3.B. 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 and FAST 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.[1] 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

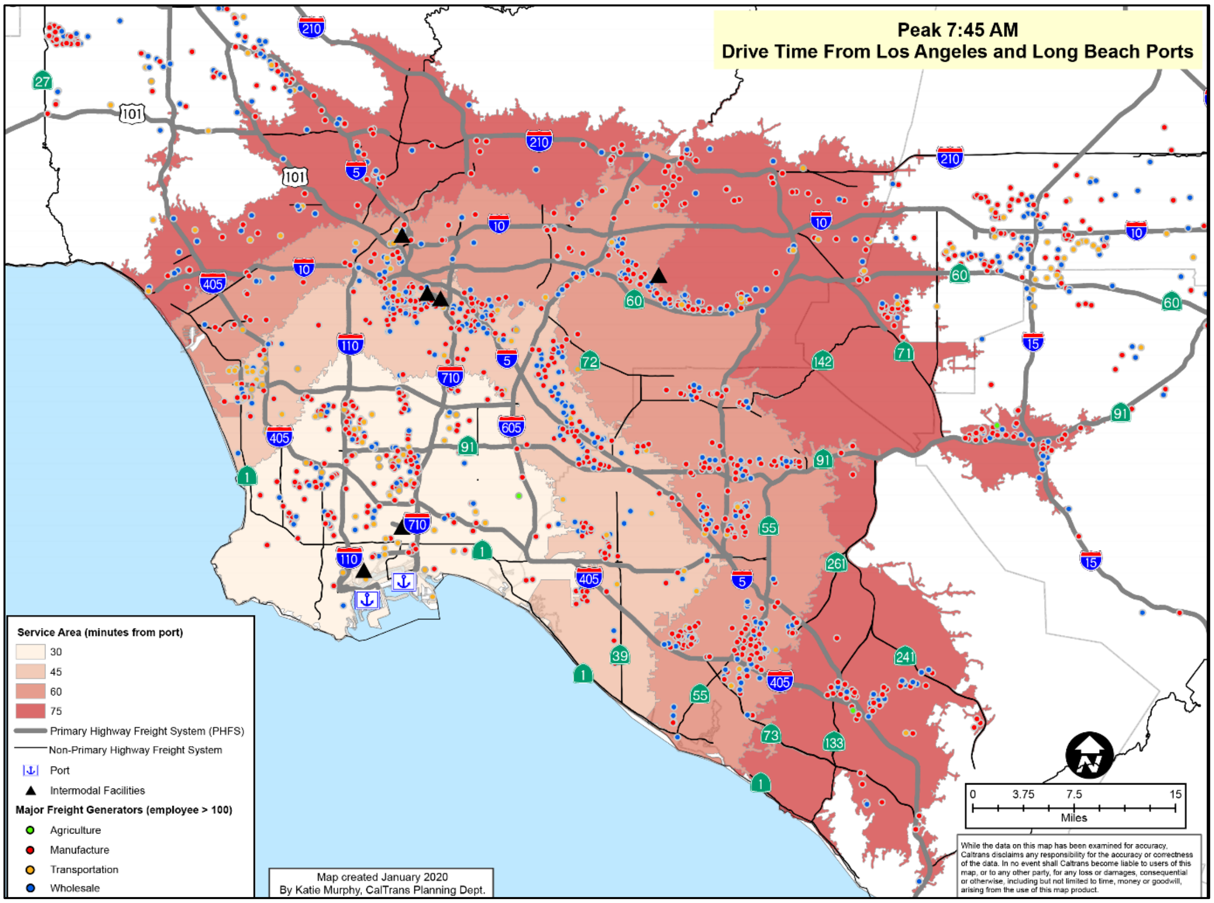
Congestion and Bottleneck Assessment

For many decades after the interstate highway system was completed, population and vehicle miles traveled continued to increase, while road and highway capacity increased only slightly. Today traffic congestion is chronic, affecting freight as well as passenger travel. The longer freight sits in traffic, the higher the prices of the delayed products and services. As previously mentioned, efficiency diminishes as the number of trips per day per truck is reduced, and same-day vehicle turnaround use is lost.

Excluding terrain and weather conditions, vehicle travel speed is a good indicator of congestion. The Federal Highway Administration (FHWA), in cooperation with private industry, measures the speed and travel time reliability of more than 500,000 trucks at 250 freight-significant highway infrastructure locations on an annual basis.[2] Average truck speeds generally drop below 55 miles per hour near major urban areas, and border crossings and gateways. Slower travel speeds increase truck turnaround times and reduce the number of truck trips per day, resulting in diminished efficiency and elevated costs. Additionally, when heavy-duty trucks operate at speeds below 40 mph, the rate for NOx and CO_2 emission increases significantly, creating added environmental costs and burdens.[3]

