

California High-Speed Rail Authority

# *Bakersfield to Palmdale Project Section*

Supplemental  
Alternatives  
Analysis Report

April 2016



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**California High-Speed Rail Project**



**Bakersfield to Palmdale Project Section**

**SUPPLEMENTAL ALTERNATIVES  
ANALYSIS REPORT**

April 2016

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## STATEWIDE PROGRAM

The California High-Speed Rail Authority (Authority) is responsible for planning, designing, building and operating the first high-speed rail in the nation. California high-speed rail will connect the mega-regions of the state, contribute to economic development and a cleaner environment, create jobs and preserve agricultural and protected lands. When it is completed, it will run from San Francisco to the Los Angeles basin in under three hours at speeds capable of exceeding 200 miles per hour. The system will eventually extend to Sacramento and San Diego, totaling 800 miles with up to 24 stations. In addition, we are working with regional partners to implement a statewide rail modernization plan that will invest billions of dollars in local and regional rail lines to meet the state's 21st century transportation needs.

The California High-Speed Rail program is already delivering benefits to California, years before rail operations actually will begin. It has employed over 260 certified small businesses to work on planning, design and construction activities throughout the state, and is creating new jobs and training opportunities. Ultimately, High-Speed Rail will create 3,500 permanent jobs, in addition to tens of thousands of temporary jobs designing and building the system. Once operational, the system will operate on 100% renewable energy, providing a clean alternative to the current transportation options that degrade air quality across the state.

As part of the program, the California High-Speed Rail Authority is working with regional partners to implement a statewide rail modernization plan that will invest billions of dollars in local and regional rail lines to meet the state's 21st century transportation needs. The proposed projects would add capacity to allow for more rail service, construct new overcrossings to reduce local traffic delays and improve safety, and implement technologies to increase safety for all users. These improvements will provide immediate benefits to existing rail services and local communities, while also setting the stage for future California High-Speed Rail service.

## BAKERSFIELD TO PALMDALE SECTION

The Bakersfield to Palmdale Section will provide a critical link between the Central Valley and Southern California by closing the gap in the statewide passenger rail system between these two large and diverse regions. The approximately 80-mile route will cross the Tehachapi Mountains and include stations at Bakersfield and Palmdale, providing new opportunities for economic development and revitalization in those cities.

Existing and planned transit services provide connections throughout Kern and Los Angeles Counties. Additionally, Palmdale is the planned western terminus of the High Desert Corridor, a multipurpose corridor that can accommodate a highway, energy production and/or transmission facilities and a high-speed rail feeder service line. This feeder service line will provide a connection between the California High-Speed Rail system and XpressWest, a future high-speed rail line between Victorville and Las Vegas, potentially offering a one-seat high-speed rail trip between Las Vegas and Los Angeles.

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## ABBREVIATIONS AND ACRONYMS

Authority	California High-Speed Rail Authority
CEQA	California Environmental Quality Act
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
FRA	Federal Railroad Administration
HSR	High-Speed Rail
NEPA	National Environmental Policy Act
PAA	Preliminary Alternatives Analysis
SAA	Supplemental Alternatives Analysis
SR	State Route
UPRR	Union Pacific Railroad

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## ES 1 EXECUTIVE SUMMARY

The Authority is responsible for planning, designing, building, and operating the first high-speed rail system in the nation. The California High-Speed Rail System will connect the mega-regions of the state, contribute to economic development and a cleaner environment, create jobs, and preserve agricultural and protected lands. By 2029, the system will run from San Francisco to the Los Angeles basin in under three hours at speeds of over 200 miles per hour. The system will eventually extend to Sacramento and San Diego, totaling 800 miles with up to 24 stations.

The system is being developed in sections; this report presents the Supplemental Alternatives Analysis (SAA) for the Bakersfield to Palmdale Section.

### ES 1.1 Bakersfield to Palmdale Project Section Background

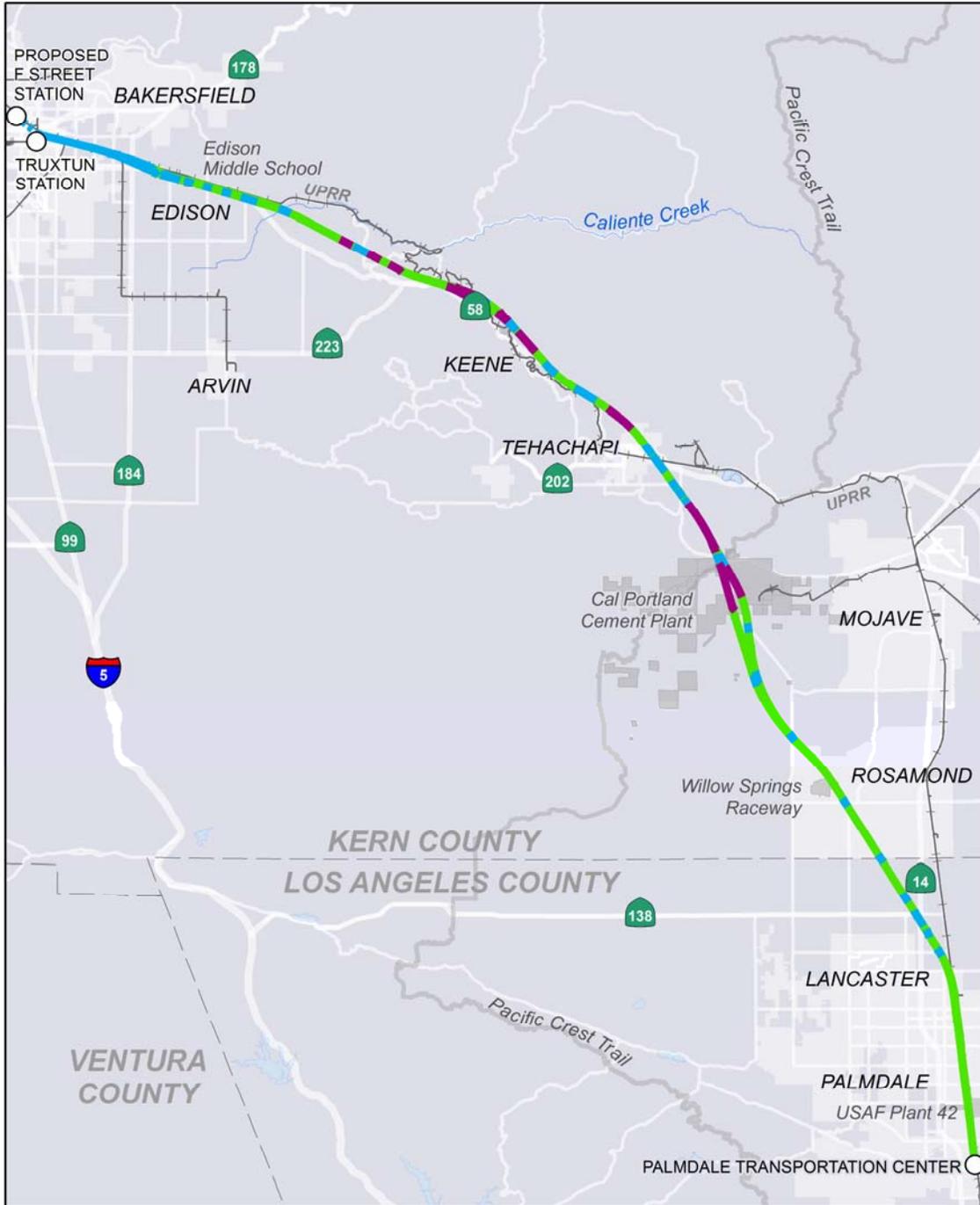
The purpose of the SAA process is to describe the Range of Alternatives considered for the Bakersfield to Palmdale Project Section, and to do the following: (1) evaluate whether the alternatives meet the High-Speed Rail Project objectives and the Purpose and Need; (2) evaluate and disclose the potential impacts of the alternatives based on a screening level of information, (3) evaluate whether the alternatives are potentially feasible and reasonable; and (4) either recommend alternatives for further study in the environmental clearance process or withdraw them from further evaluation.

This SAA informs the Project Description in the project-level environmental documents that will comply with CEQA and NEPA requirements. It also sets parameters for the environmental analysis and design. An SAA report is an analysis based on conceptual engineering, preliminary environmental analysis and community engagement information to identify feasible alternatives to carry forward for environmental review and evaluation in the [Bakersfield to Palmdale Section](#)<sup>1</sup> project-level environmental document that will be prepared in accordance with CEQA and NEPA.

The Bakersfield to Palmdale Section is an essential part of the statewide High-Speed Rail System, filling a critical gap in California's current north-south passenger rail network. The Bakersfield to Palmdale Section is approximately 80 miles long and extends through a variety of land uses and ecoregions, including rural, urban, mountainous, and desert terrain. From the north, the Bakersfield to Palmdale Section begins just outside the southeastern limits of the City of Bakersfield and travels south and southeast through the Tehachapi Mountains, then descends into the Antelope Valley to the northerly limits of the City of Palmdale. The start and end points of the Bakersfield to Palmdale Section consist of the Bakersfield Station in the north and the Palmdale Station in the south. Figure ES-1 shows the Range of Alternatives evaluated in this SAA, illustrating the vertical alignment of the Bakersfield to Palmdale Section and identifying portions of the alignment that are proposed to be elevated on viaduct structures or underground in tunnels.

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<sup>1</sup> Authority. 2016. Bakersfield to Palmdale Project Section. Website: [http://www.hsr.ca.gov/Programs/Statewide\\_Rail\\_Modernization/Project\\_Sections/bakersfield\\_palmdale.html](http://www.hsr.ca.gov/Programs/Statewide_Rail_Modernization/Project_Sections/bakersfield_palmdale.html).



PRELIMINARY DRAFT/SUBJECT TO CHANGE - HSR ALIGNMENT IS NOT DETERMINED  
SOURCE: TYLin (2016); Esri (2015)

April 5, 2016



Figure ES-1 Bakersfield to Palmdale Project Section Overview

This SAA provides updates to the prior 2012 SAA and the Preliminary Alternatives Analysis (PAA) published in 2010. The alternatives studied in this 2016 SAA are an evolution of alternatives studied in the 2012 SAA, followed by additional conceptual engineering and draft studies undertaken since January 2014, as discussed in the Alternatives Screening Memorandum included as Appendix A of this report. The alternatives evaluated and recommended in this SAA incorporate refinements that, when compared to the alternatives studied in the 2012 SAA and the 2010 PAA, further avoid or minimize potential impacts to existing facilities, land uses, and environmental resources. In addition, these refinements improve the constructability of the Bakersfield to Palmdale Section and optimize system operations. The recommended alternatives reflect engineering refinement, collaborative engagement with communities along the Bakersfield to Palmdale Section, and environmental studies conducted since the 2012 SAA.

## **ES 1.2 Collaborative Planning Approach**

The Authority evaluates project alternatives using system performance criteria that address design differences and qualities, and correspond to the project's Purpose and Need and objectives. The Authority considers input from stakeholders through a collaborative approach to alternatives evaluation. This approach seeks to avoid or minimize potential impacts by balancing the project objectives, environmental resources, and community concerns for any given alternative.

## **ES 1.3 Summary of Recommendations in the Supplemental Alternatives Analysis**

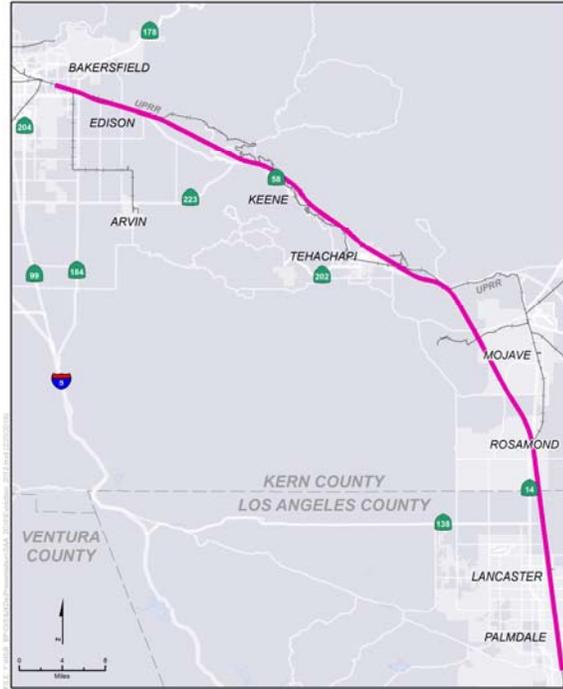
The alternatives analysis describes the range of alternatives considered for the Bakersfield to Palmdale Section and evaluates and discloses:

1. Whether the alternatives meet the High-Speed Rail Project's objectives and its Purpose and Need
2. Whether the potential impacts of the alternatives based on a screening level of information
3. Whether the alternatives are potentially feasible and reasonable; and then recommend the alternatives either be carried forward for further refinement and evaluation in the environmental review process or withdrawn from further consideration

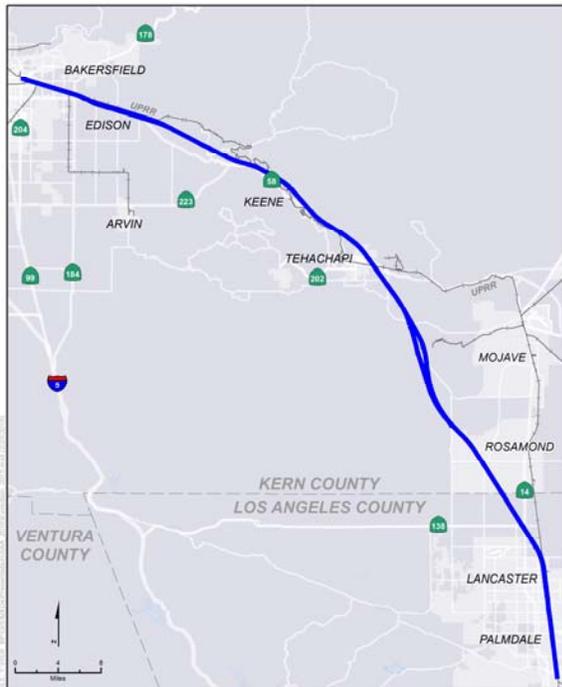
The 2010 PAA and 2012 SAA established that the alignments being considered in the Bakersfield to Palmdale Section sufficiently met the project objectives and the Purpose and Need and were potentially feasible. Therefore, this SAA focuses on refinements that avoid and minimize environmental impacts. Figure ES-2 shows the evolution of alternatives in the Bakersfield to Palmdale Section since the 2010 PAA. The Alternatives Screening Memorandum provided in Appendix A describes the environmental, community, and engineering factors considered in refining the alternatives recommended in the 2012 SAA.



