3B. Multimodal Freight System Performance Assessment

Performance assessment is key to improving the transportation system. Tracking and analyzing the condition and performance of the freight system ensures that management, operations, and capital improvements are based on sound data and analysis. Assessment of the freight system's condition and performance includes a combination of quantitative and qualitative performance measures to inform and prioritize freight investments for decision makers. As required by the MAP-21, FAST, and IIJA Acts, U.S. DOT has established a set of performance measures for use by state Departments of Transportation and MPOs to assess freight movement on the U.S. Interstate System.[72] These measures are highlighted to:

- Be inclusive of Federal required measures and tied directly to the goals and objectives of the CFMP;
- Measure, update, and track on a rolling basis based on available data sources; and
- Provide insights about the performance of the freight system as needed by its users e.g., shippers, carriers).

Highway Assessment

CONGESTION AND BOTTLENECK ASSESSMENT

American Trucking Research Institute (ATRI) publishes an annual list of the Top 100 Freight Bottlenecks in the nation. This information helps California better understand the severity of congestion and provides some criteria for comparison with other analytical methods. California's highest congested bottlenecks are listed in **Table 3.13**.

Table 3.13: Bottlenecks in California – National Ranking by Congestion Level (2022)

Congestion Ranking	Location Description	Average Speed	Peak Average Speed	Non-Peak Average Speed	Peak Average Speed Percent Change 2020-2021
7	Los Angeles, CA: SR 60 at SR 57	43.3	36.9	46.0	-12.1%
9	San Bernardino, CA: I-10 at I-15	42.2	35.7	44.8	-12.1%
35	Corona, CA: I-15 at SR 91	45.0	40.0	46.8	-8.7%
47	Oakland, CA: I-880 at I-238	43.9	38.1	46.9	-13.1%
59	Los Angeles, CA: I-110 at I-105	41.7	34.5	44.8	-13.1%
63	Oakland, CA: I-80 at I-580/I-880	34.8	29.7	37.0	-16.1%

90	Anaheim, CA: SR 91 at SR 55	48.4	42.7	50.3	-8.3%
91	Los Angeles, CA: I-710 at I-105	49.3	42.3	52.4	8.1%
Source: American Transportation Research Institute[73]					

Table 3.14 lists examples of planned and programmed projects across the state and regional strategies listed in **Chapter 6B. Freight Investments** to address the identified freight bottleneck locations. This table is intended to highlight major innovative project examples and regional strategies that align with State and Federal freight goals and policies.

Table 3.14: Planned and Programmed Projects and Strategies to address Bottleneck locations in California (2023)

Location Description	Planned/Programmed Projects*	Chapter 6B. Regional Strategy
Los Angeles, CA: SR 60 at SR 57	• SR 57/60 Confluence Chokepoint Relief Program	• Maintaining the long-term economic competitiveness of the region • Increasing freight and passenger mobility • Improving safety of goods movement activities
San Bernardino, CA: I-10 at I-15	• I-10 Corridor Freight and Managed Lane Project • I-15 Express Lanes	• Maintaining the long-term economic competitiveness of the region • Increasing freight and passenger mobility • Improving safety of goods movement activities
Corona, CA: I-15 at SR 91	• I-15 Express Lanes • SR-91 Capital Improvement Project (Express lanes and striping) • Upgrade CCTV detection	• Maintaining the long-term economic competitiveness of the region • Increasing freight and passenger mobility • Improving safety of goods movement activities
Oakland, CA: I-880 at I-238	• Per-Mile Tolling | Regional • Express Lanes | Regional • Express Bus | Service • Expansion | ReX (Basic) | Red Line (Oakland to Redwood City)	• Reduce environmental and community impacts and improve the quality of life in communities most affected by goods movement. • Provide safe, reliable, efficient, and well-maintained freight movement facilities. • Promote innovative technology strategies to improve efficiency. • Preserve and strengthen a multi-modal system that supports freight movement and coordinates with passenger transportation systems and local land use decisions. • Increase economic growth and prosperity.
Los Angeles, CA: I-110 at I-105	• N/A	• Maintaining the long-term economic competitiveness of the region • Increasing freight and passenger mobility • Improving safety of goods movement activities

Oakland, CA: I-80 at I-580/I-880	• Per-Mile Tolling | Regional • Corridor & Interchange Improvements | I-580 | Alameda County • Bay Area Forward Program | Regional • Express Lanes | Regional • Express Bus | Service Expansion | AC Transit | Transbay Corridor • Express Bus | Modernization | I-80 • Express Bus | Service Expansion | ReX (Premium) | Green Line (Vallejo to SFO Airport)	• Reduce environmental and community impacts and improve the quality of life in communities most affected by goods movement. • Provide safe, reliable, efficient, and well-maintained freight movement facilities. • Promote innovative technology strategies to improve efficiency. • Preserve and strengthen a multi-modal system that supports freight movement and coordinates with passenger transportation systems and local land use decisions. • Increase economic growth and prosperity.
Anaheim, CA: SR 91 at SR 55	• State Route 91 Operational and Multimodal Improvement Project	• Maintaining the long-term economic competitiveness of the region • Increasing freight and passenger mobility • Improving safety of goods movement activities
Los Angeles, CA: I-710 at I-105	• N/A	• Maintaining the long-term economic competitiveness of the region • Increasing freight and passenger mobility • Improving safety of goods movement activities
Source: Rebuilding CA Project Map 2023, Trade Corridor Enhance Program Project list, Southern California Association of Governments Regional Transportation Plan (2020), Metropolitan Transportation Commission Regional Transportation Plan (2021), State Highway Operations Protection Program, State Transportation Improvement Program (2022). ****This** is a non-exhaustive list of projects and strategies and is not prioritized*		

