California High-Speed Rail Authority

Merced to Fresno Section: Central Valley Wye

Transportation Technical Report

December 2016

CALIFORNIA High-Speed Rail Authority

U.S. Department of Transportation
Federal Railroad Administration

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ACRONYMS AND ABBREVIATIONS

AADT	annual average daily traffic
Authority	California High-Speed Rail Authority
BMP	best management practice
BNSF	BNSF Railway
BRT	bus rapid transit
Caltrans	California Department of Transportation
COG	Council of Governments
EIR	environmental impact report
EIS	environmental impact statement
FAA	Federal Aviation Administration
FRA	Federal Railroad Administration
FTA	Federal Transit Administration
FTIP	Federal Transportation Improvement Program
HCM	Highway Capacity Manual
HDM	Highway Design Manual
HOV	high-occupancy vehicle
HSR	high-speed rail
LOS	level-of-service
PMT	Program Management Team
RC	Regional Consultant
SAFETEA-LU	Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users
SR	State Route
UPRR	Union Pacific Railroad

EXECUTIVE SUMMARY

The California High-Speed Rail Authority (Authority) has prepared this *Merced to Fresno Section: Central Valley Wye Transportation Technical Report* (Central Valley Wye Transportation Technical Report) to support the *Merced to Fresno Section: Central Valley Wye Supplemental Environmental Impact Report (EIR)/Supplemental Environmental Impact Statement (EIS)* (Supplemental EIR/EIS). The Supplemental EIR/EIS tiers from the original *Merced to Fresno Section Final EIR/EIS* (Authority and FRA 2012a). When the Authority Board of Directors and the Federal Railroad Administration approved the Merced to Fresno Section in 2012, they deferred a decision on the wye connection for a future environmental analysis. Since then, the Authority and Federal Railroad Administration have identified four alternatives for consideration.

This technical report characterizes existing conditions and analyzes transportation effects of the four Central Valley Wye alternatives:

- SR 152 (North) to Road 13 Wye Alternative
- SR 152 (North) to Road 19 Wye Alternative
- Avenue 21 to Road 13 Wye Alternative
- SR 152 (North) to Road 11 Wye Alternative

This technical report addresses effects resulting from the high-speed rail track alignment for the Central Valley Wye. The Central Valley Wye alternatives also include electrical interconnections and PG&E network upgrades, which are not evaluated in this technical report. This report identifies relevant federal, state, regional, and local regulations and requirements; methods used for the analysis of effects; the affected environment; potential effects on transportation in the Central Valley Wye resource study area that could result from construction and operations of the Central Valley Wye alternatives; and impact avoidance and minimization features (IAMF) that would avoid, minimize, or reduce effects. As discussed in the Supplemental EIR/EIS, Section 3.2, Transportation, there would be no significant impacts as a result of Central Valley Wye construction or operations; therefore, no mitigation measures are required.

Summary of Effects

The direct and indirect effects of the Central Valley Wye alternatives on transportation resource areas include:

Effects on Roadway Level of Service

Construction of the Central Valley Wye would result in the permanent closure or modification of some existing roadways. Traffic from the closed roads would be diverted to other nearby streets. An evaluation of effects on traffic operations for the roadway network due to these roadway closures and modifications for the Existing (2015) Plus Project and 2040 Plus Project indicated that even with the additional rerouted traffic, all selected roadway segments in the RSA would operate under uncongested conditions. Traffic conditions within the transportation RSA would remain similar to existing conditions after construction of the Central Valley Wye.

Effects on Regional Transportation System

The Central Valley Wye, as a component of the HSR system, would provide a new regional surface transportation system that would complement and connect to existing transportation modes. At a regional level, HSR service would reduce vehicle miles traveled by providing motorists an alternative to existing interregional and intercity freeways and highways. The HSR service would also provide a higher level of reliability and lower travel times when compared with existing bus and rail services. Effects on the regional transportation system would be beneficial.

Temporary Construction Effects

Construction of the Central Valley Wye would require temporary lane or road closures, temporary realignment or rerouting of roadways, underground utility work, and would generate construction-related traffic. This could temporarily alter levels of service and traffic volumes for intersections and roadways, pedestrian and bicycle access, regional and local transit, and access to nearby

and adjoining roadways. In the context of the low traffic volumes and limited transit and pedestrian/bicycle traffic in the study area, these effects are expected to be minimal. Additionally, the Authority would implement impact avoidance and minimization features (IAMFs) to maintain acceptable levels of service and traffic volumes on intersections and roadways during construction, reduce conflicts between vehicles and construction-related traffic, and make sure access is maintained. With implementation of these measures, temporary construction-related effects on transportation would be reduced.

1 INTRODUCTION

1.1 Background of HSR Program

The Authority proposes to construct, operate, and maintain an electric-powered high-speed rail (HSR) system in California. When completed, the nearly 800-mile train system would provide new passenger rail service to more than 90 percent of the state's population. More than 200 weekday trains would serve the statewide intercity travel market. The HSR would be capable of operating speeds of up to 220 miles per hour, with state-of-the art safety, signaling, and automatic train control systems. The system would connect and serve the major metropolitan areas of California, extending from San Francisco and Sacramento in the north to San Diego in the south.

The Authority commenced its environmental planning process with the 2005 *Final Program EIR/EIS for the Proposed California High-Speed Train System* (Authority and FRA 2005), and then began preparing second-tier, project environmental evaluations for sections of the statewide HSR system. The 2012 *Merced to Fresno Section Final EIR/EIS* (Merced to Fresno Final EIR/EIS) (Authority and FRA 2012a) was the first project-level EIR/EIS that the Authority certified and the Federal Railroad Administration (FRA) approved. The Merced to Fresno Final EIR/EIS identified the Merced to Fresno Section: Hybrid Alignment (Hybrid Alignment) as the preferred alternative and examined two design options for an east-west connection to the San Jose to Merced Section, referred to as the "wye connection" (Authority and FRA 2012a: pages 2-3 and 2-21). When the Authority Board of Directors and the FRA approved the Merced to Fresno Section later in 2012, they deferred a decision on the wye connection for a future environmental analysis. The Authority and FRA have prepared the Supplemental EIR/EIS as the next step in the environmental review process to select a Central Valley Wye connection. Chapter 2 of the Supplemental EIR/EIS provides a detailed history of how the Authority developed the Central Valley Wye alternatives.

1.2 Organization of this Technical Report

This technical report includes the following sections:

- Section 2, Merced to Fresno Section: Central Valley Wye, provides a description of the Central Valley Wye alternatives.
- Section 3, Laws, Regulations and Orders, identifies the federal, state, and local laws, guidance, and policies relevant to transportation for the Central Valley Wye.
- Section 4, Methods for Evaluating Effects, describes the methods used to determine and evaluate potential effects.
- Section 5, Affected Environment, describes existing conditions.
- Section 6, Effects Analysis, describes direct and indirect effects, both adverse and beneficial.
- Section 7, References, provides a list of the references cited in this technical report.
- Section 8, Preparer Qualifications, identifies the individuals involved in preparing this report and their credentials.

Additional details on transportation are provided in:

- Appendix A, California High-Speed Rail Impact Avoidance and Minimization Features for Transportation
- Appendix B, Madera Traffic Model Statistics
- Appendix C, Traffic Counts at Study Locations
- Appendix D, Grade Separations and Road Closures
- Appendix E, Construction Staging Plans and Possible Detour Routes by Alternative

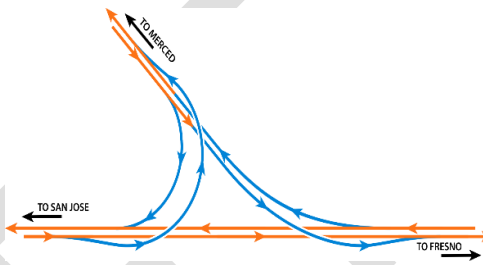
2 MERCED TO FRESNO SECTION: CENTRAL VALLEY WYE

The Central Valley Wye would create the east-west HSR connection between the San Jose to Merced Section to the west and the north-south Merced to Fresno Section to the east.[1] The four Central Valley Wye alternatives addressed in the Supplemental EIR/EIS (Figures 2-1 to 2-4) are:

- SR 152 (North) to Road 13 Wye Alternative
- SR 152 (North) to Road 19 Wye Alternative
- Avenue 21 to Road 13 Wye Alternative
- SR 152 (North) to Road 11 Wye Alternative

This section describes the common design features of the four alternatives, followed by descriptions of each alternative.

Central Valley Wye Schematic



2.1 Common Features

The Central Valley Wye alternatives would cross rural areas in unincorporated Merced and Madera Counties, and would travel through the southern portion of Chowchilla and the rural-residential community of Fairmead. Volume 3 of the Supplemental EIR/EIS provides detailed design drawings that support the descriptions of the Central Valley Wye alternatives.

The HSR alignment would be entirely grade-separated, meaning that crossings of roads, railroads, and other transport facilities would use overpasses or underpasses so that the HSR would operate independently of other modes of transport. The HSR right-of-way would also be fenced to prevent public or vehicle access. The Central Valley Wye project footprint would primarily consist of the train right-of-way, which would accommodate two sets of tracks in an area with a minimum width of 100 feet. Additional right-of-way would be required to accommodate grade separations, embankments, traction power facilities, and transitional portions of the Central Valley Wye that allow for bidirectional interface between north-south and east-west trending alignments.

The Central Valley Wye alternatives would include at-grade, below-grade, and above-grade (elevated) track segments. The at-grade track would be laid on an earthen railbed raised 6–10 feet (embankment heights are in excess of 35 feet) off the ground level, set on ties with rock ballast; fill and ballast for the railbed would be obtained from permitted borrow sites and quarries. Below-grade track would be laid in open cut, trench, or cut-and-cover tunnel at a depth that would allow roadway and other grade-level uses above the track. Elevated track segments would span some waterways, roadways, railroad, and other HSR tracks, and would consist of precast, prestressed concrete box girders, cast-in-place concrete box girders, or steel box girders. The height of elevated track sections would depend on the height of existing structures below, or clearances to existing roads or other HSR facilities, and would range from 35 to 90 feet above grade. Columns would be spaced approximately 100–120 feet apart on average.

2.2 SR 152 (North) to Road 13 Wye Alternative

The SR 152 (North) to Road 13 Wye Alternative (Figure 2-1) follows the existing Henry Miller Road and SR 152 rights-of-way as closely as possible in the east-west direction, and the Road 13, SR 99, and BNSF Railway (BNSF) rights-of-way in the north-south direction. Deviations from these existing transportation routes or corridors are necessary to accommodate design requirements; specifically, wider curves are necessary to accommodate the speed of the HSR

[1] The term *wye* refers to the Y-like formation created at the point where train tracks branch off the mainline to continue in different directions. The transition of mainline track to a wye requires splitting two tracks into four tracks that cross over one another before the wye "legs" (segments) can diverge in opposite directions to allow two-way travel. For the Merced to Fresno Section of the HSR system, the two tracks traveling east-west from the San Jose to Merced Section must become four tracks—a set of two tracks branching toward Merced to the north and a set of two tracks branching toward Fresno to the south.

compared to lower-speed roadway alignments. The SR 152 (North) to Road 13 Wye Alternative would not follow existing transportation rights-of-way where it transitions from following one transportation corridor to another.

2.2.1 Alignment and Ancillary Features

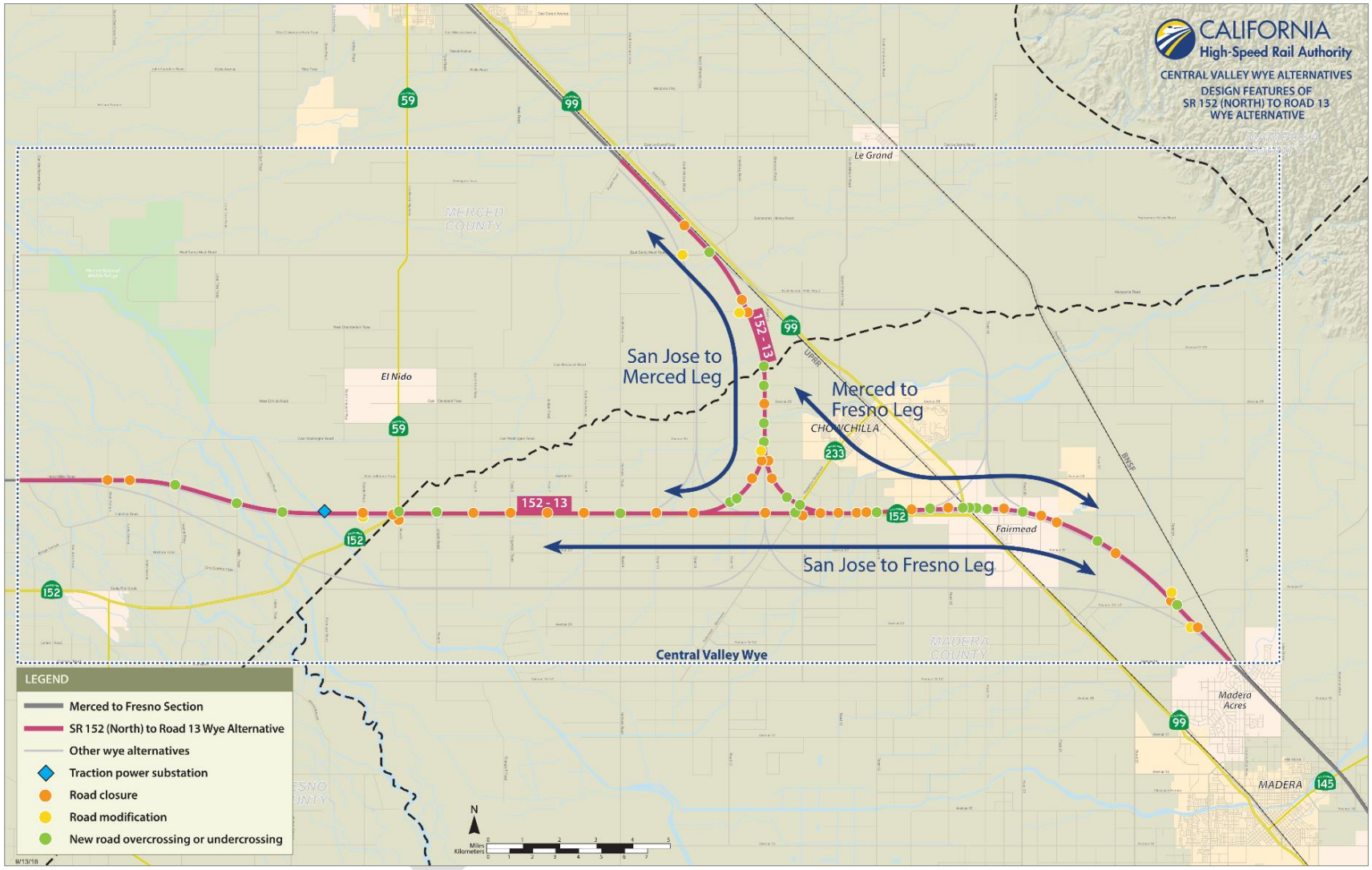
The SR 152 (North) to Road 13 Wye Alternative would extend approximately 52 miles, mostly at-grade on raised embankment, although it would also have aerial structures and a segment of retained cut (depressed alignment). The wye configuration of this alternative would be located southwest of the City of Chowchilla, with the east-west axis along the north side of SR 152 and the north-south axis on the east side of Road 13.

As shown on Figure 2-1, this alternative would begin in Merced County at the intersection of Henry Miller Road and Carlucci Road, and would continue at-grade on embankment due east toward Elgin Avenue, where it would curve southeast toward the San Joaquin River and Eastside Bypass. Approaching Willis Road, the alignment would cross the San Joaquin River on an aerial structure, then would return to embankment. It would then cross the Eastside Bypass on an aerial structure. After crossing the Eastside Bypass, the alignment would continue east and cross SR 59 at-grade just north of the existing SR 152/SR 59 interchange, entering Madera County. The SR 152/SR 59 interchange would be reconstructed a little to the south and SR 59 would be grade-separated to pass above the HSR on an aerial structure. The alignment would continue east at-grade along the north side of SR 152 toward Chowchilla, splitting into two legs (four tracks) near Road 11 to transition to the Merced to Fresno Section: Hybrid Alignment, and would cross Ash Slough on an aerial structure. All but the northbound track of the San Jose to Merced section of the alignment (leg) would then return to at-grade embankment. The northbound track would rise to cross over the tracks of the San Jose to Fresno leg on aerial structure as it curves north toward Merced. The SR 152 (North) to Road 13 Wye Alternative legs would be routed as described below and as shown on Figure 2-1:

- The southbound track of the San Jose to Merced leg[2] would be at-grade. This split (where tracks separate) would be west of Chowchilla, at approximately Road 11. The two San Jose to Merced tracks would continue north on the eastern side of Road 13, crossing Ash Slough and the Chowchilla River, and then would cross over Road 13 to its west side. As the tracks return to grade, they would curve northwest, crossing Dutchman Creek on an aerial structure, and follow the west side of the Union Pacific Railroad (UPRR)/SR 99 corridor. At Sandy Mush Road, the alignment would descend into a shallow cut (depressed) section for approximately 0.5 mile, with a retained cut-and-cover undercrossing[3] at Caltrans' Sandy Mush Road overhead. The alignment would return to grade and continue along the west side of the UPRR/SR 99 corridor, connecting to the Merced to Fresno Section: Hybrid Alignment at Ranch Road.

[2] A track is included within a leg; e.g., southbound track of the San Jose to Merced leg.

[3] An undercrossing is a road or track crossing under an existing road or track.



Source: Authority, 2016b; ESRI, 2013; CAL FIRE, 2004; ESRI/National Geographic, 2015

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Figure 2-1 SR 152 (North) to Road 13 Wye Alternative Alignment and Key Design Features

- The San Jose to Fresno leg of this alternative would continue east from the split near Road 11 and along the north side of SR 152 toward Chowchilla. It would be predominantly at-grade, crossing several roads and Berenda Slough on aerial structures. The alignment would pass south of Chowchilla at-grade then would rise to cross over the UPRR/SR 99 corridor and Fairmead Boulevard on an aerial structure. East of the UPRR/SR 99 corridor, the alternative would extend at-grade through Fairmead, north of Avenue 23. At approximately Road 20, the alignment would curve southeast toward the BNSF corridor and cross Dry Creek on a short aerial structure. The San Jose to Fresno leg would align parallel to the west side of the BNSF corridor as it meets the Merced to Fresno Section: Hybrid Alignment at Avenue 19.
- The Merced to Fresno leg of the alternative would split from the San Jose to Fresno leg near Road 14, where the southbound track of the Merced to Fresno leg would ascend on aerial structure, crossing over the tracks of the San Jose to Fresno leg. The northbound track would curve northwest, rise on a high embankment crossing over several roads, and continue on an at-grade embankment until joining the San Jose to Merced leg near Avenue 25.

Wildlife undercrossing structures would be installed in at-grade embankments along this alternative where the alignment intersects wildlife corridors.

2.2.2 State Highway or Local Roadway Modifications

The SR 152 (North) to Road 13 Wye Alternative would require the permanent closure of 38 public roadways at selected locations and the construction of 24 overcrossings[4] or undercrossings in lieu of closure. Figure 2-1 shows the anticipated state highway and local roadway closures and modifications. Fourteen of these permanent road closures would be located at SR 152, where roads currently cross at-grade but need to be closed to convert SR 152 to a fully access-controlled corridor. The 14 proposed closures are Road 5, Road 6, Road 7, Road 8, Road 10, Road 11, Road 13, Road 14, Road 14 1/2, Road 15, Road 15 1/2, Road 15 3/4, Road 17, and Road 18. Planned new grade separations along SR 152 at the SR 59/SR 152 Interchange, Road 4/Lincoln Road, Road 12, and Road 17 1/2 would maintain access to, and across, SR 152. These roadways would be reconfigured to two 12-foot lanes with two 8-foot shoulders. Each of the new interchanges would require realigning SR 152. Three new interchanges are proposed between SR 59 and SR 99 to provide access to SR 152: at Road 9/Hemlock Road, SR 233/Robertson Boulevard, and Road 16.

The distance between over- or undercrossings would vary from less than 2 miles to approximately 5 miles where other roads are perpendicular to the proposed HSR. Between these over- or undercrossings, 24 additional roads would be closed, as shown on Figure 2-1. Local roads paralleling the proposed HSR alignment and used by small communities and farm operations may be shifted and reconstructed to maintain their function. Access easements would be provided to maintain access to properties severed by HSR.

2.2.3 Freight or Passenger Railroad Modifications

The SR 152 (North) to Road 13 Wye Alternative would cross over the UPRR right-of-way south of Chowchilla. This alternative would maintain required vertical (at least 23.3 feet) clearance over UPRR operational right-of-way to avoid or minimize impacts on UPRR rights-of-way, spurs, and facilities (BNSF and UPRR 2007). In areas where the SR 152 (North) to Road 13 Wye Alternative parallels the UPRR right-of-way, the alternative maintains a minimum horizontal clearance of 102 feet from the centerline to the UPRR right-of-way.

2.2.4 Summary

Table 2-1 summarizes the design features for the SR 152 (North) to Road 13 Wye Alternative.

[4] An overcrossing is a road or track crossing over an existing road or track.

