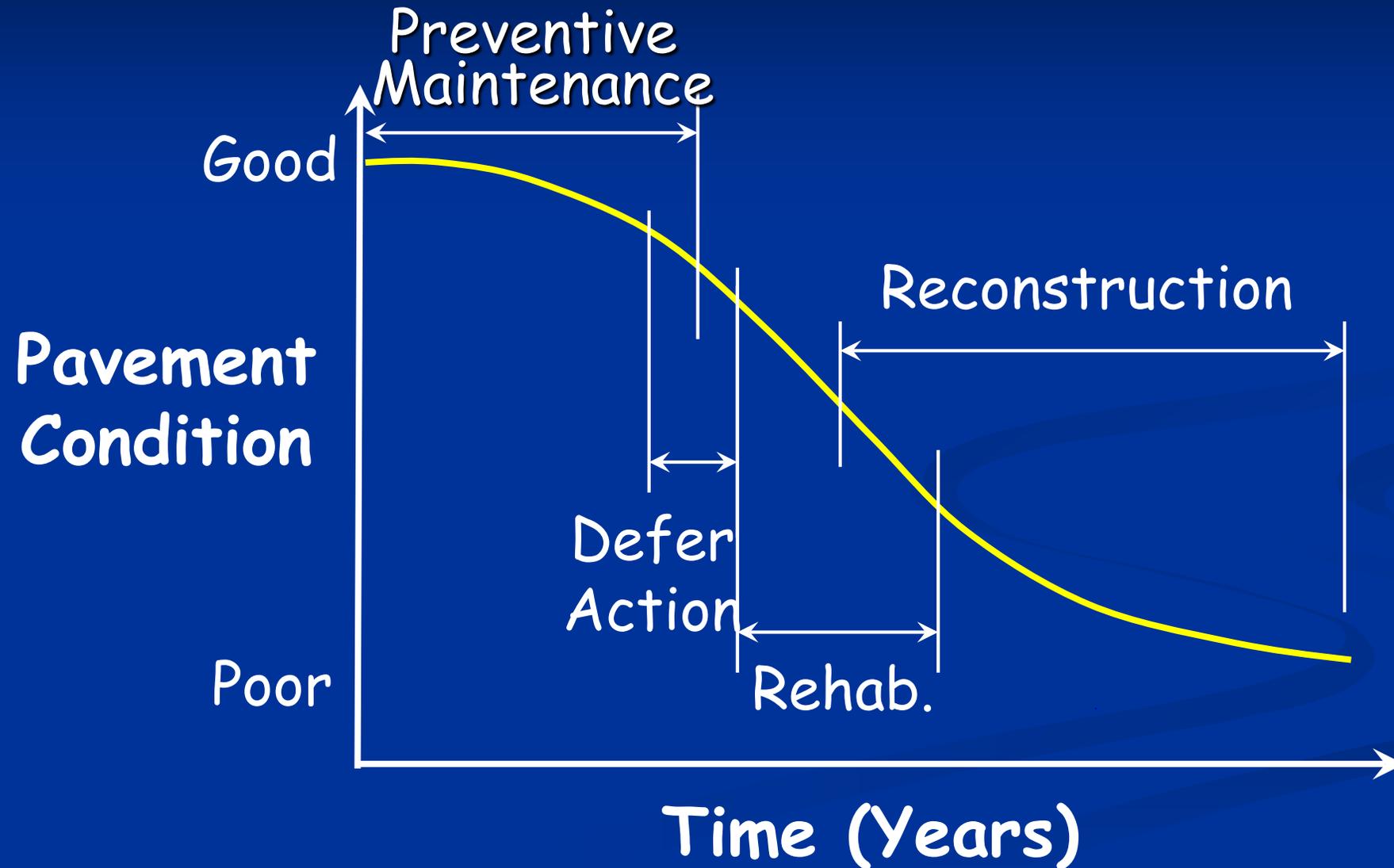


- Minor surface defect
- No structural damage

