Understanding Project Input Sheets and Data
01 About This Module
This module will... 

- Build on Modules 4e and 7e to provide more details on how to get data for your benefit-cost analysis (BCA) using Cal-B/C IF 
- Identify data sources to use for demand, operational, and project cost data
Previous Modules…

- **Module 1** provided a basic introduction on benefit-cost analysis (BCA) and a general overview of how to conduct a BCA
- **Module 2** described the Cal-B/C suite of tools, discussed the types of projects that can be evaluated, and provided guidance on which tools to use for various project types
- **Module 3** presented the Cal-B/C results page, detailed what each output measure means, and explained how they are calculated
- **Module 4e** presented an overview of how Cal-B/C IF works including a review of all worksheets and inputs
  - This current module complements Module 4e
- **Module 5** highlighted the information in the Parameters worksheet and discussed key assumptions used by Cal-B/C tools
- **Module 6e** provided detailed information on how Cal-B/C IF calculates benefits
- **Module 7e** presented the 1-2-3 approach to starting a Cal-B/C IF analysis
  - This current module complements Module 7e
Requirements for Making Full Use of This Module

- Basic understanding of intermodal freight, transportation planning methodologies, data and terminology
  - Examples: Average short tons per truck or railcar, total tons shipped by truck or rail, freight drayage, collision rates
- Basic understanding of modal diversion, freight network improvements, transload operations, and terminal efficiency improvements
- Ability to navigate websites and download relevant data
- Knowledge of Microsoft Excel and data analysis features
### Terminology

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bulk</td>
<td>Bulk cargo is loose cargo such as grain, coal, and iron ore. Bulk freight is not unitized or packaged and typically transported in cargo holds via bulk carriers. Bulk volumes are measured in short tons in Cal-B/C IF.</td>
</tr>
<tr>
<td>Break bulk</td>
<td>Break bulk cargo is cargo that is unitized and loaded individually. Break bulk cargo is generally packaged (e.g., bags, boxes, barrels, etc.) and not containerized. Break bulk volumes are measured in short tons in Cal-B/C IF.</td>
</tr>
<tr>
<td>Short tons</td>
<td>Short tons/US ton is measurement of weight equal to 2,000 pounds. Used as the unit of measure for bulk/break bulk volumes in Cal-B/C IF.</td>
</tr>
<tr>
<td>TEU</td>
<td>Twenty-foot equivalent unit (TEU) refers to container freight equivalent to a 20-footlong intermodal container. For instance, a 40-foot container would be equivalent to 2 TEU's.</td>
</tr>
<tr>
<td>Intermodal</td>
<td>Freight transportation that requires multiple modes of transportation without any handling of the freight itself when changing modes.</td>
</tr>
<tr>
<td>Intermodal Train</td>
<td>A freight train that carries goods or commodities loaded into domestic or international shipping containers or highway semi-trailers on their own wheels.</td>
</tr>
<tr>
<td>Transload</td>
<td>The process of transferring a shipment from one mode of transportation to another.</td>
</tr>
<tr>
<td>Drayage</td>
<td>The transportation of goods over a short distance and usually part of a longer overall move – for instance from a port to a nearby rail yard.</td>
</tr>
<tr>
<td>Empty-haul trip</td>
<td>The movement of empty freight trucks and railcars.</td>
</tr>
<tr>
<td>Modal Diversion</td>
<td>The process of diverting freight volumes from one transportation mode to another. For instance, diverting freight shipments from trucks to rail.</td>
</tr>
</tbody>
</table>
Cal-B/C IF Data Entry Worksheets Overview
### Cal-B/C IF Data Entry Worksheets

- For most analyses, two worksheets will be needed for data entry
  - **Project Information**: Main data input worksheet. For many projects it would be the only sheet in which the user must enter input values.
  - **Model Inputs**: Allows the user to review and replace several values used in the model