2010



2012



2016

-  Proposed 2010 HSR Alternatives
-  Proposed 2012 HSR Alternatives
-  Proposed 2016 HSR Alternatives

Figure ES-2 Evolution of Alternatives

The summary of this SAA's recommendations includes the following:

#### *Summary of Recommendations*

- ◆ Carry forward Alternatives 1, 2, 3, and 5, which would have lower potential impacts to community facilities, Section 4(f) resources, and cultural resources compared to Alternatives 4, 6, 7, and 8.
- ◆ These alternatives provide for two options through the community of Edison. Either of these options can connect to either of the alignment routes being proposed in the Fresno to Bakersfield Section to the north.
- ◆ These alternatives provide for two options through the City of Tehachapi. The option included in Alternatives 1, 2, and 5 reduces tunnel lengths and impacts to the Pacific Crest Trail compared to Alternative 3.
- ◆ These alternatives provide for two options in the City of Lancaster, one alternative option places the High-Speed Rail alignment as close as possible to the existing rail corridor while still providing High-Speed Rail grade separation. Both alternative options in the City of Lancaster provide adequate clearances for the existing rail corridor (UPRR and MetroLink) facilities.

### ES 1.3.1 Project Objectives

The project objectives leading to the eventual selection of a preferred alternative are driven by many factors: safety, speed, reliability, and cost, as well as the operation of the future High-Speed Rail System. At each stage of development, extensive technical evaluation is performed on the proposed alternatives to ensure that they meet the objectives of the future operation of high-speed rail service.

#### *Key considerations that will ultimately drive the success of the project include:*

**High-Speed Rail Operations**—Up to 220-miles-per-hour trains that require highly specific track geometry.

**Connecting Major Population Areas**—Stations are placed in the heart of major urban centers to bring high-speed rail service to the greatest number of people and maximize ridership of the system.

**Network Integration with Existing Systems**—Stations are placed next to existing and planned transportation centers in order to provide seamless multimodal transfers and system-wide transportation improvements.

**Cost-Effectiveness**—Goals are accomplished in the most cost-effective manner and, to the extent possible, multiplying the benefits of each dollar invested across the wider multimodal network and the broader community.

### ES 1.3.2 Community Engagement

The Authority developed and is implementing a continuous community engagement program to support the development of alternatives for study during the environmental process. For the Bakersfield to Palmdale Section, the Authority has held more than 150 meetings, briefings, and conversations to date with community stakeholders, businesses, local agencies, and elected officials to gather, confirm, and understand key community concerns so that these community concerns are incorporated into the development of alternatives and during the environmental process. The meetings included the following:

- Four stakeholder working groups held in September 2015
- Five open house meetings held in September/October 2015

The feedback from these meetings was used to develop the alternatives and design the refinements shared with the public during several rounds of outreach efforts. Section 1.8 describes these efforts in more detail.

#### *Some of the major community and environmental considerations heard through the collaborative approach process included:*

- ▶ Sensitive habitats and species
- ▶ Water resources
- ▶ Noise and vibration
- ▶ Traffic
- ▶ Mountains and agricultural land
- ▶ Environmental justice issues
- ▶ Cultural resources
- ▶ Section 4(f) resources

### ES 1.3.3 Environmental Resources

Environmental resource considerations are guided by federal laws, state laws, and local considerations, which provide laws and regulations that protect the natural and built environmental resources and inform decisionmakers and the public of the potential environmental effects of a project. Feedback from community members and local stakeholders also helps focus attention on locally important resources of concern.

### ES 1.4 Next Steps

This SAA recommends carrying forward alternatives with consideration to reducing and avoiding potential environmental impacts, which will be refined and evaluated further in the project-level environmental document. The Authority will continue engaging local governments and the public in the alternatives analysis and environmental review process, detailed in Figures ES-3 and ES-4. The Authority and the Federal Railroad Administration (FRA) will continue working with regulatory agencies, including state and federal agencies, to advance review of the recommended alternatives in the project-level environmental documents.



*The alternative development process seeks to balance project objectives, natural resources, and the protection of community character.*

**Figure ES-3 Collaborative Approach**

# INITIATE PROJECT

Statewide Program EIR/EIS (certified 2005)

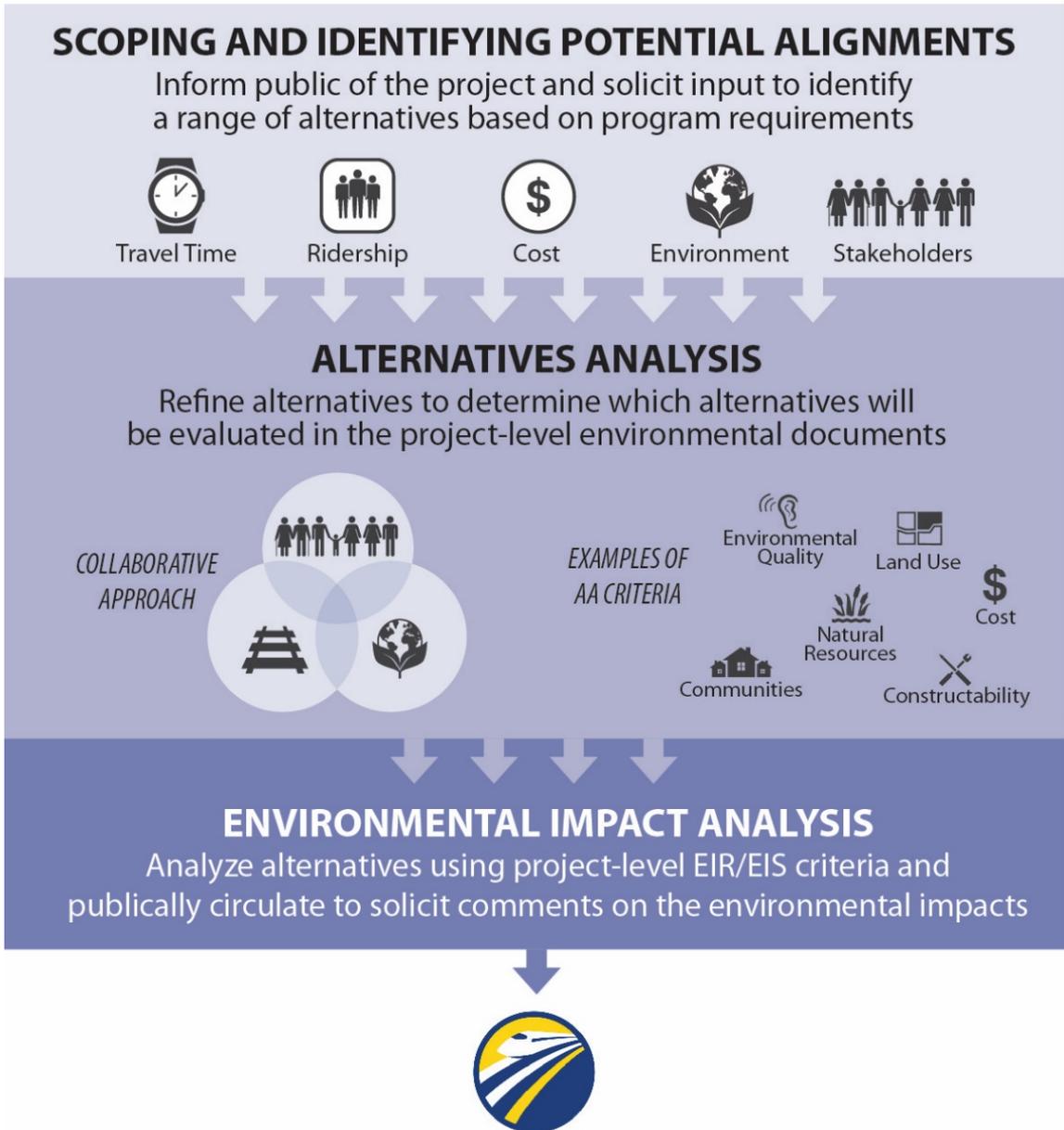


Figure ES-4 Environmental and Alternatives Analysis Processes

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# 1 INTRODUCTION AND BACKGROUND

## 1.1 Introduction

The [Bakersfield to Palmdale Section](#)<sup>2</sup> is an essential part of the statewide High-Speed Rail System that will fill a critical gap in California’s current north-south passenger rail network. The rail network will provide a new transportation option that will contribute to increased mobility and improved access to major urban areas throughout California.

*Section 1 at a Glance—In this section, you will find the following information:*

- ▶ Introduction
- ▶ Alternatives Development Approach
- ▶ Meeting Project Purpose and Need/Objectives
- ▶ Collaborative Approach to Evaluation of Alternatives
- ▶ Alternatives Analysis Criteria Applied in the Evaluation Process
- ▶ Agency and Community Outreach and Input

This project section is approximately 80 miles in length and ascends some 3,800 feet as it crosses the Tehachapi Mountains from north to south. It traverses valley, mountain, and high desert terrain, as well as urban, rural, agricultural, and wild lands.

*The purposes of this 2016 SAA Report include the following:*

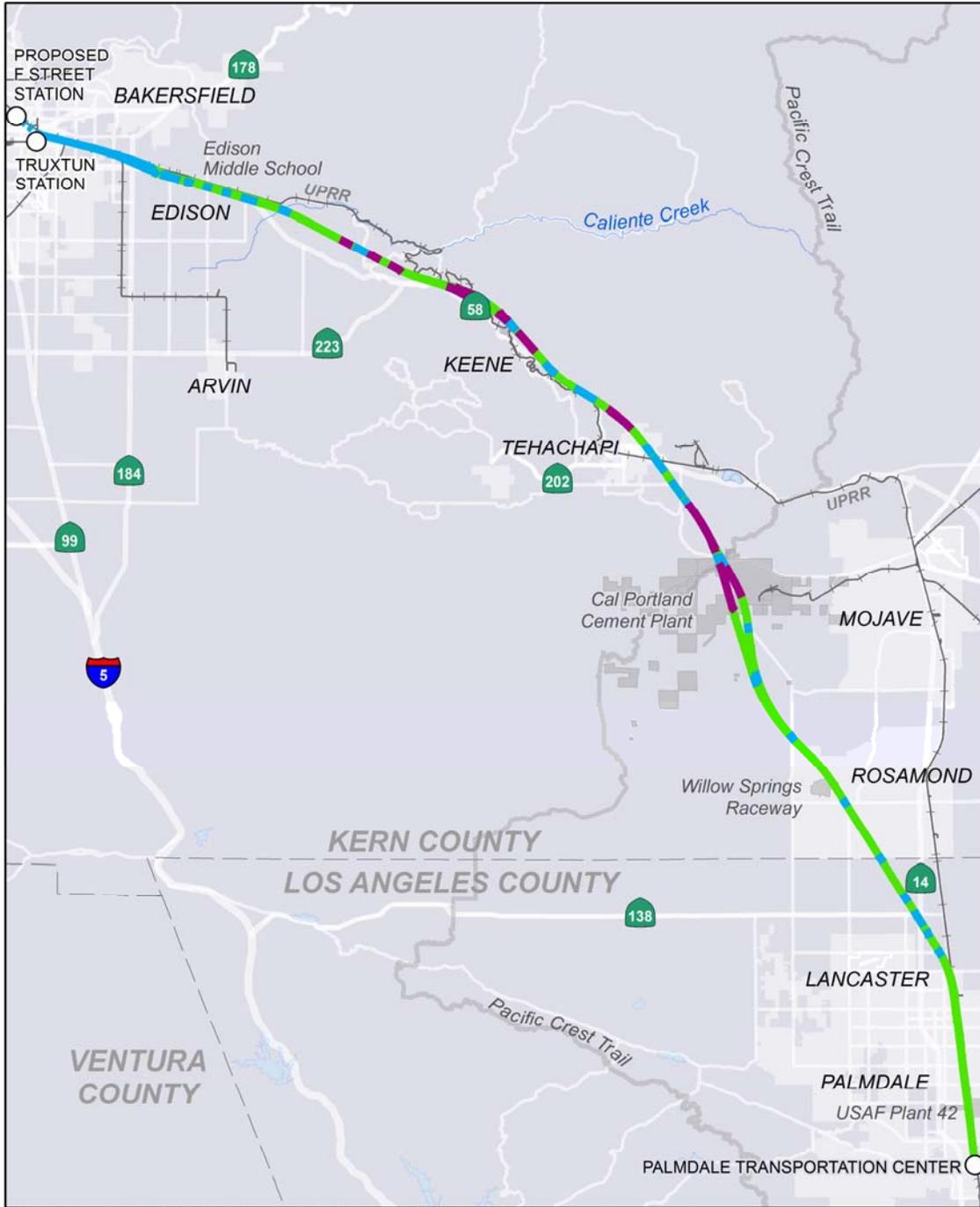
- ◆ Provide information to document the evaluation process used to identify reasonable and feasible project alternatives that would meet the purpose and need for the project.
- ◆ Identify alternatives where environmental constraints or engineering challenges may justify dropping alternatives from further analysis.
- ◆ Provide comparative information and data highlighting and comparing similarities and differences between alternatives by using project evaluation measures and criteria.
- ◆ Evaluate preliminary location and design alternatives via a collaborative approach with input from agencies and communities using existing conditions, design criteria, and construction and operating factors supporting identification and selection of a reasonable range of practicable and feasible alternatives for project environmental review.
- ◆ Recommend alternatives for additional analysis in the project-level environmental review process.

As shown in Figure 1.1-1, the northern limit of the Bakersfield to Palmdale Section is the Truxtun Station located in the City of Bakersfield. This station was studied and approved in the Final Environmental Impact Report/Environmental Impact Statement (EIR/EIS) for the [Fresno to Bakersfield Section](#).<sup>3</sup> Since the approved 2014 Record of Decision, the Authority and the City of Bakersfield have agreed to consider an alternate station location at F Street. This alternative is currently being evaluated through a Supplemental EIR/EIS for the Fresno to Bakersfield Section. The Bakersfield to Palmdale Section alternatives studied in this SAA, and in the following EIR/EIS, accommodate a connection to either of the alternatives currently under evaluation in the Fresno to Bakersfield Section to the north. The Bakersfield Station would provide interconnectivity for the High-Speed Rail System in the Bakersfield area.

South of the Bakersfield Station, the Bakersfield to Palmdale alignment follows the existing transportation corridors of Edison Highway and State Route (SR) 58, passing the community of Edison as it leaves the Central Valley and climbs into the Tehachapi Mountains. As it generally parallels SR 58 toward the City of Tehachapi, the Bakersfield to Palmdale alignment passes through the community of Keene, as well as the Tejon, Cummings, and Loop Ranches.

