Pavement Remaining Service Interval: A Logical Replacement to RSL Concept

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VDOT

Remaining Service Life

- Remaining Service Life (RSL) is a measure used to communicate pavement health and timing future needs.
- A very familiar term to pavement engineers
- In one form or another, in use at a number SHAs
- Need for RSL estimation arises from:
  - Planning and programming activities
  - Assessing infrastructure health, worth and needs
  - Remaining value at end of LCC analysis period
  - Compliance with concession and warranty agreements

Challenges with the use of RSL

- Wide variation in the definition
  - Time until a pavement reaches a threshold condition
  - Extent of useful life left in a pavement
  - Time to next rehabilitation/reconstruction treatment
  - The life remaining in a pavement before a major rehabilitation or reconstruction is the most cost effective fix to apply
- Results in “RSL” values that are very different from and inconsistent with each other yet all often assumed to mean the same

Challenges with the use of RSL

- When communicated, meaning of “life” or end point is often not part of the message - left to the recipients interpretation of “life”
- Use of word "life" in this context is improper since pavements do not “die;” they are infinitely repairable systems – the end point is economics based
- A term that is perceived to be well understood but in reality very much misinterpreted

Challenges with the use of RSL

DEPARTMENT OF TRANSPORTATION
FY 2012-13 JOINT BUDGET COMMITTEE HEARING AGENDA

6. Why has CDOT lowered its benchmark for the percent of pavement in good or fair condition year after year? Is there something below the poor rating for pavement? Should the performance metric for pavement focus on those roads in poor condition rather than those in good or fair condition?

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There is a rating below the "poor" rating for pavement. While poor pavement has a remaining service life of zero to five years, "Zero Poor" pavement has no remaining service life. Currently, 34% of CDOT's roads have zero remaining service life. This does not mean that they cannot be driven on. This means that the only economically viable treatment is complete reconstruction.

Reformulated Pavement Remaining Service Life Framework

- Remaining Service Interval (RSI) terminology created to eliminate ambiguity and lack of clarity associated with Remaining Service Life (RSL) terminology.
- RSI concept does not provide an alternative to assessing health of network or making decisions about where to spend available funds.

Remaining Service Interval

- Provides clear terminology and logical process to move away from erroneous statements such as “pavement has only 5 years of life” and towards consistent construction event-based terminology and understanding – types and timing of construction events
- Premised on identifying “a structured sequence of maintenance, preservation, repair, rehabilitation, and replacement actions” through lifecycle cost considerations to provide needed functions safely and reliably “over the lifecycle of the assets at minimum practicable cost.”

Remaining Service Interval

- Can and must consider both structural and functional conditions of the pavement
- Concept requires further development and refinement of computational algorithms and refined presentation techniques in order to find acceptance in practice

