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TRUCK RESTRICTION STUDY

CALTRANS – DISTRICT 11

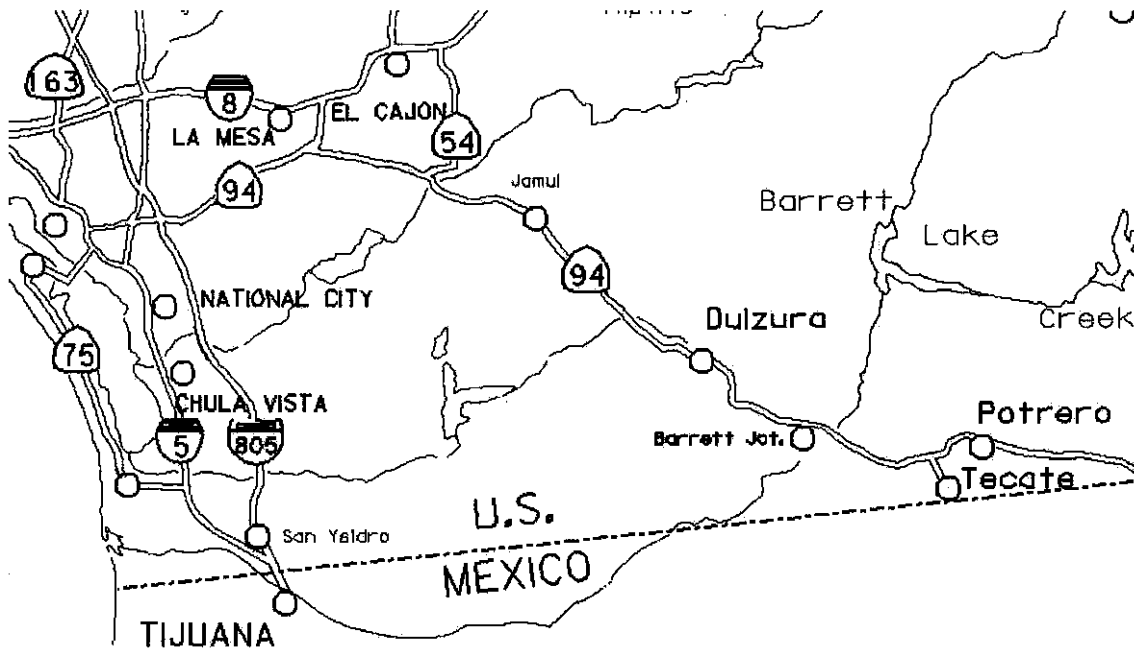
SAN DIEGO COUNTY

STATE ROUTE 94

OTAY LAKES ROAD TO STATE ROUTE 188

KP 39.7 TO KP 62.6

(PM 24.7 TO PM 38.9)



January 1999

PURPOSE AND NEED

This study provides information for assessing the appropriateness of truck restrictions on a portion of State Route 94 (SR-94) from Otay Lakes Road KP 39.7 (PM 24.7) to State Route 188 (SR-188) KP 62.6 (PM 38.9). It evaluates the safety issues related to trucks crossing the centerline (barrier stripe) into the opposing lane while negotiating curves. This problem has two parts: the length of trucks currently using the highway, and the existing nonstandard¹ roadway geometrics (lane/shoulder widths and horizontal curve length/radius) on SR-94.

This document is Phase I of a two-phase study. The segment of SR-94 from SR-188 KP 62.6 (PM 38.9) to Interstate 8 (I-8) KP 105.7 (PM 65.3) will be evaluated in the near future. SR-188 is a 3.1 km (1.8 mi) segment of highway that connects SR-94 with the international port of entry at Tecate, Mexico will also be evaluated in a future study.

This study is the first step in consideration of truck restrictions in accordance with section 35401(f) of the California Vehicle Code (Appendix A).

BACKGROUND

SR-94 is classified as a principal arterial between downtown San Diego and SR-188, and as a minor arterial from SR-188 to I-8. It was included as part of the National Highway System in November of 1995. Before passage of the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA), the study section of SR-94 was classified as a rural minor arterial and was part of the Federal Aid Primary System. SR-94 was adopted into the State Highway System in 1933, and is being considered for designation as a State Scenic Highway (Exhibit 1).

In accordance with the *Truck Kingpin to Rear Axle Length State Highway System Evaluation Report* dated December 1989, the section of SR-94 from Otay Lakes Road KP 39.7 (PM 24.7) to Tierra Del Sol Road KP 101.7 (PM 63.2) has been identified as geometrically inadequate for use by truck tractor-semitrailer combinations exceeding a 9.14 m (30 ft) kingpin to rear axle (KP-RA) length (Exhibit 3). This section of SR-94 traverses mountainous terrain, and is shown on the *Truck Networks on California State Highways* map as a route not advised for tractor-semis with kingpin to rear axle length over posted value (KP-RA Advisory). The posted value along this section is a maximum KP-RA length of 9.14 m (30 ft).

Interstate commerce must also be addressed when truck restrictions are considered. The United State Supreme Court has ruled that truck length can not be restricted unless atypical accident rates have established a substantial impact on safety.

