PRESERVATION STRATEGIES FOR THE CONCRETE PAVEMENT NETWORK OF THE WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

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ABSTRACT
The Washington State Department of Transportation (WSDOT) has about 2,400 lane miles of concrete pavements. The pavements have far exceeded their original design lives and carried several times the estimated traffic loading. WSDOT is facing an accelerating rehabilitation backlog and enormous rehabilitation need due to the continuously reduced preservation funds in the past. However, like most State Departments of Transportation, WSDOT’s roadway preservation budget has been reduced. The ability to maintain a good performance level with reduced funding comes from using innovative techniques and picking the best investment alternatives wherever possible. This paper describes the development of preservation strategies for WSDOT concrete pavement network. The strategy accounts for the current pavement conditions, predicted future conditions and agency financial constraints.

BACKGROUND

- **The Washington State Pavement System** monitors the performance of each 0.1 lane-mile pavement section.
  - Cracking, Spalling and Patching
  - Faulting
  - Roughness and Rutting

- **Concrete pavement rehabilitation methods**
  - Grinding
  - Dowel Bar Retrofit (DBR)
  - Reconstruction

- **Pavement rehabilitation trigger values**
  - **Reconstruction/CSOL**:
    1. >15% panels having multiple cracking, or
    2. >60% of slabs having single cracking, or
    3. The combination of other distresses causing the same damage.
  - **DBR for undowel sections**:
    1. >10% of slabs having 0.5" or higher faulting, or
    2. >25% of slabs having 0.25" to 0.5" of faulting, or
    3. >50% having 0.125" to 0.25" of faulting, or
    4. The combination causing same damage; and
    5. Pavement age less than 50 years; and
    6. All type of cracking and high patching <10%.

- **Grinding**:
  1. >25% of slabs have faulting, or
  2. Rutting > 0.5", or
  3. IRI > 220 in/mi.

- **Paving rehabilitation needs in 30 years (fiscal year 2016-45)**
  - Rehabilitation alternatives at the lowest life-cycle cost are selected.
  - A detailed list of proposed projects for the 2016-25 periods was developed and defined as the rehabilitation needs assuming no budget constraint occurs.
  - The plan for 2025 - 2045 is naturally less detailed and more subjective, given the lack of certainty in estimating future road conditions and needs over a 30-year period.
  - Comparing to concrete reconstruction, CSOL saves $1.6 million dollars and 90 closure-hours per lane-mile. Over the next 30 years, there will be 600 lane-miles of WSDOT concrete pavements converted to flexible pavements by CSOL.

- **Conclusions and Recommendations**
  - WSDOT is facing an accelerating rehabilitation backlog of the concrete pavements due to the continuously reduced preservation funds.
  - The analysis of WSDOT concrete pavement performance data provides a quantitative understanding of the concrete pavement network.
  - The newly updated concrete pavement condition indices are able to reflect the pavement structure conditions and rehabilitation methods properly.
  - Maintaining sections that are currently due for rehabilitation.
  - Integrating preventive activities with rehabilitation strategies.