Table 2-1 Design Features of the SR 152 (North) to Road 13 Wye Alternative

Feature	SR 152 (North) to Road 13 Wye
Total length (linear miles)[1]	52
At-grade profile (linear miles)[1]	48.5
Elevated profile (linear miles)[1]	3
Below-grade profile (linear miles)[1]	0.5
Number of straddle bents	32
Number of railroad crossings	1
Number of major water crossings	12
Number of road crossings	62
Approximate number of public roadway closures	38
Number of roadway overcrossings and undercrossings	24
Traction power substation sites	1
Switching and paralleling stations	1 switching station, 8 paralleling stations
Signaling and train-control elements	18
Communication towers	9
Wildlife crossing structures	39

Source: Authority, 2016b

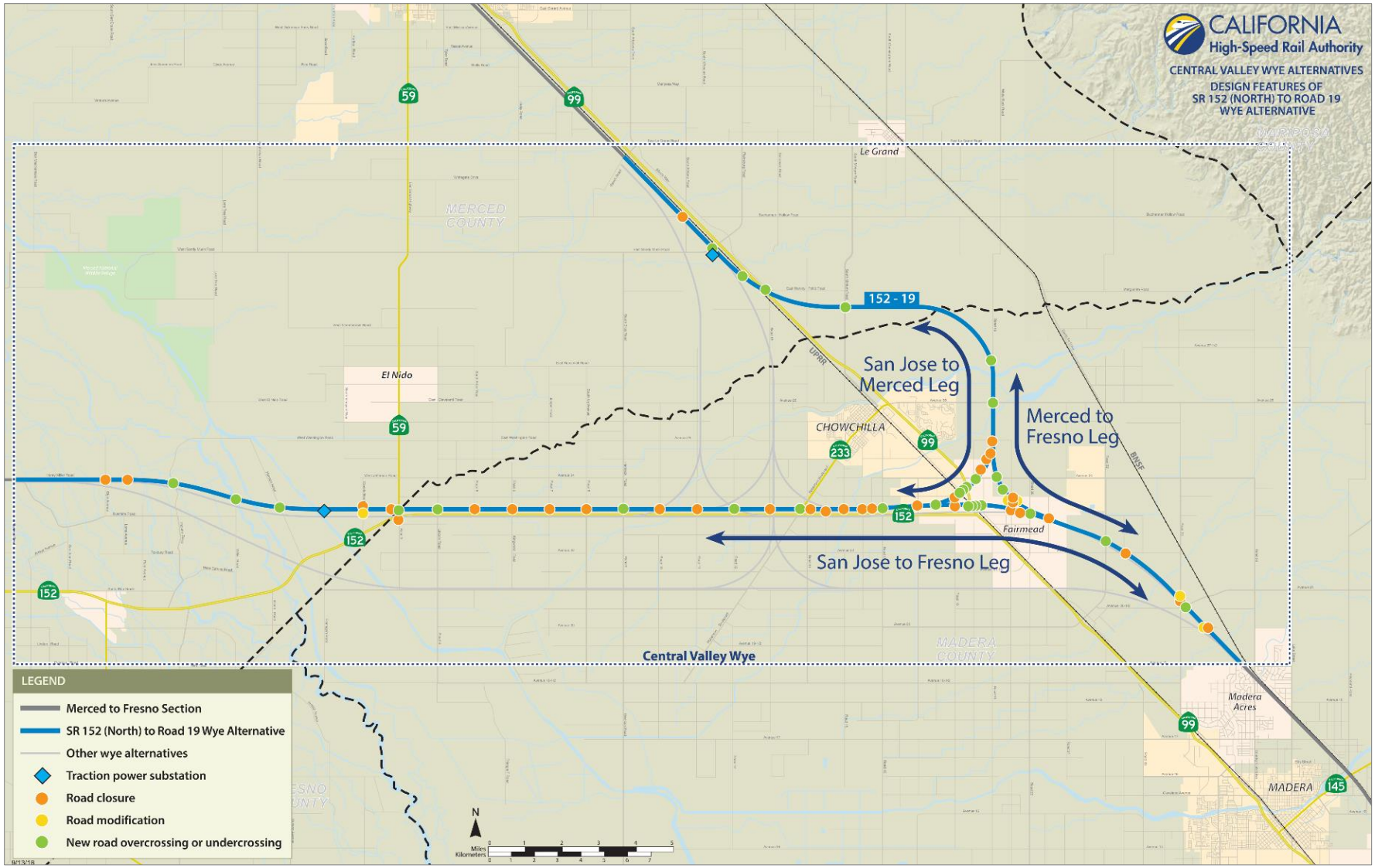
[1] Lengths shown are based on equivalent dual-track alignments and are one-way mileages. For example, the length of single-track elevated structure will be divided by a factor of 2 to convert to dual-track equivalents.

2.3 SR 152 (North) to Road 19 Wye Alternative

The SR 152 (North) to Road 19 Wye Alternative (Figure 2-2) is designed to follow the existing Henry Miller Road and SR 152 rights-of-way as closely as practicable in the east-west direction and Road 19, SR 99, and BNSF rights-of-way in the north-south direction. Deviations from these existing transportation corridors would be necessary to accommodate design requirements; specifically, larger curves would be necessary to accommodate the high speed of the HSR compared to lower-speed roadway alignments. The SR 152 (North) to Road 19 Wye Alternative would not follow existing transportation rights-of-way as it transitions from following one transportation corridor to another.

2.3.1 Alignment and Ancillary Features

The SR 152 (North) to Road 19 Wye Alternative would extend approximately 55 miles, mostly at-grade on embankment, although it would also have aerial structures, retained cut (depressed alignment), and depressed tunnel undercrossings of major railroad and highway corridors. The wye configuration of this alternative would be located southeast of the City of Chowchilla and north of Fairmead, with the east-west axis along the north side of SR 152 and the north-south axis on the east side of Road 19.



Source: Authority, 2016b; ESRI, 2013; CAL FIRE, 2004; ESRI/National Geographic, 2015

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Figure 2-2 SR 152 (North) to Road 19 Wye Alternative Alignment and Key Design Features

Beginning at the intersection of Henry Miller Road and Carlucci Road (at the same point in Merced County as the SR 152 [North] to Road 13 Wye Alternative), this alternative would continue east toward Elgin Avenue, where it would curve southeast toward the San Joaquin River. It would cross the river on an aerial structure, returning to an at-grade embankment, then onto another aerial structure to cross the Eastside Bypass. After crossing the Eastside Bypass, the alignment would continue east and cross SR 59 at-grade just north of the existing SR 152/SR 59 interchange, where it would enter Madera County. It would continue east at-grade along the north side of SR 152 toward Chowchilla, crossing Ash Slough and Berenda Slough on aerial structures. As it crosses Road 16, the alignment would split into two legs (four tracks) to transition to the Merced to Fresno Section: Hybrid Alignment. East of Road 17, the San Jose to Merced leg would curve northeast, rising to cross the UPRR/SR 99 corridor on an aerial structure, and then would continue north along the east side of Road 19.

As the alignment approaches Avenue 25, the San Jose to Merced and Merced to Fresno legs would converge, requiring the northbound track of the San Jose to Merced leg to rise on an aerial structure and cross over the tracks of the Merced to Fresno leg.

- The San Jose to Merced leg would continue north to just south of Ash Slough, where it would curve west, cross Ash Slough and the Chowchilla River on aerial structures, and continue west approximately 0.5 mile south of Harvey Pettit Road. West of South Minturn Road, the leg would curve northwest and descend below-grade into a series of three tunnels crossing under the SR 99 and UPRR corridors and the Caltrans Sandy Mush Road overhead. The UPRR tracks would be reconstructed on the roof of the HSR cut-and-cover tunnels, while maintaining the same horizontal and vertical alignment. Construction of this type of below-grade crossing would require temporarily realigning the UPRR tracks. Approximately 0.6 mile north of Sandy Mush Road, the alternative would ascend to grade and continue along the UPRR/SR 99 corridor to connect with the Merced to Fresno Section: Hybrid Alignment at Ranch Road.
- The San Jose to Fresno leg would continue east from Road 16 and, east of Road 18, ascend on an aerial structure to cross SR 99 north of the SR 99/SR 152 interchange. East of the UPRR/SR 99 corridor, the leg would continue north of Avenue 23 through Fairmead, descending to grade east of Road 18 3/4. The alternative would then curve southeast toward the BNSF corridor, crossing Dry Creek on a short aerial structure, and continuing along the west side of the BNSF corridor to join the Merced to Fresno Section: Hybrid Alignment at Avenue 19.
- The Merced to Fresno leg would split from the San Jose to Fresno leg near Road 20 1/2. The southbound track of the Merced to Fresno leg would ascend on an aerial structure and cross over the tracks of the San Jose to Fresno leg. The Merced to Fresno leg would curve northwest, rise on aerial structures over several road crossings, and then continue at-grade to join the San Jose to Merced leg near Avenue 25.

Wildlife undercrossing structures would be provided in at-grade embankments where the alignment intersects wildlife corridors.

2.3.2 State Highway or Local Roadway Modifications

The SR 152 (North) to Road 19 Wye Alternative would require the permanent closure of 36 public roadways at selected locations and the construction of 29 overcrossings or undercrossings. Table 2-2 and Figure 2-2 show the anticipated state highway and local roadway closures and modifications. Fourteen of these permanent road closures would be located at SR 152 where roads currently cross at-grade but must be closed to convert SR 152 to a fully access-controlled corridor. The proposed 14 closures are Road 5, Road 6, Road 7, Road 8, Road 10, Road 11, Road 13, Road 14, Road 14 1/2, Road 15, Road 15 1/2, Road 15 3/4, Road 17, and Road 18. New grade separations are planned along SR 152 at the SR 59/SR 152 interchange, Road 4/Lincoln Road, Road 12, SR and Road 17 1/2. These roadways would be reconfigured to two 12-foot lanes with two 8-foot shoulders, and several of these interchanges would require realigning SR 152. Interchanges between SR 59 and SR 99 that would provide access to SR 152 are Road 9/Hemlock Road, SR 233/Robertson Boulevard, and Road 16.

The distance between over- or undercrossings would vary from less than 2 miles to approximately 5 miles where roads would be perpendicular to the proposed HSR. Between these over- or undercrossings, 22 additional roads would be closed (Figure 2-2). Local roads paralleling the proposed HSR alignment and used by small communities and farm operations may be shifted and reconstructed to maintain their function. Access easements would be provided to maintain access to properties severed by HSR.

The SR 152 (North) to Road 19 Wye Alternative would cross over SR 99 at three locations. South of Chowchilla, both the San Jose to Merced and the San Jose to Fresno legs would rise on aerial structures to cross SR 99. Another crossing of SR 99 would be at the northern end of the alternative, where it descends below-grade into an undercrossing tunnel segment. SR 99 would be temporarily realigned during construction, and would be reconstructed on the roof of the undercrossing tunnel.

2.3.3 Freight or Passenger Railroad Modifications

The SR 152 (North) to Road 19 Wye Alternative would cross over the UPRR corridor at three separate locations. South of Chowchilla, both the San Jose to Merced and the San Jose to Fresno legs would rise on aerial structures to cross the UPRR operational right-of-way. In these instances, the alternative would maintain required vertical (at least 23.3 feet) clearance over UPRR operational right-of-way to avoid or minimize impacts on UPRR rights-of-way, spurs, and facilities (BNSF and UPRR 2007). The third crossing of the UPRR corridor would be at the northern end of the alternative, where the alignment would descend into an undercrossing tunnel. The UPRR tracks would be reconstructed on the roof of the HSR tunnel, maintaining the same vertical alignment. Construction of this crossing would require the temporary detour (shoofly)[5] of the UPRR tracks. In areas where the SR 152 (North) to Road 19 Wye Alternative parallels the UPRR right-of-way, the alternative maintains a minimum horizontal clearance of 102 feet from the centerline to the UPRR right-of-way.

2.3.4 Summary

Table 2-2 summarizes the design features for the SR 152 (North) to Road 19 Wye Alternative.

Table 2-2 Design Features of the SR 152 (North) to Road 19 Wye Alternative

Feature	SR 152 (North) to Road 19 Wye
Total length (linear miles)[1]	55
At-grade profile (linear miles)[1]	48.5
Elevated profile (linear miles)[1]	3.5
Below-grade profile (linear miles)[1]	3
Number of straddle bents	31
Number of railroad crossings	3
Number of major water crossings	13
Number of road crossings	65
Approximate number of public roadway closures	36
Number of roadway overcrossings and undercrossings	29
Traction power substation sites	2
Switching and paralleling stations	2 switching stations, 7 paralleling stations

[5] A shoofly is a temporary track alignment that detours trains around a construction site.

Feature	SR 152 (North) to Road 19 Wye
Signaling and train-control elements	21
Communication towers	6
Wildlife crossing structures	41

Source: Merced to Fresno Section: Central Valley Wye Final 15% Engineering Plans
[1] Lengths shown are based on equivalent dual-track alignments and are one-way mileages. For example, the length of single-track elevated structure will be divided by a factor of 2 to convert to dual-track equivalents.

2.4 Avenue 21 to Road 13 Wye Alternative

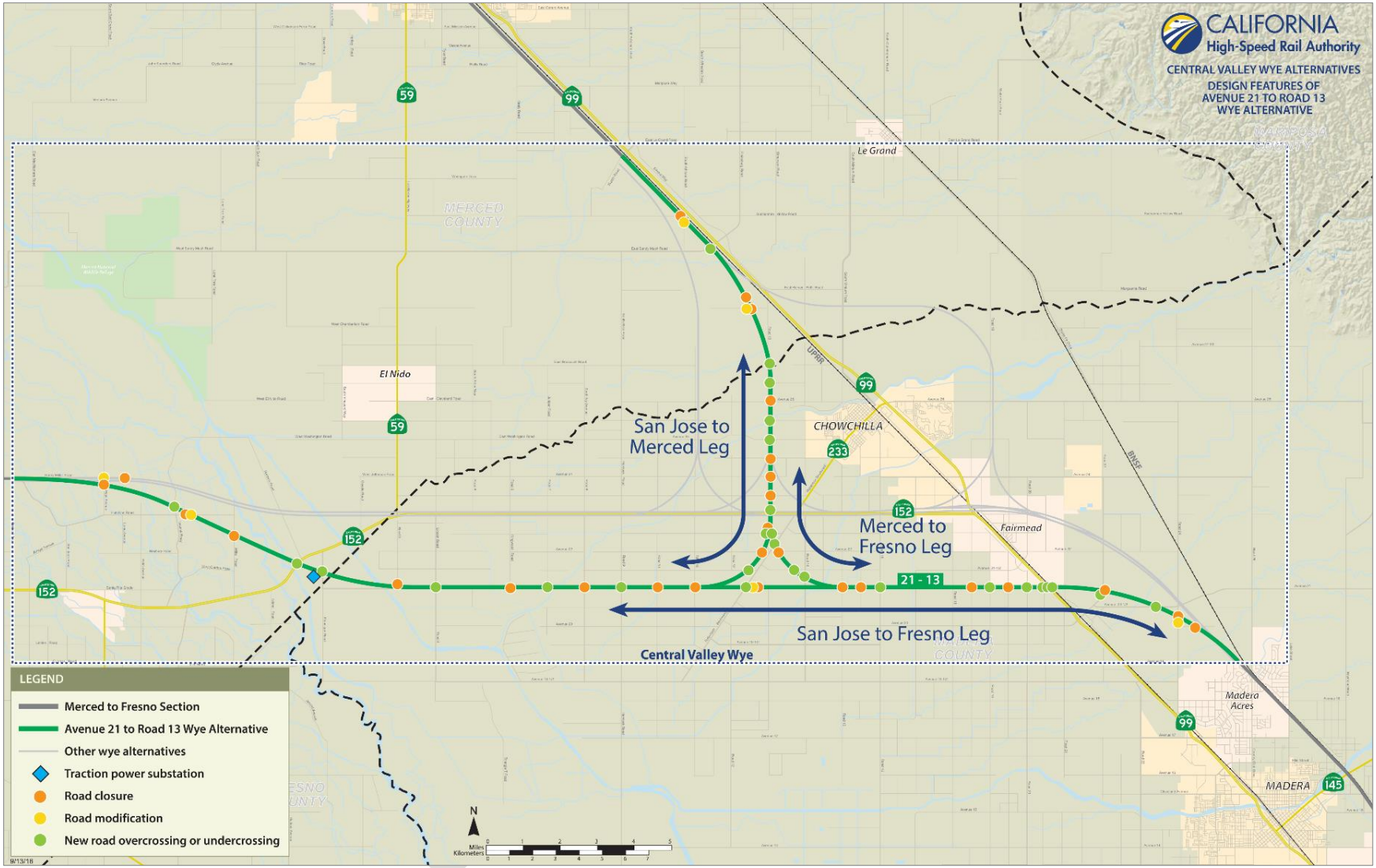
The Avenue 21 to Road 13 Wye Alternative (Figure 2-3) is designed to follow the existing Henry Miller Road and Avenue 21 rights-of-way as closely as practicable in the east-west direction and the Road 13, SR 99, and BNSF rights-of-way in the north-south direction. Deviations from these existing transportation corridors would be necessary to accommodate design requirements; specifically, larger curves would be necessary to accommodate the high speeds of the HSR compared to lower-speed roadway alignments. The Avenue 21 to Road 13 Wye Alternative would not follow existing transportation rights-of-way as it transitions from following one transportation corridor to another.

2.4.1 Alignment and Ancillary Features

The Avenue 21 to Road 13 Wye Alternative would extend approximately 53 miles, mostly at-grade on embankment, although it would also have aerial structures and a short segment of retained cut (depressed alignment). The wye configuration of this alternative would be located approximately 4 miles southwest of the City of Chowchilla, with the east-west axis along the north side of Avenue 21 and the north-south axis on the east side of Road 13.

Beginning at the intersection of Henry Miller Road and Carlucci Road (at the same point in Merced County as the SR 152 [North] to Road 13 Wye Alternative), west of Elgin Avenue this alternative would curve southeast toward the San Joaquin River and Eastside Bypass. East of Willis Road, the alignment would rise to an aerial structure to cross the river, SR 152, and the Eastside Bypass. The alignment would continue east along the north side of Avenue 21, crossing Ash Slough on an aerial structure. Southwest of Chowchilla, near Road 11, the alignment would split into two legs (four tracks) for transition to the Merced to Fresno Section: Hybrid Alignment. The San Jose to Merced leg would curve northeast, cross Road 13, and continue north along the east side of Road 13. At the beginning of the San Jose to Merced leg, the northbound track alternative would rise onto an aerial structure to cross over the tracks of the San Jose to Fresno leg. The Avenue 21 to Road 13 Wye Alternative legs would be routed as described below and shown on Figure 2-3:

- As the San Jose to Merced leg approaches SR 152, it would converge with the Merced to Fresno leg, requiring the northbound track of the San Jose to Merced leg to rise on an aerial structure and cross over the tracks of the Merced to Fresno leg. The San Jose to Merced leg would continue north on an elevated alignment crossing Ash Slough, the Chowchilla River, and Road 13 on aerial structures. As the leg returns to grade, it would curve northwest, cross Dutchman Creek on an aerial structure, and follow along the west side of the UPRR/SR 99 corridor. At Sandy Mush Road, the alternative would descend into a shallow cut (depressed) section for approximately 0.5 mile, with a retained cut-and-cover undercrossing tunnel segment at the Caltrans Sandy Mush Road Overhead. The alternative would return to grade and continue along the UPRR/SR 99 corridor, connecting to the Merced to Fresno Section: Hybrid Alignment at Ranch Road.



Source: Authority, 2016b; ESRI, 2013; CAL FIRE, 2004; ESRI/National Geographic, 2015

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Figure 2-3 Avenue 21 to Road 13 Wye Alternative Alignment and Key Design Features

- The San Jose to Fresno leg would continue east from the split near Road 11 along the north side of Avenue 21 toward Chowchilla. It would be predominantly at-grade on embankment, ascending to cross Berenda Slough on an aerial structure. East of the wye configuration, the alignment would extend south of Chowchilla, ascend on an aerial structure east of Road 19 1/2, and cross the UPRR/SR 99 corridor. The alternative would extend south of Fairmead and curve southeast toward the BNSF corridor, cross Dry Creek on an aerial structure, and run adjacent to the west side of the BNSF corridor to its meeting with the Merced to Fresno Section: Hybrid Alignment at Avenue 19.
- The Merced to Fresno leg would split from the San Jose to Fresno leg near Road 15. The southbound track of the Merced to Fresno leg would ascend on an aerial structure and cross over the tracks of the San Jose to Fresno leg. The Merced to Fresno leg would curve northwest, rise on aerial structures over several road crossings, and then continue on an at-grade embankment to join the San Jose to Merced leg near SR 152.

Wildlife undercrossing structures would be provided along this alternative in at-grade embankment portions of the HSR corridor where the alignment intersects wildlife corridors.

2.4.2 State Highway or Local Roadway Modifications

The Avenue 21 to Road 13 Wye Alternative would require the permanent closure of 30 public roadways at selected locations and the construction of 28 overcrossings or undercrossings. Table 2-3 and Figure 2-3 show the anticipated state highway and local roadway closures. This alternative would require the fewest roadway and state highway modifications.

The Avenue 21 to Road 13 Wye Alternative would rise on aerial structures and cross over state highway facilities in three locations: SR 59 at Harmon Road, SR 152 at Road 13, and SR 99 at Avenue 21. Where other roads would be perpendicular to the proposed HSR, over- or undercrossings are planned at distances from less than 2 miles to 5 miles. Between these over- and undercrossings, some roads may be closed. Local roads paralleling the HSR alignment and used by small communities and farm operations may be shifted and reconstructed to maintain their function. Access easements would be provided to maintain access to properties severed by HSR.

2.4.3 Freight or Passenger Railroad Modifications

The Avenue 21 to Road 13 Wye Alternative would cross the UPRR operational right-of-way on an aerial structure south of Fairmead and maintain a vertical (at least 23.3 feet) clearance over UPRR operational right-of-way to avoid or minimize impacts on other UPRR rights-of-way, spurs, and facilities. In areas where the Avenue 21 to Road 13 Wye Alternative parallels the UPRR right-of-way, the alternative maintains a minimum horizontal clearance of 102 feet from the centerline to the UPRR right-of-way.

2.4.4 Summary

Table 2-3 summarizes the design features for the Avenue 21 to Road 13 Wye Alternative.

Table 2-3 Design Features of the Avenue 21 to Road 13 Wye Alternative

Feature	Avenue 21 to Road 13 Wye
Total length (linear miles)[1]	53
At-grade profile (linear miles)[1]	48.5
Elevated profile (linear miles)[1]	4
Below-grade profile (linear miles)[1]	0.5
Number of straddle bents	32
Number of railroad crossings	1

Feature	Avenue 21 to Road 13 Wye
Number of major water crossings	11
Number of road crossings	58
Approximate number of public roadway closures	30
Number of roadway overcrossings and undercrossings	28
Traction power substation sites	1
Switching and paralleling stations	1 switching station, 7 paralleling stations
Signaling and train-control elements	15
Communication towers	6
Wildlife crossing structures	44

Source: Merced to Fresno Section: Central Valley Wye Final 15% Engineering Plans
[1] Lengths shown are based on equivalent dual-track alignments and are one-way mileages. For example, the length of single-track elevated structure will be divided by a factor of 2 to convert to dual-track equivalents.

