
404-LVT (Low Volume Traffic)
A new 404 specification for your lightly traveled roads
Asphalt ... Defining Value !
Safe, Smooth and Sustainable

404-LVT Asphalt Concrete

The 404-LVT specification has been designed to provide a mix rich in asphalt binder, fine textured, and non-restrictive in aggregate shape; this facilitates attaining mix density, flexibility, and resilience and allows placement in a thin layer for economy.

These are necessary properties for ensuring longevity and successful mix performance on low volume roadways where oxidation and cracking are the primary pavement distresses and high deformation resistance is not a concern.

Since 404-LVT is a recipe mix it should only be used for routes having ADT<2,500.

404 History

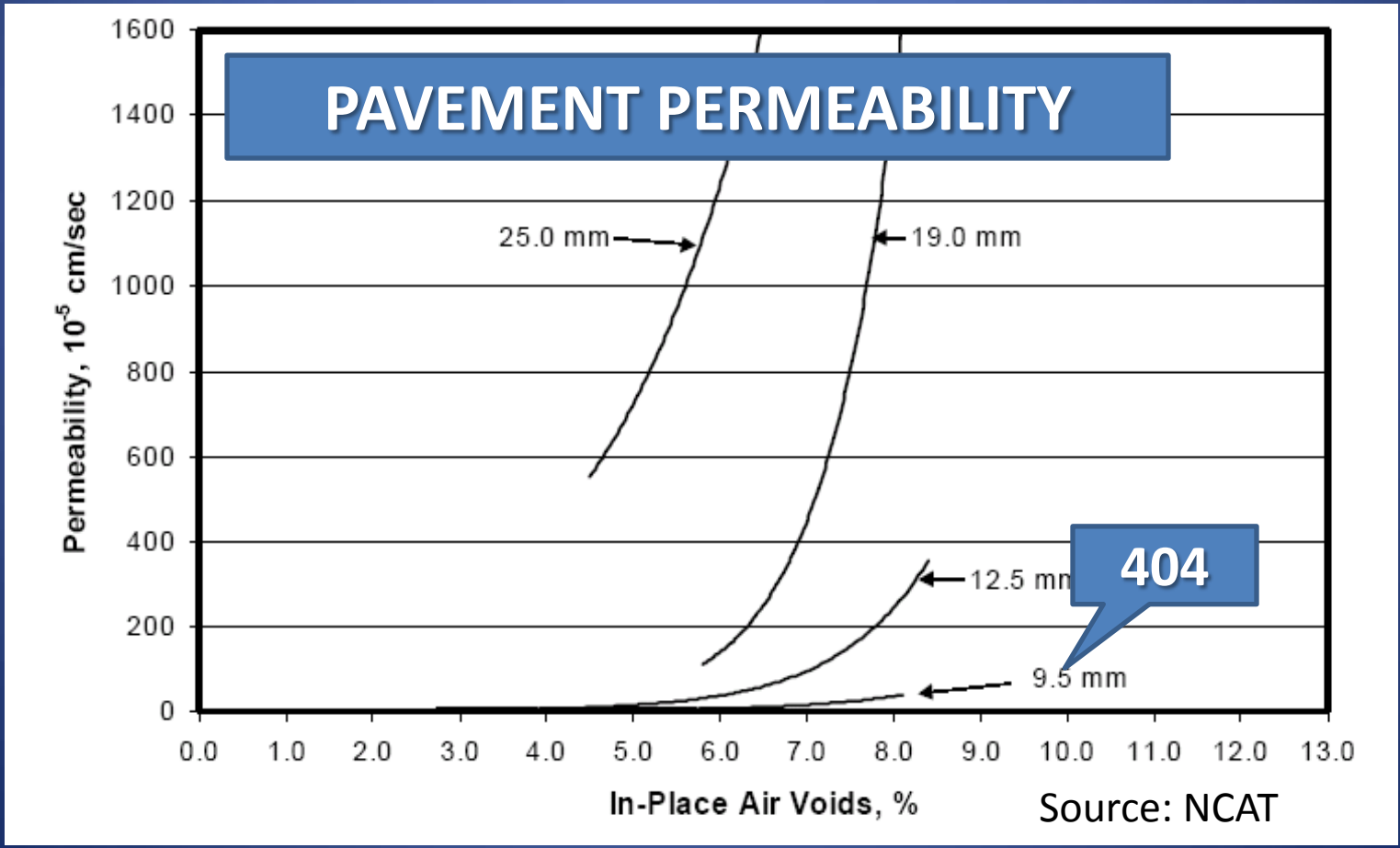
- A recipe mix provided by ODOT
- A staple of ODOT specs from 1965 until 2002
- A favorite for lower volume roads, still specified by some local agencies
- Loved for its fine texture and high binder content
- Abandoned by ODOT for contractor designed mixes and stouter mixes more capable of resisting deformation

Renewed Interest in Thin Overlays

- Federal/state emphasis on preventive maintenance
- Decreasing revenue, increasing cost
- Desire for a longer lasting, more cost effective alternative to surface treatments with better functional characteristics and serviceability

Advantages of Finer mixes

- Finer mixes are less permeable at given densities – greater durability



Advantages of Finer mixes

- Finer mixes are less permeable at given densities – greater durability
- Finer mixes are easier to compact to higher densities and produce tighter joints
- In general, finer-graded mixes provided the greatest longevity – Ohio University research

Advantages of Finer mixes

Fayette County – Creek Road - 2010

404-LVT Material Characteristics

- A finer texture and grading than 448, Type 1
  - 72% passing the #4 sieve VS. 45-57 for 448, T-1
- Narrower gradation limits for a more consistent texture
- Higher asphalt content VS. 448, T-1
  - 404-LVT asphalt content is 6.2 to 6.4% depending on aggregate type
  - 448 asphalt content typically 5.8%
- binder content can be adjusted as needed, contractor gets paid for what is directed or used

Where to Use 404-LVT

- Low volume traffic < 2500 ADT
- Where a 1 in. thick surface course can be placed

  (Note: place a variable-depth intermediate course where profile or crown are excessive)
- Pavements having no unrepaired structural damage
- No appreciable rutting (< ¼ inch)
- Sufficient pavement structural capacity to last the life of the 404-LVT overlay.

404-LVT Performance

- Fayette County Engineer - cites improved texture
- City of Cincinnati-likes-costs more per cy