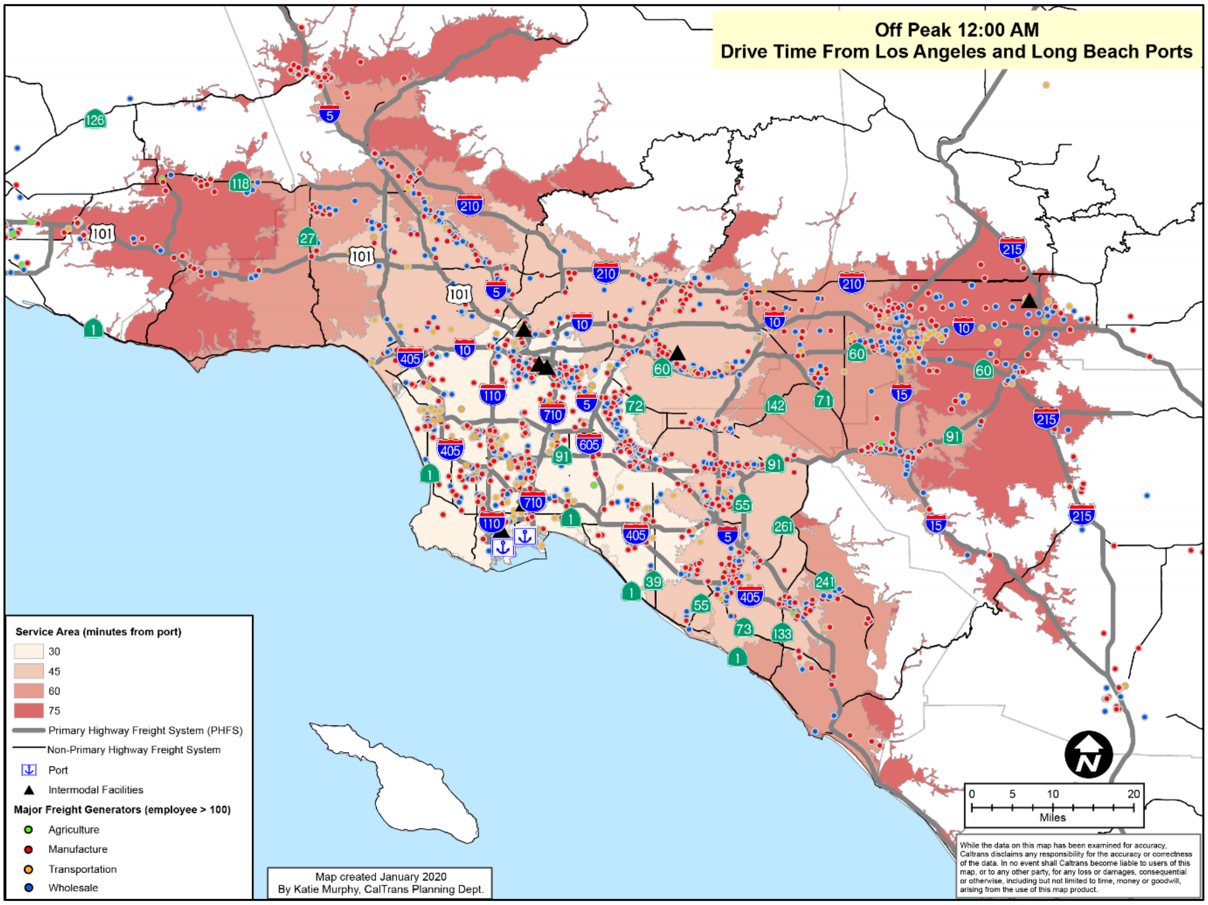
Figures 3B.1.1 and 3B.1.2 show the impact of congestion on accessibility from the Ports of Long Beach and Los Angeles to various freight hubs (such as intermodal rail terminals and major primary industries with over 100 employees) by comparing morning peak and off-peak hour travel time (in minutes) to destinations throughout the region.[4] Many destinations in the Los Angeles region take twice as long to reach during the peak hour compared to the off-peak hour, regardless of the direction of travel. **Figures 3B.2.1 and 3B.2.2** provide the same information from the Port of Oakland.

Figure 3B.1.1. Impact of Congestion on Accessibility from San Pedro Bay Ports to Major Destinations, 7:45 AM



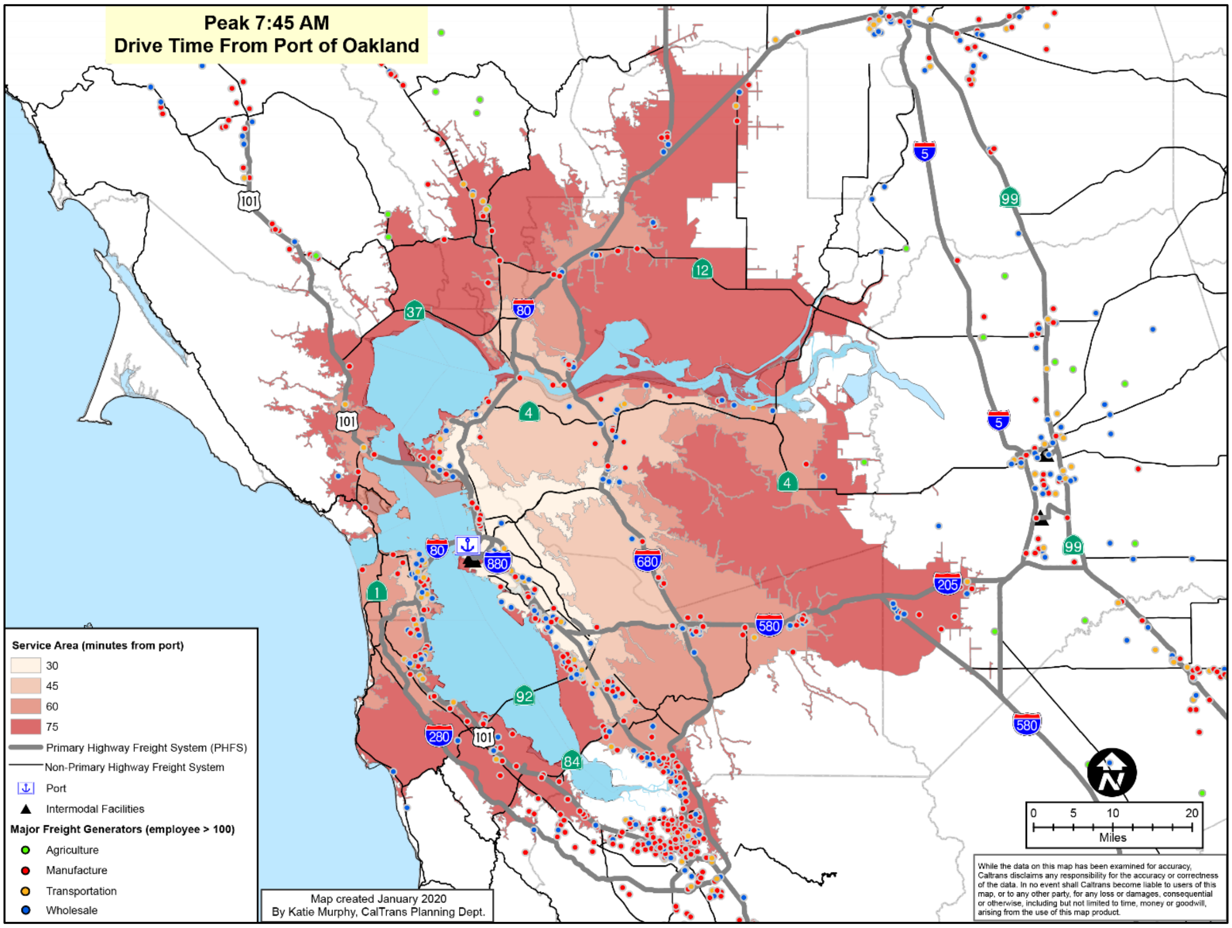
Source: Esri's 2018 historical traffic feeds based on HERE Data.[5] Analysis and graphics by Caltrans Planning Division