Caltrans conducted a field evaluation in February 1998. The vehicle used was a truck tractor-semitrailer with a 14.63 m (48 ft) trailer and the KP-RA length set to 12.19 m (40 ft). The truck was driven along SR-94 in both directions from Otay Lakes Road KP 39.8 (PM 24.7) to Tierra Del Sol Road KP 101.7 (PM 63.2) and along SR-188 from the junction at SR-94 to the international boundary at Tecate. The truck was video taped to document where the

¹ Does not meet the minimum standards in the Highway Design Manual, Section 307.3 and Design Information Bulletin Number 79

tires crossed the centerline stripe and/or went off the edge of pavement. This occurred at areas with nonstandard horizontal curves (radius between 76-92 m (250-300 ft)) and narrow shoulders. The locations of these areas within the study limits are shown on Exhibit 2 and listed in the following table:

AREAS ON SR-94 WITH KP-RA LIMITING ROADWAY GEOMETRICS (Between Otay Lakes Road to SR-188)		
LOCATION	KILOMETER POST	(POST MILE)
A	KP 41.0 – KP 41.2	(PM 25.5 – PM 25.6)
B	KP 43.0 – KP 43.1	(PM 26.7 – PM 26.8)
C	KP 43.6 – KP 43.9	(PM 27.1 – PM 27.3)
D	KP 43.9 – KP 44.1	(PM 27.3 – PM 27.4)
E	KP 44.3 – KP 44.4	(PM 27.5 – PM 27.6)
F	KP 45.7 – KP 45.9	(PM 28.4 – PM 28.5)
G	KP 46.7 – KP 46.8	(PM 29.0 – PM 29.1)
H	KP 59.7 – KP 60.7	(PM 37.1 – PM 37.7)

EXISTING FACILITY

State Route 94 connects the City of San Diego with smaller east county rural communities and Interstate 8 near the community of Boulevard. It is also the only east/west route on the United States side of the U.S./Mexico international border connecting Tecate, Mexico with San Diego. In addition to local traffic, it serves both interregional and international travel in the area.

Within the study area, Route 94 is a two-lane conventional rural highway consisting of two asphalt concrete lanes varying from 2.74 m (9 ft) to 3.66 m (12 ft) with paved shoulders varying from 0 to 2.44 m (8 ft).

TRAFFIC

Traffic Volumes and Operating Conditions

ROUTE 94 SEGMENT	YEAR	ADT	LEVEL OF SERVICE
Otay lakes Road to Route 188	1997	7,400	E
KP 39.7 – 62.6 (PM 24.7 – 38.9)	2020	12,000	F

The 1997 truck traffic was approximately 8% of the Average Daily Traffic (ADT).

Accident History

The accident history data from the Traffic Accident Surveillance & Analysis System (TASAS) Report for the period of January 1, 1995 through July 31, 1998² indicate the following accident rates:

ROUTE 94 SEGMENT	TOTAL ACCIDENTS (ACC)	ACTUAL (ACC/MVM)			AVERAGE ³ (ACC/MVM)		
		F	F+I	Total	F	F+I	Total
Otay lakes Road to Route 188 KP 39.7 – 62.6 (PM 24.7 – 38.9)	159	.022	0.50	1.17	.039	0.92	1.70

ACC = Accidents

MVM = Million Vehicle Mile

F = Fatal Rate (# Fatal Accidents)/MVM

I = Injury Rate (# Injury Accidents)/MVM

PDO = Property Damage Only Rate (# PDO Accidents)/MVM

Total = Total Rate (# Fatal + # Injury + # PDO Accidents)/MVM

The TASAS report listed 15 accidents involving trucks for the time period and post mile limits shown above. Trucks comprise 8% of the average daily traffic, therefore; approximately 13 truck related accidents would be anticipated. While truck accidents are not significantly high within the study area, SR-94 is in need of operational improvements due to slow moving vehicles (trucks, vans, and recreational vehicles) causing traffic congestion and delay.

California Highway Patrol (CHP)

The CHP has responsibility for the traffic law enforcement activities on Route 94. Since 1991 the CHP has enhanced truck inspection activities and in response to community concerns, they have recently stepped up their surveillance and enforcement along the route resulting in an increase in citations for vehicles crossing the centerline.

U.S. Border Patrol

A temporary Border Patrol inspection facility opened in 1993. It is located just east of Otay Lakes Road on Route 94 at KP 40.6 (PM 25.2). Recently the Border Patrol has increased⁴ their enforcement activities and assumed the County Sheriff's responsibility to address complaints about trespassing within the study area.

VEHICLE CODE

² 1998 accident reports processed after the date of the TASAS request (8-6-98) are not included in this total.

³ Statewide average for similar facilities.

⁴ As of September 1997, the Border Patrol's San Diego County Section has increased their staff from 992 to 2240.

The California Vehicle Code (CVC) Section 35000, Division 15 governs vehicle width, length, height, weight, and load limits. These sections define, where federal law has not preempted, the California legal truck that must be allowed to operate on every state highway and local street or road. The general rule and the more important exemptions and conditions of the codes relating to truck length are summarized below. The CVC should be consulted for further details, and other exceptions and conditions not listed here. The current CVC uses English units; therefore no Metric equivalent units are shown in the following summary and excerpts.