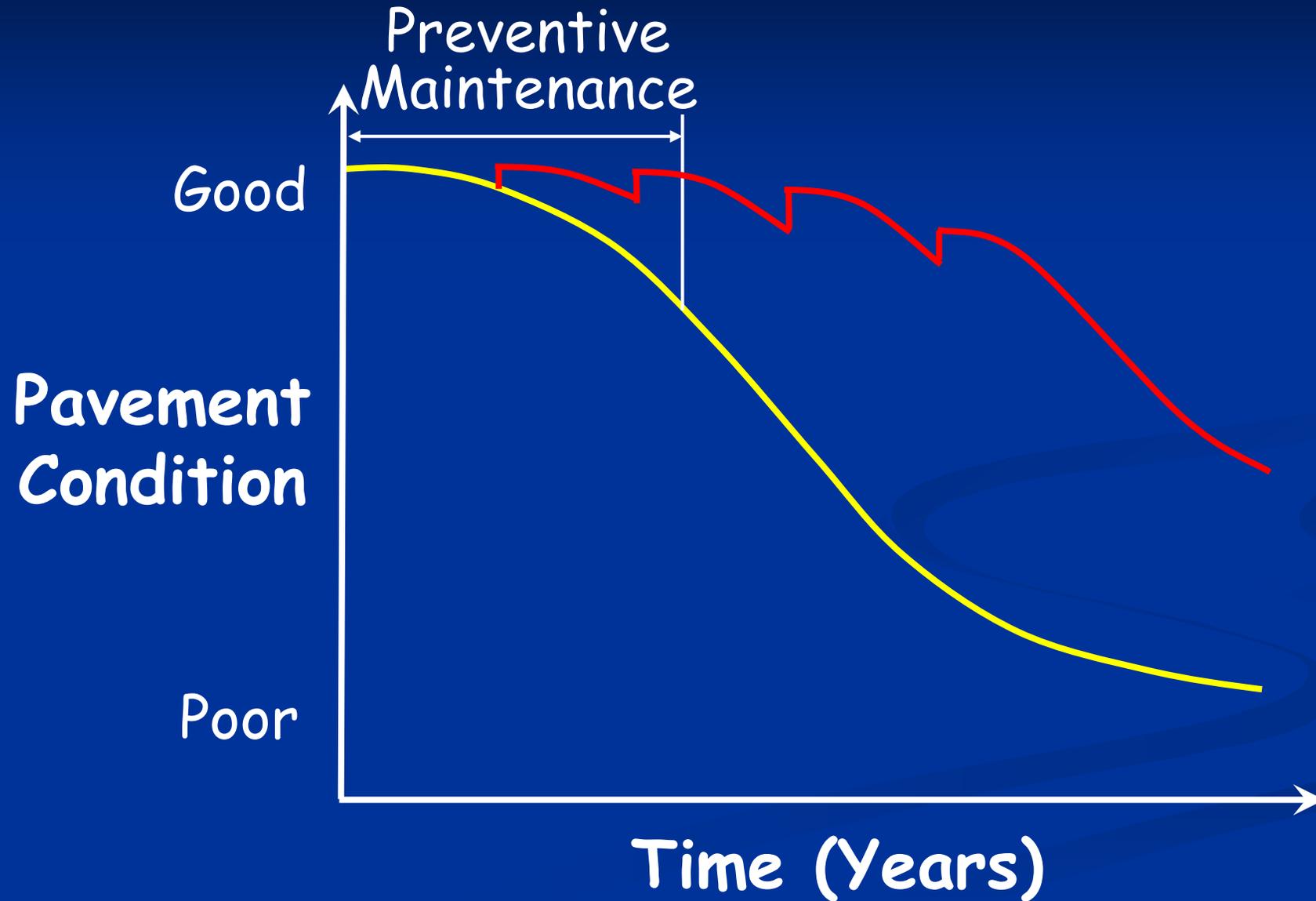
# Maintenance Types



# When Should PM be Applied?



# What will PM Do?

