Joe Kindler, P. E.

- Pavement Maintenance Engineer
  - 6 years ODOT, Dist. Maint. Engr.
  - 8 years Columbus Street Engineer
  - 14 years Pavt. Maint. Contractor
  - 7 years Using Above Experience
  - Call 1-800-638-8040

Who's in Charge

2 months to design, 2 months to bid, 2 months to construct

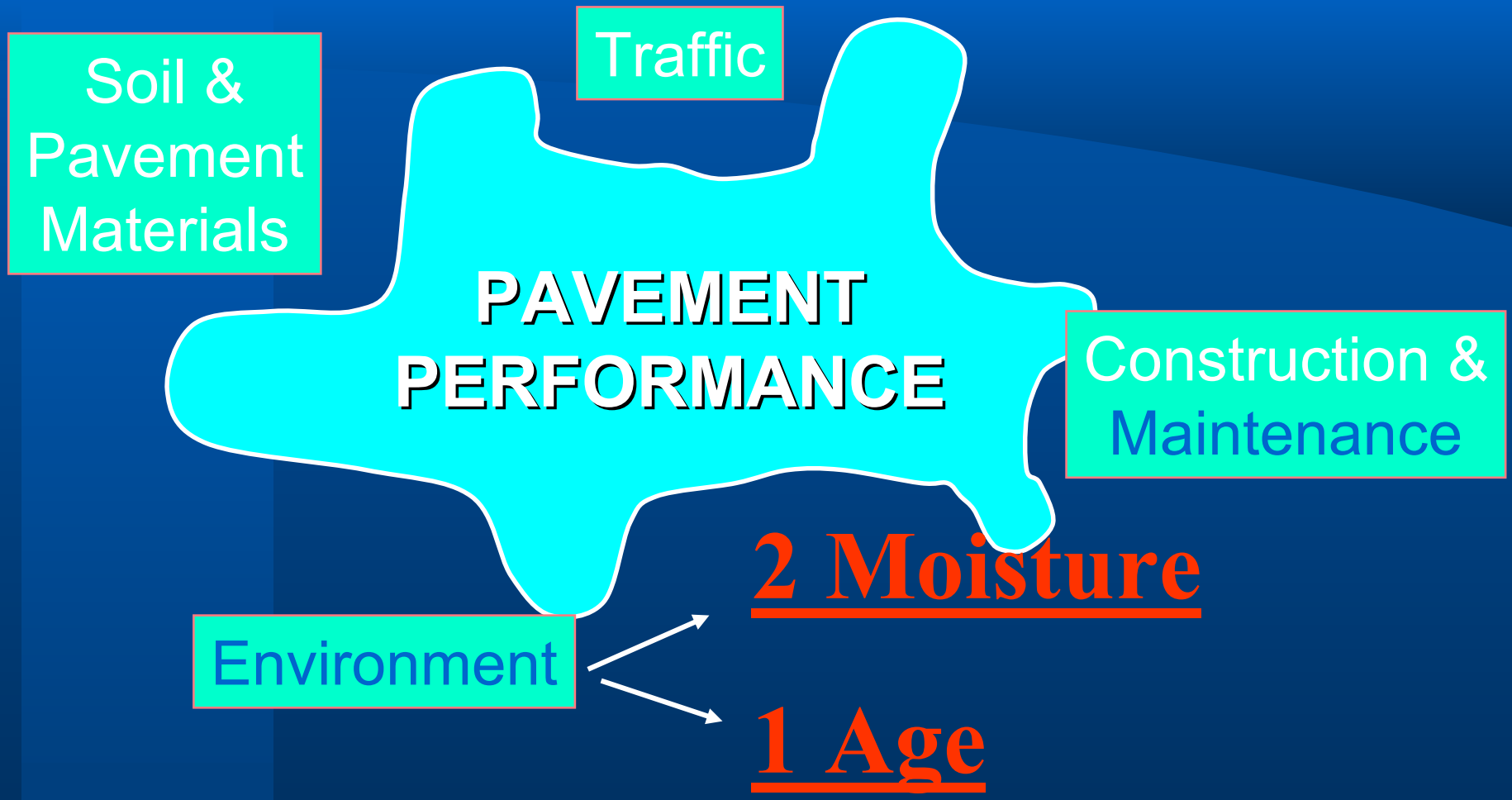
Take Control

& You've got 10 years to maintain!

