Module 4c
How Cal-B/C Active Transportation Works
About This Module
This module will...

- Build on Modules 1, 2, and 3 to provide a detailed understanding of how Cal-B/C Active Transportation (AT) works
- Help you decide if Cal-B/C AT is the appropriate tool for your job
- Review worksheet tabs and summarize key components for performing a benefit-cost analysis (BCA)
- Show where and how data is entered into Cal-B/C AT
- Summarize how to interpret BCA results

(Module 3 provides detailed discussions on BCA results)
Previous Modules…

- **Module 1** provided a basic introduction to benefit-cost analysis (BCA) and a general overview of how you 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 projects.

- **Module 3** presented the Cal-B/C results page, detailed what each output measure means, and explained how they are calculated.
Is Cal-B/C AT the right tool for you?

- Evaluates projects for active transportation
  - **Infrastructure**: Capital investments on facilities, intersection/signal improvement, and other physical amenities
  - **Non-infrastructure**: Educational and promotional initiatives to encourage ridership and safety
- **Modes**: bicycles and pedestrians
- **Applicable project context**
  - **Upgraded facility**: intersection improvement, bike lane improvement
  - **New facility**: new shared use path, new dedicated bike lane
- **Location**
  - **Safe Routes To School (SR2S)**: Encourage children walking or bicycling to school by improving safety
  - Non-Safe Routes To School (SR2S): Broadly encourages active transportation or improves safety of existing active transportation
- Can be used in conjunction with other Cal-B/C tools to evaluate AT components of larger projects

Source: [http://tinyurl.com/q8bhjss](http://tinyurl.com/q8bhjss)
Module 4c: About This Module

Cal-B/C AT System and User Requirements

Cal-B/C System Requirements

- Designed for a Windows environment, tested on Microsoft Excel 2013 and later versions
- Cal-B/C AT file is approximately 600 kilobytes (KB) in size
  - File size of the model after analysis depends on how much data is incorporated in the model

Cal-B/C User Requirements

- Working knowledge of spreadsheets, particularly Microsoft Excel
- Understanding of benefit-cost analysis
- Ability to interpret results in a transportation planning context
- Familiarity with active transportation projects
02 Cal-B/C Active Transportation Overview
Overview of Cal-B/C Active Transportation

- Part of larger effort to include bicycle and pedestrian modes in Cal-B/C suite
- Designed to meet Active Transportation Program (ATP) Guidelines
- Set up as an interconnected, multi-sheet spreadsheet
  - 16 worksheets in total, including title page shown at right
  - Project Information and Non-Infrastructure Program Information worksheets are primary locations for data entry
  - BCA results presented in the Results worksheet
Overview of Cal-B/C Active Transportation

- **Infrastructure Project** portion of the tool
  - Based on a benefit-cost method, generally comparable to approach and results in other tools

- **Estimates five categories of user benefits:**
  - Journey Quality
  - Additional delay savings
  - Additional safety benefits
  - Health benefits
  - Emission cost savings

- **Non-Infrastructure Program** portion of the tool
  - Based on a multi-criteria analysis approach, so the benefits of this portion are scored but not monetized
Worksheet Layout in Cal-B/C Active Transportation

- **Introduction Worksheets**
  - Title
  - Instructions
  - Definitions

- **Project Input & Results Worksheets**
  - 1a) Project Info
  - 1b) Non-Inf Program Info
  - 2) Model Inputs
  - 3) Results

- **Analysis Worksheets**
  - Journey Quality
  - Intersection Delay
  - Intersection Safety
  - Auto Accident Costs
  - Health - Absenteeism
  - Health - Reduced Mortality
  - Emissions
  - Final Calculations
  - Parameters
## Module 4c: Cal-B/C Active Transportation Overview

### Instructions Page in Model

#### Benefit-Cost Analysis of Active Transportation Projects (Cal-B/C AT)

**Introduction**

This workbook is a benefit-cost analysis (BCA) tool to perform simple economic analyses of active transportation projects that improve travel options and conditions for cyclists and pedestrians. Users enter data into the tool, which computes lifecycle costs, annual and total benefits in several key categories, net present value, benefit-cost ratios, internal rate of return, and payback period. Benefits are also specifically estimated for children as part of Safe Route to School (SRST) initiatives.

In addition to the BCA tool, a data entry form is provided for assessing non-infrastructure initiatives. Attributes of these initiatives are used in a multi-criteria scoring system to provide a common basis of comparison. Results of this scoring system are presented alongside, but not added to, the monetized benefits computed in the BCA tool.