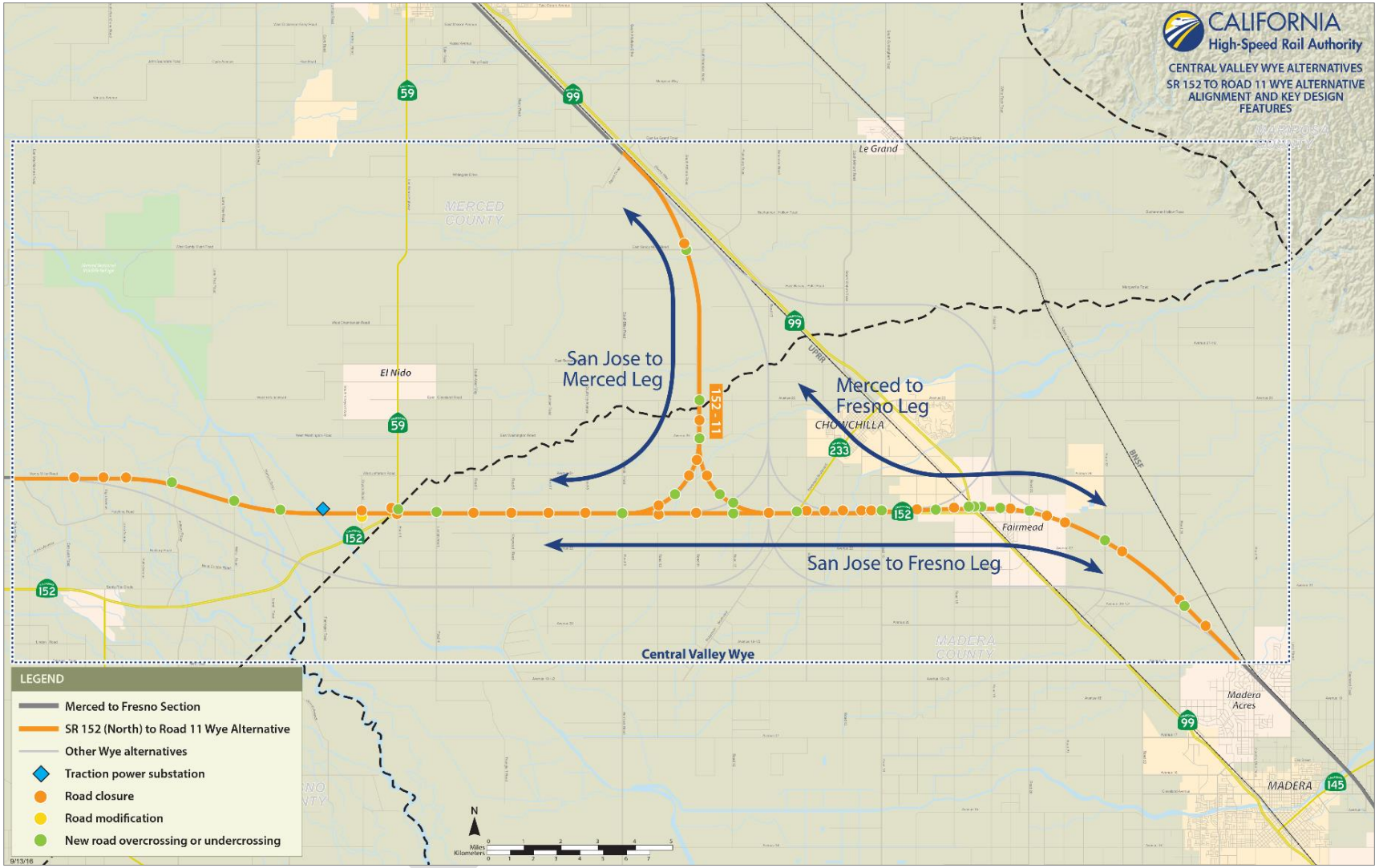
2.5 SR 152 (North) to Road 11 Wye Alternative

The SR 152 (North) to Road 11 Wye Alternative (Figure 2-4) follows the existing Henry Miller Road and SR 152 rights-of-way as closely as practicable in the east-west direction, and the Road 11, SR 99, and BNSF rights-of-way in the north-south direction. Deviations from these existing transportation corridors are necessary to accommodate design requirements; specifically, wider curves are necessary to accommodate the speed of the HSR compared to lower-speed roadway alignments. The SR 152 (North) to Road 11 Wye Alternative would not follow existing transportation rights-of-way where it transitions from following one transportation corridor to another.

2.5.1 Alignment and Ancillary Features

The SR 152 (North) to Road 11 Wye Alternative would extend approximately 51 miles, mostly at-grade on raised embankment, although it would also have aerial structures. The wye configuration of this alternative would be located west-southwest of the City of Chowchilla, with the east-west axis along the north side of SR 152 and the north-south axis on the east side of Road 11.

Like the other three alternatives, this alternative would begin in Merced County at the intersection of Henry Miller Road and Carlucci Road, and would continue at-grade on embankment east toward Elgin Avenue, where it would curve southeast toward the San Joaquin River and Eastside Bypass. Approaching Willis Road, the alignment would rise to cross the San Joaquin River on an aerial structure, return to embankment, then cross the Eastside Bypass on an aerial structure. After crossing the Eastside Bypass, this alternative would continue east, crossing SR 59 at-grade just north of the existing SR 152/SR 59 interchange, entering Madera County. To accommodate the SR 152 (North) to Road 11 Wye Alternative, the SR 152/SR 59 interchange would be reconstructed slightly to the south, and SR 59 would be grade-separated to pass above the HSR on an aerial structure. The alignment would continue east at-grade along the north side of SR 152 toward Chowchilla, splitting into two legs (four tracks) near Road 10 to transition to the Merced to Fresno Section: Hybrid Alignment, and would cross Ash Slough on an aerial structure. All but the northbound track of the San Jose to Merced leg of the alternative would then return to at-grade embankment; the northbound track would rise to cross over the tracks of the San Jose to Fresno leg on an aerial structure as it curves north toward Merced. The SR 152 (North) to Road 11 Wye Alternative legs would be routed as described below and shown on Figure 2-4:



Source: Authority, 2016b; ESRI, 2013; CAL FIRE, 2004; ESRI/National Geographic, 2015

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Figure 2-4 SR 152 (North) to Road 11 Wye Alternative Alignment and Key Design Features

- The southbound track of the San Jose to Merced leg would turn north at-grade. This split would be west of Chowchilla, at approximately Road 10. The two San Jose to Merced tracks would continue north on the eastern side of Road 11, crossing the Chowchilla River, and then would cross over Road 11 to follow its west side. As the tracks return to grade, they would curve northwest, crossing Dutchman Creek on an aerial structure, following the west side of the UPRR)/SR 99 corridor. The alignment would continue north, crossing over Sandy Mush Road on an aerial structure. The alignment would return to grade and continue along the west side of the UPRR/SR 99 corridor, connecting to the Merced to Fresno Section: Hybrid Alignment at Ranch Road.
- The San Jose to Fresno leg would continue east from the wye split near Road 10, along the north side of SR 152 toward Chowchilla. It would be predominantly at-grade, ascending on aerial structures at several road crossings and Berenda Slough. The leg would pass south of Chowchilla at-grade then rise to cross over the UPRR/SR 99 corridor and Fairmead Boulevard on an aerial structure. East of the UPRR/SR 99 corridor, the alignment would extend at-grade through Fairmead, north of Avenue 23. At approximately Road 20, the leg would curve southeast toward the BNSF corridor and cross Dry Creek on a short aerial structure. The SR 152 (North) to Road 11 Wye Alternative would align parallel to the west side of the BNSF corridor as it meets the Merced to Fresno Section: Hybrid Alignment at Avenue 19.
- The Merced to Fresno leg would split from the San Jose to Fresno leg near Road 13. The southbound track of the Merced to Fresno leg would ascend on an aerial structure and cross over the tracks of the San Jose to Fresno leg. The Merced to Fresno leg would curve northwest, rise on a high embankment crossing over several roads, and continue at-grade on embankment to join the San Jose to Merced leg near Avenue 25.

Wildlife undercrossing structures would be installed in at-grade embankments along this alternative where the alignment intersects wildlife corridors.

2.5.2 State Highway or Local Roadway Modifications

The SR 152 (North) to Road 11 Wye Alternative would require the permanent closure of 33 public roadways at selected locations and the construction of 24 overcrossings or undercrossings in lieu of closure. Table 2-4 and Figure 2-4 show the anticipated state highway and local roadway closures and modifications. Fourteen of these permanent road closures would be located at SR 152 where roads currently cross at-grade but need to be closed in order to convert SR 152 to a fully access-controlled corridor. The 14 proposed closures are Road 5, Road 6, Road 7, Road 8, Road 10, Road 11, Road 13, Road 14, Road 14 1/2, Road 15, Road 15 1/2, Road 15 3/4, Road 17, and Road 18. Planned new grade separations along SR 152 at the SR 59/SR 152 Interchange, Road 4/Lincoln Road, Road 12, and Road 17 1/2 would maintain access to SR 152. These roadways would be reconfigured to two 12-foot lanes with two 8-foot shoulders. Several of these new interchanges would require realigning SR 152. Three new interchanges are proposed between SR 59 and SR 99 to provide access to SR 152: at Road 9/Hemlock Road, SR 233/Robertson Boulevard, and Road 16.

The distance between over- or undercrossings would vary from less than 2 miles to approximately 5 miles where other roads are perpendicular to the proposed HSR Between these over- or undercrossings, 19 additional roads would be closed. Local roads paralleling the proposed HSR alignment and used by small communities and farm operations may be shifted and reconstructed to maintain their function. Access easements would be provided to maintain access to properties severed by HSR.

2.5.3 Freight or Passenger Railroad Modifications

The SR 152 (North) to Road 11 Wye Alter native would cross over the UPRR right-of-way as it passes south of Chowchilla. This alternative would maintain required vertical (at least 23.3 feet) clearance over UPRR operational right-of-way to avoid or minimize impacts on UPRR rights-of-way, spurs, and facilities (BNSF and UPRR 2007). In areas where the SR 152 (North) to Road 11

Wye Alternative parallels the UPRR right-of-way, the alternative maintains a minimum horizontal clearance of 102 feet from the centerline to the UPRR right-of-way.

2.5.4 Summary

Table 2-4 summarizes the design features for the SR 152 (North) to Road 11 Wye Alternative.

Table 2-4 Design Features of the SR 152 (North) to Road 11 Wye Alternative

Feature	SR 152 (North) to Road 11 Wye
Total length (linear miles)[1]	51
At-grade profile (linear miles)[1]	46.5
Elevated profile (linear miles)[1]	4.5
Below-grade profile (linear miles)[1]	0
Number of straddle bents	27
Number of railroad crossings	1
Number of major water crossings	13
Number of road crossings	57
Approximate number of public roadway closures	33
Number of roadway overcrossings and undercrossings	24
Traction power substation sites	1
Switching and paralleling stations	1 switching stations, 7 paralleling stations
Signaling and train-control elements	19
Communication towers	9
Wildlife crossing structures	37

Source: Merced to Fresno Section: Central Valley Wye Final 15% Engineering Plans

[1] Lengths shown are based on equivalent dual-track alignments and are one-way mileages. For example, the length of single-track elevated structure will be divided by a factor of 2 to convert to dual-track equivalents.

2.6 Central Valley Wye Impact Avoidance and Minimization Features

The Authority has developed IAMFs that would avoid or minimize potential effects and mitigation measures that would avoid or reduce significant impacts that exist after the application of all appropriate IAMFs. IAMFs are standard practices, actions, and design features that are incorporated into the Central Valley Wye description. Mitigation measures consist of practices, actions, and design features that are applied to the Central Valley Wye after an impact is identified. Appendix A, California High-Speed Rail Impact Avoidance and Minimization Features for Transportation, presents complete descriptions of all IAMFs related to transportation. Volume 2 of the Supplemental EIR/EIS, Appendix 2-B, California High-Speed Rail: Impact Avoidance and Minimization Features, presents complete descriptions of all IAMFs.

The Authority and FRA will implement the following IAMFs to address potential Central Valley Wye effects on transportation. These IAMFs include measures that are specific to transportation:

- TR-IAMF#1: Protection of Public Roadways during Construction
- TR-IAMF#2: Construction Transportation Plan
- TR-IAMF#3: Off-Street Parking for Construction-Related Vehicles
- TR-IAMF#4: Maintenance of Pedestrian Access
- TR-IAMF#5: Maintenance of Bicycle Access

- TR-IAMF#6: Restriction on Construction Hours
- TR-IAMF#7: Construction Truck Routes
- TR-IAMF#8: Construction during Special Events
- TR-IAMF#9: Protection of Freight and Passenger Rail during Construction
- TR-IAMF#10: Maintenance of Transit Access

3 LAWS, REGULATIONS, AND ORDERS

Federal, state, and local laws, regulations, and orders that pertain to transportation and traffic resources in the Central Valley Wye are presented in this section. For complete descriptions, refer to Section 3.2.2, Laws, Regulations, and Orders, of the Merced to Fresno Final EIR/EIS (Authority and FRA 2012a: pages 3.2-1 through 3.2-3). Where applicable, the summaries and table that follow identify updates or amendments that have been made since the Merced to Fresno Final EIR/EIS was completed.

3.1 Federal

3.1.1 Procedures for Considering Environmental Impacts (64 Fed. Reg. 28545)

These FRA procedures state that an EIS should consider possible impacts on transportation. These impacts include impacts on passengers and freight transportations; impacts on all modes of transport (including bicycle and pedestrian transport); impacts from relevant perspectives (including local, regional, and state perspectives); and impacts on roadway traffic congestion.

3.2 State

3.2.1 California Government Code Section 65080

The State of California requires each transportation planning agency to prepare and adopt a regional transportation plan (RTP) directed at achieving a coordinated and balanced regional transportation system. The regional transportation plans that are relevant to the Central Valley Wye study area are described in Section 3.3.

3.2.2 California Government Code Section 14036

This law requires Caltrans to produce a State Rail Plan that includes a passenger and freight rail component. The 2013 *California State Rail Plan* was developed to meet this requirement. It establishes a statewide vision and objectives, sets priorities, and develops policies and implementation strategies to enhance passenger and freight rail service in the public interest. It also details a long-range investment program for California's passenger and freight infrastructure.

3.2.3 California Streets and Highways Code Section 1 et seq.

This code provides the provisions and standards for the administration of the statewide streets and highways system. Designated SR and Interstate Highway facilities are under the jurisdiction of Caltrans, except where management of the facility has been delegated to the county transportation authority or other entity, including the San Joaquin Train, which is administered by a Joint Powers Authority.

3.3 Regional and Local (Updated Since Merced to Fresno Final EIR/EIS)

Table 3-1 identifies the county and city general plans related to transportation applicable to the Central Valley Wye. These goals and policies were considered in the preparation of this analysis.

Table 3-1 Regional and Local Plans and Policies

Policy Title	Summary
Regional Plans	
2014 Regional Transportation Plan for Merced County (2014) *(Updated since the Merced to Fresno Final EIR/EIS)*	▪ Provide a good system of roads that are well maintained, safe, efficient and meet the transportation demands of people and freight. ▪ Establishes an LOS standard of D.[6] Any segment of roadway that is operating at worse than LOS D is considered to be a deficiency in the transportation system. These deficiencies may then become the basis for project priorities in the capital improvement program. ▪ Provide an efficient, effective, coordinated regional transit system that increases mobility for urban and rural populations, including transportation disadvantaged persons. ▪ A passenger rail system that provides safe and reliable service for passengers. ▪ Establish a High-Speed Rail system connecting Merced and Los Banos to Sacramento and the Bay Area. ▪ Support the High-Speed Rail planning process and actively provide comments and input. ▪ Provide a transportation system that enables safe movement of goods in and through Merced County. ▪ A fully functional and integrated air service and airport system complementary to the countywide transportation system. ▪ A regional transportation system for bicyclists and pedestrians.
Madera County 2014 Regional Transportation Plan (2014) *(Updated since the Merced to Fresno Final EIR/EIS)*	▪ To promote Intermodal Transportation Systems that are fully accessible, encourage quality growth and development, support the region's environmental resource management strategies, and are responsive to the needs of current and future travelers. ▪ To promote and develop transportation systems that stimulate, support, and enhance the movement of people and goods to foster economic competitiveness of the Madera Region. ▪ To enhance transportation system coordination, efficiency, and intermodal connectivity to keep people and goods moving and meet regional transportation goals. ▪ To maintain the efficiency, safety, and security of the region's transportation system. ▪ To improve the quality of the natural and human-built environment through regional cooperation of transportation systems planning activities. ▪ To maximize funding to maintain and improve the transportation network. ▪ To identify reliable transportation choices that support a diverse population. ▪ To protect the environment and health of residents by improving air quality and encouraging active transportation (non-motorized transportation, such as bicycling and walking). ▪ Establishes minimum standards of LOS D for analysis of the county's transportation system (local streets and roads) and LOS C for state routes (Madera County 2014).

[6] LOS is used to measures the efficiency of traffic operations at a location, whether roadway, highway or intersection. LOS for these facilities is defined in detail in Section 4.2.2, Traffic Operational Standards.

Policy Title	Summary
Merced County	
2030 Merced County General Plan (2013) *(Updated since the Merced to Fresno Final EIR/EIS)*	▪ Goal CIR-1: Maintain an efficient roadway system for the movement of people and goods that enhances the physical, economic, and social environment while being safe, efficient, and cost-effective. ▪ Table CIR-1: Describes the desired roadway characteristics for each roadway classification type within the county. ▪ Policy CIR-1.5: Implement a countywide roadway system that achieves the following LOS standards during peak traffic periods: (A) For roadways located within rural areas – LOS C or better; (B) For roadways located outside Urban Communities that serve as connectors between Urban Communities – LOS D or better; (C) For roadways located within Urban Communities – LOS D or better. ▪ Policy AG-2.16: Coordinate with the California High Speed Rail Authority to locate the high-speed rail lines along existing major transportation corridors, such as State Routes 99 or 152, to minimize the conversion of productive agricultural land to nonagricultural uses. ▪ Policy CIR-5.5: Work with other agencies to plan railroad corridors that facilitate the preservation of important rail line right-of-way for further rail expansion or other appropriate transportation facilities.
Madera County	
Madera County General Plan (1995)	▪ Goal 2.A: To provide for the long-range planning and development of the county's roadway system, ensure the safe and efficient movement of people and goods, and provide sufficient access to existing and new development. ▪ Policy 2.A.5: The County shall minimize the adverse impacts of road construction and vehicular traffic on the environment and adjacent land uses. Appropriate erosion control measures shall be included in driveway and roadway design. These measures shall be subject to approval by the County Engineering Department. ▪ Policy 2.A.8: The County shall develop and manage its roadway system to maintain a minimum LOS D on all state and county roads. ▪ Policy 2.A.9: To identify the potential impacts of new development on traffic service levels, the County shall require the preparation of traffic impact analyses for developments determined to be large enough to have potentially significant traffic impacts. ▪ Policy 2.A.10: The County shall strive to meet LOS standards through a balanced transportation system that provides alternatives to the automobile. ▪ Policy 2.B.8: The County shall encourage and promote the use of passenger rail. ▪ Goal 2.C: To maximize the efficient use of transportation facilities as to: 1) reduce travel demand on the county's roadway system; 2) reduce the amount of investment required in new or expanded facilities; 3) reduce the quantity of emissions of pollutants from automobiles; and 4) increase the energy-efficiency of the transportation system.

Policy Title	Summary
City of Chowchilla	
City of Chowchilla 2040 General Plan (2011) *(Updated since the Merced to Fresno Final EIR/EIS)*	▪ Objective CI-2: Provide timely and effective means of programming and constructing street and highway improvements to maintain an overall LOS standard of LOS C, with peak hour LOS D acceptable in some instances. ▪ Identifies the importance of arterial street connectivity and the potential impacts on connectivity from the Union Pacific Railroad corridor and the SR 99 corridor. ▪ Identifies the future potential relocation of the Chowchilla Municipal Airport and calls for a review of alternative locations over the next 10 years.

Source: MCAG 2014; Madera County 2014; MCAG 2013; Madera County 1995; City of Chowchilla 2011.
LOS = level-of-service

3.3.1 Airport Master Plans

The Draft Madera Countywide Airport Land Use Compatibility Plan was updated in July 2015 and contains the individual Compatibility Plan for the Chowchilla Municipal Airport. As a public-service airport owned and operated by the city, the Chowchilla Municipal Airport is subject to an airport master plan and land use compatibility plan prepared by the Madera County Airport Land Use Commission, for regulating land use within airport safety zones to minimize airport hazards and risk of accidents. See Section 3.2.4.1, Regional Transportation System, of the Merced to Fresno Final EIR/EIS (Authority and FRA 2012a: page 3.2-10) for more information.

3.3.2 Public Transportation Plans

Public transportation agencies must adopt plans that guide future service and facilities development. The *Short Range Transit Plan 2012–2017* (Transit JPA for Merced County 2012) reviews the public transit services within Merced County, lays out a 10-Year Vision for an enhanced transit network and proposes a stepwise approach to pursing that vision over the next 5 years, under two potential scenarios.

The 2014 Madera County RTP includes information about public transportation. The county's public transportation is provided by fixed-route and demand-response transit systems including city providers, county-related providers, private providers and passenger rail service.

3.3.3 Transportation Plans, Policies, and Programs for Non-Motorized Transportation

Both regional and local governments must adopt plans for non-motorized transportation to guide public investment in capital infrastructure and operational programs. The *Merced County Regional Bicycle Transportation Plan* (MCAG 2008) provides a comprehensive long-range view for the development of an extensive regional bikeway network that connects cities and unincorporated areas countywide.

The *City of Merced 2013 Bicycle Transportation Plan* (City of Merced 2013) is a comprehensive planning document that describes Merced's existing bikeway system, a vision for its future, and a prioritized list of projects to be constructed. The Merced Bicycle Transportation Plan also enables the City of Merced to compete for state funds for bike-related improvements.

The *Madera County 2004 Regional Bicycle Transportation Plan* (MCTC 2004) addresses the needs of commuting and recreational cyclists throughout the county, and suggests needed improvements and additions to the bikeway routes and facilities. The plan also serves as a basis for future investment in bicycle and pedestrian infrastructure and identifies development priorities, funding sources, and grant opportunities.

4 METHODS FOR EVALUATING EFFECTS

4.1 Definition of Resource Study Area

The RSA for direct effects includes the area of potential disturbance associated with Central Valley Wye construction as well as relevant transportation facilities within 0.5 mile. For indirect effects on transportation, the RSA includes the extent of the roadway networks that may experience change in traffic volume or more than 50 peak-hour vehicular trips as a result of the Central Valley Wye.

4.2 Methods for Effects Analysis

4.2.1 Study Approach and Baseline

Per CEQA requirements, an EIR must include a description of the existing physical environmental conditions in the vicinity of the project. Those conditions, in turn, "will normally constitute the baseline physical conditions by which a lead agency determines whether an impact is significant" (CEQA Guidelines §15125[a]). An impact analysis therefore establishes baselines upon which the analyses of impacts on transportation resources are based. Analysts used a baseline of existing conditions as of 2015 and 2016 for assessing potential transportation impacts. Impacts could include any road closures or lane reconfigurations that will be implemented during construction. These could be temporary impacts associated with construction, as well as permanent impacts on traffic movement through the altered transportation network.