Figure 3B.1.2. Impact of Congestion on Accessibility from San Pedro Bay Ports to Major Destinations, 12:00AM



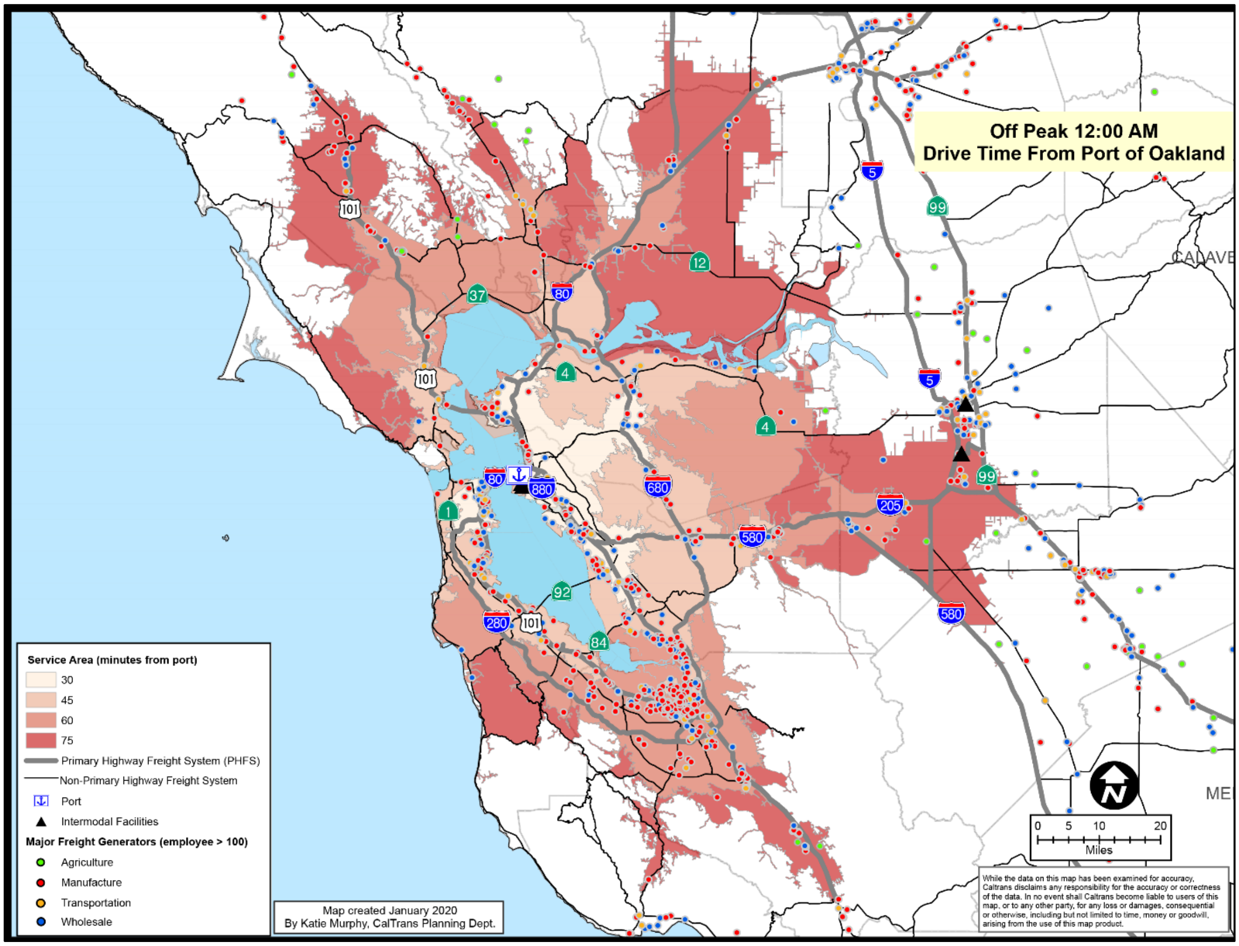
Source: Esri's 2018 historical traffic feeds based on HERE Data.[6] Analysis and graphics by Caltrans Planning Division

Figure 3B.2.1. Impact of Congestion on Accessibility from Port of Oakland to Major Destinations, 7:45AM



Source: Esri's 2018 historical traffic feeds based on HERE Data.[7] Analysis and graphics by Caltrans Planning Division

Figure 3B.2.2. Impact of Congestion on Accessibility from Port of Oakland to Major Destinations, 12:00AM



Source: Esri's 2018 historical traffic feeds based on HERE Data.[8] Analysis and graphics by Caltrans Planning Division

Detailed lists of the most congested highway facilities due to high truck volume in Southern California, the San Francisco Bay Area, and the rest of the state are presented in the METRANS report "Managing the Impacts of Freight in California 2018".[9]

Congestion can be caused by several factors, including the number and width of lanes; the location, spacing, and type of interchanges; shoulder widths; pavement conditions; gaps in the freeway system; vehicle volume; mixed-mode user conflicts; roadway geometry; merges or weaving at transition ramps; steep grades; traffic incidents; road work; special events; and weather. Bottlenecks and chokepoints are common causes of congestion.