The model contains worksheets with the following information, data, and results:

<table>
<thead>
<tr>
<th>Worksheets</th>
<th>Contents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Instructions</td>
<td>General model descriptions and assumptions</td>
</tr>
<tr>
<td>1a) Project Info</td>
<td>Input data for capital projects to improve or construct bike routes</td>
</tr>
<tr>
<td>1b) Non-Inf Program Info</td>
<td>Input data and scoring system for non-infrastructure initiatives</td>
</tr>
<tr>
<td>2) Model Inputs</td>
<td>Number of trips, users, and miles traveled by trip purpose based on data entered in Project Information worksheet and adjustable by user</td>
</tr>
<tr>
<td>3) Results</td>
<td>Summary results of analysis</td>
</tr>
<tr>
<td>Journey Quality</td>
<td>Calculation of journey quality impacts for improved travel</td>
</tr>
<tr>
<td>Intersection Delay</td>
<td>Calculation of travel time savings where bike and pedestrian facilities cross improved intersections</td>
</tr>
<tr>
<td>Intersection Safety</td>
<td>Calculation of changes in user accident risks at improved intersections on existing facilities</td>
</tr>
<tr>
<td>Auto Accident Costs</td>
<td>Calculation of changes in auto accident costs from diversions to active transportation</td>
</tr>
<tr>
<td>Health - Absenteeism</td>
<td>Calculation of health benefits for employers due to reduced absenteeism based on increased productivity</td>
</tr>
<tr>
<td>Health - Reduced Mortality</td>
<td>Calculation of user health benefits associated with reduced risk of mortality</td>
</tr>
<tr>
<td>Emissions</td>
<td>Calculation of changes in highway emissions costs from diversions to active transportation</td>
</tr>
<tr>
<td>Final Calculations</td>
<td>Calculation of net present value, internal rate of return, and payback period</td>
</tr>
</tbody>
</table>

| Parameters                | Economic assumptions, lookup tables, and other model parameters consistent with Cal-B/C |

Tool users enter data primarily on the Project Information or Non-Infrastructure Program Information sheets, depending on project type. These worksheets cover information that drives the impacts of infrastructure and non-infrastructure initiatives, respectively. Infrastructure projects are categorized as one of four bike facility classes (i.e., I - Bike Paths, II - Bike Lanes, III - Bike Route, and IV - Separated Bikeways, and Cycle Tracks). Characteristics of facility users (i.e., number of cycling and walking users, trip purpose, and average distance traveled) are influential in estimating facility benefits.

Separate data are required for estimating the benefits of improvements to existing routes and the construction of new bike routes. The model can include projects with elements of both new and improved facilities. Additional data on the number of school-aged children are also collected to estimate benefits from a Safe Route to School Initiative, if applicable. Benefits are compared with lifecycle costs to determine economic metrics, such as a benefit-cost ratio and net present value.

**Non-infrastructure initiatives include a variety of education and outreach programs. Attributes that reflect the programmatic impact of these initiatives include the numbers of people involved in the target audience, the characteristics of the promotional effort, the type of impact or messaging, and the frequency of outreach effort. Evaluations of these initiatives are performed with a multi-criteria framework that determines overall program scores consistent with the potential for reaching new users through a variety of mechanisms and frequency. The scoring system determines overall program impact scores. The scoring system allows initiatives to be compared by the estimated average lifecycle cost per new potential user.**

Cal-B/C AT is designed so that the user generally needs to insert data only in the **green boxes** on the Project Information and Non-Infrastructure Program Information sheets. Summary results are shown on the Results worksheet. The remaining worksheets are provided for the user to see, but the model performs calculations automatically.

In the process of economic analysis, some generally accepted economic assumptions are necessary. These assumptions include the real and nominal discount rates, unit user costs (e.g., value of time), consumption rates (e.g., fuel consumption and vehicle emissions), and accident rates. These assumptions are given in the Parameters worksheet and should not be changed by the user.

After reading the instructions in this worksheet, the user should proceed to the Project Information worksheet and input data for the specific project in the **green boxes** (light gray when printed). The model provides default values in the **red boxes** (medium gray when printed). These values can be changed by the user, if information specific to the project is available. The model calculates some values based on relationships or assumptions, with results shown in the **blue boxes** (dark gray when printed). These values can be changed by the user.

**Instructions for Infrastructure Projects**

The user can analyze most projects by entering limited data on the Project Information sheet. The Model Inputs sheet allows the user to enter more detailed data or adjust estimated annual trips, number of users, and total miles traveled. The analysis results are calculated automatically and displayed on the Results sheet. The section below explains the input data required to analyze infrastructure projects.
Definitions Page in Model

- Provides helpful descriptions to inform user input to the model
  - Trip Types
  - Trip Purposes
  - Benefit Categories
Cell Color-Coding

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

  - **Green** cells indicate required data
    - Input these values depending on the type of project
    - Use Section headers to determine where data should be entered (e.g. infrastructure vs. non-infrastructure, existing vs. new facility)

  - **Red** cells provide default values that you can change if needed
    - Examples of this in Cal-B/C Active Transportation include base and forecast years under your model inputs

  - **Blue** cells contain values calculated by the model for No Build and Build Scenarios
    - Can be overridden if better data is available

- **Gray** cells contain values calculated by the model for No Build and Build Scenarios which should not be overridden
  - To change the value in these cells, change the input data

- User must enter data for Cal-B/C to work correctly.
- Cal-B/C provides default values that can be overridden by the user if better data is available.
- Cal-B/C calculates cell value, but user can override result if better data is available.
- Cal-B/C calculates cell value for reference, change the result by changing the input data.
03

Project Information Worksheet
Module 4c: Project Information Worksheet

Project Information Worksheet (1a)

Section 1A: Project and Site Characteristics

Section 1B: Existing Segment Improvements and Trip Volume

Section 1C: Intersection Improvements

Section 1D: General User Characteristics

Section 1E: New Facility Improvements and Trip Volume

Section 1F: Project Costs and Requested Funds

Section 1G: Program Costs and Requested Funds

Section 1H: Data Checks
Optional, input unique project identifiers including: Caltrans District, Project Name (w/ route number and postmiles), Expenditure Authorization (EA) number, Planning and Programming Number (PPNO)

- Detailed project description with route and postmile assists with accountability (e.g., Bond Accountability Report)
1A) Project and Site Characteristics

**Type of Project**
- Existing facility upgrade, new facility, or both
  - Used to determine which benefits are calculated and how
  - Project Information in Cal-B/C AT is generally separated for existing and new facilities

**Total Project Length (miles)**
- Existing facility length
- New facility length
- Data checks confirm that data entry is internally consistent
  - Example: Type of project entry is consistent with the project length entries
1A) Project and Site Characteristics (cont.)

