Cal-B/C Training Module 4a

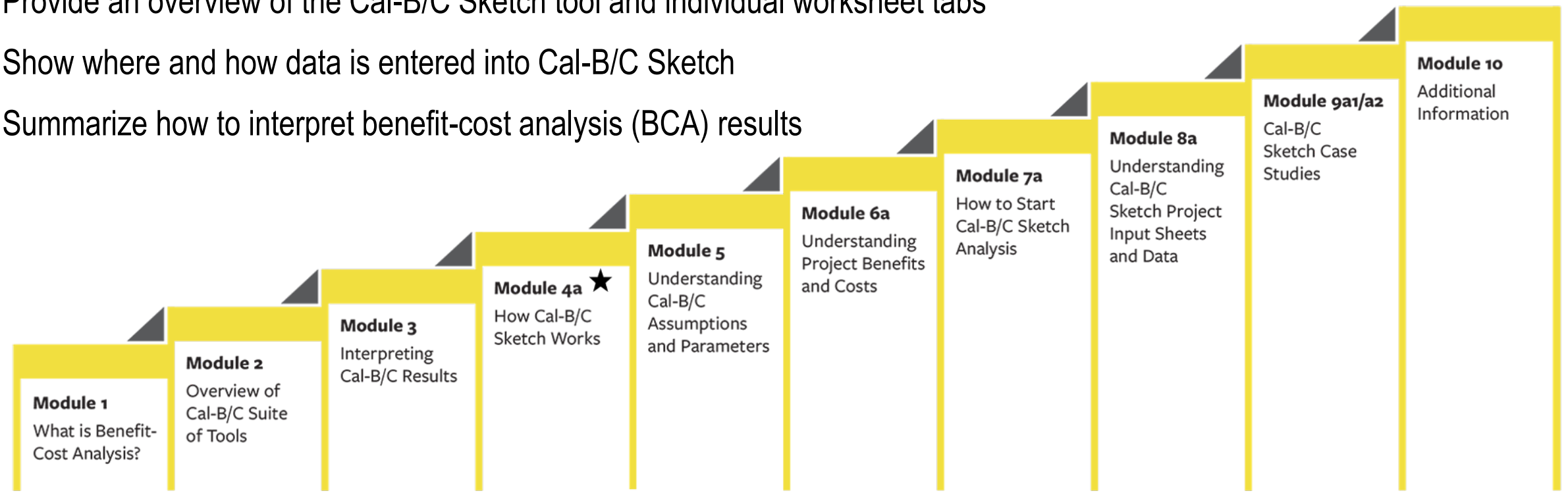
How Cal-B/C Sketch Works

01

About This Module

This module will…

- Build on Modules 1, 2, and 3 to provide a detailed understanding of how Cal-B/C Sketch works
- Help you decide if Cal-B/C Sketch is the right tool for your project
- Provide an overview of the Cal-B/C Sketch tool and individual worksheet tabs
- Show where and how data is entered into Cal-B/C Sketch
- Summarize how to interpret benefit-cost analysis (BCA) results



★ *This module is covered in this presentation*

Previous Modules…

- Module 1 provided a basic introduction to 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 project types
- 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 Sketch the right tool for you?

- California Transportation Commission endorses the use of Cal-B/C tools for grant applications and local partnership program applications
- Module 2 can help you select the right tool(s) for your job
- Cal-B/C Sketch can be used to evaluate 29 types of projects
  - Interchange, local roads, and roundabout projects cannot be evaluated in Sketch, but can be evaluated in Cal-B/C Corridor
- If travel demand model (TDM) or micro-simulation model data is available, you should consider Cal-B/C Corridor
- Cal-B/C Sketch cannot evaluate **Active Transportation**, **Park and Ride Facility**, or **Intermodal Freight Facility** projects
- Cal-B/C Sketch results can be combined with other Cal-B/C tool results

Cal-B/C Sketch Can Evaluate…

Project Type	Cal-B/C Project Category
Arterial Signal Management	Transportation Management Systems (TMS)
Auxiliary Lane	Highway Operational Improvement
Bus Transit	Rail or Transit Capacity Expansion
Bus Rapid Transit (BRT)	Transportation Management Systems (TMS)
Bypass	Highway Capacity Expansion
Freeway Connector	Highway Operational Improvement
General Highway	Highway Capacity Expansion
Highway-Rail Grade Crossing	Rail or Transit Capacity Expansion
HOT Lane Addition	Highway Capacity Expansion
HOT Lane Conversion	Highway Operational Improvement
HOV Connector	Highway Operational Improvement
HOV Drop Ramp	Highway Operational Improvement
HOV Lane Addition	Highway Capacity Expansion
HOV-2 to HOV-3 Conversion	Highway Operational Improvement
Incident Management (IM)	Transportation Management Systems (TMS)
Intersection	Highway Capacity Expansion
Light-Rail (LRT)	Rail or Transit Capacity Expansion
Off-Ramp Widening	Highway Operational Improvement
On-Ramp Widening	Highway Operational Improvement
Passenger Rail	Rail or Transit Capacity Expansion
Passing Lane	Highway Capacity Expansion
Pavement	Highway Capacity Expansion
Queuing	Highway Capacity Expansion
Ramp Metering (RM)	Transportation Management Systems (TMS)
Ramp Metering Signal Coordination	Transportation Management Systems (TMS)
Transit Vehicle Location (AVL)	Transportation Management Systems (TMS)
Transit Vehicle Signal Priority	Transportation Management Systems (TMS)
Traveler Information (TI)	Transportation Management Systems (TMS)
Truck Only Lane	Highway Capacity Expansion

Cal-B/C Sketch 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 Sketch file is approximately 700 kilobytes (KB) in size

Cal-B/C User Requirements

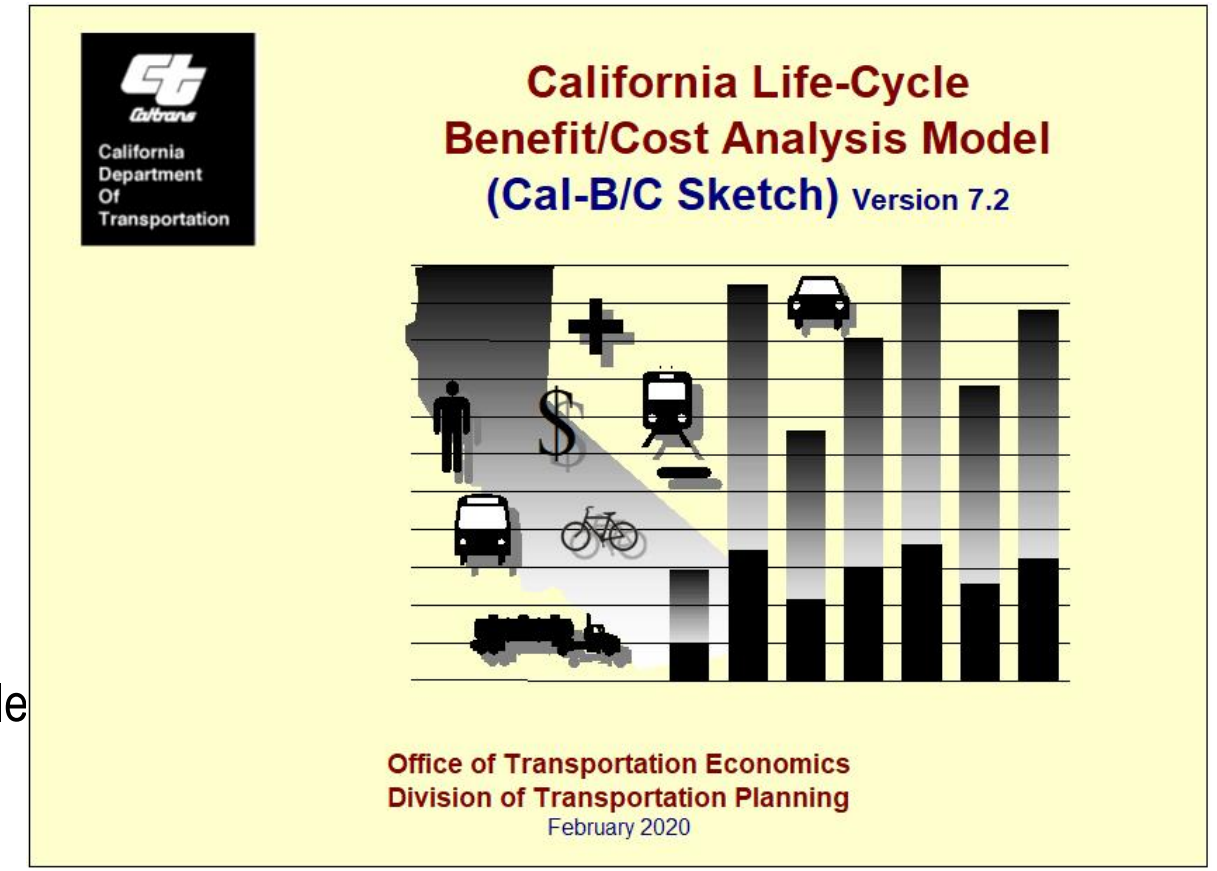
- Working knowledge of spreadsheets, particularly Microsoft Excel
- Understanding of benefit-cost analysis
- Ability to interpret results in a transportation planning context

02

Cal-B/C Sketch Overview

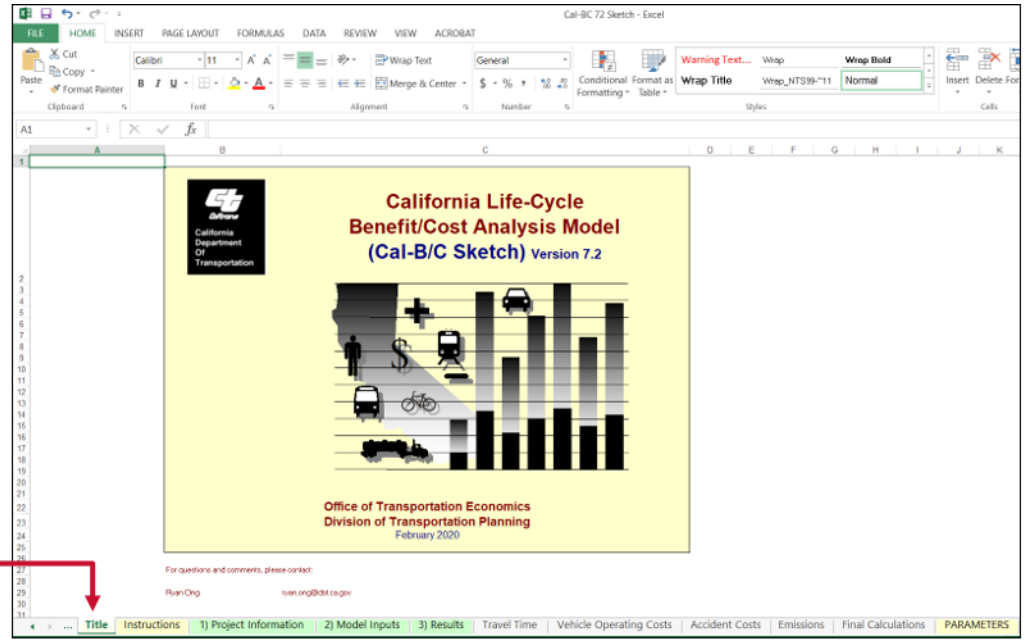
Overview of Cal-B/C Sketch 7.2

- Simple, **sketch** planning model
- Set up as an **interconnected**, multi-sheet **spreadsheet**
  - **Project Information** and **Model Inputs** worksheets are primary locations for data entry
  - BCA results presented in the **Results** worksheet
- Contains **default values** and lookup tables to standardize analysis
- Performs calculations automatically from project input data
- Estimates **speeds from volumes** when speed data not available
- Estimates **four user benefits**



Contact: eab@dot.ca.gov
Website: https://dot.ca.gov/programs/transportation-planning/economics-data-management/transportation-economics

Worksheet Layout in Cal-B/C Sketch



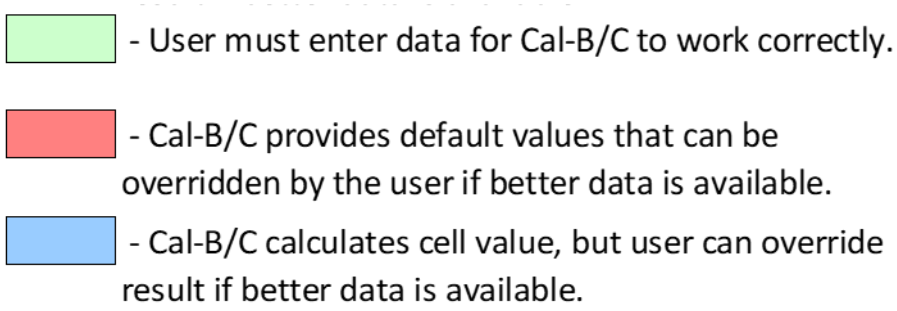
Worksheets where data will be entered and results presented

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

Title	Instructions	1) Project Information	2) Model Inputs	3) Results	Travel Time	Vehicle Operating Costs	Accident Costs	Emissions	Final Calculations	PARAMETERS
	Summary instructions on how to fill out each data item in Cal-B/C	▪ Project Description/ Type of Project ▪ Highway Geometric and Traffic Data ▪ Highway Collision Data ▪ Rail and Transit Data ▪ Project Costs	▪ Default calculations for: ○ Speeds ○ Volumes ○ Collisions ▪ Additional ramp and arterial inputs ▪ Person-trip verification for HOV/HOT projects	▪ BCA results ▪ Itemized Benefits ($) ▪ Emission Savings (Tons)	Calculates No Build and Build Person-Hours and Costs by: ○ Year ○ Facility ○ Mode	Calculates Highway No Build and Build Fuel and Non-Fuel Costs by: ○ Year ○ Facility	Calculates No Build and Build Collision Costs by: ○ Year ○ Facility ○ Mode	Calculates No Build and Build Running and Starting Emissions and Costs: ○ Year ○ Facility ○ Mode	Tabulates final results, including: ▪ Net present value ▪ Internal rate of return	Key default analysis parameters and assumptions for all Cal-B/C tools

Cell Color-Coding

- Cal-B/C Sketch requires few user inputs, but allows for more inputs when data is available
- **Green** cells indicate required data
  - Must input values depending on analysis being performed
  - Cal-B/C descriptions tell you what cells need to be used for a given analysis
  - Example: for a highway project, highway traffic data must be entered in the appropriate green cells. Rail transit data in this case does not need to be entered
- **Red** cells provide default values that can be changed if needed
  - Examples: default values for percent trucks and average vehicle occupancy (AVO)
- **Blue** cells contain values calculated by the model for No Build and Build Scenarios



03

Project Information Worksheet

1) Project Information Worksheet

- Primary data entry worksheet
- For most projects, this will be the only worksheet used
- Other worksheets should be modified if project specific information is available

1A Project Data

- Required for all projects

1B Highway Design and Traffic Data

- Roadway geometrics
- Traffic Demand and Speed Data
- Not all sections need to be filled in

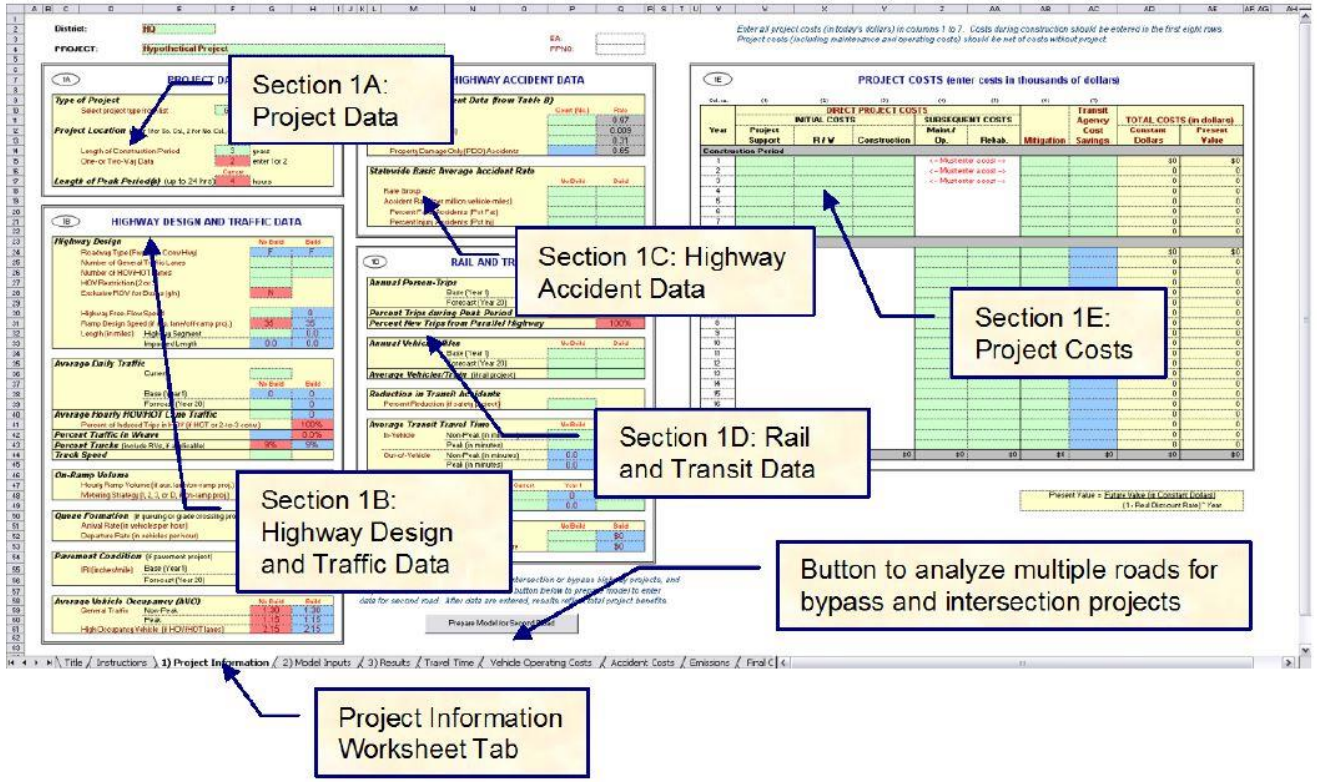
1C Highway Accident (i.e., Collision) Data

