PLANNING & MODAL PROGRAMS

Data & Digital Services · Local Assistance · Program Management
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Senate Bill 1 Performance Metrics and the California Benefit Cost Model (Cal B/C) Model

1. Is the project in the Regional Transportation Plan?

2. How does the project perform?

- Benefit cost ratio
- SB 1 performance metrics

3. Does the project comply with state and federal law?

- California Environmental Quality Act
- Federal laws and regulations

SENATE BILL 1 PERFORMANCE METRICS – ALL PROJECTS

Travel Time Reliability	Travel Time Savings	Safety	Air Quality	Jobs Created	Benefit Cost Ratio
Road length, daily traffic, and vehicle occupancy of reliable segments divided by the same information for all segments (for trucks and all vehicles)	Number of person trips multiplied by average travel time, or Number of vehicles/trucks multiplied by average travel time	Average serious injuries per year for last five years on segment and Average fatalities per year for last five years on segment Rate is number divided by VMT times 1 million	Number of vehicles multiplied by their speed multiplied by emissions factors (for each particulate)	Project cost multiplied by .000013 (federal multiplier for jobs created)	Total benefits divided by total costs

This slide is a summary of more detailed information
SB 1 Performance Metrics Guidebook: https://catc.ca.gov/-/media/ctc-media/documents/ctc-workshops/2022/sb-1/performance-measurement-guidebook-final-draft.pdf

SENATE BILL 1 PERFORMANCE METRICS – SOME PROJECTS

Vehicle Miles Travelled	Change in Truck/Rail Volume	Velocity	Level of Transit Delay
Number of vehicles multiplied by length of road, including induced demand (Solutions for Congested Corridors Program, Local Partnership Program Competitive Program, and Active Transportation Program)	Number of trucks, trains, or containers on project segment (Trade Corridor Enhancement Program)	Distance times average speed (Trade Corridor Enhancement Program)	Median number of minutes late per bus per stop (for transit projects)

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SB 1 metrics found in the Cal B/C model

- Travel time savings (cost and hours)
- Safety (cost savings)
- VMT (partially, Cal B/C assumes induced demand is captured before being input into the model)
- Air quality
- Benefit cost ratio
- Velocity

CAL B/C MODEL

- Economic model
- Calculates a project's benefit cost ratio (federally required) and other impacts
- Free for anyone
- Publicly available online
- Regional agencies, districts, and consultants use it
- SB 1 performance metrics information can be pulled from the tool

How does the Cal B/C model work?

1. Uses project inputs
2. Runs inputs through formulas (using assumptions in "Parameters" tab)
3. Provides the user with outputs in year 1 through year 20 of the "with project" scenario

HIGHWAY EMISSIONS FACTORS (g/mi)

Model Year 2044

Mode	Speed	CO	CO2	NOX	PM10	SOX	VOC	PM2.5
Auto	0	1.7535	60.2289	0.1686	0.0008	0.0006	0.1451	0.0008
	5	0.5559	330.9034	0.0223	0.0019	0.0033	0.0249	0.0018
	6	0.5576	324.7042	0.0221	0.0018	0.0032	0.0233	0.0016
	7	0.5594	318.6210	0.0219	0.0017	0.0031	0.0217	0.0015
	8	0.5612	312.6518	0.0218	0.0016	0.0031	0.0203	0.0014
	9	0.5630	306.7945	0.0216	0.0014	0.0030	0.0189	0.0013
	10	0.5647	301.0469	0.0214	0.0014	0.0030	0.0177	0.0012
	11	0.5479	285.9535	0.0206	0.0012	0.0028	0.0161	0.0011
	12	0.5315	271.6169	0.0199	0.0011	0.0027	0.0147	0.0010
	13	0.5156	257.9991	0.0192	0.0010	0.0026	0.0134	0.0009
	14	0.5002	245.0640	0.0185	0.0009	0.0024	0.0122	0.0009
	15	0.4853	232.7774	0.0178	0.0008	0.0023	0.0111	0.0008
	16	0.5039	236.9560	0.0184	0.0008	0.0023	0.0109	0.0008
	17	0.5232	241.2096	0.0190	0.0008	0.0024	0.0107	0.0008

HEALTH COST OF TRANSPORTATION EMISSIONS

($/ton)

Area	Proj Loc	CO	CO_2e	NO_X	PM_{10}	SO_X	VOC
LA/South Coast	1	$170	$48	$69,200	$566,800	$213,000	$4,300
CA Urban Area	2	$90	$48	$20,300	$163,700	$81,700	$1,415
CA Rural Area	3	$80	$48	$15,100	$116,700	$59,000	$1,110