General Rule

CVC Section 35400 provides, as a general rule, that no vehicle shall exceed a KP-RA length of 40 feet. However numerous exceptions to this rule are listed in the section.

CVC Section 35401(a) provides that no combination of vehicles shall exceed a total length of 65 feet.

CVC Section 35401(b) states that for a truck tractor, semitrailer, and trailer combination, the total length shall not exceed 75 feet if the length of neither the semitrailers nor the trailer in the combination of vehicles exceed 28 feet 6 inches.

Exceptions and Conditions

CVC Section 35400(b)(4) states that the 40 foot limitation does not apply to a semitrailer when being towed by a motor truck or truck tractor if the distance from the center of the kingpin to the center of the rearmost axle, for semitrailers having two or more axles, does not exceed 40 feet. For semitrailers having one axle, this distance is 38 feet.

CVC Section 35401(f) permits Caltrans to restrict the kingpin to rear axle length of semitrailers to not less than 38 feet. The basis for this is safety. The general rule is 40 feet. This section is also the basis for the maximum kingpin to rear axle KP-RA advisory signing on designated state highways.

“Whenever, in the judgement of the Department of Transportation, any state highway cannot, in consideration of public safety, sustain the operation of trailers or semitrailers of the maximum kingpin to rearmost axle distances permitted under Section 35400, the director, in consultation with the Department of the California Highway Patrol, shall compile data on total traffic volume, frequency of use by vehicles covered by this subdivision, accidents involving these vehicles, and other relevant data to assess whether these vehicles are a threat to public safety and should be excluded from the highway or highway segment. The study, containing the conclusions and recommendations of the director, shall be submitted to the Secretary of the Business, Transportation and Housing Agency. Unless otherwise notified by the Secretary, the Director shall hold public hearings in accordance with the procedures set forth in Article 3 (commencing with Section 35650) of Chapter 5 for the purpose of determining the maximum kingpin to rear axle length, which shall be

not less than 38 feet, that the highway or highway segment can sustain without unreasonable threat to the safety of the public. Upon the basis of the findings, the Director of Transportation shall declare in writing the maximum kingpin to rear axle lengths which can be maintained with safety upon the highway. Following the declaration of maximum lengths as provided by this subdivision, the Department of Transportation shall erect suitable signs at each end of the affected portion of the highway and at any other points that the Department of Transportation determines to be necessary to give adequate notice of the length limits.”

CVC Section 35401.5 incorporates the National Network requirements into California law. There is no overall length limit on the National Network and terminal access routes in accordance with the following CVC sections:

CVC Section 35401.5(a)(1) states that the length of the semitrailer in exclusive combination with a truck tractor does not exceed 48 feet. A semitrailer not more than 53 feet in length shall satisfy this requirement when configured with two or more rear axles, the rearmost of which is located 40 feet or less from the kingpin or when configured with a single axle which is located 38 feet or less from the kingpin.

CVC Section 35401.5(a)(2) states that when a truck tractor, semitrailer and trailer are used in combination, neither the length of the semitrailer nor the length of the trailer shall exceed 28 feet 6 inches.

EVALUATION CRITERIA

The basic criteria for mainline evaluation is that trucks must be able to stay on the paved width available (lane width plus paved shoulder in their direction of traffic). Offtracking computer software in conjunction with highway as-built plans, aerial photos logs, survey data, field reviews and engineering judgement are used in evaluating the highway geometrics for truck access and use.

Offtracking

The definition of offtracking as described in the *Highway Design Manual*.

“Any vehicle whether car, bus, truck, or combination tractor semi-trailer traveling around a circular curve will sweep a wider path than the width of the vehicle. The steering axle, controlled by the driver, can generally follow a circular curve, but the following axles (or trailers) will swing inward toward the center of the curve sweeping a wide path defined by the wheel tracks of the outside front wheel and the inside rear wheel. The difference between the swept width and the vehicle width is referred to as offtracking.”

Computer Model – AutoTURN®

AutoTURN[®] is a computer aided design (CAD) based program that simulates low speed turning maneuvers for highway vehicles and aircraft. This program calculates the location and orientation of the vehicle as it is steered along a pre-defined path and can be used to determine vehicle tire tracking and swept paths. The path is that of the center of the vehicle steering axle, and is drawn in the CAD environment. AutoTURN[®] comes with complete sets of standard vehicles including the Caltrans Standard Vehicles, as defined in the *Highway Design Manual Figure 404.2* (The California Design Vehicle is shown on Exhibit 4). This program was used to evaluate the extent of offtracking for trucks with specific KP-RA lengths of 12.19 m (40 ft), 11.58 m (38 ft) and 9.14 m (30 ft) along SR-94 within the study limits. These computer simulation runs were able to show how much roadway width was needed for the different size trucks to negotiate the highway at the identified curve locations without crossing the centerline, and was used in determining the roadway widening and realignment for Alternative 3.

ALTERNATIVES

Alternative 1 – No Action

This alternative would maintain the existing 9.14 m (30 ft KP-RA) advisory signs on SR-94. This alternative does not address the problem with the existing nonstandard roadway geometrics, and would only be effective if the trucks using the route were restricted to the maximum advised length. With this alternative, as the traffic volume increases, so could the potential for truck and automobile accidents if the same types of trucks (longer than the advised maximum) continue using this route.