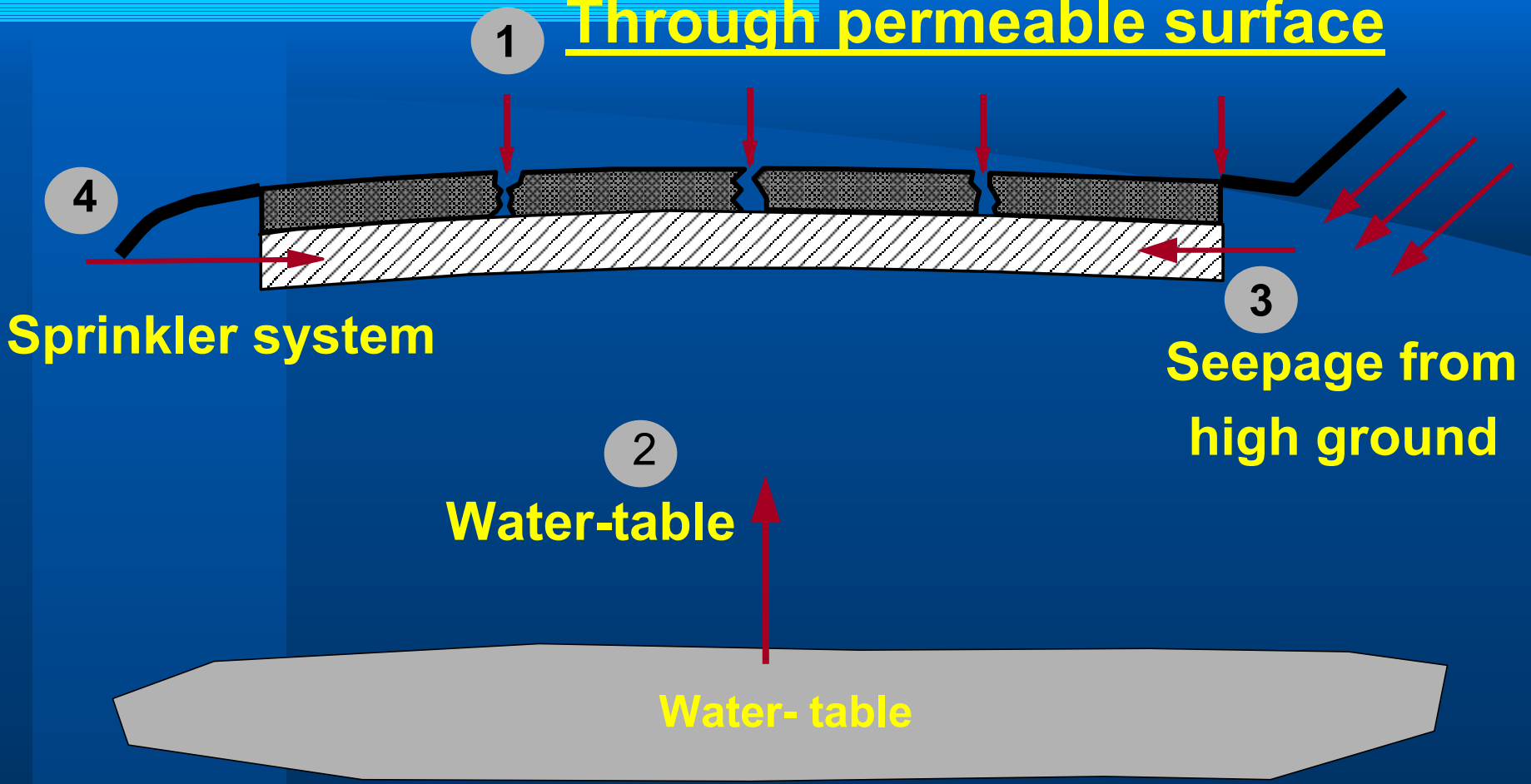
Expand & Extend your funding

- Preventive Maintenance
- Pavement Management
- Verification
- Analysis

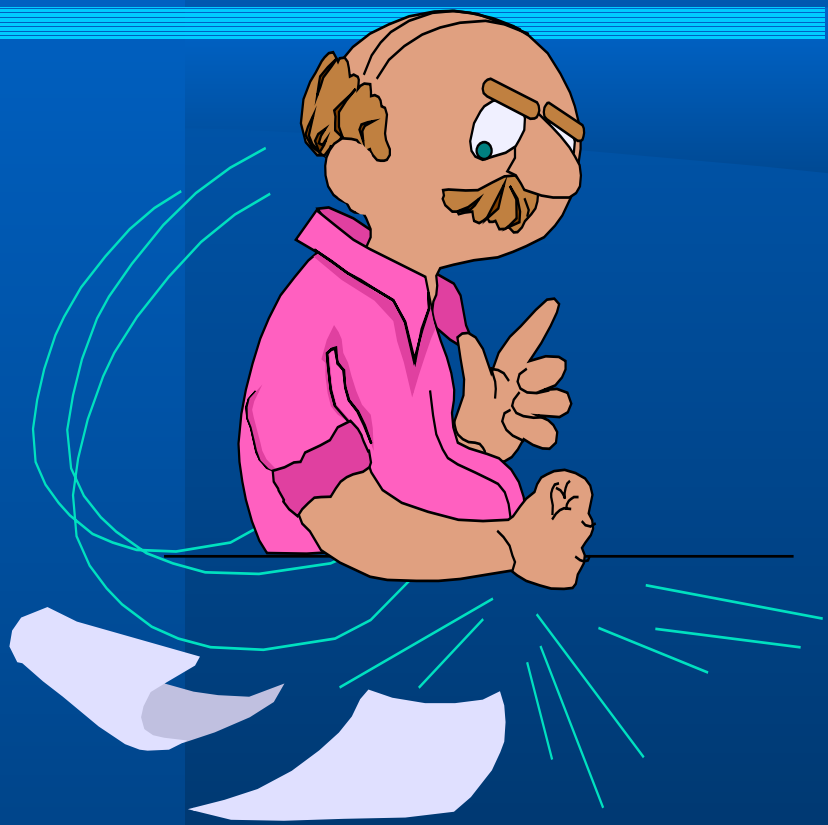
Factors Affecting Pavement Performance



Moisture


1
Through permeable surface
4
Sprinkler system
3
Seepage from high ground
2
Water-table
Water- table

Aging = (Oxidation)



Old asphalt has

no flexibility

(And it seems to get old faster)

What will moisture do?

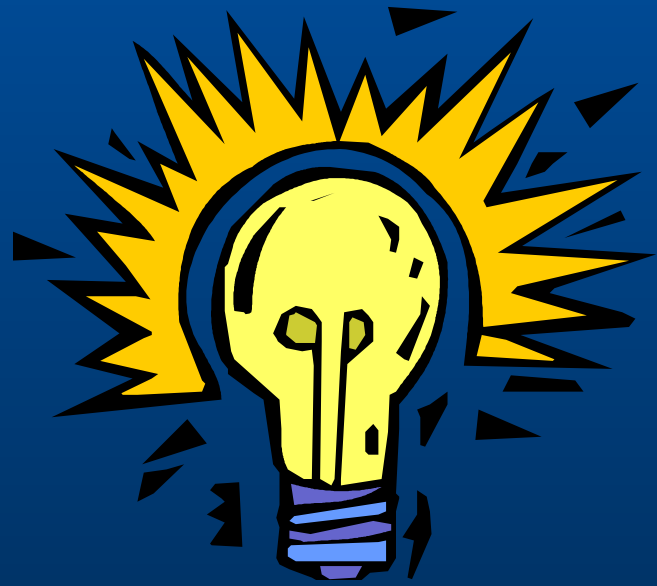
- Swells & Reduces soil strength
- Develops pot holes & Pumping
- Strips asphalt
- Frost heave
- Ends Pavement life
- Increase Phone Time

What does aging & loss of flexibility (within 1-2 years) cause?

- Cracking (thermal,reflective,load)
- Moisture in & pavement failure
- Raveling (loss of surface)
- & More Phone Time

Preventive maintenance Goals

- Reduce moisture intrusion
- Retard aging
- and ?



Take Control

- Be proactive now, don't wait to be reactive tomorrow!
- 50-60% of the Oxidation takes place in the first 2 years!
- Oxidation causes loss of flexibility and cracking allows moisture to end your pavement life.