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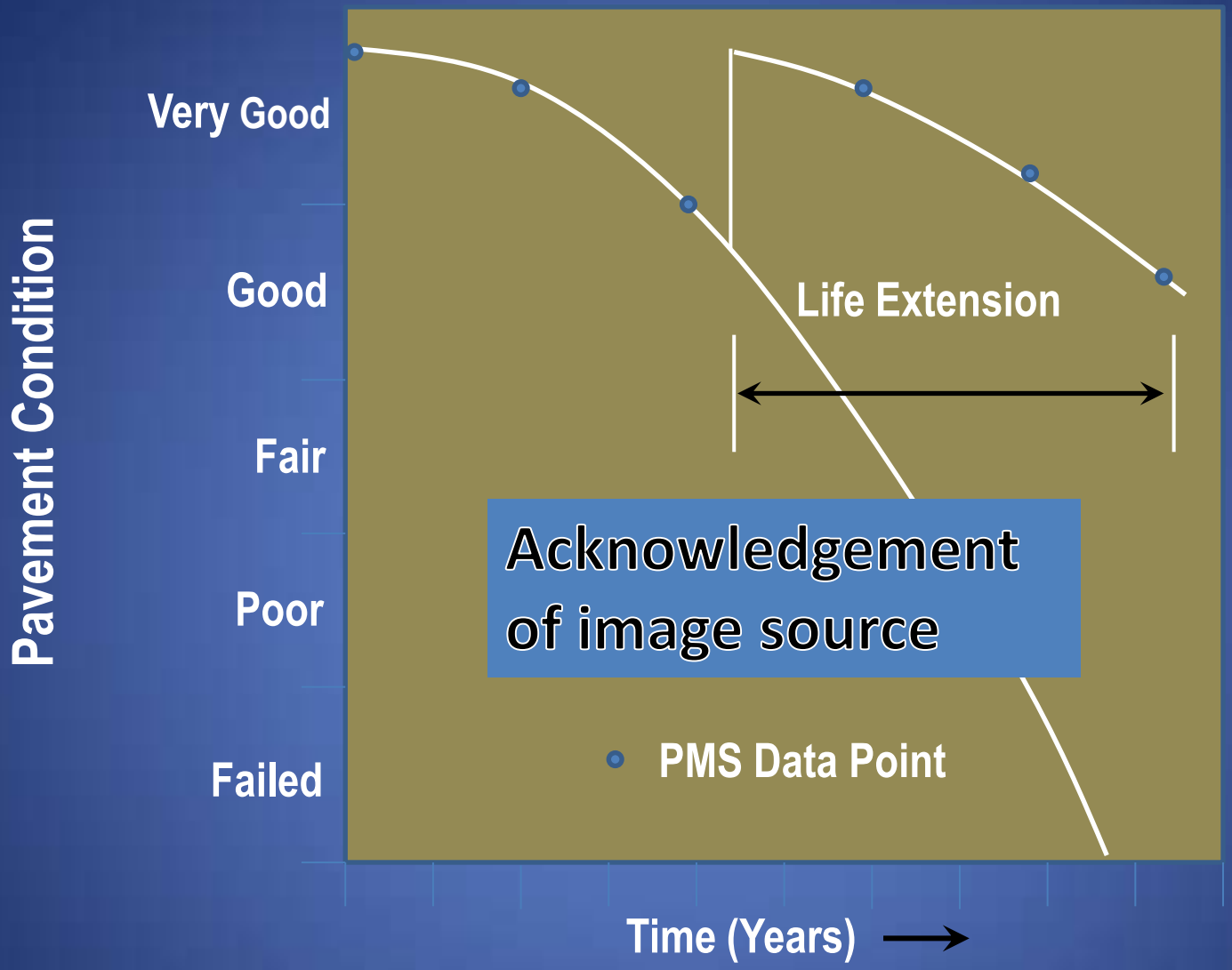
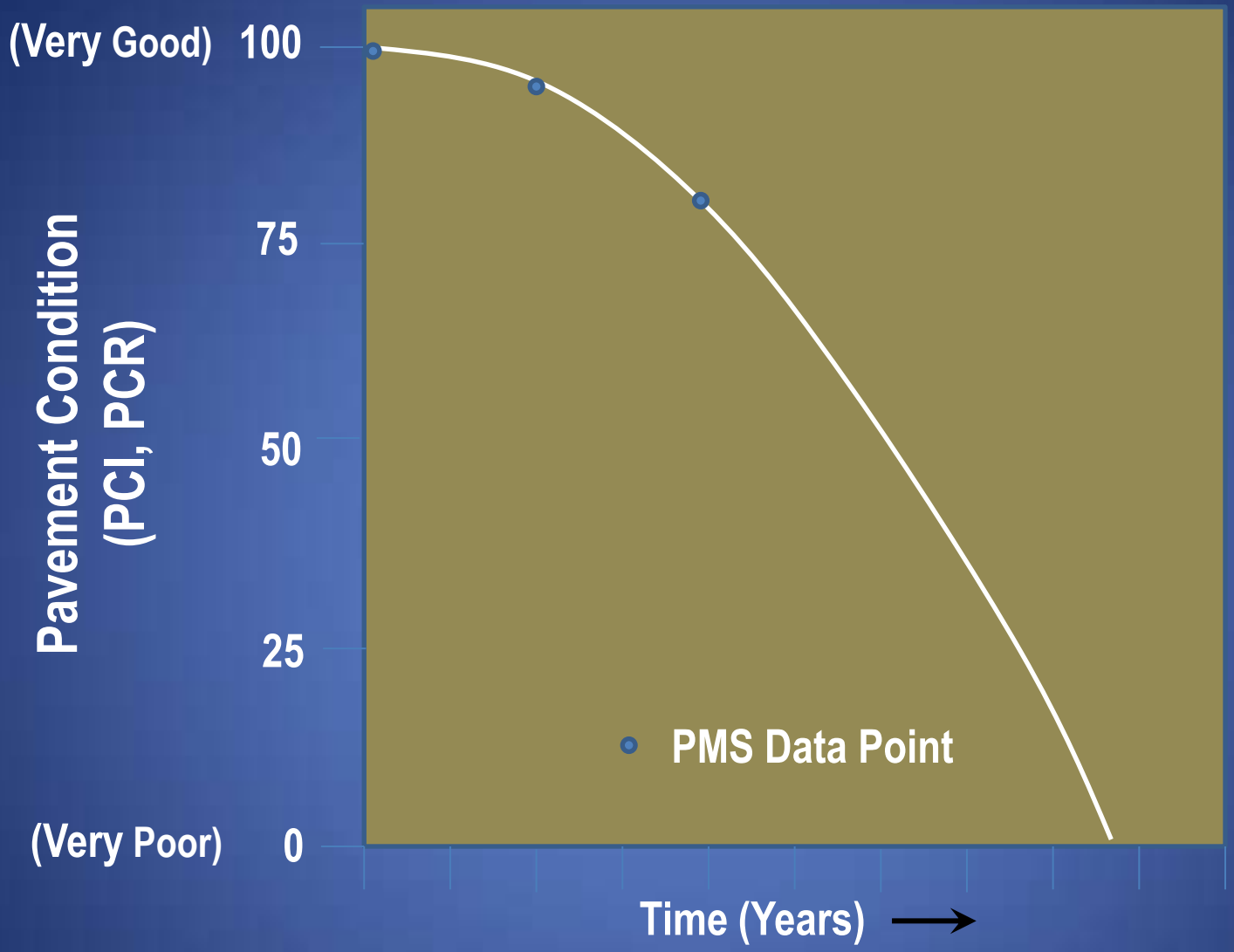
- Other agencies using 404-LVT
  - Muskingum County Engineer – 2010
  - Licking County Engineer – 2012
  - City of Bexley – 2012
  - City of Hilliard - 2012

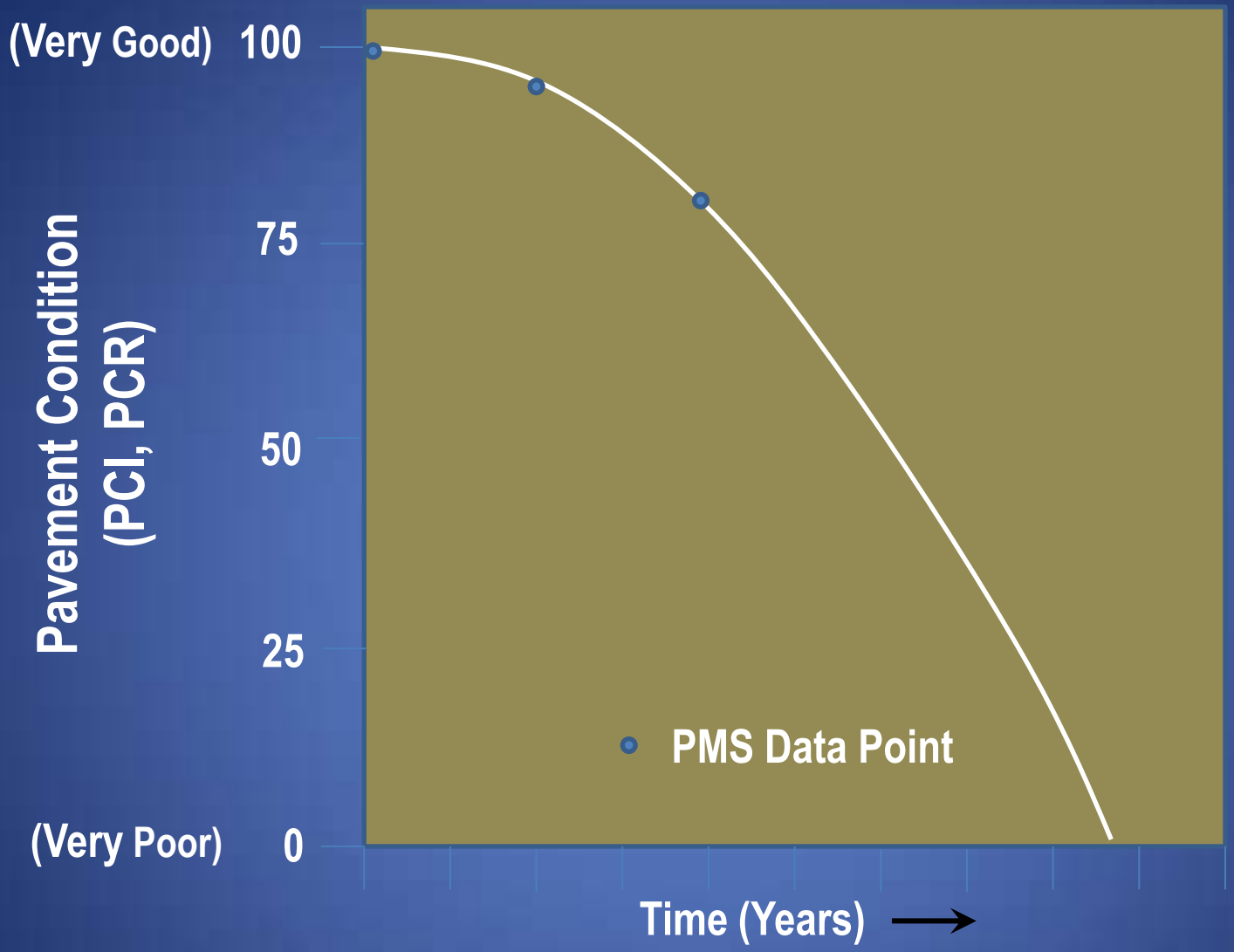
PM Treatment Effect on Pavement Condition and Pavement Serviceability