Alternative 2 – Restrict Trucks to Maximum (KP-RA) length of 11.58 m (38 ft)

This alternative proposes to restrict trucks on Route 94 with KP-RA length greater than 11.58 m (38 ft). The CVC permits Caltrans to restrict the (KP-RA) length of truck tractor-semitrailers to not less than 11.58 m (38 ft).

This alternative also does not address the problem with the existing roadway geometrics and only partially addresses the truck length problem because SR-94 has segments where trucks with 11.58m (38 ft) KP-RA length would not be able to negotiate the roadway without offtracking. Since this alternative does not change the existing roadway geometrics, the route would continue to be posted with the 9.14 m (30 ft) KP-RA advisory signs.

In addition, this alternative does not necessarily reduce the number of trucks currently using the route. The configuration of the typical truck tractor-semitrailer allows the KP-RA setting to be adjusted from the 12.19 m (40 ft) to the 11.58 m (38 ft). By eliminating the longer trucks without this capability, this alternative may put more shorter length trucks on the route to carry the same load and the potential for truck and automobile accidents could increase as traffic volumes increase. This alternative may also prompt the trucking industry to use different type trucks, such as the truck-tractor semitrailer-trailer combination, whose offtracking characteristics would likely be less than that of the truck-tractor semitrailer combination.

Alternative 3 - Widening and Realignment

This alternative proposes to revise the existing roadway to standard geometrics as outlined in Section 307 of the *Highway Design Manual* and the *Design Information Bulletin Number 79 – Geometric Design Criteria for Resurfacing Restoration and Rehabilitation Projects (RRR)*. This alternative addresses both issues of nonstandard geometrics and truck length by upgrading the roadway to accommodate trucks with KP-RA length of 12.19 m (40 ft) for the segment of Route 94 from Otay Lakes Road KP 39.7 (PM 24.7) to State Route 188 KP 62.6 (PM 38.9).

RRR design criteria apply to bridge and pavement projects on two-lane conventional highways for certain operational improvements and safety funded nonfreeway projects. These criteria apply to geometric design features such as lane and shoulder widths, horizontal and vertical alignment, cross slope, superelevation, side slope and clear recovery zone. The RRR criteria were used in the preliminary design to upgrade the areas where trucks were offtracking. To reduce environmental impacts, the preliminary design for these locations minimized the proposed cut areas. The studies indicate a small difference in the amount of grading required to accommodate the trucks with 12.19 m (40 ft) KP-RA lengths versus the grading needed for the trucks with 11.58 m (38 ft) KP-RA lengths. The proposed typical cross sections are shown on Exhibits 5, 6 and 7 and summarized in the table below:

LOCATION	EXISTING CURVE RADIUS ± m / (ft)	EXISTING CURVE LENGTH ± m / (ft)	PAVEMENT WIDENING REQUIRED ± m / (ft)	MAXIMUM CUT PROPOSED ± m / (ft)	MAXIMUM FILL PROPOSED ± m / (ft)
A	181.7 m (596 ft)	67.4 m (221 ft)	1.6 m (5.2 ft)	none	none
B	108. m (356 ft)	75.0 m (246 ft)	2.2 m (7.2 ft)	none	none
C	62.8 - 91.4 m (206 - 300 ft)	47.9- 94.8 m (157 - 311 ft)	1.7 m (5.6 ft)	none	1.2 m (4 ft)
D	36.6 - 40.8 m (120 - 134 ft)	36.0 - 41.6 m (118 - 137 ft)	1.2 m (3.9 ft)	none	1.2 m (4 ft)

LOCATION	EXISTING CURVE RADIUS ± m / (ft)	EXISTING CURVE LENGTH ± m / (ft)	PAVEMENT WIDENING REQUIRED ± m / (ft)	MAXIMUM CUT PROPOSED ± m / (ft)	MAXIMUM FILL PROPOSED ± m / (ft)
E	54.9 m (180 ft)	72.2 m (237 ft)	2.2 m (7.2 ft)	none	1.4 m (4.5 ft)
F	109.7 m (360 ft)	113.9 m (374 ft)	2.1 m (6.9 ft)	none	none
G	76.2 m (250 ft)	52.1 m (171 ft)	2.8 m (9.2 ft)	9.1 m (30 ft)	none
H	60.9 – 83.8 m (200 – 275 ft)	51.4 – 96.5 m (169 – 317 ft)	4.8 m (15.6 ft)	10.7 m (35 ft)	6 m (16.4 ft)

Location A – KP 41.0 – KP 41.2 (PM 25.5 – PM 25.6)

This is the only location that is within the limits of the proposed passing lane project (EA 165740) for SR-94. The proposed design shown in Exhibit 5 is for a short segment of the roadway; revising the horizontal curve alignment and widening to minimum lane and shoulder width standards without requiring additional right of way. This design has minimal environmental impacts as compared to the design in the proposed passing lane project for this curve. The proposed passing lane project utilizes full geometric standards for lane and shoulder widths which require additional right of way.

Location B – KP 43.0 – KP 43.1 (PM 26.7 – PM 26.8)

The curve at this location requires realignment and roadway widening but does not require additional right of way. At this location there are existing oak trees adjacent to the roadway. Environmental impacts will be mitigated.