Site Characteristics

Project Location
- Used to estimate emission benefits (emission cost parameters vary by region)

Safe Route to School? (Y/N)

Programmatic Initiatives? (Y/N)
- Non-infrastructure components

Length of Construction Period
- Years needed to construct project
1B) Existing Segment Improvements and Trip Volume – Improvement Characteristics

- Infrastructure projects are categorized as one of four bike facility classes
- Existing Facility Length (miles) by class
  - Bike Paths
  - Bike Lanes
  - Bike Routes
  - Separated bikeways and tracks
- Data check to ensure the data entry matches project length in Section 1A
Pedestrian Improvements

- Yes = 1; Leave blank if “No”
- Identifies pedestrian improvement project components, which contribute to Journey Quality benefits
  - Street lighting
  - Curb level
  - Crowding
  - Pavement evenness
  - Information Panels
  - Benches
  - Directional Signage
1B) Existing Segment Improvements and Trip Volume – Trip Data

**Trip Data - Adults**
- For Cycling and Pedestrian traffic
- **Current Daily Trips**
- **Projected Annual Growth Rates**
  - in No Build and Build scenarios
- **Daily Trips, post-construction**
  - Year 1 and Year 20, No Build and Build scenarios
  - Calculated from above inputs
  - Can be overwritten if better data is available

**Trip Data - Children - SRTS**
- Same inputs as above
- Only required for SRTS projects
- Section 1E is generally like Section 1B
  - Section 1B is for existing segment improvements
  - Section 1E is for new facility improvements

Module 4c: Project Information Worksheet

### New Facility Improvements and Trip Volume

<table>
<thead>
<tr>
<th>Improvement Characteristics</th>
<th>Crnt</th>
<th>Build</th>
<th>Proj. Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>New Facility Length</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bike Path (miles)</td>
<td>I</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bike Lane (miles)</td>
<td>I</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bike Route (miles)</td>
<td>IY</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Separated Bikeways, Cycle Tracks (miles)</td>
<td>IY</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pedestrian Improvements</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Street Lighting</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Curb Level</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Crosswalk</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pavement Elevation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inform. Panels</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Driveways</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Directional Signage</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Trip Data - Adults

<table>
<thead>
<tr>
<th>Cycling</th>
<th>Crnt</th>
<th>Build</th>
</tr>
</thead>
<tbody>
<tr>
<td>Daily Trips - Current</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>Projected Annual Growth Rates from Year 1 (Trips)</td>
<td>0.8%</td>
<td>3.3%</td>
</tr>
<tr>
<td>Daily Trips - Year 1 (post-construction)</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>Daily Trips - Year 20 (post-construction)</td>
<td>150</td>
<td></td>
</tr>
</tbody>
</table>

#### Trip Data - Children - 5-15

<table>
<thead>
<tr>
<th>Cycling</th>
<th>Crnt</th>
<th>Build</th>
</tr>
</thead>
<tbody>
<tr>
<td>Daily Trips - Current</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Projected Annual Growth Rates from Year 1 (Trips)</td>
<td>0.5%</td>
<td>3.3%</td>
</tr>
<tr>
<td>Daily Trips - Year 1 (post-construction)</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Daily Trips - Year 20 (post-construction)</td>
<td>24</td>
<td></td>
</tr>
</tbody>
</table>

#### Pedestrian

| Daily Trips - Current        | 24   |       |
| Projected Annual Growth Rates from Year 1 (Trips) | 0.5% | 3.3% |
| Daily Trips - Year 1 (post-construction) | 24 |       |
| Daily Trips - Year 20 (post-construction) | 24 |       |
1E) New Facility Improvements & Trip Value – Improvement Characteristics (2/4)

- New Facility Length (miles) by class
  - No Facility (based on entry in Section 1A)
  - Bike Paths
  - Bike Lanes
  - Bike Route
  - Separated Bikeways, Cycle Tracks
  - Data check to ensure the data entry matches project length in Section 1A

### Module 4c: Project Information Worksheet

![New Facility Improvements and Trip Volume Table]

<table>
<thead>
<tr>
<th>Improvement Characteristics</th>
<th>Class</th>
<th>No Build</th>
<th>Build</th>
<th>Project Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Facility</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bike Paths (miles)</td>
<td>I</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Bike Lanes (miles)</td>
<td>II</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Bike Route (miles)</td>
<td>III</td>
<td>4</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Separated Bikeways, Cycle Tracks (miles)</td>
<td>IV</td>
<td>5</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>11</td>
<td>11</td>
<td></td>
</tr>
</tbody>
</table>