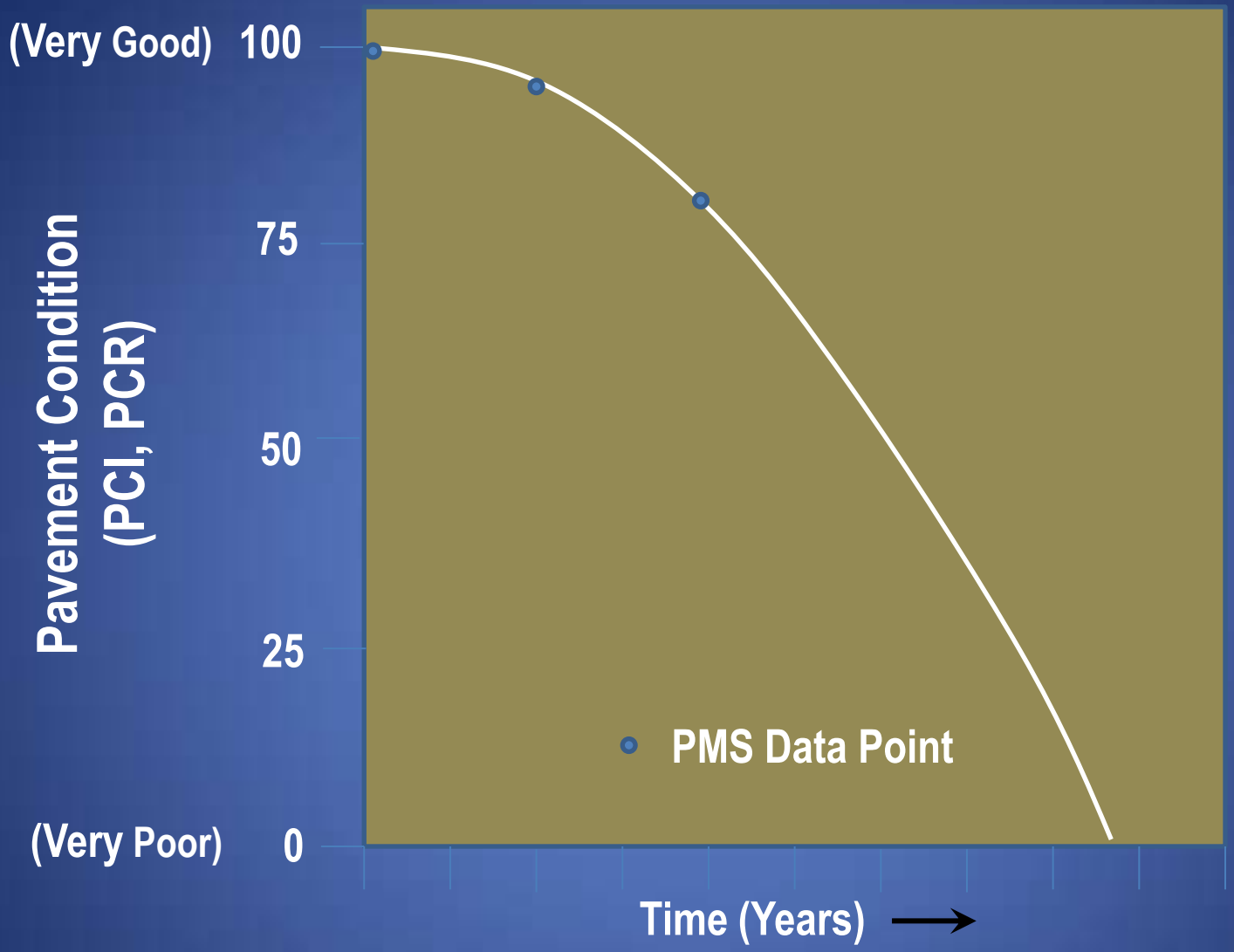
Source: FHWA Pavement Preservation Compendium, Figure 2. Life-extending benefit of preventive maintenance treatment.



Pavement Condition Index (PCI) and Pavement Condition Rating (PCR) are widely accepted pavement rating systems.



Pavement condition is assessed on a scale of 0 to 100, where a rating of 100 indicates no distress exits or, in the case of a pavement rehabilitation, all distresses have been corrected.

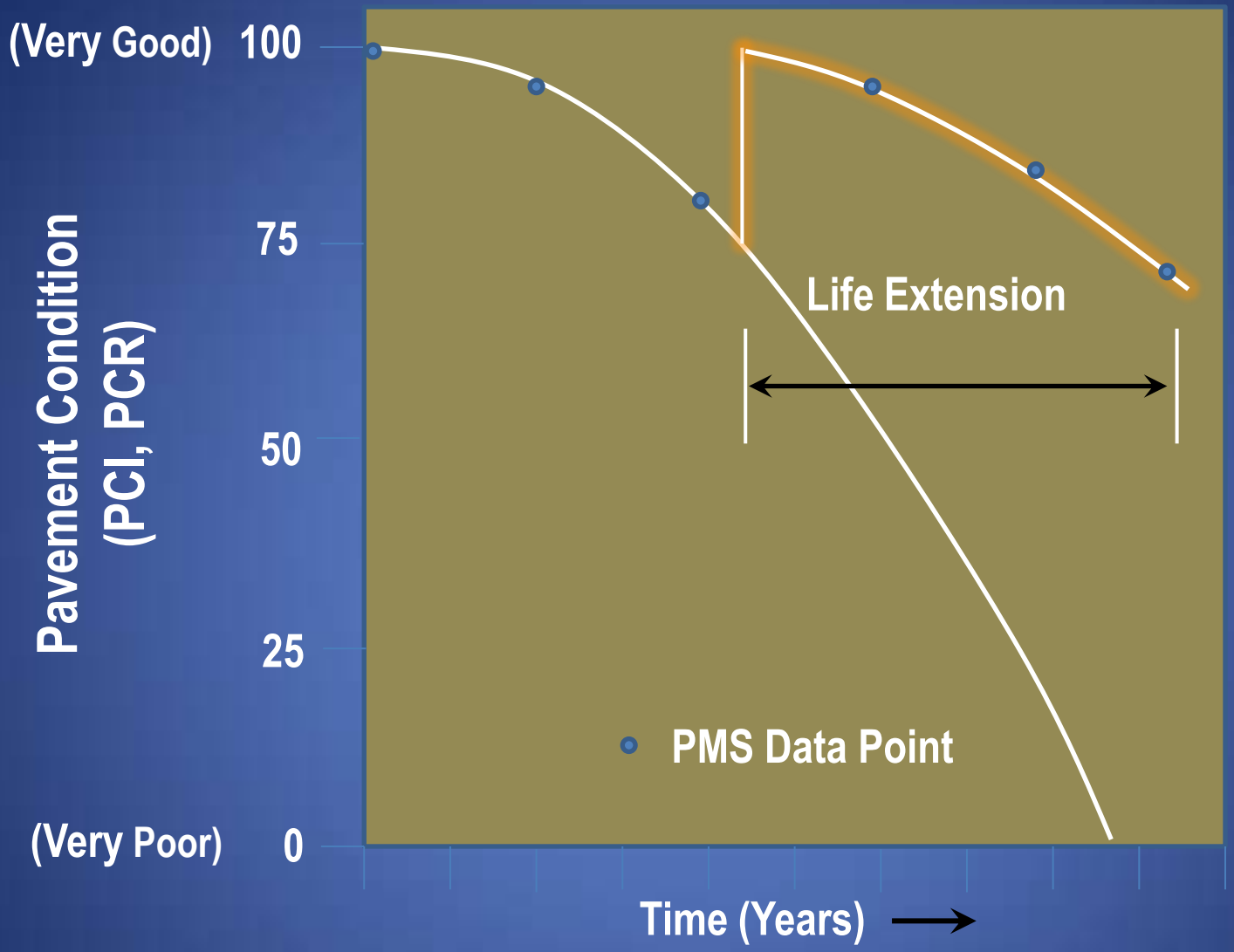


The plot of pavement management system (PMS) data indicates the rate of deterioration in pavement condition as determined by measuring severity and extent of pavement distresses.