In addition to the planned and programmed projects listed and regional strategies in **table 3.14**, there are several listed in **Chapter 6A. Strategies and Objectives** that the state is committed to employing to address the freight mobility issues at these locations. The following 17 strategies can be used to address freight bottlenecks:

- Strategy MM-1-A: Create a multimodal freight bottleneck list for priority corridors
- Strategy MM-1-B: Conduct alternatives analysis – Determine if the highway build-out is the best solution
- Strategy MM-2-A: Identify the most congested freight corridors and facilities; prioritize for improvement
- Strategy MM-2-B: Conduct a dedicated truck lane feasibility study
- Strategy MM-2-C: Explore variable tolling for passenger vehicles and trucks to maximize peak capacity
- Strategy MM-3-A: Implement detection on priority corridors to identify problem areas across modes, particularly targeted to truck data
- Strategy MM-3-B: Construct railroad grade separations at high-volume roadway crossings where feasible; prioritize crossings that facilitate the movement of trucks
- Strategy MM-3-C: Implement systems management approach and active traffic management (ATM) technologies to support efficient and safe freight operations

- Strategy MM-3-D: Expand freight travel information availability
- Strategy MM-3-F: Coordinate with other states and regions to improve multi-jurisdictional freight corridors to reduce delay, increase speed, improve reliability, and improve safety
- Strategy EP-1-A: Reduce transportation costs by eliminating bottlenecks and recurrent delays, making operational improvements, and accelerating rapid incident response on priority freight corridors
- Strategy EP-1-C: Measure the throughput of pass-through freight and identify friction points
- Strategy EP-2-A: Encourage the creation of regional freight advisory committees at regional/county transportation agencies
- Strategy SR-1-D: Prioritize projects that address high-crash and truck-involved locations
- Strategy SR-2-C: Identify alternate freight routes to maintain freight movement at times of disruption by disaster
- Strategy SR-3-B: Identification of high-priority safety concerns, critical and vulnerable infrastructure, and aspects of the State's key supply chains that have resiliency concerns
- Strategy AM-1-D: Fortified bridges and pavement design standards to accommodate heavy freight travel

Infrastructure Assessment

Poor pavement and bridge conditions negatively affect truck operations. Infrastructure deterioration results in potential safety concerns, increased truck operating costs due to slower speeds, increased wear and tear on trucks, and damage to fragile goods. Poor condition of pavement and bridges also may result in weight restrictions that limit access for trucks. Trucks contribute to pavement and bridge structural deficiencies, which affect the ability of those bridges to carry heavy loads. High volume truck corridors have a higher potential for rapid infrastructure deterioration, and therefore higher preservation costs. The National Highway System (NHS) in California consists of 57,699 lane miles of pavement and 10,936 bridges totaling 243,347,047 square feet of bridge deck area in California. The California SHS includes all assets within the boundaries of the highway system including 49,672 lane miles of pavement and 13,189 bridges as identified in Transportation Management System (TMS) assets.[74]

According to the Caltrans 2020 State of the Pavement Report, distressed pavement is considered in poor condition when it has extensive cracks, is considered a "poor ride", or both. Pavement in this category would trigger the need for Capital Preventive Maintenance (CAPM) rehabilitation or reconstruction projects.[75] **Table 3.15** provides an inventory and detailed breakdown of the condition of pavements on the NHS and SHS in California by lane mile.[76]

Table 3.15: Inventory and Conditions of NHS Pavements (State and Local) in CA, by Lane Mile

	Lanes Miles	Good	Fair	Poor
State-Owned NHS	36,896	45.0%	52.8%	2.3%
Interstate	14,419	47.9%	50.2%	1.9%
Non-interstate NHS	22,477	43.1%	54.4%	2.5%
Off the SHS (Locally-Owned NHS)				
Non-interstate NHS	20,803	3.0%	79.0%	17.9%

Total (State and Local NHS Pavements)				
ALL NHS	57,699	29.8%	62.2%	7.9%
Interstate	14,419	47.9%	50.2%	1.9%
Non-interstate NHS	43,281	23.8%	66.2%	9.9%
Source: California Transportation Asset Management Plan, 2022				

Distressed pavement is one of Caltrans' 2022 California Transportation Asset Management Plan (TAMP) performance measures and Caltrans has set goals to bring 94 percent of the California's NHS pavement and 99.5 percent of California's SHS pavement to a good or fair condition in 10 years.[77] According to the 2022 TAMP, 92 percent of highway lane miles on the California NHS and 99 percent of highway lane miles on the California SHS are in fair or good condition, meaning Caltrans has almost surpassed its goals. Proactive maintenance is now paramount to ensuring that pavement conditions do not deteriorate. The remaining highway lane miles on the California NHS and SHS are in poor condition and will require more substantial maintenance and rehabilitation to improve pavement conditions.[78]

Locally owned pavements on the NHS are those that are not on the California SHS but are owned and maintained by local and/or regional governments. There is a greater percentage of miles on the NHS in fair condition than in good condition on the portions of the NHS owned and maintained by local jurisdictions, suggesting that greater investment is needed to improve pavement conditions for these facilities. Detailed information about pavement conditions is available at 2022 California Transportation Asset Management Plan.[79]

Bridge asset data are reported by Caltrans annually to FHWA to support National Bridge Inventory (NBI), an FHWA database that includes data on all bridges 20 feet or longer. Any culvert with a width that spans 20 feet, or more is also classified as a bridge and recorded on the NBI. Bridges and culverts with a span shorter than 20 feet are excluded. Caltrans also records an inventory of bridges in the State Highway System Management Plan (SHSMP). This inventory has minor differences from NBI data. Notably, SHSMP inventory includes shorter bridges and pedestrian bridges that don't meet NBI requirements. The California TAMP uses NBI data as the source of NHS bridge inventory and condition and uses SHSMP data as the source of SHS bridge inventory and condition. Bridge health is critical to freight movement because bridge closures can redirect trips: lengthening travel time, wasting fuel, reducing efficiency, and delaying emergency deliveries and services.