### Trip Data - Adults

<table>
<thead>
<tr>
<th></th>
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<th>Build</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cycling</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Daily Trips - Current</td>
<td>110</td>
<td>110</td>
</tr>
<tr>
<td>Projected Annual Growth Rates from Year 1(%)</td>
<td>0.5%</td>
<td>3.0%</td>
</tr>
<tr>
<td>Daily Trips - Year 1 (post-construction)</td>
<td>106</td>
<td>106</td>
</tr>
<tr>
<td>Daily Trips - Year 20 (post-construction)</td>
<td>106</td>
<td>106</td>
</tr>
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</table>

### Trip Data - Children - SMTS

<table>
<thead>
<tr>
<th></th>
<th>No Build</th>
<th>Build</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cycling</td>
<td></td>
<td></td>
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<tr>
<td>Daily Trips - Current</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Projected Annual Growth Rates from Year 1(%)</td>
<td>0.5%</td>
<td>3.0%</td>
</tr>
<tr>
<td>Daily Trips - Year 1 (post-construction)</td>
<td>14</td>
<td>14</td>
</tr>
<tr>
<td>Daily Trips - Year 20 (post-construction)</td>
<td>24</td>
<td>24</td>
</tr>
</tbody>
</table>

### Pedestrian Improvements

- Street Lighting
- Curb Level
- Crewing
- Pavement Evenness
- Information Panels
- Benches
- Directional Signage

<table>
<thead>
<tr>
<th></th>
<th>Yes x1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Street Lighting</td>
<td></td>
</tr>
<tr>
<td>Curb Level</td>
<td></td>
</tr>
<tr>
<td>Crewing</td>
<td></td>
</tr>
<tr>
<td>Pavement Evenness</td>
<td></td>
</tr>
<tr>
<td>Information Panels</td>
<td></td>
</tr>
<tr>
<td>Benches</td>
<td></td>
</tr>
<tr>
<td>Directional Signage</td>
<td></td>
</tr>
</tbody>
</table>

**Project Information**
### Pedestrian Improvements

- Yes = 1; Leave blank if “No”
- Identifies new pedestrian improvement components, which contribute to Journey Quality benefits:
  - Street lighting
  - Curb level
  - Crowding
  - Pavement evenness
  - Information Panels
  - Benches
  - Directional Signage

### Improvement Characteristics

<table>
<thead>
<tr>
<th>New Facility Length</th>
<th>Class</th>
<th>No Build</th>
<th>Build</th>
<th>Project Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Facility</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>OK</td>
</tr>
<tr>
<td>Bike Paths (miles)</td>
<td>I</td>
<td>1</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Bike Lanes (miles)</td>
<td>II</td>
<td>1</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Bike Route (miles)</td>
<td>III</td>
<td>1</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Separated Bikeways, Cycle Tracks (miles)</td>
<td>IV</td>
<td>1</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>4</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

### Pedestrian Improvements

- Street Lighting
- Curb Level
- Crowding
- Pavement Evenness
- Information Panels
- Benches
- Directional Signage

### Trip Data - Adults

**Cycling**

- Daily Trips - Current: 100
- Projected Annual Growth Rates from Year 1 (1%)
  - Daily Trips - Year 1 (post-construction): 101
  - Daily Trips - Year 20 (post-construction): 102

**Pedestrian**

- Daily Trips - Current: 25
- Projected Annual Growth Rates from Year 1 (1%)
  - Daily Trips - Year 1 (post-construction): 26
  - Daily Trips - Year 20 (post-construction): 27

### Trip Data - Children - SIVTS

**Cycling**

- Daily Trips - Current: 16
- Projected Annual Growth Rates from Year 1 (1%)
  - Daily Trips - Year 1 (post-construction): 18
  - Daily Trips - Year 20 (post-construction): 20

**Pedestrian**

- Daily Trips - Current: 24
- Projected Annual Growth Rates from Year 1 (1%)
  - Daily Trips - Year 1 (post-construction): 24
  - Daily Trips - Year 20 (post-construction): 27
1E) New Facility Improvements & Trip Value – Improvement Characteristics (4/4)

**Trip Data - Adults**
- For Cycling and Pedestrian traffic
- **Current Daily Trips**
- **Projected Annual Growth Rates**
  - in No Build and Build scenarios
- **Daily Trips, post-construction**
  - Year 1 and Year 20, No Build and Build scenarios
  - Calculated from above inputs
  - Can be overwritten if better data is available

**Trip Data - Children – SRTS**
- Same inputs as above
- Only required for SRTS projects

---

### Trip Data - Adults

<table>
<thead>
<tr>
<th></th>
<th>No Build</th>
<th>Build</th>
</tr>
</thead>
<tbody>
<tr>
<td>Daily Trips - Current</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Projected Annual Growth Rates from Year 1(%)</td>
<td>0.5%</td>
<td>3.0%</td>
</tr>
<tr>
<td>Daily Trips - Year 1 (post-construction)</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Daily Trips - Year 20 (post-construction)</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

### Trip Data - Children - SRTS

<table>
<thead>
<tr>
<th></th>
<th>No Build</th>
<th>Build</th>
</tr>
</thead>
<tbody>
<tr>
<td>Daily Trips - Current</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Projected Annual Growth Rates from Year 1(%)</td>
<td>0.5%</td>
<td>3.0%</td>
</tr>
<tr>
<td>Daily Trips - Year 1 (post-construction)</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Daily Trips - Year 20 (post-construction)</td>
<td>10</td>
<td>10</td>
</tr>
</tbody>
</table>
Reduced Delay Due to Intersection Improvements