- Study area accident rates
- Statewide average accident rates

1D Rail and Transit Data

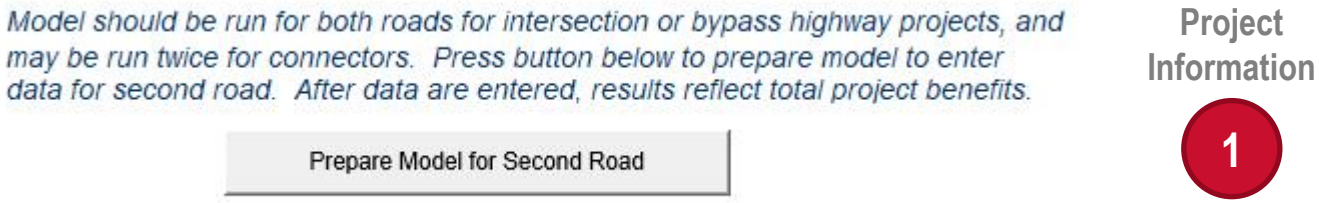
- Service demand characteristics (e.g., person trips)
- Service supply characteristics

1E Project Costs

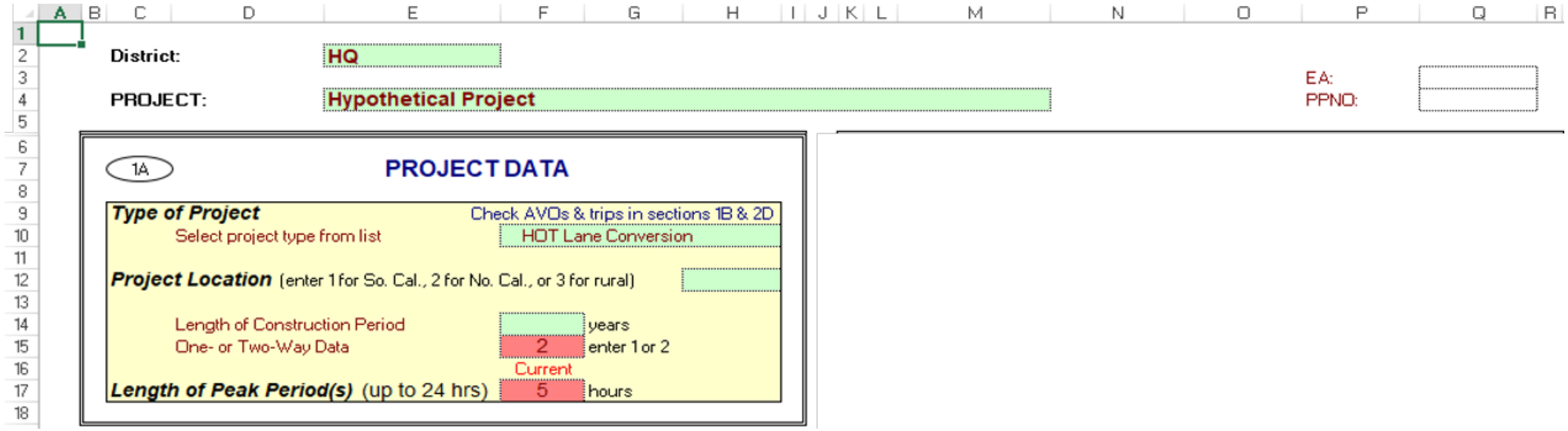


Macro Button (for intersection projects)

- Saves Road 1 project information
- Clears cells for Road 2 data enter



1A) Project Data



- Optional, but can include unique project identifiers: Caltrans District, Project Name (w/ route number and postmiles), Expenditure Authorization (EA) number, Planning and Programming Number (PPNO)

Type of Project

- Pull-down menu allows user to select one of 29 project types
- Text above pull-down menu indicates data entry requirements for each section

1A) Project Data

District: HQ

PROJECT: Hypothetical Project

EA:
PPNO:

1A

PROJECT DATA

Type of Project	Check AVOs & trips in sections 1B & 2D	
Select project type from list	HOT Lane Conversion	
Project Location (enter 1 for So. Cal., 2 for No. Cal., or 3 for rural)		
Length of Construction Period		years
One- or Two-Way Data	2	enter 1 or 2
	Current	
Length of Peak Period(s) (up to 24 hrs)	5	hours

Project Location

- Used to estimate emission benefits using values appropriate for each region
- Used to look up the percentage of travel during the peak period

Length of Construction Period

- Years needed to construct project
- Project opening date assumed to occur at the end of the construction period

One- or Two-Way Data

- Indicates if Section 1B data is for travel in one direction or two directions. For example, Caltrans Annual Average Daily Traffic (AADT) volumes are reported for 2-way traffic, but the Performance Measurement System (PeMS) volumes can be one-way traffic

1A) Project Data

District: HQ

PROJECT: Hypothetical Project

EA:
PPNO:

1A

PROJECT DATA

Type of Project	Check AVOs & trips in sections 1B & 2D	
Select project type from list	HOT Lane Conversion	
Project Location (enter 1 for So. Cal., 2 for No. Cal., or 3 for rural)		
Length of Construction Period		years
One- or Two-Way Data	2	enter 1 or 2
	Current	
Length of Peak Period(s) (up to 24 hrs)	5	hours

Length of Peak Period(s)

- Helps determine peak/non-peak volumes and speeds for emissions and operating cost benefit calculations
- Value entered should be the total number of daily hours that are considered peak hours for travel
- Example: if peak period is four hours from 3PM to 7PM, then enter a “4”

1B) Highway Design and Traffic Data – Highway Design

Roadway Type (i.e., Freeway, Expressway, or Conventional Highway)

- "F" (freeway), "E" (expressway), or "C" (conventional highway) indicates roadway type
- Inputs are case sensitive and should be entered in upper case

Number of General Traffic Lanes

- Mainline traffic lanes along the roadway section (Required input for all highway projects)
- Do not include short auxiliary lanes or ramp merge lanes general traffic lane count

Number of HOV/HOT Lanes

- For HOV-to-HOT lane conversions - same number of lanes for No Build and Build

HOV Restriction (2 or 3)

- Cal-B/C allows a "2" for a two-person or "3" for a three-or more person restriction

Exclusive ROW (Right-of-Way) for Buses

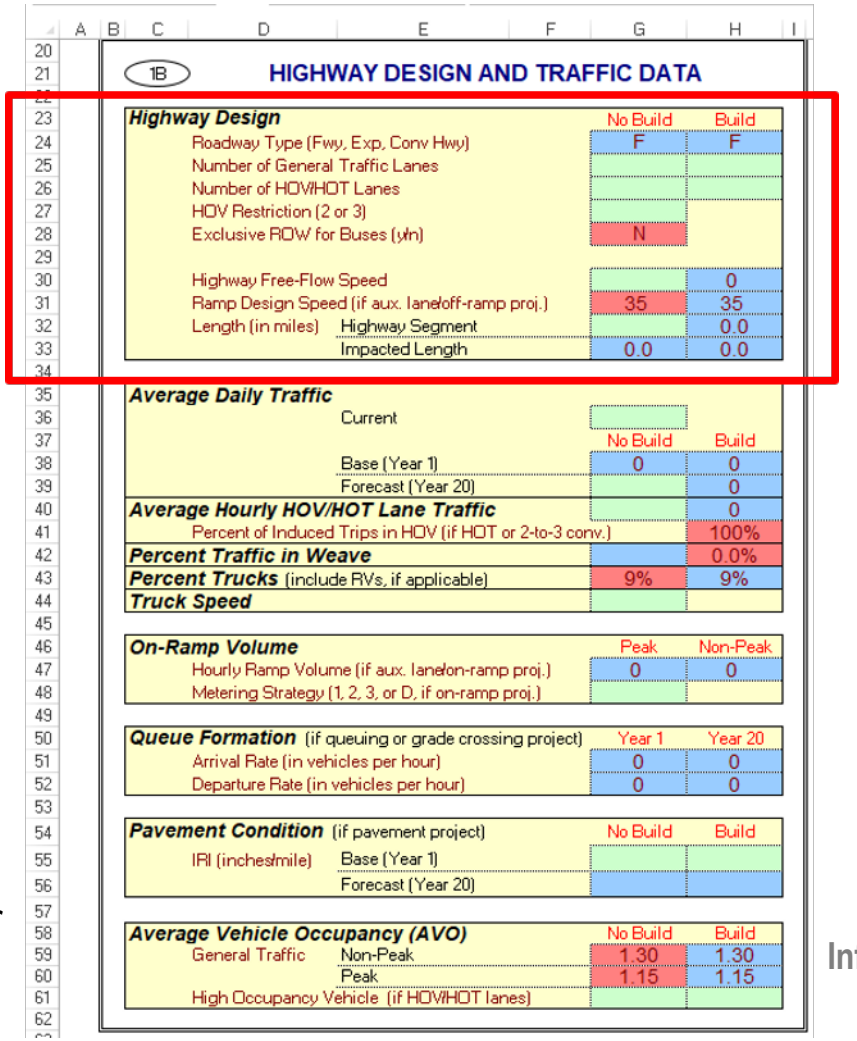
- Input used if the highway contains an exclusive busway or bus lanes

Highway Free-Flow Speed

- Design speed for the highway section

Ramp Design Speed (if auxiliary lane/off-ramp project)

- For auxiliary lanes, speed is average speed during acceleration (for on-ramps), merging, or decelerating (for off-ramps)



1B HIGHWAY DESIGN AND TRAFFIC DATA

Highway Design		No Build	Build
Roadway Type (Fwy, Exp, Conv Hwy)		F	F
Number of General Traffic Lanes			
Number of HOV/HOT Lanes			
HOV Restriction (2 or 3)			
Exclusive ROW for Buses (y/n)		N	
Highway Free-Flow Speed			0
Ramp Design Speed (if aux. lane/off-ramp proj.)		35	35
Length (in miles)	Highway Segment		0.0
	Impacted Length	0.0	0.0

Average Daily Traffic			
	Current		
		No Build	Build
	Base (Year 1)	0	0
	Forecast (Year 20)		0
Average Hourly HOV/HOT Lane Traffic			0
Percent of Induced Trips in HOV (if HOT or 2-to-3 conv.)			100%
Percent Traffic in Weave			0.0%
Percent Trucks (include RVs, if applicable)		9%	9%
Truck Speed			

On-Ramp Volume	Peak	Non-Peak
Hourly Ramp Volume (if aux. lane/on-ramp proj.)	0	0
Metering Strategy (1, 2, 3, or D, if on-ramp proj.)		

Queue Formation (if queuing or grade crossing project)	Year 1	Year 20
Arrival Rate (in vehicles per hour)	0	0
Departure Rate (in vehicles per hour)	0	0

Pavement Condition (if pavement project)		No Build	Build
IRI (inches/mile)	Base (Year 1)		
	Forecast (Year 20)		

Average Vehicle Occupancy (AVO)		No Build	Build
General Traffic	Non-Peak	1.30	1.30
	Peak	1.15	1.15
High Occupancy Vehicle (if HOV/HOT lanes)			

1B) Highway Design and Traffic Data – Travel Demand, Weaving, and Trucks

Average Daily Traffic (ADT)

- Enter general purpose highway traffic for current and forecast year
- Forecast year is 20 years after the project opening date
- Cal-B/C uses straight-line/linear interpolation to estimate future year volumes
- Induced demand can be included in analysis

Average Hourly HOV/HOT Lane Traffic

- If segment has existing HOV/HOT lane, enter current year average hourly HOV/HOT volumes
- Both HOT lane or HOV-2 to HOV-3 conversions affect both AVO and can induce demand

Percent of Induced Trips in HOV (if HOT or 2-3 conversion)

- Percentage of forecast ADT is in HOV/HOT lanes (Required for all highway projects)

Percent Traffic in Weave

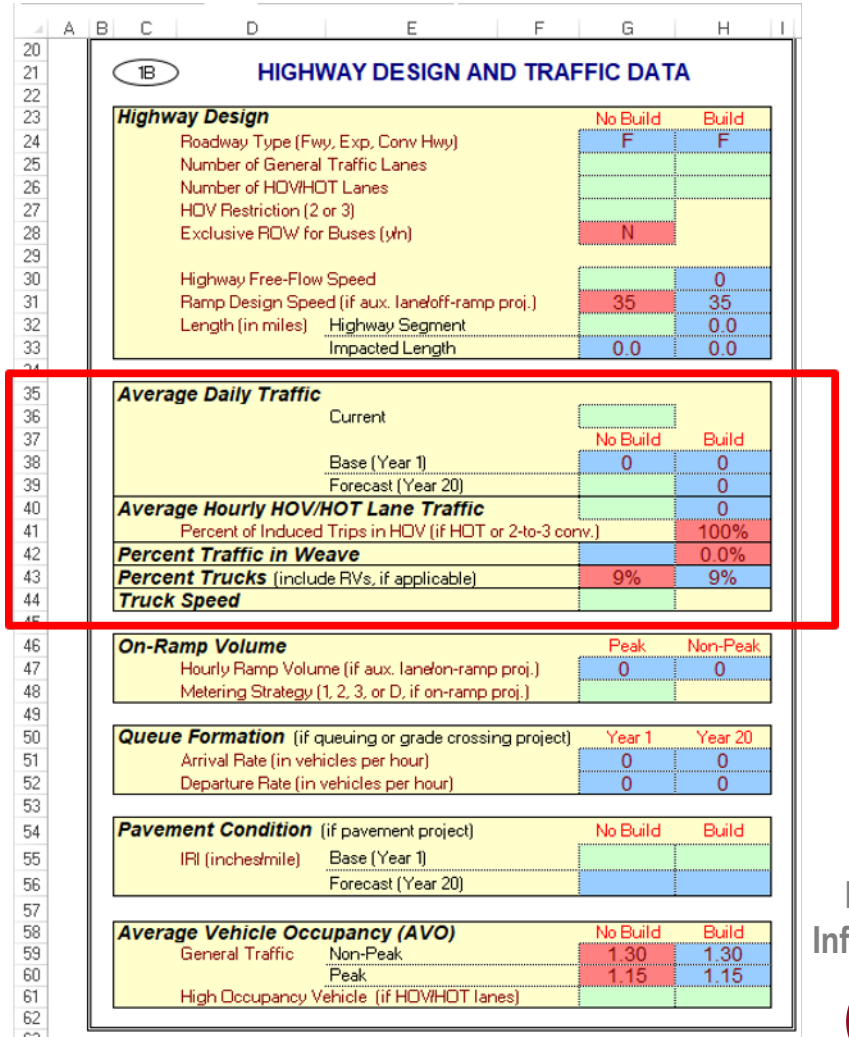
- Used for operational improvement projects

Percent Trucks

- Include RVs if significant % of travel, otherwise use readily available truck percent data

Truck Speed

- Trucks/RV average speed on a grade with no passing lanes
- Required input for passing lane projects
- Future speeds are automatically calculated



1B HIGHWAY DESIGN AND TRAFFIC DATA

Highway Design		No Build	Build
Roadway Type (Fwy, Exp, Conv Hwy)		F	F
Number of General Traffic Lanes			
Number of HOV/HOT Lanes			
HOV Restriction (2 or 3)			
Exclusive ROW for Buses (y/n)		N	
Highway Free-Flow Speed			0
Ramp Design Speed (if aux. lane/off-ramp proj.)		35	35
Length (in miles)	Highway Segment		0.0
	Impacted Length	0.0	0.0

Average Daily Traffic			
	Current		
		No Build	Build
	Base (Year 1)	0	0
	Forecast (Year 20)		0
Average Hourly HOV/HOT Lane Traffic			0
Percent of Induced Trips in HOV (if HOT or 2-to-3 conv.)			100%
Percent Traffic in Weave			0.0%
Percent Trucks (include RVs, if applicable)		9%	9%
Truck Speed			

On-Ramp Volume	Peak	Non-Peak
Hourly Ramp Volume (if aux. lane/on-ramp proj.)	0	0
Metering Strategy (1, 2, 3, or D, if on-ramp proj.)		