According to the Caltrans 2022 TAMP, California's NHS includes 10,936 bridges. **Table 3.16** presents the inventory and condition of bridges on the NHS in California. It includes overall ratings for bridge decks, superstructures, and substructures on a scale from 0 (worst condition) to 9 (best condition). Overall, 5.4 percent of the bridges on the NHS are in poor condition.[80]

Table 3.16: Inventory and Conditions of NBI Bridges on the NHS, Weighted by Deck Area

System	Count	Deck Area (sq. ft.)	Good	Fair	Poor
State-owned NHS	9,263	218,564,095	49.9%	45.7%	4.4%
Locally-owned NHS	1,673	24,782,952	35.8%	50.5%	13.7%

Total NHS	10,936	243,347,047	48.5%	46.1%	5.4%
Source: California Transportation Asset Management Plan, 2022					

According to the Caltrans 2022 TAMP, California's SHS includes 13,189 bridges. **Table 3.17** presents the inventory and condition of bridges on the SHS in California. It includes overall ratings for bridge decks, superstructures, and substructures on a scale from 0 (worst condition) to 9 (best condition). Overall, 3.5 percent of the bridges on the SHS are in poor condition.[81]

Table 3.17: Inventory and Conditions of NBI Bridges on the NHS, Weighted by Deck Area

Bridges on the SHS (State)					
	Count	**Deck Area (sq. ft.)**	**Good**	**Fair**	**Poor**
Total	13,246	251,703,052	54.1%	42.4%	3.5%
Source: California Transportation Asset Management Plan, 2022					

An alternative measure for bridge performance is to track the number of structurally deficient or functionally obsolete bridges. A structurally deficient bridge is one with routine maintenance concerns that do not pose a safety risk or one that is frequently flooded. A bridge is classified by the FHWA as functionally obsolete if it fails to meet design criteria either by its deck geometry, its load-carrying capacity, its vertical or horizontal clearances, or the approach roadway alignment to the bridge.

Further, another aspect of bridge performance for goods movement is the capacity for handling oversized loads, either by weight or dimension. When bridges cannot handle these permitted loads, freight routing is less efficient. The California Vehicle Code stipulates that no load is to exceed a height of 14 feet measured from the surface upon which the vehicle stands, except that a double-deck bus may not exceed a height of 14 feet, 3 inches. Despite this stipulation, there are several State routes that have vertical clearances of 14 feet or less, which means trucks with loads more than the vertical clearance must find alternate routes. **Table 3.18** provides examples of vertical clearances on State routes that are 14 feet or less.[82]

For these oversized and/or overweight loads, Caltrans has a special permitting system that identifies appropriate routes for a load, which might be significantly longer than another route. One such effort to reduce the number of these detours is Caltrans' Accelerated Bridge Program, which focuses on improving freight movement (extralegal trucks). The program aims to clear pinch points due to truck load and vertical clearance restrictions along primary highway freight corridors. These improvements will reduce unnecessary detours, which reduce impacts to neighborhoods and local streets, vehicles miles traveled, increase safety, and provide greater travel time reliability.

Table 3.18: Vertical Clearances on the State Highway System of 14'-0" or less

Route	County	Postmile	Direction	Name	Vertical Clearance
I-5	San Diego	15.420	NB	Pershing Drive	13'-10''
SR-33	Ventura	18.231	NB	South Matilija Tunnel	13'-4''
SR-33	Ventura	18.811	NB	Middle Matilija Tunnel	13'-4''
SR-33	Ventura	18.846	NB	North Matilija Tunnel	13'-4''
SR-33	Ventura	18.846	SB	North Matilija Tunnel	13'-4''
SR-33	Ventura	18.811	SB	Middle Matilija Tunnel	13'-4''
SR-33	Ventura	18.231	SB	South Matilija Tunnel	13'-4''
I-110	Los Angeles	24.160	NB	College Street	13'-6''
I-110	Los Angeles	24.548	NB	Hill Street	13'-5''
SR-151	Shasta	5.508	EB	Coram Railroad Crossing	13'-9''
SR-151	Shasta	5.508	WB	Coram Railroad Crossing	13'-9''
I-238	Alameda	2.190	SB	Edenvale Railroad Crossing	14'-0''
Source: Caltrans, "Height & Low Clearances."					

Safety Assessment

Safety is Caltrans' top priority. By identifying incident trends, Caltrans and other infrastructure owners/operators can make the necessary infrastructure and operational improvements to enhance safety on the SHS. Additionally, improved technology can eliminate or reduce the severity of certain collisions.

The California Strategic Highway Safety Plan (SHSP) is a statewide, coordinated traffic safety plan that provides a comprehensive framework for reducing roadway fatalities and serious injuries on California's public roads. According to the 2020-2024 SHSP which used California Highway Patrol (CHP) Statewide Integrated Traffic Records System (SWITRS) data, between 2008 and 2017, 8,266 fatal or serious injury crashes involved a commercial vehicle in California.[83] These crashes resulted in 3,310 fatalities and 6,651 serious injuries. Crashes related to commercial vehicles represent 6% of fatal or serious injury crashes, 10% of all traffic fatalities, and 6% of all serious injuries over the same period.

California has a significant number of commercial vehicles that transport goods from marine ports and Mexico. Many crashes involving commercial vehicles are caused by passenger vehicles not accounting for the time and ability that a commercial vehicle has to slow down or

speed up. Due to the size of trucks and buses, the severity of a commercial vehicle crash is often substantial.