Location C – KP 43.6 – KP 43.9 (PM 27.1 – PM 27.3)

Location D – KP 43.9 - KP 44.1 (PM 27.3 – PM 27.4)

Location E – KP 44.3 - KP 44.4 (PM 27.5 – PM 27.6)

These locations have a series of horizontal curves connected with very short or no tangent sections in steep mountainous terrain. The curves require realignment and roadway widening. To minimize any cut areas, the proposed widening for these locations utilizes retaining walls for fill areas. Several types of walls have been proposed, including soldier pile walls and crib walls. The type of wall selected will depend on several factors such as: soil/rock characteristics and required wall height. Environmental impacts will be mitigated.

Location F – KP 45.7 - KP 45.9 (PM 28.4 – PM 28.5)

The curve at this location requires widening which can be done within the existing right of way. There should be no major grading impacts since there are flat unpaved areas adjacent to both sides of the roadway that can accommodate the widening at this location.

Location G – KP 46.7 - KP 46.8 (PM 29.0 – PM 29.1)

The curve at this location is the most severe of the areas being studied. The roadbed at the narrowest is 19 ft wide. The proposed widening will require additional right of way and result in a cut area approximately 91 m (300 ft) in length with a maximum cut height of approximately 9.1 m (30 ft). At this location the lanes are less than 3.65 m (12 ft) with shoulders less than 0.30 m (1 ft). There is a stream along the south side of the roadway, and a hillside to the north, (Exhibit 7). Several trees line the embankment along the streambed. The hillside on the other side of roadway is sparsely vegetated, with exposed rock outcroppings. These factors influenced the proposed widening to cut into the existing hillside to reduce the impact to the streambed and the surrounding vegetation, which may include environmentally sensitive areas (ESA).

From preliminary geotechnical investigation, grading for this location will require blasting to remove the rock for the roadway widening. Construction methods to avoid debris from entering any ESA adjacent to the stream should be implemented for this location.

Location H – KP 59.7 - KP 60.7 (PM 37.1 – PM 37.7)

This location has a series of nine horizontal curves connected with very short or no tangent sections in steep mountainous terrain. It encompasses a segment of the highway that is approximately 966 m (3200 ft) long. The curves require realignment and roadway widening.

The preliminary geotechnical investigation for this segment of SR-94 recommended a 1.5H :1V maximum cut slope. To minimize any cut areas, the proposed widening for these locations utilizes retaining walls for fill areas. Several types of walls have been proposed, including soldier pile walls and crib walls. The type selected will depend on several factors which include, but are not restricted to: soil/rock characteristics, wall height required and any environmental impacts that will need to be mitigated. The proposed preliminary design has areas with cut slope heights varying from 4.2 m to 10.7 m (14 ft – 35 ft) for a distance of 20 m - 45 m (66 ft – 148 ft) along the roadway for each area. This would total approximately 140 m (460 ft) of cut length. The wall heights for the fill areas in the proposed preliminary design range from 0.91 m to 6.1 m (3 ft – 20 ft) along the north side of the roadway varying in length from 100 m – 300 m (328 ft – 985 ft) for each section of fill.

The amount of cut can be reduced through further refined design. However, if this is done the fill areas would increase and probably be continuous throughout the length of this series of curves. In depth geotechnical studies are required for more detailed engineering. The type of rock and soil will dictate the best engineering strategy to use for this location.

SUMMARY

This report concludes that State Route 94 from Otay Lakes Road KP 39.7 (PM 24.7) to State Route 188 KP 62.6 (PM 38.9) has nonstandard sections of roadway that inhibit the ability of truck tractor-semitrailers with KP-RA length over 9.1 m (30 ft) to negotiate the highway without crossing the centerline or going off the existing edge of pavement.

To address this issue, three alternatives have been discussed: 1) No action proposed and keep the existing 9.1 m (30 ft) advisory signs in place, 2) Restrict the length of trucks using the highway to 11.6 m (38 ft), the legal restriction limit per the CVC, and 3) Revise the roadway geometrics by realigning the nonstandard curves and widening the traveled way so the highway can accommodate the length of truck that is legally allowed.

Further studies are required to address the environmental issues and processes related to alternative 3. These studies should be consistent with the other safety and operational improvement projects currently being developed for the Route 94 corridor.

RECOMMENDATIONS

It is recommended that future activities related to the segment of SR-94 evaluated in this study be categorized as immediate, intermediate and future goals.

The recommended immediate goal is to implement Alternative 1 (keep the existing 9.1 m (30 ft) advisory signs in place) with a high level of surveillance by the CHP, and delete Alternative 2. The 11.6 m (38 ft) regulatory sign would likely add confusion for the motorist when used in conjunction with the 9.1 m (30 ft) advisory sign. Additionally, the 11.6 m (38 ft) restriction would decrease the load capacity of trucks and thereby cause an increase in the number of trucks using this segment of the highway.

The recommended intermediate goal is to implement portions of Alternative 3; pursue an operational improvement project to address the areas within Locations A through G that can be accomplished within the confines of the Categorical Exemption/Categorical Exclusion environmental process.