Queue Formation (if queuing or grade crossing project)	Year 1	Year 20
Arrival Rate (in vehicles per hour)	0	0
Departure Rate (in vehicles per hour)	0	0

Pavement Condition (if pavement project)		No Build	Build
IRI (inches/mile)	Base (Year 1)		
	Forecast (Year 20)		

Average Vehicle Occupancy (AVO)		No Build	Build
General Traffic	Non-Peak	1.30	1.30
	Peak	1.15	1.15
High Occupancy Vehicle (if HOV/HOT lanes)			

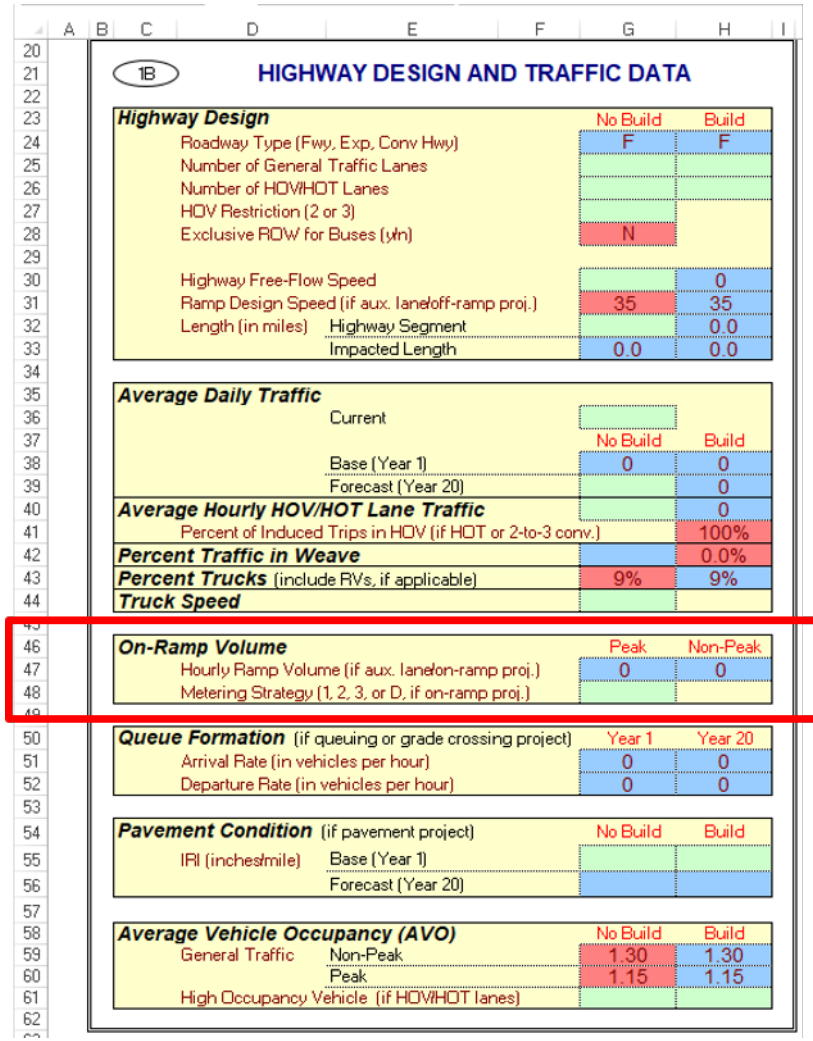
1B) Highway Design and Traffic Data – On Ramp Volumes

Hourly Ramp Volume

- Section only required for auxiliary lane and on-ramp widening projects
- Used to estimate traffic volumes affected by weaving for auxiliary lanes and effectiveness of ramp metering for on-ramp widening projects
- Cell automatically calculated for peak and non-peak periods based on ramp volume and length of peak period
- Peak period 1,350 vehicles per hour (VPH) for auxiliary lanes; 800 VPH for on-ramps assumed

Metering Strategy

- Required for on-ramp widening projects with ramp metering
- "1", "2", or "3" required to indicate the number of vehicles per green
- "D" indicates dual metering



1B HIGHWAY DESIGN AND TRAFFIC DATA

Highway Design		No Build	Build
Roadway Type (Fwy, Exp, Conv Hwy)		F	F
Number of General Traffic Lanes			
Number of HOV/HOT Lanes			
HOV Restriction (2 or 3)			
Exclusive ROW for Buses (y/n)		N	
Highway Free-Flow Speed			0
Ramp Design Speed (if aux. lane/off-ramp proj.)		35	35
Length (in miles)	Highway Segment		0.0
	Impacted Length	0.0	0.0

Average Daily Traffic			
	Current		
		No Build	Build
	Base (Year 1)	0	0
	Forecast (Year 20)		0
Average Hourly HOV/HOT Lane Traffic			0
Percent of Induced Trips in HOV (if HOT or 2-to-3 conv.)			100%
Percent Traffic in Weave			0.0%
Percent Trucks (include RVs, if applicable)		9%	9%
Truck Speed			

On-Ramp Volume	Peak	Non-Peak
Hourly Ramp Volume (if aux. lane/on-ramp proj.)	0	0
Metering Strategy (1, 2, 3, or D, if on-ramp proj.)		

Queue Formation (if queuing or grade crossing project)	Year 1	Year 20
Arrival Rate (in vehicles per hour)	0	0
Departure Rate (in vehicles per hour)	0	0

Pavement Condition (if pavement project)		No Build	Build
IRI (inches/mile)	Base (Year 1)		
	Forecast (Year 20)		

Average Vehicle Occupancy (AVO)		No Build	Build
General Traffic	Non-Peak	1.30	1.30
	Peak	1.15	1.15
High Occupancy Vehicle (if HOV/HOT lanes)			

1B) Highway Design and Traffic Data – Queue Formation

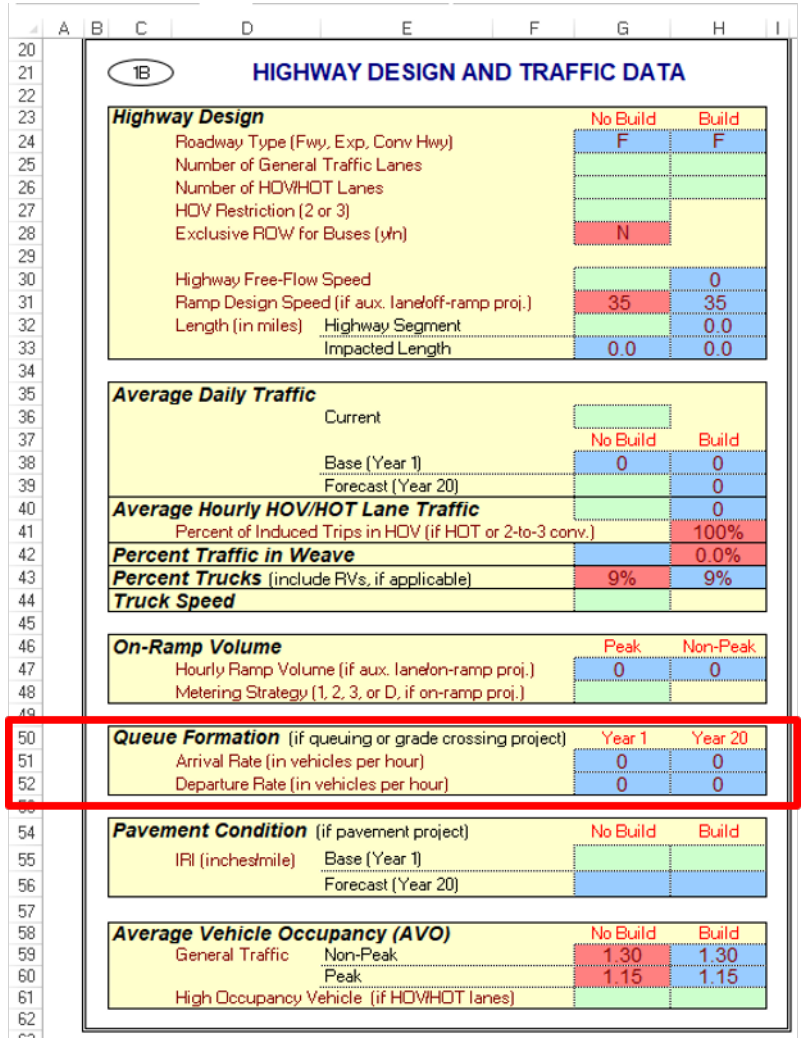
- This section only requires data entry for highway queuing and for rail grade separation projects

Arrival Rate

- Enter VPH contributing to the queue
- Should be estimated only for the time that the queue grows
- Cal-B/C estimates queue dissipation automatically

Departure Rate

- Enter VPH leaving the queue



1B — HIGHWAY DESIGN AND TRAFFIC DATA

		No Build	Build
Highway Design			
Roadway Type (Fwy, Exp, Conv Hwy)		F	F
Number of General Traffic Lanes			
Number of HOV/HOT Lanes			
HOV Restriction (2 or 3)			
Exclusive ROW for Buses (y/n)		N	
Highway Free-Flow Speed			0
Ramp Design Speed (if aux. lane/off-ramp proj.)		35	35
Length (in miles)	Highway Segment		0.0
	Impacted Length	0.0	0.0
Average Daily Traffic			
	Current		
		No Build	Build
	Base (Year 1)	0	0
	Forecast (Year 20)		0
Average Hourly HOV/HOT Lane Traffic			0
Percent of Induced Trips in HOV (if HOT or 2-to-3 conv.)			100%
Percent Traffic in Weave			0.0%
Percent Trucks (include RVs, if applicable)		9%	9%
Truck Speed			

		Peak	Non-Peak
On-Ramp Volume			
Hourly Ramp Volume (if aux. lane/on-ramp proj.)		0	0
Metering Strategy (1, 2, 3, or D, if on-ramp proj.)			

		Year 1	Year 20
Queue Formation (if queuing or grade crossing project)			
Arrival Rate (in vehicles per hour)		0	0
Departure Rate (in vehicles per hour)		0	0

		No Build	Build
Pavement Condition (if pavement project)			
IRI (inches/mile)	Base (Year 1)		
	Forecast (Year 20)		

		No Build	Build
Average Vehicle Occupancy (AVO)			
General Traffic	Non-Peak	1.30	1.30
	Peak	1.15	1.15
High Occupancy Vehicle (if HOV/HOT lanes)			

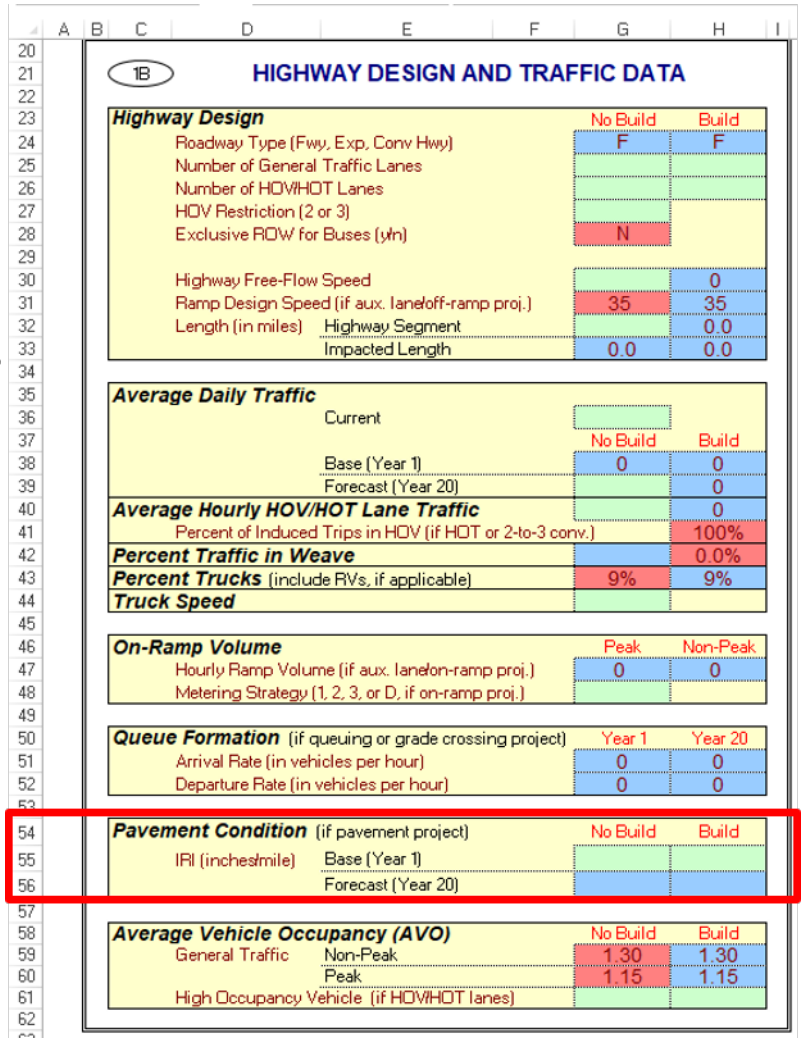
1B) Highway Design and Traffic Data – Pavement Condition

- This section only requires data entry for pavement projects

International Roughness Index (IRI)

- Enter the IRI in the No Build and Build scenarios
- Cal-B/C Sketch will calculate Year 20 values using standard parameters
- Forecast year (Year 20) IRI values and be overridden if better data is available

- IRI is the standard measure used by the Federal Highway Administration (FHWA) for pavement condition
- Measured in California by vehicles driving along a road and capturing deviations from a smooth pavement condition



1B HIGHWAY DESIGN AND TRAFFIC DATA

Highway Design		No Build	Build
	Roadway Type (Fwy, Exp, Conv Hwy)	F	F
	Number of General Traffic Lanes		
	Number of HOV/HOT Lanes		
	HOV Restriction (2 or 3)		
	Exclusive ROW for Buses (y/n)	N	
	Highway Free-Flow Speed		0
	Ramp Design Speed (if aux. lane/off-ramp proj.)	35	35
	Length (in miles) Highway Segment		0.0
	Impacted Length	0.0	0.0
Average Daily Traffic			
	Current		
		No Build	Build
	Base (Year 1)	0	0
	Forecast (Year 20)		0
Average Hourly HOV/HOT Lane Traffic			0
	Percent of Induced Trips in HOV (if HOT or 2-to-3 conv.)		100%
Percent Traffic in Weave			0.0%
Percent Trucks (include RVs, if applicable)		9%	9%
Truck Speed			
On-Ramp Volume		Peak	Non-Peak
	Hourly Ramp Volume (if aux. lane/on-ramp proj.)	0	0
	Metering Strategy (1, 2, 3, or D, if on-ramp proj.)		
Queue Formation (if queuing or grade crossing project)		Year 1	Year 20
	Arrival Rate (in vehicles per hour)	0	0
	Departure Rate (in vehicles per hour)	0	0
Pavement Condition (if pavement project)		No Build	Build
	IRI (inches/mile) Base (Year 1)		
	Forecast (Year 20)		
Average Vehicle Occupancy (AVO)		No Build	Build
	General Traffic Non-Peak	1.30	1.30
	Peak	1.15	1.15
	High Occupancy Vehicle (if HOV/HOT lanes)		

