

Maritime Administration FY 2023 Port Infrastructure Development Program (PIDP)



FY 2023 PIDP Preparing a Benefit-Cost Analysis for a Large Project

Questions during the presentation? Email: PIDPGRANTS@DOT.GOV

- **Benefit-cost analysis (BCA) is a systematic process for *identifying, quantifying, and comparing* expected economic benefits and costs of a proposed infrastructure project.**

- Provides a useful benchmark from which to evaluate and compare potential transportation investments
- Adds a degree of rigor to the project evaluation process

- **Applicants for large projects (as defined in the NOFO) should submit a benefit-cost analysis (BCA) as part of their PIDP grant application**
- **Use of the BCA in PIDP**
 - Assessment of project cost-effectiveness
 - Evaluation of the Economic Vitality merit criterion

- **For large projects, USDOT must determine that the project will be cost effective in order for it to be selected under the PIDP**
 - For amounts made available under the FY23 Consolidated Appropriations Act, this requirement does not apply to projects located in noncontiguous states and territories
- **Cost-effectiveness determinations based on results of the BCA**
 - Projects must be found to have estimated benefits that are reasonably likely to exceed costs in order to be considered cost effective

- **USDOT considers the relative magnitude of estimated project benefits and costs**

- **Assign projects to one of five ratings:**
 - **High** – Benefits exceed costs with a BCR of at least 1.5
 - **Medium-High** – Project benefits will exceed costs
 - **Medium** – Project benefits are likely to exceed costs
 - **Medium-Low** – Costs are likely to exceed benefits
 - **Low** – Costs will exceed benefits

- **USDOT economists will review the applicant's BCA**
 - Examine key assumptions
 - Correct for any technical errors
 - Perform sensitivity analysis on key inputs
 - Consider any unquantified benefits

- **Clear understanding of the problem the project is intended to solve (baseline conditions) and how the project addresses the problem (measures of effectiveness)**
- **Well-defined project scope and cost estimate**
- **Monetization factors for key project benefits**

- **Sources of information may include:**
 - Project planning and engineering documents
 - Industry technical references and analytical tools
 - DOT BCA Guidance
 - Project partners

- **Technical memo/discussion describing the analysis, including any unquantified benefits, and documenting sources of information used (assumptions and inputs)**
 - If provided as an appendix, does not count against page limit for the application narrative
- **An unlocked spreadsheet (e.g., an Excel workbook) showing the calculations used to produce the estimates of benefits and costs**

- Covers all USDOT discretionary grant programs
- Updated January 2023
- Available at <https://www.transportation.gov/mission/office-secretary/office-policy/transportation-policy/benefit-cost-analysis-guidance>

- **The 2023 update to the BCA Guidance includes:**
 - Additional background information on BCA
 - New and updated monetization values
 - Additional guidance and new examples on
 - Valuing pedestrian and transit infrastructure improvements
 - Valuing the benefits of transit transfer reduction
 - Additional guidance on valuation of right-of-way being made available for other purposes

- **Should measure costs and benefits of a proposed project against a baseline alternative (“base” or “no build”)**
- **“Do’s”**
 - Factor in any projected changes (e.g., increased traffic or cargo volumes) that would occur even in the absence of the requested project
 - Factor in ongoing routine maintenance
 - Consider full long-term impacts of no build (e.g., facility closure)
 - Explain and provide support for the chosen baseline
- **“Don’t’s”**
 - Assume that the same (or similar) improvement will be implemented later
 - Use unrealistic assumptions about alternative traffic or freight flows

- **Most benefit estimates depend on usage estimates**
- **Provide supporting info on forecasts**
 - Geographic scope, assumptions, data sources, methodology
- **Provide forecasts for intermediate years**
 - Or at least interpolate—don't apply forecast year impacts to interim years
- **Exercise caution about long-term growth assumptions**
 - Consider underlying capacity limits of the facility

