Performance Related Specifications for Concrete Pavement

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Performance Related Specifications for Concrete Pavement

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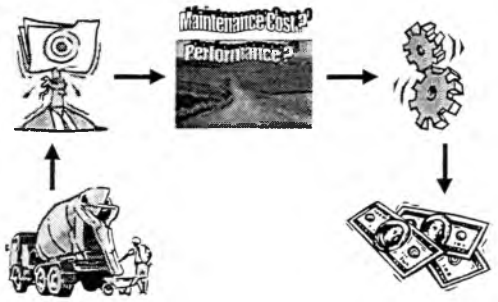
PRS Background

- 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

PRS Concept



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.

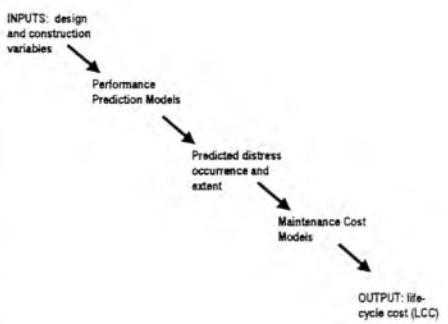
QC/QA Specifications vs PRS

- 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 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...

- Level 1
  - Primary method of Acceptance Testing
    - Current acceptance tests (QC/QA)
  - Acceptance Quality Characteristics
    - Current acceptance characteristics
- Level 2
  - Primary method of Acceptance Testing
    - In situ acceptance testing
  - Acceptance Quality Characteristics
    - Current acceptance characteristics + any other desired PRS quality characteristics

Differences between PRS Level 1 and Level 2...

- Level 1
  - Price Adjustment
    - 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)
- Level 2
  - Price Adjustment
    - One overall price adjustment which reflects interactions among quality characteristics
    - Overall price adjustment based on as-constructed LCC estimate calculated from all quality characteristics

Quality Characteristics

- On target but inconsistent
- Consistent but out of target