Surface Treatment Impact on Surface Condition Rating

WSAC Subsurface Road Condition Pilot Project

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applied pavement TECHNOLOGY
providing engineering solutions to improve pavement performance

Presentation Outline

- Study incentive, objectives, and tasks
- Pavement types evaluated
  - Data collection
- Deflection parameters
  - Center deflection
  - Area value
  - Surface curvature index
- Conclusions

Study Incentive

- Preservation treatment application
  - Mask underlying structural problems
  - Roadway appears to be in good condition
  - Underlying distresses can quickly propagate through the preservation treatment
- Concerns that the surface rating does not accurately reflect structural condition

Study Sponsors

- Washington State Association of Counties
  - Coordinated by Spokane County
    - ➢Scanlan Consulting (Prime)
    - ➢APTech (Subcontractor)

Pilot Project Objectives

- Determine if collecting subsurface condition provides a more accurate portrayal of road conditions
- Determine a practical method to measure subsurface road condition

Project Tasks

- Identify pavement types
- FWD testing (summer 2013)
  - Adams, Chelan, Clark, Lewis, and Spokane County
- Obtain pavement management data
  - Layer thickness and type
  - Pavement structural condition (PSC)
- Compare FWD results with PSC
- Prepare a report of findings

Test Site and Data Needs

- Uniform pavement section
  - Type and thickness
  - Traffic
  - 1000 ft in length
- Asphalt and base thickness
- Current and historic pavement condition
- Treatment type
- Deflection data (prior to and following treatment)

Analysis

- For each pavement segment
  - Average deflection measurement/parameter
  - PSC adjusted to 2013 condition
- Layer thickness
  - ACP greater than or less than 4 in.
  - Limited or no information on aggregate base

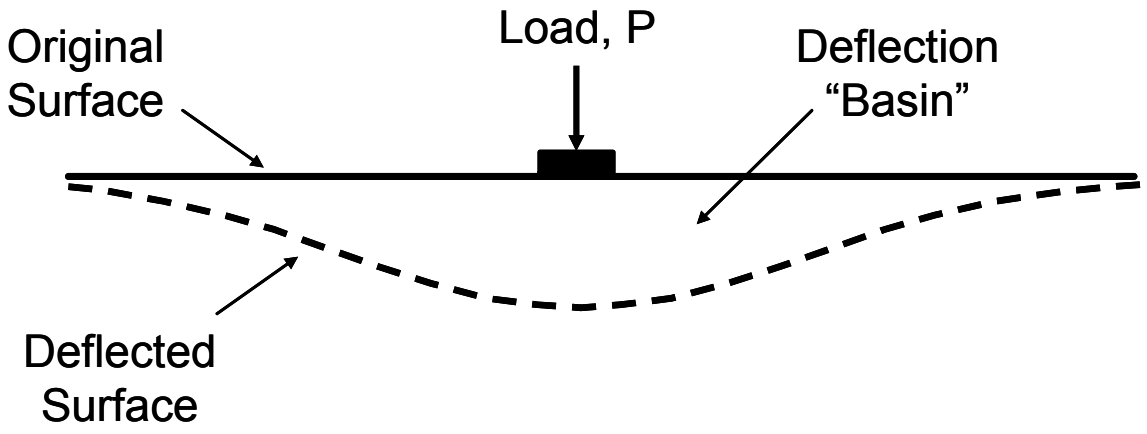
Limited analysis to deflection parameters that do not require specific layer thickness

Pavement Types Evaluated

Pavement Type	No. FWD Tests	No. Pavement Segments
ACP over aggregate base	***220***	***25***
Thin ACP overlay of existing ACP	***124***	***11***
Thin ACP overlay of existing BST	***115***	***11***
BST over aggregate base	***69***	***10***
BST over existing ACP	***186***	***26***
BST over existing BST	***219***	***17***
Total	***933***	***100***