<sup>2</sup> Authority. 2016. Bakersfield to Palmdale Project Section. Website: [http://www.hsr.ca.gov/Programs/Statewide\\_Rail\\_Modernization/Project\\_Sections/bakersfield\\_palmdale.html](http://www.hsr.ca.gov/Programs/Statewide_Rail_Modernization/Project_Sections/bakersfield_palmdale.html).

<sup>3</sup> Authority. 2016. Fresno to Bakersfield Project Section. Website: [http://www.hsr.ca.gov/Programs/Statewide\\_Rail\\_Modernization/Project\\_Sections/fresno\\_bakersfield.html](http://www.hsr.ca.gov/Programs/Statewide_Rail_Modernization/Project_Sections/fresno_bakersfield.html).



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SOURCE: TYLin (2016); Esri (2015)

April 5, 2016



Figure 1.1-1 Bakersfield to Palmdale Project Section Overview

The Bakersfield to Palmdale alignment skirts the northern and eastern limits of the City of Tehachapi before it curves to the southeast and descends into and crosses the Antelope Valley. The Bakersfield to Palmdale alignment would include a maintenance of infrastructure facility in the Antelope Valley. The specific location of the maintenance of infrastructure facility will be addressed in a separate terminal storage and maintenance facility and maintenance of infrastructure facility report.

Passing west of the communities of Mojave and Rosamond, the Bakersfield to Palmdale alignment crosses SR 14 and then parallels Sierra Highway at the northern limit of the City of Lancaster. The alignment then follows Sierra Highway to Avenue O, where the Bakersfield to Palmdale Section meets the northern limit of the [Palmdale to Burbank Section](#).<sup>4</sup> The southern terminus of the Bakersfield to Palmdale Section would be the [Palmdale Transportation Center Station](#),<sup>5</sup> currently being evaluated through the environmental process within the Palmdale to Burbank Section. The Palmdale station would provide interconnectivity for the High-Speed Rail System in the Palmdale area.

The Bakersfield to Palmdale Section includes a variety of constraints that pose significant technical and environmental challenges, including seismic faults, steep grades through the Tehachapi Mountains, and floodplains. The Bakersfield to Palmdale Section contains various natural areas with existing conservation plans, potential critical habitats, recreational resources (such as the Pacific Crest Trail), cultural resources protected under Section 4(f), and aquatic resources (such as Caliente Creek and historic Lake Thompson). The Bakersfield to Palmdale Section also includes areas with environmental justice communities; community resources such as schools and parks; and a variety of business interests such as agricultural lands, wind energy facilities, and quarries. These constraints complicate the ability of the Authority to develop alignments that completely avoid and minimize impacts to communities and natural features.

This SAA provides comparative information and data highlighting and comparing similarities and differences between the alternatives along the Bakersfield to Palmdale corridor while also studying existing constraints in order to recommend alternatives for additional analysis in this environmental review process.

This SAA evaluates eight distinct alternatives (Alternatives 1 through 8) and provides environmental and engineering information for each (Figure 1.1-2). The Range of Alternatives considered includes potential horizontal variations through the communities of Edison, Tehachapi, and Lancaster, and potential vertical variations through the entire length of the Bakersfield to Palmdale Section.

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<sup>4</sup> Authority. 2016. Burbank to Los Angeles Project Section. Website: [http://www.hsr.ca.gov/Programs/Statewide\\_Rail\\_Modernization/Project\\_Sections/burbank\\_losangeles.html](http://www.hsr.ca.gov/Programs/Statewide_Rail_Modernization/Project_Sections/burbank_losangeles.html).

<sup>5</sup> Authority. 2016. Palmdale to Burbank Project Section. Website: [http://www.hsr.ca.gov/docs/brdmeetings/2015/brdmtg\\_060915\\_Item3\\_ATTACHMENT\\_Supplemental\\_Alt\\_Analysis\\_PalmBurb\\_Project\\_Section.pdf](http://www.hsr.ca.gov/docs/brdmeetings/2015/brdmtg_060915_Item3_ATTACHMENT_Supplemental_Alt_Analysis_PalmBurb_Project_Section.pdf).

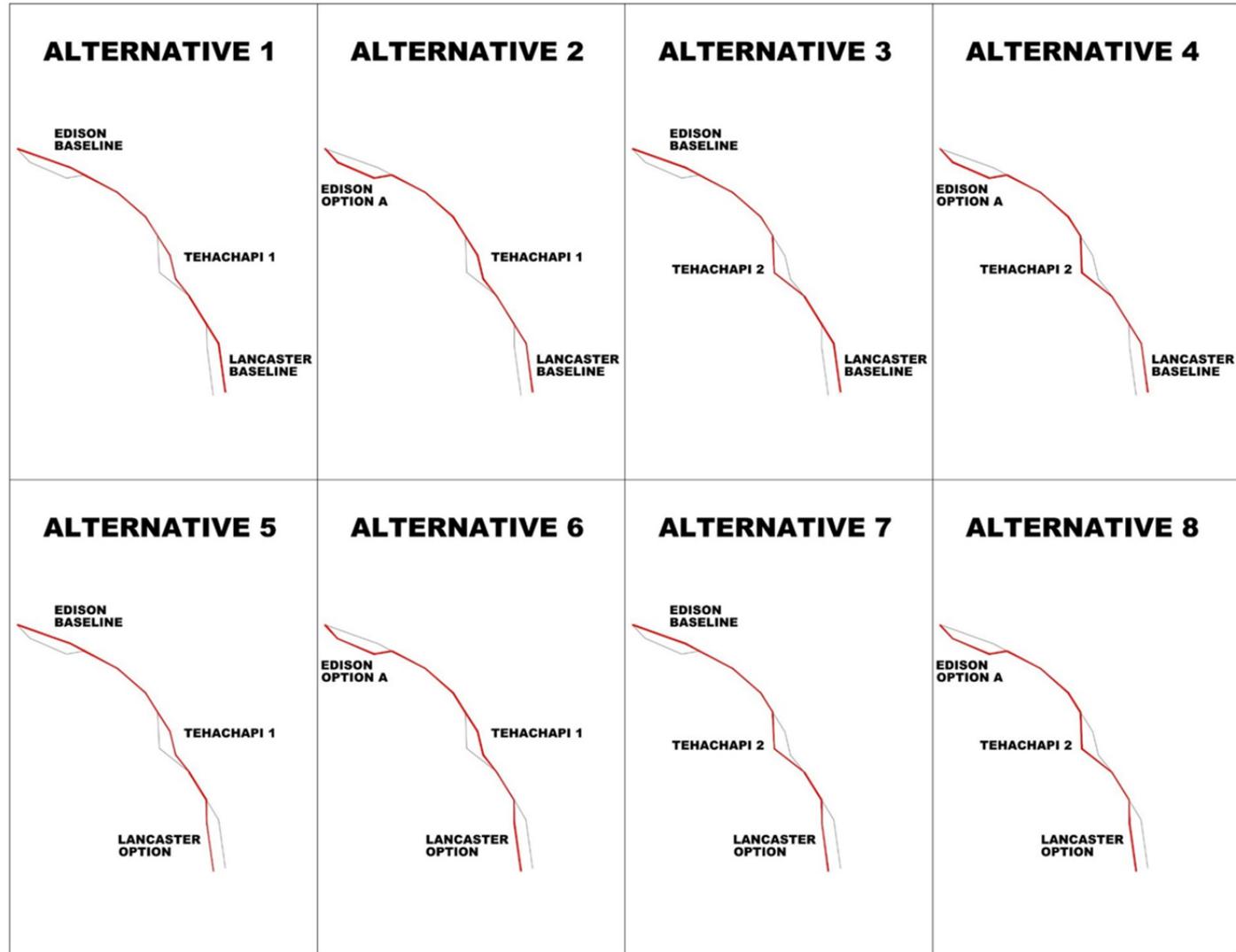


Figure 1.1-2 2016 Range of Alternatives

## 1.2 Alternatives Analysis Background

In September 2010, the Authority issued a PAA<sup>6</sup> report for the Bakersfield to Palmdale Section that introduced an initial range of project alternatives based on the High-Speed Rail corridor selected in 2005 in the Programmatic EIR/EIS for the Statewide High-Speed Rail System. In February 2012, an SAA report was released that presented a refined Range of Alternatives for the Bakersfield to Palmdale Section based on new information obtained since the previous study. Since the 2012 SAA, the Authority has continued to refine the alternatives in response to both stakeholder input and the degree to which the alternatives meet the Authority’s objectives and the project Purpose and Need. This additional study effort led to the preparation of an Alternatives Screening Memorandum, which is provided in Appendix A.

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### *Phases of Work since 2012:*

Work performed between the conclusion of the 2012 SAA and January 2014, resulting in draft studies.

Work performed since January 2014, resulting in continued refinements and adjustments to previous alignments due to new stakeholder, agency, environmental, and engineering input.

Completion of the Alternatives Screening Memorandum, which presented the rationale for screening/removing several subsection alignment options proposed by previous and current studies. The Alternatives Screening Memorandum resulted in the consolidation of the remaining subsection options into eight complete end-to-end alternatives evaluated in this SAA (Appendix A).

The first objective of the Alternatives Screening Memorandum was to refine previous alternatives from the 2012 SAA, and draft studies based on new information obtained since these previous studies, and compare them to the previous alternatives. This comparison was performed on a subsection basis in a process similar to that used in the previous SAAs. It is feasible to subdivide the overall Bakersfield to Palmdale Section into these subsections because the areas being analyzed are fully contained within each section, with no overlap, and the meeting points between these sections are the same in each of the alternatives considered. The Alternatives Screening Memorandum (Appendix A) outlines this detailed analysis. The results include the following determinations:

---

### *Edison Subsection:*

Carry forward: Edison Baseline and Edison A

Withdraw: E2B, New E2, E4, New E4, and Edison B

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### *Keene Subsection:*

Carry forward: Keene Baseline

Withdraw: T3-1, New T3, and T3-2

---

### *Tehachapi Subsection:*

Carry forward: Alternative 1 and Alternative 2

Withdraw: T3-1, New T3, T3-2, Revised New T3, and Oak Creek Pass

---

### *Lancaster Subsection:*

Carry forward: Lancaster Baseline and Lancaster A

Withdraw: AV3B, New AV3B, AV4, and New AV4

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<sup>6</sup> The 2010 PAA and the 2012 SAA are posted on the Authority’s website at [http://www.hsr.ca.gov/Programs/Statewide\\_Rail\\_Modernization/Project\\_Sections/bakersfield\\_palmdale.html](http://www.hsr.ca.gov/Programs/Statewide_Rail_Modernization/Project_Sections/bakersfield_palmdale.html).

The second objective of the Alternatives Screening Memorandum was to combine the recommended alternatives from each subsection into complete end-to-end alignments. Table 1.2-1 shows which combinations of alternatives, studied in the Alternatives Screening Memorandum, were used to create the eight alternatives studied further in this 2016 SAA (Figure 1.1-2).

**Table 1.2-1 Definition of Alternatives for the Overall Bakersfield to Palmdale Section Based on Combining Subsections Identified and Previously Analyzed in the Alternatives Screening Memorandum**

Alternative #	Edison		Keene	Tehachapi		Lancaster	
	Baseline	Option A	Baseline	1	2	Baseline	Option
1	✓		✓	✓		✓	
2		✓	✓	✓		✓	
3	✓		✓		✓	✓	
4		✓	✓		✓	✓	
5	✓		✓	✓			✓
6		✓	✓	✓			✓
7	✓		✓		✓		✓
8		✓	✓		✓		✓

### 1.3 Alternatives Development Approach

Through the alternatives analysis process, the Authority and the FRA sought to identify reasonable and feasible project alternatives that would meet the Purpose and Need for the project. Additionally, the alternatives development process identified those alternatives where environmental constraints or engineering challenges might justify dropping alternatives from further analysis while retaining those alternatives that avoid and minimize impacts to environmental and community resources. The process also provided comparative information and data highlighting similarities and differences between alternatives by using applicable state and federal standards, environmental impact criteria, design criteria, and construction/operation factors.

Every conceivable project alternative need not be evaluated. Rather, when multiple potentially feasible options exist, a reasonable Range of Alternatives is considered. Alternatives that are not potentially feasible or that do not meet the basic Purpose and Need are not required to be considered further and can be dropped from further analysis, including those alternatives which clearly have greater environmental impacts.

The environmental analysis in this SAA uses the concept rail line centerline for analysis, meaning that the analysis contained in the evaluation table in Appendix B is based on a common centerline between the southbound and northbound high-speed rail tracks. This is an appropriate approach for the SAA analysis, which screens a relatively large number of alternatives. A more detailed analysis based on the engineered project footprint will be conducted as part of the draft environmental document.

The Authority and the FRA work with community and agency stakeholders to vet the conceptual alternatives using the following techniques to gather information in developing and comparing alternatives.

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*The techniques that are used to gather information to develop and compare alternatives include:*

**Environmental Analysis Using Geographic Information Systems (GIS) Technology**—Planners, engineers, and environmental scientists perform the bulk of the assessment using GIS data, which enables analysis of the project’s interactions with a variety of measurable geographic features in both natural and built environments. The use of GIS data helps to quickly analyze the ability to avoid and minimize potential impacts on farmland, water resources, floodplains, wetlands, threatened and endangered species, cultural resources, current urban development, infrastructure, oil and gas exploration and production, and other resources.

**Field Inspections of Corridors**—The potential alignment and right-of-way are the subject of field inspection by planners, engineers, and environmental scientists with experience in tunneling, railroad operations, and construction of linear transportation projects to identify conditions and factors not visible in aerial photographs or on maps. Over the course of the study, field inspections become progressively more detailed as the planning, environmental, and engineering work refines the alternatives.

**Qualitative Assessment**—Professionals with experience in the construction and operation of High-Speed Rail and other transportation systems develop a number of the qualitative measures used to describe the alternative alignments. These measures include constructability, accessibility, operations and maintenance, right-of-way needs, public infrastructure impacts, railway infrastructure impacts, and environmental impacts.

**Engineering Assessment**—Engineering assessments are provided for a number of measures that can be readily quantified at this stage of project development. The engineering assessments can provide information on project length, travel time, and configuration of key features of the alignment, such as the presence of existing infrastructure and geology.

**Community/Stakeholder Outreach**—The Authority conducts outreach meetings with stakeholders and the general public to discuss and receive feedback on the project alternatives. Input from the outreach process provides insight regarding local issues and concerns and is used to supplement the information provided by the other information-gathering techniques cited above.