The evaluation considered both direct and indirect effects. Direct effects of the Central Valley Wye on transportation include temporary construction effects, permanent road closures and modification, and the resulting effects on roadway levels of service. Indirect effects of the Central Valley Wye on transportation include effects on the regional transportation system, including changes in trip generation, transit services, or non-motorized modes of travel.

Because no HSR stations or other traffic-generating sources such as maintenance facilities are proposed within the RSA, operations of the Central Valley Wye are not anticipated to generate any additional traffic beyond what would exist in the roadway system as a result of build-out under the counties and city general plans. The only notable effect of the Central Valley Wye on the roadway network would be the rerouting of traffic due to permanent road closures or other roadway modifications. Representative roadway segments that could experience an increase in traffic volumes due to road closures and modifications as a result of the Central Valley Wye were selected for this study. Due to the low traffic volumes in the local roadway network in the RSA (i.e. most roadways had average daily traffic volumes of less than 500 vehicles, with many having average daily traffic volumes of less than 50 vehicles), an intersection analysis is not required. At such low volumes, intersection level of service (LOS) would never be worse than the General Plan target LOS.

Analysts reviewed the proposed roadway modifications (road closures and grade separations) due to the Central Valley Wye alternatives in detail to determine possible traffic rerouting. The likely new routes taken by this diverted traffic were also reviewed. Traffic volumes of many of the roadways in the surrounding street network were collected in 2012, 2013, and 2016. Depending on the Central Valley Wye alternative, 11 or 12 representative roadway segments that would likely serve as new routes for the rerouted traffic were selected for traffic analysis. Hourly traffic counts at these locations were collected.

In general, traffic on all roadways in this rural region is anticipated to grow at or below 1 percent every year. Hence, this study assumes the more conservative (i.e., less likely to underestimate traffic impacts) estimate of 2.5 percent annual growth for traffic volumes in the RSA. The traffic volumes on the roadway segments are escalated to 2015 and 2040 based on a growth rate of 2.5 percent per year, which is consistent with projected population growth in Merced and Madera Counties from 2010 and 2040 (CDOF 2013). Appendix B, Madera Traffic Model Statistics, presents the traffic volume and traffic growth rate increase near the RSA from 2010 to 2020, 2010 to 2035 and 2010 to 2040, by facility type available in the Madera County Traffic Model. Based on

the traffic model, traffic growth rates in the roadways in the region are projected to grow at or below 2.5 percent per year.

Some highway interchanges are proposed to be modified as part of the Central Valley Wye. The design of these interchanges will be finalized at a later stage. Throughout Central Valley Wye design, the Authority has coordinated and will continue to coordinate with Caltrans and local jurisdictions regarding potential effects on their facilities, such as the future HSR crossing of the SR 99/SR 152 interchange.

4.2.2 Traffic Operational Standards

The efficiency of traffic operations at a location is measured in terms of LOS. LOS is the primary unit of measure for the operating quality of a highway, roadway, or intersection. For highway and roadway segments, LOS is calculated by comparing the actual number of vehicles using a facility to its carrying capacity. At intersections, LOS measures time delay experienced per vehicle.

The *Highway Capacity Manual* (Transportation Research Board 2010) is a widely referenced source, providing techniques to measure transportation facility performance. Using procedures from the manual, the quality of traffic operations is graded using one of six LOS designations: A, B, C, D, E, or F. A designation of LOS A represents excellent (free-flow) conditions, while a designation of LOS F represents oversaturated (congested) conditions.

4.2.2.1 Roadways

The LOS for roadway segments are based on: (1) the volume of traffic for designated sections of roadway (segment) during a typical day, and (2) the practical vehicular capacity of that segment. These two measures are used to determine the volume-to-capacity (V/C) ratio for that segment. The *2012 Florida Department of Transportation Quality/Level of Service Handbook* (FDOT 2012) was used to determine the vehicular capacity of roadways. These planning-level guidelines are quoted extensively in transportation planning and traffic engineering sectors, and are shown in Table 4-1.

Table 4-1 Level of Service Thresholds (LOS)

Area	Facility	Interchanges	Intersections	Flow	Lanes	Median	Level of Service					Qty
							A	B	C	D	E	
Urban	Freeway	<2 miles apart	N/A	N/A	4	N/A	22,000	36,000	52,000	67,200	76,500	1
Urban	Expressway	N/A	N/A	N/A	4	Divided	**	**	21,400	31,100	32,900	1
Urban	Highway	N/A	N/A	Uninterrupted	2	Undivided	2,000	7,000	13,800	19,600	27,000	1
Urban	Highway	N/A	<2/mile		2	Undivided	**	4,200	13,800	16,400	16,900	1
Urban	Highway	N/A	<4.5/mile		2	Undivided	**	1,900	11,200	15,400	16,300	1
Urban	Collector	N/A	N/A	N/A	2	Undivided	**	**	4,800	10,000	12,600	1
Urban	Highway	N/A	<4.5/mile	N/A	4	Undivided	**	3,500	23,200	29,100	30,600	1
Urban	Arterial	N/A	N/A	N/A	4	Undivided	**	**	15,600	27,800	29,400	1
Urban	Highway	N/A	<2/mile	N/A	4	Undivided	3,500	20,900	24,600	25,700	**	1
Urban	Collector	N/A	N/A	N/A	4	Undivided	**	**	9,800	19,200	22,800	1
Urban	Highway	N/A	<2/mile	N/A	2	Undivided	**	4,000	13,100	15,500	16,300	1
Urban	Arterial	N/A	N/A	N/A	2	Undivided	**	**	7,000	13,600	14,600	2
Transitioning /Urban	Freeway	N/A	N/A	N/A	4	N/A	23,500	38,700	52,500	62,200	69,100	5
Transitioning /Urban	Collector	N/A	N/A	N/A	2	Undivided	**	**	4,400	9,400	12,000	31
Rural	Freeway	N/A	N/A	N/A	6	N/A	33,100	54,300	73,900	87,400	97,200	1
Rural	Freeway	N/A	N/A	N/A	4	N/A	21,300	35,300	47,900	56,600	63,000	4
Rural	Non-Fwy	N/A	N/A	Uninterrupted	4	Divided	17,500	28,600	40,800	52,400	58,300	4
Rural	Non-Fwy	N/A	N/A	Isolated Stops	4	N/A	**	2,900	17,400	23,000	25,200	2
Rural	Non-Fwy	N/A	N/A	Uninterrupted	2	Undivided	2,600	5,300	8,600	13,800	22,300	70
Rural	Non-Fwy	N/A	N/A	Isolated Stops	2	Undivided	**	1,900	8,000	10,700	12,100	30
Suburban	Non-Fwy	N/A	N/A	Interrupted	4	Divided	**	5,300	25,500	29,400	31,200	2

Area	Facility	Interchanges	Intersections	Flow	Lanes	Median	Level of Service					Qty
							A	B	C	D	E	
Suburban	Highway	N/A	N/A	Uninterrupted	2	Undivided	2,500	7,200	12,700	17,300	23,500	1
Suburban	Arterial	N/A	N/A	Interrupted	2	Undivided	**	2,200	11,000	13,900	14,900	5
Suburban	Collector	N/A	N/A	N/A	2	Undivided	**	**	1,900	7,600	10,100	17

Source: Florida Department of Transportation Quality/Level of Service Handbook, 2012

The V/C ratio is then converted to an alpha descriptor identifying operating conditions and expressed as an LOS (LOS A through LOS F). LOS A identifies the best operating conditions along a section of roadway and is characterized by free-flow traffic, low volumes, and few or no restrictions on maneuverability. LOS F characterizes forced traffic flow with high traffic densities, slow travel speeds, and often stop-and-go conditions. Table 4-2 defines and describes the LOS criteria for the roadway segment analysis.

Table 4-2 Roadway Segment Level-of-Service Criteria

Level-of-Service	Volume-to-Capacity Ratio	Definition
A	0.00–0.60	Primarily free-flow operation. Vehicles are completely unimpeded in their ability to maneuver within the traffic stream. Control delay at the boundary intersection is minimal. The travel speed exceeds 85% of the base free-flow speed, and the volume-to-capacity ratio is no greater than 1.0.
B	0.61–0.70	Reasonably unimpeded operation. The ability to maneuver within the traffic stream is only slightly restricted, and control delay at the boundary intersection is not significant. The travel speed is between 67% and 85% of the base free-flow speed, and the volume-to-capacity ratio is no greater than 1.0..
C	0.71–0.80	Stable operation. The ability to maneuver and change lanes at midsegment locations may be more restricted than at LOS B. Longer queues at the boundary intersection may contribute to lower travel speeds. The travel speed is between 50% and 67% of the base free-flow speed, and the volume-to-capacity ratio is no greater than 1.0..
D	0.81–0.90	A less stable condition in which small increases in flow may cause substantial increases in delay and decreases in travel speed. This operation may be due to adverse signal progression, high volume, or inappropriate signal timing at the boundary intersection. The travel speed is between 40% and 50% of the base free-flow speed, and the volume-to-capacity ratio is no greater than 1.0.
E	0.91–1.00	Characterized by unstable operation and significant delay. Such operations may be due to some combination of adverse progression, high volume, and inappropriate signal timing at the boundary intersection. The travel speed is between 30% and 40% of the base free-flow speed, and the volume-to-capacity ratio is no greater than 1.0.
F	>1.00	Characterized by flow at extremely low speed. Congestion is likely occurring at the boundary intersection, as indicated by high delay and extensive queuing. The travel speed is 30% or less of the base free-flow speed, or the volume-to-capacity ratio is greater than 1.0.

Source: Transportation Research Board, 2010
LOS = level-of-service

4.3 High-Speed Rail Recommended Significance Criteria

The following are the recommended criteria for roadway segments, and are generally consistent with the local agency criteria. It should be noted that while the HSR-recommended criteria considers LOS D the impact threshold for roadways, Caltrans and Chowchilla use a more stringent LOS standard of C. The Authority uses a single standard statewide to make sure all jurisdictions are treated equally. LOS D was selected because it is the most common standard used for the areas of the state relevant to HSR. While the Authority might have selected LOS C instead, doing so would have resulted in many cases of the Authority having to improve roadways

beyond what the local agencies want or need, which would unnecessarily raise the cost of HSR for all Californians. Moreover, as shown in subsequent sections of this report, whether the threshold used for determining impacts is LOS C or D is inconsequential because roadways affected by the Central Valley Wye continue to operate at an acceptable LOS of C or better.

For roadway segments, a substantial change in the V/C ratio between the 2015 existing conditions and project conditions would be:

- A reduction in LOS below LOS D

For segments that are projected to operate at LOS E or F under 2015 existing conditions:

- An increase in the V/C ratio by 0.04 or more

5 AFFECTED ENVIRONMENT

This section describes the affected environment for transportation in the Central Valley Wye vicinity, including major roadways, traffic volumes, truck routes and volumes, transit service and facilities, rail service and facilities, and aviation services and facilities.

5.1 Regional and Local Roadway Network

The system of major roadways parallel to and crossing the proposed Central Valley Wye alternatives is part of the local and regional network serving the communities along the RSA. All roadways are classified according to their primary functions. Major roadways in the RSA and regionally significant roadways in the RSA are presented on Figures 5-1 and 5-2, respectively.

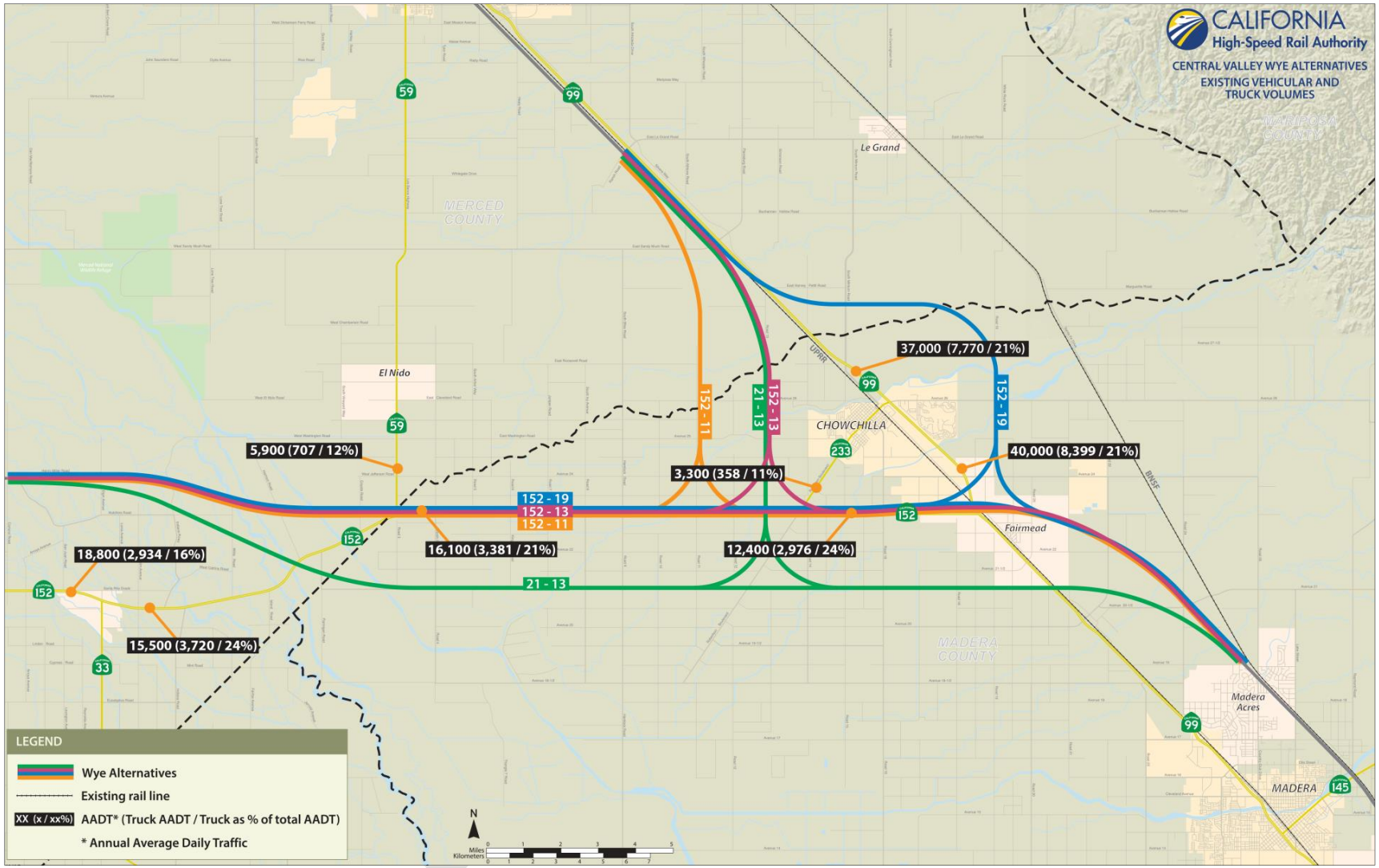
- **Freeway—**A major roadway with controlled access, devoted exclusively to traffic movement, mainly of a through or regional nature.
- **Expressway—**A major roadway with a mix of controlled and uncontrolled access, linking freeways with arterials and providing access to major destinations.
- **Arterial—**A major roadway mainly taking traffic to and from expressways and freeways and providing access to major destinations as well as adjacent properties.
- **Collector—**A roadway that collects and distributes traffic to and from arterials and provides access primarily to and from adjacent properties.
- **Local—**The lowest category of roadway, providing access to and from individual properties and distributing local traffic to and from the higher roadway classifications, particularly collector streets.

5.2 Existing Major Roadways

5.2.1 Major State Routes

Regional access in the RSA is provided by SR 59, SR 99, SR 152, and SR 233. Traffic volumes on the state routes are collected and compiled by Caltrans and presented as annual average daily traffic (AADT). AADT is the 24-hour volume at a given location averaged over a 365-day year. These roadways and respective AADT (available as of December 2014) are shown on Figure 5-1 and described in this section.

- **SR 59** is a north-south route beginning at SR 152 at the Merced County–Madera County line and extending north through Merced and beyond. The AADT ranged between 5,700 and 11,500 vehicles in the RSA in 2013 (Caltrans 2013).
- **SR 99** is a major north-south highway connecting Central Valley cities, including Merced and Fresno, and serves as a major truck route for the transportation of agricultural products. It is also a major commuter route and connects recreational sites such as Yosemite National Park, the Sierra Nevada forest, Kings Canyon National Park, and Sequoia National Park. SR 99 is currently a four-lane freeway between SR 152 and the Merced County line. SR 99 is a four-lane expressway between Avenue 21 and SR 152. On SR 99 in 2013, AADT was about 38,000 vehicles near SR 152, and about 37,500 vehicles near SR 233 (Caltrans 2013).
- **SR 152** is generally an east-west roadway and operates as a four-lane divided expressway within the RSA. Based on Caltrans 2013 data, the AADT ranges from 14,900 to 33,500 in the RSA. SR 152 is a designated truck route throughout the RSA (Caltrans 2013).
- **SR 233** is generally a northeast-southwest arterial extending between SR 99 and SR 152 near Chowchilla in Madera County. SR 233 is also known as Robertson Boulevard and is owned and maintained by Madera County. SR 233 is a two- to four-lane facility with no high-occupancy vehicle lanes. The AADT ranges from 3,300 to 12,600 (Caltrans 2013).



Source: Authority, 2016b; Caltrans, 2013, 2015

FINAL – SEPTEMBER 1, 2016

Figure 5-1 Existing Vehicular and Truck Volumes in the Resource Study Area

5.2.2 Regionally Significant Roadways

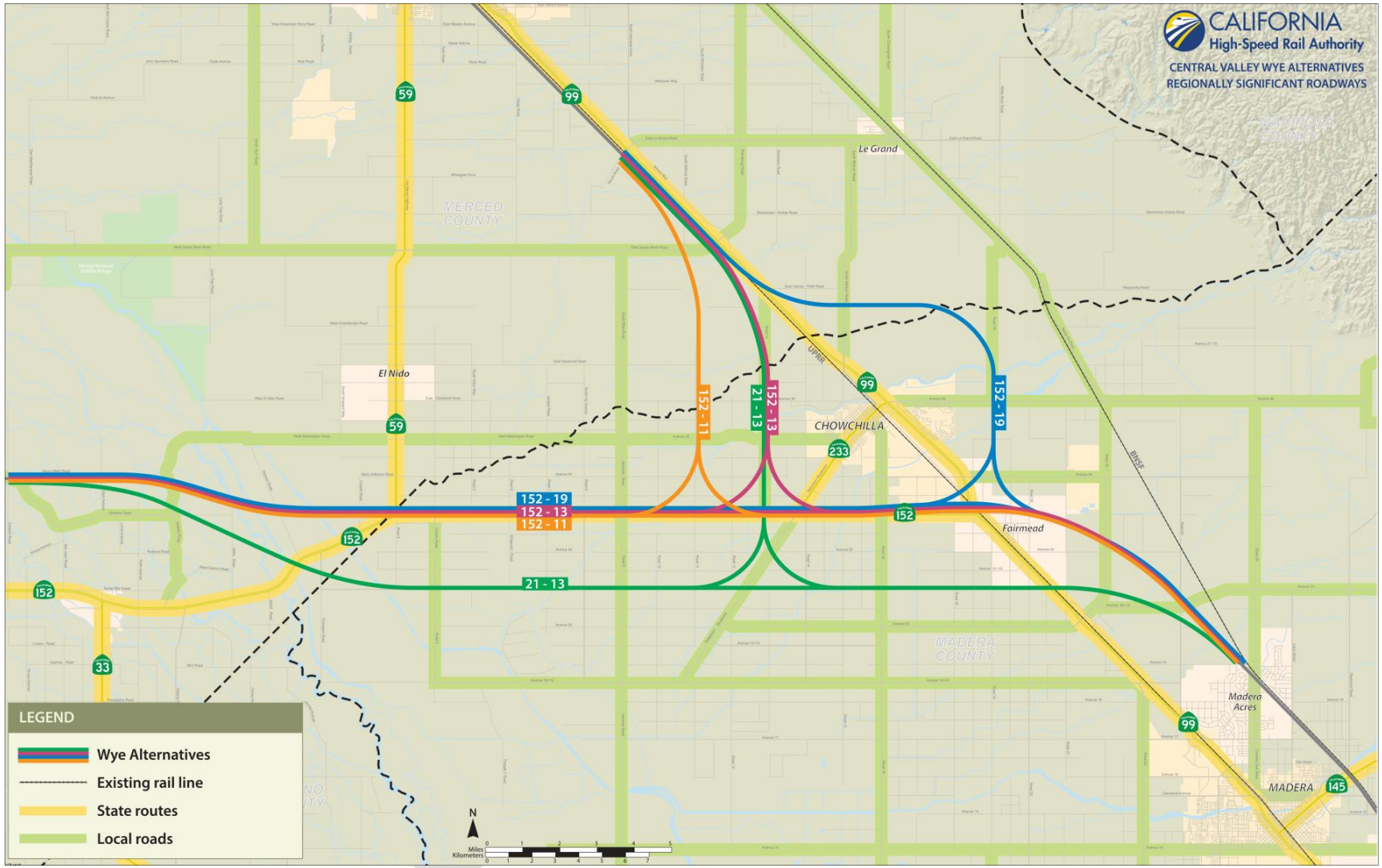
Merced County Association of Governments and the Madera County Transportation Commission have developed a "Regionally Significant Road System" based on the Federal Highway Administration's functional classification system of streets and highways. The region contains state routes as well as other regionally significant roadways that serve as connections to population centers outside of the RSA. Regionally significant roads within and around the RSA are presented on Figure 5-2.

5.2.3 Regional Truck Routes

The Federal Surface Transportation Assistance Act of 1982 defined a system to describe truck routes. The truck routes within the RSA include both national network and terminal access routes, as follows:

- **National Network (Federal)—**National network truck routes are federal highways. SR 99 is the only national network truck route within the RSA.
- **Terminal Access (State, Local)—**Terminal access routes are portions of state routes or local roads that can accommodate trucks. Within the RSA, the only terminal access routes are SR 59 and SR 152.

Figure 5-1 presents the total truck volumes on the designated truck route in the RSA. Similar to the roadway volumes, truck volumes are expressed as the annual average daily truck volume, which is total truck volume averaged over a 365-day year. The most recent truck volumes available from Caltrans were from 2014 (as of September 2016). The total truck volume includes the number of trucks with two or more axles. The total truck volumes expressed as a percentage of the total AADT volumes are also presented on Figure 5-1.



Source: Authority, 2016b; MCAG, 2014; Madera County, 2014

FINAL – JULY 7, 2016

Figure 5-2 Regionally Significant Roadways near the Resource Study Area

5.3 Corridor Traffic Volumes

Both Merced and Madera Counties are in the San Joaquin Valley. In the past two decades, the San Joaquin Valley has transformed from an agricultural economy to a more diversified economy.