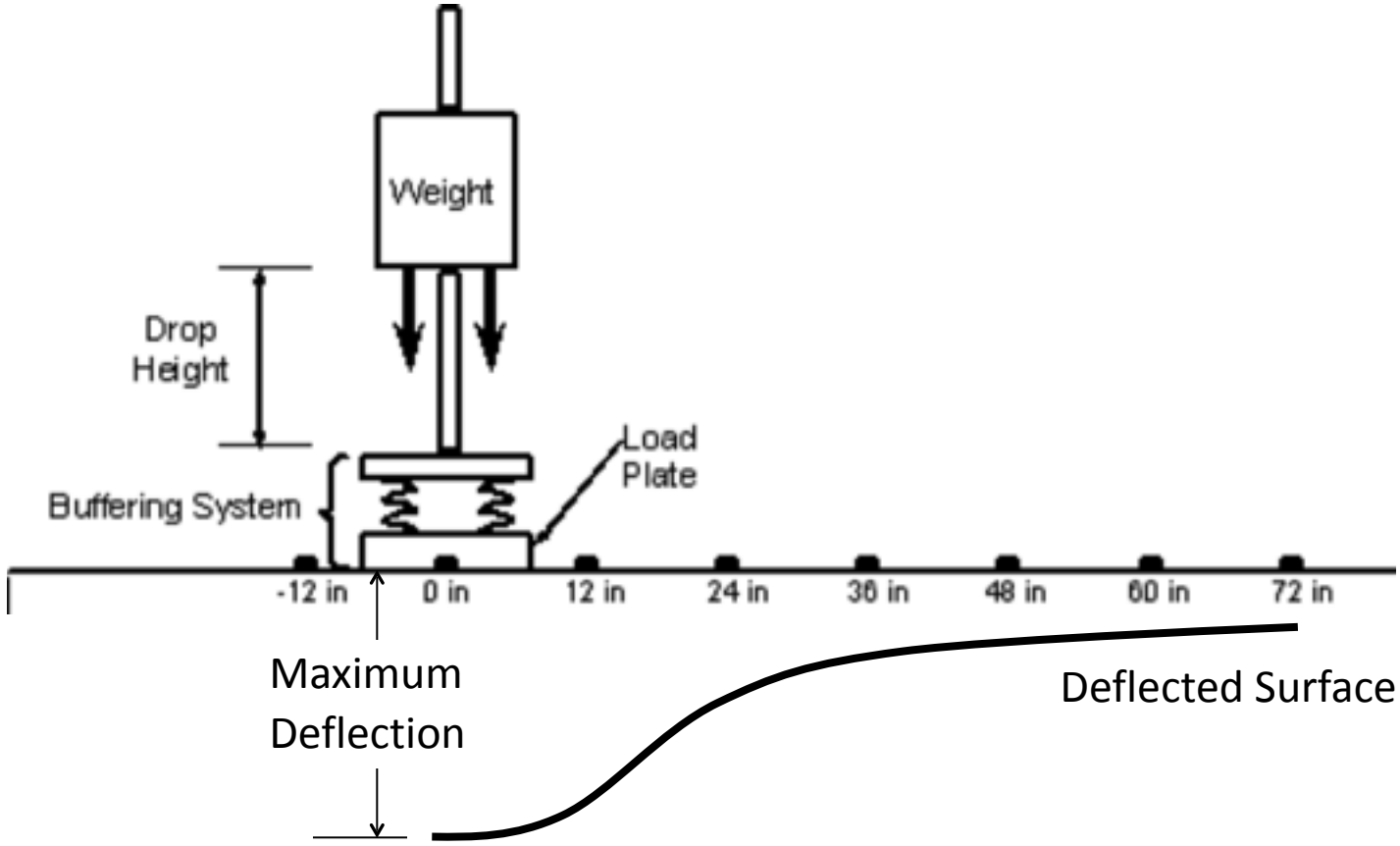
Evaluated Deflection Parameters

- Center Deflection
- Area Value
- Surface Curvature Index

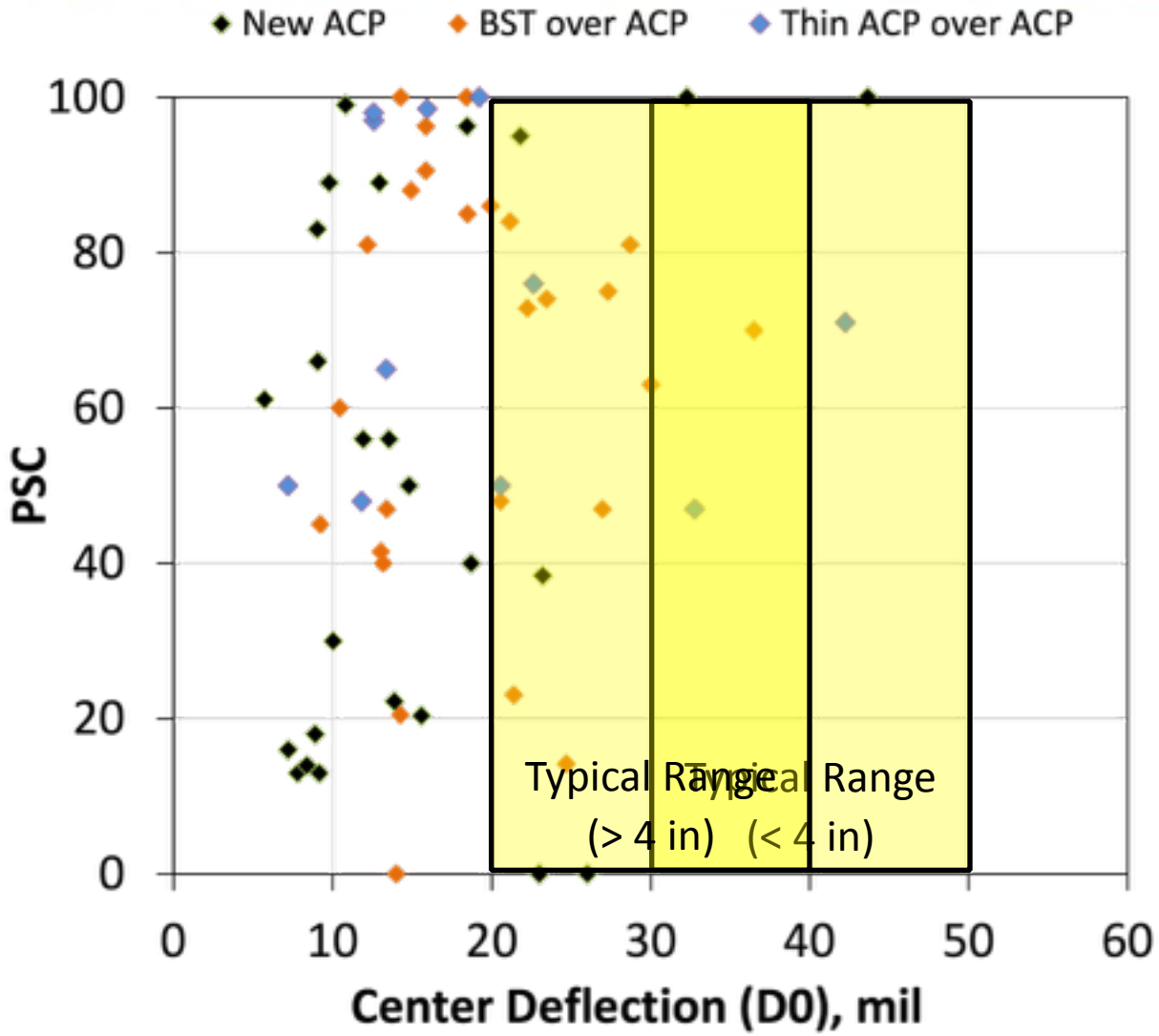


Center Deflection

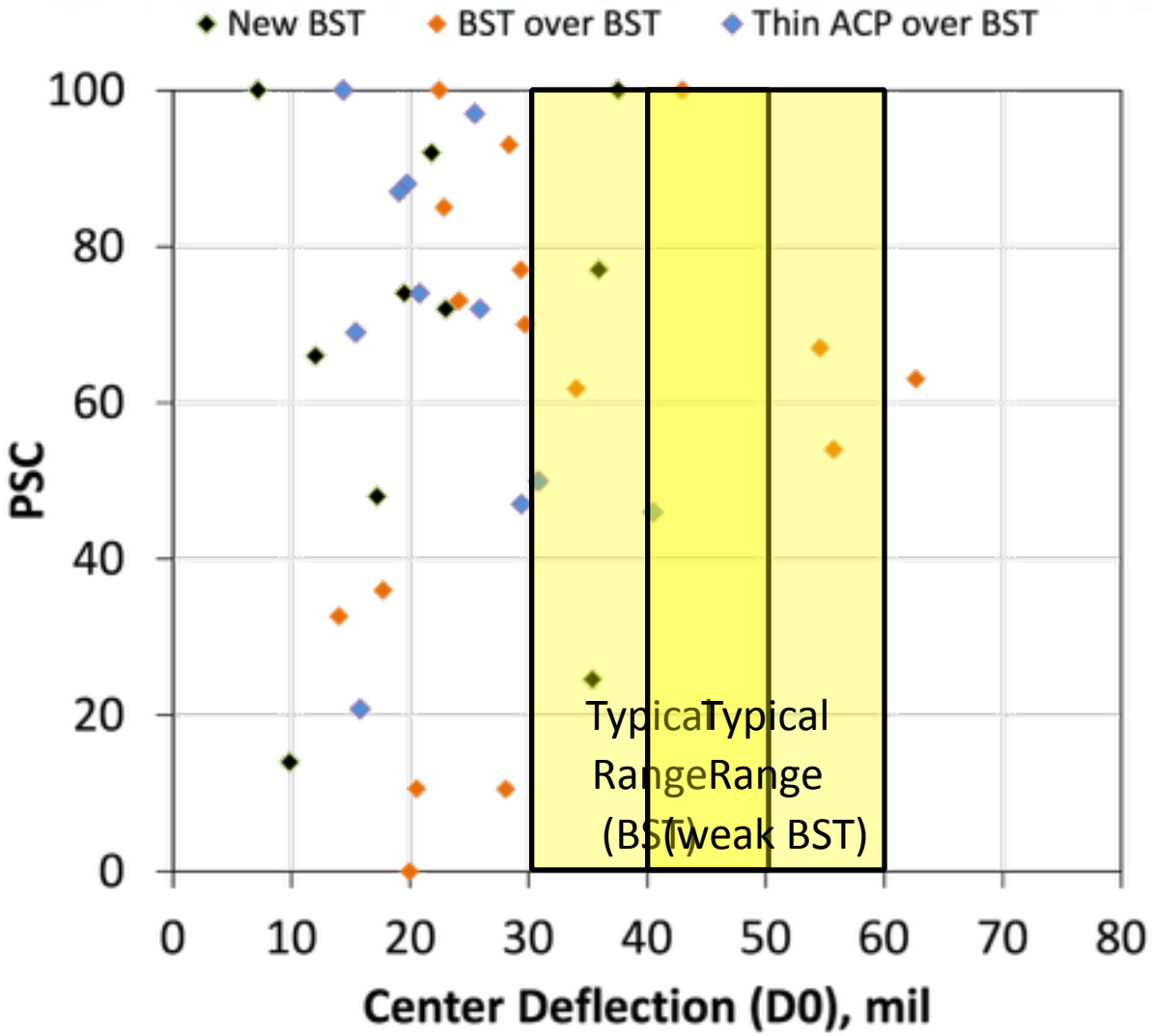