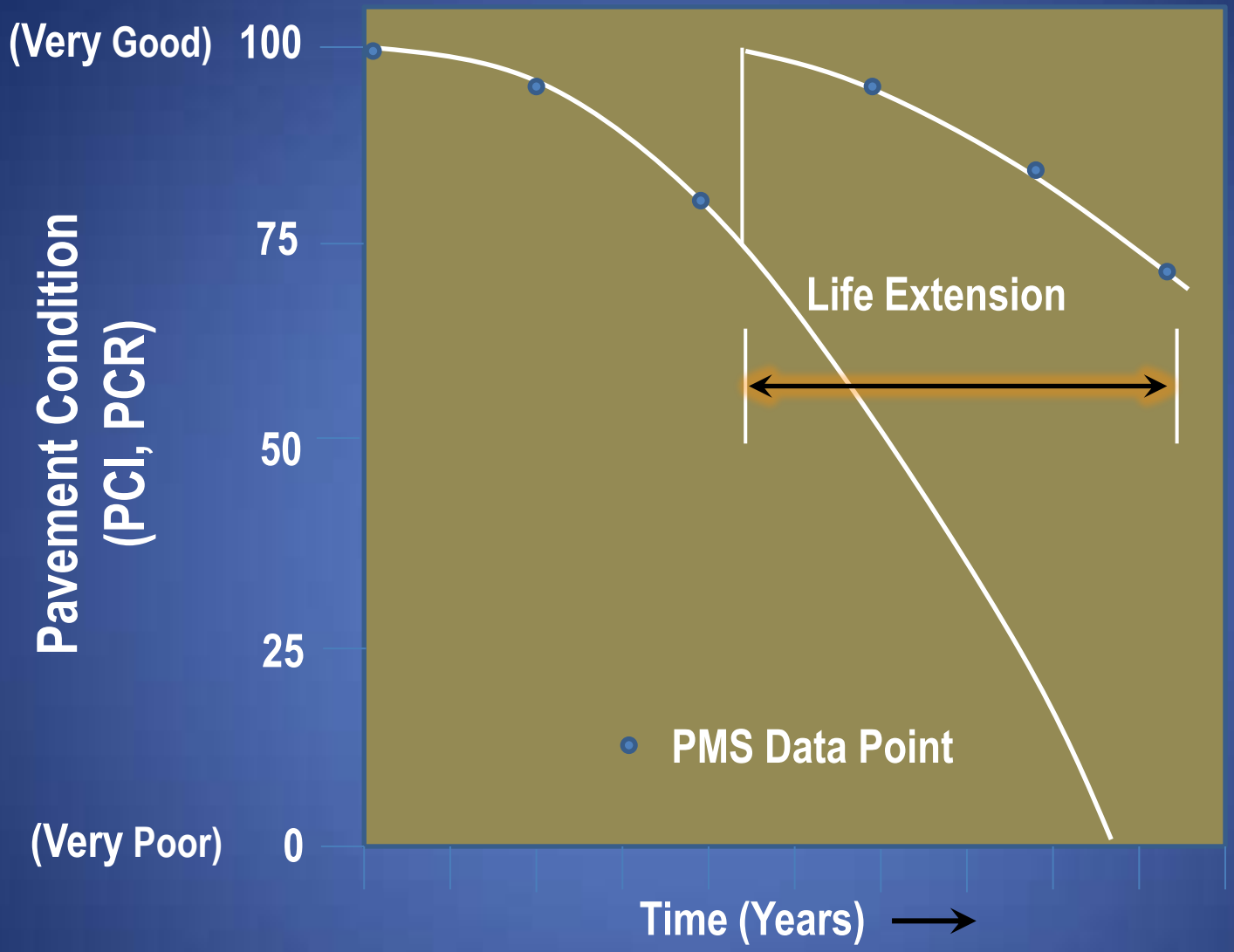
Pavement Condition Rating System – Distresses Rated (Flexible Pavement)

Distress types rated for flexible pavements.

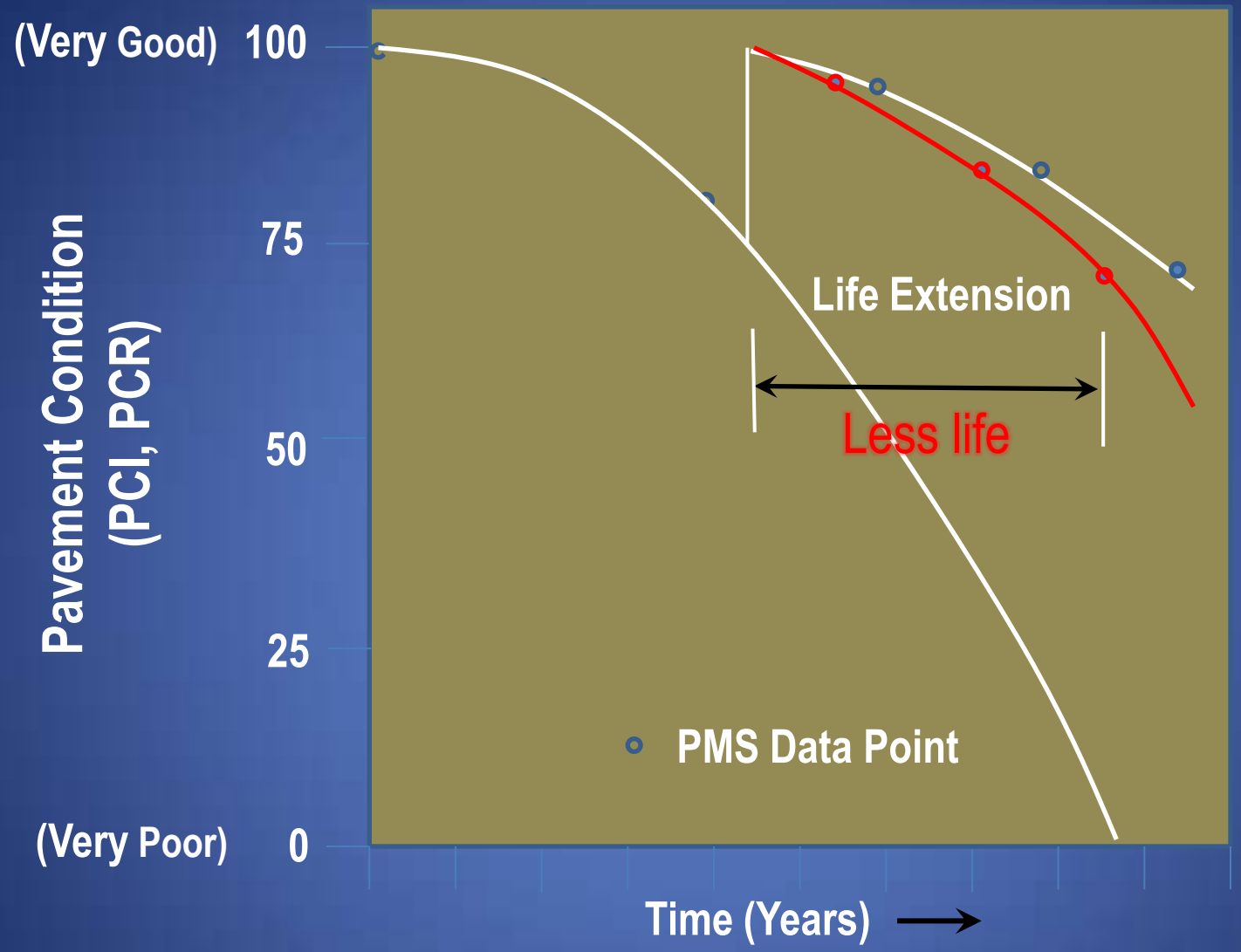
- Raveling
- Bleeding
- Patching
- Potholes/debonding
- Crack sealing deficiency
- Rutting
- Settlements
- Corrugations
- Wheel track cracking
- Block & Transverse cracking
- Longitudinal joint cracking
- Edge cracking
- Random cracking



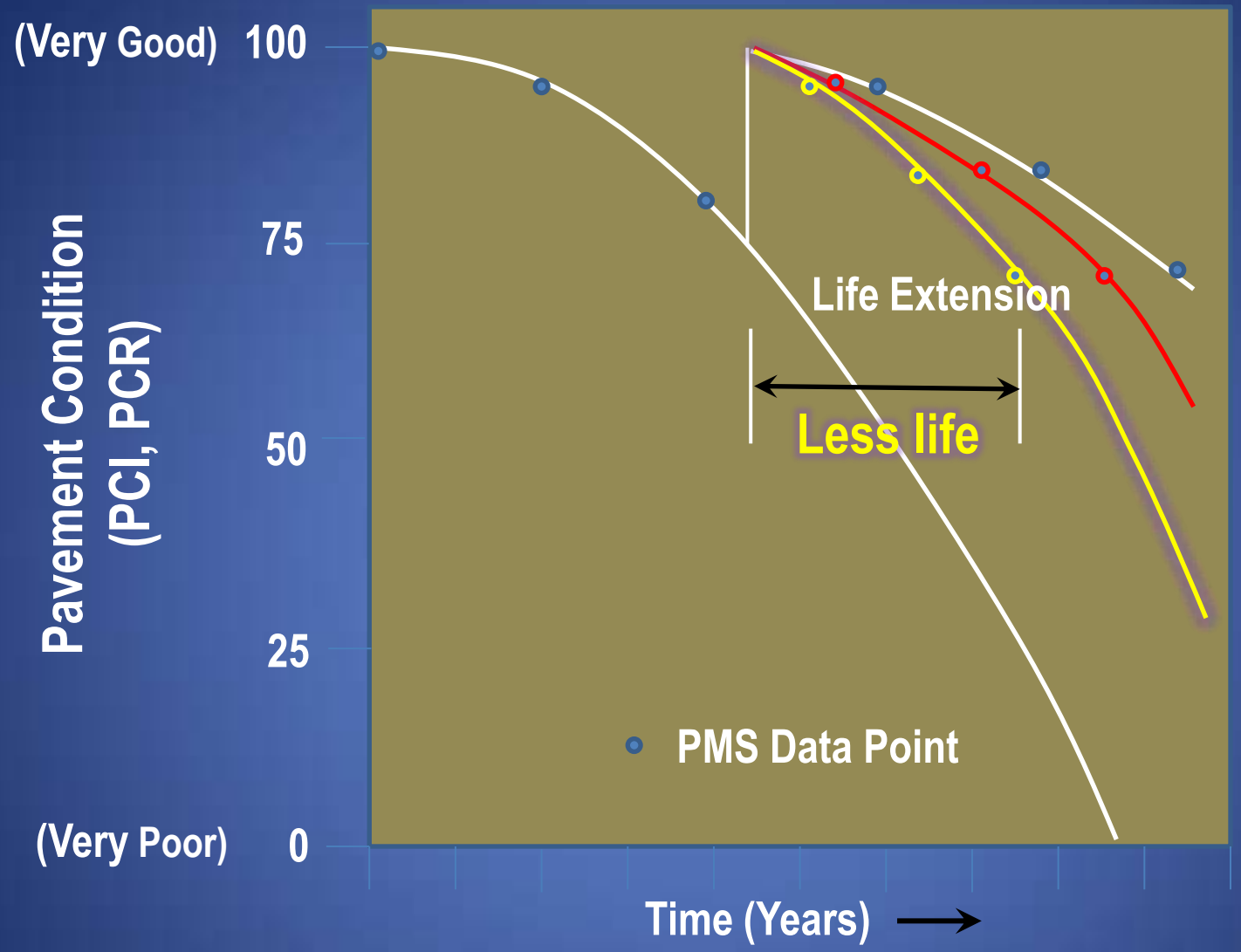
With the application of a preventive maintenance treatment pavement distresses are corrected and condition is improved. Pavement life is extended.

