Maritime Administration Port Infrastructure Development Grant Program

Labrador Sea

TRATION

## Preparing a Benefit-Cost Analysis

Presented by: Office of the Chief Economist

UNITED STATE

July 30, 2019

United States Department of Transportation



- All project sponsors should submit a benefit-cost analysis (BCA) as part of their PIDG application
- USDOT will consider a project's demonstrated benefits and costs in evaluating applications



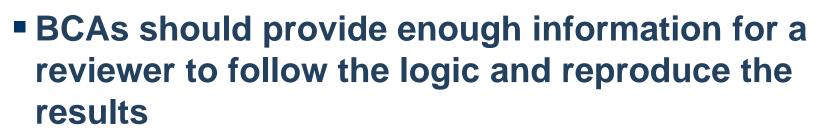
# •USDOT economists will review the applicant's BCA

- Examine key assumptions
- -Correct for any technical errors
- -Perform sensitivity analysis on key inputs
- -Consider any unquantified benefits



- Covers all USDOT discretionary grant programs
- Contains most recent recommended values
- Available at:

https://www.transportation.gov/officepolicy/transportation-policy/benefit-costanalysis-guidance



- Spreadsheet or database files showing the calculations
- Technical memos describing the analysis and documenting sources of information used (assumptions and inputs)
- Present annual benefit & cost streams by type (not just summary output)



 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 volumes) that would occur even in the absence of the requested project
- Factor in ongoing routine maintenance
- Consider full impacts of no build
- 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 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
- 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 2017 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



#### Project scope included in estimated costs and benefits must match

- E.g., 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





- Recommended values found in BCA Guidance
  - See footnotes for discussion on non-vehicle time, longdistance travel, business travel
- Consider vehicle occupancy where appropriate
- 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 usage reductions
- Localized, specific data preferred, but standard values for light duty vehicles and commercial trucks provided in BCA guidance



- 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
  - Show clear linkage between project and improved outcomes
  - Use facility-specific data history where possible
- Available crash-related injury data may need to be converted from KABCO to MAIS (see BCA Guidance document)



- For infrastructure improvements, emissions reductions will typically be a function of reduced fuel consumption
- Recommended unit values for CO<sub>2</sub>, SO<sub>2</sub>, VOCs, NOx, and PM<sub>2.5</sub> found in BCA guidance
  - Be careful about the measurement units being applied

- 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, pavement damage

#### If using 1997 HCAS values...

- Don't apply urban values to rural truck travel
- Should net out highway user fees paid by trucks from marginal pavement damage costs



#### Resilience

- Consider expected frequency of events and their consequences
- Noise Reduction
- Emergency Response
  - FEMA methodology for fire and ambulance services
- Quality of Life
- Property Value Increases
  - Is a measure rather than a benefit—avoid double-counting





- Should quantify magnitudes/timing of the impacts wherever possible
- Should clearly link specific project outcomes to any claimed unquantified benefits





#### Include all costs of implementing the project

- E.g., design, ROW acquisition, construction
- Regardless of funding source
- Include previously incurred costs

#### 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
- Simple approach: assume linear depreciation
- Be sure to property 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)



#### Economic Impact Analysis (EIA)

- BCA measures the value of a project's benefits and costs to society
- EIA measures the impact of increased economic activity within a region attributable to a project
- EIA represents the translation of "first order" benefits into other economic outcomes—not added benefits to be counted in BCA

#### Transfers

"Avoided" Costs



#### Visit – <u>https://www.maritime.dot.gov/PIDPgrants</u>

 Applications – Must be submitted on or before 8:00 PM E.D.T. on September 16, 2019

# Maritime Administration Port Infrastructure Development Grant Program

Question and Answer Session

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