#### Worksheets where data will be entered

<table>
<thead>
<tr>
<th>Title</th>
<th>Instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Project Information</td>
<td>Summary instructions on how to fill out each data item in Cal-B/C IF</td>
</tr>
<tr>
<td>2) Model Inputs</td>
<td>Instructions:</td>
</tr>
<tr>
<td>3) Results</td>
<td>Instructions:</td>
</tr>
</tbody>
</table>

#### Worksheets where Cal-B/C performs calculations and tabulates results

<table>
<thead>
<tr>
<th>Title</th>
<th>Instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shipper Costs</td>
<td>Instructions:</td>
</tr>
<tr>
<td>Accident Costs</td>
<td>Instructions:</td>
</tr>
<tr>
<td>Emissions</td>
<td>Instructions:</td>
</tr>
<tr>
<td>Final Calculations</td>
<td>Instructions:</td>
</tr>
<tr>
<td>PARAMETERS</td>
<td>Instructions:</td>
</tr>
</tbody>
</table>

#### Key Data Entry Items

- **Project Information**:
  - Project Location
  - Freight Capacity
  - Freight Volumes and Shipments by Mode
  - Highway Accident Data
  - Freight Shipping Costs
  - Transload Operations Data
  - Project Costs

- **Model Inputs**:
  - Input Data for:
    - Freight volumes
    - Transload operations
    - Safety
      - Collision Rate

- **Results**:
  - Shipping Costs:
    - **BCA results**: Calculates total shipper cost benefits for modal diversion, drayage, terminal efficiency and transload operations
  - Accident Costs:
    - Calculates accident reduction benefits for modal diversion and drayage
  - Emissions:
    - Calculates emission benefits for modal diversion, drayage, and terminal efficiency
  - Final Calculations:
    - Tabulates final results, including:
      - Net present value
      - Internal rate of return
      - Payback period

#### Additional Data

- **Emissions**:
  - Calculates emission benefits for modal diversion, drayage, and terminal efficiency

- **Parameters**:
  - Key default analysis parameters and assumptions for all Cal-B/C tools
Module 8e: Cal-B/C IF Data Input Overview

Review: Cell Color-Coding

- Cal-B/C IF requires few user inputs, but allows you to enter more inputs when data is available

- Cells in the worksheets are color-coded:
  - Green cells indicate required data
    - You must input values for Cal-B/C IF to work for the type of analysis being performed
    - Cal-B/C IF descriptions tell you what cells need to be used for a given analysis
  - Red cells provide default values that you can change if needed
    - For example, Cal-B/C IF provides default annual increase in shipper costs (net of inflation)
  - Blue cells contain values calculated by the model
    - You can override the values in these cells if better data is available
  - Gray cells cannot be overridden and contain values calculated by the model. Most of these cells represent data quality checks for the user
Suggested Data Sources for Evaluations in Cal-B/C IF

Model Data

- Freight Analysis Framework
- Bureau of Transportation Statistics
- Data from Ports or Freight Rail Institutions

Traffic Collision and Safety Data

- Caltrans Traffic Accident Surveillance and Analysis System (TASAS)
- California Highway Patrol (CHP) Statewide Integrated Traffic Records System (SWITRS)
- Other sources (e.g., Transportation Research Board publications)

Project Costing Data

- Project Study Report (PSR) or other documents
- Project Report (PR)
Cal-B/C IF Data Entry – Project Information Worksheet

- The primary data entry worksheet for Cal-B/C IF
- Other worksheets should be modified if project specific information is available

1A Project Data
- Required for all projects

1B Freight Capacity
- Average capacity and distance traveled by mode and type of freight

1C Freight Volumes by Mode
- Volumes of bulk / break bulk and containers shipped by mode relevant to project
Cal-B/C IF Data Entry – Project Information Worksheet

**1D Freight Shipments by Mode**
- Calculated values for total number of trucks and trains
- Number of empty-haul returns
- Average truck speeds
  (for emissions benefits)