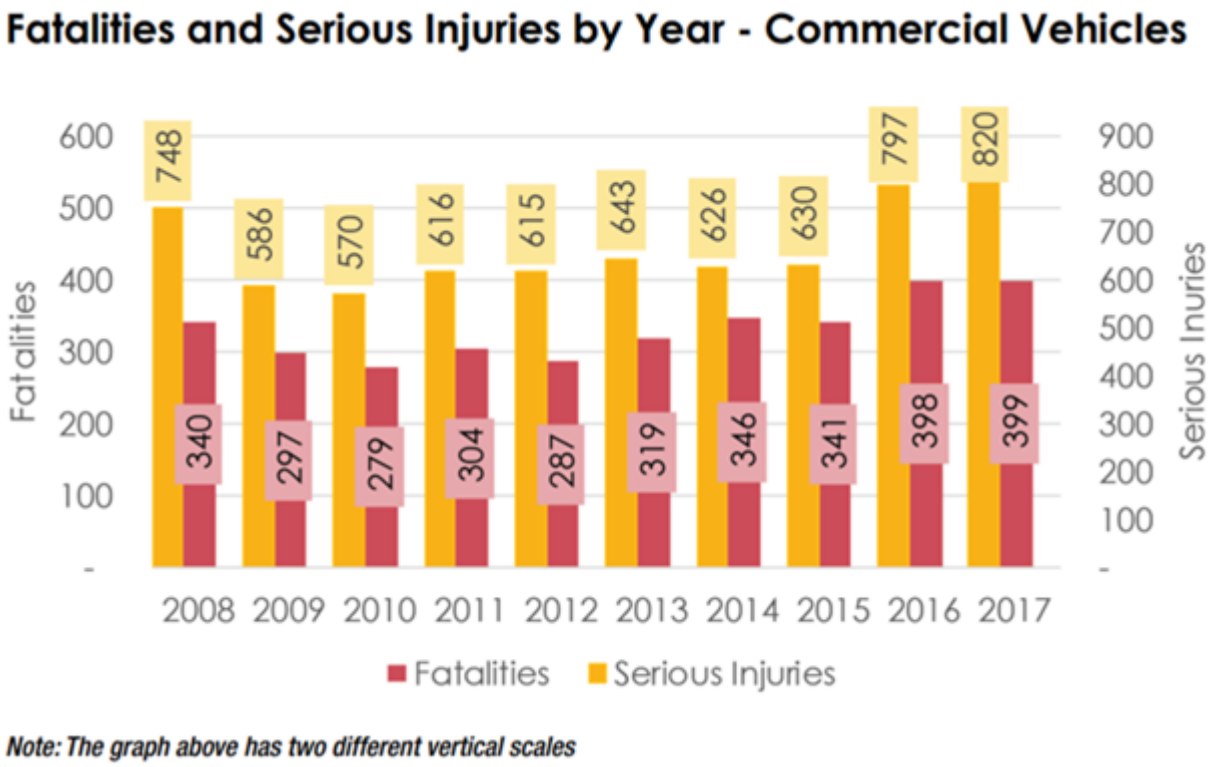
The two most frequent primary crash factors in the 2020-2024 SHSP Commercial Vehicle Challenge Area are improper turning (18%) and unsafe speed (26%). Given that commercial vehicles were a factor in approximately 6% of all fatal and serious injury crashes, three primary crash factors were over-represented:

- 23% of all crashes where the primary crash factor was Other Equipment
- 15% of crashes where the primary crash factor was Brakes
- 15% of crashes where the primary crash factor was Hazardous Parking

Two crash types were also over-represented:

- 17% of rear end crashes involved commercial vehicles
- 13% of sideswipe crashes involved commercial vehicles

In 2019, the CHP SWITRS reported that out of the 347 total fatal traffic collisions for trucks or trucks pulling a trailer, the truck driver was at fault in 82 incidents. This data indicates that passenger



Note: The graph above has two different vertical scales

Figure 3.19: 2008-2017 Fatalities and Serious Injuries per Year – Commercial Vehicles. (Source: California Safe Roads: 2020-2024 Strategic Highway Plan)

vehicle drivers involved in fatal collisions with trucks were far more likely to be at fault than the truck driver.[84]

Of the total 7,089 injury collisions for trucks or trucks pulling a trailer, the truck driver was at fault in 3,034 incidents. The above statistics are represented in **Table 3.19.**

Table 3.19: Collision Statistics (Fatal and Injury)

Collision Statistics, Trucks or Trucks Pulling a Trailer (2019)			
	Total Collisions	Involved	At Fault
Fatal	347	265	82
Injury	7,089	4,055	3,034
Source: California Highway Patrol (CHP) Statewide Integrated Traffic Records System (SWITRS) 2019			

RAIL CONGESTION AND BOTTLENECKS/CHOKEPOINT ASSESSMENT

Similar to roadway congestion, reduced track speed may be caused by bottlenecks and chokepoints are mainly caused by track capacity limitations, track structural strength, steep grades, track geometry, conflicts with passenger service, rail yard capacity, track class, and double-stack height limitations. The 2018 CSRP identified the following eight main line and intermodal bottlenecks and chokepoints:

1) BNSF San Bernardino – Los Angeles: San Bernardino via Fullerton and Riverside
2) BNSF Cajon: Barstow to Keenbrook
3) UPRR Sunset Route: Yuma Subdivision
4) UPRR Alhambra and Los Angeles:
5) UPRR Martinez: Oakland to Martinez
6) Southern Oakland Route: Oakland to Niles Junction
7) BNSF Main Line Stockton to Bakersfield: San Joaquin Corridor
8) UPRR Roseville to Reno over Donner Pass