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The Authority has developed assessment and analysis measures for each of the techniques outlined above. The evaluation measures, as applied, are progressively more technical and quantitative as the alternatives evolve.

## 1.4 Meeting Project Purpose and Need/Project Objectives

The Authority’s purpose is to plan, build, and operate a high-speed rail system coordinated with California’s existing transportation network to increase access and mobility, and to provide better connections and close existing gaps among regional rail, transit commuter rail, intercity rail and bus lines, highways, and airports.

This SAA compares the alignment alternatives to the Authority’s adopted Purpose and Need and project objectives as described below:

The purpose of the California High-Speed Rail System is to provide a reliable high-speed electric-powered train system that links the major metropolitan areas of the state, and that delivers predictable and consistent travel times. A further objective is to provide an interface with commercial airports, mass transit, and the highway network, and to relieve capacity constraints of the existing transportation system as increases in intercity travel demand in California occur, in a manner sensitive to and protective of California’s unique natural resources (Authority and FRA 2005).<sup>7</sup>

The purpose of this project is to implement the Bakersfield to Palmdale Section of the California High-Speed Rail System to provide the public with electric-powered high-speed rail service that maintains predictable and consistent travel times between major urban centers and connectivity to airports, mass transit, and the highway network connecting the San Joaquin Valley to the Antelope Valley, connecting the northern and southern sections of the system.

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<sup>7</sup> Authority. 2016. Bakersfield to Palmdale Project Section. Website: [http://www.hsr.ca.gov/Programs/Statewide\\_Rail\\_Modernization/Project\\_Section/bakersfield\\_palmdale.html](http://www.hsr.ca.gov/Programs/Statewide_Rail_Modernization/Project_Section/bakersfield_palmdale.html).

The need for a high-speed rail system exists statewide. The Bakersfield to Palmdale Section is an essential component of the California High-Speed Rail System as it would close the regional rail gap between the Central Valley and Southern California. The Bakersfield to Palmdale Section would provide a new transportation option, contributing to increased mobility and access for regional and local commuter connections.

The capacity of California's intercity transportation system is insufficient to meet existing and future travel demands. The current and projected system congestion will continue to result in poor air quality, reduced reliability, and increased travel times. The current transportation system has not kept pace with the increase in population, economic activity, and tourism in the state, including that in Southern California. The interstate highway system, commercial airports, and conventional passenger rail system serving the intercity travel market are operating at or near capacity and will require large public investments for maintenance and expansion to meet existing demand and future growth over the next 25 years and beyond. Moreover, the feasibility of expanding many major highways and key airports is uncertain; some necessary expansions may be impractical or are constrained by physical, environmental, or additional factors. The need for improvements to intercity travel in California, including intercity travel between the Bakersfield area and the Antelope Valley, relates to the following issues.

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*The Authority has adopted the following program objectives for the proposed High-Speed Rail System:*

1. Provide intercity travel capacity to supplement critically overused interstate highways and commercial airports.
  2. Meet future intercity travel demand that present transportation systems will not meet and increase capacity for intercity mobility.
  3. Maximize intermodal transportation opportunities by locating stations in areas with good access to local mass transit or other modes of transportation.
  4. Improve the intercity travel experience for Californians by providing comfortable, safe, frequent, and reliable high-speed travel.
  5. Provide a sustainable reduction in travel time between major urban centers.
  6. Increase the efficiency of the intercity transportation system.
  7. Reduce potential impacts on communities and the environment by having the alignment follow existing transportation or utility corridors to the extent feasible.
  8. Develop a practical and economically viable transportation system that can be implemented in phases and generate revenues in excess of operations and maintenance costs.
  9. Provide intercity travel in a manner that minimizes urban sprawl, is sensitive to and protective of the region's natural resources, and reduces emissions and vehicle miles traveled for intercity trips.
  10. Preserve wildlife corridors and mitigate potential impacts to wildlife movement where feasible to limit the extent to which the system may present an additional barrier to wildlife's natural movement.
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## **1.5 Business Plan**

### **1.5.1 Consistency with Business Plan Objectives**

#### **1.5.1.1 Business Plan**

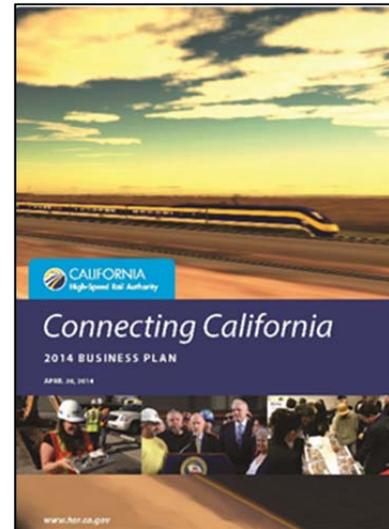
The Authority publishes a business plan according to statute every two years that serves as the foundational document for implementing the state's high-speed rail system. The plan includes progress to date, updates information and forecasts and identifies key milestones and decisions. It includes a description of the proposed service, expected patronage, operating and maintenance costs, anticipated costs and funding, environmental and construction schedules for the Phase 1 subsections and program risks.

### 1.5.1.2 Previous Business Plans

In 2012, the Authority adopted its 2012 Business Plan that laid out a new framework for implementing the California high-speed rail system in concert with other state, regional and local rail investments, as part of a broader statewide rail modernization program. In that same year, the Legislature approved – and Governor Brown signed into law – Senate Bill 1029 (Budget Act of 2012) approving almost \$8 billion in federal and state funds for the construction of the first high-speed rail investment in the Central Valley and 15 bookend and connectivity projects throughout the state. In 2014, the Authority adopted its 2014 Business Plan which built on and updated the 2012 Business Plan, implementing the requirements of Senate Bill 1029.

The Authority issued a Draft 2014 Business Plan on February 7, 2014, received and considered public comments, and published the 2014 Business Plan on April 30, 2014. The 2014 Business Plan:

- Updated forecasts and estimates informed by rigorous external scrutiny
- Introduced a risk-based breakeven analysis that continued to show financial viability
- Confirmed that the system will be an attractive private sector investment opportunity

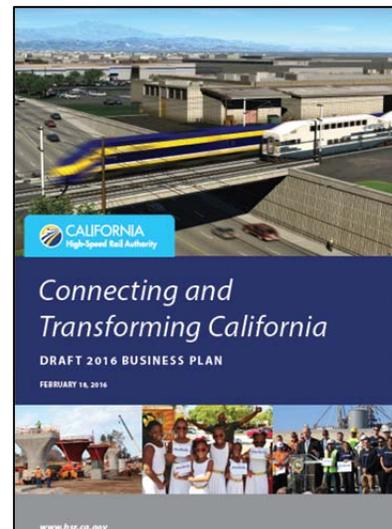


### 1.5.1.3 Draft 2016 Business Plan

On February 18, 2016, the Authority released its Draft 2016 Business Plan for a 60-day public comment period. At this time, the comment period is open and the Authority Board is anticipated to take up adoption of the 2016 Business Plan at its April 21, 2016, meeting.

The Draft 2016 Business Plan has three fundamental objectives:

- First, initiate high-speed rail passenger service as soon as possible, which will demonstrate the benefits of the project and begin generating revenues to then attract private sector participation and help fund extending the system beyond an initial line.
- Second, make strategic, concurrent investments throughout the system that will be linked together over time. By making discrete investments that connect state, regional and local rail systems, the project can provide immediate mobility, environmental, economic and community benefits. Together these prepare a solid foundation for high-speed rail and provide for early implementation of projects that will be required for high-speed rail construction. The Authority will enter into partnering agreements with other transportation providers, aggregate federal, state and local funding sources and advance regional planning and coordination. This approach will yield the best and fastest results.
- Third, position the Authority to construct additional segments as funding becomes available. This requires completing the required environmental analyses for every mile of the program and securing environmental approvals as soon as possible. Additionally, environmental clearance positions concurrent investments in blended corridors for funding ahead of full segment implementation.



#### 1.5.1.4 **Difference between 2014 and 2016 Business Plan**

Following are the differences between the 2014 and 2016 Business Plans:

- **Funding:** The funding authorized by the Governor and Legislature, by the federal government and the people of California is sufficient to deliver a high-speed rail line connecting the Silicon Valley to the Central Valley.
- **Schedule:** The Authority now projects starting passenger service on the Silicon Valley to the Central Valley line in 2025 instead of on a line between Merced and the San Fernando Valley in 2022.
- **Cost Estimates:** The capital cost estimates for building the Phase 1 system between San Francisco/Merced and Los Angeles/Anaheim are lower than prior estimates.

#### 1.5.1.5 **SAA Consistency with the Business Plan**

The alternatives considered in this SAA are consistent with the goals and objectives laid out in the Draft 2016 Business Plan and previously iterated in the 2014 Business Plan. Advancing the environmental clearance of the program allows the program to be construction-ready which will maximize flexibility to capture new funding opportunities. Additionally, it will provide greater certainty about route and station locations to help local communities and transport partners with their planning decisions. Specific to the Bakersfield to Palmdale Section, the alternatives are consistent with the Business Plans in that they close the existing rail gap between the Central Valley and the Antelope Valley.

### 1.6 Collaborative Approach to Alternatives Evaluation

This SAA documents how each alternative meets the Purpose and Need for the High-Speed Rail Project. This SAA also describes how evaluation measures applied through a collaborative process helped the Authority determine which recommendations for alternatives were to be carried forward for environmental analysis and which did not meet the evaluation measures and will not be carried forward for further analysis.

The SAA process is intended to provide the Authority and the FRA with sufficient information and documentation on how evaluation measures and criteria have been applied to each potential alternative to optimize project objectives, minimize potential environmental impacts, and identify project information from the communities along the High-Speed Rail corridor.

Figure 1.6-1 illustrates the collaborative approach used in the alternatives evaluation.



*The alternative development process seeks to balance project objectives, natural resources, and the protection of community character.*

**Figure 1.6-1 Collaborative Approach**

Alternatives development and refinements included the balancing of the concerns of communities along the given alternatives and designing alignments to address the technical challenges posed by the geology and topography of the Bakersfield to Palmdale Section region, as well as the community and natural resources present. The process also aimed to minimize potential impacts to those resources, ensure the system's safety, and maintain the project's capital and operating costs, operations, and interconnectivity required by the Bakersfield to Palmdale Section.

The three key elements in the collaborative approach include Project Objectives, Community Engagement, and Environmental Resources, and are described in the following sections.

### 1.6.1 Project Objectives

Safety, speed, reliability, costs, and operations are the key project objectives for the High-Speed Rail System. At each stage of development, extensive technical evaluation is performed on the proposed alternatives to ensure that they meet the objectives of the future operation of the High-Speed Rail System.

*Several of the key considerations that will ultimately drive the success of the project include:*

**High-Speed Rail Operations**—Up to 220-miles-per-hour trains that require highly specific track geometry.

**Connecting Major Population Areas**—Stations are placed in the heart of major urban centers to bring High-Speed Rail to the greatest number of people and maximize ridership of the system.

**Network Integration with Existing Systems**—Stations are placed next to existing and planned transportation centers in order to provide seamless multimodal transfers and system-wide transportation improvements.

**Cost-Effectiveness**—Goals are accomplished in the most cost-effective manner and, to the extent possible, multiplying the benefits of each dollar invested across the wider multimodal network and the broader community.

### 1.6.2 Community Engagement

The Authority developed and is implementing a continuous community engagement program to support the development of alternatives for study during the environmental process. For the Bakersfield to Palmdale Section, the Authority has held more than 150 meetings, briefings, and conversations to date with the community stakeholders, businesses, local agencies, and elected officials to gather, confirm, and understand key community concerns so that these concerns are incorporated both into the development of alternatives and during the environmental process.

The Authority used the feedback from these meetings, as well as the alternatives and design refinements shared with the public during several rounds of outreach efforts. Section 1.8 describes these efforts. The meetings included the following:

- Four stakeholder working groups held in September 2015
- Five open house meetings held in September and October 2015
- More than 150 briefings with community stakeholders, businesses, local agencies, and elected officials

*Some of the major considerations heard through the collaborative approach process included:*

- ▶ Sensitive habitats and species
- ▶ Water resources
- ▶ Noise and vibration
- ▶ Traffic
- ▶ Mountains and agricultural land
- ▶ Environmental justice issues
- ▶ Cultural resources
- ▶ Section 4(f) resources

### 1.6.3 Environmental Resources

Environmental resource considerations are guided by federal laws, state laws, and local considerations, which provide laws and regulations that protect the natural and built environmental resources and inform decisionmakers and the public of the potential environmental effects of a project. In addition, feedback from community members and local stakeholders also helps focus attention on locally important resources of concern.

Section 4(f) of the United States Department of Transportation Act (49 United States Code Section 303) is a federal law that limits the use of certain parks, recreation areas, refuges, and historic properties for transportation projects. Section 4(f) applies to transportation projects that require funding or other approvals by any United States Department of Transportation agency, including the FRA.

Section 4(f) states that land from a publicly owned park, recreation area, wildlife or waterfowl refuge, or significant historic site can be used for a transportation project only if (1) there is no

feasible and prudent alternative to the use of these resources and all possible planning has been taken to minimize harm to the resource, or (2) the use would result in a *de minimis* impact on the Section 4(f) property. A finding of *de minimis* impact requires concurrence of the official with jurisdiction over the Section 4(f) property.

For purposes of this Alternatives Analysis, the FRA and the Authority have sought to identify potential Section 4(f) uses for each of the alternatives considered, based on the information available at this stage of the study. This analysis includes the use of geographic information systems (GIS) that incorporate existing data regarding locations of known parks, recreation areas, refuges, and historic sites. Fieldwork to identify and evaluate potential Section 4(f) resources has not yet been completed. In addition, engineering at this stage is not advanced sufficiently to determine the full extent of potential impacts on these resources from a Section 4(f) perspective.

The potential 4(f) uses have been pointed out in this document to advance the project design, and they work to avoid and/or minimize impacts to these resources going forward. They also allow the Authority to begin planning with resource owners to minimize harm to these resources, if needed.