Number of Improved Intersections
- Improved intersections in the project area (if applicable to project)

Time Savings per Improved Intersection
- Expected savings in minutes per intersection due to improvements

Intersection improvements on SRTS? (Y/N)
- Yes = 1; Leave blank if “No”
1C) Intersection Improvements – Accident Rates

For Cyclists

Number of Years of Data
- Years of accident data to be entered

Total Accidents in Existing Conditions
- Fatal, Injury, Property Damage Only
- Enter actual number of accidents in the project area
- Total Number of Accidents (Tot) are calculated as the sum of accidents by type
- Accident rates (per year) = Accidents / Years of data, by type
- Rates can be overridden if better data is available

Annual Growth Rate in Accidents
- Applies to accidents in No Build and Build scenarios
1C) Intersection Improvements – Accident Rates (cont.)

For Pedestrians

- Same inputs as for bicyclists
  - Number of Years of Data
  - Total Accidents (Fatal, Injury, Property Damage Only) in Existing Conditions
  - Annual Growth Rate in Accidents

- Years of data and growth are independent for each mode

NOTE: Current practice at Caltrans and CA agencies refers to vehicular incidents or “accidents” as “collisions” or “crashes.” Current versions of Cal-B/C still refer to collisions/crashes as accidents.
1C) Intersection Improvements – Safety Countermeasures

- Yes = 1; Leave blank if “No”
- Identifies safety countermeasures at existing facilities that contribute to bicycle and pedestrian accident cost savings
- Signalized Intersection
- Unsignalized Intersection
- Roadways (pedestrian improvements only)
- Other Reduction Factor Countermeasures

- Used in accident cost savings in the Intersection Safety worksheet
1D) General User Characteristics (Based on Project Location)

- Default Parameters for:
  - Distribution of Trip Purpose
  - Distance traveled
  - For Cyclists and Pedestrians
  - No Build and Build scenarios

- Based on Project Location entry in Section 1A

- Characteristics of facility users are used in estimating facility benefits

- Can be overridden if better data is available

- Refer to Module 5 for discussion of default parameter sources
1F) Project Costs

- All project costs entered into five cost columns
- Project costs should be entered as incremental rather than total costs
  - Incremental costs are difference between No Build and Build scenarios
- Costs must be entered in thousands of dollars ($1,000)
- Project costs must be entered in constant dollars, in same year as economic parameters used for benefit calculations (current year in Cal-B/C is 2016)
  - Modules 5 and 6a will go into more details about year for current dollars
1F) Project Costs – Direct Project Costs

Initial Costs
- Project support
- Right-of-way acquisition costs
- Construction costs
- Cal-B/C assumes that all initial project costs are expended by the last year of construction

Subsequent Costs
- Any costs incurred after the project is constructed and open
  - Operating and Maintenance (O&M) costs
  - Rehabilitation costs
- Module 8 discusses project cost sources, including O&M costs
1F) Project Costs

- Up to eight (8) years of initial infrastructure project costs allowed
- Costs must be entered for each year to be consistent with “Length of Construction Period” entered in Section 1A
- Following construction, project opens and the 20-year project operating period begins
- Year 1 (Base Year) described in previous slides represented by the “1” under the “Project Open” header
1F) Project Costs – Total Costs

**Total Costs**
- Calculated automatically
- Include project cost in constant dollars and present value for each year
- Values are in total dollars and not in thousands of dollars like other columns
1G) Program Costs and Requested Funds

- Cal-B/C AT has an additional section for programmatic or non-infrastructure costs
- Same five cost columns are available to use to enter costs for projects with non-infrastructure improvements
  - Must be entered in thousands of dollars ($1,000)
  - Must be entered in constant dollars, in same year as economic parameters
- Total costs in constant and present value dollars are still calculated
- ATP Requested Funds
  - Enter how much money has been requested (or will be requested) from the ATP program
  - Only used if the tool is being used for an ATP application
1H) Data Checks – Project Length, Daily Trips

- Checks for data consistency in all sections in 1a) Project Info
  - Facility length: existing and new, in No Build and Build scenarios
  - Safety measures on existing facilities
- If data entry is not consistent, “Not OK” will appear in the box corresponding to the inconsistency.

In this example, the project length for the existing and new facilities in the Build scenario does not match between sections 1A, 1B, and 1E.
Once the trip data is entered in sections 1B and 1E, Section 1H summarizes Existing and New Facility Users (in total trips per mile) for cyclists and pedestrians.

- "NA" indicates no data is entered.
- Review the demand, does it match your expectations for existing and new infrastructure?

Module 4c: Project Information Worksheet
Non-Infrastructure Program Information Worksheet
Non-Infrastructure Program Information Worksheet (1b)

- Data entry and scoring system for non-infrastructure initiatives and programs
  - Examples: educational and outreach programs
- Non-Infrastructure programs are intended to reach target audiences through a variety of outreach and training mechanisms
  - This sheet collects information about the proposed initiative and applies a scoring framework to determine the overall program cost per score
Non-Infrastructure Program Information Worksheet (1b) (cont.)