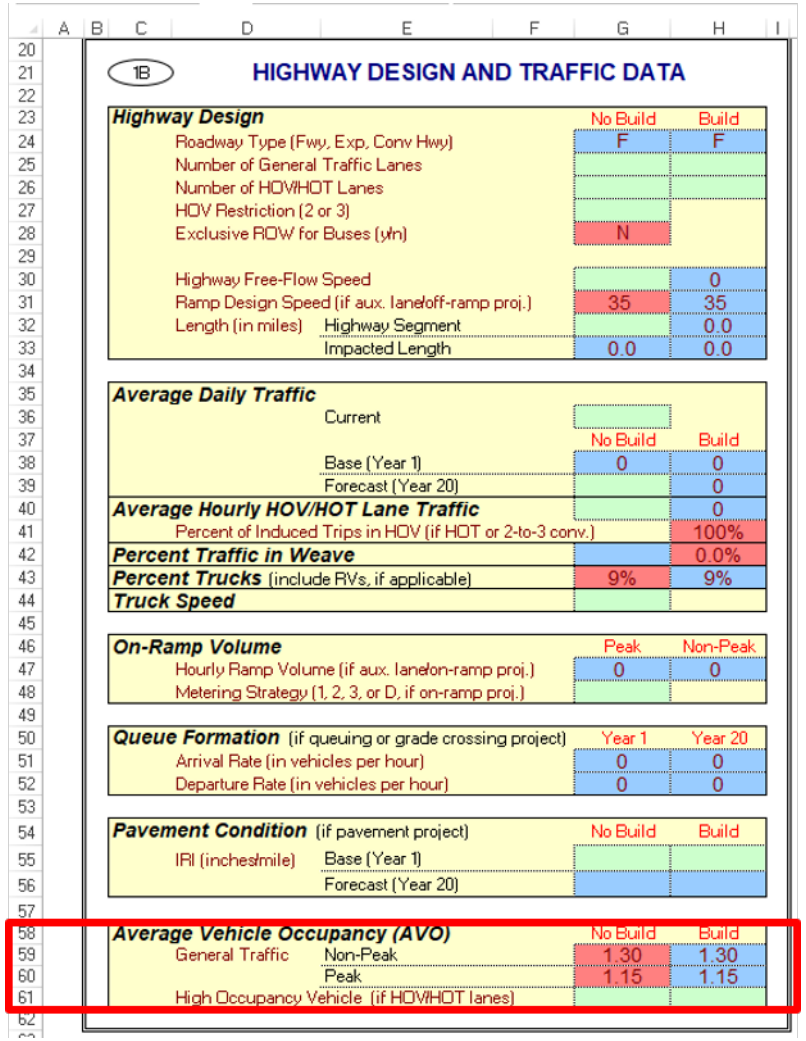
1B) Highway Design and Traffic Data – Average Vehicle Occupancy (AVO)

General Traffic AVO

- Cal-B/C uses standard AVO estimates based most recent California Statewide Travel Survey
- Many regional and local agencies have more updated No Build and Build AVO data available

High Occupancy Vehicle (HOV) Occupancy

- Data entry required if the analysis roadway has an HOV or HOT lane
- Estimate can vary widely from freeway to freeway, so appropriate values must be entered in this section
- Caltrans District Managed Lanes Annual Report reports AVOs for both general purpose and HOV/HOT lanes at select locations



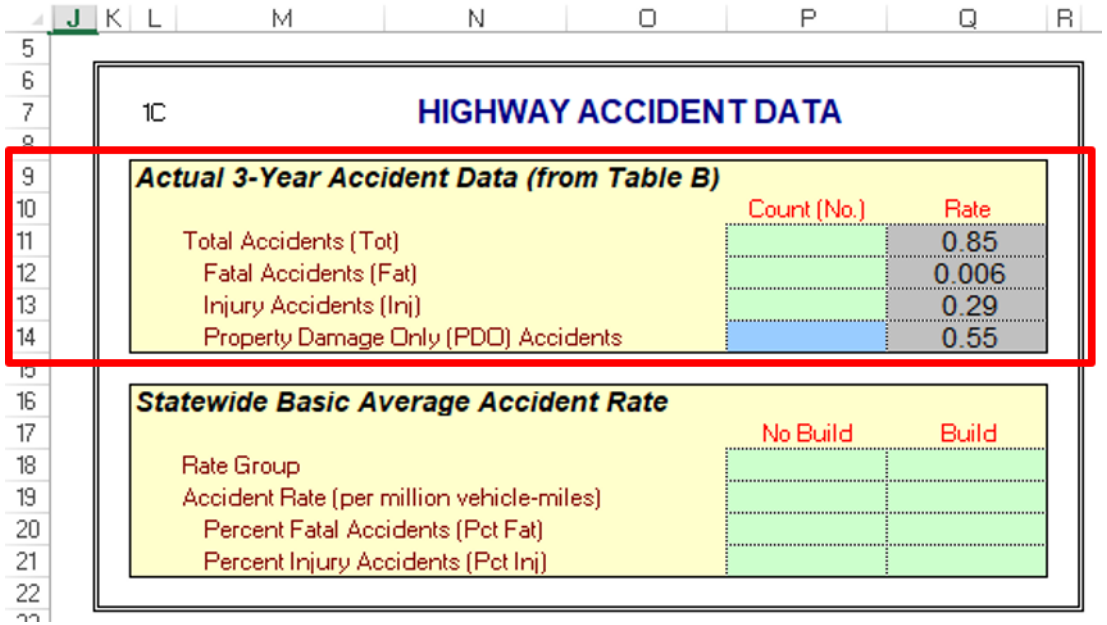
1B HIGHWAY DESIGN AND TRAFFIC DATA

		No Build	Build
Highway Design			
Roadway Type (Fwy, Exp, Conv Hwy)		F	F
Number of General Traffic Lanes			
Number of HOV/HOT Lanes			
HOV Restriction (2 or 3)			
Exclusive ROW for Buses (y/n)		N	
Highway Free-Flow Speed			0
Ramp Design Speed (if aux. lane/off-ramp proj.)		35	35
Length (in miles)	Highway Segment		0.0
	Impacted Length	0.0	0.0
Average Daily Traffic			
	Current		
		No Build	Build
	Base (Year 1)	0	0
	Forecast (Year 20)		0
Average Hourly HOV/HOT Lane Traffic			0
Percent of Induced Trips in HOV (if HOT or 2-to-3 conv.)			100%
Percent Traffic in Weave			0.0%
Percent Trucks (include RVs, if applicable)		9%	9%
Truck Speed			
On-Ramp Volume		Peak	Non-Peak
Hourly Ramp Volume (if aux. lane/on-ramp proj.)		0	0
Metering Strategy (1, 2, 3, or D, if on-ramp proj.)			
Queue Formation (if queuing or grade crossing project)		Year 1	Year 20
Arrival Rate (in vehicles per hour)		0	0
Departure Rate (in vehicles per hour)		0	0
Pavement Condition (if pavement project)		No Build	Build
IRI (inches/mile)	Base (Year 1)		
	Forecast (Year 20)		
Average Vehicle Occupancy (AVO)		No Build	Build
General Traffic	Non-Peak	1.30	1.30
	Peak	1.15	1.15
High Occupancy Vehicle (if HOV/HOT lanes)			

1C) Highway Accident Data – Actual 3-Year Accident Data

Total Accidents/Fatal/Injury/Property Damage Only

- Enter actual number of collisions along the analysis corridor over the most recent 3-Year period
- Collision data can come from a range of sources:
  - State Highway System (SHS) - Caltrans Traffic Accident Surveillance and Analysis System (TASAS)
  - Local arterial collisions- California Highway Patrol (CHP) Statewide Integrated Traffic Records System (SWITRS)
  - Rail grade crossing collisions - Federal Highway-Rail Crossing Accident database or the Federal Railroad Administration Web Accident Prediction System (WBAPS)
- Collision rates calculated using ADT values from Section 1B
- Collision Rate = ADT x highway segment length x 365 days/1,000,000
- Calculated rates can be overridden if better data available



1C HIGHWAY ACCIDENT DATA

Actual 3-Year Accident Data (from Table B)

	Count (No.)	Rate
Total Accidents (Tot)		0.85
Fatal Accidents (Fat)		0.006
Injury Accidents (Inj)		0.29
Property Damage Only (PDO) Accidents		0.55

Statewide Basic Average Accident Rate

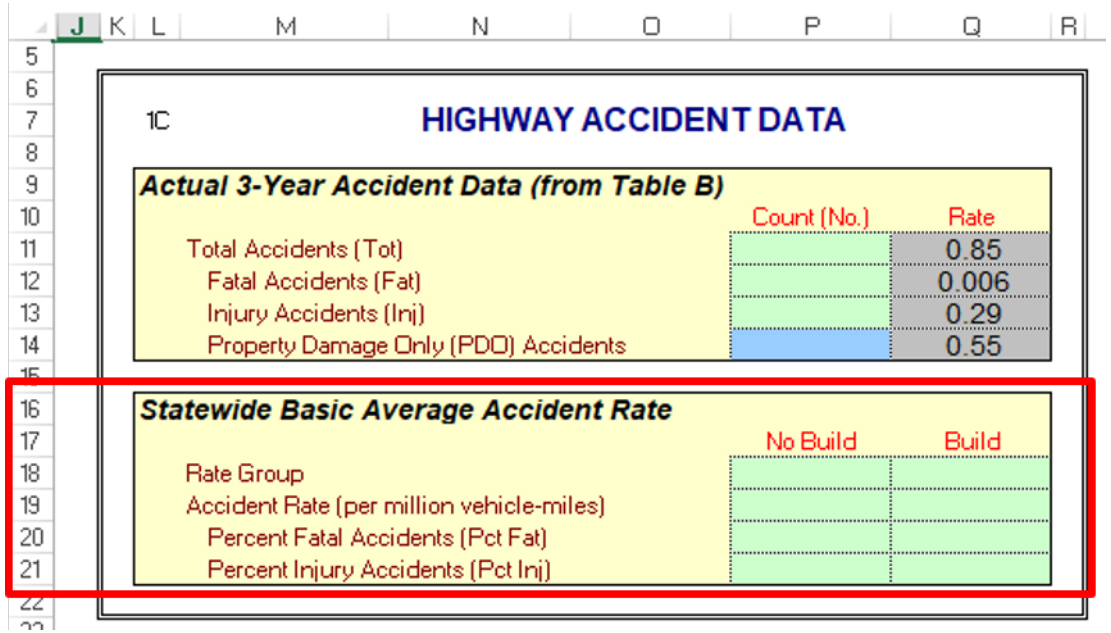
	No Build	Build
Rate Group		
Accident Rate (per million vehicle-miles)		
Percent Fatal Accidents (Pct Fat)		
Percent Injury Accidents (Pct Inj)		

NOTE: Current practice at Caltrans and 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) Highway Accident Data – Statewide Basic Average Accident Rate

Rate Group

- Cal-B/C Sketch uses the change in accident rate group to estimate the safety benefits of roadway projects
- Enter appropriate rate groups for No Build and Build scenarios
- This information is for record-keeping purposes only
  - Cal-B/C relies on average accident rates and percentages by accident type for analysis
- Latest information for State Highways can be found in annual collision reports, which provide rate group data in the "Basic Accident Rate Tables"



1C **HIGHWAY ACCIDENT DATA**

Actual 3-Year Accident Data (from Table B)

	Count (No.)	Rate
Total Accidents (Tot)		0.85
Fatal Accidents (Fat)		0.006
Injury Accidents (Inj)		0.29
Property Damage Only (PDO) Accidents		0.55

Statewide Basic Average Accident Rate

	No Build	Build
Rate Group		
Accident Rate (per million vehicle-miles)		
Percent Fatal Accidents (Pct Fat)		
Percent Injury Accidents (Pct Inj)		

1D) Rail and Transit Data – Person Trip Data

Annual Person Trips

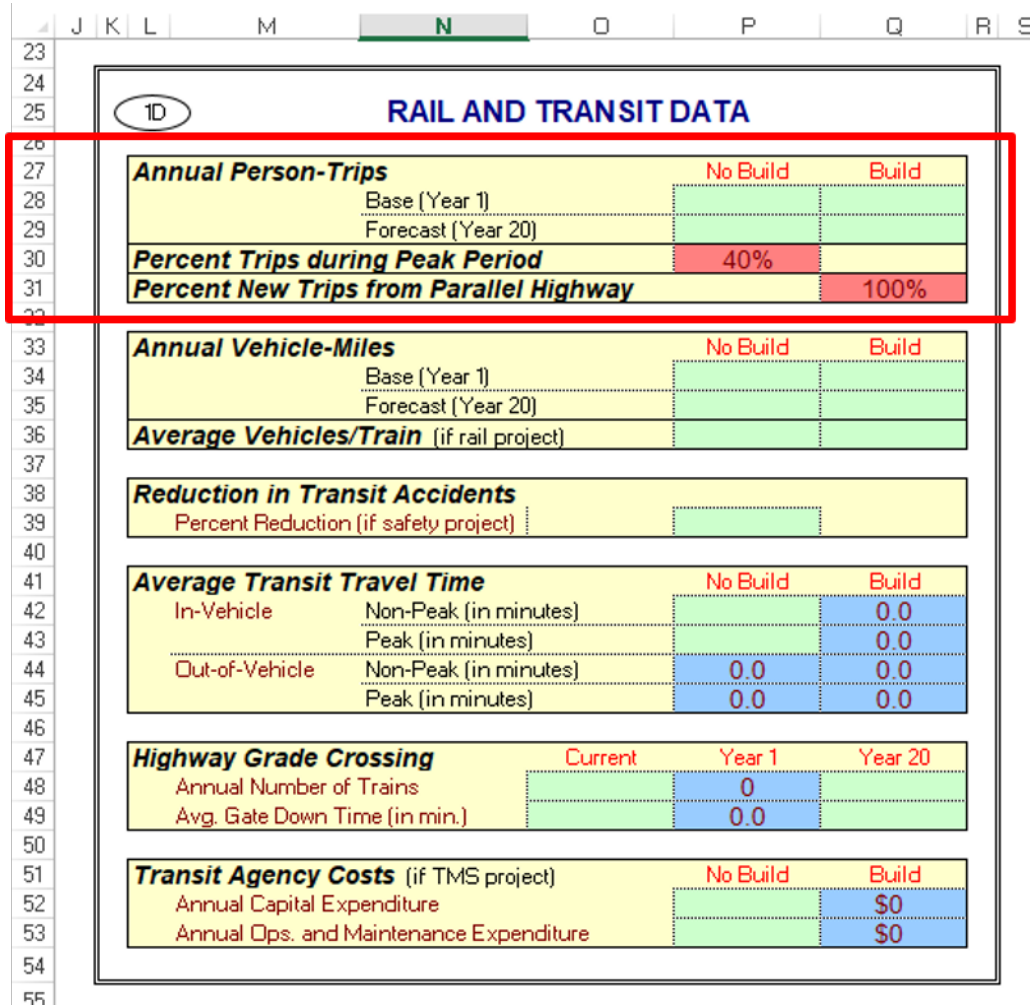
- Enter passenger trips on transit for both Base (Year 1) and the Forecast year for both the No Build and Build scenarios
- Forecast (Year 20) is project completion date plus 20 years

Percent Trips during Peak Period

- Cal-B/C Sketch provides a default estimate of the ratio of peak period to daily ridership that can be overridden

Percent New Trips from Parallel Highway

- Improved transit may attract new trips from parallel highways
  - In practice, percentage of new transit trips from highways ranges between 50 and 80 percent



1D

RAIL AND TRANSIT DATA

		No Build	Build
Annual Person-Trips			
	Base (Year 1)		
	Forecast (Year 20)		
Percent Trips during Peak Period		40%	
Percent New Trips from Parallel Highway			100%

		No Build	Build
Annual Vehicle-Miles			
	Base (Year 1)		
	Forecast (Year 20)		
Average Vehicles/Train (if rail project)			

Reduction in Transit Accidents	
Percent Reduction (if safety project)	

		No Build	Build
Average Transit Travel Time			
In-Vehicle	Non-Peak (in minutes)		0.0
	Peak (in minutes)		0.0
Out-of-Vehicle	Non-Peak (in minutes)	0.0	0.0
	Peak (in minutes)	0.0	0.0

	Current	Year 1	Year 20
Highway Grade Crossing			
Annual Number of Trains		0	
Avg. Gate Down Time (in min.)		0.0	

		No Build	Build
Transit Agency Costs (if TMS project)			
Annual Capital Expenditure			$0
Annual Ops. and Maintenance Expenditure			$0