SR 99, SR 40, SR 41, SR 145, SR 152 and SR 233 are the major state routes in Madera County. Traffic volumes of selected segments of SR 99, SR 59, SR 152, and SR 233, which fall within or near the Central Valley Wye RSA, are presented in Table 5-1.

Travel along the major corridors in Merced County is mostly in a north-south direction. The county is accessible by I-5 to the west and SR 99 to the east. SR 152 and SR 59 provide the major east-west connections between I-5 and SR 99. Table 5-1 shows the traffic volumes on selected segments of these highways within the Central Valley Wye RSA under 2012 and escalated 2015 conditions.

Table 5-1 2012 and 2015 Annual Average Daily Traffic and Peak Hour Volume on Resource Study Area Highways

Highway	Location[1]	2012		2015[3]	
		AADT[2]	Peak-Hour Traffic[2]	AADT[2]	Peak-Hour Traffic[2]
SR 152	Merced/Madera County line	16,500	1,600	18,563	1,800
	SR 59	16,000	1,450	18,000	1,631
	SR 233[3]	15,500	1,600	17,438	1,800
	SR 33	18,800	1,550	21,150	1,744
SR 59	SR 152	5,000	450	5,625	506
SR 99[2]	SR 233	37,000	3,350	41,625	3,769
	SR 152	37,000	3,300	41,625	3,713
SR 233[2]	SR 152	3,600	3,80	4,050	428

Source: Caltrans, 2014
[1] Traffic volumes east or north of the specified location are presented in the table
[2] Two-way Volumes
[3] Traffic escalated by 2.5 percent per year. A worst-case scenario for these state routes.
AADT = annual average daily traffic
SR = State Route

5.3.1 Major Roadway Traffic Volumes

Major roadways in the traffic study other than the state routes (SR 59, SR 99, SR 152, and SR 233) include Avenue 21, Avenue 24, Road 13, and Road 19. Traffic volumes on selected segments of these roadways are presented in Tables 5-2 through 5-4, most of which have very low traffic volumes.

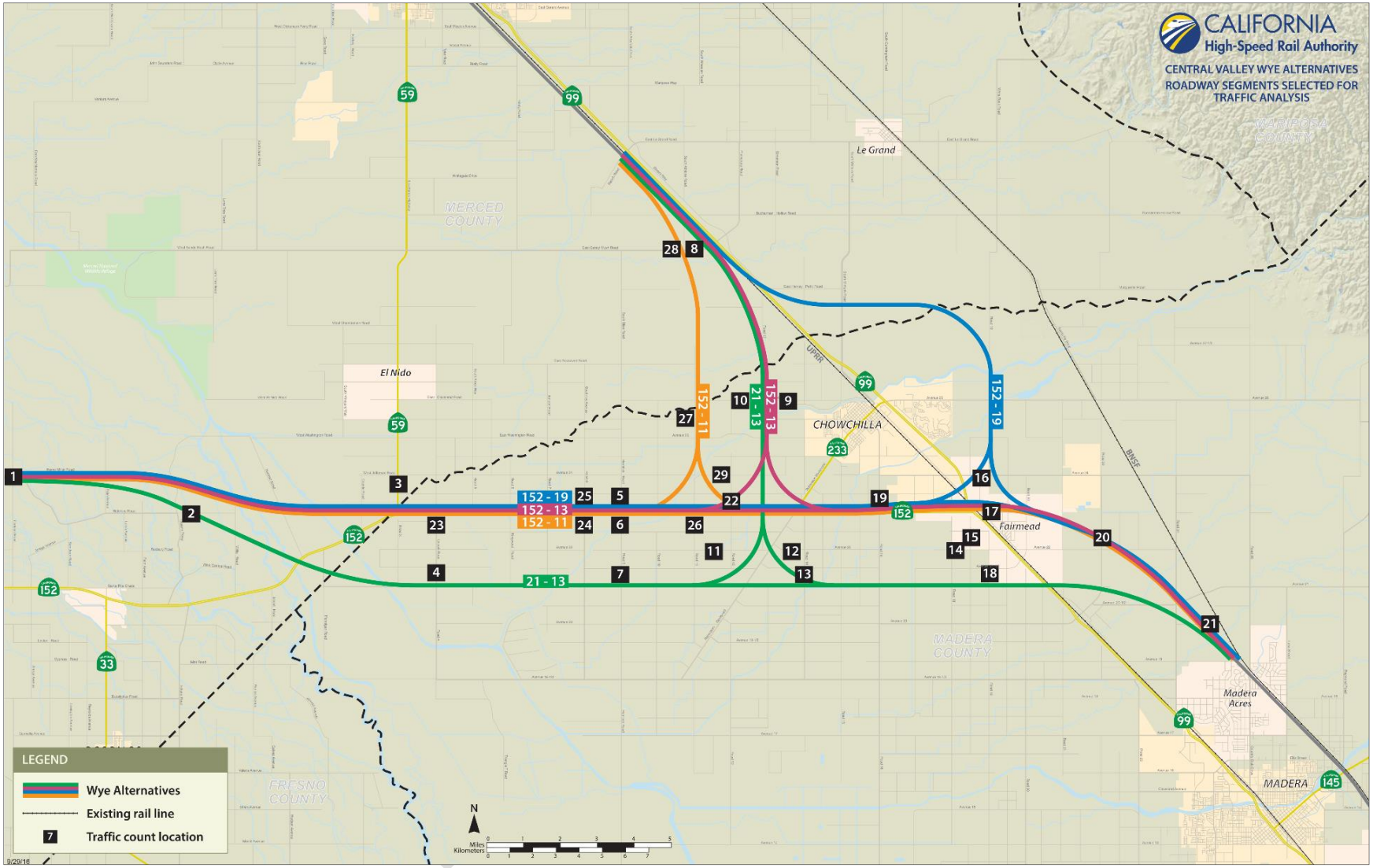
Figure 5-1 presents the traffic volume at selected locations along SR 59, SR 99, SR 152, and SR 233 within the RSA. These numbers represent the total volume across all lanes in both directions. The figure also presents the total truck volume and the truck volume as a percentage of the total vehicular volume. As of September 2016, the latest truck volumes available from Caltrans are from year 2014, which are presented in Figure 5-1.

5.3.2 Roadway Operations along Central Valley Wye Alternatives

As explained in Section 4.2.1, Study Approach and Baseline, the proposed roadway modifications (road closures and grade separations) due to the Central Valley Wye alternatives were reviewed in detail to determine possible traffic rerouting. The traffic volumes in the surrounding street

network which would likely serve this diverted traffic were also reviewed. Depending on the alternative, 11 or 12 representative roadway segments that would likely serve the rerouted traffic were selected for traffic analysis. Due to the low traffic volume in the local roadway network in the RSA, all intersections have an LOS of C or better and so intersection analyses were not conducted.

Figure 5-3 shows the location of the study segments with respect to the proposed Central Valley Wye alternatives. Traffic volume was collected at these locations (24-hour tube counts). Appendix C, Traffic Counts at Study Locations, presents the traffic counts collected at these locations.



Source: Authority, 2016b; Traffic count locations selected by Parsons Transportation Group in 2012, 2013, and 2016

FINAL – SEPTEMBER 30, 2016

Figure 5-3 Roadway Segments Selected for Traffic Analysis

The following sections describe current roadway operating conditions of the study segments presented on Figure 5-3. All roadway traffic volumes were counted in 2012 or 2013 and were escalated to 2015.

5.3.2.1 SR 152 (North) to Road 13 Wye Alternative

This section discusses existing (2015) roadway conditions under the SR 152 (North) to Road 13 Wye Alternative. Existing (2015) peak hour conditions of selected roadway segments in the RSA are presented in Table 5-2. As shown in the table, these roads experience low traffic volumes and all roadway segments operate at LOS A. The highest traffic volume in the RSA occurs along Los Banos Highway, which at its peak experiences traffic volumes of less than half its capacity.

Table 5-2 Existing (2015) Roadway Operations along SR 152 (North) to Road 13 Wye Alternative

Count #	Roadway	Location	Lanes	Existing (2015) No Project					
				AM Peak			PM Peak		
				Volume	V/C	LOS	Volume	V/C	LOS
1	Henry Miller Road	Near Hutchins Road	2	35	0.03	A	20	0.02	A
3	Los Banos Highway	North of Avenue 23 1/2	2	463	0.39	A	533	0.45	A
5	Hemlock Road	North of SR 152	2	52	0.04	A	28	0.02	A
6	Hemlock Road	South of SR 152	2	29	0.02	A	22	0.02	A
8	E. Sandy Mush Road	West of SR 99	2	20	0.02	A	26	0.02	A
9	Avenue 25	East of Road 14	2	49	0.04	A	88	0.07	A
10	Avenue 25	West of Road 13	2	126	0.11	A	101	0.08	A
17	Avenue 23	East of Fairmead Boulevard	2	5	0.00	A	11	0.01	A
19	Road 16	at SR 152	2	125	0.10	A	142	0.12	A
20	Road 22	North Avenue 22	2	352	0.29	A	209	0.17	A
21	Avenue 20	West of Road 25	2	6	0.01	A	9	0.01	A
22	Road 12	at SR 152	2	11	0.01	A	18	0.02	A

Source: Author's compilation from traffic counts conducted by Parsons Transportation Group in 2012, 2013, and 2016
LOS standard pursuant to Merced County guidelines (LOS D for rural highway, LOS C for all other rural roads) and Madera County guidelines (LOS D).
Volume = two-way peak-hour volume
V/C = volume-to-capacity ratio
LOS = level-of-service
SR = State Route

5.3.2.2 SR 152 (North) to Road 19 Wye Alternative

This section presents existing (2015) roadway conditions under the SR 152 (North) to Road 19 Wye Alternative. Existing (2015) peak hour conditions of selected roadway segments in the RSA are presented in Table 5-3. As shown in the table, these roads experience low traffic volumes and all roadway segments operate at LOS A.

Table 5-3 Existing (2015) Roadway Operations along SR 152 (North) to Road 19 Wye Alternative

Count #	Roadway	Location	Lanes	Existing (2015) No Project					
				AM Peak			PM Peak		
				Volume	V/C	LOS	Volume	V/C	LOS
1	Henry Miller Road	Near Hutchins Road	2	35	0.03	A	20	0.02	A
3	Los Banos Highway	North of Avenue 23 1/2	2	463	0.39	A	533	0.45	A
5	Hemlock Road	North of SR 152	2	52	0.04	A	28	0.02	A
6	Hemlock Road	South of SR 152	2	29	0.02	A	22	0.02	A
8	E Sandy Mush Road	West of SR 99	2	20	0.02	A	26	0.02	A
16	Avenue 24	East of Avenue 18 3/4	2	96	0.08	A	62	0.05	A
17	Avenue 23	East of Fairmead Boulevard	2	5	0.00	A	11	0.01	A
19	Road 16	at SR 152	2	125	0.10	A	142	0.12	A
20	Road 22	North Avenue 22	2	352	0.29	A	209	0.17	A
21	Avenue 20	West of Road 25	2	6	0.01	A	9	0.01	A
22	Road 12	at SR 152	2	11	0.01	A	18	0.02	A

Source: Author's compilation from traffic counts conducted by Parsons Transportation Group in 2012, 2013, and 2016
LOS standard pursuant to Merced County guidelines (LOS D for rural highway, LOS C for all other rural roads) and Madera County guidelines (LOS D).
Volume = two-way peak-hour volume.
V/C = volume-to-capacity ratio
LOS = level-of-service
SR = State Route

5.3.2.3 Avenue 21 to Road 13 Wye Alternative

This section presents existing (2015) roadway conditions under the Avenue 21 to Road 13 Wye Alternative. Existing (2015) peak hour conditions of selected roadway segments in the RSA are presented in Table 5-4. As shown in the table, these roads experience low traffic volumes and all roadway segments operate at LOS A.

Table 5-4 Existing (2015) Roadway Operations along Avenue 21 to Road 13 Wye Alternative

Count #	Roadway	Location	Lanes	Existing (2015) No Project					
				AM Peak			PM Peak		
				Volume	V/C	LOS	Volume	V/C	LOS
1	Henry Miller Road	Near Hutchins Road	2	37	0.03	A	21	0.02	A
2	Hutchins Road	North of SR 152	2	6	0.01	A	6	0.01	A
4	Road 4	North of Avenue 21	2	86	0.07	A	56	0.05	A
7	Road 9/Hemlock Road	North of Avenue 21	2	46	0.04	A	34	0.03	A
8	E Sandy Mush Road	West of SR 99	2	21	0.02	A	27	0.02	A
9	Avenue 25	East of Road 14	2	49	0.04	A	88	0.07	A
10	Avenue 25	West of Road 13	2	126	0.11	A	101	0.08	A
11	Road 21 1/2	East of Road 12	2	4	0.00	A	6	0.01	A
12	Avenue 21 1/2	East of Robertson Boulevard	2	10	0.01	A	14	0.01	A
13	Road 14	North of Avenue 21	2	22	0.02	A	13	0.01	A
14	Avenue 22	West of Road 18 1/2	2	1	0.00	A	2	0.00	A
18	Avenue 21	West of Road 19	2	0	0.00	A	5	0.00	A

Source: Author's compilation from traffic counts conducted by Parsons Transportation Group in 2012, 2013, and 2016
LOS standard pursuant to Merced County guidelines (LOS D for rural highway, LOS C for all other rural roads) and Madera County guidelines (LOS D).
Volume = Two-way peak-hour volume
V/C = volume-to-capacity ratio
LOS = level-of-service
SR = State Route

5.3.2.4 SR 152 (North) to Road 11 Wye Alternative

This section presents existing (2015) roadway conditions under the SR 152 (North) to Road 11 Wye Alternative. Existing (2015) peak hour conditions of selected roadway segments in the RSA are presented in Table 5-5. As shown in the table, these roads experience low traffic volumes and all roadway segments operate at LOS A.

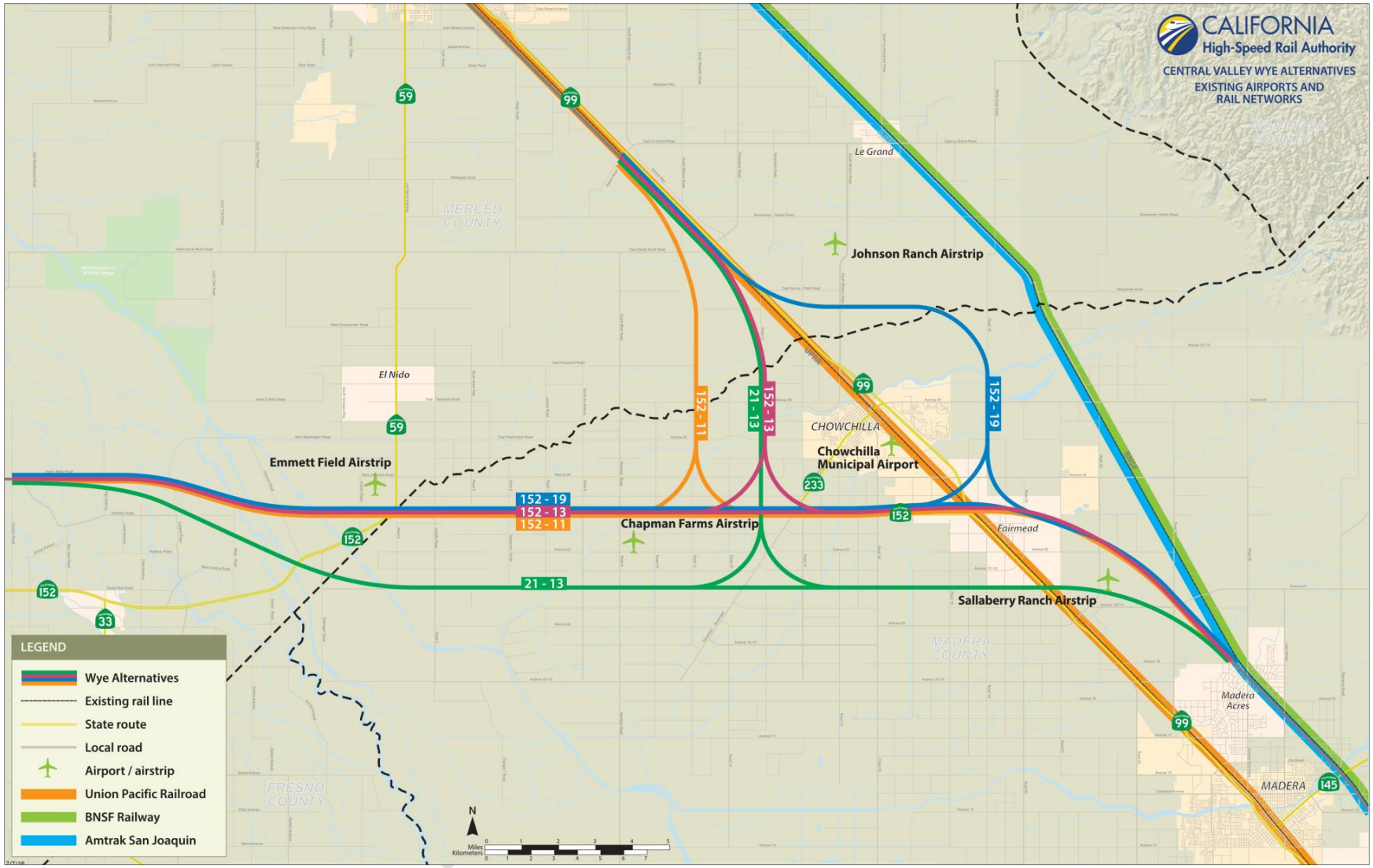
Table 5-5 Existing (2015) Roadway Operations along SR 152 (North) to Road 11 Wye Alternative

Count #	Roadway	Location	Lanes	Existing (2015)					
				AM Peak			PM Peak		
				Volume	V/C	LOS	Volume	V/C	LOS
1	Henry Miller Road	Near Hutchins Road	2	35	0.03	A	20	0.02	A
3	Los Banos Highway	North of Avenue 23 ½	2	463	0.39	A	533	0.45	A
5	Hemlock Road	North of SR 152	2	52	0.04	A	28	0.02	A
6	Hemlock Road	South of SR 152	2	29	0.02	A	22	0.02	A
8	E. Sandy Mush Road	West of SR 99	2	20	0.02	A	26	0.02	A
23	Road 4	South of SR 152	2	40	0.03	A	75	0.06	A
24	Road 8	South of SR 152	2	30	0.03	A	32	0.03	A
25	Road 8	North of SR 152	2	10	0.01	A	20	0.02	A
26	Road 11	South of SR 152	2	8	0.01	A	8	0.01	A
27	Avenue 25 1/2	West of Road 11	2	11	0.01	A	5	0.00	A
28	E. Sandy Mush Road	East of S. Athlone Road	2	32	0.03	A	50	0.04	A
29	Avenue 24	West of Road 12	2	4	0.00	A	7	0.01	A

Source: Author's compilation from traffic counts conducted by Parsons Transportation Group in 2012, 2013, and 2016
LOS standard pursuant to Merced County guidelines (LOS D for rural highway, LOS C for all other rural roads) and Madera County guidelines (LOS D).
Volume = two-way peak-hour volume
V/C = volume-to-capacity ratio
LOS = level-of-service
SR = State Route

5.4 Existing Transit Conditions

The existing transit services that serve the populations within the transportation RSA are described in this section. These transit services include aviation, commercial and freight rail service and bus services, with the existing airports and rail network in the vicinity of the RSA presented on Figure 5-4.



Source: Airport-Data.com, 2013; Authority, 2016b

FINAL – JULY 11, 2016

Figure 5-4 Existing Airports and Rail Network in the Resource Study Area

5.4.1 Regional Transit Service

Regional bus service in the RSA is provided by Greyhound and Amtrak. Greyhound-Trailways Bus Lines provides scheduled bus service; a bus terminal is located in the city of Merced. Greyhound-Trailways also provides charter service to Yosemite Valley. Amtrak augments the San Joaquin trains with an extensive system of Thruway buses, with connections at the train stations. From Merced, Amtrak buses provide connections to Yosemite and Monterey.

5.4.2 Local Transit

5.4.2.1 Merced County Transit

Merced County operates an urban bus transit service, known as *The Bus,* which operates on 20 regularly scheduled fixed-route lines. In addition, a demand response (Dial-A-Ride) service is available. The Dial-A-Ride service is limited to seniors and disabled customers in Merced County who are unable to navigate the fixed-route services without special assistance.

Generally, *The Bus* fixed-route services operate from 5:15 a.m. to 11:00 p.m. Monday through Friday, from 7:00 a.m. to 7:00 p.m. on Saturdays, and from 7:30 a.m. to 7:00 p.m. on Sundays. The Dial-A-Ride service is generally available during the same operating hours as the fixed-route service.

5.4.2.2 Madera County

Public transit in Madera County is provided by Madera County Connection, Madera Area Express, Dial-A-Ride, and Chowchilla Area Transit Express. The County of Madera operates the Madera County Connection, an intercity fixed-route system. The Chowchilla/Fairmead–Madera Route of the Madera County Connection serves the City of Chowchilla. It operates from 7:30 a.m. to 6:22 p.m. on weekdays.

The City of Madera operates Madera Area Express, a fixed-route system that provides service within the city limits. Madera Area Express operates from 7:00 a.m. to 6:30 p.m. on weekdays and from 9:00 a.m. to 4:00 p.m. on Saturdays, with no service on Sundays. The City of Madera also operates Dial-A-Ride, a demand-response paratransit system that serves the city, as well as some parts of the county. The service operates from 7:00 a.m. to 6:30 p.m. on weekdays, from 9:00 a.m. to 4:00 p.m. on Saturdays, and on Sundays from 8:30 a.m. to 2:30 p.m.

The City of Chowchilla operates Chowchilla Area Transit Express, a demand-response service. Chowchilla Area Transit Express operates from 7:30 a.m. to 3:30 p.m. on weekdays only.

5.5 Aviation

One public airport and four private airstrips are located within 2 miles of the Central Valley Wye alternatives, including Chowchilla Municipal Airport, Emmett Field, Chapman Farms Airport, Johnson Ranch Airport, and Sallaberry Ranch Strip (Airport-Data.com 2013).

5.5.1 Chowchilla Municipal Airport

Chowchilla Municipal Airport, the only public airport in the RSA, is adjacent to the developed areas of Chowchilla. It is a general-aviation facility situated on approximately 32 acres on the southeast edge of the City of Chowchilla, just west of SR 99. The airport is owned and operated by the City of Chowchilla. The Central Valley Wye alternatives would not pass through any zone containing height restrictions associated with Chowchilla Municipal Airport and therefore would not prohibit construction of the Central Valley Wye (Madera County Airport Land Use Commission 1993).

