

***Performance Related Specifications
for Concrete Pavement***

Tommy Nantung
Pavement and Materials Engineer
Research Division
INDOT



Performance Related Specifications for Concrete Pavement

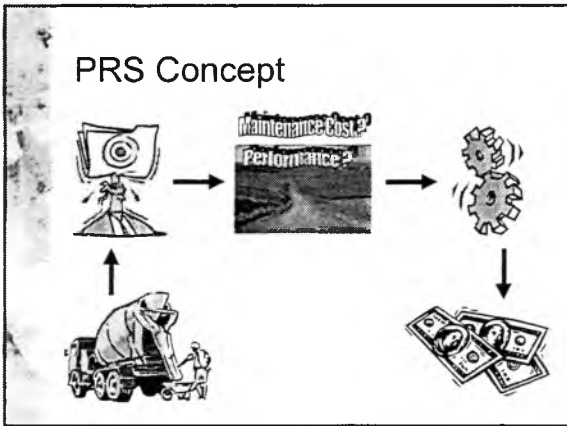
Tommy Nantung (INDOT Research)
Richard Smutzer (INDOT Materials and Tests)
Tim Bertram (INDOT Contract and Construction)
Jason Weiss (Purdue University)

PRS Background

- Commitment of highway community to the public:
 - Providing roadways of the highest possible quality
- A cooperative effort to improve quality:
 - Inclusion of statistical quality assurance elements to the specifications
 - Sometimes includes price adjustment based on test results

Definition of PRS

- Specifications that describe the desired levels of key materials and construction quality characteristics that have been found to correlate with fundamental engineering properties that predict performance



QC/QA Specifications vs PRS

- QC/QA require engineering intuition to establish price adjustments for each quality characteristic
- PRS uses mathematical models taking all quality characteristics into account to determine price adjustments.

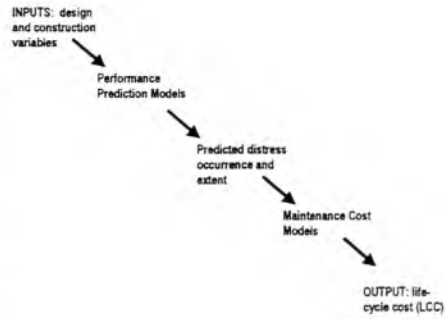
QC/QA Specifications vs PRS

- QC/QA Specifications
 - Minimum Portland Cement Content
 - Maximum Water-Cement Ratio
 - Unit Weight
 - Air Content (disincentive pay factor)
 - Flexural Strength (disincentive pay factor)
 - Thickness (disincentive pay factor)
 - Smoothness (incentive pay factor)

QC/QA Specifications vs PRS

- PRS Level 1
 - Identical to QC/QA
 - Flexural Strength (price adjustment)
 - Thickness (price adjustment)
 - Smoothness (price adjustment)
- PRS Level 2
 - Performance quality characteristics (one overall price adjustment) for current + any other PRS quality characteristics

PRS Models for LCC



Basis for Price Adjustment

- Inputs
 - Design variables such as: traffic loading, climatic factors, etc
 - Materials and construction quality characteristic such as: concrete strength, pavement smoothness, thickness, etc.

Basis for Price Adjustment...

- Target values as inputs will give *as-designed LCC*
- Actual measured values as inputs will give *as constructed LCC*
- The difference between the *as-designed LCC* and the *as constructed LCC* is the basis for any price adjustment

Criteria for PRS Elements

- Distress types to be controlled through PRS
 - It is under contractor's control
 - It can be predicted through an engineering-based model
 - It impacts pavement life and required maintenance and rehabilitation

Criteria for PRS Elements...

- Materials and Construction Quality Characteristics that influence each controllable distress type
 - It is under contractor's control
 - It is measurable
 - It correlates strongly with the distress

Differences between PRS Level 1 and Level 2...

<ul style="list-style-type: none"> ● Level 1 <ul style="list-style-type: none"> ● Primary method of Acceptance Testing <ul style="list-style-type: none"> ● Current acceptance tests (QC/QA) ● Acceptance Quality Characteristics <ul style="list-style-type: none"> ● Current acceptance characteristics 	<ul style="list-style-type: none"> ● Level 2 <ul style="list-style-type: none"> ● Primary method of Acceptance Testing <ul style="list-style-type: none"> ● In situ acceptance testing ● Acceptance Quality Characteristics <ul style="list-style-type: none"> ● Current acceptance characteristics + any other desired PRS quality characteristics
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Differences between PRS Level 1 and Level 2...

<ul style="list-style-type: none"> ● Level 1 <ul style="list-style-type: none"> ● Price Adjustment <ul style="list-style-type: none"> ● Price adjustment for each quality characteristic ● Individual price adjustment for each quality characteristic based on an as-constructed LCC estimate (assuming other characteristics are held constant at their target value) 	<ul style="list-style-type: none"> ● Level 2 <ul style="list-style-type: none"> ● Price Adjustment <ul style="list-style-type: none"> ● One overall price adjustment which reflects interactions among quality characteristics ● Overall price adjustment based on as-constructed LCC estimate calculated from all quality characteristics
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Quality Characteristics

<ul style="list-style-type: none"> ● On target but inconsistent 	<ul style="list-style-type: none"> ● Consistent but out of target
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