- Deflection at center of applied load



Center Deflection – ACP Segments



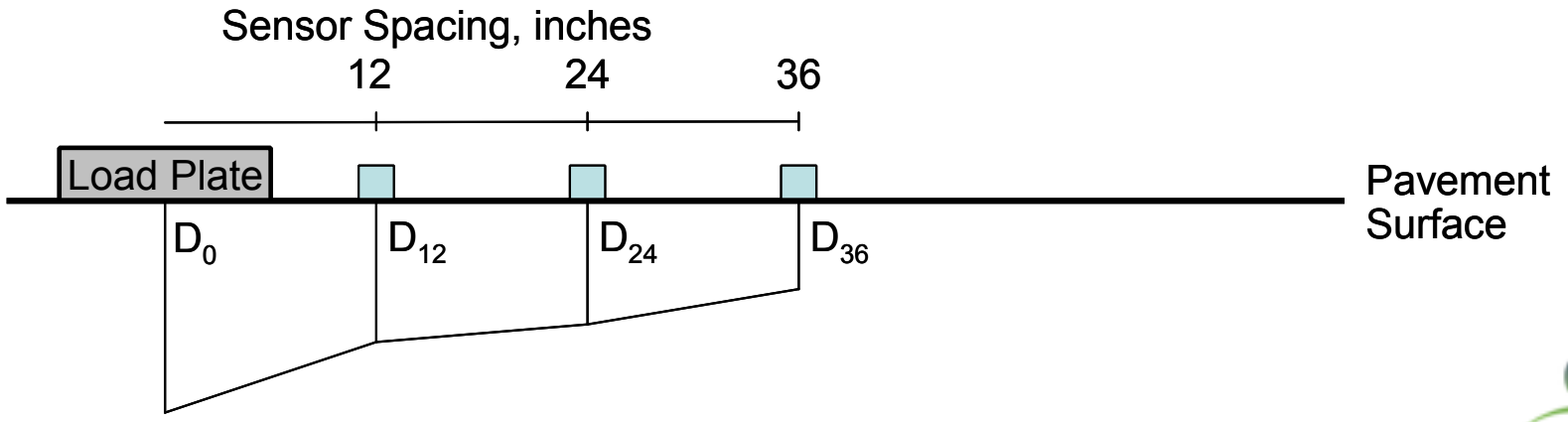
Center Deflection – BST Segments



Area Value

- Represents normalized area
- Good indication of pavement section stiffness