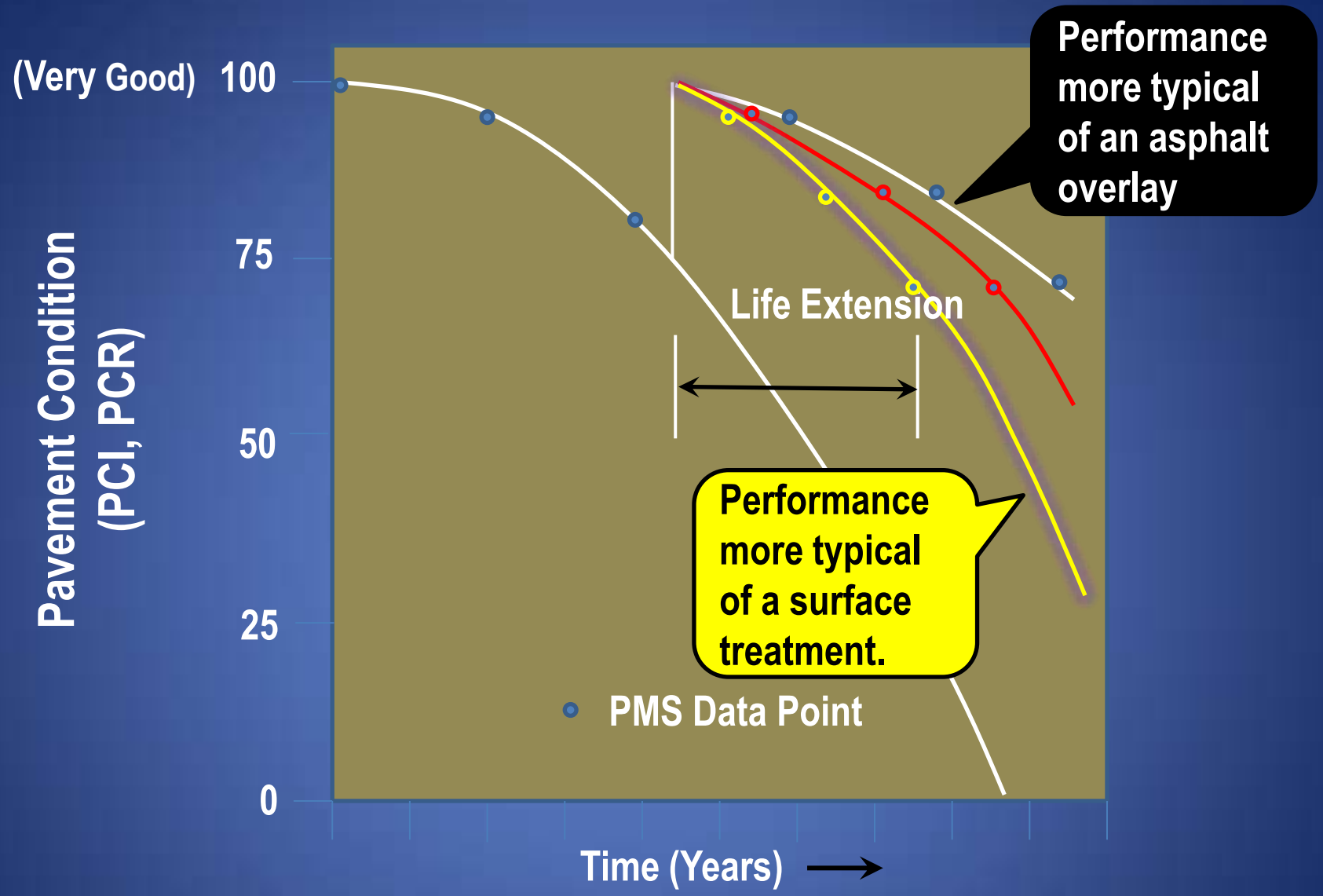


Life Extension depends on (1) structural soundness of the pavement upon which the preventive maintenance treatment is to be applied, and (2) robustness of the treatment.

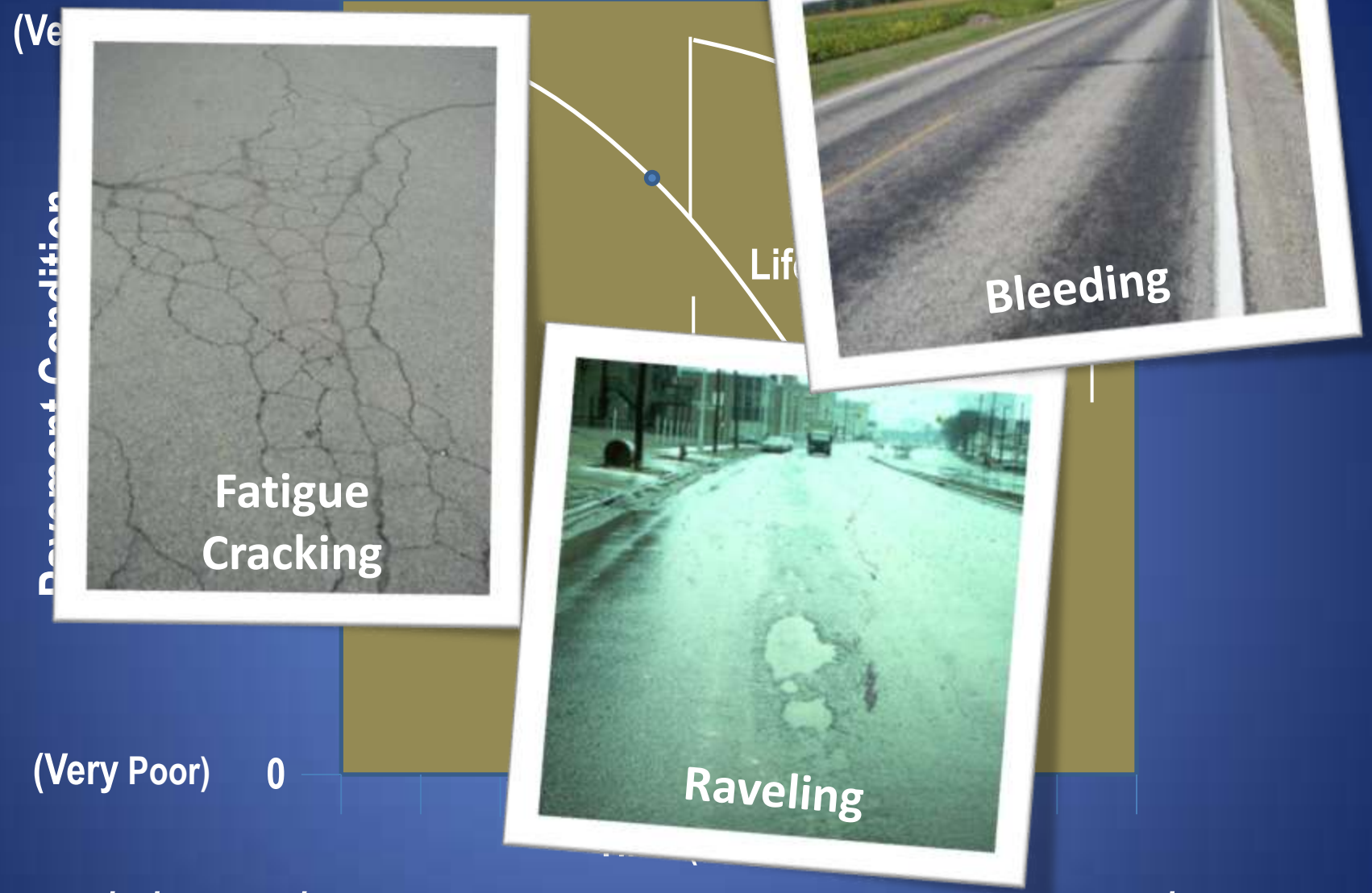


Generally, less robust treatments provide lesser life extension.