The recommended future goal is to diligently pursue the appropriate environmental document for a project that improve Location H and areas in Locations A through G not addressed in the intermediate goal.

REFERENCES

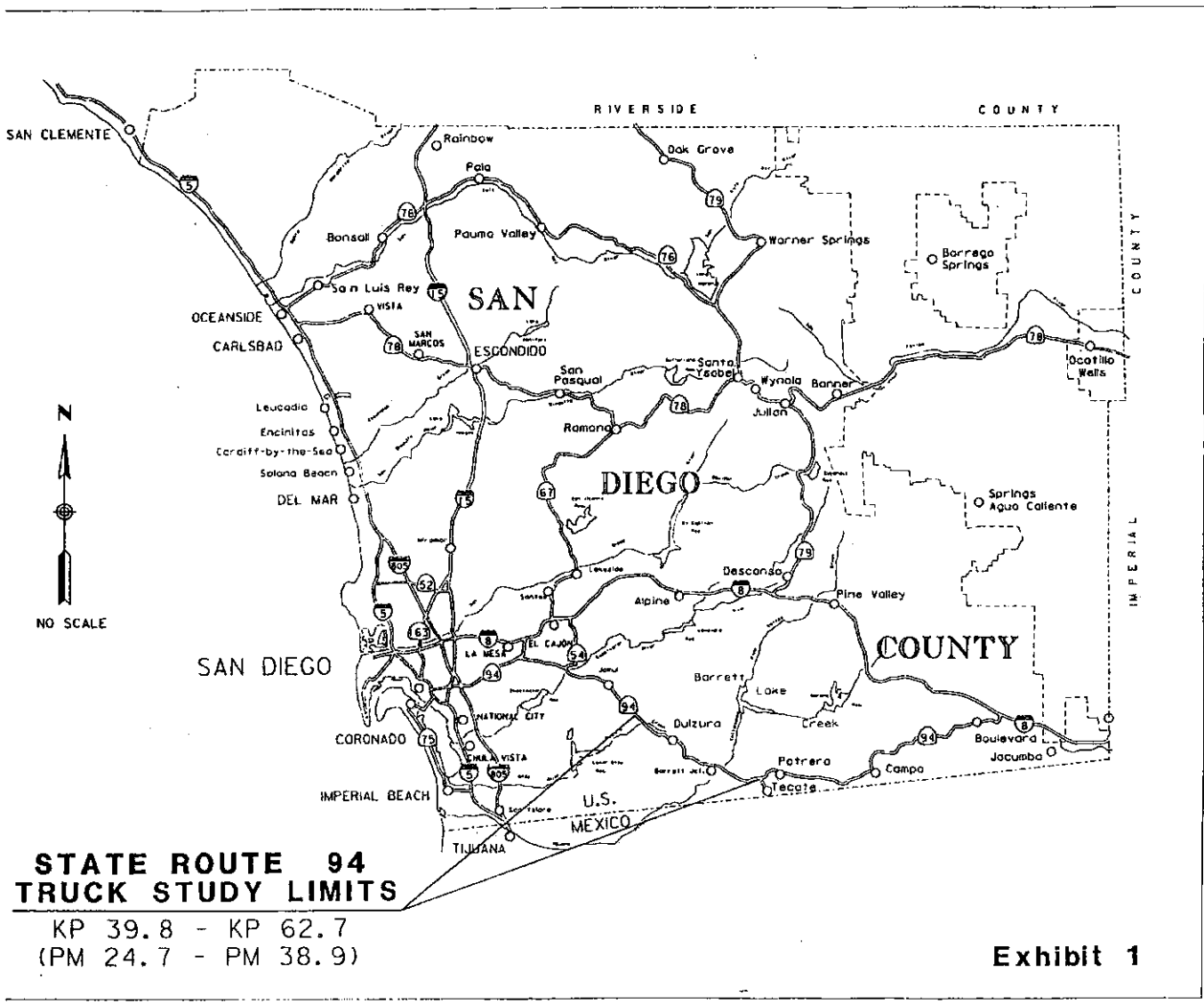
- 1) "Truck Restrictions, Overview of Existing Authority and Procedures Pertaining to Truck Restrictions", February 1994 Draft
- 2) "State of California 1998 Vehicle Code Through the 1997 Legislative Session"
- 3) "Highway Design Manual" Fifth Edition
- 4) "Route Concept Report State Route 94" January 1991
- 5) "State Route 94 Corridor Study – Phase 1" March 1997

- 6) "State Route 94 Passing Lanes San Diego County, Negative Declaration Finding of No Significant Impact" May 1998
- 7) "Technical Report State Route 94 Corridor, Tecate Port of Entry: Trade and Truck Traffic" July 9, 1997 SANDAG
- 8) "Traffic Volumes" California State Highways District 11, 1984-1997
- 9) "1996 Annual Average Daily Truck Traffic on the California State Highway System", October 1997
- 10) Map titled "Truck Networks on California State Highways", January 1998
- 11) "Truck Kingpin to Rear Axle Length State Highway System Evaluation Report", December 1989
- 12) "Truck Networks and Offtracking Analysis", Caltrans, September 1994
- 13) "AutoTURN[®] Version 3.0 User's Guide, Revised August 1997