1D) Rail and Transit Data – Transit Service and Collision Data

Annual Vehicle-Miles

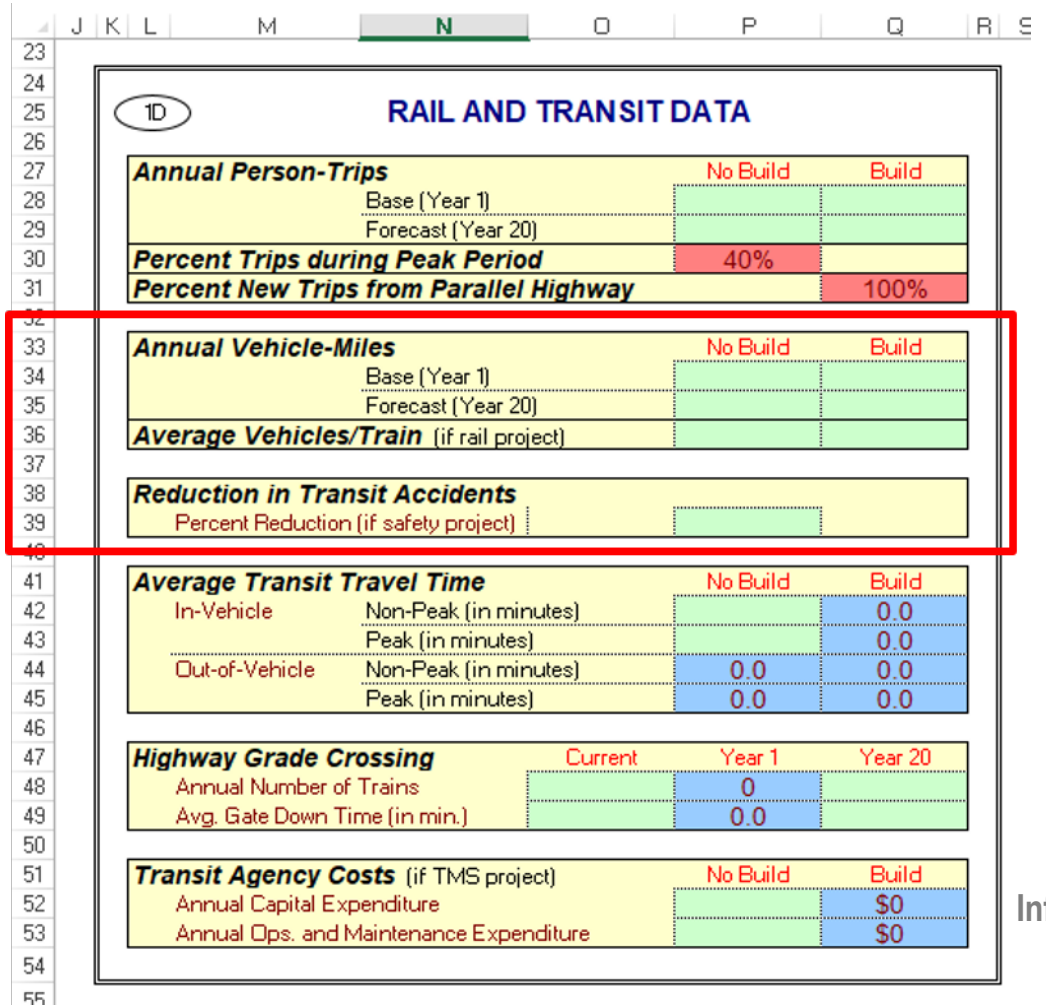
- Enter number of vehicle-miles of transit or rail service operated on the line each year
- Estimates needed for Base (Year 1) and Forecast (Year 20) after the opening date for both No Build and Build scenarios
- For passenger rail projects, number of vehicle-miles is total number of train car miles (i.e., multiply train miles x average number of cars per train)

Average Vehicles per Train

- Enter number of train cars used in an average train consist
- Can be used above to calculate vehicle-miles
- Vehicle-Miles and vehicles/train used by Cal-B/C to estimate annual emissions caused by transit

Reduction in Transit Accidents (collisions)

- Enter percentage change in collisions due to project
- Enter a value only if project specifically addresses safety



1D

RAIL AND TRANSIT DATA

Annual Person-Trips		No Build	Build
	Base (Year 1)		
	Forecast (Year 20)		
Percent Trips during Peak Period		40%	
Percent New Trips from Parallel Highway			100%
Annual Vehicle-Miles		No Build	Build
	Base (Year 1)		
	Forecast (Year 20)		
Average Vehicles/Train (if rail project)			
Reduction in Transit Accidents			
Percent Reduction (if safety project)			
Average Transit Travel Time		No Build	Build
In-Vehicle	Non-Peak (in minutes)		0.0
	Peak (in minutes)		0.0
Out-of-Vehicle	Non-Peak (in minutes)	0.0	0.0
	Peak (in minutes)	0.0	0.0

Highway Grade Crossing	Current	Year 1	Year 20
Annual Number of Trains		0	
Avg. Gate Down Time (in min.)		0.0	
Transit Agency Costs (if TMS project)		No Build	Build
Annual Capital Expenditure			$0
Annual Ops. and Maintenance Expenditure			$0

1D) Rail and Transit Data – Transit Travel Times

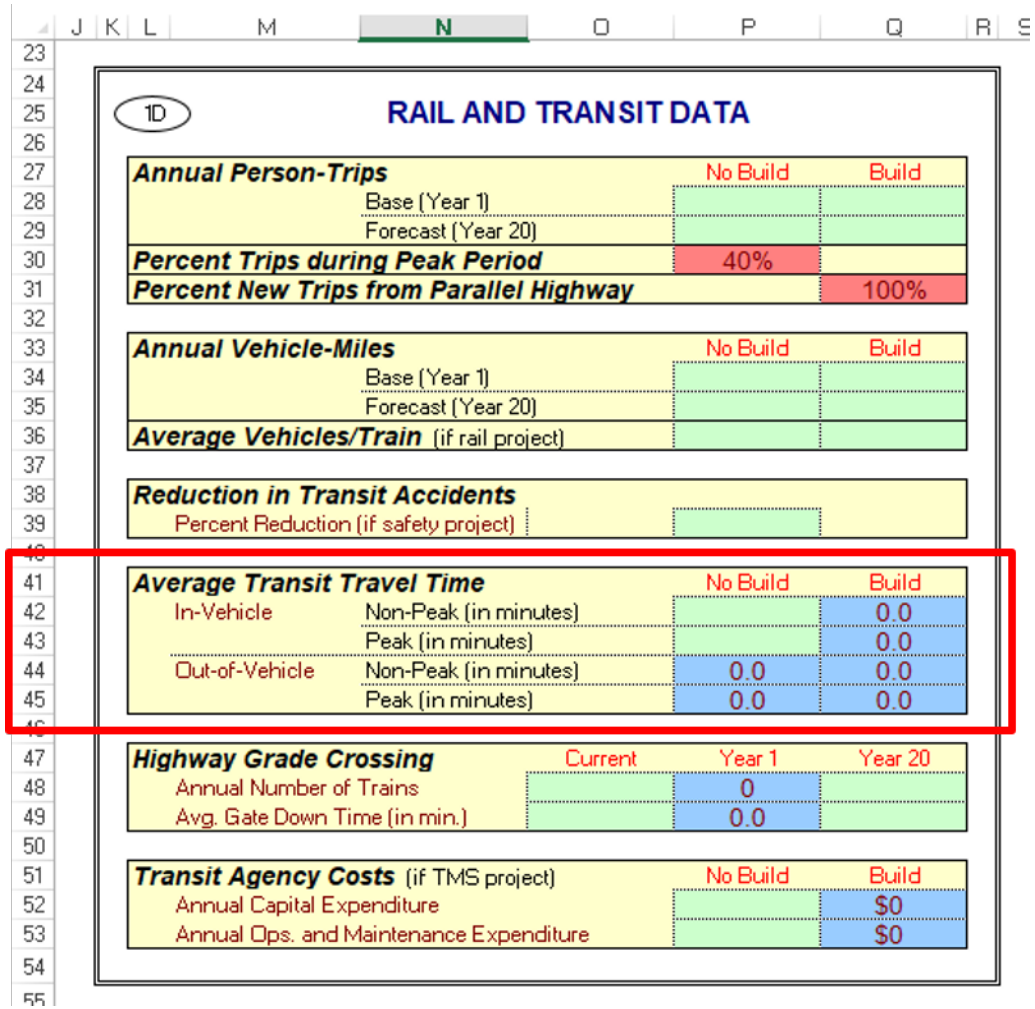
- Enter data only for
- Travelers experience time differently depending on how they perceive their movement from point “A” to point “B”
- Transit users assign a higher value of time when waiting than when traveling in the transit vehicle

In-Vehicle Travel Time

- In-vehicle time is the time spent in the bus or train
- Enter average travel time spent in the transit vehicle for both No Build non-Peak and Peak periods
- Cal-B/C estimates future travel time, but can be overridden
- If TMS project, enter average travel time for all affected routes

Out-Of-Vehicle Time

- Out of vehicle time impacts estimated by Cal-B/C for Automatic Vehicle Location (AVL) projects
- Out-of-vehicle savings for other types of projects can be overridden



1D

RAIL AND TRANSIT DATA

Annual Person-Trips		No Build	Build
	Base (Year 1)		
	Forecast (Year 20)		
Percent Trips during Peak Period		40%	
Percent New Trips from Parallel Highway			100%

Annual Vehicle-Miles		No Build	Build
	Base (Year 1)		
	Forecast (Year 20)		
Average Vehicles/Train (if rail project)			

Reduction in Transit Accidents	
Percent Reduction (if safety project)	

Average Transit Travel Time		No Build	Build
In-Vehicle	Non-Peak (in minutes)		0.0
	Peak (in minutes)		0.0
Out-of-Vehicle	Non-Peak (in minutes)	0.0	0.0
	Peak (in minutes)	0.0	0.0

Highway Grade Crossing	Current	Year 1	Year 20
Annual Number of Trains		0	
Avg. Gate Down Time (in min.)		0.0	

Transit Agency Costs (if TMS project)		No Build	Build
Annual Capital Expenditure			$0
Annual Ops. and Maintenance Expenditure			$0

1D) Rail and Transit Data – Highway Grade Crossing

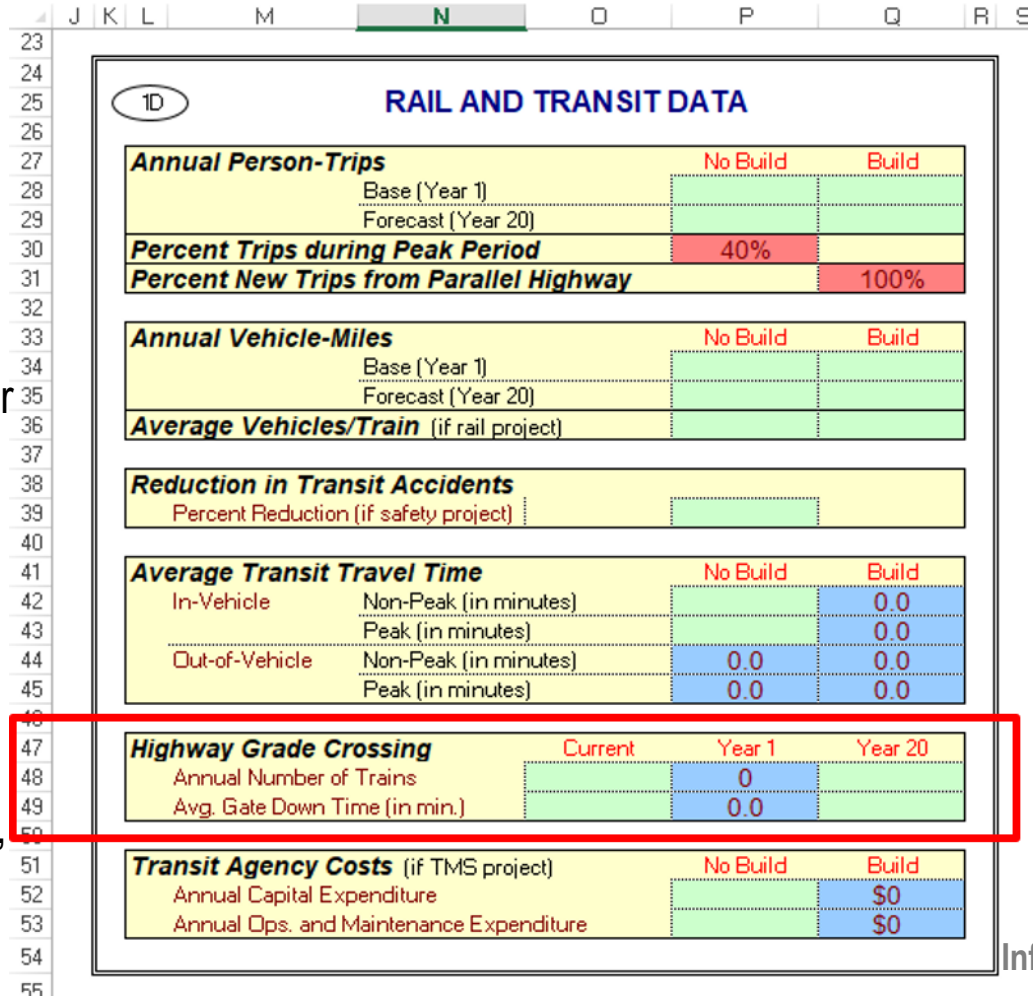
- At grade highway grade crossings increase travel times as vehicles queue while waiting for trains to pass
- Collisions with trains also eliminated with railroad grade crossing construction

Annual Number of Trains

- Annual number of trains is total number of freight & passenger trains
- Total number of annual trains passing by grade crossing in current year
- Number of annual trains forecast to pass in Year 20 following grade crossing construction
- Year 1 estimates often unavailable, so Cal-B/C estimates year based on current and Year 20 inputs

Average Gate Down Time (minutes)

- Average time (minutes) crossing gate is closed for train to pass
- Can vary by train type: longer, slower moving freight trains and shorter, faster moving passenger trains
- Enter an average estimated gate down time that combines impact of both freight and passenger trains



1D

RAIL AND TRANSIT DATA

		No Build	Build
Annual Person-Trips			
	Base (Year 1)		
	Forecast (Year 20)		
Percent Trips during Peak Period		40%	
Percent New Trips from Parallel Highway			100%

		No Build	Build
Annual Vehicle-Miles			
	Base (Year 1)		
	Forecast (Year 20)		
Average Vehicles/Train (if rail project)			

Reduction in Transit Accidents	
Percent Reduction (if safety project)	

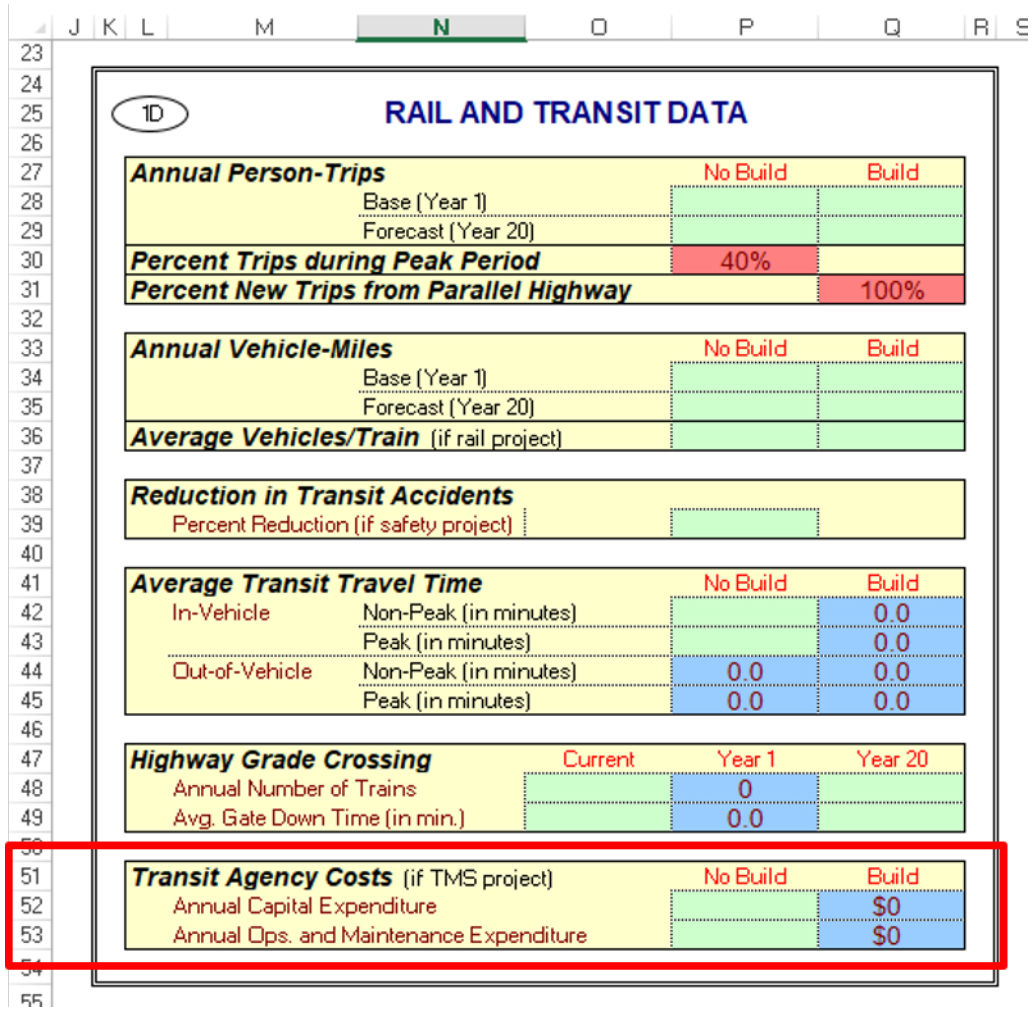
		No Build	Build
Average Transit Travel Time			
In-Vehicle	Non-Peak (in minutes)		0.0
	Peak (in minutes)		0.0
Out-of-Vehicle	Non-Peak (in minutes)	0.0	0.0
	Peak (in minutes)	0.0	0.0

