



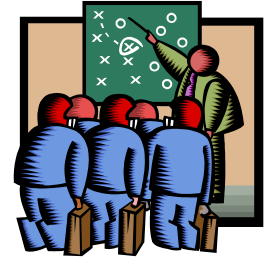
# **Life Cycle Cost Analysis**

Michael Holder, PE

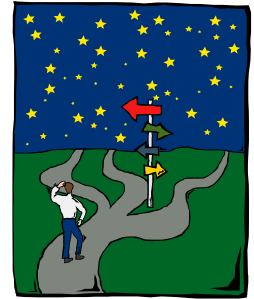
April 4, 2014

# Outline of Presentation

- Definition and Goal
- Components of Life Cycle Cost Analysis
- Revision Process
- Senate Bill 402, Sec. 34.25
- Responses to Questions
- Comparison to Other States
- Stakeholder Input
- Next Steps

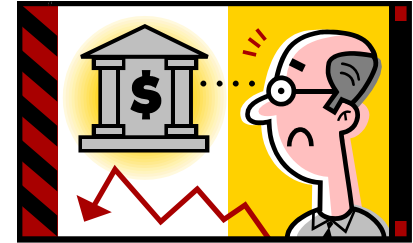


# Definition and Goal



- LCCA is a method of calculating the economic value of a pavement alternate considering its initial cost and the costs of future treatments over an analysis period.
- *Goal: Make the best business and engineering pavement type decision for each project.*

# Components of LCCA



- Design life: establishes the initial thickness of layers during the pavement design process.
- Discount rate: used to consider the time value of money from standard economic analysis.
- Treatments: most common treatment for that pavement type in NC.

## Components (continued)



- Treatment timing: the time from the beginning of the analysis period to the application of the first treatment.
- Salvage value: any remaining treatment life at the end of the analysis period.
- User costs: costs born by the public due to increased vehicle operating costs or delay. These are considered separately from other costs.

# Revision Process



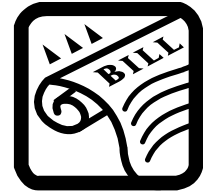
- NC Turnpike Authority sought consensus on LCCA beginning in 2009-2011.
- Outside review, by David Peshkin, PE, of NCDOT's 2007 process received in Jan 2012. LCCA procedure was modified.
- SAS report on treatment timing completed Aug 2012. LCCA modified.

# Revision Process



- Re-review of LCCA process by David Peshkin received Dec 2012.
- Follow-up meetings with concrete and asphalt industries in Dec 2013. Concerns of both industries are detailed in our report. Additional meetings in Jan and Feb 2014.

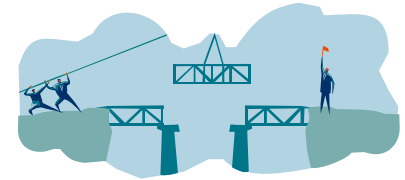
# Senate Bill 402, Sec. 34.25



- Proportion of projects for which LCCA has been performed.
- Federal or statutory impediments to LCCA.
- Comparison to other states methodology.
- Scope and nature of outside stakeholder involvement.



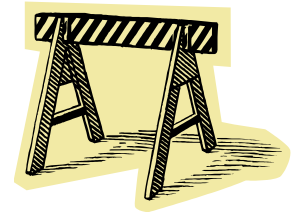
# Proportion for which LCCA is Conducted



- Done for many centrally designed and centrally let Transportation Improvement Program (TIP) Projects.
- Not done for Bridge projects. Also not done for very short projects, or variable widening.
- 37% of Interstate, 100% of rest area and welcome center, 43% of rural, 36% of urban.

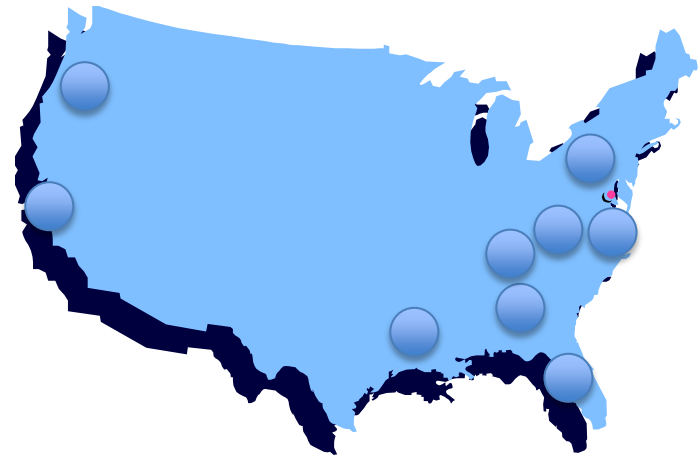
# Statutory Impediments to Use of LCCA

- No federal or state statutes are impediments.
- No federal “LCCA process”. States are to use “good practice.”
- Use of LCCA was mandated for NHS projects costing >\$25 million from 1995 to 1998, but is no longer mandated.



# Similar States Used in Comparison

- Alabama
- California
- Florida
- Georgia
- Louisiana
- Oregon
- Pennsylvania
- Tennessee
- Virginia
- West Virginia



# Comparison to Similar States



- Our 2011 analysis period of 30 years was similar to 4 of the comparison states. Many agencies are moving to longer analysis periods nationally.
- Most of the comparison states used the same design life for asphalt and concrete.
- Most did LCCA for new location and rehab.

# Comparison to Similar States



- NCDOT process was similar in calculation of agency costs.
- Most of comparison states calculate user costs. Use of work zone delay and operating costs are most common. All considered separate from agency costs.

# Stakeholder Involvement



- Citizens are the ultimate stakeholder. FHWA holds us to good practice and fiscal responsibility.
- Asphalt and concrete industry are directly impacted by LCCA decisions. The aggregate industry is also a major material supplier, but LCCA is not their focus.

# Asphalt Industry Concerns



- Believe that recent modifications to specs have improved performance.
- Want 20 year design life for asphalt and 30 year design life for concrete.
- Wants user costs to be included directly in LCCA.

# Concrete Industry Concerns



- Believe that use of 15' slabs and dowels will improve performance.
- Want rehab to consist of ultrathin bonded wearing course rather than unbonded overlay.
- Wants discount rate to be the OMB 30-year discount rate.



## Next steps



- Draft LCCA discussed with both industries and FHWA for additional input. 4/30/2014
- Comparison of 5 projects using previous design procedure and 2007 LCCA and new design procedure and new LCCA. 4/15/2014
- Revised LCCA to industry and FHWA by 5/15/2014 for comments.
- Recommended LCCA to NCDOT leadership for approval by 6/1/2014.

# LCCA



- LCCA is a process that impacts pavement type selection in an agency.
- Any change impacts the balance between stakeholders.
- The process of revision and updating will continue.
- The goal is selection of the best pavement type for each project.