American Trucking Research Institute (ATRI) provides annual estimates of total cost of congestion on the trucking industry. In 2016, traffic congestion cost the trucking industry nearly $74.5 billion including approximately $5.06 billion for California. California ranked third among all states for total cost of congestion on the trucking industry after Texas and Florida. This estimate is 6.4 percent higher than in the year 2015, ranking California second by states with largest increase in cost of congestion, after Texas. The Los Angeles/Long Beach/Anaheim metropolitan area accounted for 32 percent of this cost. Los Angeles ranked as the metropolitan area with the largest increase in cost of congestion relative to 2015 (about 12 percent).[10]

The 2018 ATRI Top 100 freight bottleneck locations included the following segments within California:[11]

- #1 Los Angeles: SR 60 at SR 57
- #13 Los Angeles: I-710 at I-105
- #27 San Bernardino: I-10 at I-15
- #38 Oakland: I-880 at I-238
- #45 Corona: I-15 at SR 91
- #64 Los Angeles: I-110 at I-105
- #65 Oakland: I-80 at I-580/I-880

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) consists of 56,075 lane miles of pavement and 10,825 bridges totaling 234,285,883 square feet of bridge deck area in California. The California SHS includes all assets within the boundaries of the highway system including 49,644 lane miles of pavement and 13,160 bridges as identified in Transportation Management System (TMS) assets.[12]

According to the Caltrans 2015 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 Capital Preventive Maintenance (CAPM) rehabilitation or reconstruction projects.[13] Caltrans conducts an annual Pavement Condition Survey (PCS) “on more than 50,000 lane miles of pavement (265 State highways) which have a combined travel of 178 million vehicle miles.”[14] **Table 3B.1** provides an inventory and detailed breakdown of the condition of pavements on the NHS and SHS in California by lane mile.[15]

Table 3B.1. Inventory and Conditions of NHS Pavements (State and Local) in CA, by Lane Mile

	Lanes Miles	Good	Fair	Poor
ALL NHS	36,649	44.0%	53.2%	2.7%
Interstate	14,159	44.9%	52.1%	3.1%
Non-interstate NHS	22,490	43.5%	54.0%	2.5%
Off the SHS (Local NHS)				
Pavements	18,427	4.6%	82.9%	12.5%
Total (State and Local NHS Pavements)				
ALL NHS	56,075	30.4%	63.5%	6.1%
Interstate	14,159	44.9%	52.1%	3.1%
Non-interstate NHS	41,917	25.5%	67.4%	7.1%
Source: California Transportation Asset Management Plan, 2018				

Distressed pavement is one of Caltrans' 2018 California Transportation Asset Management Plan (TAMP) performance measures and Caltrans has set a goal to bring 90 percent of the SHS's pavement to a good or fair condition by 2025.[16] According to the 2018 TAMP, almost 95 percent of highway lane miles on the California SHS are in fair or good condition, meaning Caltrans has already surpassed its goal. Proactive maintenance is now paramount to ensuring that pavement conditions do not deteriorate. The other nearly six percent of highway lane miles on the California SHS are in poor condition and will require more substantial maintenance and rehabilitation to improve pavement conditions.[17]

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. Twelve of the state's twenty-one metropolitan planning organizations and regional transportation planning agencies that own and maintain parts of the NHS have a greater percentage of miles on the NHS in poor condition than in good condition, suggesting that greater local investment is needed to improve pavement conditions for these facilities. Detailed information about pavement conditions are available at 2018 California Transportation Asset Management Plan.[18]

According to the Caltrans 2017 State Highway System Management Plan, California's SHS includes 13,160 bridges. These highway bridges have an average age of 45 years, which increases their maintenance requirements.[19] 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.

Table 3B.2 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, 3.3 percent of the bridges on NHS are in poor condition.[20]

Table 3B.2. Inventory and Conditions of Bridges Weighted by Deck Area

Bridges on the SHS (State)					
	Count	**Deck Area (sq. ft.)**	**Good**	**Fair**	**Poor**
Total	13,160	245,756,328	74.9%	21.8%	3.3%
Source: California Transportation Asset Management Plan, 2018					

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. According to the federal State Transportation Statistics document, in 2014, California had 6,807 structurally deficient/functionally obsolete bridges out of a total of 25,315 structures (27 percent), which constitutes an approximately 2 percent improvement from 2012.[21]

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 3B.3** provides examples of vertical clearances on State routes that are 14 feet or less.[22]

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 3B.3. 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.