**1E Highway Accident Data**
- Project-specific highway accident data

**1F Freight Shipping Costs**
- Shipping cost information (to calculate benefits for projects that involve modal diversion)
Cal-B/C IF Data Entry – Project Information Worksheet

1G Transload Operations Data
- Required data for freight projects that include changes in transloading operations or drayage

1H Changes in Terminal Efficiency
- Required data for freight projects that impact terminal efficiencies
- Captured through reduced delay or dwell time

1I Project Costs
- Required to fill in each year of construction period
- Recommended to estimate O&M costs based on existing relevant transload terminal projects
- O&M costs should be the difference between the No Build and Build Scenarios
Cal-B/C IF Data Entry – Model Inputs Worksheet

- Review this worksheet to make sure that your freight volume and transload operations input make sense.

- This worksheet also lists the accident rates calculated for the project in the No Build and Build scenarios. Review to ensure that the rates make sense.

- You should not adjust the blue cells directly if alternative values are to be used.
  - Identify which inputs need adjustments and use the green cells located next to the blue cells for making any changes.

- Specify “Reason for Change” for any values overridden by user.
  - Example: Federal Highway Administration (FHWA) grant reviewers examine these cells closely and users should have citing documents ready if values are overridden.
### Suggested Data Sources for Cal-B/C IF Evaluations by Input Item

<table>
<thead>
<tr>
<th>Section Title</th>
<th>Data Input Item</th>
<th>To Find, Look at Cell</th>
<th>Suggested Data Sources (for required input cells; or to update Cal-B/C estimates or default values)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1A) Project Data</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Project Location</td>
<td>H10</td>
<td>Depends on proposed project</td>
</tr>
<tr>
<td></td>
<td>Project Timing</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Current Year</td>
<td>F12</td>
<td>Project Initiation Document (PID)/Project Study Report (PSR)/Project Report (PR) or other source</td>
</tr>
<tr>
<td></td>
<td>Year Construction Begins</td>
<td>F13</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Year Project Opens</td>
<td>F14</td>
<td></td>
</tr>
<tr>
<td><strong>1B) Freight Capacity</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Average Short Tons per Truck</td>
<td>G23; H23</td>
<td>Freight truck technical specifications/Roadway weight limits/Project Initiation Document (PID)/Project Study Report (PSR)/Project Report (PR) or other source</td>
</tr>
<tr>
<td></td>
<td>Average Trip Distance (Miles, 1-Way)</td>
<td>G24; H24</td>
<td>Project Initiation Document (PID)/Project Study Report (PSR)/Project Report (PR) or other source</td>
</tr>
<tr>
<td></td>
<td>Average Short Tons per Railcar</td>
<td>G26; H26</td>
<td>Railcar specifications</td>
</tr>
<tr>
<td></td>
<td>Average Number of Railcars per Train</td>
<td>G27; H27</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Average Trip Distance (Miles, 1-Way)</td>
<td>G28; H28</td>
<td>Project Initiation Document (PID)/Project Study Report (PSR)/Project Report (PR) or other source</td>
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<tr>
<td></td>
<td>Average Number of TEUs per Truck</td>
<td>G31; H31</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Average Trip Distance (Miles, 1-Way)</td>
<td>G32; H32</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Average Number of TEUs per Railcar</td>
<td>G34; H34</td>
<td>Railcar specifications/Network restrictions</td>
</tr>
<tr>
<td></td>
<td>Average Number of Railcars per Train</td>
<td>G35; H35</td>
<td>Project Initiation Document (PID)/Project Study Report (PSR)/Project Report (PR) or other source</td>
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<tr>
<td></td>
<td>Average Trip Distance (Miles, 1-Way)</td>
<td>G36; H36</td>
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## Suggested Data Sources for Cal-B/C IF Evaluations by Input Item (cont’d)