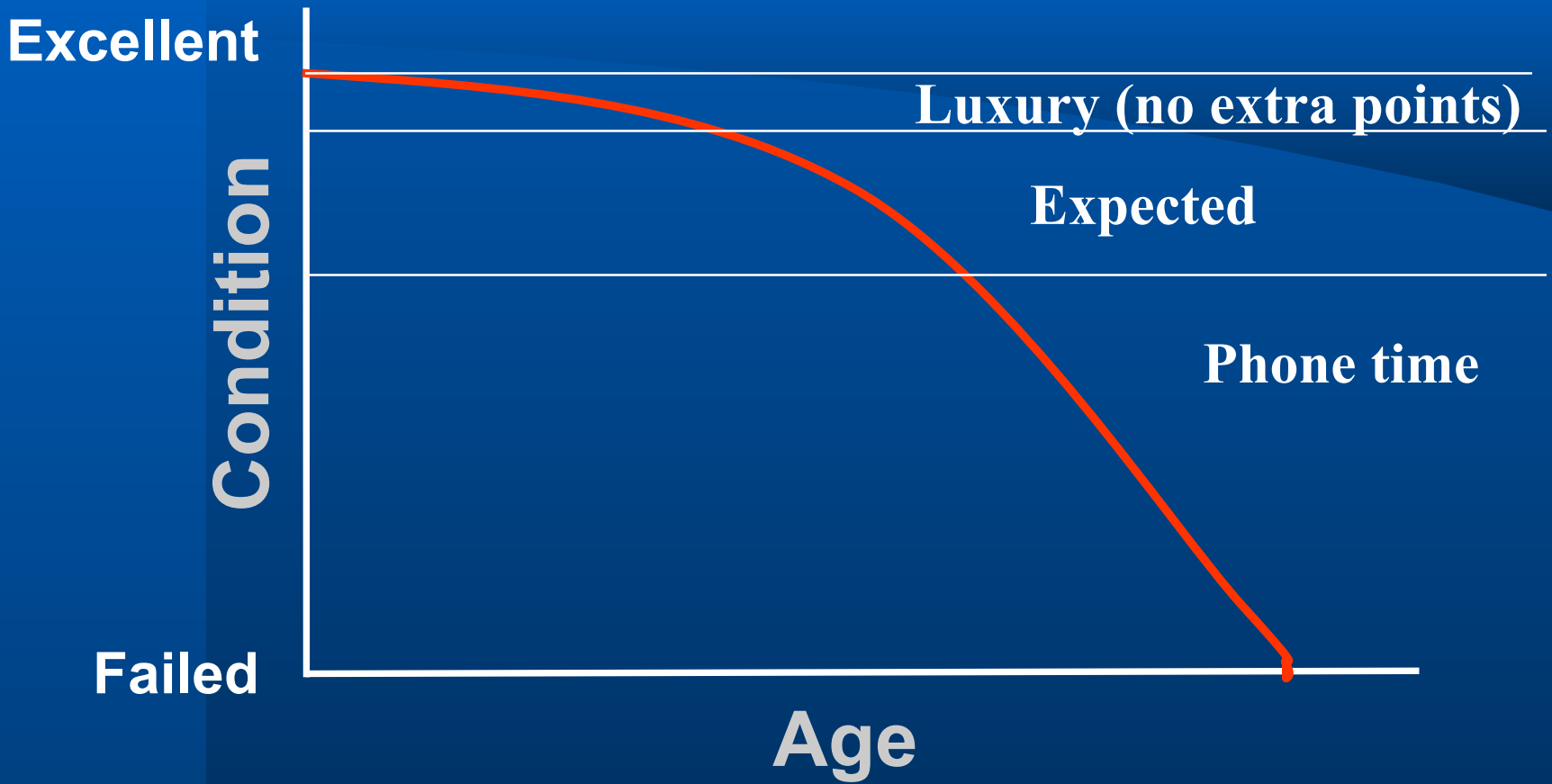
When ?

Should I start Maintaining Pavement?