In 2015, the California Highway Patrol (CHP) Statewide Integrated Traffic Records System (SWITRS) reported that out of the 4,764 drivers involved in fatal traffic collisions, 315 collisions involved trucks, and the truck driver was at fault in 74 incidents. This data indicates that automotive drivers involved in fatal collisions with trucks were far more likely to be at fault than the truck driver.[23]

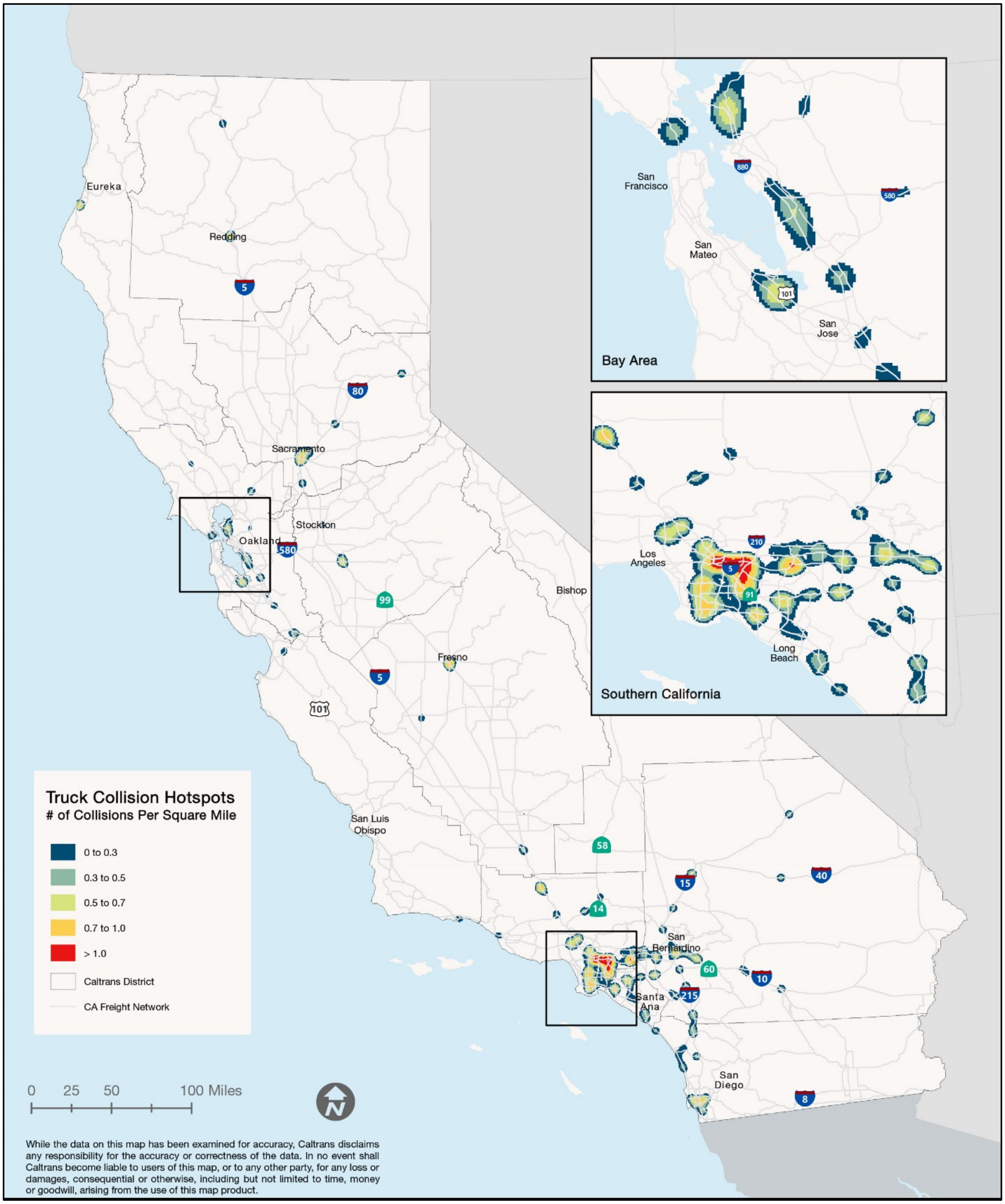
Of the total 329,509 injury collisions in 2015, 8,598 involved trucks. In 2,693 incidents, the truck driver was at fault. Drivers in passenger vehicles alone or pulling a trailer were at fault in 1,489 fatal and 114,433 injury collisions. Of the 2,693 collisions in which the truck driver was at fault, 1,153 occurred due to unsafe speed and 881 occurred due to unsafe lane changes or improper turning. The above statistics are represented in **Table 3B.4.**

Table 3B.4. Collision Statistics (Fatal and Injury)

Collision Statistics, Trucks and Passenger Cars Alone or Pulling a Trailer (2015)					
	Total Collisions	Involved	At Fault	Unsafe Speed	Unsafe Lane Changes
Trucks					
Fatal	4,764	315	74	-	-
Injury	329,509	8,598	2,693	1,153	881
Passenger Cars Alone or Pulling a Trailer					
Fatal	4,764	-	1,489	-	-
Injury	329,509	-	114,433	-	-
Source: California Highway Patrol (CHP) Statewide Integrated Traffic Records System (SWITRS) 2015					

Figure 3B.3 displays truck collision hot spots throughout California and clearly shows that the highest concentrations of truck collisions per square mile occur in the dense metropolitan centers of the Bay Area and Los Angeles.[24,25] From 2013 to 2017, the number of collisions involving commercial trucks increased by four percent (75 in 2013 and 78 in 2017), although the number of commercial truck collisions resulting in a fatality decreased by eight percent (36 in 2013 and 33 in 2017). The number of commercial truck collisions resulting in an injury increased by 24 percent (34 in 2013 and 42 in 2017).