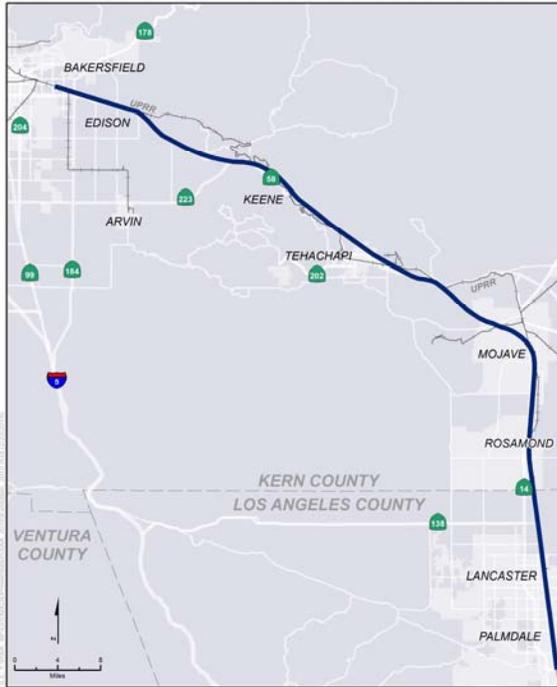
After the FRA and the Authority select a Range of Alternatives for detailed study, a full and complete Section 4(f) analysis will be completed for this project. As part of that analysis, determinations may change regarding the status of Section 4(f) properties considered in this report and additional Section 4(f) properties may be identified. In addition, more detailed information will be developed regarding each of the alternatives' effects on Section 4(f) resources. Where necessary, alternatives to avoid, minimize, and mitigate impacts on Section 4(f) resources will be considered. This analysis will be included in the Draft EIR/EIS.

#### **1.6.4 Collaborative Approach Results**

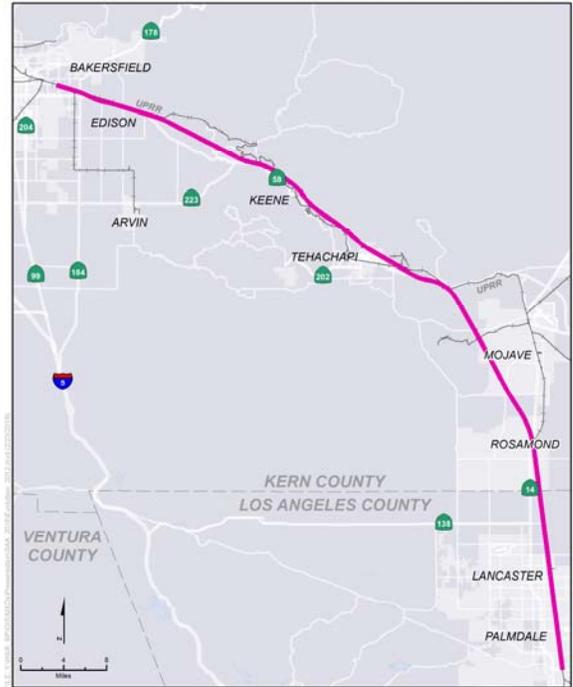
The dynamic nature of the collaborative approach process can be seen in the evolution of the alternatives considered over the past 5 years. The collaborative approach will continue to inform the process through the identification of a preferred alternative, the certification of the environmental document, and through the final project approval.

- In 2010, the PAA built upon the 2005 Programmatic EIR/EIS.
- In 2012, subsection alternatives were recommended to be added and others were recommended to be withdrawn in the Edison, Tehachapi, and Antelope Valley areas because of land-use conflicts, environmental issues, stakeholder input, and cost issues. In addition, alignments were generally moved further away from the airport conflicts near Mojave.
- In 2014, new subsection alternatives were studied in the Edison, Tehachapi, and Antelope Valley areas due to new geotechnical data and additional input from stakeholders along the alignment. In 2015, numerous refinements to the previous alternatives were developed to address the potential effects to wind energy facilitates in the Tehachapi and Rosamond areas. In addition, further geotechnical research was performed on faults along the alignment to define their locations more clearly; studies were performed to determine the optimal grade for ascending and descending the Tehachapi Mountains; and new input from cities and stakeholders along the route was obtained. This process is documented in the Alternatives Screening Memorandum, which resulted in eight new end-to-end alternatives (Appendix A).

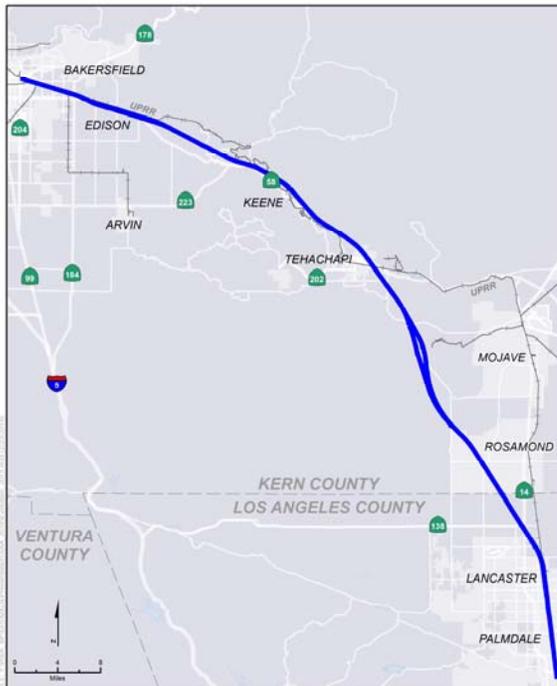
Building upon these new refinements, this 2016 SAA continues the evaluation process and makes recommendations that are further summarized in Section 3. Figure 1.6-2 illustrates the evolution of the alternatives from the 2010 PAA to date.



2010



2012



2016

- Proposed 2010 HSR Alternatives
- Proposed 2012 HSR Alternatives
- Proposed 2016 HSR Alternatives

Figure 1.6-2 Evolution of the High-Speed Rail Alternatives

## 1.7 Authority Alternatives Analysis Criteria Applied in the Evaluation Process

The Authority evaluates project alternatives using system performance criteria that both address design differences and qualities and correspond to the project's Purpose and Need and objectives, as indicated in Table 1.7-1. Table 1.7-2 describes measures to evaluate and compare the project alternatives based on community issues and environmental resources. Where it is possible to quantify the effects, estimates are provided; where it is not possible, qualitative evaluation is provided. Table 3.1-1 in Section 3 further summarizes these evaluation measures and assigns them as primary or secondary reasons for an alternative to be carried forward or withdrawn from additional consideration.

**Table 1.7-1 Performance Objectives and Criteria**

Objective	Criteria
Maximize connectivity and accessibility	Intermodal connections
Minimize operating and capital costs	Operations and maintenance issues and costs

Source: California High-Speed Rail Authority and Federal Railroad Administration, 2011, *Alternatives Analysis Guidance*

**Table 1.7-2 High-Speed Rail Alternatives Analysis Evaluation Measures**

Measurement	Method	Source
<b>A. Land use supports transit use; is consistent with existing and adopted local, regional, state, and federal plans; and is supported by existing or future growth areas, as measured by:</b>		
Consistency with other planning efforts and adopted plans	Qualitative; general analysis of applicable planning and policy documents.	Land use analysis and input from planning agencies.
<b>B. Construction of the alternative is feasible in terms of engineering challenges and right-of-way constraints, as measured by:</b>		
Constructability and access for construction within existing transportation right-of-way	Extent of feasible access to the alignment for construction.	Conceptual design plans and maps.
Disruption to existing railroads	Right-of-way constraints and potential impacts on existing railroads.	Conceptual design plans and maps.
Disruption to and relocation of utilities	Number of utilities crossed.	Conceptual design plans and maps.
Identification of geological features, including capable faults and groundwater	Constructability, design measures, and access to portals.	Desktop studies, field investigation, and geotechnical borings.
<b>C. The extent to which an alternative minimizes disruption to neighborhoods and communities, right-of-way acquisitions, dividing an established community, and conflicts with community resources, as measured by:</b>		
Displacements	If possible, estimate the number of properties by land use type that would be displaced, or acres of land within the right-of-way/station footprint, by type of land use: single-family, multifamily, and retail/commercial, industrial, etc.	Identified by comparing the alignment conceptual design drawings with aerial photographs, zoning maps, GIS layers, and regional and local General Plan maps.

Measurement	Method	Source
Property with access affected	Estimate the number of potential locations along the alignments or at station locations where, and the extent to which, access would be affected.	Conceptual design plans and aerial photographs.
Demographics, Socioeconomic Composition, and Communities of Environmental Justice Concern	This evaluation measure is based on potential impacts to communities of environmental justice concern.	Identified by comparing the alignment conceptual design drawings with aerial photographs, zoning maps, GIS layers, and regional and local General Plan maps.
Proximity to schools	Consistent with and exceeding Public Resources Code Section 21151.4, identify the location of schools within 1,500 feet on each side of the construction footprint.	Conceptual design plans, aerial photographs, GIS layers, and regional and local General Plan maps.
Proximity to landfills	Consistent with Title 27 of the California Code of Regulations, identify the location of landfills within 0.25 mile of each side of the construction footprint.	Conceptual design plans and aerial photographs.
Proximity to Section 4(f) resources	Identify protected parks, wildlife refuges, or historical sites to determine whether a permanent, temporary, or constructive use would likely occur.	Conceptual design plans; historic/archival and current aerial imagery; GIS layers; regional and local General Plan maps; and federal, state, and local cultural resources registries.
Local traffic effects around stations	Identify potential locations where increases in traffic congestion or levels of service are expected to occur.	Existing traffic levels of service from local jurisdictions.
Local traffic effects at at-grade separations	Identify potential locations for at-grade separations where increases in traffic congestion or levels of service are expected to occur.	Existing traffic levels of service from local jurisdictions.
<b>D. The extent to which an alternative minimizes potential impacts to environmental resources and natural resources, as measured by:</b>		
Waterways and wetlands and natural preserves or biologically sensitive habitat areas affected	Identify new rail and roadway bridge crossings, tunnels, and portals required; provide a rough estimate of the acres of wetlands, width of waterways crossed, acres and species of threatened and endangered habitat affected, and acres of natural areas/critical habitat affected.	Conceptual design plans and GIS layers; National Wetlands Inventory and National Hydrography Dataset.
Cultural resources	Identify locations of National Register of Historic Places or California Historical Resources Information System listed properties. For archaeological	Conceptual design plans and GIS layers; historic/archival and current aerial imagery; regional and local General Plan maps; and federal, state, and local cultural resources registries

Measurement	Method	Source
	resources, identify areas of high or moderate sensitivity based on previous studies conducted in the study area.	and cultural resource records search and surveys.
Parklands	Estimate the number and acres of parks that could be directly and indirectly affected. This would also include major trails that would be crossed.	Conceptual design plans, local General Plans, aerial photographs, and GIS layers.
Agricultural lands	Estimate acres of Prime Farmland, Farmland of Statewide Importance, Unique Farmland, and Farmland of Local Importance within the preliminary limits of disturbance.	Conceptual design plans and GIS layers.

**E. The extent to which an alternative enhances environmental quality and minimizes potential impacts on the natural and built environments, as measured by:**

Noise and vibration effects on sensitive receivers	Identify the types of land use activities that would be affected by High-Speed Rail pass-by noise and ground vibration.	Results of screening-level assessment; inventory of potential receivers from the site survey and aerial maps.
Change in visual/scenic resources	Identify the number of local and scenic corridors crossed and the scenic/visual resources that would be affected by High-Speed Rail elevated structures in scenic areas and shadows on sensitive resources (parks). Identify locations where residential development is in close proximity to elevated High-Speed Rail structures.	Results of general assessment; survey of alignment corridors and planning documents from local and regional agencies.
Maximize avoidance of areas with geological and soils constraints	Identify the number of crossings of known seismic faults, estimate the acres of encroachment into areas with highly erodible soils and acres of encroachment into areas with high landslide susceptibility; and evaluate potential groundwater impacts.	United States Geological Survey maps and available GIS data; California Department of Conservation's California Geologic Survey, Regional Geologic Hazards and Mapping Program (check Map Index to identify maps appropriate for High-Speed Rail sections).
Maximize avoidance of areas with potential hazardous materials	Identify hazardous materials/waste areas to avoid constraints.	Data from previous records search conducted for other projects within the study area.

Source: *Technical Memorandum, Alternatives Analysis Methods for Project Environmental Impact Report/Environmental Impact Statement, Version 3, California High-Speed Rail Authority and Federal Railroad Administration (2011)*

Note: Since the 2011 guidance, new criteria have been added for this analysis (proximity to schools, landfills, and Section 4(f) resources).  
GIS = geographic information systems

## 1.8 Agency and Community Outreach and Input

Agency and community input is critical to the development and refinement of the alternatives. It is necessary to gather specific detailed information on how the proposed alignments can perform within each community and how design options and alternatives can avoid or minimize potential impacts. To gather this input, a rigorous and robust approach was undertaken at the federal, regional, local, and community levels through a variety of processes described in this section.

### 1.8.1 Federal and State Agency Engagement

Federal and state lead agencies are engaged in the evaluation process and work in conjunction with the Authority to identify resources of concern and develop an approach to protecting them.

A Lead Agency is a public agency that has the principal responsibility for carrying out or approving a project or action, and is responsible for preparing environmental study review documents in compliance with CEQA and/or NEPA.

For the High-Speed Rail Project, which includes the Bakersfield to Palmdale Section, the FRA is the federal Lead Agency for compliance with NEPA and with other federal laws and Executive Orders (Code of Federal Regulations Title 40, Part 1508.16). The Authority is the project sponsor and joint Lead Agency under NEPA, as well as the state Lead Agency under CEQA (California Code of Regulations Title 14, Section 15367).

As the federal NEPA Lead Agency, the FRA manages the agency coordination process, oversees environmental studies, reviews and approves the EIS, and provides opportunity for public and Cooperating/Participating Agency involvement.

Cooperating Agencies are those federal agencies with jurisdiction by law or special expertise that have been specifically requested by the federal Lead Agency to cooperate in the preparation of the EIR/EIS for the project.

The NEPA review process for the Bakersfield to Palmdale Section currently includes four cooperating agencies:

- The United States Army Corps of Engineers agreed (by letter dated December 30, 2009) to participate as a Cooperating Agency under NEPA.
- The Surface Transportation Board agreed (by letter dated August 23, 2013) to be a Participating Agency as well as a Cooperating Agency under NEPA.
- The Department of Defense agreed (by letter dated July 5, 2013) to be a Cooperating Agency as well as a Participating Agency under NEPA.
- The Bureau of Land Management agreed (by letter dated September 25, 2013) to be a Cooperating and Participating Agency under NEPA.