	Current	Year 1	Year 20
Highway Grade Crossing			
Annual Number of Trains		0	
Avg. Gate Down Time (in min.)		0.0	

		No Build	Build
Transit Agency Costs (if TMS project)			
Annual Capital Expenditure			$0
Annual Ops. and Maintenance Expenditure			$0

1D) Rail and Transit Data – Transit Agency Costs (TMS Projects Only)

- For TMS projects, Cal-B/C requires total annual capital, operating, and maintenance expenditures
- Cal-B/C calculates cost reductions for new expenditures due to transit TMS
- Cal-B/C then estimates agency cost savings and records them as negative costs



1D

RAIL AND TRANSIT DATA

Annual Person-Trips		No Build	Build
	Base (Year 1)		
	Forecast (Year 20)		
Percent Trips during Peak Period		40%	
Percent New Trips from Parallel Highway			100%

Annual Vehicle-Miles		No Build	Build
	Base (Year 1)		
	Forecast (Year 20)		
Average Vehicles/Train (if rail project)			

Reduction in Transit Accidents	
Percent Reduction (if safety project)	

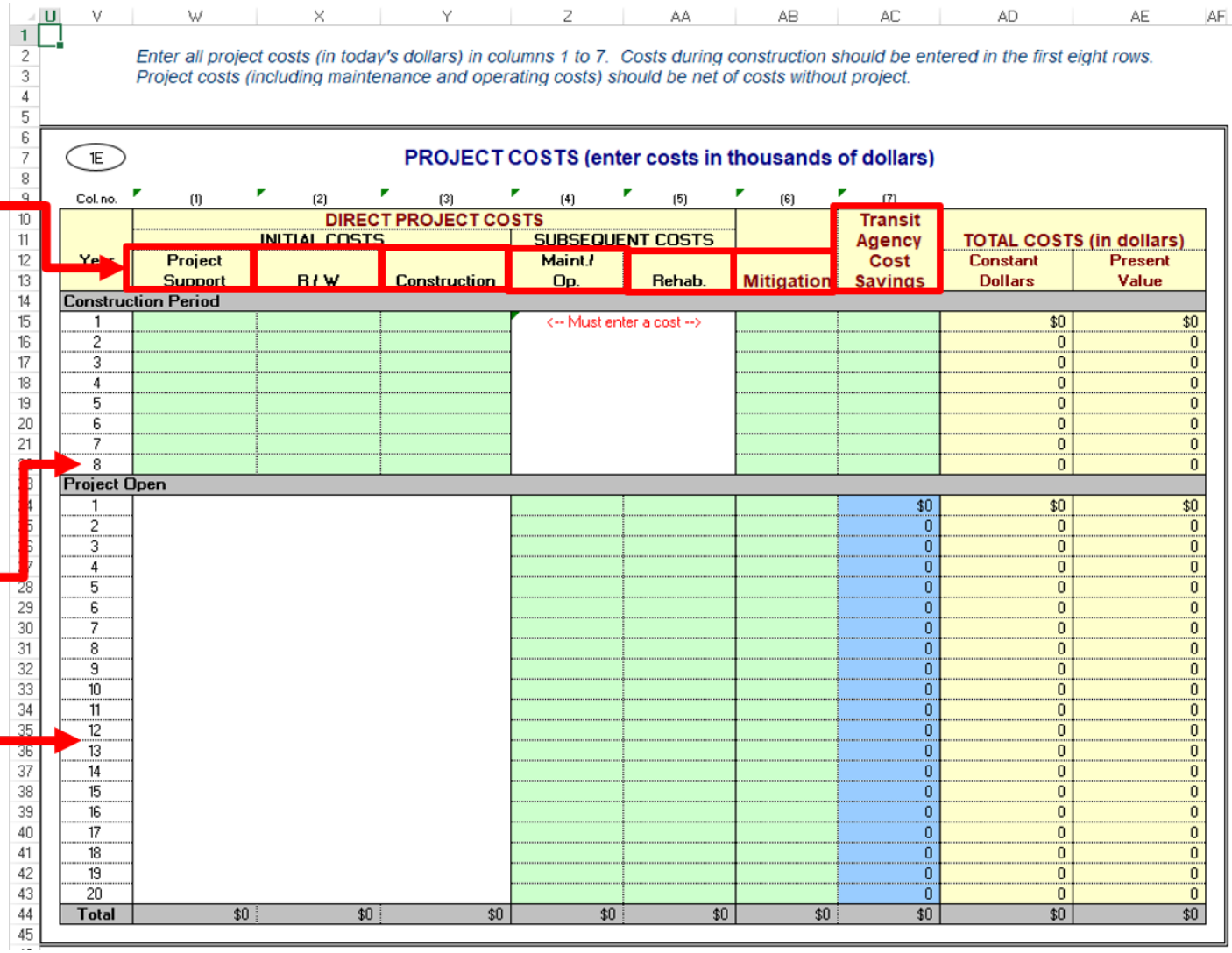
Average Transit Travel Time		No Build	Build
In-Vehicle	Non-Peak (in minutes)		0.0
	Peak (in minutes)		0.0
Out-of-Vehicle	Non-Peak (in minutes)	0.0	0.0
	Peak (in minutes)	0.0	0.0

Highway Grade Crossing	Current	Year 1	Year 20
Annual Number of Trains		0	
Avg. Gate Down Time (in min.)		0.0	

Transit Agency Costs (if TMS project)	No Build	Build
Annual Capital Expenditure		$0
Annual Ops. and Maintenance Expenditure		$0

1E) Project Costs - Overview

- All project costs entered into seven costing columns
- Project costs should be entered as incremental costs
- Costs must be entered in thousands of dollars ($1,000)
- Project costs must be in same year as economic parameters used for benefit calculations
- Up to eight (8) years of initial project costs allowed
- Costs must be entered for each year consistent with "Length of Construction Period" entered in Section 1A
- Following construction, project opens and there are 20 years during the project operating period



Enter all project costs (in today's dollars) in columns 1 to 7. Costs during construction should be entered in the first eight rows. Project costs (including maintenance and operating costs) should be net of costs without project.

1E

PROJECT COSTS (enter costs in thousands of dollars)

Col. no.	(1)	(2)	(3)	(4)	(5)	(6)	(7)		
	DIRECT PROJECT COSTS							TOTAL COSTS (in dollars)	
	INITIAL COSTS			SUBSEQUENT COSTS			Transit Agency Cost Savings		
Year	Project Support	R / W	Construction	Maint./ Op.	Rehab.	Mitigation		Constant Dollars	Present Value
Construction Period									
1				<-- Must enter a cost -->				$0	$0
2								0	0
3								0	0
4								0	0
5								0	0
6								0	0
7								0	0
8								0	0
Project Open									
1							$0	$0	$0
2							0	0	0
3							0	0	0
4							0	0	0
5							0	0	0
6							0	0	0
7							0	0	0
8							0	0	0
9							0	0	0
10							0	0	0
11							0	0	0
12							0	0	0
13							0	0	0
14							0	0	0
15							0	0	0
16							0	0	0
17							0	0	0
18							0	0	0
19							0	0	0
20							0	0	0
Total	$0	$0	$0	$0	$0	$0	$0	$0	$0

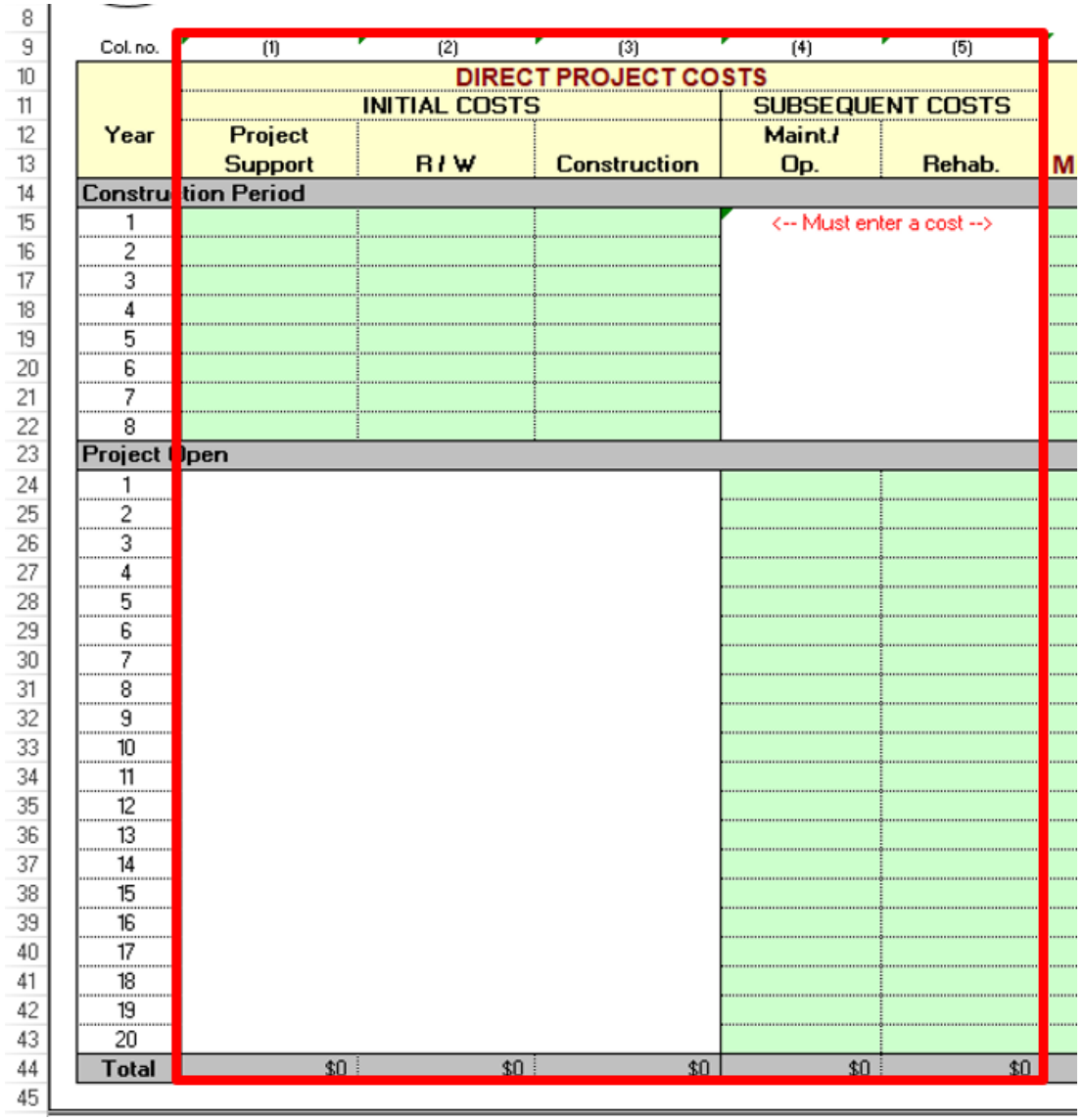
1E) Project Costs – Direct Project Costs

Initial Costs

- Project support - engineering design and management
- Right-of-way acquisition costs
- Construction costs
- Each project should incur no initial project costs after the project opens
- Assumes construction funding expended by opening day
- All costs entered in constant dollars

Subsequent Costs

- Costs incurred after the project is constructed and open
- Maintenance and operating (M&O) costs
- Rehabilitation costs - pavement overlay, vehicle, track, or station refurbishment
- All costs entered in constant dollars



Col. no.	(1)	(2)	(3)	(4)	(5)	
	DIRECT PROJECT COSTS					
	INITIAL COSTS			SUBSEQUENT COSTS		
Year	Project Support	R / W	Construction	Maint./ Op.	Rehab.	M
Construction Period						
1				<-- Must enter a cost -->		
2						
3						
4						
5						
6						
7						
8						
Project Open						
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
Total	$0	$0	$0	$0	$0	

1E) Project Costs – Mitigation, Transit Agency, and Total Costs

Mitigation

- Costs to mitigate community and environmental impacts
  - Examples: Wetland and community preservation, sound walls to reduce highway or rail transit noise
- All costs entered in constant dollars

Transit Agency Cost Savings

- Calculated automatically after project opening
- Savings to transit agency due to efficiency improvements

Total Costs

- Calculated automatically
- Include project cost in constant dollars and net present value for each year
- Values are in total dollars and not in thousands of dollars like other columns

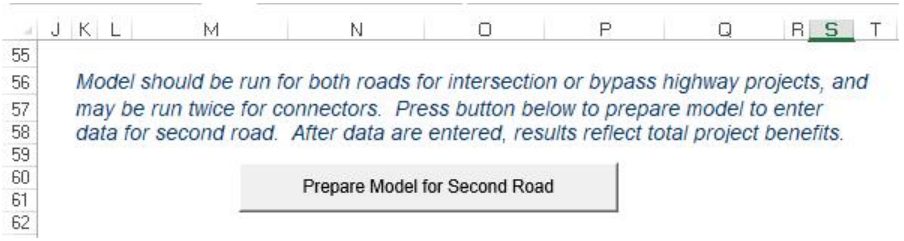
(6)	(7)		
	Transit Agency Cost	TOTAL COSTS (in dollars)	
Mitigation	Savings	Constant Dollars	Present Value
		$0	$0
		0	0
		0	0
		0	0
		0	0
		0	0
		0	0
		0	0
	$0	$0	$0
	0	0	0
	0	0	0
	0	0	0
	0	0	0
	0	0	0
	0	0	0
	0	0	0
	0	0	0
	0	0	0
	0	0	0
	0	0	0
	0	0	0
	0	0	0
	0	0	0
	0	0	0
	0	0	0
	0	0	0
	0	0	0
	0	0	0
$0	$0	$0	$0

Project Information

1

1) Bypass, Intersection, and Truck Only Lane Projects Macro

- When two roads involved in an analysis, Sketch requires data for both roads
- Button runs a macro that clears Project Information worksheet to be ready for data entry for the second road
- Detailed calculations for the first road are lost
  - Good practice to save a copy of analysis before entering information for second road
- Intersection projects - macro clears highway information box, so traffic and highway geometric data can be entered for intersecting road
- Bypass projects - macro clears highway information under No Build project column and calculates Build column traffic on bypass road as No Build traffic minus traffic on existing roads
- Truck only lane projects - macro clears No Build column, since truck only lane does not currently exist and estimates Build traffic as having only truck traffic



04

Model Inputs Worksheet

2) Model Inputs Worksheet

- Can review and replace calculated values
- Worksheet shows Cal-B/C estimated values and provides space to change values as needed

2A Highway Speed and Volume Inputs

- Peak and non-peak periods
- HOV, non-HOV, weaving, and truck volumes and speeds

2B Highway Accident Rates and adjustment factors

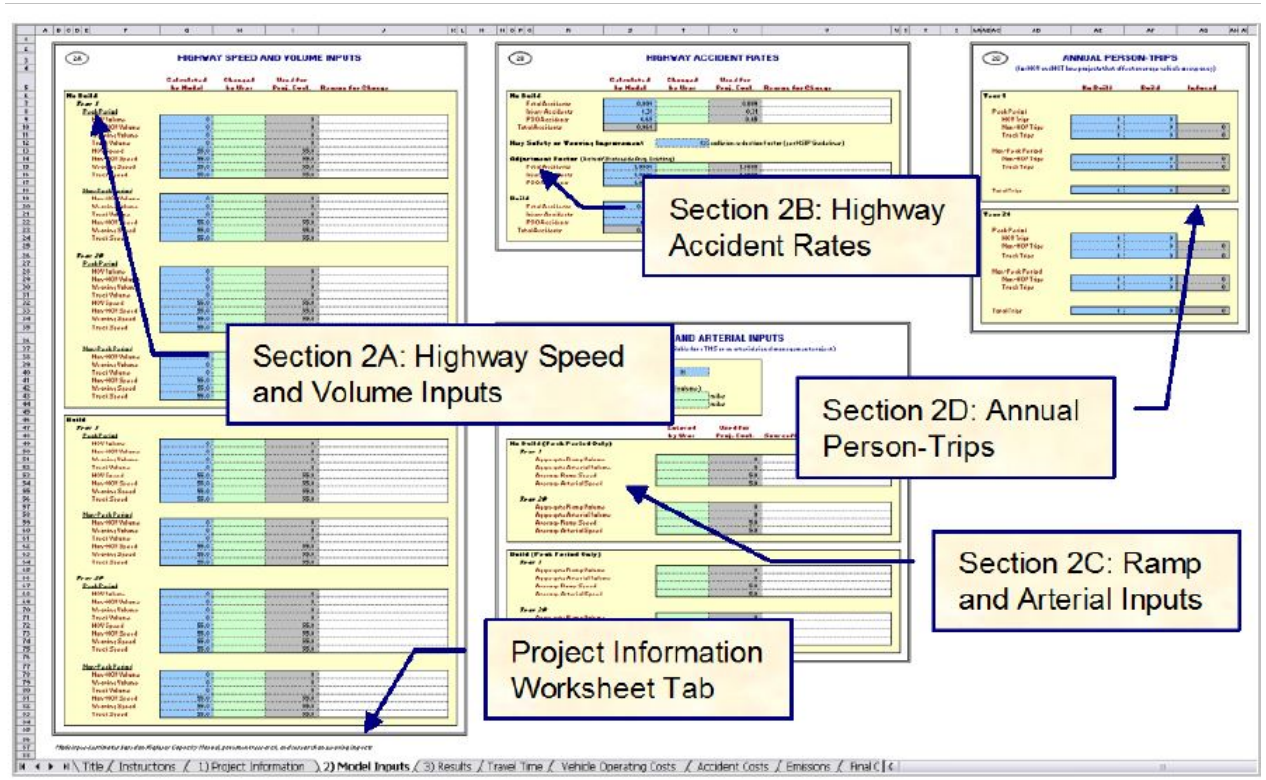
- Fatal, Injury, PDO accidents.