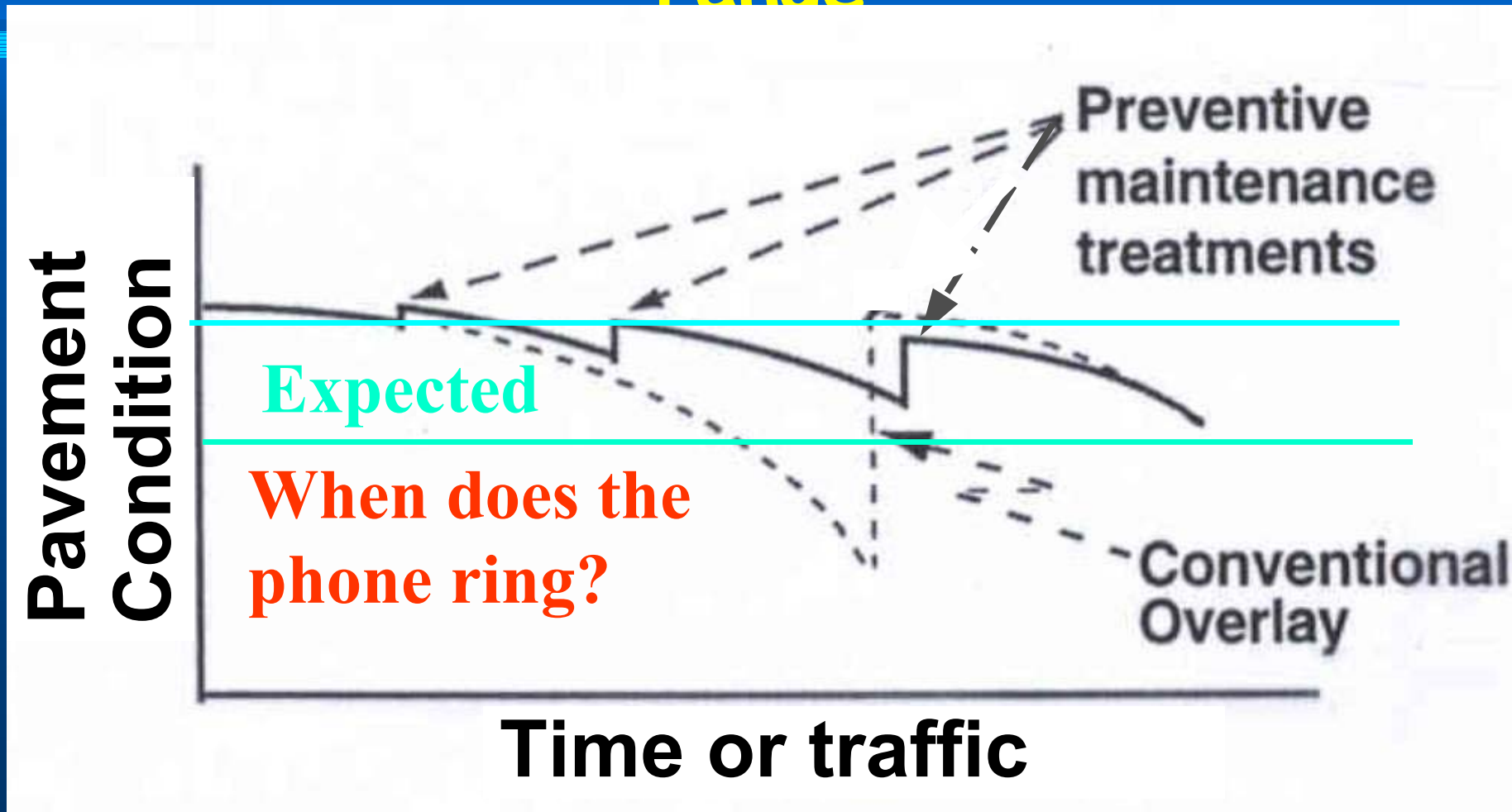
Think of

Steel beams ! & Wood decks !