- Data collected on the number of people reached who are not currently engaged in active transportation
- Data collected for four criteria to assess effectiveness of initiative
1I) Non-Infrastructure Program Characteristics

- Similar to Infrastructure data entry in Section 1a)
- Optional, input unique project identifiers including: Caltrans District, Project Name (w/ route number and postmiles), Expenditure Authorization (EA) number, Planning and Programming Number (PPNO)
- More project information assists with accountability checks
  - Route (or route name) and postmile allows to check against official county or agency websites for project information
## 1I) Non-Infrastructure Program Characteristics (2/7)

- Programmatic Initiatives (calculated based on selection in Section 1A)

### Participants/Beneficiaries

- Number of People reached per year
- Percent of Current Active Bicyclists that benefit (are reached by the program)
- Percent of Current Active Pedestrians that benefit (are reached by the program)

### Module 4c: Non-Infrastructure Program Information Worksheet

<table>
<thead>
<tr>
<th>District</th>
<th>Number of People Reached per Year</th>
<th>Percent of Current Active Bicyclists Reached per Year</th>
<th>Percent of Current Active Pedestrians Reached per Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>District 99</td>
<td>2500</td>
<td>5%</td>
<td>1%</td>
</tr>
</tbody>
</table>

### Programmatic Initiatives

- **Yes**

### Scale of Initiative

**Participants / Beneficiaries**

- Numbers of People Reached per Year: 2500
- Average Percentage of Current Active Bicyclists Reached per Year: 5%
- Average Percentage of Current Active Pedestrians Reached per Year: 1%

### Scoring Criteria

1) Target Audience

- Younger than 10: 5%
- 10-12: 45%
- 13-24: 44%
- 25-55: 5%
- 55+: 1%
- Indicator-Weighted Score: 0.21

2) Characteristics Promotional Effort

- Effort Targets 5 E’s or 5 P’s
- Knowledgeable Staff/Educator
- Other (please specify):
1I) Non-Infrastructure Program Characteristics (3/7)

- Scoring framework is used to determine the initiative overall score
- Four equally weighted criteria assess the effectiveness of the initiative
- Score is also based on how many currently non-active transportation users are impacted

**Scoring Criteria**

1) Target Audience
   - Distribution in percentages by age group
   - Gray cells are used in the calculation of the Indicator-Weighted Score, they are not intended to be overridden
## Scoring Criteria

### 2) Characteristics Promotional Effort
- Effort Targets 5 e’s or 5 p’s
- Knowledgeable Staff/Educator
- Partnership/Volunteers
- Creates Community Ownership
- Part of Bigger Effort

Mark ‘1’ for all that apply

---

### 1) Target Audience

<table>
<thead>
<tr>
<th>Indicators</th>
<th>Indicator Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Younger than 10</td>
<td>10%</td>
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<td>10-12</td>
<td>20%</td>
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<td>13-24</td>
<td>25%</td>
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<td>25-55</td>
<td>10%</td>
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<tr>
<td>55+</td>
<td>5%</td>
</tr>
<tr>
<td>Indicator-Weighted Score</td>
<td>0.21</td>
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</table>

### 2) Characteristics Promotional Effort

<table>
<thead>
<tr>
<th>Indicators</th>
<th>Indicator Weight</th>
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</thead>
<tbody>
<tr>
<td>Effort Targets 5 E’s or 5 P’s</td>
<td>5%</td>
</tr>
<tr>
<td>Knowledgeable Staff/Educator</td>
<td>5%</td>
</tr>
<tr>
<td>Partnership/Volunteers</td>
<td>5%</td>
</tr>
<tr>
<td>Creates Community Ownership/Relationship</td>
<td>5%</td>
</tr>
<tr>
<td>Part of Bigger Effort (e.g., political support)</td>
<td>5%</td>
</tr>
<tr>
<td>Indicator-Weighted Score</td>
<td>0.19</td>
</tr>
</tbody>
</table>

### 3) Type of Impact and Messaging

| Indicators                                                     | Indicator Weight |
|                                                              |                  |
| Outreach is Hands-on (self-efficacy)                          | 5%               |
| Overcome Barriers (e.g., dist., time, etc.)                   | 5%               |
| Eliminates Hazards/Threats (speed, crime, etc.)              | 5%               |
| Connected or Addresses Connectivity Challenges               | 5%               |
| Creating Value in Using Active Transportation                | 5%               |
| Indicator-Weighted Score                                     | 0.05             |

### 4) Frequency of Outreach Effort

<table>
<thead>
<tr>
<th>Indicators</th>
<th>Indicator Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>One Day</td>
<td>5%</td>
</tr>
</tbody>
</table>
1l) Non-Infrastructure Program Characteristics (5/7)

**Scoring Criteria**

- **3) Type of Impact and Messaging**
  - Hands-on Outreach
  - Overcome Barriers
  - Eliminates Hazards/Threats
  - Connected or Addresses Connectivity Challenges
  - Creating Value in Using Active Transportation

- Mark ‘1’ for all that apply
**1I) Non-Infrastructure Program Characteristics (6/7)**

**Scoring Criteria**

- 4) Frequency of Outreach Effort
  - One Day
  - One Month
  - One Year
  - Multiple Years
  - Continuous Effort

Mark ‘1’ for the option that applies (mutually exclusive options)
1I) Non-Infrastructure Program Characteristics (7/7)