2C Ramp and Arterial Inputs

- Aggregate ramp and arterial volumes and speeds for Year 1 and Year 20

2D Annual Person Trips

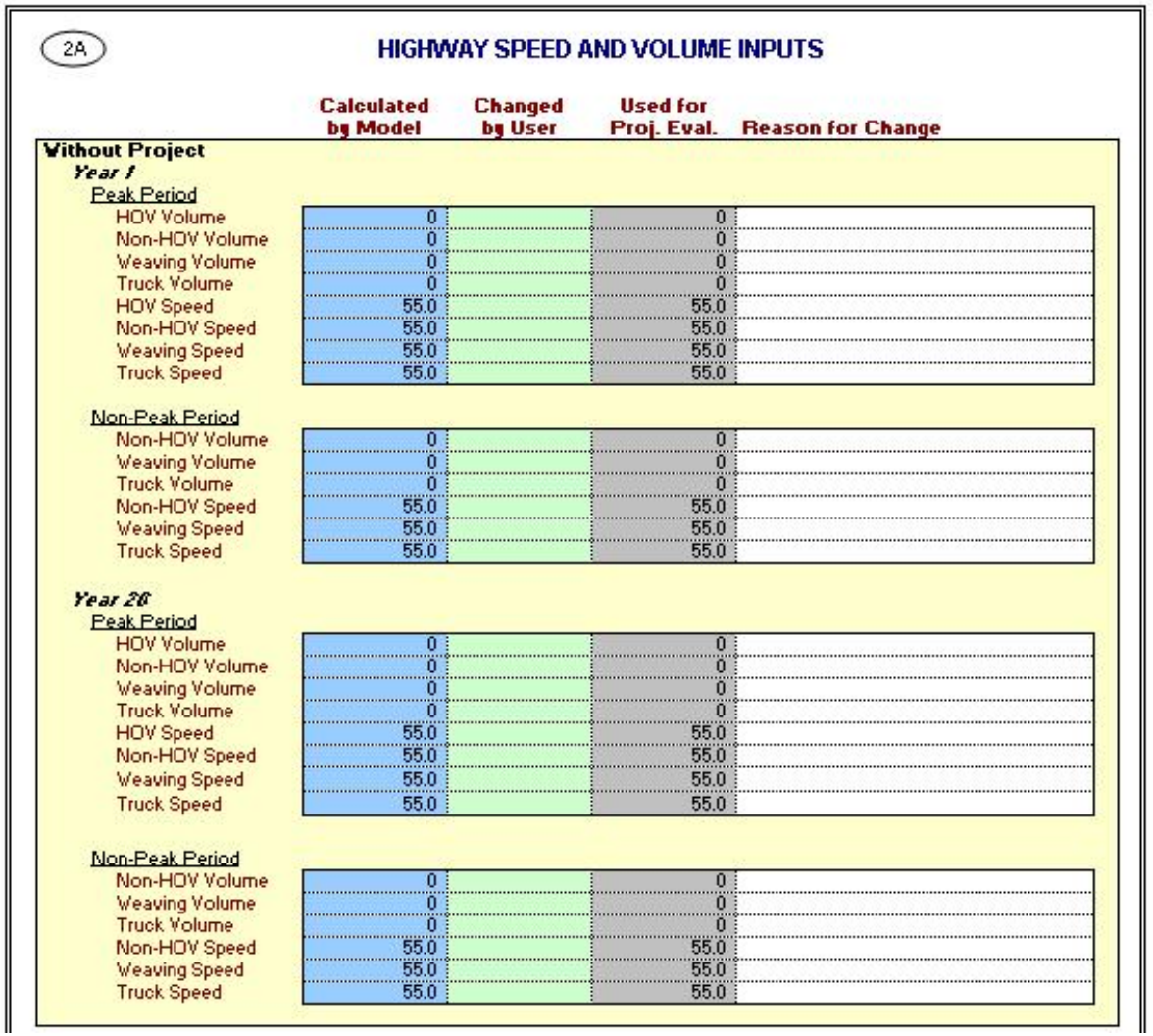
- Provides annual person-trip estimates for HOV conversion and HOT lane projects
- Provided for review purposes only. If needed, ADT and AVO inputs can be adjusted in Project Information worksheet



- **Note: Important to complete "Reason for Change" if changes made**
- **FHWA grant reviewers closely examine overridden values**
- **Should have citing documents available**

2A) Model Inputs – Highway Speed and Volume Adjustments

- Can change volumes and speeds in the green cells
  - Include a reason for the change in the white "Reason for Change" column
- Both Year 1 and Year 20 estimates
- Peak and Non-Peak estimates
- Volumes and Speeds for
  - HOV
  - General Purpose (i.e., Non-HOV)
  - Trucks



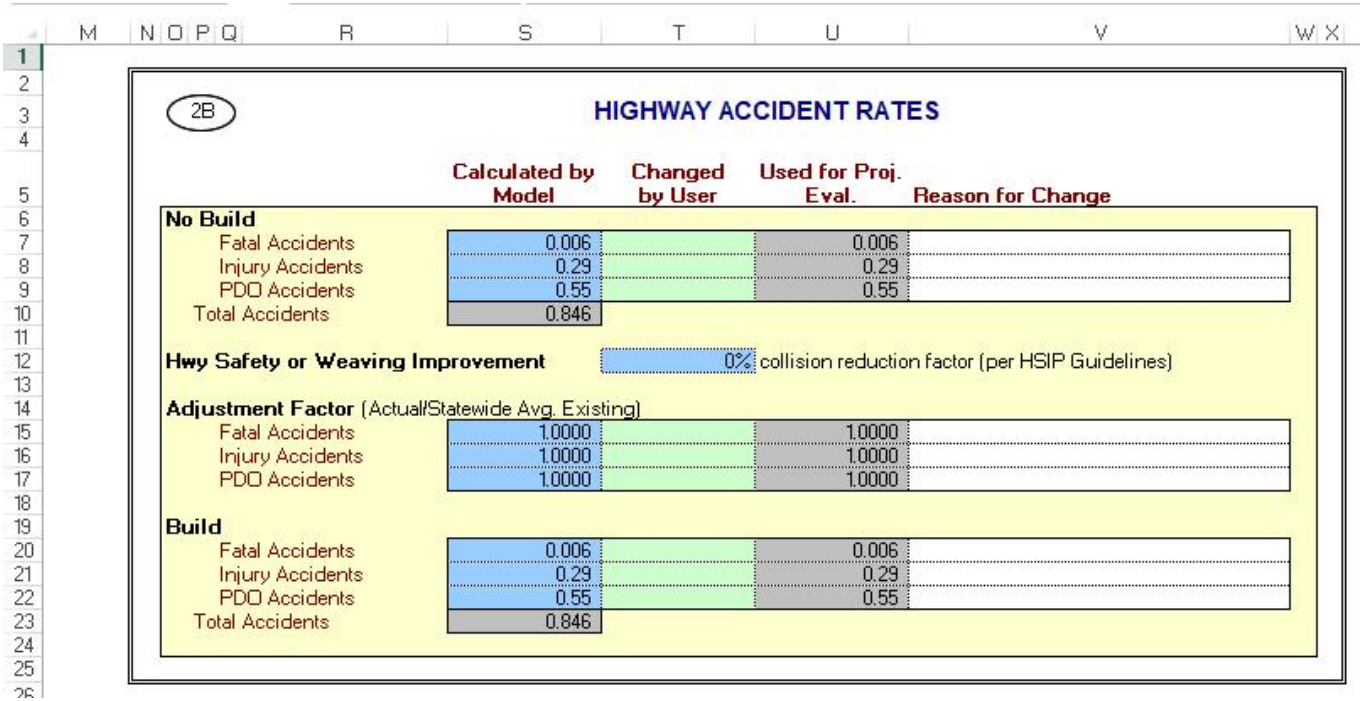
2A

HIGHWAY SPEED AND VOLUME INPUTS

	Calculated by Model	Changed by User	Used for Proj. Eval.	Reason for Change
Without Project				
Year 1				
Peak Period				
HOV Volume	0		0	
Non-HOV Volume	0		0	
Weaving Volume	0		0	
Truck Volume	0		0	
HOV Speed	55.0		55.0	
Non-HOV Speed	55.0		55.0	
Weaving Speed	55.0		55.0	
Truck Speed	55.0		55.0	
Non-Peak Period				
Non-HOV Volume	0		0	
Weaving Volume	0		0	
Truck Volume	0		0	
Non-HOV Speed	55.0		55.0	
Weaving Speed	55.0		55.0	
Truck Speed	55.0		55.0	
Year 20				
Peak Period				
HOV Volume	0		0	
Non-HOV Volume	0		0	
Weaving Volume	0		0	
Truck Volume	0		0	
HOV Speed	55.0		55.0	
Non-HOV Speed	55.0		55.0	
Weaving Speed	55.0		55.0	
Truck Speed	55.0		55.0	
Non-Peak Period				
Non-HOV Volume	0		0	
Weaving Volume	0		0	
Truck Volume	0		0	
Non-HOV Speed	55.0		55.0	
Weaving Speed	55.0		55.0	
Truck Speed	55.0		55.0	

2B) Model Inputs - Highway Accident Rate Adjustments

- Cal-B/C forecasts Build accident rates by calculating ratio of current accident rates to statewide average
- If segment accident rates > statewide average, Build accident rates will be above average
- If project designed to lower accident rates to statewide average, Cal-B/C estimate (in blue cells) must be manually overridden
- Cal-B/C assumes (through the adjustment factor) that differential remains the same for Build facility
- Changing factor to 1.0 results in accident rates at statewide averages for that facility type
- Cal-B/C calculations consistent with collision reduction factors found in the Caltrans Highway Safety Improvement Program (HSIP) Guidelines



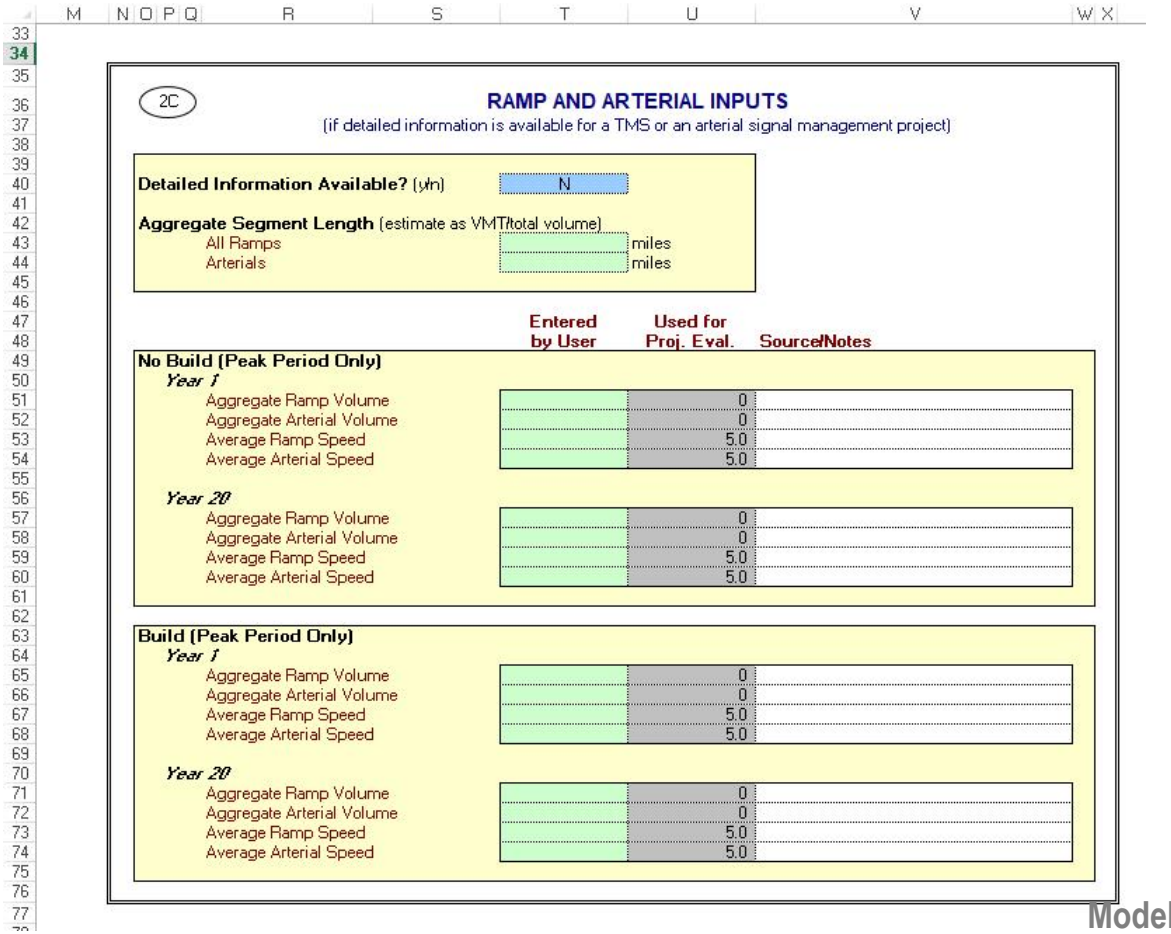
2B

HIGHWAY ACCIDENT RATES

	Calculated by Model	Changed by User	Used for Proj. Eval.	Reason for Change
No Build				
Fatal Accidents	0.006		0.006	
Injury Accidents	0.29		0.29	
PDO Accidents	0.55		0.55	
Total Accidents	0.846			
Hwy Safety or Weaving Improvement		0%	collision reduction factor (per HSIP Guidelines)	
Adjustment Factor (Actual/Statewide Avg. Existing)				
Fatal Accidents	1.0000		1.0000	
Injury Accidents	1.0000		1.0000	
PDO Accidents	1.0000		1.0000	
Build				
Fatal Accidents	0.006		0.006	
Injury Accidents	0.29		0.29	
PDO Accidents	0.55		0.55	
Total Accidents	0.846			

2C) Model Inputs - Ramp and Arterial Inputs

- Used for TMS projects
- Allows for arterial and ramp volume and speed inputs



2C

RAMP AND ARTERIAL INPUTS

(if detailed information is available for a TMS or an arterial signal management project)