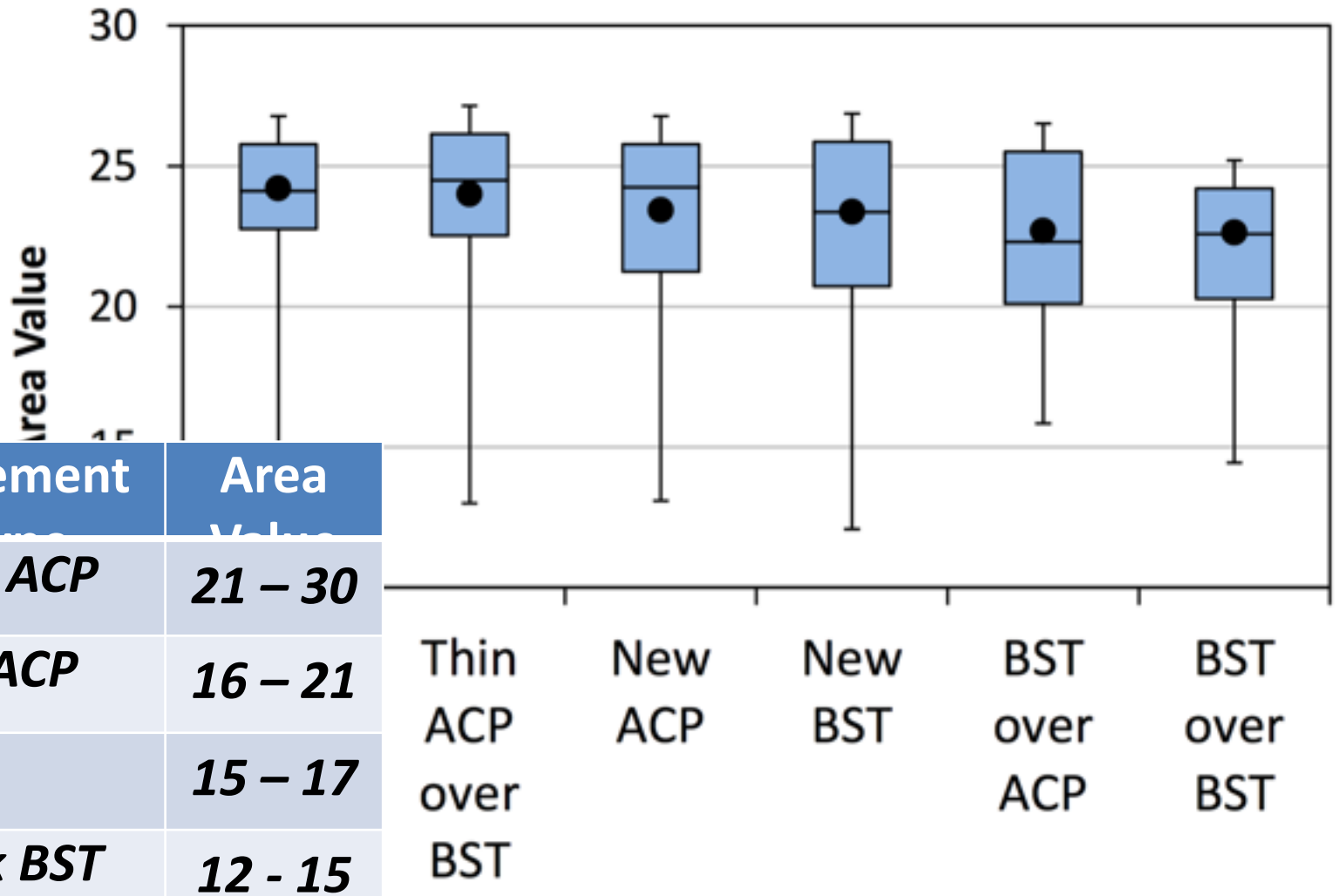
Pavement Type	Area Value (in)
Thick ACP (> 4 in)	*21 – 30*
Thin ACP (< 4 in)	*16 – 21*
BST	*15 – 17*
Weak BST	*12 - 15*



Area Value (continued)

Area Value	Center Deflection	General Condition
Low	***Low***	***Weak structure, strong subgrade***
Low	***High***	***Weak structure, weak subgrade***
High	***Low***	***Strong structure, strong subgrade***
High	***High***	***Strong structure, weak subgrade***