(Very Good) 100
75
50
25
(Very Poor) 0
Pavement Condition
(PCI, PCR)
Life Extension
Less life
PMS Data Point
Time (Years)



Life extension varies based on robustness of the preventive maintenance treatment. In general, Thin-lift asphalt overlays afford greater Life Extension.



Beyond their role in asset management, pavement condition rating systems are primarily tools for identifying distresses and developing rehabilitation strategies to correct them.

(Very Good) 100

Pavement Condition

(Very P

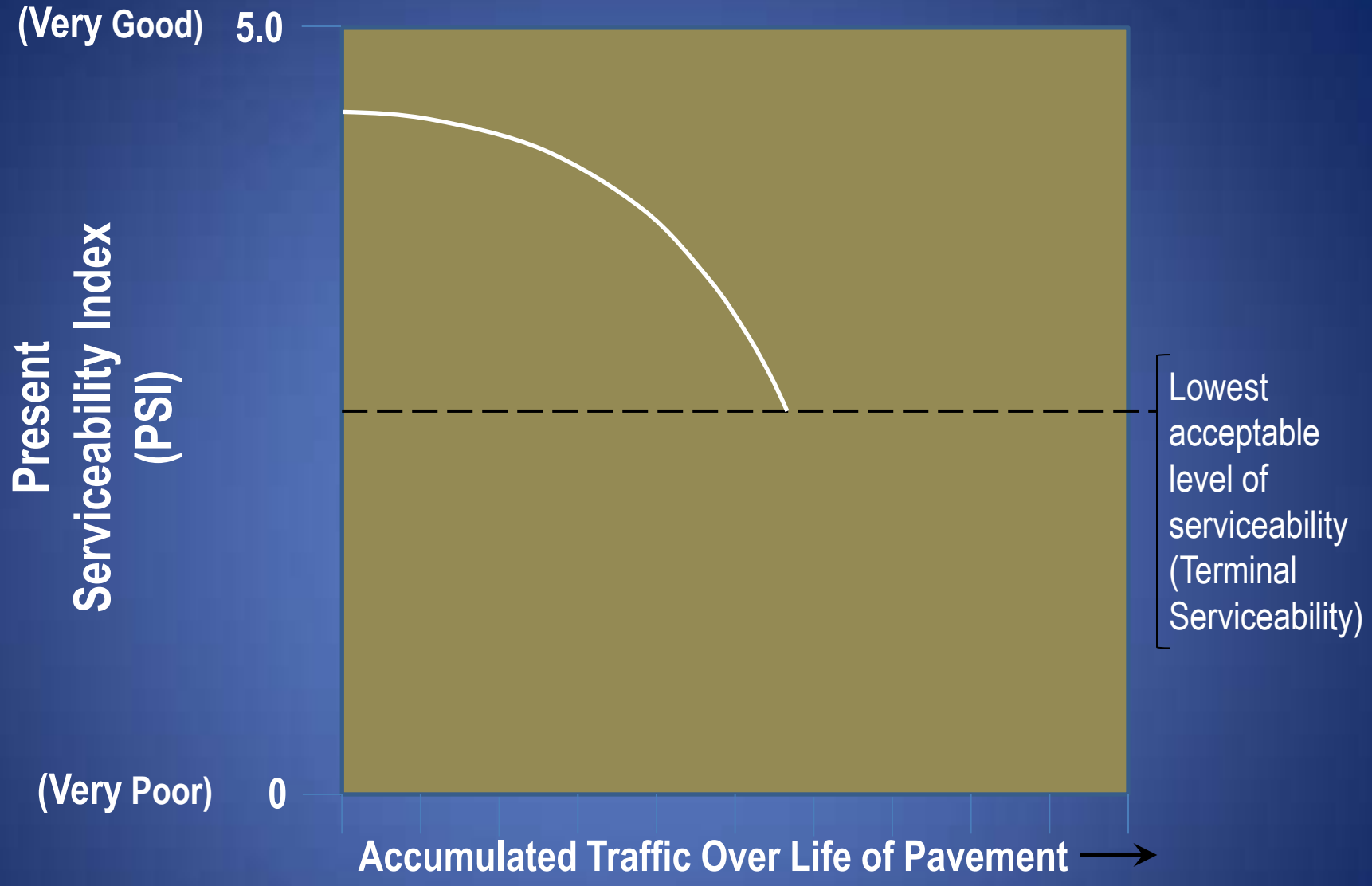
Time (Years) ⟶

Condition ratings provide only part of the answer.

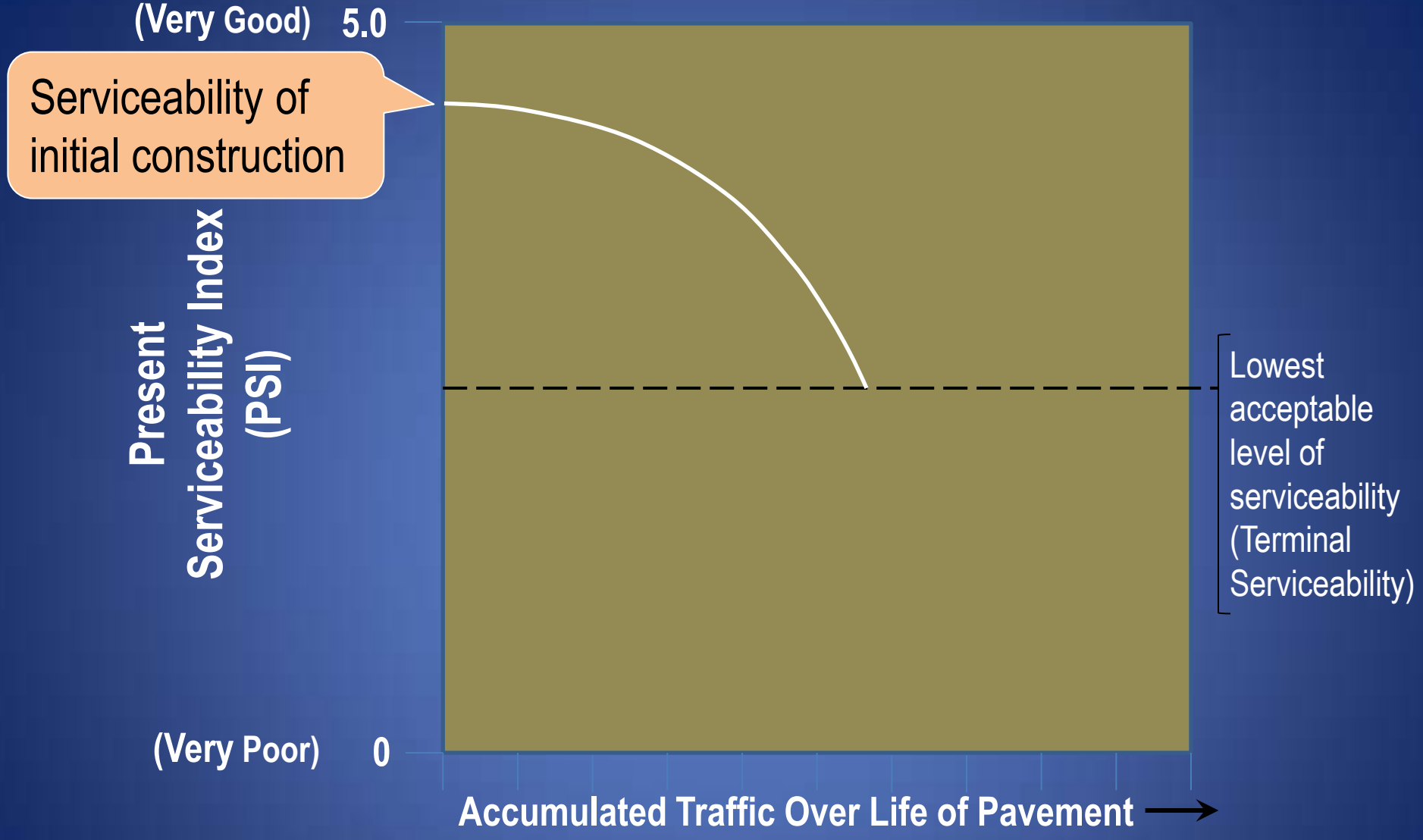
“Serviceability” also needs to be considered.