<table>
<thead>
<tr>
<th>Section Title</th>
<th>Data Input Item</th>
<th>To Find, Look at Cell</th>
<th>Suggested Data Sources (for required input cells; or to update Cal-B/C estimates or default values)</th>
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</thead>
<tbody>
<tr>
<td>1C) Freight Volumes by Mode</td>
<td>Total Tons Shipped by Truck [Current Year]</td>
<td>H45</td>
<td>Freight Analysis Framework/ Project Initiation Document (PID)/Project Study Report (PSR)/Project Report (PR) or other source</td>
</tr>
<tr>
<td></td>
<td>Total Tons Shipped by Rail [Current Year]</td>
<td>H46</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total Tons Shipped by Truck [Forecast Year]</td>
<td>G53; H53</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total Tons Shipped by Rail [Forecast Year]</td>
<td>G54; H54</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total TEUs Shipped by Truck [Current Year]</td>
<td>H59</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total TEUs Shipped by Rail [Current Year]</td>
<td>H60</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total TEUs Shipped by Truck [Forecast Year]</td>
<td>G67: H67</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total TEUs Shipped by Rail [Forecast Year]</td>
<td>G68; H68</td>
<td></td>
</tr>
<tr>
<td>1D) Freight Shipments by Mode</td>
<td>Number of Empty-Haul Return Trips for Every Full Truck</td>
<td>G97</td>
<td>Project Initiation Document (PID)/Project Study Report (PSR)/Project Report (PR) or other source</td>
</tr>
<tr>
<td>1E) Highway Accident Data</td>
<td>Total Accidents During Reporting Period</td>
<td>Q10</td>
<td>TASAS (Table B)/SWITRS</td>
</tr>
<tr>
<td></td>
<td>Fatal Accidents</td>
<td>Q11</td>
<td></td>
</tr>
<tr>
<td>Section Title</td>
<td>Data Input Item</td>
<td>To Find, Look at Cell</td>
<td>Suggested Data Sources (for required input cells; or to update Cal-B/C estimates or default values)</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>-----------------------------------------------</td>
<td>-----------------------</td>
<td>---------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>1E) Highway Accident Data</td>
<td>Injury Accidents</td>
<td>Q12</td>
<td>TASAS (Table B)/SWITRS</td>
</tr>
<tr>
<td>1E) Highway Accident Data</td>
<td>Vehicle Miles Traveled During Reporting Period</td>
<td>Q15</td>
<td>Regional traffic data</td>
</tr>
<tr>
<td>1F) Shipping Costs</td>
<td>Bulk/Breakbulk Shipping Costs per Truckload</td>
<td>Q23</td>
<td>Project Initiation Document (PID)/Project Study Report (PSR)/Project Report (PR) or other source</td>
</tr>
<tr>
<td>1F) Shipping Costs</td>
<td>No Build [Current Year Total Rates]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1F) Shipping Costs</td>
<td>Bulk/Breakbulk Shipping Costs per Carload</td>
<td>Q24</td>
<td>Project Initiation Document (PID)/Project Study Report (PSR)/Project Report (PR) or other source</td>
</tr>
<tr>
<td>1F) Shipping Costs</td>
<td>No Build [Current Year Total Rates]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1F) Shipping Costs</td>
<td>Container Shipping Costs per TEU Moved by</td>
<td>Q26</td>
<td>Project Initiation Document (PID)/Project Study Report (PSR)/Project Report (PR) or other source</td>
</tr>
<tr>
<td>1F) Shipping Costs</td>
<td>Truck No Build [Current Year Total Rates]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1F) Shipping Costs</td>
<td>Container Shipping Costs per TEU Moved by</td>
<td>Q27</td>
<td>Project Initiation Document (PID)/Project Study Report (PSR)/Project Report (PR) or other source</td>
</tr>
<tr>
<td>1F) Shipping Costs</td>
<td>Rail No Build [Current Year Total Rates]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1G) Transload Operations Data</td>
<td>Transload Cost per Short Ton [No Build]</td>
<td>Q51</td>
<td>Project Initiation Document (PID)/Project Study Report (PSR)/Project Report (PR) or other source</td>
</tr>
<tr>
<td>1G) Transload Operations Data</td>
<td>Transload Cost per TEU</td>
<td>Q52</td>
<td>Project Initiation Document (PID)/Project Study Report (PSR)/Project Report (PR) or other source</td>
</tr>
<tr>
<td>1G) Transload Operations Data</td>
<td>Distance Drayed (Miles, 1-Way) [No Build]</td>
<td>Q65</td>
<td>Project Initiation Document (PID)/Project Study Report (PSR)/Project Report (PR) or other source</td>
</tr>
<tr>
<td>1G) Transload Operations Data</td>
<td>Drayage Cost per Truck [No Build]</td>
<td>Q66</td>
<td>Project Initiation Document (PID)/Project Study Report (PSR)/Project Report (PR) or other source</td>
</tr>
<tr>
<td>1G) Transload Operations Data</td>
<td>Average Freight Truck Speed for Drayage (mph)</td>
<td>Q70</td>
<td>Roadway Speed Limit/Project Initiation Document (PID)/Project Study Report (PSR)/Project Report (PR) or other source</td>
</tr>
</tbody>
</table>
## Suggested Data Sources for Cal-B/C Corridor Evaluations by Input Item (cont’d)