Area Value Results

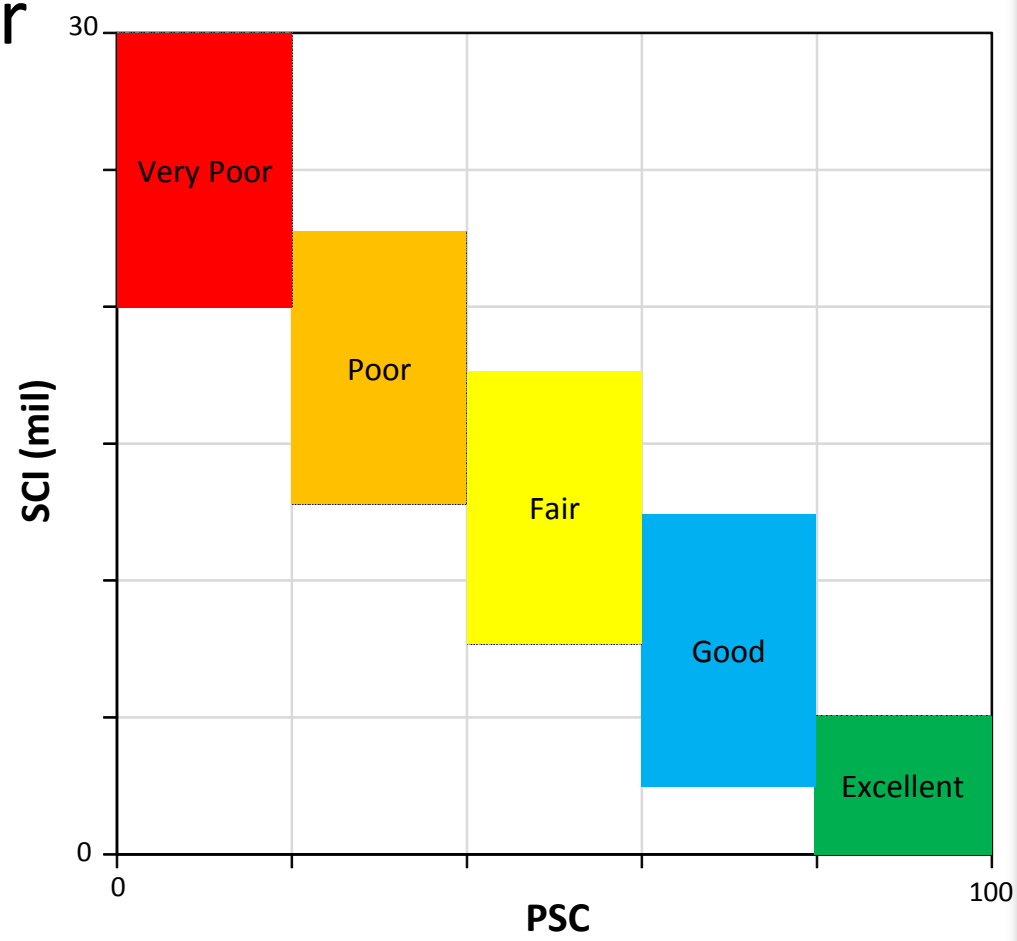


Pavement Type	Area Value
Thick ACP	*21 – 30*
Thin ACP	*16 – 21*
BST	*15 – 17*
Weak BST	*12 - 15*

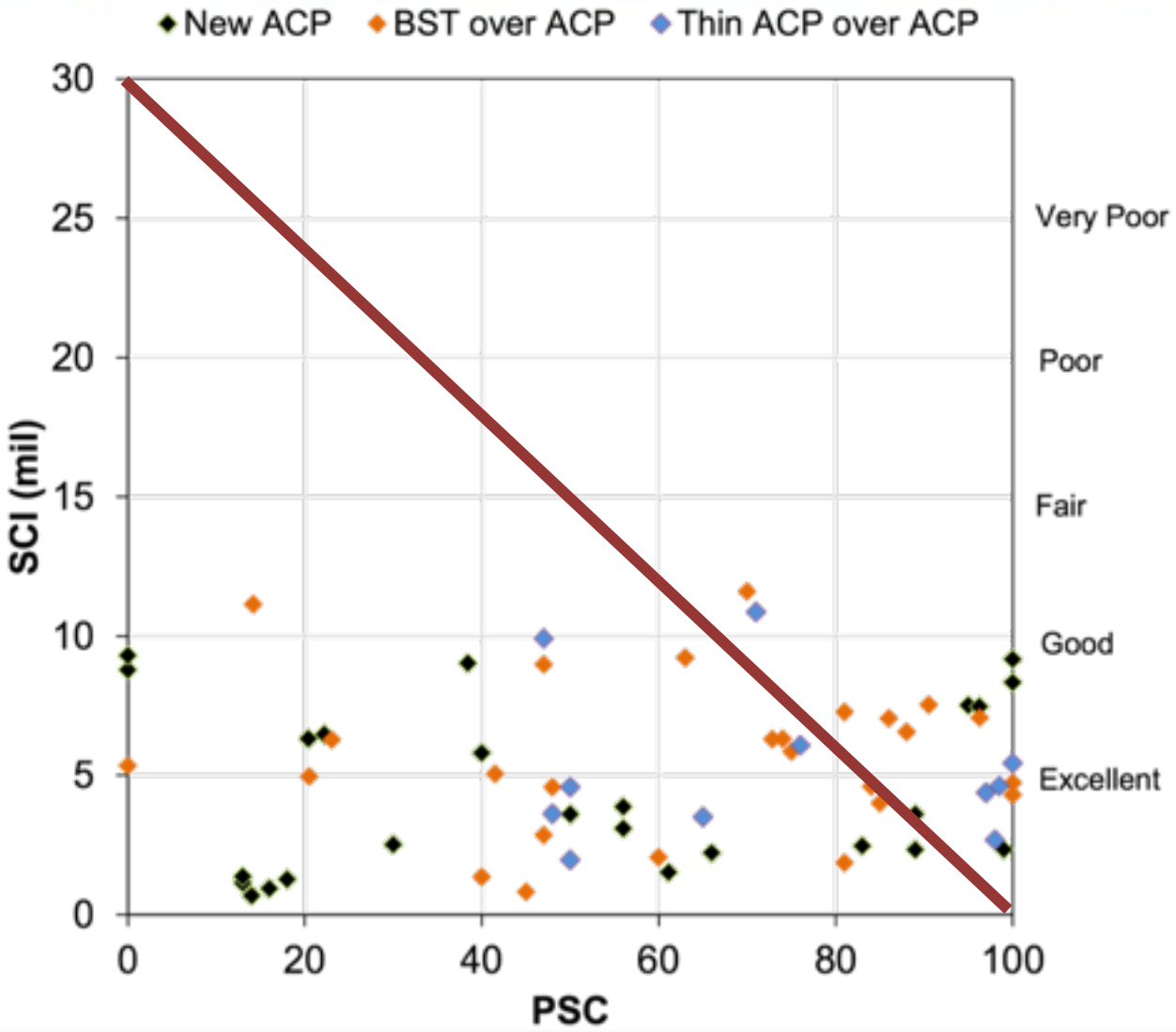
Surface Curvature Index (SCI)