**Scoring Criteria** – Calculated (gray) fields are for reference, if change is required, change the input data above

- **Projected New Active Transportation Cyclists**
  - Number of potential new facility users
  - Years of outreach
  - Impact Scores

- **Cost Effectiveness (for Cyclists)**
  - Total Discounted Cost
  - Cost per Program Impact Score

- **Projected New Active Transportation Pedestrians**
  - Number of potential new facility users
  - Years of outreach
  - Impact Scores

- **Cost Effectiveness (for Pedestrians)**
  - Total Discounted Cost
  - Cost per Program Impact Score
05

Model Inputs Worksheet
2) Model Inputs

- Number of trips, users, and miles traveled by trip purpose
- Estimated based on data entered in Project Information worksheet
- Adjust calculated values if more in-depth data are available
- “Reason for Change” should be specified for any values overridden by user
  - Example: Federal Highway Administration (FHWA) grant reviewers examine these cells closely
  - Users should have citing documents ready if values are overridden
2) Model Inputs, Sections

Cycling Volume Inputs
- 2A) Existing Facility Segment
- 2B) New Facility Segment
- 2C) New Safe Routes To School
- 2D) Existing Safe Routes To School

Pedestrian Volume Inputs
- 2E) Existing Facility Segment
- 2F) New Facility Segment
- 2G) New Safe Routes To School
- 2H) Existing Safe Routes To School

Cycling and Pedestrian inputs for existing and new facilities consider commuting, recreation and other destinations for purpose of travel.
Active Transportation Daily Volume Inputs - Cycling - Existing Facility (2A)

- Allows you to change data for the existing facility in the green columns
  - Trips
  - Users
  - Total miles
- Both Year 1 and Year 20 estimates
- No Build and Build scenarios
- Considers commuting, recreation and other destinations for purpose of travel

<table>
<thead>
<tr>
<th></th>
<th>Calculated by Model</th>
<th>Changed by User</th>
<th>Used for Proj. Eval</th>
<th>Reasons for Change</th>
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<td>Year 1</td>
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<td>Annual Trips - Commuting</td>
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<td>Annual Trips - Other Destinations</td>
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<td>Users - Commuting</td>
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<td><strong>Year 20</strong></td>
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<tr>
<td><strong>Build - Cycling</strong></td>
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<td>Year 1</td>
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<td><strong>Year 20</strong></td>
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<td>Annual Trips - Commuting</td>
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</tbody>
</table>
### Active Transportation Daily Volume Inputs - Cycling - New Facility (2B)

- Volume inputs for New Facility
- Same inputs as section 2A
Active Transportation Daily Volume Inputs - Cycling

- 2C) Cycling - **New Safe Routes To School**
- 2D) Cycling - **Existing Safe Routes To School**

- Allows you to change data for the new and existing facility in the green columns
  - Trips
  - Users
  - Total miles
- Both Year 1 and Year 20 estimates
- No Build and Build scenarios

### Table: 2C) Cycling - New Safe Routes To School

<table>
<thead>
<tr>
<th>Year</th>
<th>No Build - Cycling</th>
<th>Charged by User</th>
<th>Effect on Project</th>
<th>Reason for Change</th>
</tr>
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<tbody>
<tr>
<td>1</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
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</table>

### Table: 2D) Cycling - Existing Safe Routes To School

<table>
<thead>
<tr>
<th>Year</th>
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<th>Charged by User</th>
<th>Effect on Project</th>
<th>Reason for Change</th>
</tr>
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<tr>
<td>2</td>
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</tr>
</tbody>
</table>
Active Transportation Daily Volume Inputs - Pedestrian - Existing Facility Segment (2E)

- Allows you to change data for the existing facility in the green columns
  - Trips
  - Users
  - Total miles
- Both Year 1 and Year 20 estimates
- No Build and Build scenarios
- Considers commuting, recreation and other destinations for purpose of travel

<table>
<thead>
<tr>
<th>No Build - Pedestrian</th>
<th>Calculated by Model</th>
<th>Changed by User</th>
<th>Used for Prog. Eval</th>
<th>Reason for Change</th>
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<td>Annual Trips - Commuting</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>Recreational Users not included in Benefits</td>
</tr>
<tr>
<td>Annual Trips - Other Destinations</td>
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<td>0</td>
<td>Recreational Users not included in Benefits</td>
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<tr>
<td>Users - Commuting</td>
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<tr>
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<td>0</td>
<td>0</td>
<td>Recreational Users not included in Benefits</td>
</tr>
</tbody>
</table>

| Year 10                |                     |                 |                     |                   |
| Annual Trips - Commuting | 0                 | 0               | 0                   | Recreational Users not included in Benefits |
| Annual Trips - Other Destinations | 0 | 0 | 0 | Recreational Users not included in Benefits |
| Annual Trips - Recreational | 0 | 0 | 0 | Recreational Users not included in Benefits |
| Users - Commuting | 0 | 0 | 0 | Recreational Users not included in Benefits |
| Users - Other Destinations | 0 | 0 | 0 | Recreational Users not included in Benefits |
| Users - Recreational | 0 | 0 | 0 | Recreational Users not included in Benefits |
| Total Miles - Commuting | 0 | 0 | 0 | Recreational Users not included in Benefits |
| Total Miles - Other Destinations | 0 | 0 | 0 | Recreational Users not included in Benefits |
| Total Miles - Recreational | 0 | 0 | 0 | Recreational Users not included in Benefits |