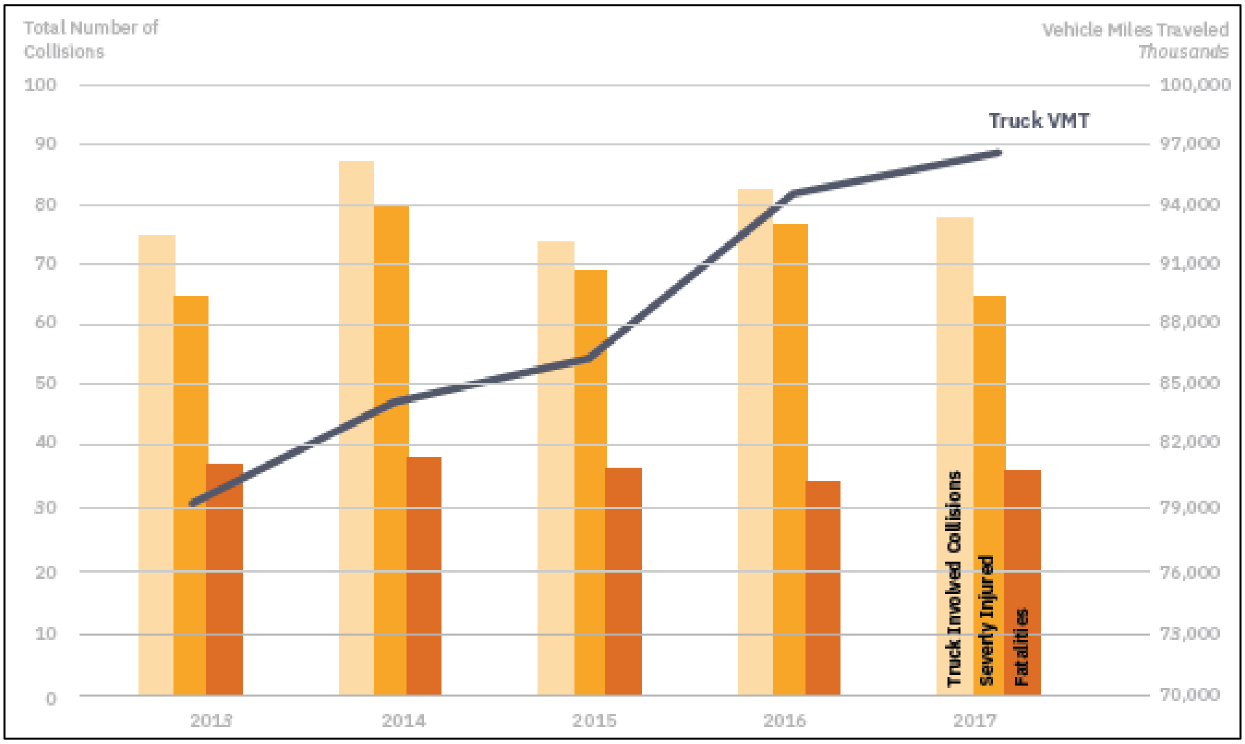
Figure 3B.3. Truck Collision Hot Spots



Source: Collision data from 2013-2017 SWITRS

During the same period, Truck VMT increased by 21 percent; therefore, the truck collision per million VMT decreased from 0.94 in 2013 to 0.81 in 2017 as shown in **Figure 3B.4.**[26]

Figure 3B.4. Truck Collision by Severity and VMT Growth, 2013-2017[27]



Source: Collision data from 2013-2017 SWITRS

Table 3B.5 shows the critical California highways with the highest combined truck-related fatalities and injuries from 2013 to 2017. The number of fatalities and injuries on these highways decreased by 17 percent during that period. As expected, most fatalities and injuries on multi-county corridors occurred in higher density areas:

- Along I-5, in Los Angeles and San Diego County (42)
- Along I-10 and I-15 in San Bernardino County (42)
- U.S. 101 in Santa Clara County (11)[28]

Table 3B.5. California Critical Highway Truck-Related Fatalities and Severe Injuries, 2013-2017

Route	Corridor Length (Approx. Mile)	Total Fatalities/Injuries 2013-2017	Fatality/Injury Per Mile
SR 60	76	35	0.46
I-405	72.4	17	0.23
SR 91	59.0	12	0.20
I-210/SR 210	85	17	0.20
I-10/SR 10	243	38	0.16
I-15/SR 15	295.4	41	0.14
I-80	205.1	22	0.11
I-5	796.8	77	0.10
SR 99	424.9	20	0.05
US 101	1,540	48	0.03
SR 1	655.8	18	0.03
Total	4453.42	345	0.08
Source: Truck VMT estimates from EMFAC 2017 annual statewide database			

Freight Rail Assessment

The Class I railroads, Union Pacific Railroad (UPRR) and BNSF Railway (BNSF), own and operate 77 percent of the track mileage in the nation.[29] UPRR and BNSF control system maintenance and infrastructure and process over 3.4 million carloads originating and over 3.5 million carloads terminating in California per year.[30] Short line freight rail owners and operators tend to have fewer resources, however, it is common that short line railroads operate at slower speeds and have lighter rail car weights. This results in well maintained track mileage, but tracks are not built to FRA class 3 or higher track standards.

