Trade Corridor Enhancement Program (TCEP) Performance Metrics Instructions by Measure Area

1. This document is intended to provide additional background and information for each Measure Area that an applicant is expected to complete for the table located in Appendix II of the project nomination.
2. The following standardized terminology has been developed:
   Project benefits = Outputs + Outcomes
   Outputs = actual physical infrastructure improvements (i.e. miles of bike lanes, # of transit stations)
   Outcomes = non-physical improvements (i.e. congestion reduction, air quality improvement)
   Measure = the outcome that is being measured (i.e. safety, air quality)
   Metric = how the outcome is being measured (i.e. air quality improvement = reduced greenhouse gas emissions)
3. Project benefits are expected to be provided for the scope of the project as defined in the application and as projected for the "Build" scenario versus the "No Build" scenario over a 20-year horizon (with no other alternatives consideration required). If a horizon other than 20 years is utilized, it must be identified and justified in the table. Provide current conditions where applicable and explain current conditions as part of project purpose and need.
4. These metrics measure estimated project benefits based on what data available at the time of application.
5. For each measure area applicants must specify the horizon year, methodology, assumptions, and data source(s) used and any data gaps or challenges should also be noted.
6. Modeled and observed data may be used. Modeled data used must be calibrated per federal standards.
7. Project types include: Freight Road, Rail, Sea Port, Land Port, and Airport or any combination thereof. Benefits are reported for the project as a whole.
8. A few tools have been identified in the table below, including the Regional Travel Demand Model, Sub-Regional or Project-Level Models. Applicants are encouraged to use tools that are industry standard to the extent possible, but when there is a need to use an alternate tool, applicants must explain their choice of model and underlying assumptions.
9. Each application should include analysis utilizing the most recent version of Caltrans' Life Cycle Benefit Cost Analysis (Cal-B/C) Model to document that the expected benefits of the project justify its costs. If another model is more applicable it may be used; the alternative model must be identified and justified in the table, including a description of the methodology, assumptions, and data sources used.
10. For the Air Quality analysis portion of the application, Cal-B/C, the SB 1 Intermodal Tool, or the SB 1 Other Projects Tool must be used. The most recent version of Cal-B/C, the SB 1 Intermodal and Other Projects Tools can be accessed here: https://dot.ca.gov/programs/transportation-planning/economics-data-management/transportation-economics
11. For Cal-B/C tool data and assumptions documentation, applicants must provide an electronic copy of the completed Excel workbook as part of the application submittal.
12. The intent of these metrics is not to require a RTDM run for every project. It is anticipated that project applicants will utilize existing analyses (i.e. project level modeling conducted for the environmental analysis) and use that information coupled with additional off model tools or other calculations to estimate the project benefits for the application process.

Measure	Metric	Project Type	Horizon, Methodology, and Data Notes
Congestion Reduction	**Daily Vehicle Hours of Travel Time Reduction**	Road Sea Port Land Port	• Regional or Sub-Regional Travel Demand Model (RTDM)
	Reduction in Daily Truck Trips (due to mode shift)	Rail Sea Port	• Regional or Sub-Regional Travel Demand Model (RTDM) • Only required for applicable port rail projects
	Reduction in Daily Truck Miles Traveled (due to mode shift)	Rail Sea Port	• Regional or Sub-Regional Travel Demand Model (RTDM) • Only required for applicable port rail projects

Measure	Metric	Project Type	Horizon, Methodology, and Data Notes
Throughput	**Change in Annual Truck Volume** that can be accommodated due to improvement	Road Land Port Airport	• Regional or Sub-Regional Travel Demand Model (RTDM) • Truck Bottleneck Reporting is a Federal Freight Metric that could be used: https://www.fhwa.dot.gov/tpm/guidance/
	Change in Annual Rail Volume that can be accommodated due to improvement	Rail Sea Port	• Regional or Sub-Regional Travel Demand Model (RTDM) • In the event detailed private rail data is difficult to obtain, # of trains or other simple observed data can be utilized.
	Change in Annual Cargo Volume that can be accommodated due to improvement	Sea Port Airport	• Regional or Sub-Regional Travel Demand Model (RTDM)

Measure	Metric	Project Type	Horizon, Methodology, and Data Notes
System Reliability	**Truck Travel Time Reliability Index**	Road Land Port	• Only required for National and State Highway System Projects • Federal Metric: https://www.fhwa.dot.gov/tpm/guidance/ and https://www.fhwa.dot.gov/tpm/guidance/hif18040.pdf and 23 CFR 490.611
	Daily Vehicle Hours of Travel Time Reduction	Road Sea Port Land Port	• Sub-Regional and Regional Travel Demand Model • Also reported for Freight Congestion