<table>
<thead>
<tr>
<th>Section Title</th>
<th>Data Input Item</th>
<th>To Find, Look at Cell</th>
<th>Suggested Data Sources (for required input cells; or to update Cal-B/C estimates or default values)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1H) Changes in Terminal Efficiency</td>
<td>Average Minutes per Truck</td>
<td>Q80; R80</td>
<td>Project Initiation Document (PID)/Project Study Report (PSR)/Project Report (PR) or other source</td>
</tr>
<tr>
<td></td>
<td>Average Minutes per Train</td>
<td>Q81; R81</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Average Operator Cost per Hour of Delay – Freight Truck Delays</td>
<td>Q87; R87</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Average Operator Cost per Hour of Delay – Train Delays</td>
<td>Q88; R88</td>
<td></td>
</tr>
<tr>
<td>1I) Project Costs</td>
<td>Direct Project Costs – Initial Project Costs (Support, R/W, Const.)</td>
<td>X14:Z22</td>
<td>Project Initiation Document (PID)/Project Study Report (PSR)/Project Report (PR) or other source</td>
</tr>
<tr>
<td></td>
<td>Subsequent Costs (O&amp;M, Rehab)</td>
<td>AA24:AB43</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mitigation</td>
<td>AC14:AC43</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Agency Cost Savings</td>
<td>AD14:AD43</td>
<td></td>
</tr>
</tbody>
</table>
Model Data
Freight Analysis Framework

- Data source and tool providing an overview of freight movement in the United States by all modes of transportation

- Allows the user to extract historical and future freight volumes by:
  - Commodity Type
  - Domestic Transportation Mode
  - Domestic Origin and Destination

- Output from the tool highlights the total tonnage, commodity value, and the ton-miles transported

- Tool also allows user to filter for movement type such as:
  - Total freight flow (i.e., domestic and foreign movement of goods)
  - Domestic freight
  - Import freight
  - Export freight

https://ops.fhwa.dot.gov/freight/freight_analysis/faf/index.htm
Bureau of Transportation Statistics

- Federal statistics agency that is the source of statistics on transportation activity, economics, and other measures of transportation
  - Statistical products are available for all modes of transportation, as well as both freight and passenger movements

- National Transportation Statistics is one of the few statistical products provided by the Bureau of Transportation Statistics
  - Includes data series that could be used to estimate factors based on national level data including:
    - Transportation Costs
    - Safety

- Granular data products are available though they may not contain the level of detail comparable to the national data
  - State Transportation Statistics
  - County Transportation Profiles

- https://www.bts.gov/browse-statistical-products-and-data
Data may provide the overview of volumes transported through the institutions