Figure 3.20: Heavy Rail Freight Traffic Corridor Bottlenecks in Southern California – Segments 1-4 (Source: Caltrans State Rail Plan, 2018)

Figure 3.21: Heavy Rail Freight Traffic Corridor Bottlenecks in Southern California – Segment 5-6 (Source: Caltrans State Rail Plan, 2018)

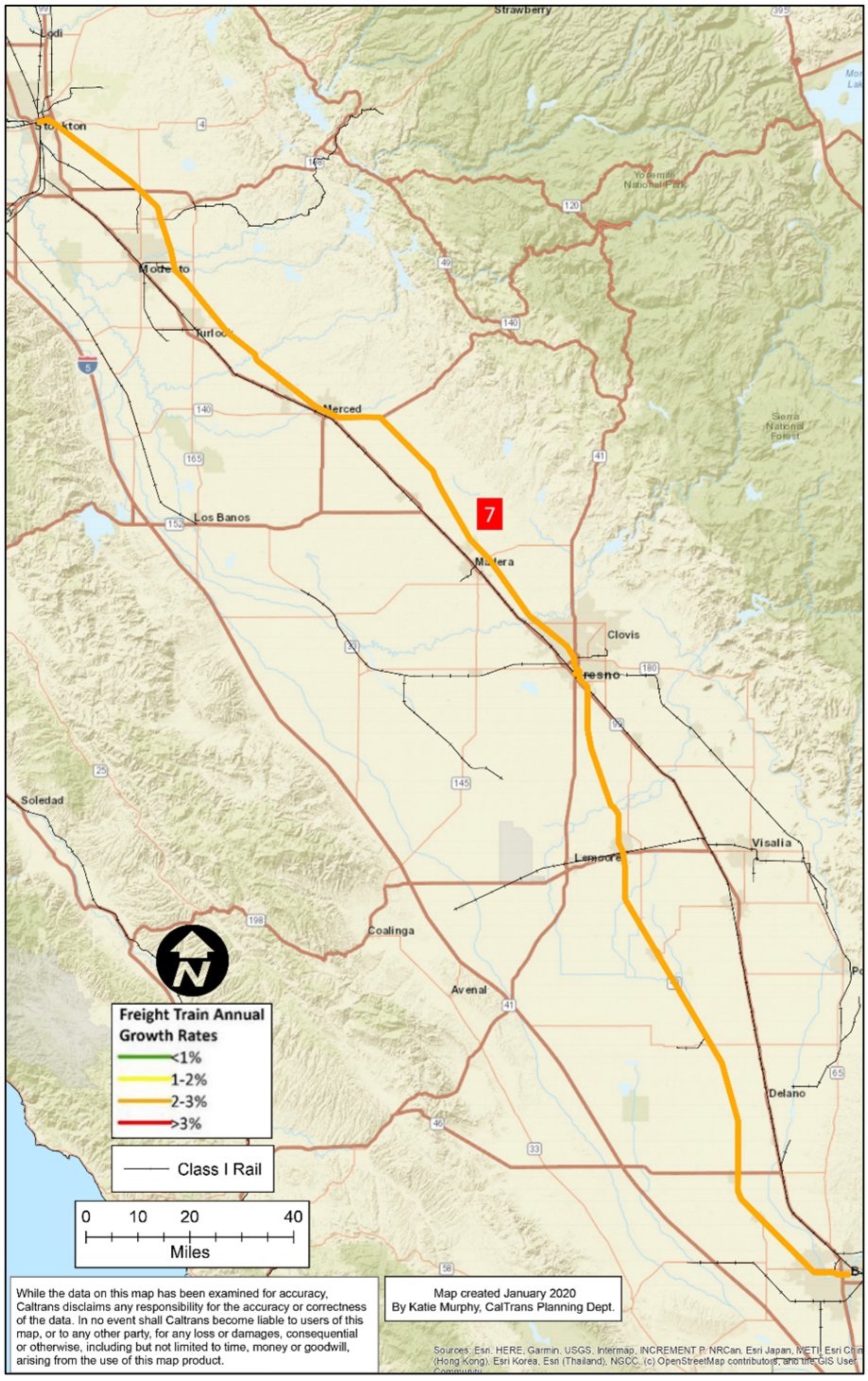


Figure 3.22: Heavy Rail Freight Traffic Corridor Bottlenecks in Southern California – Segment 7 (Source: Caltrans State Rail Plan, 2018)

