

PD-02: Life-Cycle Cost Analyses

1-3 points

Goal: Reduce life-cycle costs and resource consumption through the informed use of life-cycle cost analyses of key project features during the decision-making process for the project.

Sustainability Linkage

Conducting a life-cycle cost analysis supports the environmental and economic principles by promoting efficient use of materials and resources.



Background and Scoring Requirements

Background

Life-Cycle Cost Analysis (LCCA) is an engineering economic analysis tool that allows transportation officials to quantify the differential costs of alternative investment options for a given project. LCCA can be used to study either new construction projects or to examine preservation strategies for existing transportation assets. LCCA considers all agency expenditures (including planning, engineering, design, construction, maintenance, operations, and administration costs) and user costs (including time, safety, fuel, and other vehicle operating costs associated with normal operations and work zone delays) throughout the life of an alternative, not only initial investments. More than a simple cost comparison, LCCA offers sophisticated methods to determine and demonstrate the economic merits of the selected alternative in an analytical and fact-based manner.

Scoring Requirements

Requirement PD-02.1

1-3 points. Complete Life-Cycle Cost Analysis/Analyses

Complete calculations for LCCA of key project features in accordance with generally accepted engineering economics practices. Comparing multiple design alternatives is encouraged but not required. Scoring is based on the following, cumulative elements.

- **Requirement PD-02.1a**

1 point. Perform LCCA for Pavement Structures Alternatives

Perform an LCCA of all pavement structure alternatives considered in accordance with the method described in the FHWA's Technical bulletin for Life-Cycle Cost Analysis. This may be completed manually, or by using the FHWA's free RealCost software, which can be found at <http://www.fhwa.dot.gov/infrastructure/asstmgmt/lccasoft.cfm> or any equivalent software. This requirement may also be accomplished by using pre-determined pavement designs based on context-specific best practices that are part of a formal Pavement Management System if the pavement design was established based on LCCA analyses (e.g., if within a specific region it has been determined through LCCA analyses that a specific pavement type/mix is most appropriate for bus lanes).

- **Requirement PD-02.1b**

1 point. Perform LCCA for Stormwater Infrastructure Alternatives

Perform an LCCA of all stormwater infrastructure alternatives considered. This analysis should include costs for planning, design, initial construction, maintenance (including appropriate BMP maintenance), and operations. With respect to BMPs, careful consideration should be given to factors such as frequency of scheduled maintenance, chronic maintenance problems (e.g., clogging), and failure rates that add to the overall cost of BMP implementation.

- **Requirement PD-02.1c**

1 point. Perform LCCA for Major Features

Perform an LCCA of the project's major feature (bridges, tunnels, retaining walls, or other items not listed in the preceding options) for each of the alternatives considered. For bridges, perform an LCCA in accordance with the guidance in the National Cooperative Highway Research Program (NCHRP) Report 483 (Hawk, 2003). The report provides standard input values for a wide range of potential bridge projects and referenced sources for other input data. LCCA software may be used, including RealCost, with some minor adjustments to the spreadsheet or a bridge LCCA may also be completed by hand.

Resources

The following resources are referenced in this criterion and consolidated here:

1. FHWA, Life-Cycle Cost Analysis Primer (2002) at <https://www.fhwa.dot.gov/asset/lcca/010621.pdf>
2. FHWA, Life-Cycle Cost Analysis in Pavement Design - Interim Technical Bulletin (1998), Publication No. FHWA-SA-98-079 at http://www.wsdot.wa.gov/NR/rdonlyres/7A7CC34A-6336-4223-9F4A-22336DD26BC8/0/LCCA_TB.pdf
3. FHWA, RealCost software, at <http://www.fhwa.dot.gov/infrastructure/asstmgmt/lccasoft.cfm>
4. NCHRP, Report 483 – Bridge Life-Cycle Cost Analysis (2003) at http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_rpt_483.pdf

Scoring Sources

The project is considered to have met this criterion if the requirements above can be reasonably substantiated through the existence of one of the following documentation sources (or equal where not available):

1. Calculations for the LCCA, including a summary of inputs and outputs.
2. A copy of the owner-agency policy on LCCA if one exists.
3. Calculations for the LCCA performed as part of a Pavement Management System process to set best practice pavement designs.