- **Should cover both initial development and construction and a subsequent operational period**
- **Generally tied to the expected service life of the improvement or asset**
 - I.e., the number of years until you would anticipate having to take the same action again
 - Lesser improvements should have shorter service lives
 - Recommend 20 years maximum for capacity expansion projects or other operational improvements
- **Avoid excessively long analysis periods (over 30 years of operations)**
 - Use residual value to cover out-years of remaining service life for long-lived assets

■ Inflation Adjustments

- Recommend using a 2021 base year for all cost and benefit data
- Index values for the GDP Deflator included in the BCA guidance

■ Discounting

- Use a 7% discount rate for all benefits and costs (except CO₂)
- Recommend using a 2021 base year for discounting

- **Project scope included in estimated costs and benefits must match**
 - Don't claim benefits from an entire project, but only count costs from the grant-funded portion

- **Scope should cover a project that has independent utility**
 - May need to incorporate costs for related investments necessary to achieve the projected benefits

- **Project elements with independent utility should be individually evaluated in the BCA**
 - BCA evaluation will cover both independent elements and the submitted project as a whole

- **Should be presented on an annual basis**
 - Don't assume constant annual benefits without a good reason to do so
- **Negative outcomes should be counted as “disbenefits”**
 - E.g., work zone impacts
- **Avoid double-counting benefits**

- **Typically associated with reducing fatalities, injuries, and property damage**
- **Projected improvements in safety outcomes should be explained and documented**
 - Justify assumptions about expected reductions in crashes, injuries, and/or fatalities
 - Document any crash modification factor (CMF) used
 - Show clear linkage between project and improved outcomes
 - Use facility-specific data history for baseline where possible
- **Crash-related injury and fatality data may be available in different forms**
 - KABCO injury scales
 - Fatal/Injury crashes vs. fatalities/injuries
 - BCA Guidance provides values covering all of these

- **Recommended values found in BCA Guidance**
 - See footnotes for discussion of non-vehicle time, long-distance travel, business travel
- **Can be a function of both changes in travel speed and/or travel distance**
- **Consider vehicle occupancy where appropriate**
 - Local/facility-specific values preferred
 - National-level values provided in BCA Guidance
- **If valuing travel time reliability:**
 - Carefully document methodology and tools used
 - Show how valuation parameters are distinct from general travel time savings

- **Avoid double counting operating savings and other impacts**
 - E.g., truck travel time savings, fuel consumption reductions
- **Localized, specific data preferred**
- **Standard per-mile values for light duty vehicles and commercial trucks provided in BCA Guidance**

- **For infrastructure improvements, emissions reductions will typically be a function of reduced fuel consumption**
- **Recommended unit values for CO₂, SO₂, NO_x, and PM_{2.5} found in BCA guidance**
 - Be careful about the measurement units being applied
 - Check for PM_{2.5} versus PM₁₀
- **Reductions in CO₂ emissions should be discounted at 3 percent, while all others should be discounted at 7 percent**

- **Pedestrian, cycling, and transit facility/vehicle improvements can improve the quality or comfort of journeys**
- **Recommended values for different types of improvements found in BCA Guidance**
 - Pay attention to whether value is on a “per-trip” or “per-person-mile” basis
- **Carefully document baseline amenities, as well as specifically how the proposed project will add any amenity benefit category being claimed**

- **Trips diverted to active transportation (walking and cycling) from other modes may yield health benefits to users**
- **Recommended monetization values, on a per trip basis, are found in BCA Guidance**
- **Absent local data on existing mode share and estimates age profiles of users, applicants may apply national averages included in the BCA Guidance.**

- **Primary benefits typically experienced directly by users of the improved facility**
- **Includes both “existing” users (under baseline) and “additional” users attracted to the facility as a result of the improvement**
 - Standard practice in BCA would value benefits to additional users less than those for existing users (see BCA guidance)

■ Projected magnitude

- Should be based on careful analysis of the market and potential for diversion from other modes that might be attributable to the project

■ Benefits estimates should not be based on comparing user costs of “old” and “new” mode