Data availability may vary by organization

- Large ports generally report annual volumes transported through the facility
- Railroad freight data may be available through annual reports

Data from organizations may reflect overall volumes transported by the organization and not necessarily reflect the volumes relevant to the project
04 Traffic Collision Data
Traffic Accident Surveillance and Analysis System (TASAS) – Transportation Systems Network (TSN) Reports

- Highway inventory database which contains the current and historical collisions on the SHS
- Preferred source for SHS collision data
- Data/Reports only accessible through Caltrans Staff
- Data that can be used in Cal-B/C IF includes:
  - Total Accidents (Tot)
  - Fatal Accidents (Fat)
  - Injury Accidents (Inj)
  - Property Damage Only (PDO) Accidents (Tot – (Fat+Inj))
  - Accident Rate (per million vehicle-miles)
  - Percent Fatal Accidents (Pct Fat)

Statewide Integrated Traffic Records System (SWITRS)

- Collects and processes detailed data gathered from a collision scene by CHP and local law enforcement
- Account required to access detailed reports and data
- California collision data by location, date/time and type
- Used for collision data off the State Highway System (SHS) – TASAS should be used for SHS projects
- Downloadable but requires extensive data manipulation
- Data that can be used in Cal-B/C IF includes:
  - Total Accidents (Tot)
  - Fatal Accidents (Fat)
  - Injury Accidents (Inj)
  - Property Damage Only (PDO) Accidents

https://iswitrs.chp.ca.gov/Reports/jsp/index.jsp
Project Costing Data
Project Costs – Direct Initial Costs

- The level of detail for cost estimates depends on where the project is in the development process
  - Plans, Specifications and Estimate (PS&E), Project Report (PR), and Project Study Reports (PSR) provide detailed cost estimates
    - These costs typically include support costs (e.g., design), right of way (ROW or R/W), and construction costs (including contingency)
  - Regional Transportation Improvement Programs (RTIP)

Note: Remember to enter costs in thousands of dollars (1000$). Otherwise, you will not get a correct benefit/cost ratio
Project Costs – Direct Initial Costs (cont’d)

- Pre-planning stages are more difficult
  - Caltrans project cost database with rule-of-thumb cost guides
- Look for a similar completed project in the same region with known costs, then estimate the cost for similar type of improvements
  - If ROW impacts are likely, then a reserve amount should be included. Caltrans has rule-of-thumb for ROW estimates available

Note: Remember to enter costs in thousands of dollars (1000$). Otherwise, you will not get a correct benefit/cost ratio
Project Costs – Subsequent Costs

- Caltrans and regional agencies have estimates for maintenance and operating costs for various facilities.
- Subsequent costs should be entered as a net increase or decrease from the No Build case.
  - May be positive (e.g., increased cost associated with terminal operations).
  - May be negative (e.g., avoided maintenance or rehabilitation).

Note: Remember to enter costs in thousands of dollars (1000$). Otherwise, you will not get a correct benefit/cost ratio.
Module 8e: Project Costing Data

Project Costs – Mitigation Costs

- Mitigation costs (in thousands of dollars) include costs to protect communities and the environment from negative impacts
  - Include wetland and community preservation as well as sound walls to reduce highway or rail transit noise
- Plans, PS&E, PR, and PSR will provide mitigation cost estimates (with details found in the appendices)
- Often, these costs can be included in the “construction” costs for a project and may not need to be entered into Cal-B/C IF as separate costs
  - Soundwalls and environmental mitigations are examples of mitigations that are built into the cost of projects presented in PRs
- On-going mitigation costs that continue after the project construction is completed will be included in PRs
Conclusion
In this module, you learned…

- About potential data sources for data input and project costing for Cal-B/C IF
- How to get data from these sources
What’s Next?

- **Modules 9e** walks through an example project of an Intermodal Freight BCA
- **Module 10** closes out the training and will summarize other resources to learn more about BCA