Example: Highway Benefits

A

HIGHWAY BENEFITS

Peak Period HOV

Year	AVERAGE VOLUME (vehicles/yr)		AVERAGE SPEED (mph)		ANNUAL PERSON-TRIPS (trips/yr)		AVERAGE TRAVEL TIME (hours)		TIME BENEFIT (person-hours/yr)		Constant Dollars	Present Value
	No Build	Build	No Build	Build	No Build	Build	No Build	Build	Existing Users	New (Induced)		
1	0	3,704,750	5.0	64.1	0	7,965,213	0.22	0.02	0	807,829	$13,288,789	$10,502,323
20	0	3,704,750	5.0	64.1	0	7,965,213	0.22	0.02	0	807,829	$13,288,789	$4,984,848
2	0	3,704,750	5.0	64.1	0	7,965,213	0.22	0.02	0	807,829	$13,288,789	$10,098,387
3	0	3,704,750	5.0	64.1	0	7,965,213	0.22	0.02	0	807,829	$13,288,789	$9,709,988
4	0	3,704,750	5.0	64.1	0	7,965,213	0.22	0.02	0	807,829	$13,288,789	$9,336,527
5	0	3,704,750	5.0	64.1	0	7,965,213	0.22	0.02	0	807,829	$13,288,789	$8,977,430
6	0	3,704,750	5.0	64.1	0	7,965,213	0.22	0.02	0	807,829	$13,288,789	$8,632,144
7	0	3,704,750	5.0	64.1	0	7,965,213	0.22	0.02	0	807,829	$13,288,789	$8,300,138
8	0	3,704,750	5.0	64.1	0	7,965,213	0.22	0.02	0	807,829	$13,288,789	$7,980,902
9	0	3,704,750	5.0	64.1	0	7,965,213	0.22	0.02	0	807,829	$13,288,789	$7,673,945
10	0	3,704,750	5.0	64.1	0	7,965,213	0.22	0.02	0	807,829	$13,288,789	$7,378,793
11	0	3,704,750	5.0	64.1	0	7,965,213	0.22	0.02	0	807,829	$13,288,789	$7,094,993
12	0	3,704,750	5.0	64.1	0	7,965,213	0.22	0.02	0	807,829	$13,288,789	$6,822,109
13	0	3,704,750	5.0	64.1	0	7,965,213	0.22	0.02	0	807,829	$13,288,789	$6,559,720
14	0	3,704,750	5.0	64.1	0	7,965,213	0.22	0.02	0	807,829	$13,288,789	$6,307,423
15	0	3,704,750	5.0	64.1	0	7,965,213	0.22	0.02	0	807,829	$13,288,789	$6,064,830
16	0	3,704,750	5.0	64.1	0	7,965,213	0.22	0.02	0	807,829	$13,288,789	$5,831,567
17	0	3,704,750	5.0	64.1	0	7,965,213	0.22	0.02	0	807,829	$13,288,789	$5,607,276
18	0	3,704,750	5.0	64.1	0	7,965,213	0.22	0.02	0	807,829	$13,288,789	$5,391,612
19	0	3,704,750	5.0	64.1	0	7,965,213	0.22	0.02	0	807,829	$13,288,789	$5,184,242
Total												**$148,439,196**

Examples of Cal B/C Model Support of SB 1 Performance Metrics

AIR QUALITY

EMISSIONS REDUCTION	Tons: Total Over 20 Years	Tons: Average Annual
CO Emissions Saved	-267	-13
CO_2 Emissions Saved	-65,572	-3,279
NO_X Emissions Saved	-46	-2
PM_{10} Emissions Saved	0	0
$PM_{2.5}$ Emissions Saved	0	0
SO_X Emissions Saved	-1	0
VOC Emissions Saved	-25	-1

BENEFIT COST RATIO

Life-Cycle Costs (mil. $)	$136.7
Life-Cycle Benefits (mil. $)	$343.2
Net Present Value (mil. $)	$206.5
Benefit / Cost Ratio:	2.5

SAFETY

1C HIGHWAY CRASH DATA

Actual 3-Year Crash Data (from Table B)

	Count (No.)	Rate
Total Crashes (Tot)	150	1.38
Fatal Crashes (Fat)	3	0.028
Injury Crashes (Inj)	34	0.31
Property Damage Only (PDO) Crashes	113	1.04