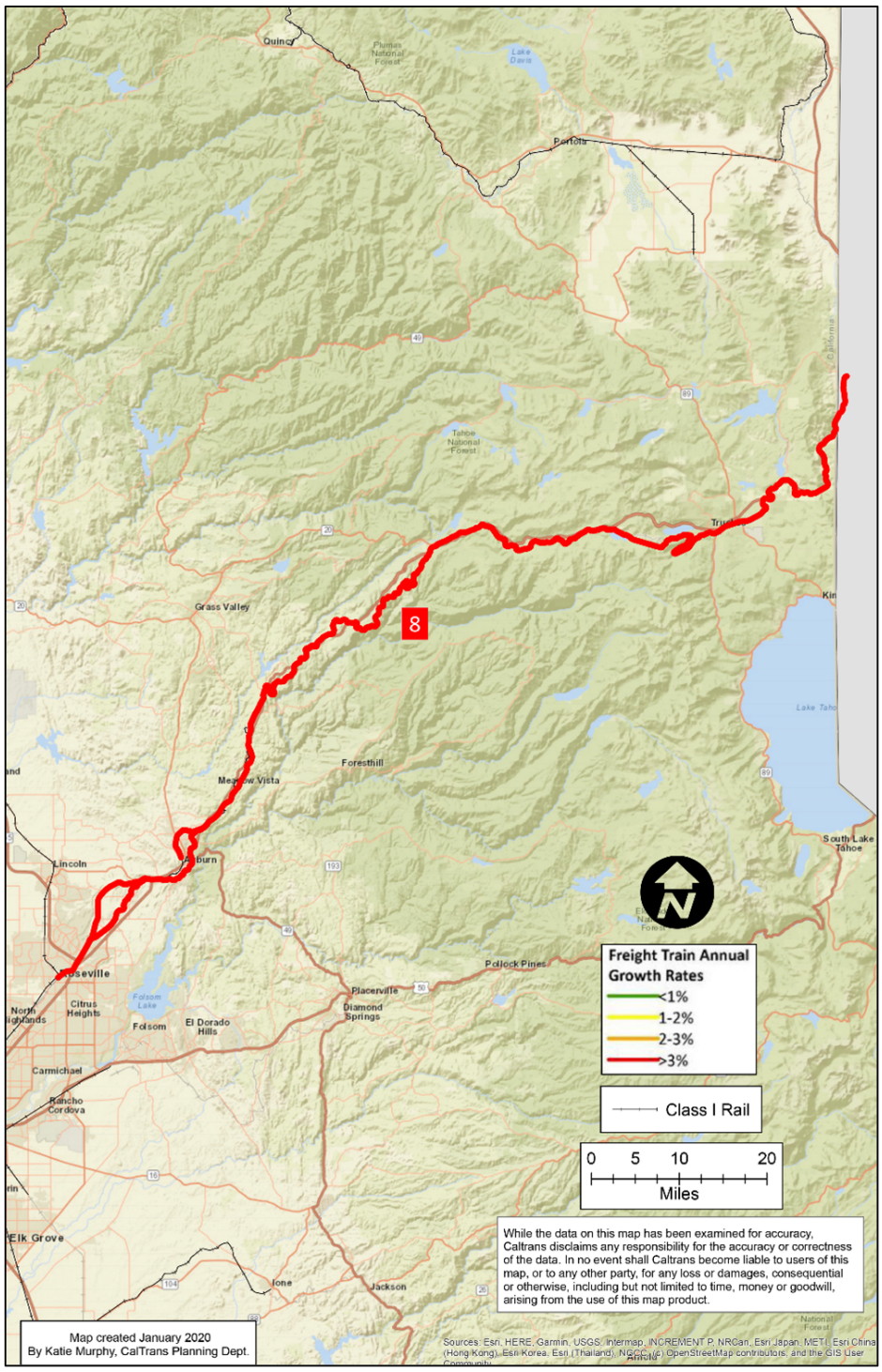


Figure 3.23: Heavy Rail Freight Traffic Corridor Bottlenecks in Southern California – Segment 8 (Source: Caltrans State Rail Plan, 2018)

The Federal Railroad Administration (FRA) categorizes all train tracks into six classes, segregated by maximum speed limits. **Table 3.20** is a list of track miles by each category for California Class I railroads:

Table 3.20: California Class 1 Railroads

Class	Maximum Speed Limit	Track Miles
Class 1	10 mph	38.5
Class 2	25 mph	380.2
Class 3	40 mph	794.8
Class 4	60 mph	10861.1
Class 5	80 mph	1167.2
Class 6	110 mph	none

Higher track speeds correlate to better system conditions and faster delivery times, typically equating to more efficient goods movement. Upgrading track and related facilities to enable higher travel speeds can be a valid infrastructure investment strategy, given a benefit/cost assessment that supports the action. Among the factors contributing to reduced speed are:

- Shared track with passenger train service
- Insufficient sidings
- Classification yard locations
- Heavy freight and/or vehicle traffic
- Steep terrain
- Curved rail geometry
- Tunnels
- Limited number of tracks
- Track gauge and tie/ballast strength

The 2018 CSRP identified the following segments of Class I railroads **(Table 3.21)** that are restricted to speeds of 40 miles per hour or lower.

Table 3.21: Class 1 Railroad Segments Restricted to Speeds 40 mph or Lower

Route	Between	Mile Post	And	Mile Post	Miles	Owner of Track	No. of Tracks	Max. Speed
San Joaquin	Sacramento	89.1	Elvas	91.7	2.6	UPRR	2	35
Capitol Corridor	Rocklin	110.5	Roseville	106.4	4.1	UPRR	2	40
Capitol Corridor	Elvas	91.8	Sacramento	88.9	2.9	UPRR	2	35

Capitol Corridor	Sacramento	88.9	Sacramento River	88.5	0.4	UPRR	2	20
Capitol Corridor	Santa Clara	44.7	San Jose	47.5	2.8	PCJPB	3	40
Pacific Surfliner	Mission Tower	0.7	L.A. Union Station	0.0	1.4	LACMTA	5	25
Pacific Surfliner	Mission Tower	0.7	CP San Diego Jct.	0.9	0.2	LACMTA	2	25
Pacific Surfliner	San Juan Capistrano	197.2	Orange/San Diego County Line	207.4	10.2	OCTA	1	40
Source: California State Rail Plan, 2018								

FREIGHT RAIL INFRASTRUCTURE PRESERVATION

Double-stacking (when freight containers are stacked atop one another on rail cars) increases economic and energy efficiency; the 2018 CSRP states that "a double-stack container-trailer-freight rail car moves freight three to five times more fuel-efficiently than a truck."[85] Sufficient vertical clearance is needed for double-stack service, which is typically 19 feet for international cargo containers and 20 feet, 6 inches for domestic cargo containers. In California, all four of the following primary freight intermodal corridors have sufficient vertical clearances for double-stack service: BNSF Transcontinental, UP Sunset, UP Donner, and Tehachapi. Height limitations that preclude double-stacking along Class I and major Short Line railroad routes are listed in detail in the CSRP.