Serviceability is…

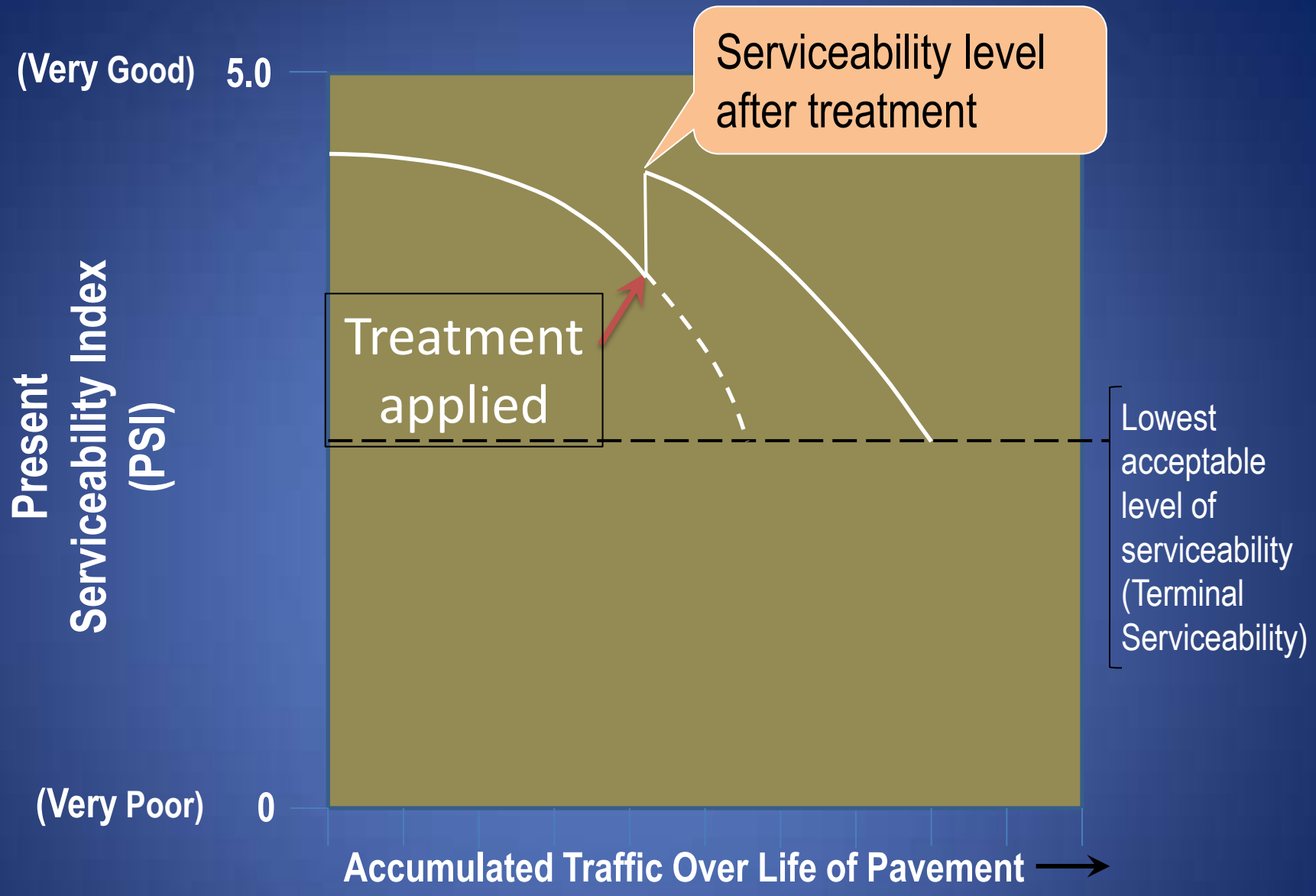
- A pavement performance measure developed as part of the AASHO Road Test, and
- A measure of the pavement's ability to serve the type of traffic which use the facility, and
- A measurement of the users' perceptions regarding the **acceptability of a pavement**, and
- Largely impacted by the user's perception of ride quality.



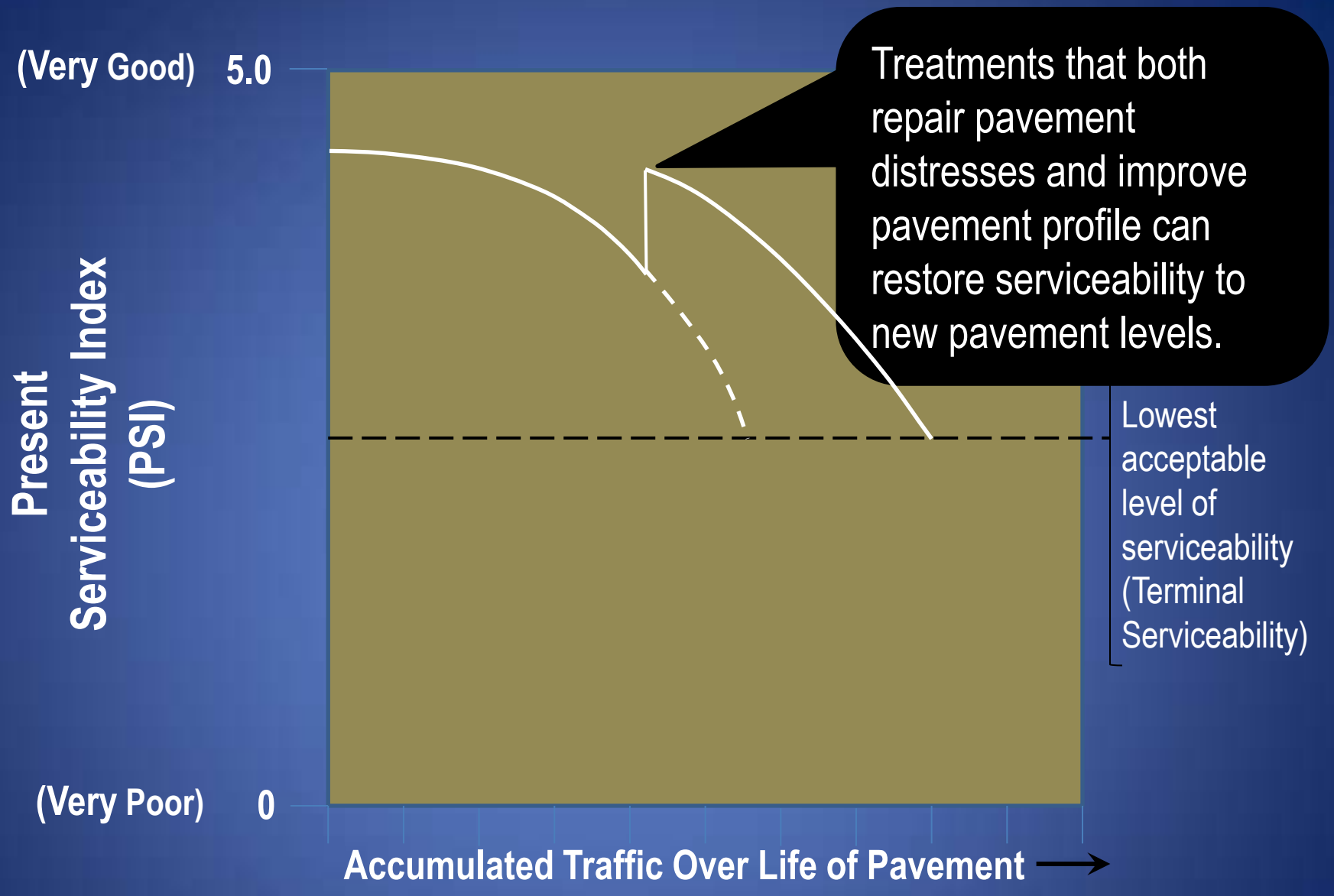
Present Serviceability Index uses a rating scale of 0 to 5, with 5 indicating the highest level of acceptability to the user. New asphalt pavements (in Ohio) typically rate 4.5