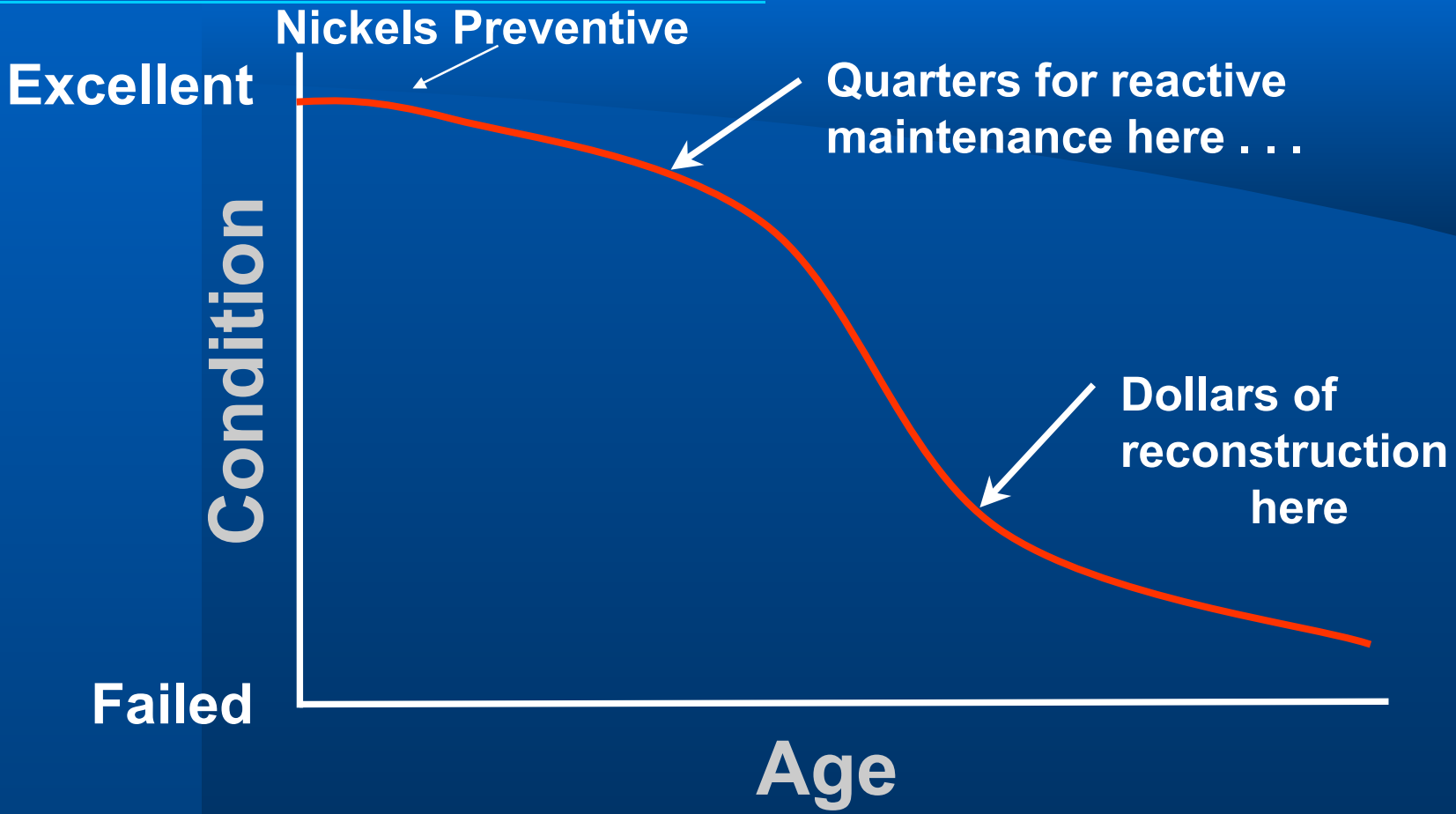
Driver Perception



Preventive Maintenance keeps you in the Expected range



Concept of Preventive Maintenance

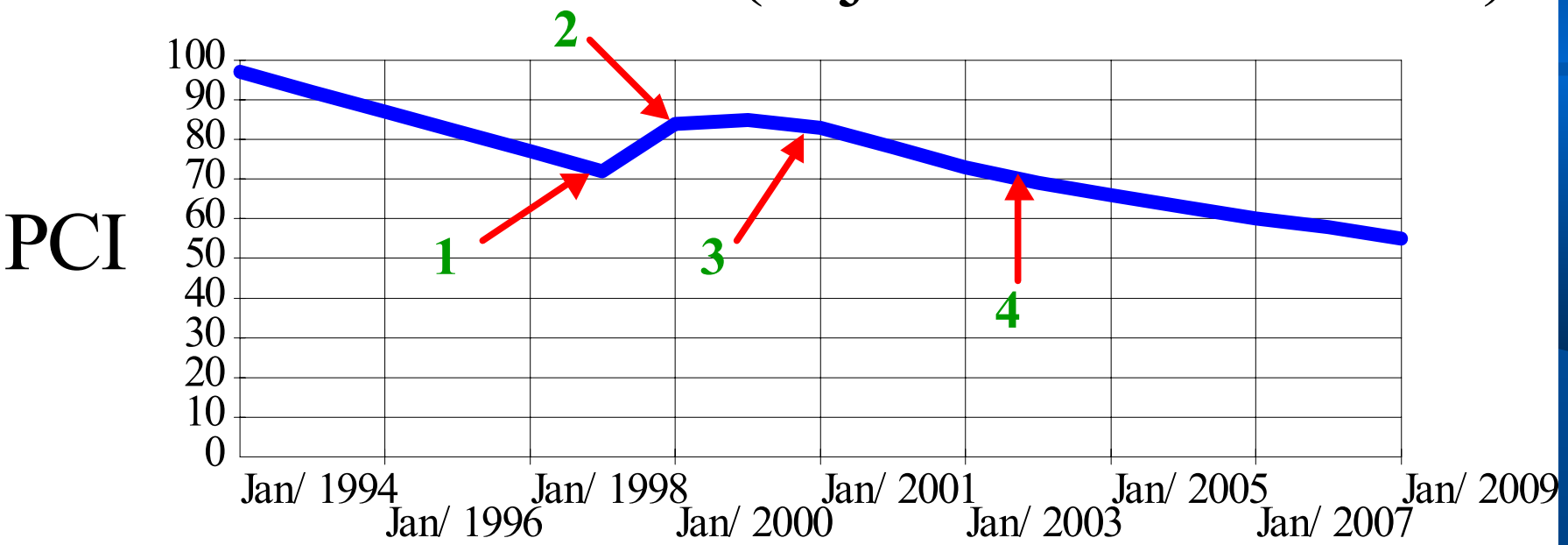


Emulsion Treatments (Fog Seals)

- Preserve present surface (current condition)
  - GSB-88
  - Reclimite
  - SS- 1

Good Candidate for Preventive Maintenance

Crawford Rt.39 Sec.1 (Rejuvenator 6/ 1/ 1999)



1 Inspection

2 Inspection after GSB-88

3 Inspection

4 Projection in 4 years after Rejuvenator

Micro-PAVER Inspections

- ASTM number (D6433-99) (the only one)
- Objective & reproducible (required by GASB-34)
  - Every distress is actually measured in the sample area
- Inspector consistency
  - Procedures are followed or inspector is replaced (private practice)

Cost and Benefit Analysis

(Life Cycle Cost Analysis)

(Project Cycle Cost Analysis)

$ vs. $

What Information is needed?

- Treatment costs
- Treatment benefits

What Are The Benefits?

- Improve pavement condition
- Smoother ride
- Better appearance
- Extend life of pavement
- 

Comparing Alternatives

Which alternative is more cost effective?

1. **Frequent seal coats every 4 years, or**
2. **Do nothing for 10 years then overlay**

Cost Analysis

- This analysis considers two alternatives:
  - Alternative I: Mill-Overlay
    - Milling cost: $1.50/yd^2
    - Overlay cost: $4.00/yd^2
  - Alternative II: ASI-GSB
    - Sealer cost: $0.50/yd^2

Pavement Performance

Cost analysis

- **Design Period:**
  - 18 YEARS
- **Alternative I:**
  - Mill-overlay at year 1
  - Mill-overlay at year 9
- **Alternative II:**
  - Mill-overlay at year 1
  - Four applications of ASI-GSB at 1, 5, 9, and 13 yrs

