THE NEW HOT-MIX ASPHALT ABSOLUTELY!

Life Cycle Cost Analysis

Whether you are an engineer, public works director, agency representative, county commissioner, or industry representative, we are all taxpayers and the responsibility lies with each generation to **invest wisely in our infrastructure**.

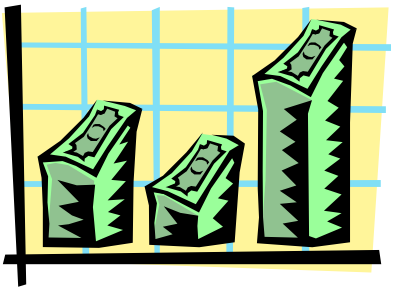
Not all investments are equal; and because road and airfield pavements are usually constructed and maintained from public funds, the economics of alternative pavement materials should be examined carefully and should be a part of the pavement design process.

The Federal Highway Administration (FHWA) promotes Life Cycle Cost Analysis (LCCA) as an engineering economic analysis tool for transportation representatives to quantify the differential costs of alternative investment options for a given project. The Discount Rate allows for the use of constant (today's) dollars in the analysis.

It is critical to the future generation that we invest wisely in our national and local network of pavements.

Improper use of the LCCA could lead to unwise decisions concerning infrastructure, which is one of our nations most valuable assets. It is imperative that LCCA be discussed to ensure proper evaluation of potential alternatives and pavement strategies to select the most economical solution.

LCCA must be a transparent process so that results are obtained with complete knowledge of the inputs and an understanding of how the model works. There are several methods for conducting life cycle cost analysis and they do not all reach the same conclusion.



LCCA should be based on sound, unbiased, and proven engineering and economical models, such as the LCCA software tool that the Federal Highway Administration has created and is available on their web site at www.fhwa.dot.gov. The same analysis is in the Asphalt Pavement Alliance's software tool, and can be found at their web site: www.asphaltalliance.com.

It is important to understand that the ***discount rate*** used in LCCA is approximately equal to the difference between the expected interest rate and expected rate of inflation. Data on historical trends over very long periods indicate that the real time value of money is approximately 4%.[1,2] **The discount rate has a positive value whether or not there is inflation in the economy.**[2]

Most Agencies do not account for **road user costs** in their life cycle cost analysis. Road user costs can include vehicle-operating costs, costs of accidents, discomfort, and user delay costs. The delay costs that are suffered by road users are sometimes considered to be indirect (non-agency) costs, but AASHTO[3] states that user delay costs may be significant

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enough in some cases to justify their inclusion in the economic evaluation. Traffic handling during lane closures can exert a strong influence on delay costs, as can other factors including:

- hourly traffic volumes,
- work period,
- length of work zone,
- road geometrics,
- traffic handling, and
- availability of alternative routes.

The FHWA has reported that 14 states are currently including user costs in the LCCA, with ten of those incorporating work zone user delay costs[4]. Several states also use FHWA's RealCost LCCA software when performing analyses. RealCost identifies cost differences between design alternatives, accounting for both initial and future agency and user costs.

The **analysis period** is the length of time (usually years) that is selected for consideration of the life cycle costs, not necessarily the service life of the pavement. This has caused confusion in the proper application of LCCA. Most pavements are constructed for long-term benefits to society and experience has shown that many hot-mix asphalt (HMA) pavements are still in service 35 or more years after initial construction, visit www.asphaltisbest.com for more information.

The analysis period should not extend beyond the period of reliable support or forecasting. It should be confidently fulfilled. The FHWA LCCA Policy statement recommends an analysis period of at least 35 years for all pavement projects, including new or total reconstruction projects as well as rehabilitation, restoration, and resurfacing projects[5].

Accounting for the different serviceability conditions of the various alternatives is clearly important. The fairest way of dealing with the differential serviceability ratings of the various alternative pavement types is to:

1. use the FHWA LCCA guidelines[1,2,5,6], which state that the analysis period is to be long enough to include at least one major rehabilitation for each alternative, and
2. to assign the costs that are necessary to restore each alternative to the same acceptable standard condition, which must be the appropriate standard for all alternatives considered.

Total reconstruction would not apply to HMA pavements because of their **cost-effective recycling** potential. Such a procedure eliminates bias and if conscientiously applied, ensures that future generations are not burdened with any foolish investment decisions of the current generation.

In summary, MAPA supports a concept of Life Cycle Cost Analysis and corridor management for a cost-effective, environmentally friendly transportation system (new or rehabilitated) for the taxpayers of Minnesota.

1. Life Cycle Cost Analysis in Pavement Design, Report No. FHWA-SA-98-079, J. Walls III and M. Smith, Sept. 1998.
2. FHWA, Economic Analysis Primer, *www.fhwa.dot.gov/infrastructure/asstmgmt/primer03.htm*.
3. AASHTO Guide for Design of Pavement Structures, NCHRP 20-7/24.
4. "Focus," US Dept. of Transportation Federal Highway Administration, March 2007.
5. Life Cycle Cost Final Policy Statement, "Federal Register," Vol. 61, No. 182, Sept. 18, 1996, p. 35404.
6. "Pavement Type Determination Task Force Final Report," Mn/DOT Engineering Services Division, October, 2003.