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*Federal Agencies engaged in the process for developing the California High-Speed Rail alternatives include the following:*

- ▶ Advisory Council on Historic Preservation
  - ▶ Bureau of Land Management
  - ▶ Bureau of Reclamation
  - ▶ Department of Defense (Air Force Plant 42)
  - ▶ Department of Homeland Security
  - ▶ Federal Emergency Management Agency
  - ▶ Federal Railroad Administration
  - ▶ National Park Service
  - ▶ National Resources Conservation Service
  - ▶ Surface Transportation Board
  - ▶ United States Army Corps of Engineers
  - ▶ United States Environmental Protection Agency
  - ▶ United States Fish and Wildlife Service
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*State Agencies engaged in the process for developing the California High-Speed Rail alternatives include the following:*

- ▶ California Air Resources Board
  - ▶ California Department of Conservation
  - ▶ California Environmental Protection Agency
  - ▶ State Historic Preservation Officer
  - ▶ California Department of Fish and Wildlife, Regions 4 and 5
  - ▶ California Department of Toxic Substances Control
  - ▶ California State Lands Commission
  - ▶ Native American Heritage Commission
-

As the state CEQA Lead Agency, the Authority manages the agency coordination process, conducts environmental studies and evaluations, prepares the EIR, and provides opportunity for public and Responsible/Trustee Agency involvement.

The agencies listed above may have consultation, oversight, and/or regulatory authority over many of the key environmental considerations evaluated in this SAA that will be studied further during the environmental process.

## 1.8.2 Community Engagement

The Authority recognizes that the individuals most knowledgeable regarding any given community are the residents, business owners, and workforce of that community. Therefore, the Authority has undertaken a comprehensive community engagement program for the Bakersfield to Palmdale Section, including, but not limited to: at-large public meetings; elected official, agency, and stakeholder briefings; group presentations; activity center outreach; and Stakeholder Working Group meetings. The at-large meetings are held for broad participation from all corridor communities and other members of the public to present the latest information on the Bakersfield to Palmdale Section, as well as to provide an opportunity for participants to have one-on-one dialogue with project team members and submit written feedback. Briefings provide opportunities to obtain detailed feedback on the proposed alignments, while presentations and outreach to major activity centers allow for broader dissemination of project information and direct engagement with the general public.

The Stakeholder Working Groups act as focus groups and enhance the feedback generated in the at-large meetings through concentrated discussions with each of the project corridor communities. Each Stakeholder Working Group is designed to be small enough for constructive collaboration as the planning process moves toward development of the draft environmental document. Stakeholder Working Group members provide important insight and feedback from their local communities to Authority representatives and the project team prior to and during the preparation of the draft environmental documents, and serve as vital partners for disseminating information regarding the project and public meetings to their constituencies.

The Authority is committed to implementing a comprehensive outreach program that reaches a broad array of interests throughout the Bakersfield to Palmdale Section region, including environmental justice groups and communities. Environmental justice groups represent the interests of predominantly low-income and/or historically underrepresented groups and would include school districts, neighborhood groups, business associations, and non-profit organizations. The Authority has conducted targeted outreach efforts for these groups including providing one-on-one briefings, conducting presentations to large groups, staffing booths at local conferences and community festivals, and distributing public meeting notices to key locations for display in targeted areas at public counters throughout the Bakersfield to Palmdale Section region. The Authority also distributed mailings and emails for events, forming a database targeting environmental justice groups and organizations that serve the Bakersfield to Palmdale communities.

Statewide fact sheets and the Bakersfield to Palmdale Section fact sheets were distributed and made available in English and Spanish at all public events. All public meeting notices and informational materials used at the Community Open Houses were available at each meeting and posted on the Authority's website in both English and Spanish. Public meeting notices were placed as print and online advertisements in major and community newspapers in English and Spanish-language publications throughout the Bakersfield to Palmdale Section communities. Spanish-language interpreters were also provided at each Community Open House meeting. In addition, the Authority coordinated with local school districts to engage local families in both Spanish and English, and all public meetings were held in socioeconomically disadvantaged communities in order to support the involvement of community members.

The Authority also participated in community events in targeted areas ensuring project information would be provided directly to members of disadvantaged communities in an

environment that was familiar and localized. A full list of community-related activities and events is included in Appendix C.

Starting with the efforts related to completion of the 2012 SAA and the preparation of this SAA, the Authority held more than 150 individual and group meetings along the alternatives described in Section 2 of this document. As described in detail below, this included facilitating Stakeholder Working Group meetings; staffing booths at major activity centers and events; conducting briefings and presentations to community, business, and civic organizations; and hosting community open house meetings. Table 1.8-1 summarizes the community engagement meetings. The goals of these meetings were to gather input, hear concerns, and identify potential alignment refinements.

Throughout this period of discussion with stakeholders, the Authority gathered feedback regarding the technical aspects of the proposed alignments (including the desire of some communities to be considered as potential future station locations), along with general questions pertaining to the statewide and section-specific process. The comments received at these meetings were collected and considered during the development of this document and the alternatives presented herein. Additionally, these comments will be used during the environmental clearance and/or design refinement processes moving forward.

### 1.8.3 Summary of Local Government Meetings

The Authority held meetings with local governments to receive comments on the alternatives and to discuss potential environmental impacts that should be studied and analyzed in the environmental documents. Agency outreach activities for the Bakersfield to Palmdale Section's environmental documents were conducted between January 2012 and December 2015. They included the Cities of Tehachapi and Lancaster, the communities of Edison and Rosamond, and the Counties of Kern and Los Angeles.

**Table 1.8-1 Community Engagement Meetings since January 2012**

Time Frame	Meeting Format	Number of Meetings
<b>2012</b>		
Spring	Briefings	8
Summer	Briefings	10
Fall	Briefings	4
<b>2013</b>		
Winter	Briefings	12
Spring	Briefings	15
Summer	Briefings	1
Fall	Briefings	8
<b>2014</b>		
Winter	Briefings/Activity Centers	3
Spring	Briefings	8
Summer	Briefings/Activity Centers	13
Fall	Briefings/Activity Centers	15

Time Frame	Meeting Format	Number of Meetings
2015		
Winter	Briefings/Activity Centers	11
Spring	Briefings/Activity Centers	20
Summer	Briefings/Activity Centers	12
Fall	Briefings/Stakeholder Working Groups/Open Houses	16

### 1.8.4 Summary of Stakeholder Briefings

The Authority has conducted more than 150 briefings to provide an overview of the Bakersfield to Palmdale Section and has received detailed feedback on the proposed alignments currently under consideration by the Authority, including the following:

- Elected officials representing the corridor at various levels of government
- Public agency staff
- Key business and industry stakeholders, including defense contractors; and wind energy facilities
- Community stakeholders in local school districts and schools
- Major property owners and individual parcel owners along the Bakersfield to Palmdale Section

### 1.8.5 Summary of Presentations

The Authority has provided 26 presentations to various groups throughout the Bakersfield to Palmdale Section region, including chambers of commerce, business associations, city and town councils, and community service districts, as well as to major business, transportation, and environmental conferences held along the corridor. These presentations allow for greater dissemination of project information and also encourage continued public participation throughout the planning and environmental review process. The noticing and distribution of information to group members and/or the general public announcing each of the Authority's scheduled presentations is managed independently by each organization involved.

*Stakeholder comments covered a wide range of topics, including, but not limited to, the following:*

- ▶ Aesthetics
- ▶ Alignment Proposals
- ▶ Business Resources
- ▶ Connectivity
- ▶ Consistency with Other Plans
- ▶ Construction Issues
- ▶ Earthquakes
- ▶ Engineering Design
- ▶ Environmental Process
- ▶ Flood Zones
- ▶ Funding
- ▶ Future Development Plans
- ▶ Geologic Faults
- ▶ Grade Crossings
- ▶ Groundwater
- ▶ Habitat
- ▶ Health
- ▶ Job Opportunities
- ▶ Land Acquisition
- ▶ Mitigation
- ▶ Noise and Vibration
- ▶ Operational Issues
- ▶ Property Values
- ▶ Quality of Life
- ▶ Right-of-Way
- ▶ Safety and Security
- ▶ Schools
- ▶ Traffic
- ▶ Wildlife

### 1.8.6 Summary of Activity Center Outreach

The Authority has staffed exhibit booths at 19 activity centers throughout the Bakersfield to Palmdale Section region. Activity centers such as major conferences and community fairs and festivals provide valuable avenues for disseminating project information, engaging the public, and encouraging their continued participation throughout this process. These events also serve as opportunities to provide issue-specific information on topics such as job creation, environmental benefits, and the Authority’s Small Business Program.

### 1.8.7 Summary of Stakeholder Working Group Meetings

The Authority developed four Stakeholder Working Groups throughout the Bakersfield to Palmdale Section region to engage community members in an ongoing basis to discuss issues that are of concern in their communities. These meetings also served as an opportunity to provide attendees with information on the upcoming community open house meetings and encourage them to distribute this information to their respective constituencies.

The Stakeholder Working Groups are informal, voluntary groups of community stakeholders representing a broad range of local interests, and are organized to deepen community input on the High-Speed Rail Project planning process. The groups consist of community representatives from various constituencies in proximity to the Bakersfield to Palmdale Section and local interest groups involved in land use, transportation, environmental sustainability, and social issues in the region. Each group is designed to be small enough for constructive collaboration to support the route planning process. The Authority considers feedback from members of each of the Stakeholder Working Groups as it continues to develop the Range of Alternatives under study to connect the Central Valley to the Antelope Valley.

The Authority developed and held four Stakeholder Working Group meetings in September 2015. Meeting notices were distributed via mail and email, and meeting agendas, statewide fact sheets, and Bakersfield to Palmdale Section fact sheets were provided to attendees. The Authority invited an average of 35 stakeholders to participate, with approximately 7 to 15 people in attendance at each meeting. The four Stakeholder Working Groups included the following:

- Tehachapi
- Edison
- Rosamond
- Lancaster

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*Stakeholder Working Group Meetings (September 2015)—Focus on listening to ideas and responding to questions and concerns.*

- ▶ September 15: Tehachapi Police Department (Community Room), Tehachapi
  - ▶ September 15: Kern County Farm Bureau (Conference Room), Edison
  - ▶ September 16: Rosamond Community Services District (Board Room), Rosamond
  - ▶ September 16: American Heroes Park (Community Room), Lancaster
- 

At each of these meetings, participants received an informative presentation, and directly addressed Authority staff during question-and-answer periods regarding the project and the process.

### 1.8.8 Summary of Community Open House Meetings

In addition to meetings and briefings conducted with elected officials, agencies, and stakeholders, the Authority wanted to share additional information regarding the project and receive further input from the community throughout the collaborative process. Therefore, the Authority held additional community engagement activities in the form of five open house meetings for the Bakersfield to Palmdale Section region, including one held in September 2015 and four held in October 2015.

Bilingual (English/Spanish) meeting notices were mailed and emailed to the Bakersfield to Palmdale Section stakeholder database, bilingual meeting flyers were delivered to local public counters, and advertisements were placed in major and community print and digital media throughout the project section region. At these meetings, held at specific locations in neighborhoods targeting underrepresented communities, the Authority presented information gathered regarding this project section and the refinement of alternatives brought about by the review and balancing of project objectives, environmental resources, and community character.

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#### *Meeting Title: 2016 SAA*

*Duration: September 30–October 7, 2015*

*Number of Meetings: 5*

*Total Attendees: Approximately 350*

#### *Meeting Format: Open House and Presentation*

- ▶ Information was provided through public presentation, as well as graphics and exhibits available at viewing stations.
- ▶ One-on-one dialogues were held between the public and technical staff to discuss the latest project updates and answer stakeholder questions.
- ▶ Language interpreters were made available at all meetings based on language needs identified through United States Census data.
- ▶ One meeting was conducted in Spanish and English.
- ▶ One meeting offered live webcasts, both in English and in Spanish.

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#### *Meeting Recap*

- ▶ A total of 78 comment cards were collected at the meetings.

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#### *Meeting Location Details*

- ▶ September 30: Edison Middle School, Gym, 721 S Edison Road, Bakersfield, CA 93307
- ▶ October 1: West Park Activity Center, 410 W “D” Street, Tehachapi, CA 93561
- ▶ October 5: Mojave Elementary School, Gym and Auditorium, 15800 “O” Street, Mojave, CA 93501
- ▶ October 6: Wayside Chapel Community Church, Gym, 2584 Felsite Avenue, Rosamond, CA 93560
- ▶ October 7: University of Antelope Valley, Grand Ballroom, 44055 N Sierra Highway, Lancaster, CA 93534

During this round of community engagement activities, the Authority conducted one meeting in the community of Rosamond (the Rosamond Community Open House was held on October 6, 2015) via live webcast and entirely in Spanish, ensuring all members of the public had the opportunity to gather information, provide valuable feedback, and participate in the process.

Additionally, as part of the Authority’s overall community engagement activities, the Authority translates informational materials, including, but not limited to, meeting notices and fact sheets, into Spanish and other languages, as necessary; places advertisements for public meetings in targeted local and Spanish-language print and digital media; and provides Spanish-language interpreters and staff at all public meetings.<sup>8</sup>

The Authority used the feedback received during these meetings to further develop the alternatives and recommendations in this report. The feedback will also be used to help inform and support the work ultimately required to select a preferred alternative. A summary of these meetings is provided

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<sup>8</sup> All informational materials provided at these meetings are posted on the Authority’s website at [http://www.hsr.ca.gov/Programs/Statewide\\_Rail\\_Modernization/Project\\_Sections/bakersfield\\_palmdale.html](http://www.hsr.ca.gov/Programs/Statewide_Rail_Modernization/Project_Sections/bakersfield_palmdale.html).

below. These summaries document how community feedback has informed previous corridor planning activities, as well as the planning activities documented in this SAA.

### 1.8.9 Summary of Recent Community Meetings

In April 2014, the Authority began sharing additional information regarding the project and receiving further comments from stakeholders in this collaborative process. As a result, the Authority held additional community engagement activities in the form of meetings with stakeholder organizations, technical working groups, and elected officials for the Bakersfield to Palmdale Section region. These meetings provided an opportunity for additional community input. The Authority scheduled and coordinated these meetings, and developed and distributed meeting agendas, informational maps, statewide fact sheets, and the Bakersfield to Palmdale Section fact sheets to those in attendance.

At these meetings, the Authority presented collective information regarding the Bakersfield to Palmdale project, and the refinement of alternatives based on the project objectives and minimizing potential impacts to natural resources and maintaining community character.

The Authority used the community input received during these meetings as it continued developing and studying the Range of Alternatives. Summaries of these meetings are provided below in Table 1.8-2.

### 1.8.10 Summary of Corridor Community Activities

The Authority has held recurring meetings with stakeholders, communities, and community organizations across the Bakersfield to Palmdale Section region. These meetings varied from one-on-one discussions and activity center events to group presentations and community open houses. All activities conducted provided information regarding the project and aimed to collect information on existing conditions and current and future projects in the area in an effort to understand key issues of concern.



*Authority staff addresses attendees at the Rosamond community open house meeting.*



*Authority staff engages Tehachapi Stakeholder Working Group attendees in discussion.*

Table 1.8-2 presents key themes, concerns, and related information collected during these community meetings, and also summarizes the number and extent of the meetings.