5.5.2 Emmett Field

Emmett Field is a small, privately-owned airstrip located in an agricultural area of Merced County. The airstrip is approximately 0.3–1.5 miles from the Central Valley Wye alternatives.

5.5.3 Chapman Farms

Chapman Farms is a private airstrip located in an agricultural area of Madera County, southwest of Chowchilla. The Chapman Farms airstrip is located within 0.4–0.8 mile of each of the four Central Valley Wye alternatives. However, there are no air restriction zones in these areas; therefore, the alternatives would not pass through any air restriction zone that prohibits construction of the Central Valley Wye.

5.5.4 Johnson Ranch Airport

Johnson Ranch Airport is a privately-owned airport in Merced County located within 0.3 mile of the SR 152 (North) to Road 19 Wye Alternative. There are no air restriction zones in the area; therefore, the alternative would not pass through any air restriction zone that prohibits construction of the Central Valley Wye.

5.5.5 Sallaberry Ranch Strip

Sallaberry Ranch Strip is a private airstrip located in an agricultural area of Madera County, southeast of Chowchilla. The Sallaberry Ranch Strip is within 0.1–0.7 mile of the Central Valley Wye alternatives. However, there are no air restriction zones in the area. As a result, the alternatives would not pass through any zone that prohibits construction of the Central Valley Wye.

5.6 Passenger Rail Service

Existing intercity passenger rail service in California is provided by Amtrak on four principal corridors that cover more than 1,300 linear miles and span almost the entire state. The existing passenger rail network in the Central Valley Wye region is provided by the Amtrak San Joaquin Route, which follows the BNSF corridor through the RSA. There is an existing Amtrak station in Merced. The RSA also includes freight train operations along the UPRR and BNSF tracks, as discussed in Section 5.7, Freight Rail Service. The Amtrak, UPRR, and BNSF rail lines in the RSA are presented on Figure 5-4.

There are six daily round trips on the Amtrak San Joaquin Route between Stockton and Bakersfield, four daily round trips on the Stockton–Oakland segment and two daily round trips on the Stockton–Sacramento segment. All trains run on the same tracks and serve the city of Merced. The intercity route carried 1,219,818 riders in Fiscal Year 2013 with an on-time performance of 72.9 percent between December 2013 and December 2014. The scheduled running time between Bakersfield and Oakland averages 6 hours 8 minutes, at an average speed of 53 miles per hour. The maximum speed on the route is 79 miles per hour. The *2013 California State Rail Plan* (Caltrans 2013) envisions an increase in service to 8 or 11 daily round trips by 2020, operating at speeds up to 90 miles per hour on the Bakersfield–Stockton segment of the line.

5.7 Freight Rail Service

Freight movement is an integral part of the economy and transportation system of the RSA. BNSF and UPRR provide freight movement in and through Merced and Madera Counties on a daily basis. The service totals approximately 20–25 trains per day. Several industrial/manufacturing and agricultural companies within the two counties use rail freight service. The largest of these rail freight service users are located in the cities of Merced, Atwater, and Los Banos.

BNSF is also the primary owner of the railroad right-of-way used by the Amtrak San Joaquin Route. The railroad owns a 276-mile section of the San Joaquin Corridor from Bakersfield to Port Chicago.

5.8 Railroad Accident History

This section presents the railroad accident history in Merced and Madera Counties obtained from the FRA website for all railroad lines using tracks in these two counties (FRA 2016c).

Table 5-6 presents the number of total train accidents occurring in Merced and Madera Counties annually between 2011 and 2015, with the type of accident and casualties (fatalities and nonfatal conditions, which include injuries). Table 5-7 lists the types and cause of train accidents within the two counties between 2011 and 2015, with accidents categorized as derailments, collisions with other trains, highway-railroad crossing, and other types of accidents that include incidents with pedestrians on the railway or injury of railroad employees.

Table 5-6 Number of Train Accidents and Incidents with Casualties and Property Damages by County, 2011–2015

County	Accidents			Casualties	
	Total	Type of Accident		Total Fatalities	Total Nonfatal Conditions
		Fatal	Nonfatal		
Merced County	63	24	39	24	28
Madera County	29	9	20	9	24

Source: FRA, 2016a, 2016b, 2016d
Data are for January 2011 through December 2015.

Table 5-7 Types and Causes of Train Accidents by County, 2011–2015

County	Type of Accident				Cause of Accident				
	Collision[1]	Derailment	Highway Railroad Crossing	Other[2]	Track	Signal	Human Error	Motive Power/ Equipment	Miscellaneous[3]
Merced County	0	1	24	38	0	0	16	0	47
Madera County	0	0	7	22	0	0	6	0	23

Source: FRA, 2016a, 2016b, 2016d
Data are for January 2011 through December 2015.
[1] Collision accidents include head-on, rear-end, side, raking, broken-train, or heavy-rail collisions.
[2] Other accidents include trespassing incidents and activities such as getting on or off equipment, doing maintenance work, throwing switches, setting handbrakes, stumbling and tripping.
[3] Miscellaneous causes of accidents include all accidents described under other.

According to FRA accident reports (2016a, 2016b, 2016d), 92 train accidents and incidents occurred in Merced and Madera Counties during the 5-year period of January 2011 and December 2015. Of these 92 accidents, 33 accidents resulted in fatalities, and 59 were nonfatal accidents (injuries or property damage only). These accidents comprise all train accidents in the two counties for BNSF, UPRR, and Amtrak and include accidents outside of the RSA.

At the state level, there were a total of 3,668 accidents between 2011 and 2015, with 546 fatalities (FRA 2016c). This figure represents a 15 percent fatality rate statewide per the total number of accidents. The fatality rate for Merced and Madera Counties was more than double for the same period at 37 percent. Between the two counties, Merced's fatality rate was slightly higher at 38 percent, compared to 33 percent for Madera. According to FRA data (2016c), the overall number of accidents in the state have declined about 22 percent between 2006 and 2015, with fatalities increasing 9.8 percent and injuries decreasing 15.4 percent during the same time period.

Most accidents within Merced and Madera Counties between 2011 and 2015 (approximately 76 percent) were a result of trespassing incidents and railroad worker–related activities such as getting on/off equipment, doing maintenance work, throwing switches, setting handbrakes,

stumbling, and tripping, or other reasons, including the stalling of vehicles on tracks (FRA 2016a, 2016b, 2016d). Approximately 34 percent of accidents were highway-railroad crossing accidents, with only one derailment occurring during the 5-year period. None of the accidents involved train collisions (FRA 2016a, 2016b, 2016d).

6 EFFECTS ANALYSIS

6.1 Introduction

This section describes the potential construction and operation effects of the Central Valley Wye on transportation. The analysis includes the following:

- Effects on Roadway Level of Service
- Effects on Regional Transportation System
- Temporary Construction Effects

The Central Valley Wye is not expected to have any effect on trip generation, transit services, or non-motorized modes of travel because there are no stations or maintenance facilities included in the Central Valley Wye. These topics are not discussed further in this technical report. Refer to the *Merced to Fresno Section Project EIR/EIS Transportation Technical Report* for a discussion of these topics as they relate to the Merced to Fresno Section (Authority and FRA 2012b).

6.2 No Project Alternative

The No Project Alternative provides a basis for comparing Existing Conditions (2015) with future conditions (2040) without the Central Valley Wye. The No Project Alternative represents the state's transportation system (highway, transit, air, and conventional rail) as it currently is and as it would be after implementation of programs or projects that are currently identified in RTPs, have identified funds for implementation, and are expected to be in place by 2040, the HSR project's planning horizon year. The No Project Alternative was developed from the following sources of information:

- State Transportation Implementation Program
- RTPs, financially constrained projects for all modes of travel
- Airport master plans
- Intercity passenger rail plans

The following is an analysis of the No Project Alternative for transportation movements. A description of anticipated projects under the No Project Alternative is provided in the following sections. The transportation analysis assumes a conservative estimate of 2.5 percent annual growth for traffic volumes, which is in accordance with projected population growth in Merced and Madera Counties from 2010 and 2040 (CDOF 2013).

Based on the assumed growth rate between 2015 and 2040, vehicle miles traveled are projected to increase 52 percent and 55 percent in Merced and Madera Counties, respectively. According to a statewide transportation projection conducted by Cambridge Systematics, the two-county region is projected to increase from 11.9 million to almost 22.1 million miles traveled per year by 2040 (Cambridge Systematics 2007). This establishes the background for the following assessment of the transportation infrastructure.

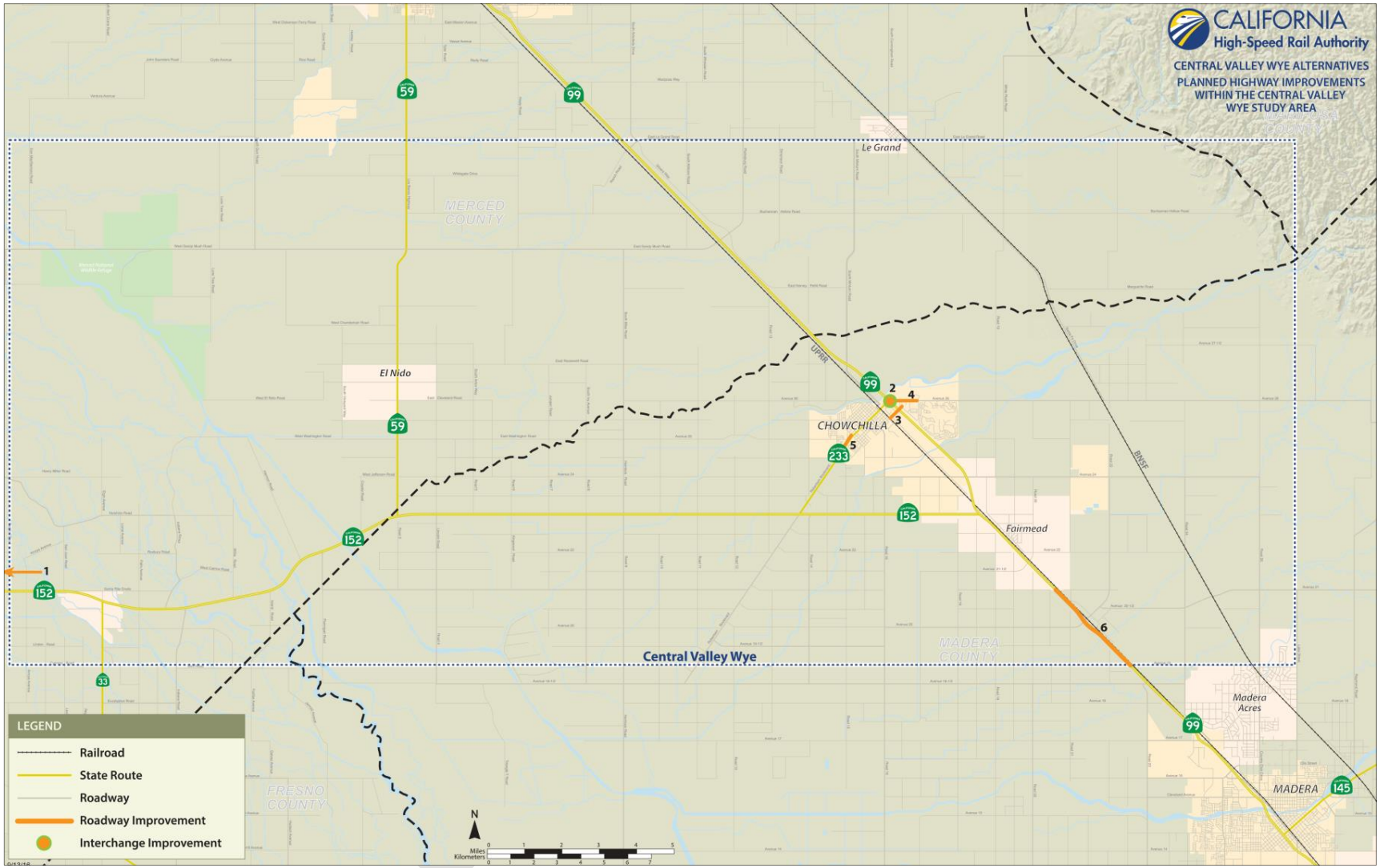
6.2.1 Highway Element

The highway element of the No Project Alternative includes the existing highway system as well as the funded and programmed future improvements. The identification of improvements on the highway network is based on financially constrained RTPs developed by regional transportation planning agencies. Intercity highway improvements included as part of the No Project Alternative include infrastructure projects and other potential system improvements programmed to be in operation by 2040. Highway improvements consist primarily of individual interchange improvements and roadway widening projects on segments of the existing highway network. The major highway improvements included as part of the 2040 No Project Alternative are identified by county in Table 6-1 and Figure 6-1.

Table 6-1 No Project Alternative Planned Improvements in Merced and Madera Counties

Location/ Map No.	Routes	Planned Improvements	Project Timeline
Merced County			
1	SR 59	Los Banos Bypass	Segment 1: 2023, Segment 2: 2033
Madera County			
2	Interchange SR 99 at SR 233	Reconstruct interchange	2024
3	Avenue 26 from SR 99 to Coronado	Widen from two lanes to four lanes	2032
4	SR 99 Overcrossing at Fig Tree	Construct new two-lane overcrossing to Chowchilla Boulevard	2020
5	Robertson Boulevard from 15th Street to Palm Parkway	Restripe two to four lanes	2017
6	SR 99	Convert to six-lane freeway between Merced/Madera County boundary and SR 152; reconstruct interchange at Avenue 24	2017–2018

Sources: MCAG, 2014; Madera County, 2014
SR = State Route



Sources: Authority, 2016b; MCAG, 2014; Madera County, 2014

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Figure 6-1 Planned Highway Improvements in the Resource Study Area

The major highway improvements would provide benefits to the existing highway network by widening existing highways, improving safety, and reducing congestion. These effects on the highway system would be temporary, because population growth in the region would continue to increase the number of highway users. However, over the long term, congestion would continue to worsen on highways.

6.2.2 Regional Bus Service

The existing regional bus service includes Greyhound and Amtrak. While intercity bus service is likely to increase in the future, as of December 2014 there were no documented plans for regional service expansion for the future. Continued service is an element of the No Project Alternative, although these bus lines serve only a very small portion of the intercity travel market (based on information obtained from Amtrak and Greyhound websites). Without changes, it is expected that demand would remain mostly steady, with only small incremental growth of ridership.

6.2.3 Aviation Element

Statewide, the airport development process is distinct from the highway and rail development processes and is not documented in local plans, RTPs, or the State Transportation Implementation Program. For this analysis and to conceptualize a No Project Alternative airport system, analysts evaluated proposed airport improvements based on a review of available plans. An airport improvement is deemed likely to be implemented and operational by 2040 if the improvement has been identified in an approved or under-development airport master planning program, an environmental document, a regional aviation system planning document, or a capital improvement program.

The air transportation system evaluated under the 2040 No Project Alternative consists of Merced Regional Airport/Macready Field, the only airport that currently provides commercial service in the region. The airport does not provide commercial service between the same intercity markets as the proposed HSR system. Other, smaller airports and private airstrips that serve the region are described in Section 5.5, Aviation.

Improvement plans for Merced Regional Airport/Macready Field are documented in the *Merced Municipal Airport Master Plan* (City of Merced 2007) and include engineering and environmental clearance for the relocation of Taxiway A, relocation of Taxiway A to 400-foot separation, the demolition of Building 10, and the construction of four nested t-hangar type buildings. The plan forecasts a baseline increase (by 2026) of enplaning passengers to 53,000 annual passengers, with a high forecast of 104,500 passengers and a low forecast of 14,800 passengers. This is a notable increase, compared to 2013 enplanements of 2,580 (FAA 2014). The Merced Municipal Airport Master Plan does not have any planned improvements documented beyond the year 2026 and the planned improvements identified are not yet funded.

6.2.4 Freight Rail

The freight rail system in the region is operated by BNSF and UPRR, which provide Class I rail service to the San Joaquin Valley. According to the 2030 Merced County General Plan, these two railroad companies provide use of the rail for industrial, manufacturing, and agricultural companies by means of flat beds, fuel tankers, refrigerated produce, regular stock box and piggy-back cars. The service totals approximately 20–25 trains per day. UPRR does not project rail traffic growth beyond a 5-year horizon. Over the next 5 years, UPRR does not anticipate a notable change in freight rail traffic.

In Merced and Madera Counties, both BNSF and UPRR currently operate near capacity; according to the 2009 Goods Movement Study (Caltrans 2010). Without major improvements (such as double tracking more sections), freight demand would be expected to exceed capacity by 2040, with minimal additional train movements. UPRR and BNSF have historically added capacity when needed to meet market demands in other regions, and UPRR has conveyed a desire to do so in areas of California. These future improvements are expected to continue to provide sufficient capacity for interstate needs. Expansion of freight rail capacity is assumed to be a permanent trend under the No Project Alternative.

6.2.5 Conventional Passenger Rail Element

Existing intercity passenger rail service in California is provided on four principal corridors covering more than 1,300 route miles and spanning almost the entire state. The No Project passenger rail network for this segment includes one of these corridors, the San Joaquin Route.

The 2013 California State Rail Plan (Caltrans 2013) envisions an increase in service to 8 or 11 daily round trips by 2020, operating at speeds up to 90 miles per hour on the Bakersfield to Stockton segment of the line. This plan also seeks to reduce the travel time (Bakersfield to Oakland) to less than 6 hours, a reduction of about 10–15 minutes from today's train travel times (Caltrans 2008). The plan would only slightly reduce Merced to Fresno travel time (less than 5 minutes).

The San Joaquin Corridor currently shares track with the BNSF freight line on a route running east of SR 99. There are existing stations in the cities of Merced, Madera, and Fresno. This corridor serves a portion of the same intercity markets as the Central Valley Wye.

The California State Rail Plan identifies improvements that will expand service and help improve service reliability. However, with increased freight demand, capacity issues will likely persist beyond the 2020 timeframe of the plan. The No Project Alternative includes the following intercity passenger rail system improvements identified in the State Transportation Implementation Program and the Caltrans California State Rail Plan for implementation prior to 2020:

- Increased track capacity through double-tracking critical areas where trains frequently pass each other
- New rolling stock
- Grade-crossing improvements
- Track and signal improvements
- Construction of a new, relocated station in Madera

The programmed track improvements in the 2013 California State Rail Plan are identified in Table 6-2. While improvement of conventional passenger rail capacity is assumed to be ongoing, over the long term, population growth would exceed planned passenger rail capacity improvements. This is expected to cause part of the demand to shift to automobiles, which would cause congestion on highways to worsen.

Table 6-2 Programmed Improvements in 2013 California State Rail Plan

Project Title	Project Description	Project Timeline
San Joaquin Route		
Merced to Le Grand	Construct second main track	Segment 1: 2016–2018
		Segments 2,3: 2019–2040
Madera County	Track improvements	By 2016/2018
Planada to Madera	Construct second main track and curve realignments	2019–2040
Corridor-Wide Signal Upgrades	Track and signal improvements from Stockton to Bakersfield (90 mph)	2019–2040
Gregg-Madera	Convert Gregg-Madera route to double-track with addition of 11 trains at 90 mph	2019–2040

Source: Caltrans, 2013
mph = miles per hour

6.3 Effects on Roadway Level-of-Service

The Central Valley Wye transportation RSA is rural with very low volumes of traffic. Most roadways in the RSA have average daily traffic volumes of less than 500 vehicles, and many have average daily traffic volumes of less than 50 vehicles. In addition, because there are no stations or traffic-generating facilities related to the Central Valley Wye, the Central Valley Wye alternatives would not add any new traffic to the roadway system.

Construction of the Central Valley Wye would result in the permanent closure or modification of some existing roadways, and traffic from the closed roads would be diverted onto other nearby streets. Table 6-3 summarizes the road closures and modifications under the Central Valley Wye alternatives. Appendix D, Grade Separations and Road Closures, presents the full list of grade separations and road closures under each Central Valley Wye alternative. Effects on traffic operations for the street network due to these roadway modifications were incorporated into the analysis of future LOS that has been prepared for each alternative.

Table 6-3 Summary of Roadway Modifications and Design Features

Modification	SR 152 (North) to Road 13 Wye	SR 152 (North) to Road 19 Wye	Avenue 21 to Road 13 Wye	SR 152 (North) to Road 11 Wye
Total Number of Road Crossings[1]	62	65	58	57
Number of Public Road Closures	38	36	30	33
Number of Roadway Grade Separations[2]	24	29	28	24
Number of Railroad Crossings	1	3	1	1

Source: Author's compilation from Merced to Fresno Section: Central Valley Wye Final 15% Engineering Plans
[1]Number of road crossings includes the number of public road closures and number of grade separations
[2]Grade separations are defined as overcrossings and undercrossings of a roadway.

6.3.1 SR 152 (North) to Road 13 Wye Alternative

The SR 152 (North) to Road 13 Wye Alternative would require the permanent closure of 38 public roadways and construction of 24 overcrossings or undercrossings in lieu of closure. Additionally, under this alternative there would be 62 road crossings of the Central Valley Wye and one HSR crossing over the UPRR corridor. Figure 2-1 shows the locations of anticipated state and local roadway closures and modifications.

As described in Section 2.2.3.1, SR 152 (North) to Road 13 Wye Alternative, 14 of the permanent road closures would occur along SR 152 where roads currently cross at-grade but need to be closed in order to convert SR 152 to a fully access-controlled corridor. Planned new grade separations and interchanges along SR 152 at the SR 59/SR 152 Interchange, Road 4/Lincoln Road, Road 9/Hemlock Road, Road 12, SR 233/Robertson Blvd, Road 16, and Road 17 1/2 would maintain access to SR 152. Several of these new interchanges would require realigning SR 152.

Additionally, overcrossings or undercrossings without connections to SR 152 would be provided for some roads that are perpendicular to the HSR alignment (e.g., Road 4, Road 12, Road 17). Between these overcrossings or undercrossings, some roads would be closed. Local frontage roads paralleling the proposed HSR alignment and used by small communities and farm operations may be shifted and reconstructed to maintain their function.