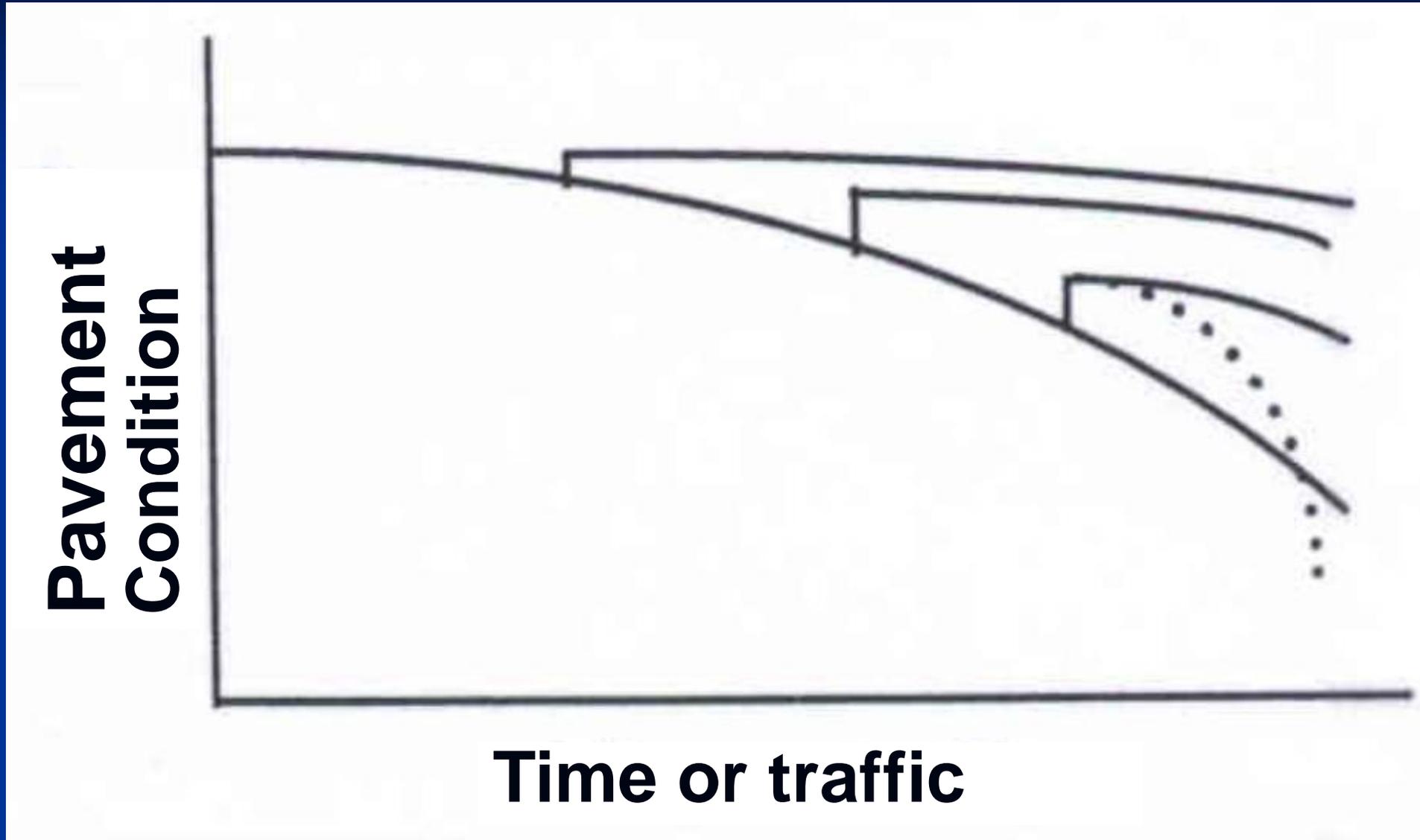


# When is it Too Late for PM?

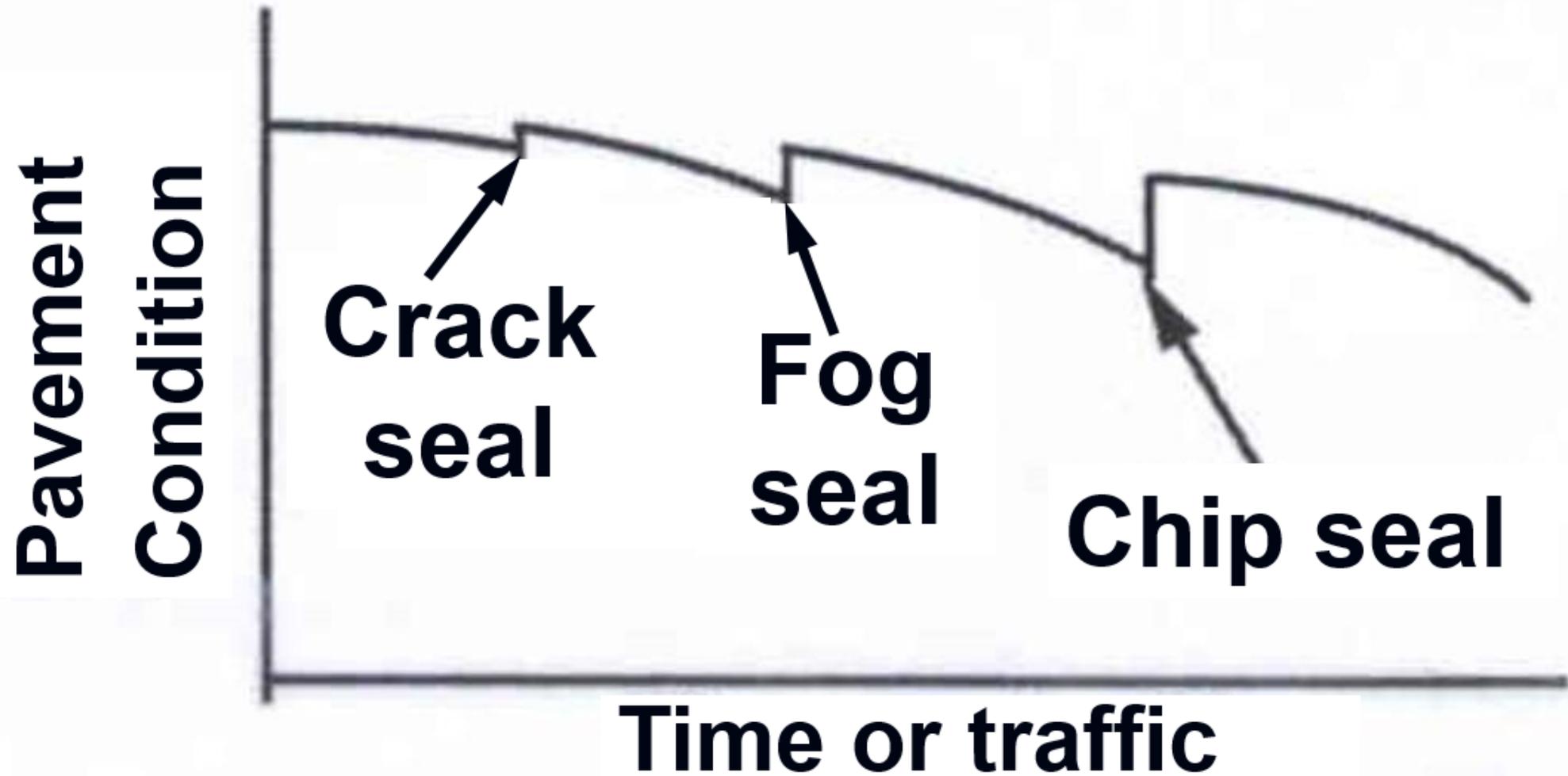
- Potholes
- Severely deteriorated cracks
- Unstable rutting
- Shoving
- Weak structure