Combined Structural and Functional Condition

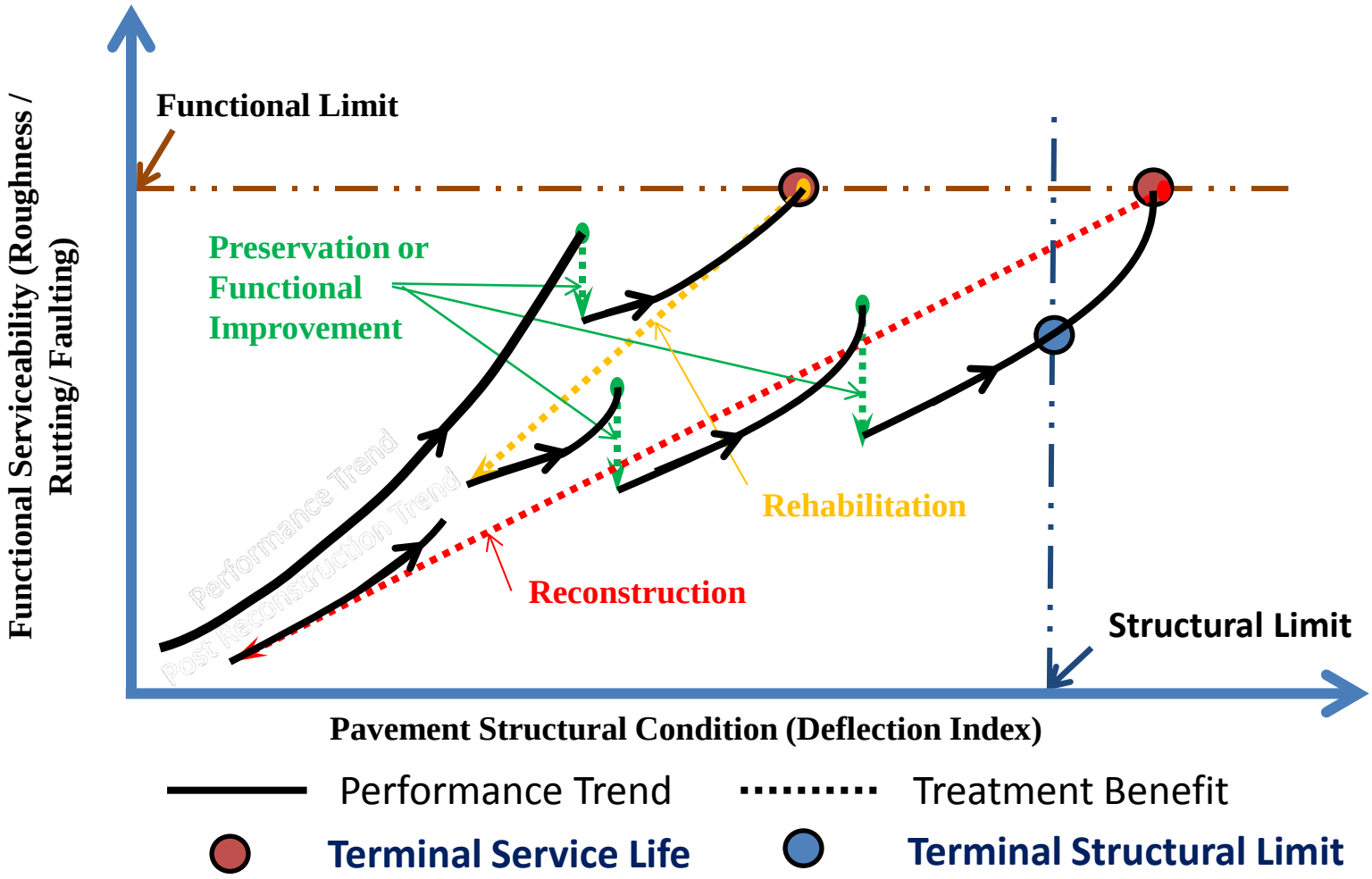
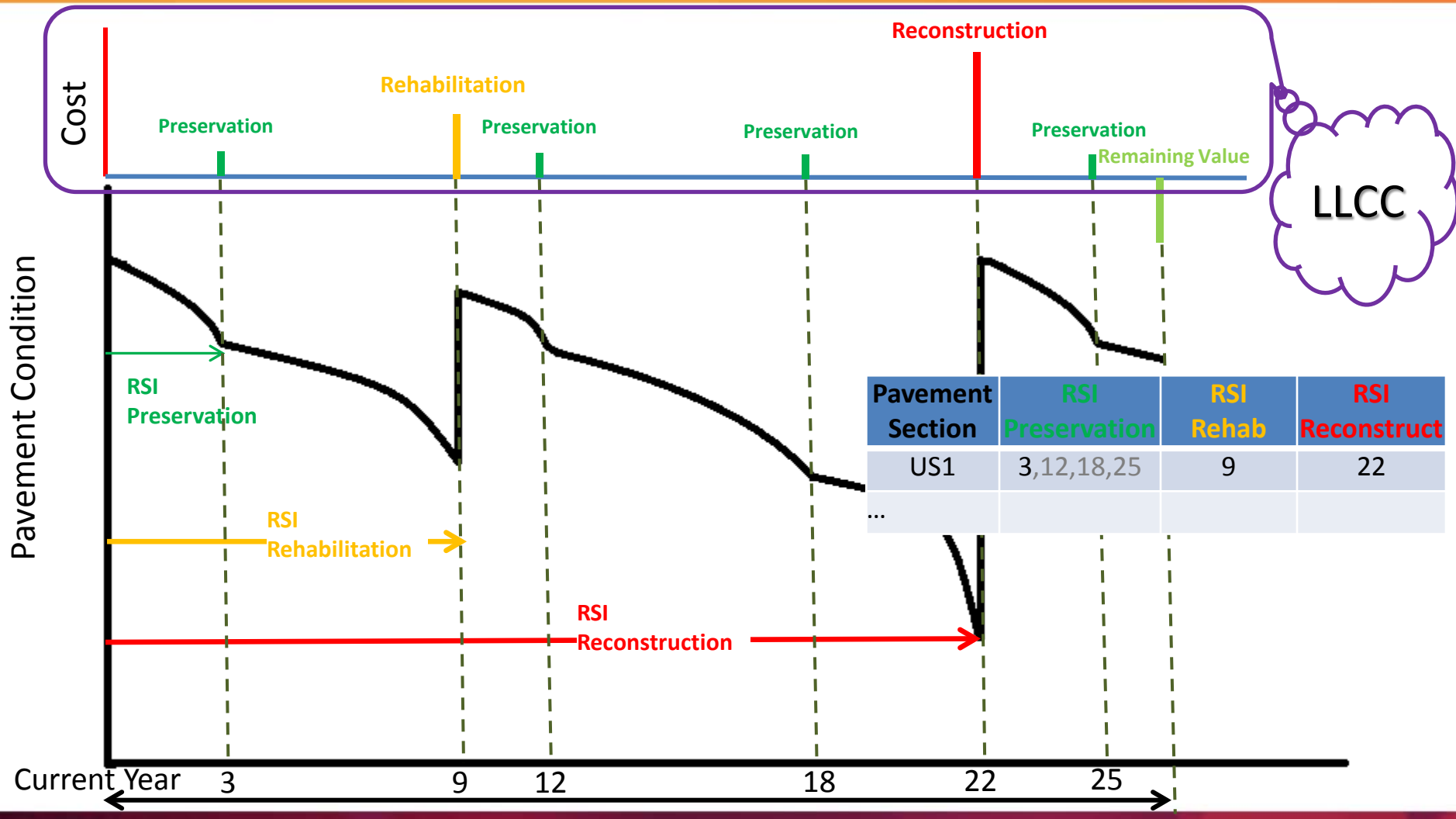