**Table 1.8-2 Key Community Themes, Concerns, and Project Coordination**

Community Issues	
Unincorporated Kern County – Community of Edison	
Themes	Rich in agricultural industry and petroleum resources; community has diverse social/demographic make-up.
Concerns	Potential impacts to south side of Edison Highway, including packing houses and Edison Middle School, potential traffic congestion and grade separation impacts, pedestrian access, natural streams and biological resources, and the land acquisition process.
Project Coordination	Effective and ongoing coordination with Kern Council of Governments, Kern County Farm Bureau, Edison School District, and Kern County Planning and Community Development Department.
City of Tehachapi	
Themes	Unique ecological diversity; railroad history and wind energy facilities contribute to overall community character.
Concerns	Potential impacts to Proctor Lake, Lehigh Cement Plant, and wind energy facilities; noise; devaluation of highly developable land; degradation of viewshed to the immediate north of the community, cutting the city in half; dust; and relocation of residents.
Project Coordination	Effective and ongoing coordination with Kern Wind Energy Association and local project proponents, including a new hospital, a proposed senior living community, and a proposed mixed-use development.
Unincorporated Kern County – Communities of Rosamond and Mojave	
Themes	Strong aviation, space, and military presence, along with the unique growth of the solar and wind energy industry, contribute to the overall character of these communities and their history.
Concerns	Potential impacts to military facilities and related activities, potential impacts to wind energy facilities west of Mojave, potential impacts to both densely populated areas and rural communities in Rosamond, noise and vibration impacts, visual impacts including graffiti, decrease in property values, quality of life impacts, beliefs that the 2010/2012 alignments that cross the Tehachapi Mountains to the existing rail lines in Mojave will impact less populated areas than the 2015 alignment, lack of utilization of current rail lines, potential impacts to the Exotic Feline Compound in Rosamond, seismic safety, flood zones, loss of water wells, loss of electricity from the local grid at 60 <sup>th</sup> Street in Rosamond during peak demand hours, height of walls and overpasses needed, dust control, spread of Valley Fever, wildlife migration, protection of Joshua trees in the area, emergency service response times during construction, potential impacts to local businesses during construction, project costs, potential impacts of high winds on the project, and livestock and equestrian access.
Project Coordination	Effective and ongoing coordination with Kern County, defense contractors, Kern Wind Energy Association, and local municipal councils and districts.
City of Lancaster	
Themes	Strong aviation, space, and military presence inform the character of this community and its history; diverse social/demographic make-up; and unique investment in the use of solar energy and production.

Community Issues	
Concerns	Potential impacts to local plans and connectivity, potential impacts to businesses and the tax base, aesthetics, noise and vibration, right-of-way requirements, impact on foot traffic on Lancaster Boulevard, and seismic safety.
Project Coordination	Effective and ongoing coordination with the City of Lancaster, including discussion of future developments, master plan and traffic modeling, and continuing coordination with the University of Antelope Valley.
Los Angeles County – Antelope Valley	
Themes	Unique desert ecosystem with a wide range of plant and animal life; strong aviation, space, and military presence; and diverse social/demographic make-up.
Concerns	Potential grade separation impacts, community connectivity, and natural lands.
Project Coordination	Effective and ongoing coordination with Los Angeles County, including regular participation in the Antelope Valley Quarterly Transportation Summit sponsored by Los Angeles County Supervisor Michael Antonovich's office.

Note: The information in this table is not exhaustive in nature but rather provides a representative snapshot of each location. The summaries are based on comments that have been submitted at the recent community open house meetings described in this document.

### 1.8.11 Record of Outreach Briefings

The Authority has continued to engage the communities along the Bakersfield to Palmdale Section and has conducted more than 150 meetings and presentations to key stakeholders and the general public. Table C-1 in Appendix C summarizes the key stakeholder meetings conducted between January 2012 and December 2015. Key stakeholders included agencies, companies, organizations, corridor cities, and elected officials.

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## 2 DESCRIPTION AND ANALYSIS OF ALTERNATIVES

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*Section 2 at a Glance—In this section, you will find the following information:*

- ▶ **Introduction**—Introduction to the section.
  - ▶ **Refinements since the 2012 SAA**—Refinements are recommended to the alignments of the 2012 SAA and conceptual and draft studies.
  - ▶ **Alternatives 1 through 8**—Alternatives 1 through 8, including refinements since the 2012 SAA, are described and evaluated.
- 

### 2.1 Introduction

This section presents a series of maps, along with a narrative description of the alternatives studied in the past and those proposed for further study. The alternatives were developed using the collaborative approach described in Section 1. The tables are used to present evaluation data on the separate alternatives, organizing each into different categories.

### 2.2 Refinements since the 2012 Supplemental Alternatives Analysis

The Authority is proposing several refinements to the alternatives recommended in the 2012 SAA Report (Figure 2.2-1). This section and Appendix A include detailed alignment alternatives and discussion of these refinements.

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*Phases of Work since 2012:*

- ◆ Work performed between the conclusion of the 2012 SAA and January 2014, which resulted in conceptual and draft studies. Work performed since January 2014, which resulted in continued refinements and adjustments to previous alignments due to new stakeholder, agency, environmental, and engineering input.
  - ◆ Conceptual and draft studies since January 2014 (Alternatives Screening Memorandum, Appendix A), which presented the rationale for screening and removing several subsection alignment options proposed by previous and current studies. The conceptual and draft studies resulted in the consolidation of the remaining subsection options into complete end-to-end alternatives evaluated in this SAA (Alternatives Screening Memorandum, Appendix A).
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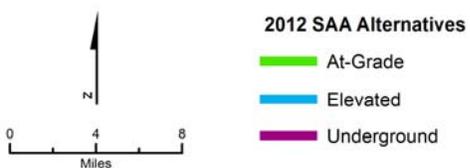
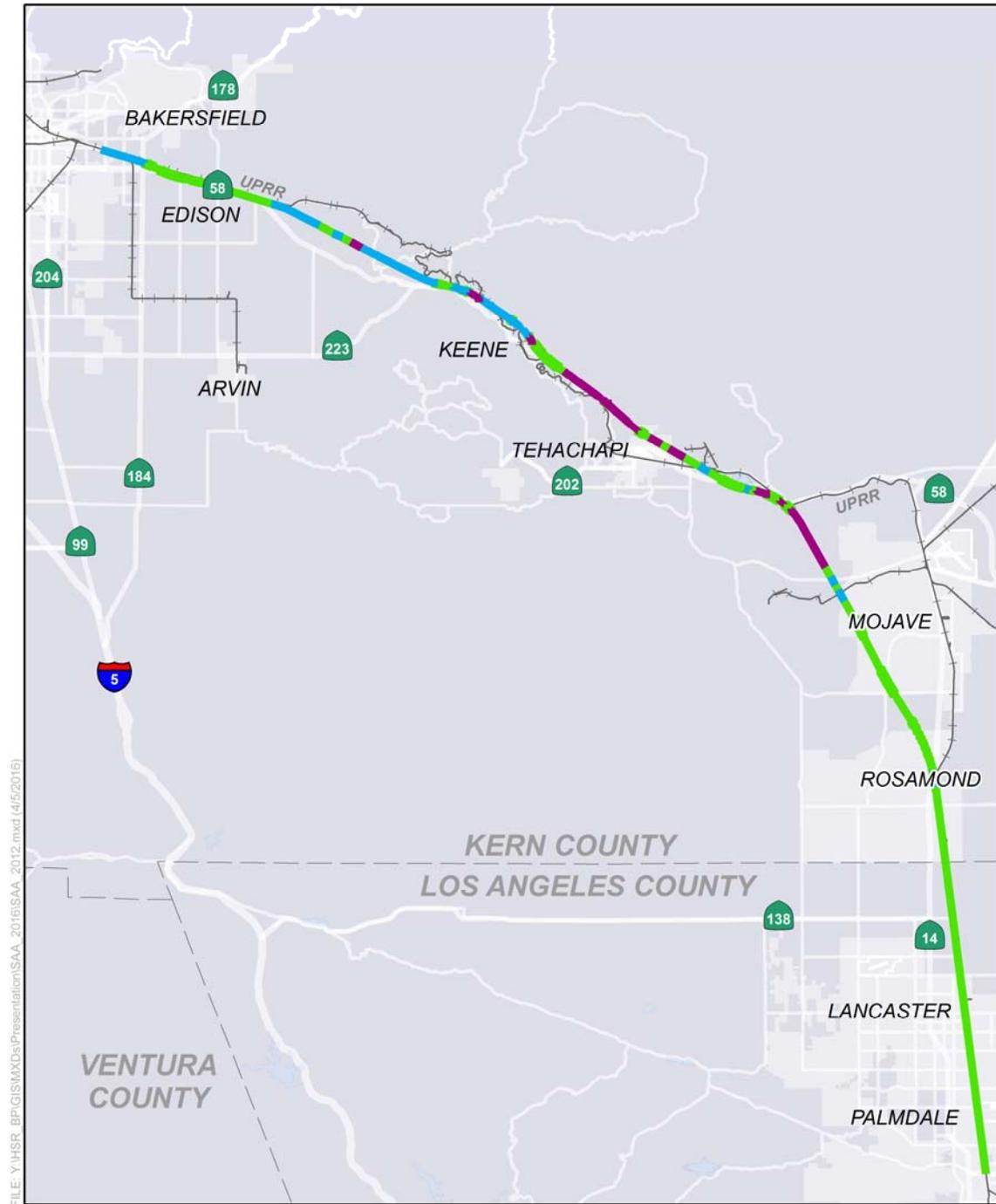


Figure 2.2-1 2012 SAA Alignment Alternatives

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### *Response to Potential Business Impacts in Edison:*

The 2012 and 2014 previous studies' alignments proposed a route on the south side of Edison Highway. This route introduced potential impacts to the businesses along Edison Highway. Further discussion with Authority staff and local stakeholders introduced the concept of moving the elevated alignment to the Edison Highway right-of-way rather than along the private properties on the south. This alternative maintains compliance with the project's Purpose and Need and Authority design standards, and was encouraged by the local community. This refinement was, therefore, included because it minimizes potential impacts to businesses along the south side of Edison Highway as compared to previous alignments. All eight alternatives use this High-Speed Rail routing at this northerly end of the project, and the route on the south side of Edison Highway is being dropped.

As shown later in Figure 2.3-2, this newer routing on Edison Highway can connect to both alignments proposed in the High-Speed Rail Fresno to Bakersfield Section to the north.

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### *Response to Potential Impacts to Edison School, Environmental Justice Communities, and Seismic Fault Zones:*

To minimize potential visual, noise, air quality, and land impacts to Edison Middle School and adjacent environmental justice communities, refinements to move the alignment further from these properties to the southwest were made compared to the previous 2012 and 2014 studies. As an added benefit, this refinement also moved most of the High-Speed Rail alignment out of the existing fault zone paralleling the SR 58 freeway in compliance with the Authority's guidelines for the High-Speed Rail System.

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### *Response to Achieve Project Cost Reduction in Edison:*

Between Edison Road and Caliente Creek (Figure 2.3-2), refinements were made to bring the High-Speed Rail profile closer to existing grade and thereby reduce the amount of viaduct and respective construction costs needed for the project compared to the 2012 and 2014 studies.

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### *Response to Potential Conservation Easement Impacts:*

To minimize the potential impacts to parcels placed under a conservation easement and managed by the Tejon Ranch Conservancy, refinements were made to the alignment such that it follow the existing conservation easement boundary rather than bisecting its northeastern corner, compared to the 2012 and 2014 studies (Figure 3 in Appendix A). This alignment also shortened the project's length and allowed the use of a flatter grade ascending the mountain range to the south.

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### *Response to Achieve Optimum Profile Grade for Climbing the Tehachapi Mountains:*

The previous 2012 and 2014 studies all suggested steeper vertical profile grades to help reduce the number and length of tunnels, meet the constraints of crossing seismic faults at grade, reduce overall project costs, and reduce the project's environmental footprint. These steeper vertical profile grades exceed the Authority's design guidelines for the High-Speed Rail System and could possibly introduce impacts to operating costs, maximum train speeds, and route travel time. A more detailed study was, therefore, prepared to identify the most beneficial balance between cost effectiveness, long-term maintenance, and travel time for this particular climb over the Tehachapi Mountains. Profile grades ranging from 2.5 percent to 3.5 percent were evaluated to quantify the earthwork, the tunnel lengths, and the viaduct lengths for each grade. An optimal vertical profile grade of 2.8 percent has been identified for this section through engineering consultation. Refer to Figure 3 in Appendix A, which shows the general location of the refinements.

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### *Response to the Tehachapi Creek Fault Corridor*

Further geotechnical studies were performed on the Tehachapi Creek Fault Corridor since the 2012 and 2014 studies to define more narrowly the likely fault zone location and evaluate the potential for related seismic hazards, including landslides. The review was conducted using existing aerial photographs, previous geologic mapping, groundwater studies, and regional topographic mapping. The geotechnical area of concern begins approximately 2.3 miles northwest of Keene and extends southeasterly approximately 15 miles along and to the north of the SR 58 freeway/Union Pacific Railroad corridor. Maps were compiled using 1-foot contour information combined with the aerial photography. New fault locations were then mapped with 100-foot buffers on each side of the defined fault line. Weaving the alignment through these defined fault zones allowed the alignment to follow a path closer to the SR 58 corridor and helped to minimize the amount of tunnels required in this portion of the alignment.

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### *Response to Potential Kern County Wind Farm Impacts:*

To address the Kern County concerns regarding the number of wind turbines being impacted by the project, between 2012 and the 2014 Interim Draft SAA Report, the Authority developed the Oak Creek Pass alternative alignment in a series of studies in 2015. The 2015 studies continued to optimize and refine the alternative to significantly reduce the number of wind turbines being impacted from 85 to 26. The Oak Creek Pass alternative alignment also straightened the alignment, reducing its overall length, cost, and travel time. The 2015 studies continue to evolve to date, on the same collaborative approach and refinements to the Oak Creek Pass alternative, resulting in two newer alternatives that further reduce the number of potential wind turbine impacts from 26 to 10 (Figure 2.3-2).

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### *Response to Potential Impacts to CalPortland Cement Plant Operations:*

One design objective of all eight alternatives identified alignments that would minimize potential impacts to the existing and future limestone quarry operations compared to the 2012 and 2014 studies. Two alignments through this property were identified based on meetings with the property owner. One alignment passes through an area immediately adjacent to an active mining area but not within any areas proposed for future mining. The second alignment attempts to follow Tehachapi-Willow Springs Road as closely as possible to keep the road and the High-Speed Rail corridors as close together as possible (Figure 2.3-3).