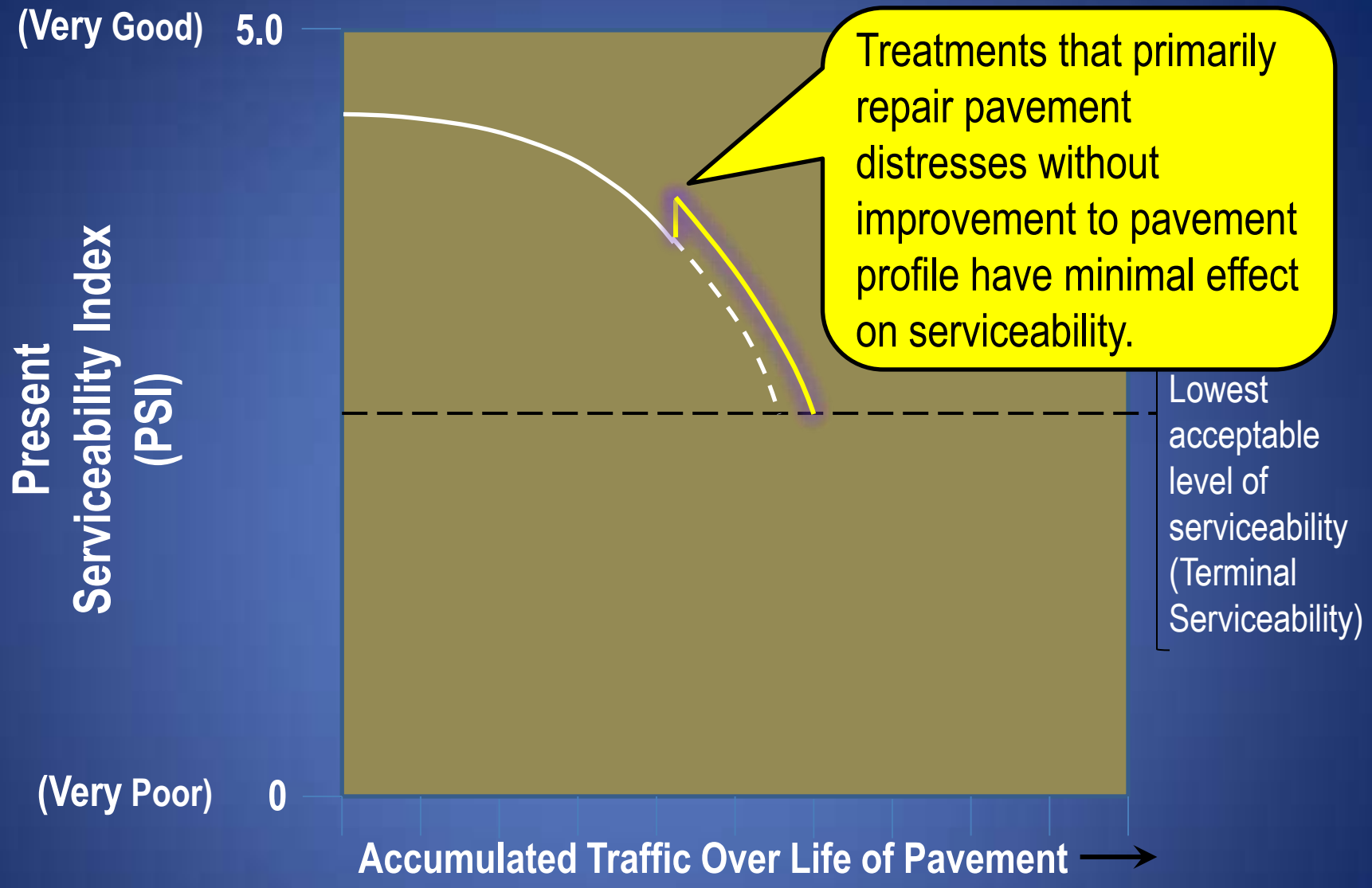
Serviceability declines as a pavement deteriorates under the punishment of traffic. The lowest tolerable level of serviceability is called the "Terminal Serviceability".



Preventive maintenance treatments arrest the deterioration in service caused by traffic. Serviceability is restored to a level commensurate with the treatment type.



Preventive maintenance treatments differ widely in their ability to improve serviceability.



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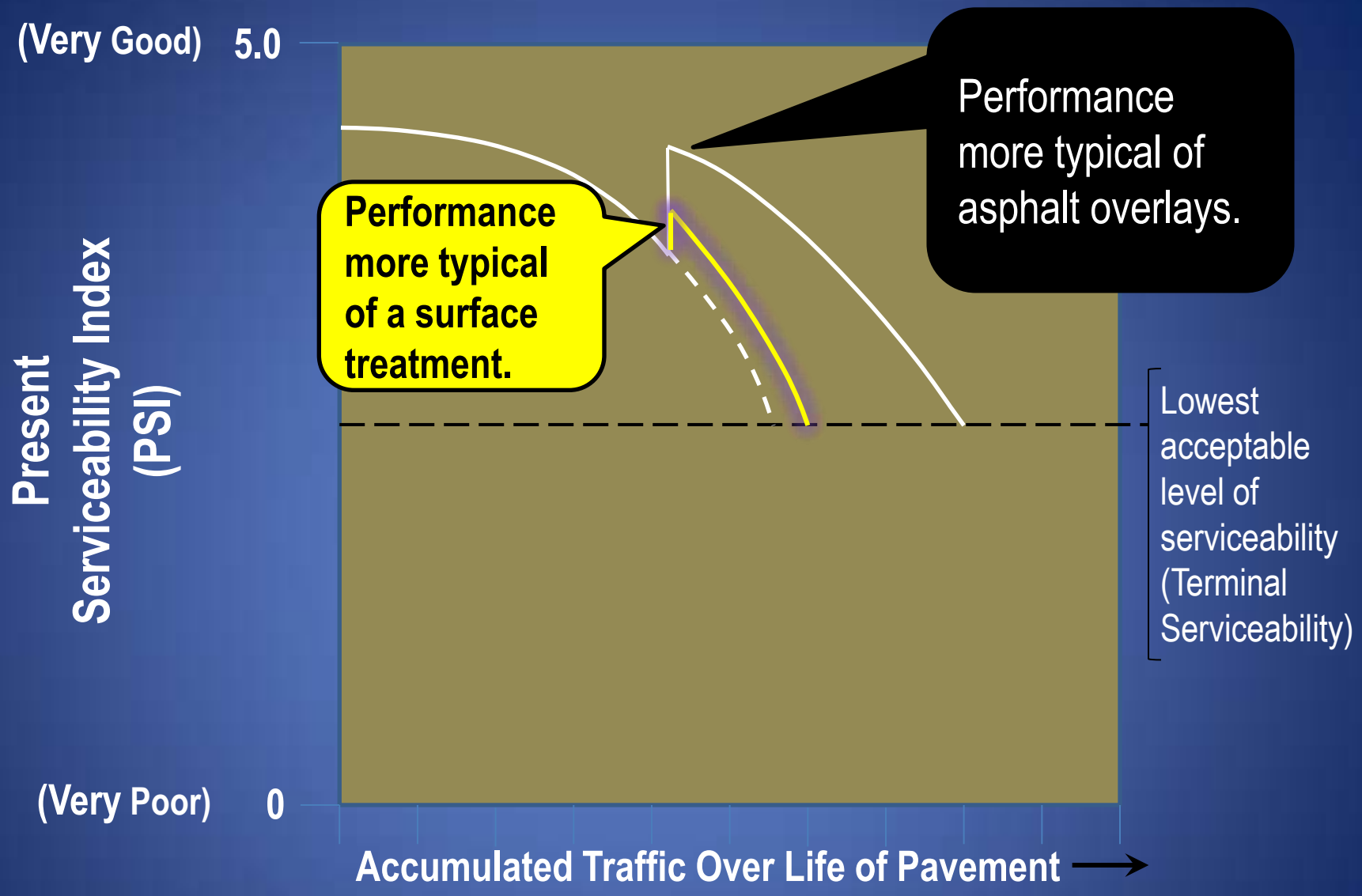

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Cost Comparison

Costs (2010 data)

	$ per CY	$ per SY	Lift Thickness
404-LVT Fayette County	$ 111.60	$ 3.10	1 inch
404-LVT City of Cincinnati	$ 140.00	$ 3.88	1 inch
Single Course Chip Seal	--	$ 1.64	--
Microsurfacing – Surface Course	--	$2.17	--

Cost Comparison

Costs (Annualized)

	Life (years)	$ per SY Annualized	Lift Thickness
404-LVT Fayette County	10	$0.31	1inch
404-LVT City of Cincinnati	10	$ 0.39	1 inch
Single Course Chip Seal	4	$ 0.41	--
Microsurfacing – Surface Course	5	$0.43	--

Value Assessment

	404-LVT	Micro.	Chip Seals
Corrects surface distress	✓	✓	✓
Increases skid resistance	✓	✓	✓
Minimizes curb loss	✓	✓	✓
Eliminates dust and loose aggregate	✓	✓	
Corrects minor rutting	✓	✓	
Increases structural strength	✓		
Improves pavement drainage	✓		
Improves ride quality and driver safety	✓		
Provides quiet ride	✓		
Engenders public support	✓		
Longer life (low permeability)	✓		

Value Assessment

What's in an inch?

Asphalt Thickness VS. Fatigue Life

Thickness	Micro strain	Reps to failure
2	-652	30,234
3	-495	71,537
4	-383	160,693
5	-302	340,507
6	-242	682,133

Source: James Huddleston, PE, Asphalt Pavement Association of Oregon

A 1-inch overlay can double the fatigue life of a pavement. One inch of thickness added to a 4-inch thick asphalt pavement improves repetitions to failure by 110 percent!

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404-LVT Specification

- Find a PDF of the spec at http://www.flexiblepavements.org/sites/www.flexiblepavements.org/files/404lvtspecification-rev8nov2010.pdf
- Get the informational brochure at http://www.flexiblepavements.org/sites/www.flexiblepavements.org/files/404lvtbrochure.pdf
- Contact FPO for guidance and a MSWord file

Questions?

Flexible Pavements of Ohio

www.flexiblepavements.org

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