Illustration of Pavement RSI Concept



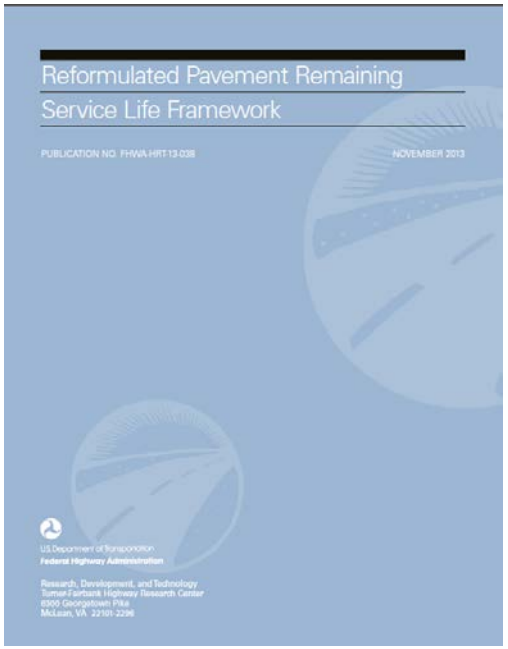
Pavement Section	RSI Preservation	RSI Rehab	RSI Reconstruct
US1	3,12,18,25	9	22
…			

How it relates to MAP-21?

ASSET MANAGEMENT—The term ‘asset management’ means a strategic and systematic process of operating, maintaining, and improving physical assets, with a focus on both engineering and economic analysis based upon quality information, to identify a structured sequence of maintenance, preservation, repair, rehabilitation, and replacement actions that will achieve and sustain a desired state of good repair over the lifecycle of the assets at minimum practicable cost.

Project Reports

- Reformulated Pavement Remaining Service Life Framework
  http://www.fhwa.dot.gov/publications/research/infrastructure/pavements/13038/13038.pdf
- Pavement Remaining Service Interval Implementation Guidelines
  http://www.fhwa.dot.gov/publications/research/infrastructure/pavements/13050/13050.pdf



RSI Implementation Steps

- Setting minimum acceptable user LOS measures
- Selecting or developing performance models
- Identifying collection of inputs
- Establishing construction strategy selection process
  - Engineering interpretation
  - Economic analysis
  - Optimization
- Performing periodic assessments and updates

Application and Validation of RSI Framework to Pavements

1. Develop RSI Analysis Methodologies
2. Application and Validation of RSI Framework
   A. SHA Pavement Management Data for SHA Network and Project Level Applications
      - Maryland SHA
      - Washington DOT
   B. HPMS 2010+ Pavement Data for National Level Application
3. Develop a Step-by-Step Procedure / Algorithm Documenting the Refined Analyses for Computerized Implementation

Application and Validation: Maryland SHA

- Status
  - Models for cracking, rutting, IRI and friction
  - Treatments types, threshold values, benefits and costs
- Issues/Challenges
  - Models are primarily a function of treatment type and age
  - Limits scenario analysis for identifying lowest LCC based treatment sequence

Application and Validation: Washington DOT

- Status
  - Access to WSPMS via WebPMS
    - Condition data
    - Performance models
    - Cost
  - Investigated relationship between pre-treatment condition on post-treatment life/performance
- Issues/Challenges
  - “Due Year” based on a single intervention threshold for the predominant defect
  - Apparent lack of expected correlation between post-treatment performance and pre-treatment condition

Application and Validation: HPMS 2010+ and PHT Tool

- Status
  - RSI module for PHT developed and tested
  - Finalizing RSI module and documentation
- Issues/Challenges
  - Limited historical performance data in HPMS for calibration of models in PHT
  - Validity of models within PHT tool

Thank You!

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