EXHIBITS

- 1) Vicinity Map – San Diego County
- 2) Location Map / Aerial Photographs – State Route 94
- 3) Truck Diagram – Tractor / Semitrailer Terminology
- 4) Design Vehicles – Highway Design Manual
- 5) Alternative 3 - Typical Cross Section - Locations A, B & F
- 6) Alternative 3 - Typical Cross Section - Locations C, D, E & H
- 7) Alternative 3 - Typical Cross Section - Location G

APPENDIX A California Vehicle Code (Sections 35400-35414)



**STATE ROUTE 94
TRUCK STUDY LIMITS**

KP 39.8 - KP 62.7
(PM 24.7 - PM 38.9)

Exhibit 1

TRACTOR/SEMITRAILER
TERMINOLOGY

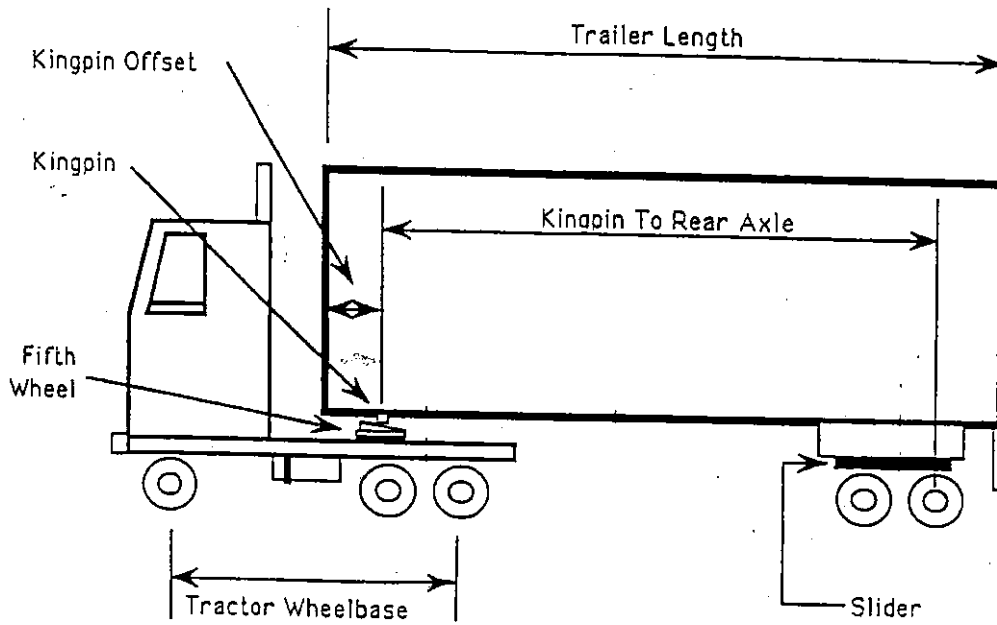
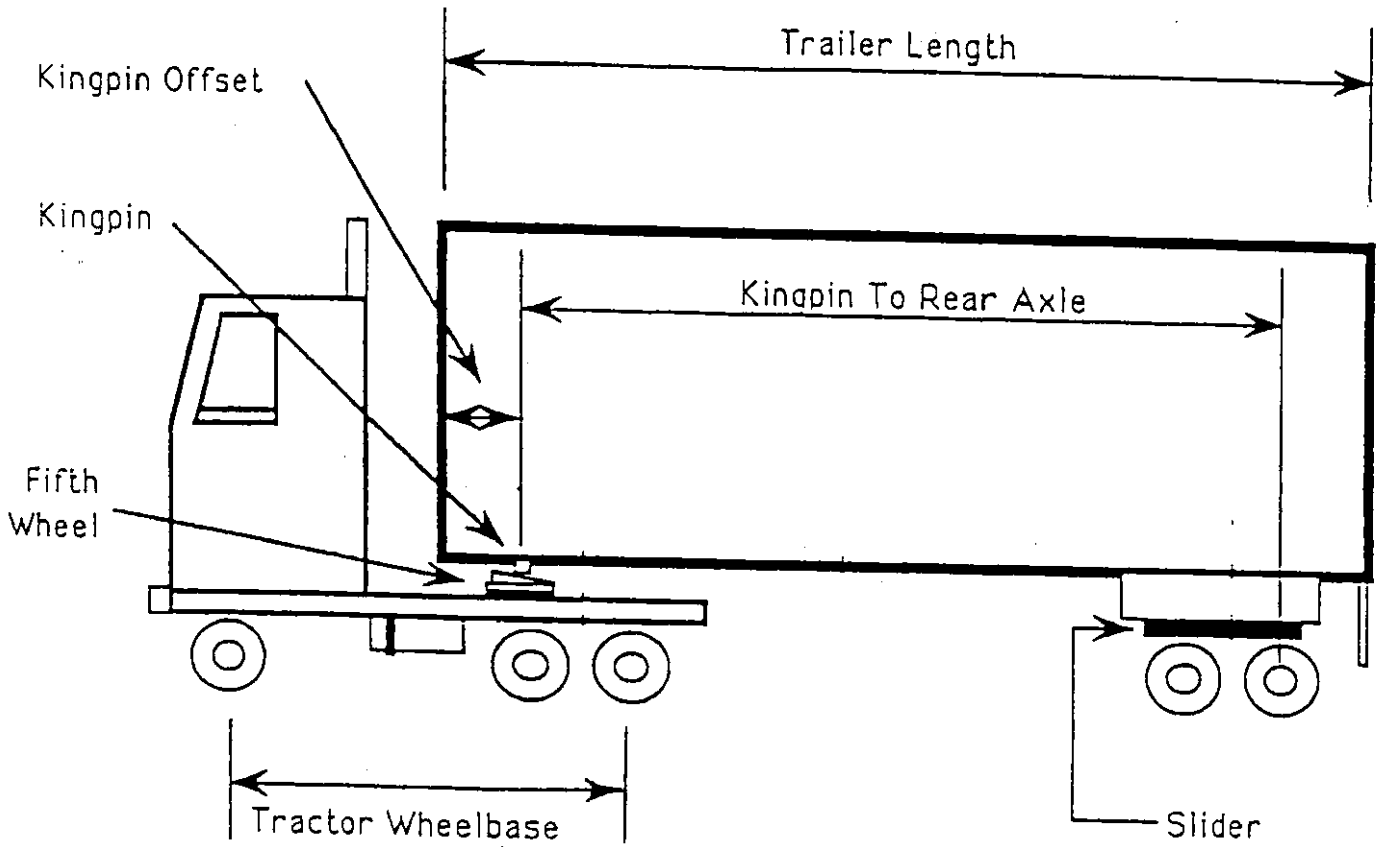
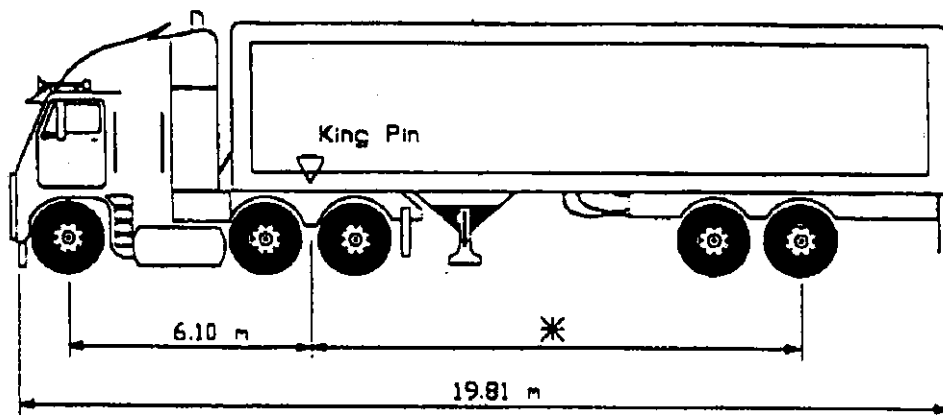