Measure	Metric	Project Type	Horizon, Methodology, and Data Notes
Safety	Number of Fatalities	Road Land Port	• Required for **all** National and State Highway System Projects, and for any project that will facilitate the movement of freight on a public road in California • Federal Metric: https://www.fhwa.dot.gov/tpm/guidance/ https://www.fhwa.dot.gov/tpm/guidance/safety_performance.pdf also AASHTO Highway Safety Manual Methodology • Projected for the life of the improvement, up to 20 years • The nomination must address safety issues and concerns in the corridor, including actual reported injury and fatality collisions for the last 5 full years. • See safety calculations documentation on p. 5 for more information
	Rate of Fatalities per 100 Million VMT	Road Land Port	
	Number of Serious Injuries	Road Land Port	
	Number of Serious Injuries per 100 Million VMT	Road Land Port	
	Number of Non-Motorized Fatalities and Non-Motorized Serious Injuries	Road Land Port	
	Other Narrative (optional)		• Other freight project information can be presented here, would be a good place to discuss rural freight safety metrics. • For freight rail projects: train involved collisions and railroad grade crossing fatalities and injuries are examples of other metrics that could be used if applicable.

Measure	Metric	Project Type	Horizon, Methodology, and Data Notes
Velocity	**Travel Time** or **Total Cargo Transport Time** (including dwell time in logistics facility – port, railyard, etc.) if applicable for project	All	• Regional or Sub-Regional Travel Demand Model (RTDM)
	Change in Average Peak Period Weekday Speed for Road Facility	Road	• Regional or Sub-Regional Travel Demand Model (RTDM)
	Change in Average Peak Period Weekday Speed for Rail Facility	Rail	• Regional or Sub-Regional Travel Demand Model (RTDM)

Measure	Metric	Project Type	Horizon, Methodology, and Data Notes
Economic Development and Job Creation	Jobs Created (Direct and Indirect)	All	• Federal Multiplier (RIMS II-type) based on Project Cost • Caltrans uses 11 jobs per $1 million invested in 2018 Executive Fact Book
	Other Narrative (optional)	All	• Narrative explanation of other economic development information including the quality of jobs, local training and hires, etc.

Measure	Metric	Project Type	Horizon, Methodology, and Data Notes
Air Quality & Greenhouse Gas Emissions	Particulate Matter (PM 2.5 PM 10)	All	• Cal-B/C Tools Available using RTDM inputs for project area: https://dot.ca.gov/programs/transportation-planning/economics-data-management/transportation-economics • Provide a summary of Cal-B/C inputs
	Carbon Dioxide (CO_2)		
	Volatile Organic Compounds (VOC)		
	Sulphur Dioxides (SO_x)		
	Carbon Monoxide (CO)		
	Nitrogen Oxides (NO_x)		

Measure	Metric	Project Type	Horizon, Methodology, and Data Notes
Cost Effectiveness	Cost Benefit Ratio	All	• Cal-B/C Tools Available using RTDM inputs: https://dot.ca.gov/programs/transportation-planning/economics-data-management/transportation-economics • Provide a summary of Cal-B/C inputs

Safety Calculations Documentation:

Table 1 – Safety Performance Measures and Data Sources

Safety Performance Measures	Safety Performance Measure Description	Data	Data Source
Number of Fatalities	The total number of persons suffering fatal injuries in a motor vehicle crash during a calendar year	Fatalities	Final FARS and FARS ARF
		Target	HSIP Annual Report
Rate of Fatalities	The ratio of the total number of fatalities to the number of VMT (expressed in 100 million VMT)	Fatalities	Final FARS and FARS ARF
		VMT	VM-2 Table in Highway Statistics Series
		Target	HSIP Annual Report
Number of Serious Injuries	The total number of persons suffering at least one serious injury in a motor vehicle crash during a calendar year	Serious injuries	HSIP Annual Report
		Target	HSIP Annual Report
Rate of Serious Injuries	The ratio of the total number of serious injuries to the number of VMT (expressed in 100 million VMT)	Serious injuries	HSIP Annual Report
		VMT	VM-2 Table in Highway Statistics Series
		Target	HSIP Annual Report
Number of Non-Motorized Fatalities and Non-Motorized Serious Injuries	The total number of fatalities with the FARS person attribute codes: (5) Pedestrian, (6) Bicyclist, (7) Other Cyclist, (8) Person on Personal Conveyances and the total number of serious injuries where the injured person is, or equivalent to, a pedestrian (2.2.36) or a pedalcyclist (2.2.39) a s defined in the American National Standards Institute (ANSI) D16.1-2007.	Non-motorized fatalities	Final FARS and FARS ARF
		Non-motorized serious injuries	HSIP Annual Report
		Target	HSIP Annual Report