# How Long Would it Last?



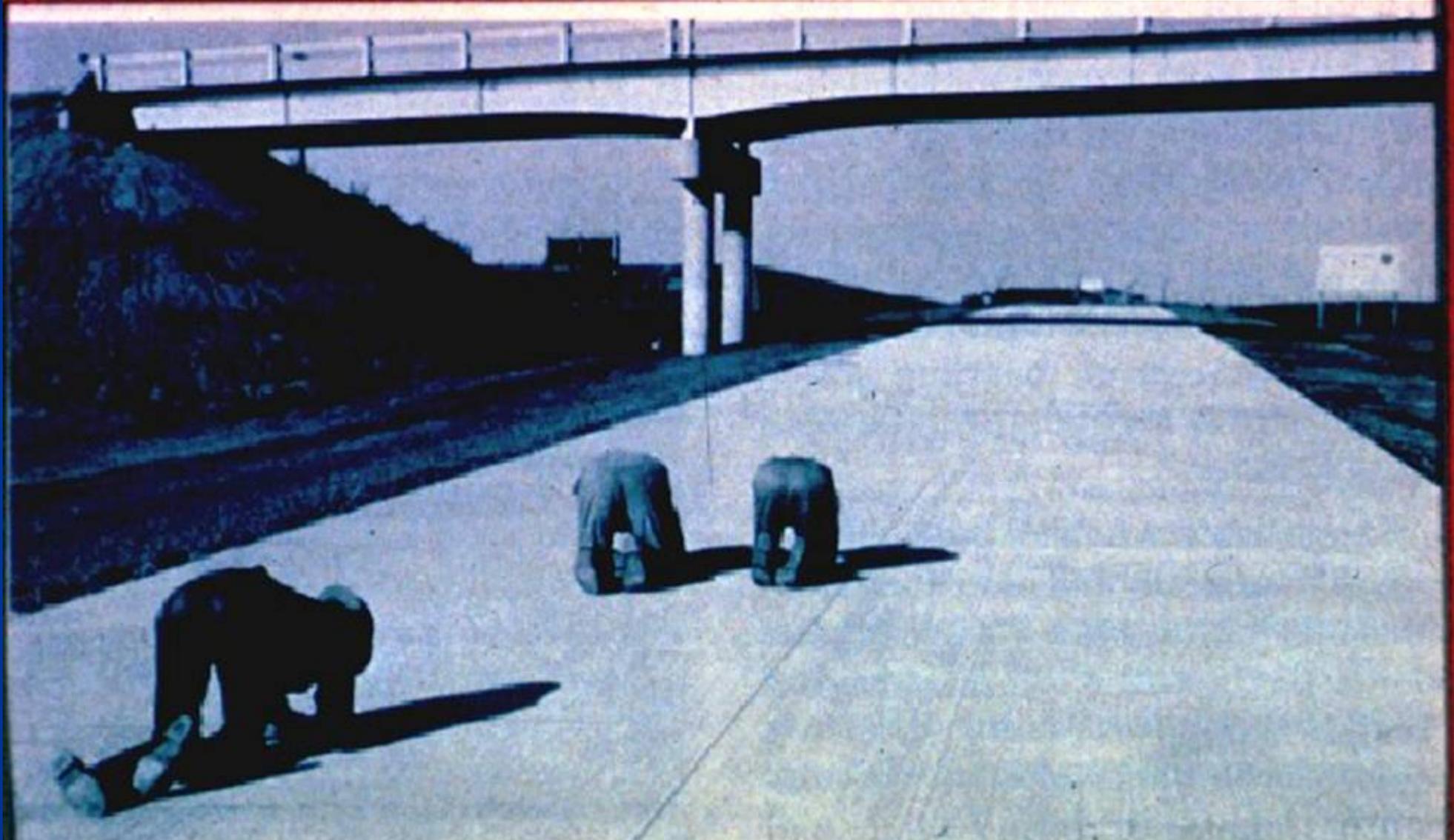
# Periodic Applications



# How to Determine Condition

- Conduct surveys
  - Type, extent, and severity of distress
- Additional information / historical records
- Engineering judgment

# Knees and Elbows Survey



# Preservation Types

- Crack treatments
- Surface treatments
  - Fog seal, chip seal, scrub seal, slurry seal, microsurfacing, ultrathin wearing course
- Thin/ultrathin HMA overlays
- Recycling treatments

When is  
crack  
sealing  
effective?



# Effectiveness of Crack Sealing

Distress Type	Extent of Problem			
	Minor	↔	Major	
Fatigue Cracking	Effective		No Impact	Effective
Linear / Block Cracking	Effective	Marginal	No Impact	Marginal
“Stable” Rutting	No Impact	No Impact	No Impact	No Impact
Raveling	No Impact	No Impact	No Impact	No Impact
Flushing/Bleeding	No Impact	No Impact	No Impact	No Impact
Roughness	No Impact	No Impact	No Impact	No Impact
Friction Loss	No Impact	No Impact	No Impact	No Impact
Moisture Damage	Effective	No Impact	No Impact	No Impact
Shoving	No Impact	No Impact	No Impact	No Impact



When is fog seal  
effective?

# Effectiveness of Fog Seal

Distress Type	Extent of Problem			
	Minor	↔	Major	
Fatigue Cracking	Yellow		Red	Effective
Linear / Block Cracking	Yellow		Red	Marginal
“Stable” Rutting	Red		Red	No Impact
Raveling	Yellow		Red	
Flushing/Bleeding	Red		Red	
Roughness	Red		Red	
Friction Loss	Red		Red	
Moisture Damage	Green		Red	
Shoving	Red		Red	



When is chip  
seal effective?