Exhibit 3

TRACTOR/SEMITRAILER TERMINOLOGY



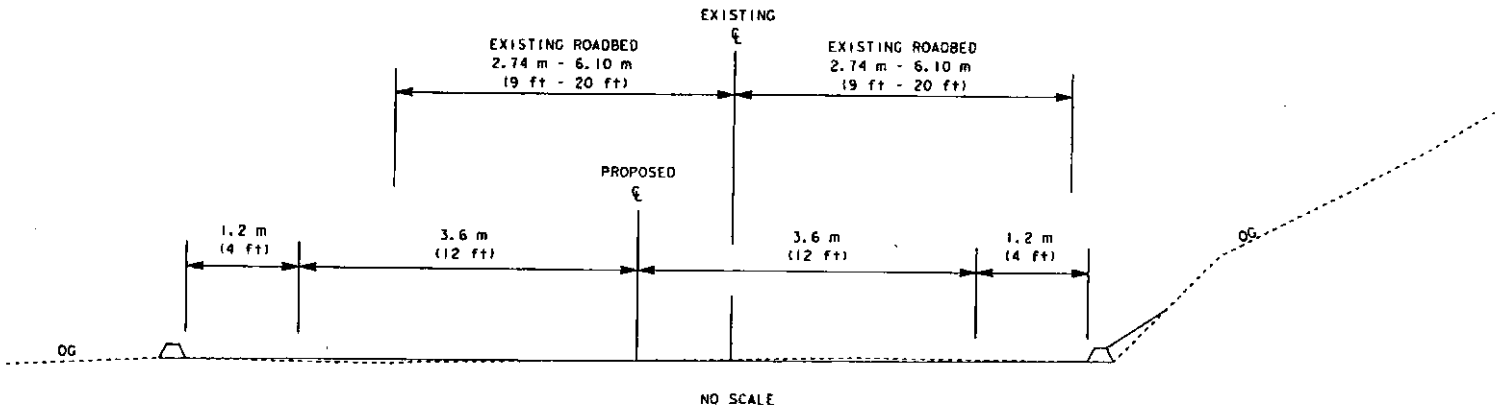


* 12.19 m two or more axles
11.58 m one axle

California Design Vehicle

Exhibit 4

**TRUCK RESTRICTION STUDY
STATE ROUTE 94**



**ALTERNATIVE 3
TYPICAL CROSS SECTION
WIDENING ONLY
LOCATIONS A,B&F**

Exhibit 5