- Would be reflected in benefits to additional users

■ Reductions in external costs would be relevant

- E.g., emissions costs, congestion reduction, noise reduction
- Values for congestion, noise, and safety costs included in BCA Guidance
- Don't apply urban values to rural truck travel
- Should net out highway user fees paid by trucks from marginal pavement damage costs

- **Agglomeration Economies**
- **Noise, Stormwater Runoff, and Wildlife Impact Reduction**
- **Emergency Response**
- **State of Good Repair**
- **Resilience**
 - Consider expected frequency of events and their consequences
- **Property Value Increases**
 - Is a measure rather than a benefit—avoid double-counting

- **Some potential benefits of PIDP projects may be difficult to quantify and monetize**
- **Any claimed unquantified benefits should be explained as well as possible**
 - Should clearly link specific project outcomes to any claimed unquantified benefits
 - Should quantify magnitudes/timing of the impacts wherever possible
 - Should only include impacts that would be counted as benefits, if quantified

- **Include all costs of implementing the project**
 - E.g., design, ROW acquisition, construction
 - Regardless of funding source
 - Include previously incurred costs
- **Three forms of capital costs**
 - Nominal dollars (project budget)
 - Real dollars (base year)
 - Discounted Real dollars (use in BCA)

- **Net maintenance costs may be positive or negative**
 - New facilities would incur ongoing maintenance costs over the life of the project
 - Rehabilitated/reconstructed facilities may result in net savings in maintenance costs between the build/no-build

- **For assets with remaining service life at the end of the analysis period, may calculate a “residual value” for the project**
 - Recall service life does not necessarily match the physical life of the asset
- **Simple approach: assume linear depreciation**
- **Be sure to properly apply discounting**

- **Net Present Value (Benefits – Costs)**

- **Benefit-Cost Ratio (Benefits / Costs)**
 - Denominator should only include capital costs (i.e., net maintenance costs and residual value should be in the numerator)
 - Dis-benefits should be subtracted from the numerator

■ Examples

- Economic Impact Analysis (e.g., job creation)
- Financial Impacts (e.g., revenue impacts)
- Distributional Effects (e.g., equity)

■ Issues

- Use different approaches and answer different questions than does BCA
- Do not represent additional benefits to include in BCA

■ The BCA Guidance

- <https://www.transportation.gov/mission/office-secretary/office-policy/transportation-policy/benefit-cost-analysis-guidance>
- The main body discusses methodology
- Appendix A has many useful input values
- Appendix B shows sample calculations

■ BCA webinars from previous USDOT discretionary programs

- <https://railroads.dot.gov/rail-network-development/training-guidance/webinars-0>
- <https://www.transportation.gov/office-policy/rural/routes-webinar-bca>
- <https://www.transportation.gov/grants/reconnecting-communities/reconnecting-communities-webinars>
- Note that parameter values updated each year

■ Project engineering and planning documents

- **Local traffic counts and travel survey data**
- **U.S. Census Bureau**
- **Project partners (higher levels of government, MPOs, universities, etc.)**
- **Many BCAs submitted for other programs are publicly available via web search**
- **FRA's Crossing Inventory and Accident Reports**
 - <https://safetydata.fra.dot.gov/OfficeofSafety/PublicSite/Crossing/Crossing.aspx>
- **NHTSA's Fatality Analysis Reporting System**
 - <https://www.nhtsa.gov/research-data/fatality-analysis-reporting-system-fars>
- **The Crash Modification Factors Clearinghouse**
 - <https://www.cmfclearinghouse.org/>
- **Technical questions can be submitted to PIDPgrants@dot.gov**

- **Make sure inputs and assumptions in the BCA are sourced and documented**
- **Make sure the submitted BCA and claimed benefits match the project being proposed for grant funding**
- **Show individual project utility of separable project components**
- **Provide an unlocked BCA spreadsheet (rather than a PDF of a spreadsheet)**

- Applications must be submitted by 11:59 p.m. E.D.T. on April 28th, 2023.
- Email any questions to PIDPGrants@dot.gov

■ Questions?