The effect of these roadway closures and modifications would be the diversion of traffic from closed roads to nearby streets. Although this could result in some additional out-of-direction travel for motorists, road crossings of the HSR alignment are provided approximately every 2 miles to minimize increased travel time and cost. A diagram depicting potential traffic distribution is

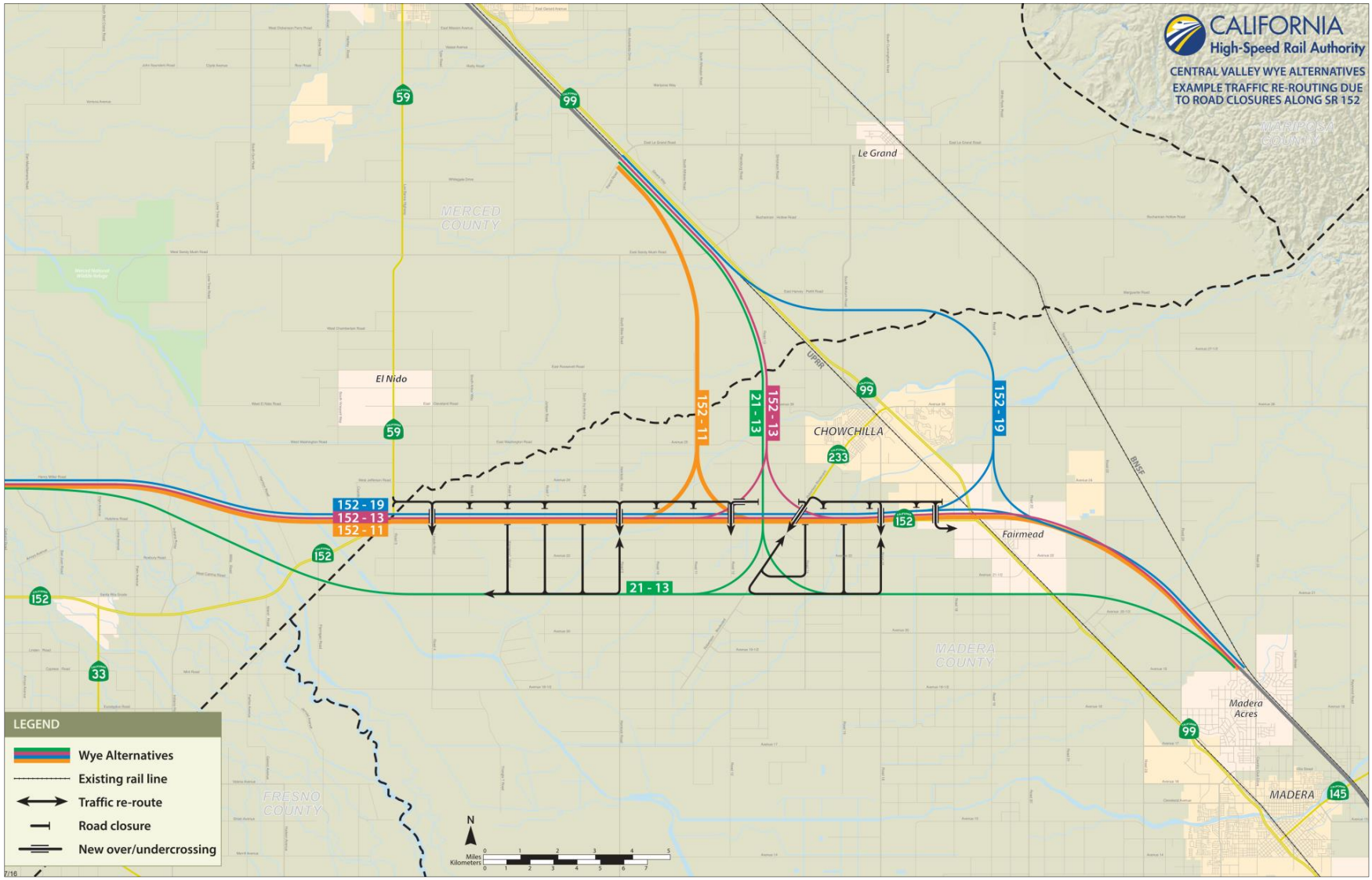
presented on Figure 6-2. The effect on the roadway network due to the diverted traffic under the SR 152 (North) to Road 13 Wye Alternative for the 2015 and 2040 baselines is discussed in the subsequent subsections.

6.3.1.1 Existing (2015) Plus Project Conditions

This section presents a comparison of the roadway operations on roadway segments for the SR 152 (North) to Road 13 Wye Alternative between the Existing (2015) and Existing (2015) Plus Project scenarios. The Existing (2015) Plus Project Conditions applies design year (2040) effects on a 2015 baseline (existing conditions). The 2015 traffic rerouted due to road closures and grade separations are applied to the 2015 baseline. Even with the addition of the rerouted traffic under the Existing (2015) Plus Project scenario, all selected roadway segments in the RSA would continue to operate at LOS A as shown in Table 6-4.

6.3.1.2 2040 Plus Project Conditions

Even with the addition of the rerouted traffic under the 2040 Plus Project scenario, all selected roadway segments in the RSA would operate under uncongested conditions, with LOS much better than the LOS D threshold. All segments except one would continue to operate at LOS A, as shown in Table 6-5. The roadway segment on Los Banos Highway, north of Avenue 23 1/2, would continue to operate at LOS B, denoting reasonable free-flow, during AM peak hour, and LOS C, denoting stable flow with minor delays, during PM peak hour. All selected roadway segments in the RSA would operate under uncongested conditions under the 2040 Plus Project Condition.



Source: Authority, 2016b; Merced to Fresno Section: Central Valley Wye Final 15% Engineering Plans

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Figure 6-2 Traffic Distribution Diagram

Table 6-4 Existing (2015) Plus Project Peak Hour Roadway Operations along SR 152 (North) to Road 13 Wye Alternative

Count #	Roadway	Location	Existing (2015)						Existing (2015) Plus Project					
			AM Peak			PM Peak			AM Peak			PM Peak		
			Volume	V/C	LOS	Volume	V/C	LOS	Volume	V/C	LOS	Volume	V/C	LOS
1	Henry Miller Road	Near Hutchins Road	35	0.03	A	20	0.02	A	35	0.03	A	20	0.02	A
3	Los Banos Highway	North of Ave 23 1/2	463	0.39	A	533	0.45	A	489	0.41	A	580	0.49	A
5	Hemlock Road	North of SR 152	52	0.04	A	28	0.02	A	61	0.05	A	40	0.03	A
6	Hemlock Road	South of SR 152	29	0.02	A	22	0.02	A	29	0.02	A	22	0.02	A
8	E Sandy Mush Road	West of SR 99	20	0.02	A	26	0.02	A	20	0.02	A	26	0.02	A
9	Avenue 25	East of Road 14	49	0.04	A	88	0.07	A	49	0.04	A	88	0.07	A
10	Avenue 25	West of Road 13	126	0.11	A	101	0.08	A	126	0.11	A	101	0.08	A
17	Avenue 23	East of Fairmead Boulevard	5	0.00	A	11	0.01	A	14	0.01	A	52	0.04	A
19	Road 16	at SR 152	125	0.10	A	142	0.12	A	148	0.12	A	169	0.14	A
20	Road 22	North Avenue 22	352	0.29	A	209	0.17	A	352	0.29	A	209	0.17	A
21	Avenue 20	West of Road 25	6	0.01	A	9	0.01	A	6	0.01	A	9	0.01	A
22	Road 12	at SR 152	11	0.01	A	18	0.02	A	11	0.01	A	18	0.02	A

Source: Author's compilation, 2016
LOS standard pursuant to Merced County guidelines (LOS D for rural highway, LOS C for all other rural roads) and Madera County guidelines (LOS D).
Volume = two-way peak-hour volume
V/C = volume-to-capacity ratio. Each roadway segment has two lanes.
LOS = level-of-service
SR = State Route

Table 6-5 Comparison of 2040 Peak Hour Roadway Operations to 2015 Existing Conditions along SR 152 (North) to Road 13 Wye Alternative

Count #	Roadway	Location	Existing (2015)		2040 No Project						2040 Plus Project					
			AM Peak	PM Peak	AM Peak			PM Peak			AM Peak			PM Peak		
			LOS	LOS	Volume	V/C	LOS	Volume	V/C	LOS	Volume	V/C	LOS	Volume	V/C	LOS
1	Henry Miller Road	Near Hutchins Road	A	A	56	0.05	A	32	0.03	A	56	0.05	A	32	0.03	A
3	Los Banos Highway	North of Ave 23 1/2	A	A	733	0.62	B	843	0.72	C	765	0.65	B	901	0.77	C
5	Hemlock Road	North of SR 152	A	A	82	0.07	A	44	0.04	A	94	0.08	A	60	0.05	A
6	Hemlock Road	South of SR 152	A	A	46	0.04	A	34	0.03	A	46	0.04	A	34	0.03	A
8	E Sandy Mush Road	West of SR 99	A	A	32	0.03	A	41	0.03	A	32	0.03	A	41	0.03	A
9	Avenue 25	East of Road 14	A	A	78	0.07	A	139	0.12	A	78	0.07	A	139	0.12	A
10	Avenue 25	West of Road 13	A	A	199	0.17	A	160	0.14	A	199	0.17	A	160	0.14	A
17	Avenue 23	East of Fairmead Boulevard	A	A	9	0.01	A	17	0.01	A	19	0.02	A	68	0.06	A
19	Road 16	at SR 152	A	A	197	0.17	A	224	0.19	A	226	0.19	A	258	0.22	A
20	Road 22	North Avenue 22	A	A	556	0.47	A	330	0.28	A	556	0.47	A	330	0.28	A
21	Avenue 20	West of Road 25	A	A	10	0.01	A	14	0.01	A	10	0.01	A	14	0.01	A
22	Road 12	at SR 152	A	A	17	0.01	A	29	0.02	A	17	0.01	A	29	0.02	A

Source: Author's compilation, 2016
LOS standard pursuant to Merced County guidelines (LOS D for rural highway, LOS C for all other rural roads) and Madera County guidelines (LOS D).
2015 Existing volumes and V/C are included in Table 6-4.
Volume = two-way peak-hour volume
V/C = volume-to-capacity ratio. Each roadway segment has 2 lanes.
LOS = level-of-service
SR = State Route

6.3.2 SR 152 (North) to Road 19 Wye Alternative

The SR 152 (North) to Road 19 Wye Alternative would require the permanent closure of 36 public roadways at selected locations and construction of 29 overcrossings or undercrossings. Additionally, under this alternative there would be 65 road crossings of the HSR and 3 HSR crossings of the UPRR (two above-grade crossings south of Chowchilla and one below-grade crossing at the northern end of the Central Valley Wye). Figure 2-2 shows the anticipated state highway and local roadway closures and modifications.

As described in Section 2.2.3.2, SR 152 (North) to Road 19 Wye Alternative, 14 of the permanent road closures would be located at SR 152 where roads currently cross at-grade but need to be closed in order to convert SR 152 to a fully access-controlled corridor. New grade separations or interchanges are planned along SR 152 at the SR 59/SR 152 interchange, Road 4/Lincoln Road, Road 9/Hemlock Road, Road 12, SR 233/Robertson Boulevard, Road 16, and Road 17 1/2 to maintain access to SR 152. Several of these interchanges would require realigning SR 152.

The SR 152 (North) to Road 19 Wye Alternative would cross over SR 99 in three locations. South of Chowchilla, both the San Jose to Merced and the San Jose to Fresno legs of the wye would rise on aerial structures to cross SR 99. Another crossing of SR 99 would be at the northern end of the alternative, where the alternative descends below grade into an undercrossing tunnel segment. SR 99 would be temporarily realigned during construction and would be reconstructed on the roof of the undercrossing tunnel.

The effect of these roadway modifications would be the diversion of traffic from closed roads to nearby streets. Although this could result in some additional out-of-direction travel for motorists, road crossings are provided approximately every 2 miles to minimize increased travel time and cost. The following subsections present a discussion of the effect of these changes on the roadway network for the 2015 and 2040 baselines.

6.3.2.1 Existing (2015) Plus Project Conditions

Table 6-6 shows changes in roadway operations on roadway segments for the SR 152 (North) to Road 19 Wye Alternative between the Existing (2015) and Existing (2015) Plus Project scenarios. Similar to the SR 152 (North) to Road 13 Wye Alternatives, all selected roadway segments in the RSA would continue to operate at LOS A with the addition of rerouted traffic under the Existing (2015) Plus Project scenario.

6.3.2.2 2040 Plus Project Conditions

Even with the addition of the rerouted traffic under the 2040 Plus Project scenario, all selected roadway segments in the RSA for the SR 152 (North) to Road 19 Wye Alternative would operate under uncongested conditions. As shown in Table 6-7, all segments except one would continue to operate at LOS A. The roadway segment on Los Banos Highway, north of Avenue 23 1/2, would continue to operate at LOS B during the AM peak hour and LOS C during the PM peak hour.

Table 6-6 Existing (2015) Plus Project Peak Hour Roadway Operations along SR 152 (North) to Road 19 Wye Alternative

Count #	Roadway	Location	Existing (2015)						Existing (2015) Plus Project					
			AM Peak			PM Peak			AM Peak			PM Peak		
			Volume	V/C	LOS	Volume	V/C	LOS	Volume	V/C	LOS	Volume	V/C	LOS
1	Henry Miller Road	Near Hutchins Road	35	0.03	A	20	0.02	A	35	0.03	A	20	0.02	A
3	Los Banos Highway	North of Ave 23 1/2	463	0.39	A	533	0.45	A	489	0.41	A	580	0.49	A
5	Hemlock Road	North of SR 152	52	0.04	A	28	0.02	A	61	0.05	A	40	0.03	A
6	Hemlock Road	South of SR 152	29	0.02	A	22	0.02	A	29	0.02	A	22	0.02	A
8	E Sandy Mush Road	West of SR 99	20	0.02	A	26	0.02	A	20	0.02	A	26	0.02	A
16	Avenue 24	East of Avenue 18 3/4	96	0.08	A	62	0.05	A	125	0.10	A	98	0.08	A
17	Avenue 23	East of Fairmead Boulevard	5	0.00	A	11	0.01	A	14	0.01	A	52	0.04	A
19	Road 16	at SR 152	125	0.10	A	142	0.12	A	148	0.12	A	169	0.14	A
20	Road 22	North Avenue 22	352	0.29	A	209	0.17	A	352	0.29	A	209	0.17	A
21	Avenue 20	West of Road 25	6	0.01	A	9	0.01	A	6	0.01	A	9	0.01	A
22	Road 12	at SR 152	11	0.01	A	18	0.02	A	11	0.01	A	18	0.02	A

Source: Author's compilation, 2016
LOS standard pursuant to Merced County guidelines (LOS D for rural highway, LOS C for all other rural roads) and Madera County guidelines (LOS D).
Volume = two-way peak-hour volume
V/C = volume-to-capacity ratio. Each roadway segment has 2 lanes.
LOS = level-of-service
SR = State Route

Table 6-7 Comparison of 2040 Peak Hour Roadway Operations to 2015 Existing Conditions along SR 152 (North) to Road 19 Wye Alternative

Count #	Roadway	Location	Existing (2015)		2040 No Project						2040 Plus Project					
			AM Peak	PM Peak	AM Peak			PM Peak			AM Peak			PM Peak		
			LOS	LOS	Volume	V/C	LOS	Volume	V/C	LOS	Volume	V/C	LOS	Volume	V/C	LOS
1	Henry Miller Road	Near Hutchins Road	A	A	56	0.05	A	32	0.03	A	56	0.05	A	32	0.03	A
3	Los Banos Highway	North of Ave 23 1/2	A	A	733	0.62	B	843	0.72	C	765	0.65	B	901	0.77	C
5	Hemlock Road	North of SR 152	A	A	82	0.07	A	44	0.04	A	94	0.08	A	60	0.05	A
6	Hemlock Road	South of SR 152	A	A	46	0.04	A	34	0.03	A	46	0.04	A	34	0.03	A
8	E Sandy Mush Road	West of SR 99	A	A	32	0.03	A	41	0.03	A	32	0.03	A	41	0.03	A
16	Avenue 24	East of Avenue 18 3/4	A	A	151	0.13	A	99	0.08	A	187	0.16	A	143	0.12	A
17	Avenue 23	East of Fairmead Boulevard	A	A	9	0.01	A	17	0.01	A	19	0.02	A	68	0.06	A
19	Road 16	at SR 152	A	A	197	0.17	A	224	0.19	A	226	0.19	A	258	0.22	A
20	Road 22	North of Avenue 22	A	A	556	0.47	A	330	0.28	A	556	0.47	A	330	0.28	A
21	Avenue 20	West of Road 25	A	A	10	0.01	A	14	0.01	A	10	0.01	A	14	0.01	A
22	Road 12	at SR 152	A	A	17	0.01	A	29	0.02	A	17	0.01	A	29	0.02	A

.

Source: Author's compilation, 2016

LOS standard pursuant to Merced County guidelines (LOS D for rural highway, LOS C for all other rural roads) and Madera County guidelines (LOS D).

2015 Existing volumes and V/C are included in Table 6-6.

Volume = two-way peak-hour volume

V/C = volume-to-capacity ratio. Each roadway segment has 2 lanes.

LOS = level-of-service

SR = State Route

6.3.3 Avenue 21 to Road 13 Wye Alternative

The Avenue 21 to Road 13 Wye Alternative would require the permanent closure of 30 public roadways at selected locations and building 28 overcrossings or undercrossings. Additionally, under this alternative there would be 58 road crossings of the HSR and one HSR crossing above the UPRR corridor. Figure 2-3 shows the anticipated state highway and local roadway closures.

This alternative would have the second fewest roadway and state highway modifications. The Avenue 21 to Road 13 Wye Alternative would rise on aerial structures and cross over state highway facilities in three locations: SR 59 at Harmon Road, SR 152 at Road 13, and SR 99 at Avenue 21. A full list of proposed roadway modifications under the Avenue 21 to Road 13 Wye Alternative is provided in Appendix D.

The effect of these roadway closures and modifications would be the diversion of traffic from closed roads to nearby streets. Although this could result in some additional out-of-direction travel for motorists, road crossings are provided approximately every 2 miles to minimize increased travel time and cost. The following subsections present a discussion of the effect of these changes on the roadway network for the 2015 and 2040 baselines.

6.3.3.1 Existing (2015) Plus Project Conditions

Table 6-8 shows changes in roadway operations on roadway segments for the Avenue 21 to Road 13 Wye Alternative between the Existing (2015) and Existing (2015) Plus Project scenarios. With the addition of the rerouted traffic under the Existing (2015) Plus Project scenario, all selected roadway segments in the RSA would continue to operate at LOS A.

6.3.3.2 2040 Plus Project Conditions

Even with the addition of the rerouted traffic under the 2040 Plus Project scenario, all selected roadway segments in the RSA for the Avenue 21 to Road 13 Wye Alternative would operate under uncongested conditions, much better than the LOS D threshold for a substantial effect. As shown in Table 6-9, all roadway segments would continue to operate at LOS A.

Table 6-8 Existing (2015) Plus Project Peak Hour Roadway Operations along Avenue 21 to Road 13 Wye Alternative

Count #	Roadway	Location	Existing (2015)						Existing (2015) Plus Project					
			AM Peak			PM Peak			AM Peak			PM Peak		
			Volume	V/C	LOS	Volume	V/C	LOS	Volume	V/C	LOS	Volume	V/C	LOS
1	Henry Miller Road	Near Hutchins Road	37	0.03	A	21	0.02	A	37	0.03	A	21	0.02	A
2	Hutchins Road	North of SR 152	6	0.01	A	6	0.01	A	12	0.01	A	8	0.01	A
4	Road 4	North of Avenue 21	86	0.07	A	56	0.05	A	103	0.09	A	64	0.05	A
7	Road 9/Hemlock Road	North of Avenue 21	44	0.04	A	32	0.03	A	58	0.05	A	50	0.04	A
8	E Sandy Mush Road	West of SR 99	20	0.02	A	26	0.02	A	20	0.02	A	26	0.02	A
9	Avenue 25	East of Road 14	49	0.04	A	88	0.07	A	49	0.04	A	88	0.07	A
10	Avenue 25	West of Road 13	126	0.11	A	101	0.08	A	126	0.11	A	101	0.08	A
11	Road 21 1/2	East of Road 12	4	0.00	A	6	0.01	A	4	0.00	A	6	0.01	A
12	Avenue 21 1/2	East of Robertson Boulevard	10	0.01	A	14	0.01	A	18	0.02	A	15	0.01	A
13	Road 14	North of Avenue 21	22	0.02	A	13	0.01	A	22	0.02	A	13	0.01	A
14	Avenue 22	West of Road 18 1/2	1	0.00	A	2	0.00	A	1	0.00	A	2	0.00	A
18	Avenue 21	West of Road 19	0	0.00	A	5	0.00	A	0	0.00	A	5	0.00	A

Source: Author's compilation, 2016
LOS standard pursuant to Merced County guidelines (LOS D for rural highway, LOS C for all other rural roads) and Madera County guidelines (LOS D).
Volume = two-way peak-hour volume
V/C = volume-to-capacity ratio. Each roadway segment has 2 lanes.
LOS = level-of-service
SR = State Route

Table 6-9 Comparison of 2040 Peak Hour Roadway Operations to 2015 Existing Conditions along Avenue 21 to Road 13 Wye Alternative

			Existing (2015)		2040 No Project						2040 Plus Project					
			AM Peak	PM Peak	AM Peak			PM Peak			AM Peak			PM Peak		
Count #	Roadway	Location	LOS	LOS	Volume	V/C	LOS	Volume	V/C	LOS	Volume	V/C	LOS	Volume	V/C	LOS
1	Henry Miller Road	Near Hutchins Road	A	A	56	0.05	A	32	0.03	A	56	0.05	A	32	0.03	A
2	Hutchins Road	North of SR 152	A	A	10	0.01	A	10	0.01	A	17	0.01	A	12	0.01	A
4	Road 4	North of Avenue 21	A	A	136	0.12	A	88	0.08	A	156	0.13	A	99	0.08	A
7	Road 9/Hemlock Road	North of Avenue 21	A	A	70	0.06	A	51	0.04	A	87	0.07	A	73	0.06	A
8	E Sandy Mush Road	West of SR 99	A	A	32	0.03	A	41	0.03	A	32	0.03	A	41	0.03	A
9	Avenue 25	East of Road 14	A	A	78	0.07	A	139	0.12	A	78	0.07	A	139	0.12	A
10	Avenue 25	West of Road 13	A	A	199	0.17	A	160	0.14	A	199	0.17	A	160	0.14	A
11	Road 21 1/2	East of Road 12	A	A	7	0.01	A	10	0.01	A	7	0.01	A	10	0.01	A
12	Avenue 21 1/2	East of Robertson Boulevard	A	A	15	0.01	A	22	0.02	A	26	0.02	A	24	0.02	A
13	Road 14	North of Avenue 21	A	A	34	0.03	A	20	0.02	A	34	0.03	A	20	0.02	A
14	Avenue 22	West of Road 18 1/2	A	A	2	0.00	A	3	0.00	A	2	0.00	A	3	0.00	A
18	Avenue 21	West of Road 19	A	A	0	0.00	A	9	0.01	A	0	0.00	A	9	0.01	A

Source: Author's compilation, 2016
LOS standard pursuant to Merced County guidelines (LOS D for rural highway, LOS C for all other rural roads) and Madera County guidelines (LOS D).
2015 Existing volumes and V/C are included in Table 6-8.
Volume = two-way peak-hour volume
V/C = volume-to-capacity ratio. Each roadway segment has 2 lanes.
LOS = level-of-service
SR = State Route

6.3.4 SR 152 (North) to Road 11 Wye Alternative

The SR 152 (North) to Road 11 Alternative would require the permanent closure of 33 public roadways at selected locations and construction of 24 overcrossings or undercrossings. Additionally, under this alternative there would be 57 road crossings of the HSR and 1 HSR crossing of the UPRR corridor. Figure 2-4 shows the anticipated state highway and local roadway closures and modifications.