Cost analysis

- **Alternative I:**

  M&O M&O

  5.50 + 5.50 = $11.00/yd^2

- **Alternative II:**

  M&O GSB GSB GSB GSB

  5.50 + 0.50 + 0.50 + 0.50 + 0.50 = $7.50/yd^2

Cost analysis

- **Cost Saving:**

  $11.00 - $7.50 = $3.50

- **Total Saving for a 100,000 yd^2 project: (7 miles)**

  100,000 yd^2 x $3.50/$yd^2$ = $350,000

Final analysis

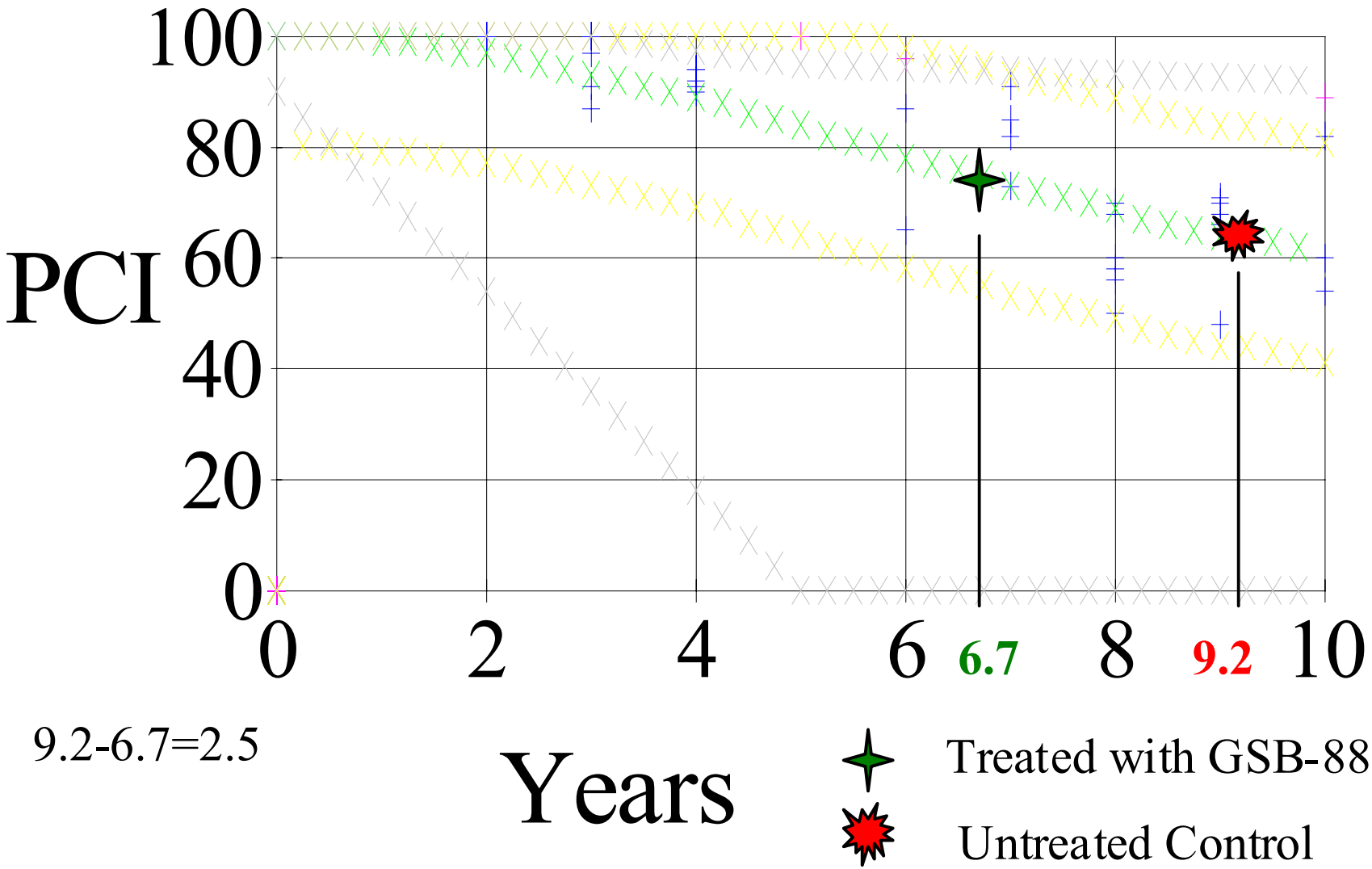
- **Percent Saving for a 100,000 yd^2 Project:**

$$\frac{1{,}100{,}000 - 750{,}000}{1{,}100{,}000} \times 100 = 32\%$$

- **Would this be the same as getting a 32% increase in funding?**

Logan County Road (2002)

Model: Logan Asphalt



9.2-6.7=2.5

Micro-PAVER Models Module

- Research & Development Investment $1,100,000
- Matches
  - Surface Type
  - Rank
  - Other Fields
- ASTM Inspection methodology

GSB-88 Treated vs Control

- **GSB-88**
  - Application = $0.50 / sy
  - $0.50 / 2.5 = $0.20 / sy / yr
- **Do Nothing**
  - Overlay = $4.00 / sy (lasting 10 years)
  - $4.00 / 10 = $0.40 / sy / yr

Cut the yearly cost in half for 2 years

What is it worth?

- Well maintained pavements
- Smooth pavements
- 

- Preventive Maintenance can help!!

Helpful Phone Numbers & Web Sites

- ASI office 800 729 8094
- www.asi-roads.com
- Joe Kindler 800 638 8040
- www.micropaver.net