Safety Documentation Continued:

2.1 Number of Fatalities

Number of Fatalities Measure $_{PY}$ =

$$\frac{\{\text{Fatalities}_{PY-4} + \text{Fatalities}_{PY-3} + \text{Fatalities}_{PY-2} + \text{Fatalities}_{PY-1} + \text{Fatalities}_{PY}\}}{5}$$

Where,

Number of Fatalities Measure $_{PY}$ = Calculated fatality measure for the PY *(rounded to the nearest tenth decimal place)*

Fatalities $_{PY}$ = Annual number of fatalities metric *(whole number)*

2.2 Rate of Fatalities

Rate of Fatalities Measure $_{PY}$ =

$$\frac{\left\{\left(\frac{\text{Fatalities}_{PY-4}}{\text{Total VMT}_{PY-4}}\right) + \left(\frac{\text{Fatalities}_{PY-3}}{\text{Total VMT}_{PY-3}}\right) + \left(\frac{\text{Fatalities}_{PY-2}}{\text{Total VMT}_{PY-2}}\right) + \left(\frac{\text{Fatalities}_{PY-1}}{\text{Total VMT}_{PY-1}}\right) + \left(\frac{\text{Fatalities}_{PY}}{\text{Total VMT}_{PY}}\right)\right\}}{5}$$

Where,

Rate of Fatalities Measure $_{PY}$ = Calculated fatality rate measure for the PY *(rounded to the nearest thousandth decimal place)*

Fatalities $_{PY}$ = Annual number of fatalities metric *(whole number)*

Total VMT $_{PY}$ = Annual VMT per 100 million metric *(calculated per 100 million and rounded to the nearest hundredth decimal place)*

$\frac{\text{Fatalities}_{PY}}{\text{Total VMT}_{PY}}$ = Annual fatality rate metric *(rounded to the nearest hundredth decimal place)*

Number of Serious Injuries Measure $_{PY}$ =

$$\frac{\{\text{Serious Injuries}_{PY-4} + \text{Serious Injuries}_{PY-3} + \text{Serious Injuries}_{PY-2} + \text{Serious Injuries}_{PY-1} + \text{Serious Injuries}_{PY}\}}{5}$$

Where,

Number of Serious Injuries Measure $_{PY}$ = Calculated serious injury measure for the PY *(rounded to the nearest tenth decimal place)*

Serious Injuries $_{PY}$ = Annual number of serious injuries metric *(whole number)*

2.4 Rate of Serious Injuries

Rate of Serious Injuries Measure $_{PY}$ =

$$\frac{\left\{\left(\frac{\text{Serious Injuries}_{PY-4}}{\text{Total VMT}_{PY-4}}\right) + \left(\frac{\text{Serious Injuries}_{PY-3}}{\text{Total VMT}_{PY-3}}\right) + \left(\frac{\text{Serious Injuries}_{PY-2}}{\text{Total VMT}_{PY-2}}\right) + \left(\frac{\text{Serious Injuries}_{PY-1}}{\text{Total VMT}_{PY-1}}\right) + \left(\frac{\text{Serious Injuries}_{PY}}{\text{Total VMT}_{PY}}\right)\right\}}{5}$$

Where,

Rate of Serious Injuries Measure $_{PY}$ = Calculated serious injury rate measure for the PY *(rounded to the nearest thousandth decimal place)*

Serious Injuries $_{PY}$ = Annual number of serious injury metric *(whole number)*

Total VMT $_{PY}$ = Annual VMT (per 100 million) metric *(calculated per 100 million and rounded to the nearest hundredth decimal place)*

$\frac{\text{Serious Injuries}_{PY}}{\text{Total VMT}_{PY}}$ = Annual serious injury rate metric *(rounded to the nearest hundredth decimal place)*

2.5 Number of Non-Motorized Fatalities and Non-Motorized Serious Injuries

Number of Non-Motorized Measure $_{PY}$ =

$$\frac{\{\text{Non-Motorized}_{PY-4} + \text{Non-Motorized}_{PY-3} + \text{Non-Motorized}_{PY-2} + \text{Non-Motorized}_{PY-1} + \text{Non-Motorized}_{PY}\}}{5}$$

Where,

Number of Non-Motorized Measure $_{PY}$ = Calculated number of non-motorized fatalities and number of serious injury measure for the PY *(rounded to the nearest tenth decimal place)*

Non-Motorized $_{PY}$ = Combined annual number of non-motorized fatalities and non-motorized serious injuries metric *(whole number)*