# Effectiveness of Chip Seal

Distress Type	Extent of Problem			
	Minor	↔	Major	
Fatigue Cracking	Effective		No Impact	Effective
Linear / Block Cracking	Effective	Marginal	No Impact	Marginal
“Stable” Rutting	No Impact	No Impact	No Impact	No Impact
Raveling	Effective	Effective	Marginal	Marginal
Flushing/Bleeding	Effective	No Impact	No Impact	No Impact
Roughness	No Impact	No Impact	No Impact	No Impact
Friction Loss	Effective	Effective	Effective	Effective
Moisture Damage	Effective	No Impact	No Impact	No Impact
Shoving	No Impact	No Impact	No Impact	No Impact

When is  
scrub seal  
effective?



# Effectiveness of Scrub Seal

Distress Type	Extent of Problem			
	Minor	←————→	Major	
Fatigue Cracking	Effective			Effective
Linear / Block Cracking	Effective	Marginal		Marginal
“Stable” Rutting	No Impact	No Impact	No Impact	No Impact
Raveling	Effective	Marginal		
Flushing/Bleeding	No Impact	No Impact	No Impact	
Roughness	No Impact	No Impact	No Impact	
Friction Loss	Marginal	No Impact	No Impact	
Moisture Damage	Effective	No Impact	No Impact	
Shoving	No Impact	No Impact	No Impact	



When is  
slurry seal  
effective?

# Effectiveness of Slurry Seal

Distress Type	Extent of Problem			
	Minor	→	Major	
Fatigue Cracking	Effective		No Impact	Effective
Linear / Block Cracking	Effective	Marginal	No Impact	Marginal
“Stable” Rutting	No Impact	No Impact	No Impact	No Impact
Raveling	Effective	Marginal	No Impact	Marginal
Flushing/Bleeding	No Impact	No Impact	No Impact	No Impact
Roughness	No Impact	No Impact	No Impact	No Impact
Friction Loss	Effective	Effective	Effective	Effective
Moisture Damage	Effective	No Impact	No Impact	No Impact
Shoving	No Impact	No Impact	No Impact	No Impact



When is  
microsurfacing  
effective?

# Effectiveness of Microsurfacing

Distress Type	Extent of Problem			
	Minor	↔	Major	
Fatigue Cracking	Green		Red	Effective
Linear / Block Cracking	Green	Yellow	Red	Marginal
“Stable” Rutting	Green	Yellow	Red	No Impact
Raveling	Green	Green	Yellow	
Flushing/Bleeding	Green	Yellow	Red	
Roughness	Green	Yellow	Red	
Friction Loss	Green	Green	Green	
Moisture Damage	Green	Red	Red	
Shoving	Red	Red	Red	



When is Ultrathin  
Bonded Wearing  
Course effective?

# Effectiveness of Ultrathin Bonded Wearing Course (Novachip)

Distress Type	Extent of Problem			
	Minor	↔	Major	
Fatigue Cracking	Yellow		Red	Effective
Linear / Block Cracking	Yellow		Red	Marginal
“Stable” Rutting	Red		Red	No Impact
Raveling	Green	Yellow	Red	
Flushing/Bleeding	Green	Red	Red	
Roughness	Green	Red	Red	
Friction Loss	Green	Green	Green	
Moisture Damage	Yellow	Red	Red	
Shoving	Red	Red	Red	





When is in-place recycling effective?