- Deflection parameter
- $SCI = D_0 - D_1$

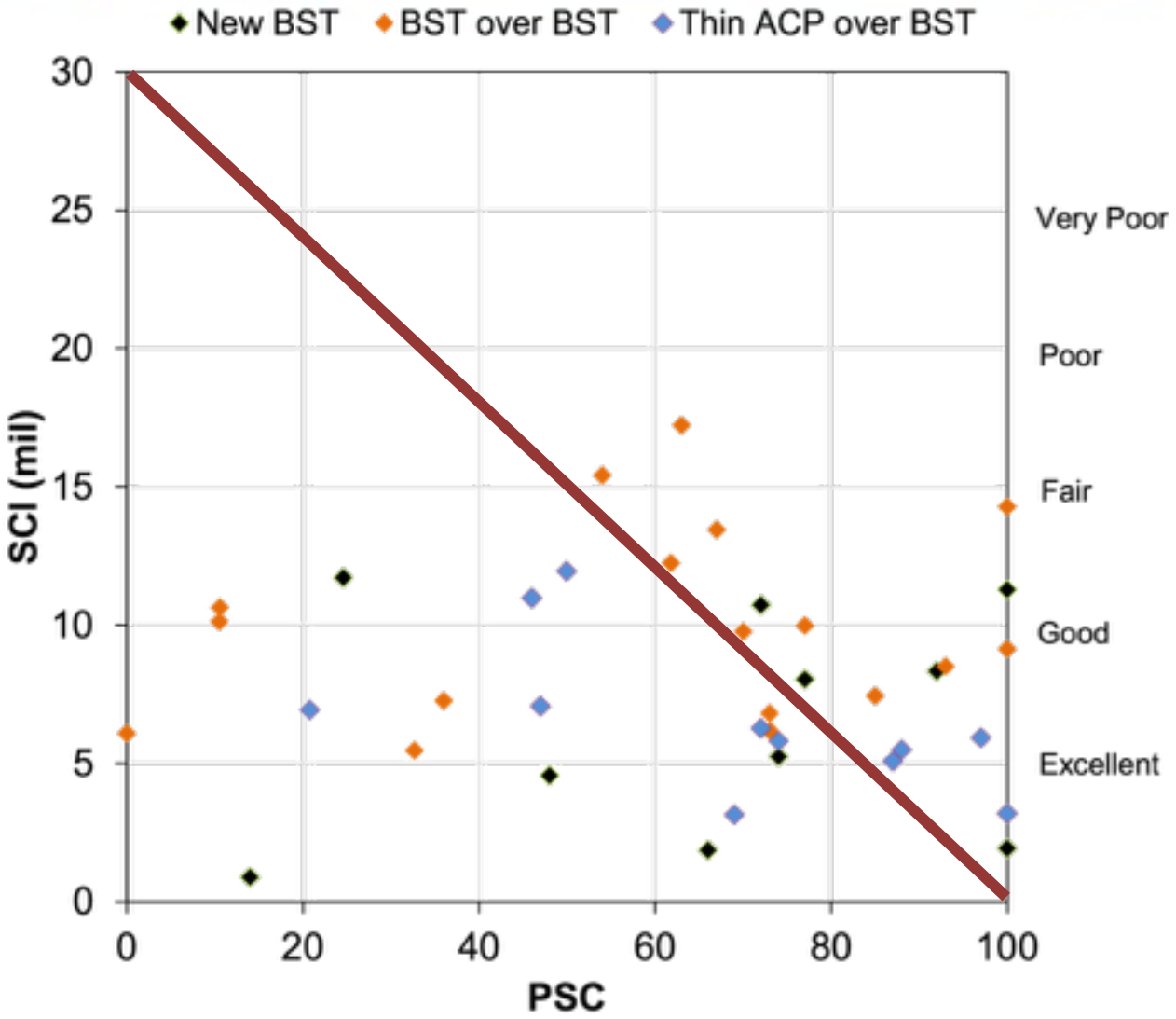
SCI (mil)	General Condition
0 – 5	*Excellent*
5 – 10	*Good*
10 – 15	*Fair*
15 – 20	*Poor*
20 – 25	*Very Poor*