TRACK WEIGHT ACCOMMODATION

According to the 2013 CSRP, in the mid-1990s, the standard railcar weight was increased from 263,000 to 286,000 pounds and became the applicable weight for all Class I railroads. A rail line's ability to handle this weight is a function of track conditions, rail weight or gauge, and weight bearing structures such as bridges.[86] Over 95 percent of California's Class I network is generally able to handle this standard weight, with only 1.2 percent of total miles (39 miles in Orange County) rated less than the standard. Weight data was not available for 120.5 miles of Class I track along the San Diego, Olive, and San Gabriel subdivisions.

FREIGHT RAIL SAFETY ASSESSMENT

California had 34 fatalities and 36 non-fatal injury collisions occurred at highway-rail grade crossings.[87] **Table 3.22** summarizes highway-rail grade crossing accidents from 2017 to 2021.[88] This information was provided by the Federal Railroad Administration's Office of Safety Analysis, which does not differentiate between the number of freight and passenger train incidents.

Table 3.22: Highway-Rail Grade Crossing Collisions, 2017-2021

Type & Highway User		2017	2018	2019	2020	2021
Train Struck Highway User	**Car**	56	59	58	39	64
	Trucks	12	20	15	17	18
	Pedestrian	45	52	51	44	34
	Other	31	41	40	32	33
	Subtotal	144	172	164	132	149
Highway User Struck Train	**Car**	11	12	3	11	12
	Trucks	6	1	2	2	2
	Pedestrian	2	2	3	-	1
	Other	4	5	3	5	4
	Subtotal	23	20	11	18	19
Total		167	192	168	166	190

Source: Federal Railroad Administration, Office of Safety Analysis, Total Causalities by State Report

Short line railroads throughout California serve a critical role in keeping local communities connected to the national freight rail network. These lines tend to be products of Class I railroad spinoffs that faced years of deferred investment due to minimal traffic volume. Because of this, the short line rail industry faces significant challenges in upgrading its rail infrastructure. A short line's ability to haul the modern weighted 286,000-pound rail car can, in some cases, be the deciding factor if a new customer locates on its rail line. In addition, short lines on average operate their trains at much slower speeds because of the condition of the track and bridges. This can lead to increased wait times at crossings, emissions, and reduced utilization of crews and other railroad personnel. Generally, short line rail accommodates less weight than Class I rail. Though some short line railroads have excellent track conditions, the tie and ballast conditions of short line track are typically inferior to Class I track, and short lines often lack an active signaling system. Consequently, short line train speeds are generally lower (typically 40 miles per hour or less for freight trains) and operations are less automated. Approximately one in five, 19 percent of tons and 18 percent of carloads, start their trips on a short line in California. Only 26 percent (270 miles) of reported short line mileage in California can accommodate the 286,000-pound maximum (CRSP 2018).

California short line railroads are facing pressure for investment to remain competitive with trucks, with short lines in other regions, and to maintain vital connectivity to Class 1 railroads.

Seaports

MARINE FREIGHT INFRASTRUCTURE PRESERVATION

Efficient inbound and outbound movement at California seaports is critical for the State's economic health. To preserve maritime transportation infrastructure, channels and harbors for all ports must be dredged and maintained to accommodate the size of ships that California ports are designed to handle. In addition to the California's 12 ports, there are 16 waterways that require minimum vessel depths. **Table 3.23** indicates minimum channel depths as determined by the US Army Corp of Engineers (USACE), and actual channel depths as listed by the American Association of Port Authorities' (AAPA) Seaport Directory.[89]

Table 3.23: Minimum Seaport Channel Depth

Channel	USACE	AAPA
San Diego Harbor	39'	37'-47'
Long Beach Harbor	68'	76'
Los Angeles Harbor	57'	53'
Port of Hueneme	39'	35' MLLW*
Redwood City Harbor	38'	30'
San Francisco Bay Entrance	47'	--**
San Francisco Harbor	45'	55'
Oakland Harbor	45'	50'
Richmond Harbor	47'	35'-38'
San Pablo Bay and Mare Island Strait	42'	--
Carquinez Strait	42'	--
Suisun Bay Channel	42'	--
San Joaquin River	40'	--
Stockton	40'	35'*
Sacramento River	34'	--
Humboldt Harbor and Bay	34'	--

Source: American Association of Port Authorities' (AAPA) Seaport Directory, 2018.
****mean lower low water (Figures are for planning purposes only and not intended for use in navigation decision making.) **These facilities are no longer with AAPA***

The configurations of some California ports require vessels to heed minimum bridge clearances to avoid collisions. Vertical clearance is measured as the distance from the mean high-water level (high tide) to the bottom of the structural span.

Table 3.24 shows minimum vertical bridge height information for major California seaport bridges.[90] Access to the inland ports of Stockton and West Sacramento may require navigation under smaller fixed bridges and draw bridges.