# Effectiveness of Cold & Hot In-Place Recycling

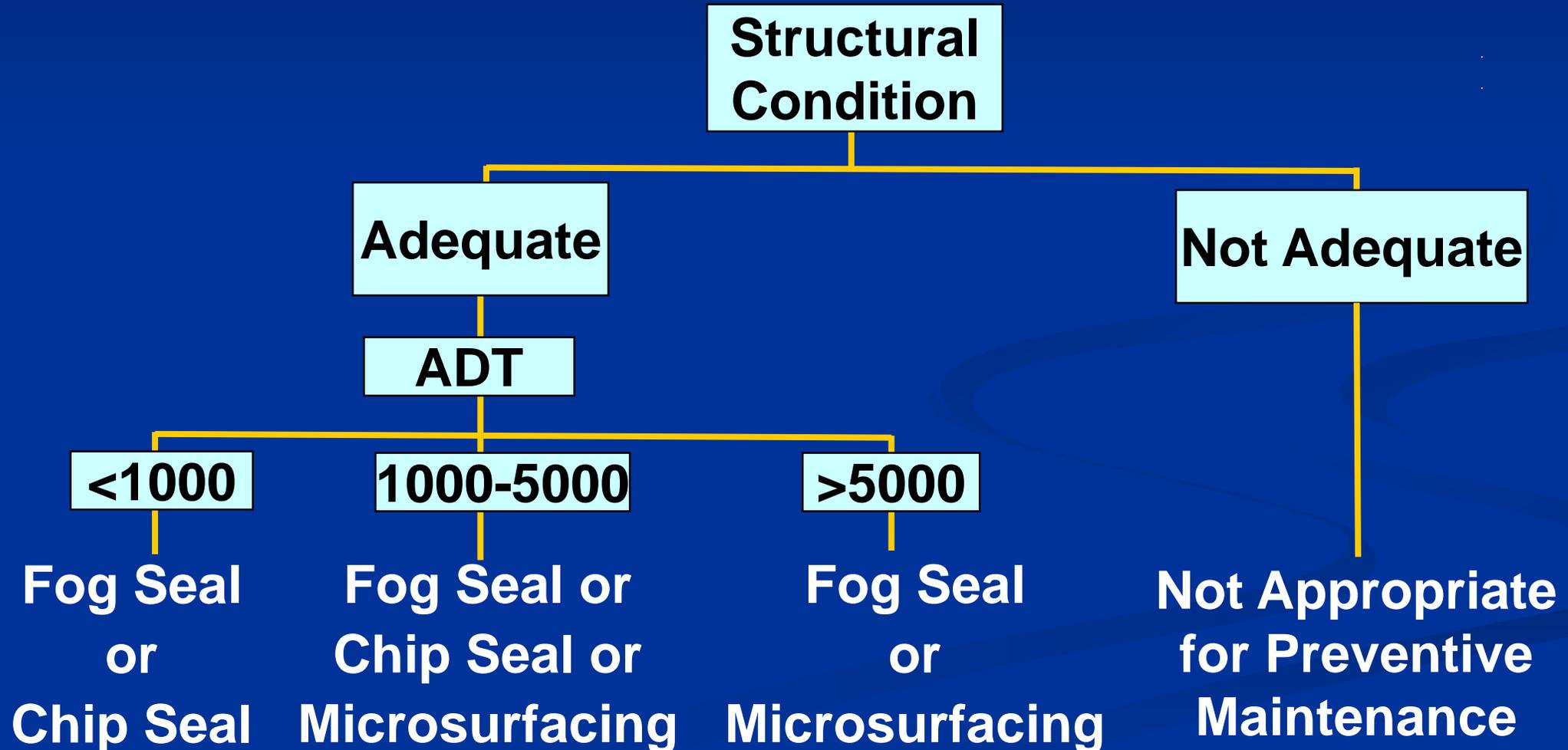
Distress Type	Extent of Problem			
	Minor	←→	Major	
Fatigue Cracking	Effective	Marginal	No Impact	Effective
Linear / Block Cracking	Effective	Marginal	No Impact	Marginal
“Stable” Rutting	Effective	Effective	Marginal	No Impact
Raveling	Effective	Effective	No Impact	Effective
Flushing/Bleeding	Effective	Effective	Marginal	Effective
Roughness	Effective	Effective	Effective	Effective
Friction Loss	Effective	Effective	Effective	Effective
Moisture Damage	Effective	No Impact	No Impact	No Impact
Shoving	No Impact	No Impact	No Impact	No Impact

# Effectiveness of Milling with Thin HMA Overlay

Distress Type	Extent of Problem			
	Minor	↔	Major	
Fatigue Cracking	Red	Red	Red	Effective
Linear / Block Cracking	Red	Red	Red	Marginal
“Stable” Rutting	Green	Yellow	Red	No Impact
Raveling	Green	Yellow	Red	
Flushing/Bleeding	Green	Yellow	Red	
Roughness	Green	Yellow	Red	
Friction Loss	Green	Green	Green	
Moisture Damage	Green	Red	Red	
Shoving	Red	Red	Red	

# Example of Decision Tree

## Raveling and Weathering



# Factors for Treatment Selection

1. Cost
2. Performance
3. Traffic
4. Other factors
5. Optimization



# AGC Pavement Preservation Committee

Pavement Condition Range	Qualified Treatments	Cost Range
100 - 90		
90 - 70		
70 - 50		
50 - 30		
30 - 0		



# Conclusions

1. Applying the treatment on good roads is more cost-effective
2. Treatment effectiveness varies depending on pavement condition
3. Treatment selection should be based on cost, traffic and performance

Thanks for your attention!



Any Questions?