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

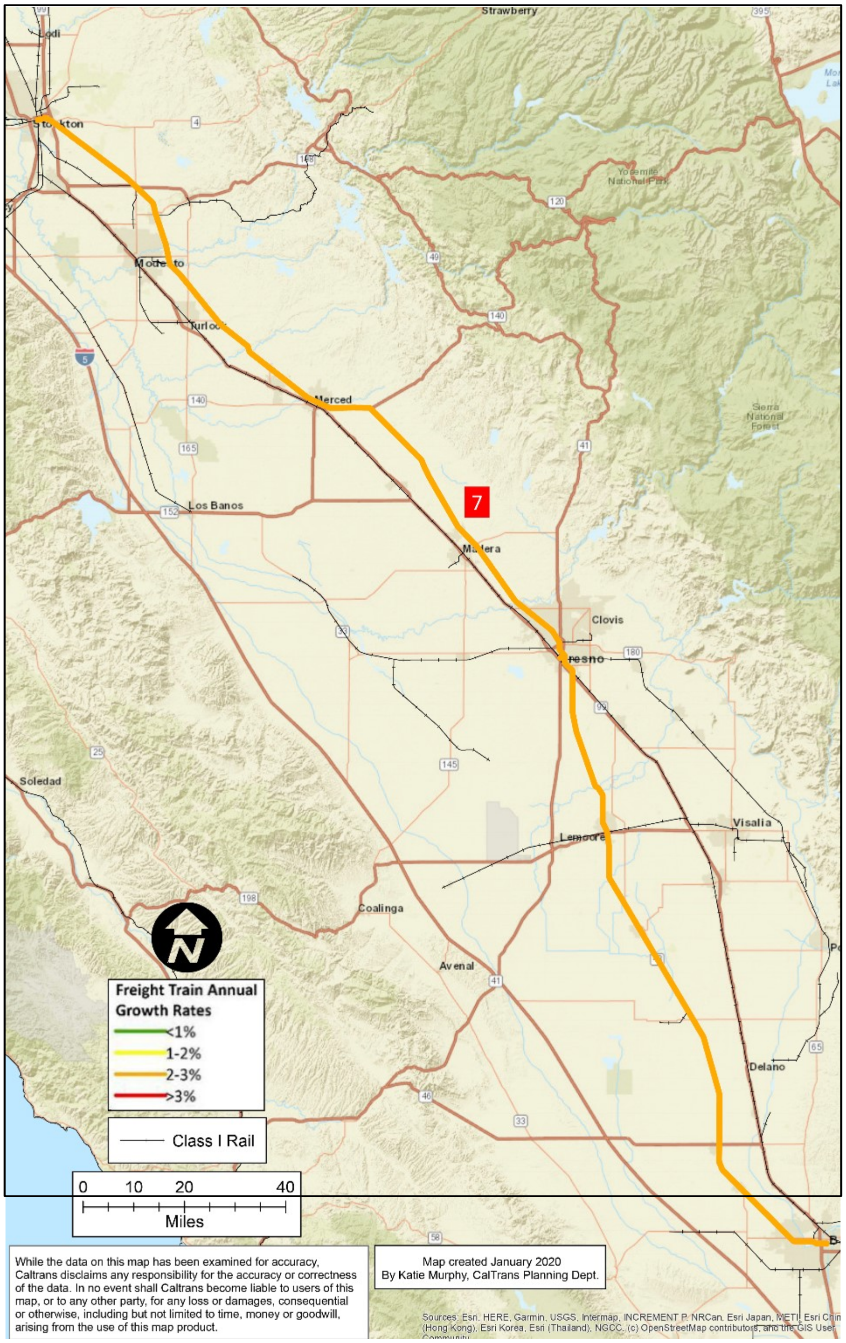
Figure 3B.5.1. Heavy Rail Freight Traffic Corridor Bottlenecks in Southern California – Segments 1-4

Source: Caltrans State Rail Plan, 2018

Figure 3B.5.2. Heavy Rail Freight Traffic Corridor Bottlenecks in Northern California – Segments 5 and 6