<table>
<thead>
<tr>
<th>Build - Pedestrian</th>
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<th>Changed by User</th>
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<th>Reason for Change</th>
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</table>

| Year 10             |                     |                 |                     |                   |
| Annual Trips - Commuting | 0                 | 0               | 0                   | Recreational Users not included in Benefits |
| Annual Trips - Other Destinations | 0 | 0 | 0 | Recreational Users not included in Benefits |
| Annual Trips - Recreational | 0 | 0 | 0 | Recreational Users not included in Benefits |
| Users - Commuting | 0 | 0 | 0 | Recreational Users not included in Benefits |
| Users - Other Destinations | 0 | 0 | 0 | Recreational Users not included in Benefits |
| Users - Recreational | 0 | 0 | 0 | Recreational Users not included in Benefits |
| Total Miles - Commuting | 0 | 0 | 0 | Recreational Users not included in Benefits |
| Total Miles - Other Destinations | 0 | 0 | 0 | Recreational Users not included in Benefits |
| Total Miles - Recreational | 0 | 0 | 0 | Recreational Users not included in Benefits |
Active Transportation Daily Volume Inputs - Pedestrian - New Facility (2F)

- Volume inputs for New Facility
- Same inputs as section 2E
Active Transportation Daily Volume Inputs - Pedestrian

- 2G) Pedestrian - New Safe Routes To School
- 2H) Pedestrian - Existing Safe Routes To School

- Allows you to change data for the new and existing facility in the green columns
  - Trips
  - Users
  - Total miles
- Both Year 1 and Year 20 estimates
- No Build and Build scenarios
3) Model Results

- Life-Cycle Costs
- Life-Cycle Benefits
- Net Present Value
- Benefit/Cost Ratio
- Rate of Return on Investment
- Payback Period
- Results calculated over lifecycle
- Person-Hours of Time Saved
- Accidents Avoided
- Emissions Reduction

Model results and interpretation were presented in Module 3
Additional Information
Active Transportation Benefit Categories

Discussed in more detail in Module 6c

- **Journey Quality**: Value of enhanced trip conditions
- **Travel Time Savings (at Intersections)**: Estimated by reduced wait times at intersections
- **Safety Benefits (at Intersections, Sidewalks)**: Estimated by crash reduction factors for safety countermeasures
- **Auto Accident Cost Savings**: Modal shift from passenger vehicles to active transportation reduces number of accidents
- **Emissions Cost Savings**: Modal shift from passenger vehicles to active transportation reduces pollution
- **Health Benefits**: Reduced absenteeism (short-term health risk), and avoided pre-mature deaths (long-term health risk)

<table>
<thead>
<tr>
<th>Benefit Categories by Facility Type</th>
<th>Existing Trips</th>
<th>Induced Trips</th>
<th>Existing Trips</th>
<th>Induced Trips</th>
</tr>
</thead>
<tbody>
<tr>
<td>Journey Quality</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Time Savings (at Intersections)</td>
<td>Yes</td>
<td></td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Safety (at Intersections)</td>
<td>Yes</td>
<td></td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Auto Accident Costs and Auto Emissions</td>
<td>Yes</td>
<td></td>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>Health Benefits (Reduced Absenteeism)</td>
<td>Yes (Commuters)</td>
<td></td>
<td>Yes (Commuters)</td>
<td>Yes (Commuters)</td>
</tr>
<tr>
<td>Health Benefits (Reduced Mortality)</td>
<td>Yes (Age dependent)</td>
<td></td>
<td>Yes (Age dependent)</td>
<td></td>
</tr>
</tbody>
</table>
Detailed Calculations

- Discussed in more detail in Module 6c
- Analysis worksheets produce detailed calculations for each benefit category
- Final Calculations Worksheet tabulates all the benefits and calculates the results
- Calculations provided by year, by mode, and by facility type (existing and new)
- Generally, you do not need to review these sheets
- They are provided for model transparency
Cal-B/C AT User’s Guide
- User-focused model overview with step-by-step instructions and project example
- Describes model framework, project types, and updated parameters

- Parameter Guide
  - Describes economic values and parameters

User’s Guide

Parameter Guide
Conclusion
In this module, you learned…

- What Cal-B/C Active Transportation is and were provided an overview of the tool
- How to determine if Cal-B/C AT is the right tool for your project evaluation
- Cal-B/C color-coding and worksheet layout
- Where and how data is entered into Cal-B/C AT
What’s Next?

- Get more information on a different Cal-B/C tool and how it works
  - Module 4a (Cal-B/C Sketch)
  - Module 4b (Cal-B/C Corridor)
  - Module 4d (Cal-B/C Park & Ride)
  - Module 4e (Cal-B/C Intermodal Freight)

- Find out more about Cal-B/C assumptions and parameters
  - Module 5: Understanding Cal-B/C Assumptions and Parameters

- Start an analysis!
  - Module 7a (Cal-B/C Sketch)
  - Module 7b (Cal-B/C Corridor)
  - Module 7c (Cal-B/C Active Transportation)
  - Module 7d (Cal-B/C Park & Ride)
  - Module 7e (Cal-B/C Intermodal Freight)