Detailed Information Available? (y/n): N

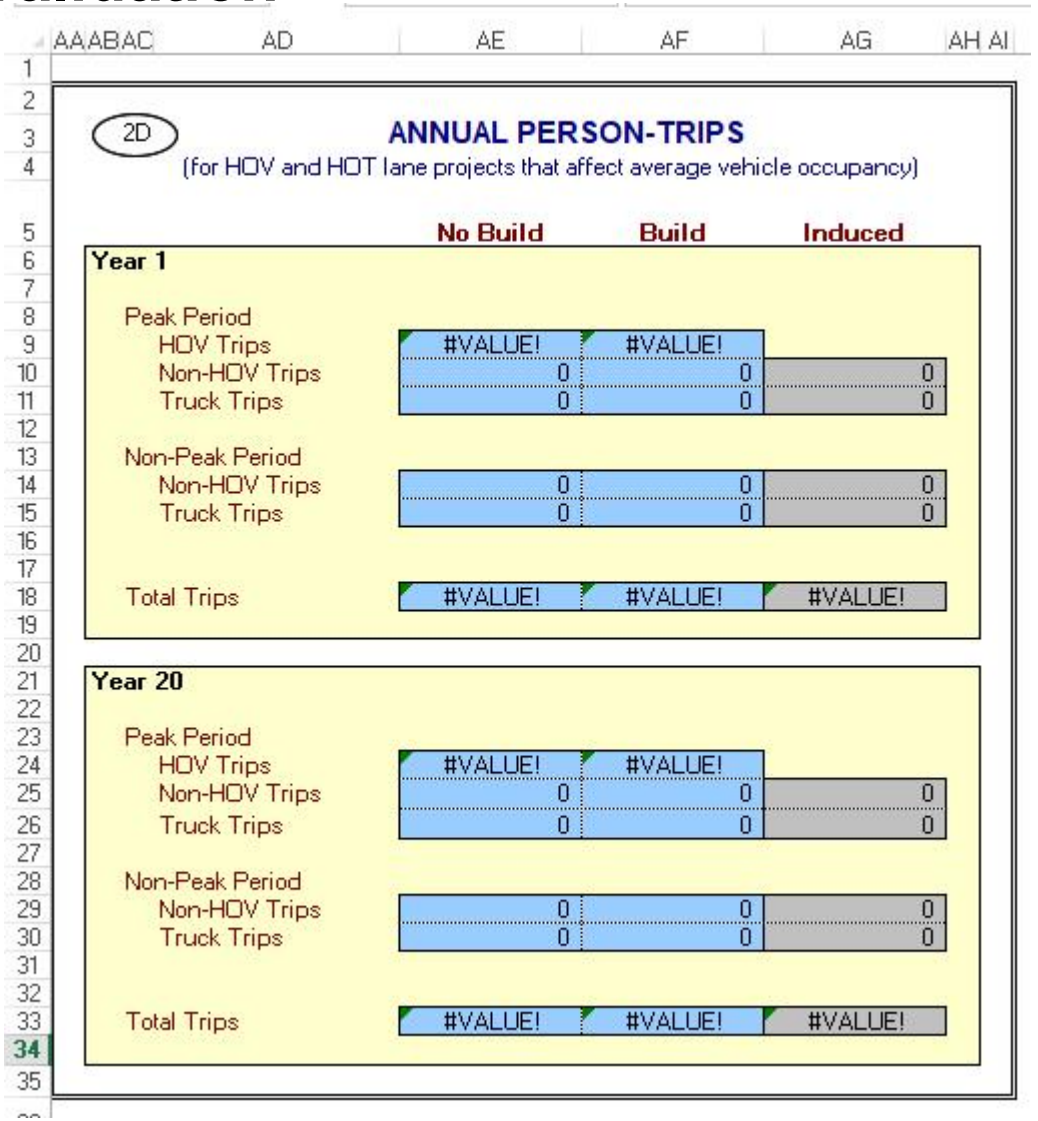
Aggregate Segment Length (estimate as VMT/total volume)

All Ramps		miles
Arterials		miles

	Entered by User	Used for Proj. Eval.	Source/Notes
No Build (Peak Period Only)			
Year 1			
Aggregate Ramp Volume		0	
Aggregate Arterial Volume		0	
Average Ramp Speed		5.0	
Average Arterial Speed		5.0	
Year 20			
Aggregate Ramp Volume		0	
Aggregate Arterial Volume		0	
Average Ramp Speed		5.0	
Average Arterial Speed		5.0	
Build (Peak Period Only)			
Year 1			
Aggregate Ramp Volume		0	
Aggregate Arterial Volume		0	
Average Ramp Speed		5.0	
Average Arterial Speed		5.0	
Year 20			
Aggregate Ramp Volume		0	
Aggregate Arterial Volume		0	
Average Ramp Speed		5.0	
Average Arterial Speed		5.0	

2D) Model Inputs – Annual Person-Trips Validation

- Provided for validation purposes only
- Calculates annual person-trip data based on inputs in the Project Information worksheet for HOV conversion and HOT lane projects
- If total trips do not match, ADT and AVO data in project information worksheet should be adjusted



2D

ANNUAL PERSON-TRIPS

(for HOV and HOT lane projects that affect average vehicle occupancy)

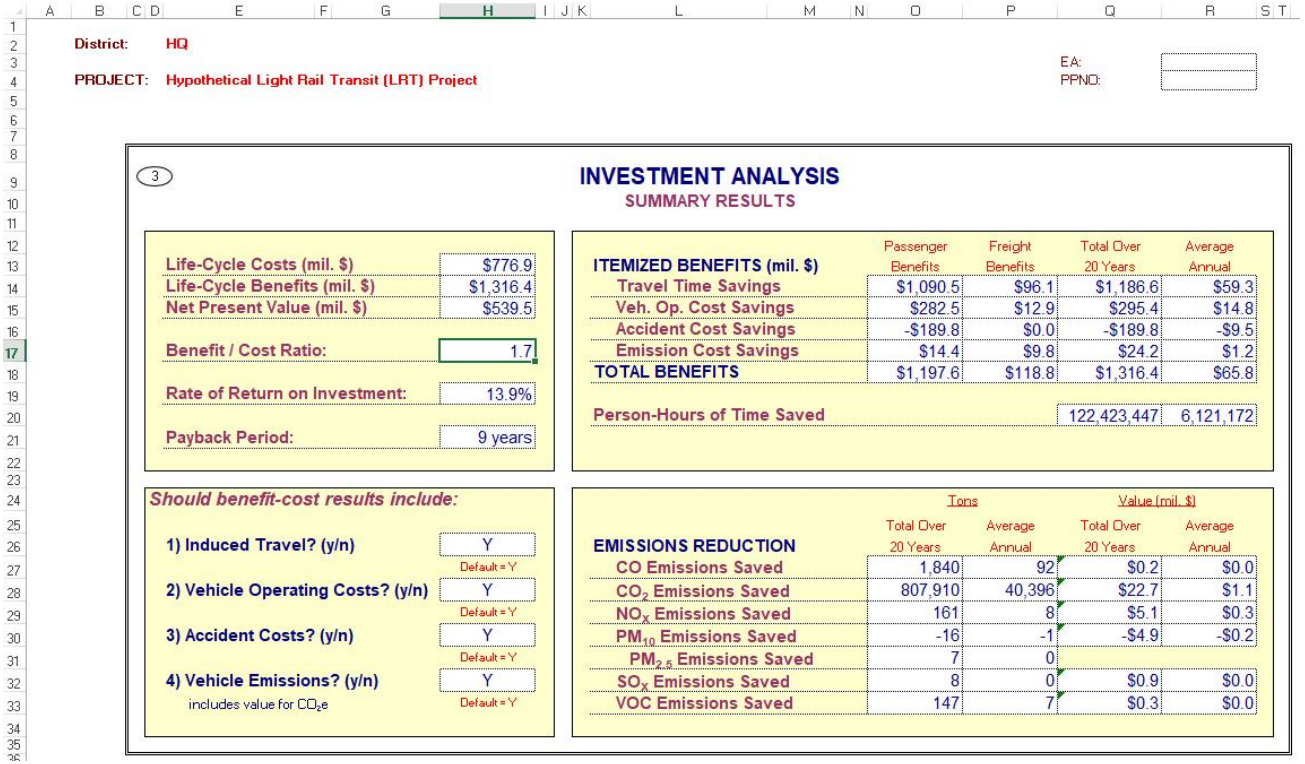
	No Build	Build	Induced
Year 1			
Peak Period			
HOV Trips	#VALUE!	#VALUE!	
Non-HOV Trips	0	0	0
Truck Trips	0	0	0
Non-Peak Period			
Non-HOV Trips	0	0	0
Truck Trips	0	0	0
Total Trips	#VALUE!	#VALUE!	#VALUE!
Year 20			
Peak Period			
HOV Trips	#VALUE!	#VALUE!	
Non-HOV Trips	0	0	0
Truck Trips	0	0	0
Non-Peak Period			
Non-HOV Trips	0	0	0
Truck Trips	0	0	0
Total Trips	#VALUE!	#VALUE!	#VALUE!

05

Results Worksheet

3) Model Results

- Results calculated over 20-year project lifecycle
- Life-Cycle Costs - present values of all net project costs
- Life-Cycle Benefits - sum of present value project benefits
- Net Present Value = Life-Cycle Benefits - Lifecycle Costs
- Benefit/Cost Ratio - Life-Cycle Benefits/Lifecycle Costs
  - >1 means project has a positive economic value
- Rate of Return on Investment - Discount rate at which benefits and costs are equal.
- Payback Period - Number of years it takes for net benefits (lifecycle benefits minus lifecycle costs) to equal initial construction costs
- Emission reductions – positive value = a reduction in emissions



District: HQ

PROJECT: Hypothetical Light Rail Transit (LRT) Project

EA:
PPNO:

3

INVESTMENT ANALYSIS
SUMMARY RESULTS

Life-Cycle Costs (mil. $)	$776.9
Life-Cycle Benefits (mil. $)	$1,316.4
Net Present Value (mil. $)	$539.5
Benefit / Cost Ratio:	1.7
Rate of Return on Investment:	13.9%
Payback Period:	9 years

ITEMIZED BENEFITS (mil. $)	Passenger Benefits	Freight Benefits	Total Over 20 Years	Average Annual
Travel Time Savings	$1,090.5	$96.1	$1,186.6	$59.3
Veh. Op. Cost Savings	$282.5	$12.9	$295.4	$14.8
Accident Cost Savings	-$189.8	$0.0	-$189.8	-$9.5
Emission Cost Savings	$14.4	$9.8	$24.2	$1.2
TOTAL BENEFITS	$1,197.6	$118.8	$1,316.4	$65.8
Person-Hours of Time Saved			122,423,447	6,121,172

Should benefit-cost results include:

1) Induced Travel? (y/n)	Y	Default = Y
2) Vehicle Operating Costs? (y/n)	Y	Default = Y
3) Accident Costs? (y/n)	Y	Default = Y
4) Vehicle Emissions? (y/n) (includes value for CO_2e)	Y	Default = Y

	Tons		Value (mil. $)	
EMISSIONS REDUCTION	Total Over 20 Years	Average Annual	Total Over 20 Years	Average Annual
CO Emissions Saved	1,840	92	$0.2	$0.0
CO_2 Emissions Saved	807,910	40,396	$22.7	$1.1
NO_X Emissions Saved	161	8	$5.1	$0.3
PM_{10} Emissions Saved	-16	-1	-$4.9	-$0.2
$PM_{2.5}$ Emissions Saved	7	0		
SO_X Emissions Saved	8	0	$0.9	$0.0
VOC Emissions Saved	147	7	$0.3	$0.0

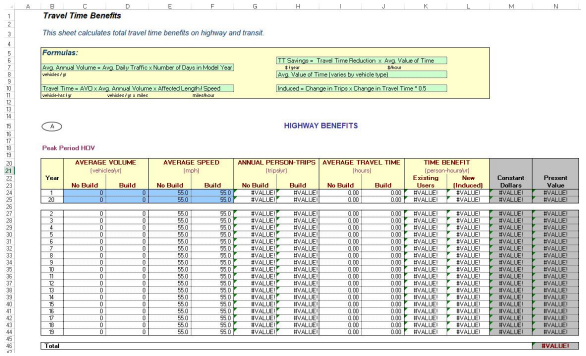
06

Additional Information

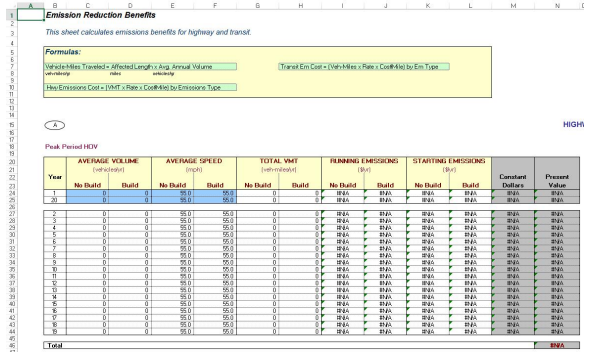
Detailed Calculations

- Discussed in more detail in Module 6a
- Produces detailed calculations for each benefit category (i.e., Travel Time, Vehicle Operating, Accidents, and Emissions)
- Final Calculations Worksheet tabulates benefits and calculates the results
- Year by year calculations, and in most cases, by mode and facility
- Benefits are functions of user data inputs and assumptions from the parameters worksheet:
  - Travel time savings = f (volume, speed)
  - Vehicle operating cost savings = f (volume, speed, fuel consumption, wear factors)
  - Accident cost savings = f (volume, accident rate, facility type)
  - Emission cost savings = f (volume, speed, emission rate)

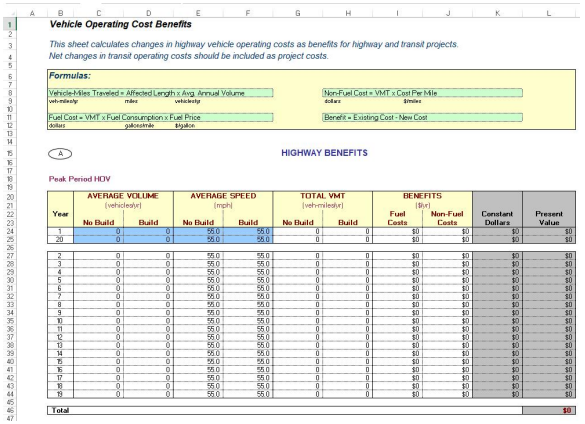
Travel Times Benefits



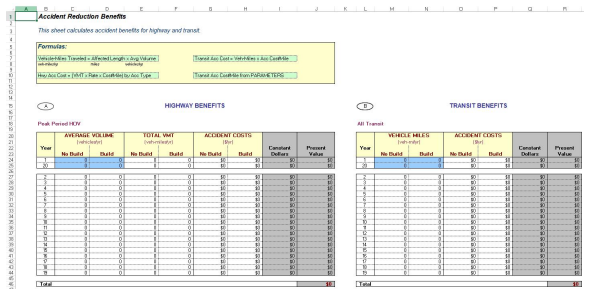
Vehicle Operating Cost Benefits



Collision Benefits



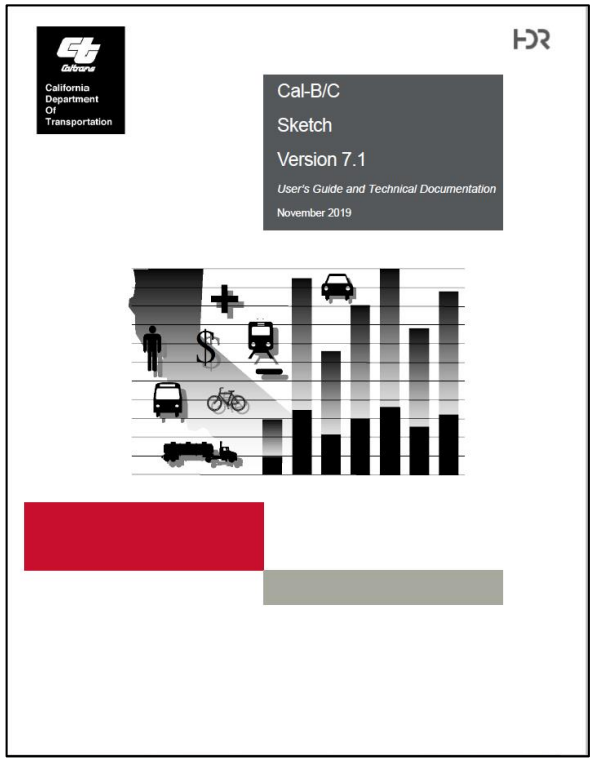
Emissions Benefits



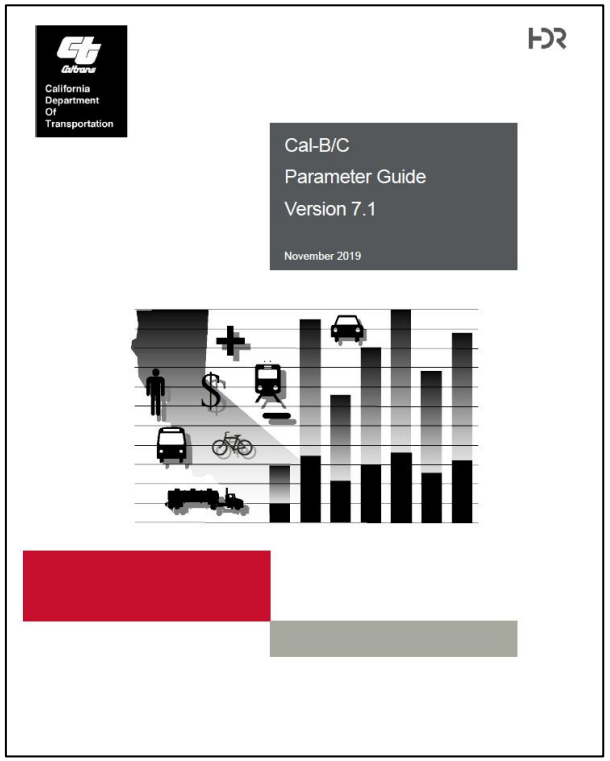
Cal-B/C Sketch Documentation

- 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



07

Conclusion

In this module, you learned…

- How Cal-B/C Sketch works
- How to determine if Cal-B/C Sketch 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 Sketch

What's Next?

- Get more information on a different Cal-B/C tool and how it works
  - **Module 4b** (Cal-B/C Corridor)
  - **Module 4c** (Cal-B/C Active Transportation)
  - **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**
  - **Module 6a: Calculations**
- 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)