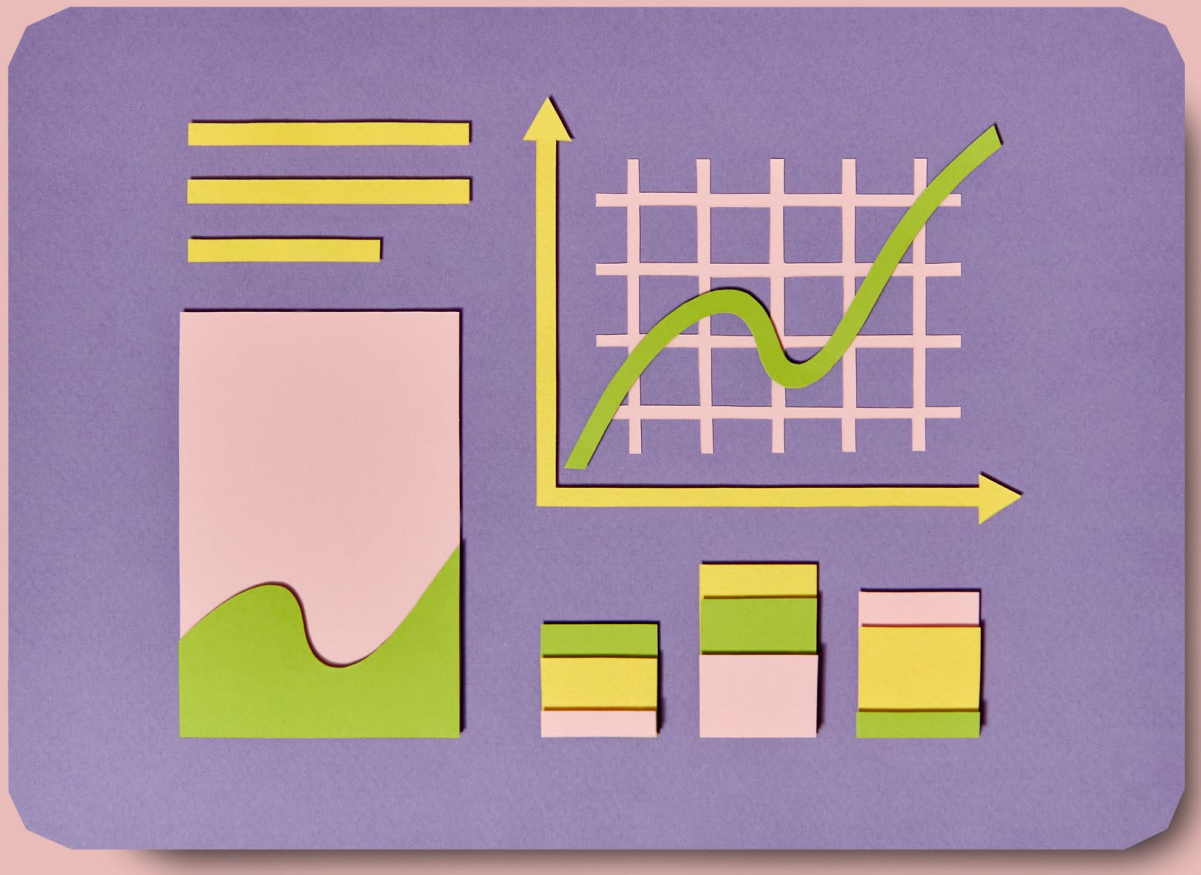
Statewide Basic Average Crash Rate

	No Build	Build
Rate Group	H	H
Crash Rate (per million vehicle-miles)	1.14	0.64
Percent Fatal Crashes (Pct Fat)	0.6%	0.5%
Percent Injury Crashes (Pct Inj)	38.0%	32.1%

Accounts for Safety Countermeasures, and Crash Reduction Factors (CRFs)

CAL B/C UPDATES IN PROGRESS

- Add the SB 1 performance metrics to the “results” tab
- Make the tool more user friendly
- Incorporate additional information, such as additional emissions (methane) and additional economic benefits (gross domestic product, salaries and wages, and jobs created)



Caltrans Economics Branch

- Caltrans Funding Booklet
- California County-Level Economic Forecasts
- Cal B/C Sketch Models (links on main website)
- Project Specific Economic Impact Analysis
- Link to website: https://dot.ca.gov/programs/transportation-planning/division-of-transportation-planning/state-planning/transportation-economics

Gilberto Chambers: gilberto.chambers@dot.ca.gov