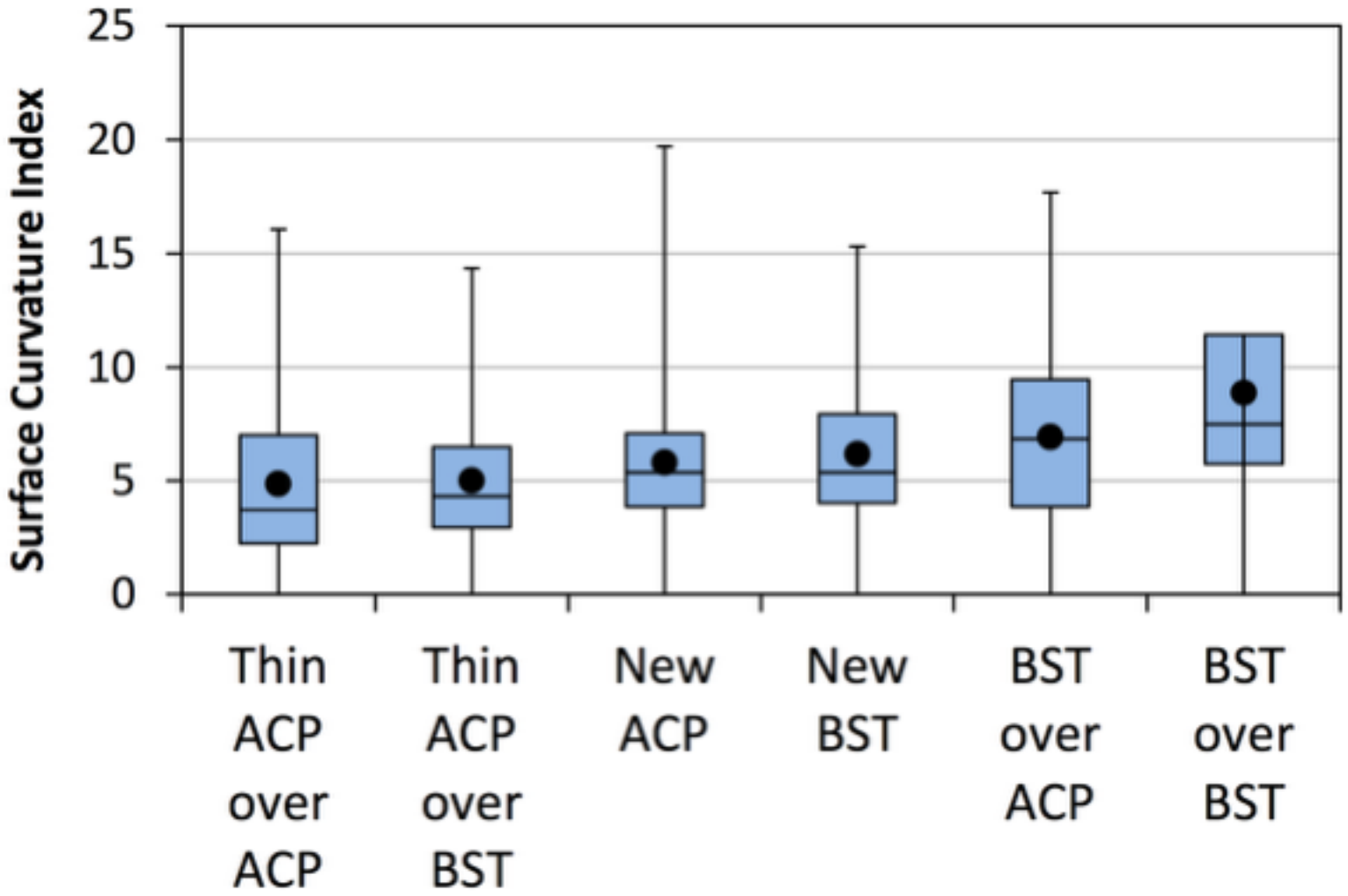
SCI Results – ACP Segments



SCI Results – BST Segments



SCI – Results (continued)



Conclusions

- Deflection parameters alone does not appear to provide sufficient information on the relationship of structural to surface condition
- Additional research may be warranted
  - Layer thickness and truck loading
  - Coring
- WSDOT research study on chip seal pavement performance measures (October 2015)