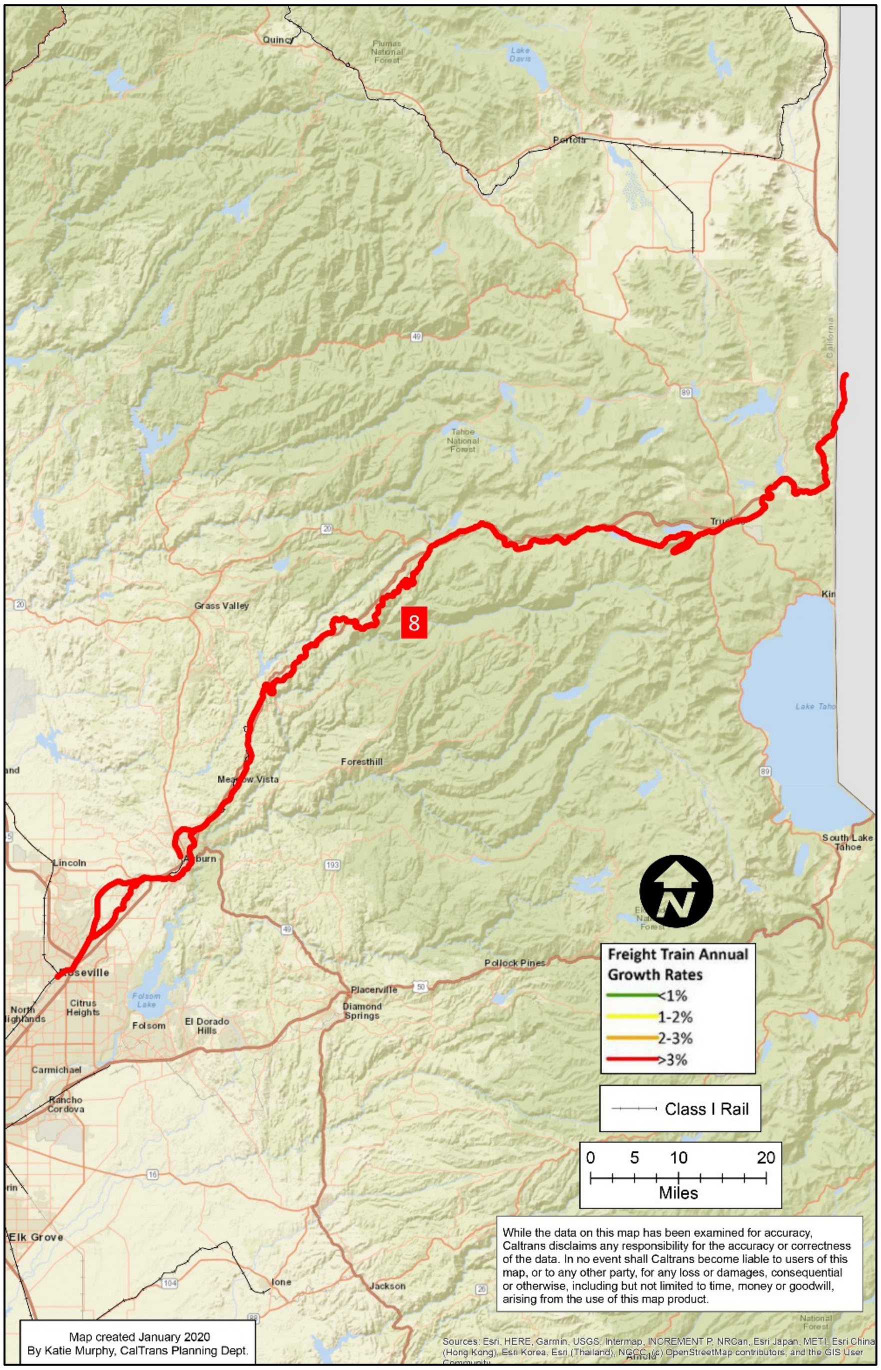
Source: Caltrans State Rail Plan, 2018

Figure 3B.5.3. Heavy Rail Freight Traffic Corridor Bottlenecks in Northern California – Segment 7



Source: Caltrans State Rail Plan, 2018

Figure 3B.5.4. Heavy Rail Freight Traffic Corridor Bottlenecks in Northern 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 3B.6** is a list of track miles by each category for California Class I railroads:

Table 3B.6. California Class I 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 3B.7)** that are restricted to speeds of 40 miles per hour or lower.

Table 3B.7. Class 1 Railroad Segments Restricted to Speeds of 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."[31] 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.[32] 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 8,882 grade crossings in 2019[33] and 37 fatalities and 66 non-fatal injury collisions occurred at highway-rail grade crossings.[34] **Table 3B.8** summarizes highway-rail grade crossing collisions, fatalities, and injuries from 2014 to 2018.[35] 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 3B.8. Highway-Rail Grade Crossing Collisions, 2014-2018

Type & Highway User		2014	2015	2016	2017	2018
Train Struck Highway User	Car	38	46	51	68	65
	Trucks	28	37	38	24	46
	Pedestrian	36	35	50	45	52
	Other	6	7	11	6	5
	Subtotal	108	125	150	143	169
Highway user Struck Train	Car	15	14	13	12	15
	Trucks	4	8	3	6	2
	Pedestrian	-	1	1	2	2
	Other	-	2	1	3	1
	Subtotal	19	25	18	23	21
Total		127	150	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 3B.9** 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.[36]

Table 3B.9. Minimum Seaport Channel Depth

Channel	USACE	AAPA
San Diego Harbor	39'	37'-47'
Long Beach Harbor	68'	76'
Los Angeles Harbor	57'	53'
Port 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 3B.10 shows minimum vertical bridge height information for major California seaport bridges.[37] Access to the inland ports of Stockton and West Sacramento may require navigation under smaller fixed bridges and draw bridges.

Table 3B.10. 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’
Gerald Desmond	
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 – San Rafael	
West Channel	185’
Carquinez	
North Span	146’
South Span	132’
Martinez UP Rail Bridge	135’
Rio Vista Bridge	146’
Source: NOAA Raster Chart Products	

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. The California Air Cargo Groundside Needs Study[38] concluded that California airports have sufficient capacity to meet 2040 demand.

System Performance Monitoring

The National Highway Performance Program, which was established under MAP-21 and continued under the FAST Act, 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 2019 calendar year by August 31, 2018. Caltrans and OTS have adopted aspirational goals consistent with the California Strategic Highway Safety Plan (SHSP) as follows:

Table 3B.11. Safety Measures (based on a 5-year rolling average)

	Data Source	Target 2019	Reduction 2019
Number of Fatalities	FARS	3,445.4	3%
Rate of Fatalities (per 100M VMT)	FARS & HPMS	0.995	3%
Number of Serious Injuries	SWITRS	12,688.1	1.5%
Rate of Serious Injuries (per 100M VMT)	SWITRS & HPMS	3.661	1.5%
Number of Non-Motorized Fatalities and Non-Motorized Severe Injuries	FARS & SWITRS	3,949.8	3% (Fatalities) 1.5% (Serious Injuries)
Source: California Department of Transportation and the Office of Traffic Safety, 2018			

States must establish statewide targets for each of the safety performance measures. Targets will be established annually, beginning in August 2017 for calendar year 2018 (and so forth). 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 3B.12. National Highway System Pavement and Bridge Performance Measures

	2-Year NHS Targets *(1/1/2018 to 12/31/2019)*		**4-Year NHS Targets** *(1/1/2018 to 12/31/2019)*	
NHS Pavement Condition	**Poor**	**Good**	**Poor**	**Good**
Interstate	45.1%	3.5%	44.5%	3.8%
Non-Interstate	28.2%	7.3%	29.9%	7.2%
NHS Bridge Condition	69.1%	4.6%	70.5%	4.4%
Source: Caltrans Letter to Regional Transportation Planning Agencies, May 21, 2018				

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, California Biennial Performance Report State Caltrans established 2- and 4-year targets to improve TTRR Index to 1.68 by 2020 and to 1.67 by 2022.

Table 3B.13. System and Freight Performance Measures

	2017 Baseline Data	2-Year Target	4-Year Target
% of Reliable Person-Miles Traveled on the Interstate	64.6%	65.1% (+0.5%)	65.6% (+1%)
% of Interstate System Mileage Providing Reliable Truck Travel Time *(Truck Travel Time Reliability Index)*	1.69	1.68 (-0.01)	1.67 (-0.02)
Source: NPMRDS Analytics Tool			

Endnotes

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