This alternative would have the fewest roadway and state highway modifications. As described in Section 2.2.3.4, SR 152 (North) to Road 11 Alternative, 14 of these permanent road closures would be located at SR 152 where roads currently cross at-grade but need to be closed in order to convert SR 152 to a fully access-controlled corridor. The 14 proposed closures are Road 5, Road 6, Road 7, Road 8, Road 10, Road 11, Road 13, Road 14, Road 14 1/2, Road 15, Road 15 1/2, Road 15 3/4, Road 17, and Road 18. Planned new grade separations and interchanges along SR 152 at the SR 59/SR 152 Interchange, Road 4/Lincoln Road, Road 9/Hemlock Road, Road 12, SR 233/Robertson Blvd, Road 16, and Road 17 1/2 would maintain access to SR 152. These roadways would be reconfigured to two 12-foot lanes with two 8-foot shoulders. Several of these new interchanges would require realigning SR 152.

The effect of these roadway modifications would be the diversion of traffic from closed roads to nearby streets. Although this could result in some additional out-of-direction travel for motorists, road crossings would be provided approximately every 2 miles to minimize increased travel time and cost. The following subsections present a discussion of the effect of these changes on the roadway network for the 2015 and 2040 baselines.

6.3.4.1 Existing (2015) Plus Project Conditions

Table 6-10 shows changes in roadway operations on roadway segments for the SR 152 (North) to Road 11 Wye Alternative between the Existing (2015) and Existing (2015) Plus Project scenarios. With the addition of the rerouted traffic under the Existing (2015) Plus Project scenario, all selected roadway segments in the RSA would continue to operate at LOS A.

6.3.4.2 2040 Plus Project Conditions

Even with the addition of the rerouted traffic under the 2040 Plus Project scenario, all selected roadway segments in the RSA for the SR 152 (North) to Road 11 Wye Alternative would operate under uncongested conditions. As shown in Table 6-11, all segments except one would continue to operate at LOS A. The roadway segment on Los Banos Highway, north of Avenue 23 ½, would continue to operate at LOS B during the AM peak hour and LOS C during the PM peak hour.

Table 6-10 Existing (2015) Plus Project Peak Hour Roadway Operations along SR 152 (North) to Road 11 Wye Alternative

Count #	Roadway	Location	Existing (2015)						Existing (2015) plus Project					
			AM Peak			PM Peak			AM Peak			PM Peak		
			Volume	V/C	LOS	Volume	V/C	LOS	Volume	V/C	LOS	Volume	V/C	LOS
1	Henry Miller Road	Near Hutchins Road	35	0.03	A	20	0.02	A	35	0.03	A	20	0.02	A
3	Los Banos Highway	North of Avenue 23 ½	463	0.39	A	533	0.45	A	489	0.41	A	580	0.49	A
5	Hemlock Road	North of SR 152	52	0.04	A	28	0.02	A	61	0.05	A	40	0.03	A
6	Hemlock Road	South of SR 152	29	0.02	A	22	0.02	A	29	0.02	A	22	0.02	A
8	E. Sandy Mush Road	West of SR 99	20	0.02	A	26	0.02	A	20	0.02	A	26	0.02	A
23	Road 4	South of SR 152	40	0.03	A	75	0.06	A	40	0.03	A	75	0.06	A
24	Road 8	South of SR 152	30	0.03	A	32	0.03	A	30	0.03	A	32	0.03	A
25	Road 8	North of SR 152	10	0.01	A	20	0.02	A	10	0.01	A	20	0.02	A
26	Road 11	South of SR 152	8	0.01	A	8	0.01	A	58	0.05	A	57	0.05	A
27	Avenue 25 ½	West of Road 11	11	0.01	A	5	0.00	A	11	0.01	A	5	0.00	A
28	E. Sandy Mush Road	East of S. Athlone Road	32	0.03	A	50	0.04	A	32	0.03	A	50	0.04	A
29	Avenue 24	West of Road 12	4	0.00	A	7	0.01	A	4	0.00	A	7	0.01	A

Source: Author's compilation, 2016
LOS standard pursuant to Merced County guidelines (LOS D for rural highway, LOS C for all other rural roads) and Madera County guidelines (LOS D).
Volume = two-way peak-hour volume
V/C = volume-to-capacity ratio. Each roadway segment has 2 lanes.
LOS = level-of-service
SR = State Route

Table 6-11 Comparison of 2040 Peak Hour Roadway Operations to 2015 Existing Conditions along SR 152 (North) to Road 11 Wye Alternative

			Existing (2015)		2040 No Project						2040 Plus Project					
			AM Peak	PM Peak	AM Peak			PM Peak			AM Peak			PM Peak		
Count #	Roadway	Location	LOS	LOS	Volume	V/C	LOS	Volume	V/C	LOS	Volume	V/C	LOS	Volume	V/C	LOS
1	Henry Miller Road	Near Hutchins Road	A	A	56	0.05	A	32	0.03	A	56	0.05	A	32	0.03	A
3	Los Banos Highway	North of Avenue 23 ½	A	A	733	0.62	B	843	0.72	C	765	0.65	B	901	0.77	C
5	Hemlock Road	North of SR 152	A	A	82	0.07	A	44	0.04	A	94	0.08	A	60	0.05	A
6	Hemlock Road	South of SR 152	A	A	46	0.04	A	34	0.03	A	46	0.04	A	34	0.03	A
8	E. Sandy Mush Road	West of SR 99	A	A	32	0.03	A	41	0.03	A	32	0.03	A	41	0.03	A
23	Road 4	South of SR 152	A	A	64	0.05	A	120	0.10	A	64	0.05	A	120	0.10	A
24	Road 8	South of SR 152	A	A	48	0.04	A	51	0.04	A	48	0.04	A	51	0.04	A
25	Road 8	North of SR 152	A	A	16	0.01	A	32	0.03	A	16	0.01	A	32	0.03	A
26	Road 11	South of SR 152	A	A	13	0.01	A	13	0.01	A	93	0.08	A	91	0.08	A
27	Avenue 25 ½	West of Road 11	A	A	18	0.01	A	8	0.01	A	18	0.01	A	8	0.01	A
28	E. Sandy Mush Road	East of S. Athlone Road	A	A	51	0.04	A	80	0.07	A	51	0.04	A	80	0.07	A
29	Avenue 24	West of Road 12	A	A	6	0.01	A	11	0.01	A	6	0.01	A	11	0.01	A

Source: Author's compilation, 2016
LOS standard pursuant to Merced County guidelines (LOS D for rural highway, LOS C for all other rural roads) and Madera County guidelines (LOS D).
2015 Existing volumes and V/C are included in Table 6-10.
Volume = two-way peak-hour volume
V/C = volume-to-capacity ratio. Each roadway segment has 2 lanes.
LOS = level-of-service
SR = State Route

6.4 Effects on Regional Transportation System

The Central Valley Wye does not include any HSR stations or other traffic-generating HSR facilities. It would not attract new traffic and by itself would not cause changes to the regional transportation system. However, the Central Valley Wye would be a part of the larger Merced to Fresno Section project, which would provide benefits to the regional transportation system by reducing vehicle trips on area freeways and air travel through the diversion of intercity trips from road and air to HSR. These beneficial indirect effects of the Merced to Fresno Section project are described in the *Merced to Fresno Section Project EIR/EIS Transportation Technical Report* (Authority and FRA 2012b).

6.5 Temporary Construction Effects

Implementation of the Central Valley Wye would include purchasing rights-of-way, securing temporary construction easements, constructing the selected alternative, and testing the HSR system. Heavy construction (such as grading, excavating, constructing the HSR railbed, and laying of tracks) would occur over about a 9-year period, with effects at any given location expected to last 1–3 years. It is anticipated that all grade-separation construction would be coordinated so that construction sites would be located on average 2 miles apart. This gap in the construction areas would allow for the efficient passage of traffic.

Effects on existing freeways and expressways adjacent to the Central Valley Wye would be temporary and would typically affect roadway operations. Such construction could result in temporary closure of traffic lanes, reduction of lane widths, reduced speed limits, temporary on- and off-ramp closures, detours, and temporary closure of the freeway for placement of structural elements or installation or removal of falsework. The duration of these effects could range from several hours, in the case of a freeway closure to install or remove falsework, to months in the case of lane-width reductions.

All truck traffic required for excavation would use designated truck routes within each city to the maximum extent feasible to minimize traffic on surface roads. Additionally, movement of heavy construction equipment such as cranes and bulldozers, and oversized structures such as steel cages for aerial structures, would occur during off-peak hours to the maximum extent feasible. A detailed construction access plan would be developed for the Central Valley Wye prior to beginning any construction activities and would be reviewed and approved by the cities, counties, and local and state transportation authorities.

In urban areas, Central Valley Wye construction effects could contribute to increased intersection delays and interference with pedestrians, bicyclists, and transit. Also, construction traffic may create an operational hazard or loss of access to community facilities, although emergency access would be maintained at all times. In rural areas, primary traffic effects during construction would occur at locations where overpasses or underpasses are needed to carry minor roadways over or under the HSR tracks. At these locations, the affected roadway would either be rerouted onto a temporary alignment or temporarily closed.

Construction-related effects on circulation and emergency access, and LOS effects on adjacent highways are based on comparison with existing conditions, using the existing roadway network as a baseline. At this stage of preliminary engineering design, analysis of construction effects is preliminary.

6.5.1 SR 152 (North) to Road 13 Wye Alternative

Construction staging plans at the 15 percent design level outline possible roadway detours during the construction phase. These detours and construction measures for the SR 152 (North) to Road 13 Wye Alternative are described in Appendix E, Construction Staging Plans and Possible Detour Routes by Alternative. These temporary detour plans could be modified at final design.

Most of the RSA is rural, with a few more developed areas, including Chowchilla, Fairmead, and Madera Acres. Common construction effects from all Central Valley Wye alternatives are from

effects on local circulation and emergency access, which are organized by the location in which they occur:

- Urban areas where some mainline construction would occur
- Areas adjacent to freeways or existing rail lines
- Rural areas where mainline roadbed and minor road overcrossings would be built

6.5.1.1 Construction Effects on Circulation and Emergency Access

In more developed areas, including Chowchilla, Fairmead and Madera Acres, Central Valley Wye construction traffic could interfere with pedestrians, bicyclists, and transit operations. Also, construction traffic may create an operational hazard or loss of access to community facilities, although emergency access would be maintained. This traffic includes heavy trucks, because materials are brought to construction sites and demolished or excavated materials are hauled away. Construction activities could require temporary lane or road closures and underground utility work. Construction activities could also lead to both temporary disruption of transportation system operations and possible damage to elements of the roadway system such as pavement and curbs.

The construction of the Central Valley Wye would require temporary construction easements (TCE). The TCE may require the temporary closure of parking areas, roadway travel lanes, pedestrian facilities, bicycle lanes, and paths. The temporary detours and road closures that could be required during construction of the SR 152 (North) to Road 13 Wye Alternative (based on preliminary design) are discussed in Appendix E. In addition, since construction conditions may vary, there is a possibility for disruption to or temporary delay of railroad operations.

The following IAMFs are included as part of the design of the Central Valley Wye for reducing effects on circulation and emergency access:

- TR-IAMF#1, Protection of Public Roadways during Construction
- TR-IAMF#2, Construction Transportation Plan
- TR-IAMF#3, Off-Street Parking for Construction-Related Vehicles
- TR-IAMF#4, Maintenance of Pedestrian Access
- TR-IAMF#5, Maintenance of Bicycle Access
- TR-IAMF#6, Restriction on Construction Hours
- TR-IAMF#7, Construction Truck Routes
- TR-IAMF#8, Construction during Special Events
- TR-IAMF#9, Protection of Freight and Passenger Rail during Construction
- TR-IAMF#10, Maintenance of Transit Access

As specified in TR-IAMF#7, all truck traffic, either for excavation or for transporting construction materials to the site, would use the designated truck routes within each city. The Authority will require the design/builder to develop a detailed construction transportation plan (TR-IAMF#2) for the Central Valley Wye prior to beginning any construction activities. This construction transportation plan will be reviewed by the jurisdictions located in the RSA.

Central Valley Wye construction may involve building remote parking areas for construction workers, with shuttles to bring them to and from the construction area if the remote parking areas are distant from the construction site. Early construction of the remote parking lots as the first phase of construction will make them available for use by construction workers for the remainder of Central Valley Wye construction.

A detailed Construction Transportation Plan will be prepared by the design-build contractor that will address the activities to be carried out in each construction phase (TR-IAMF#2). The movement of heavy construction equipment such as cranes, bulldozers, and dump trucks to and from the site would generally occur during off-peak hours on designated truck routes. The Surface Transportation Assistance Act truck routes within the RSA include national network and terminal access routes, as follows:

- **National Network (Federal)—**The national network truck routes are federal highways. SR 99 is the only national network truck route in the RSA.
- **Terminal Access (State, Local)—**The terminal access routes are portions of state routes or local roads that can accommodate trucks. In the RSA, terminal access routes include SR 59, SR 152, and SR 233.

Once on an active project site, heavy construction equipment such as cranes and large earthmoving equipment dedicated for the required work will remain on-site until its use for that site is completed. Consequently, such heavy equipment will not be moved repeatedly over public streets, thereby avoiding damage to pavement (TR-IAMF#7).

Any road closure or removal due to TCEs during construction would be temporary and every attempt would be made to minimize their removal or shorten the length of time that these roads are inoperable. Upon completion of construction, all parking areas, roadway lanes, pedestrian facilities, and bicycle lanes will be restored. For TCEs that cross railroad property, the Authority will avoid affecting railroad operations to the extent possible. Additional information about construction staging and detours is included in Appendix E.

Permission for temporary access on railroad property would be necessary during construction. To avoid affecting railroad operations during construction, the Authority will be responsible for reaching an agreement on the timing and duration of activities prior to implementing a TCE on railroad property. Because the timing and duration of activities would be predetermined in agreement with the railroad, the railroads would have sufficient time to adapt their operations during construction activities. However, the Authority and the freight railroads (BNSF and UPRR) will work together to make sure that the Central Valley Wye is constructed in a manner consistent with the agreements that have been or will be negotiated (TR-IAMF#9). This process will enable each entity to conduct its relevant activities in a manner which will minimize any detrimental effects on freight railroad operations.

6.5.1.2 Effects of Construction Adjacent to Highways

Effects on existing highways adjacent to the Central Valley Wye would be temporary and would typically affect roadway operations. Effects on SR 99 due to the construction of the Merced to Fresno Section are described in the *Merced to Fresno Section Project EIR/EIS Transportation Technical Report* (Authority and FRA 2012b).

Construction of the SR 152 (North) to Road 13 Wye Alternative could result in temporary closure of traffic lanes, reduction of lane widths, reduced speed limits, temporary on- and off-ramp closures, detours, and temporary closure of the freeway for placement of structural elements of installation or removal of falsework. The duration of these effects could range from several hours in the case of a freeway closure to months in the case of lane-width reductions.

In addition to temporary effects, such construction could also result in permanent road closures and grade separations. Parts of the highway may be permanently rerouted to the future design location of SR 152 and the introduction of grade-separated interchanges. The duration of the construction effects could range from a few weeks with the construction effects of a grade separation over the highway, to several weeks for the interchange construction.

TR-IAMF#1 and TR-IAMF#2 will be incorporated into the design of the Central Valley Wye. Standard construction procedures related to traffic management will be used, including development of a detailed traffic control plan for each affected location prior to beginning any construction activities. These plans will identify when and where temporary closures and detours would occur, with the goal of maintaining traffic flow, especially during peak travel periods (TR-IAMF#2).

Effects of temporary roadway closures associated with construction would not substantially increase hazards or incompatible uses due to the minimization practices that are part of the construction transportation plan, such as:

- Temporary signage to alert drivers and pedestrians to the construction zone

- Flag persons or other methods of traffic control
- Traffic speed limitations in the construction zone
- Temporary road closures and provisions for alternative access during the closure
- Detour provisions for temporary road closures. Alternating one-way traffic will be considered as an alternative to temporary closures where practicable and where it would result in better traffic flow than would a detour.
- Identified routes for construction traffic
- Provisions for safe pedestrian and bicycle passage, or convenient detour

Effects due to temporary roadway closures associated with construction would not result in inadequate emergency access because the construction transportation plan will provide 24-hour access by emergency vehicles during construction. Additionally, standard construction procedures related to traffic management will be used, including development of a detailed traffic control plan for each affected location prior to beginning any construction activities. These plans would identify when and where temporary closures and detours would occur, with the goal of maintaining traffic flow, especially during peak travel periods, resulting in temporary construction effects on circulation (TR-IAMF#2).

6.5.2 SR 152 (North) to Road 19 Wye Alternative

Construction staging plans at the 15 percent design level outline probable roadway detours during the construction phase. These detours and construction measures for the SR 152 (North) to Road 19 Wye Alternative are described in Appendix E. These temporary detour plans could be modified at final design.

Most of the RSA is rural, with a few more developed areas including Chowchilla, Fairmead, and Madera Acres. The common construction effects on this Central Valley Wye alternative are effects on local circulation and emergency access and are similar to the effects under the SR 152 (North) to Road 13 Wye Alternative.

6.5.2.1 Construction Effects on Circulation and Emergency Access

The urban area construction effects are similar to that under the SR 152 (North) to Road 13 Wye Alternative, and would be temporary during construction of the selected Central Valley Wye alternative. TR-IAMF#1 through TR-IAMF#10 will avoid and minimize effects on the public, transit, and freight and passenger rail during construction. These measures would make sure that construction traffic is managed in a manner that avoids unnecessary hardships on the public, transit and freight and passenger rail.

6.5.2.2 Effects of Construction Adjacent to Highways

Construction effects on circulation due to construction adjacent to freeway are similar to that under the SR 152 (North) to Road 13 Wye Alternative, resulting in temporary construction effects on circulation. TR-IAMF#1 and TR-IAMF#2 would reduce construction effects by identifying when and where temporary closures and detours would occur, with the goal of maintaining traffic flow, especially during peak travel periods. In addition, effects due to temporary roadway closures associated with construction would not substantially increase hazards or incompatible uses or result in inadequate emergency access.

6.5.3 Avenue 21 to Road 13 Wye Alternative

Construction staging plans at the 15 percent design level outline probable roadway detours during the construction phase. These detours and construction measures for the Avenue 21 to Road 13 Wye Alternative are described in Appendix E. These temporary detour plans could be modified at final design.

Most of the RSA is rural, with a few more developed areas including Fairmead and Madera Acres. The common construction effects on this Central Valley Wye alternative are effects on

local circulation and emergency access and are similar to the effects under the SR 152 (North) to Road 13 Wye Alternative.

6.5.3.1 Construction Effects on Circulation and Emergency Access

The urban area construction effects are similar to that under the SR 152 (North) to Road 13 Wye Alternative, and would be temporary during construction of the Avenue 21 to Road 13 Wye Alternative. TR-IAMF#1 through TR-IAMF#10 will avoid and minimize effects on the public, transit, and freight and passenger rail during construction. These measures will make sure that construction traffic is managed in a manner that avoids unnecessary hardships on the public, transit and freight and passenger rail.

6.5.3.2 Effects of Construction Adjacent to Highways

Construction effects on circulation due to construction near adjacent freeways are similar to that under the SR 152 (North) to Road 13 Wye Alternative. However, unlike the construction of the SR 152 alternatives, which would have effects on SR 152 operations, the construction of the Avenue 21 to Road 13 Wye Alternative would have fewer effects on freeway operations. Construction effects on circulation would be temporary.

While road or lane closures would disrupt the flow of traffic during construction, TR-IAMF#1 and TR-IAMF#2 will help reduce effects by identifying when and where temporary closures and detours would occur, with the goal of maintaining traffic flow, especially during peak travel periods. In addition, effects due to temporary roadway closures associated with construction would not substantially increase hazards or incompatible uses or result in inadequate emergency access.

6.5.4 SR 152 (North) to Road 11 Wye Alternative

Construction staging plans at the 15 percent design level outline probable roadway detours during the construction phase. These detours and construction measures for the SR 152 (North) to Road 11 Wye Alternative are described in Appendix E. These temporary detour plans could be modified at final design.

Most of the RSA is rural, with a few more developed areas including Chowchilla, Fairmead, and Madera Acres. The common construction effects on this Central Valley Wye alternative are related to local circulation and emergency access and are similar to the effects under the SR 152 (North) to Road 13 Wye Alternative.

6.5.4.1 Construction Effects on Circulation and Emergency Access

The urban area construction effects are similar to that under the SR 152 (North) to Road 13 Wye Alternative, and would be temporary during construction of the SR 152 (North) to Road 11 Wye Alternative. TR-IAMF#1 through TR-IAMF#10 will avoid and minimize effects on the public, transit, and freight and passenger rail during construction. These measures will make sure that construction traffic is managed in a manner that avoids unnecessary hardships on the public, transit, and freight and passenger rail.

6.5.4.2 Effects of Construction Adjacent to Highways

Construction effects on circulation due to construction near adjacent freeways are similar to that under the SR 152 (North) to Road 13 Wye Alternative. Construction effects on circulation would be temporary.

While road or lane closures would disrupt the flow of traffic during construction, TR-IAMF#1 and TR-IAMF#2 will help reduce effects by identifying when and where temporary closures and detours would occur, with the goal of maintaining traffic flow, especially during peak travel periods. In addition, effects due to temporary roadway closures associated with construction would not substantially increase hazards or incompatible uses or result in inadequate emergency access.

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Caltrans	California Department of Transportation
CDOF	California Department of Finance
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
ESRI	Environmental Systems Research Institute
FAA	Federal Aviation Administration
FDOT	Florida Department of Transportation
FRA	Federal Railroad Administration
JPA	Joint Powers Authority
MCAG	Merced County Association of Governments
MCTC	Madera County Transportation Commission
UPRR	Union Pacific Railroad
VPC	Valley Planning Consultants Inc.

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