Table 3.24: Major Bridge Vertical Clearances

Bridge	Vertical Clearance
San Diego – Coronado Bay	
West Span	156'
Middle Spans	175'-195'
East Span	214'
Vincent Thomas	
Middle Span	165'
Long Beach International Gateway	
Current	155'
New	205'
San Mateo - Hayward	135'
San Francisco – Oakland Bay	
West	204' -220'
East	112'
Golden Gate	
Center	225'
North Pier	213'
South Pier	211'
Richmond	
West Channel	185'
Carquinez	
North Span	146'
South Span	132'
Martinez UP Rail Bridge	135'
Rio Vista Bridge	146'
Source: NOAA Raster Chart Products	

Airports

AIR CARGO ASSESSMENT

Of California's top 13 air cargo-carrying airports, 12 also have commercial passenger service, with Mather Airport in Sacramento as the exception. Runway pavement is regularly inspected by federal and state officials for conditions and other compliance measures. These assessments ensure California's runways are maintained in "good" condition or better. Airport infrastructure, other than runways, is typically maintained by municipalities or regional airport systems. In the California Aviation System Plan 2020, San Francisco International (SFO) airport was identified as the one California airport having capacity-related constraints—due especially to geography. However, FAA acknowledged SFO's participation in regional planning efforts to address capacity needs.[91]

System Performance Monitoring

The National Highway Performance Program, which was established under MAP-21 and continued under the IIJA, provides support for the condition and performance of the National Highway System (NHS), for the construction of new facilities on the NHS, and for ensuring that investments of Federal-aid funds in highway construction are directed to support progress toward the achievement of performance targets established in a state's asset management plan for the NHS.

Safety Measures

Safety Performance Management (SPM) is part of the overall Transportation Performance Management (TPM) program, which the FHWA defines as a strategic approach that uses system information to make investment and policy decision to achieve national performance goals. The Safety PM Final Rule supports the Highway Safety Improvement Program (HSIP), as it establishes safety performance measure requirements for the purpose of carrying out the HSIP and to assess fatalities and serious injuries on all public roads.

Caltrans, in cooperation with the Office of Traffic Safety (OTS), is required to set five annual Safety Performance Management Targets (SPMTs) for all public roads in California by August 31 of each year. This is pursuant to the MAP-21 Act, P.L. 112-141. The Safety Performance Management Final Rule adds Part 490 to Title 23 of the Code of Federal Regulations to implement the performance management requirements in 23 U.S.C. 150.

Caltrans set SPMTs for the 2023 calendar year by August 31, 2022.[92] Caltrans and OTS have adopted aspirational goals consistent with the California Strategic Highway Safety Plan (SHSP) as follows:

Table 3.25: Safety Measures (Based on a 5-year rolling average)

	Data Source	5-Yr. Rolling Average Target for 2023	Annual Percentage Change for 2023
Number of Fatalities	FARS	3,808.2	-0.3%
Rate of Fatalities (per 100M VMT)	FARS & HPMS	1.216	-1.7%
Number of Serious Injuries	SWITRS	15,156.2	-2.3%
Rate of Serious Injuries (per 100M VMT)	SWITRS & HPMS	4.904	-2.3%
Number of Non-Motorized Fatalities and Non-Motorized Severe Injuries	FARS & SWITRS	4,131.7	-0.3% (Fatalities) -2.3% (Serious Injuries)
Source: California Department of Transportation and the Office of Traffic Safety, 2022			

States must establish statewide targets for each of the safety performance measures. For three performance measures (number of fatalities, rate of fatalities and number of serious injuries), targets must be identical to the targets established for the National Highway Traffic Safety Administration (NHTSA) Highway Safety Grants program that is administered by OTS. The State Departments of Transportation must also coordinate with Metropolitan Planning Organizations (MPOs) in their states on establishment of targets, to the maximum extent practicable. States report targets to the FHWA in the HSIP report that are due in August of each year.

Infrastructure Measures

The Bridge and Pavement Performance Management Final Rule, which is codified in 23 Code of Federal Regulations Part 490, defines the following national performance measures for bridge and pavement:

PAVEMENT MEASURES

- Percentage of Interstate pavements in Good condition
- Percentage of Interstate pavements in Poor condition
- Percentage of non-Interstate NHS pavements in Good condition
- Percentage of non-Interstate NHS pavements in Poor condition

BRIDGE MEASURES

- Percentage of NHS bridges in Good condition
- Percentage of NHS bridges in Poor condition

Table 3.26: National Highway System Pavement and Bridge Performance Measures

	2-Year NHS Targets *(1/1/2022 to 12/31/2023)*		4-Year NHS Targets *(1/1/2022 to 12/31/2025)*	
NHS Pavement Condition	**Good**	**Poor**	**Good**	**Poor**
Interstate	47.2%	1.9%	49.2%	1.7%
Non-Interstate	21.7%	10.5%	28.2%	9.0%
NHS Bridge Condition	49.1%	5.9%	47.3%	4.4%
Source: Caltrans 2022 TAMP				

System and Freight Performance Monitoring

TRUCK TRAVEL TIME RELIABILITY INDEX

Average travel time for a corridor does not provide travel time reliability information for individual trips along that corridor. Truckers, who may lose a competitive edge if shipments are late or too early, need to consistently predict actual arrival time. Truck Travel Time Reliability (TTTR) Index is the FHWA recommended metric to assess freight movement on NHFN. This TTTR Index comes from the collection of travel time data on the heaviest traffic days and comparing those to average travel time. It is calculated for each segment and each peak period. Based on FHWA methodology, the TTTR index is generated by dividing the 95th percentile time by the normal time (50th percentile) for each segment. The TTTR Index is generated by multiplying each segment's largest ratio of the five periods by its length, then dividing the sum of all length-weighted segments by the total length of roadway. For example, if a trip usually takes 20 minutes, and the TTTR Index is 40 percent, an additional 8 minutes (20 minutes x 0.4 = 8 minutes, or 28 minutes total) should be allowed for that stretch to ensure on-time arrival over 95 percent of the time for that segment.

In February 2017, FHWA finalized the ruling for this performance measure and required state DOTs to report TTTR Index periodically. The average TTTR Index for the Interstate Highway network in California in 2018 was 1.69. In 2018, Caltrans established 2- and 4-year targets to improve TTRR Index to 1.68 by 2020 and to 1.67 by 2022. In the 2022 Full Performance Period Progress Report submitted to FHWA, Caltrans reported that the TTTR Index in 2022 was 1.60.[93]