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### *Response to Potential Impacts to Rosamond:*

In response to concerns raised in public meetings in the Rosamond area, the Authority evaluated alternatives to minimize disruption to neighborhoods and communities, right-of-way acquisitions, the division of an established community, and conflicts with community resources. The objectives in Rosamond were to minimize potential visual, noise, air quality, and land use impacts to Rosamond neighborhoods, businesses, and environmental justice communities. Therefore, options to shift the centerline of alternatives to the east or to the west to achieve these objectives were evaluated. The resulting refinements identified alignment locations that minimized potential impacts within Rosamond to the greatest extent possible while still meeting the project objectives for the Bakersfield to Palmdale Section. As shown later in Figure 2.3-3, this evaluation process resulted in an alignment that minimized the number of parcels affected and avoided the Willow Springs Raceway (an historic resource). Other refinements resulted in a reduction in fill heights to a minimum height while still enabling the alignment to cross over rather than bisect existing roadways.

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### *Response to City of Lancaster and Union Pacific Railroad Concerns:*

The City of Lancaster has requested all elevated High-Speed Rail structures be removed within the City, compared to the 2012 and 2014 studies. The City of Lancaster has requested all elevated High-Speed Rail structures be removed within the City, compared to the 2012 and 2014 studies. In addition, new information originated from a recent Memorandum of Understanding with the Union Pacific Railroad, has added a separation criterion to maintain a geometric design feature retaining a 102-foot separation between the closest High-Speed Rail track centerline and the Union Pacific Railroad right-of-way. The 102-foot separation criterion had significant potential direct and indirect impacts on all prior alternatives through Lancaster developed since 2012. Thus, it created a need to develop different alternatives to the Memorandum of Understanding and the City of Lancaster requirements. Prior elevated alignments through Lancaster were dropped due to lack of support from the City and high costs, and the prior remaining at-grade alignment was refined by design modifications. The refinements resulted in two new at-grade alignments that complied with the newer separation criterion of the Union Pacific Railroad and the City of Lancaster. The new at-grade alignments through Lancaster are included in Alternatives 1 through 8.

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## **2.3 Alternatives**

### **2.3.1 Alternative Descriptions**

The alternatives presented in the following sections differ in operating and capital costs; consistency with existing planning efforts; tunneling miles required; direct and indirect potential impacts to communities; environmental, recreational, cultural, and historical resources; and constructability.

Based on the refinements described in Section 2.2, above, as well as additional public input received during open house meetings in September and October 2015, the Authority identified eight potential alignment alternatives that meet the following objectives:

- Combine the SR 58 and High-Speed Rail corridors in Edison to reduce the overall transportation corridor footprint.
- Minimize potential impacts to the CalPortland limestone quarry and cement plant.
- Based on community input, minimize potential impacts to existing land uses along the community of Rosamond, including, but not limited to, residential parcels, environmental justice communities and local businesses.
- Combine the High-Speed Rail and existing rail corridors in Lancaster to minimize potential impacts to land uses along Sierra Highway, including the University of Antelope Valley, environmental justice communities, and local businesses.
- Reduce potential impacts to natural resources and minimize direct and indirect potential impacts to existing conservancy lands.

Further public input was received during open house meetings in September and October 2015.

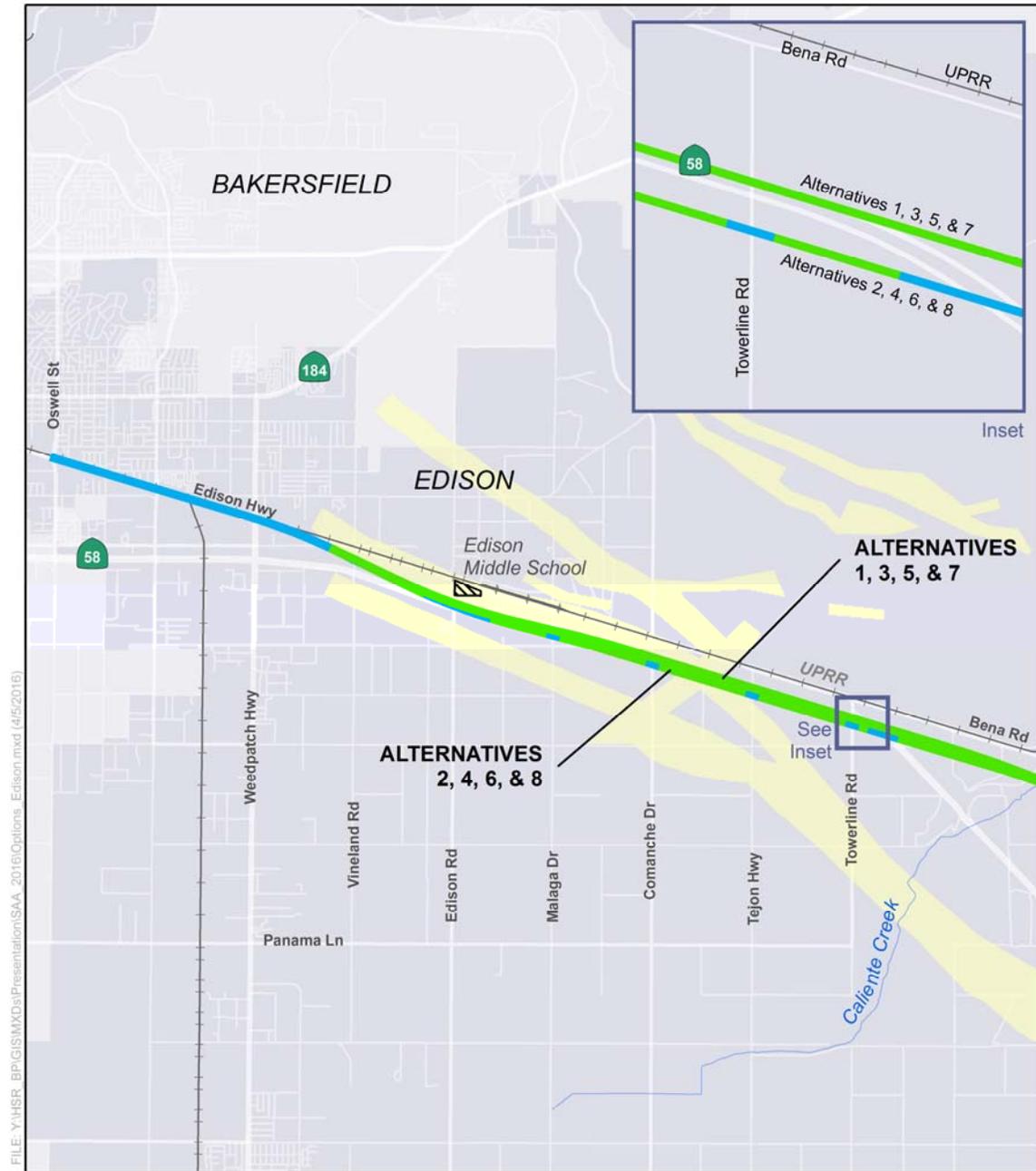
As discussed in Section 1.2 of this SAA, these alternatives were initially identified in an Alternatives Screening Memorandum, which is included as Appendix A. The Alternatives Screening Memorandum analyzed a Range of Alternatives within the communities along the alignment: Edison, Keene, Tehachapi, and Lancaster. The Range of Alternatives was selected and grouped based on the High-Speed Rail Purpose and Need and addressed the concerns for each community in Edison, Keene, Tehachapi, and Lancaster. The Alternatives Screening Memorandum conclusions included grouping the best one or two alternatives for each community, which resulted in a total of eight alternatives described in more detail below.

### **2.3.1.1 Description of Alternative 1**

As shown in earlier in Figure 1.1-1, Alternative 1 begins at the Bakersfield Station, near Oswell Street, outside the southeastern city limit of Bakersfield. The Alternative 1 centerline runs down the center of Edison Highway on viaduct. Figure 2.3-1 shows the Edison area details, and Edison Highway is also shown as on Figure 2.3-2 as SR 58. Previous alignments proposed a route on the south side of Edison Highway introducing potential impacts to businesses along this highway. Further discussion with Authority staff and local stakeholders introduced the concept of designing an elevated alignment along the Edison Highway right-of-way rather than along private properties on the south side of the highway.

As shown in Figure 2.3-2, the alignment then begins to converge with the SR 58 freeway near the intersection of SR 184 and SR 58. Once clear of the Edison Highway right-of-way, the High-Speed Rail profile descends and transitions from a viaduct to an elevated embankment, and then to a shallow cut section. The High-Speed Rail alignment meets SR 58 at Edison Road, at which point the freeway would be relocated to the south, allowing the High-Speed Rail alignment to parallel the existing SR 58 alignment along the north side of the relocated freeway section. This alignment would result in the following benefits compared to the 2012 alternatives:

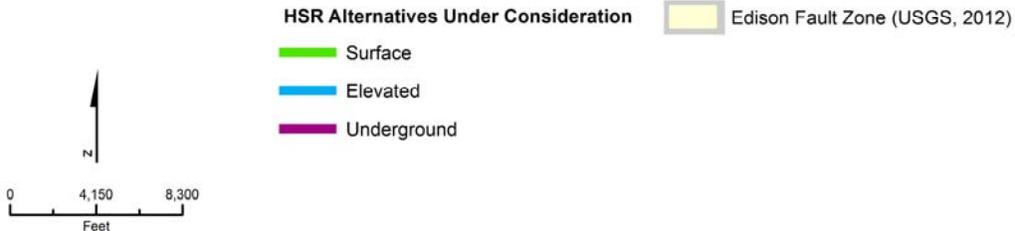
- Movement of the High-Speed Rail tracks 100 feet further away from Edison Middle School than the 2012 alternatives, and movement of freeway traffic further from the school, which might result in improved air quality at the school.
- Consolidation of the SR 58 transportation corridor, which would result in a combined transportation corridor footprint, reducing potential impacts to nearby agricultural properties.
- Maintaining the corridor alignment further away from existing fault zones that parallel SR 58 and moving the alignment to the south.
- Would not impact or avoid any natural resources, compared to the 2012 alternatives.



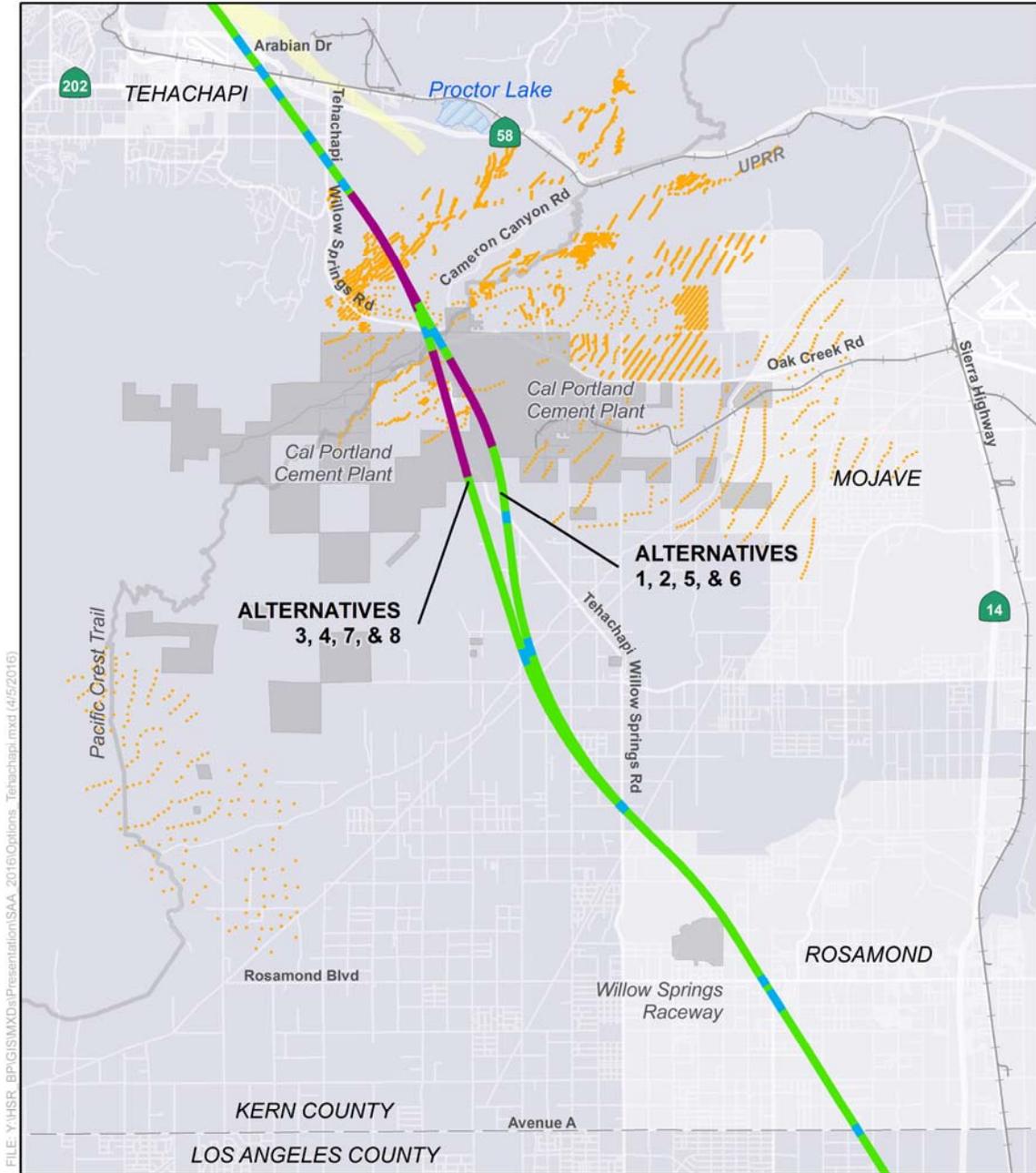
FILE: Y:\HSR\_BP\GIS\MXDs\Presentation\SA\_A\_2016\Options\_Edison.mxd (4/5/2016)

PRELIMINARY DRAFT/SUBJECT TO CHANGE - HSR ALIGNMENT IS NOT DETERMINED  
SOURCE: USGS (2012); URS (2012, 2013); TYLin (2015); Esri (2015)

April 5, 2016



**Figure 2.3-1 Edison Area Detail Map**



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PRELIMINARY DRAFT/SUBJECT TO CHANGE - HSR ALIGNMENT IS NOT DETERMINED  
SOURCE: URS (2012, 2013); TYLin (2015); Esri (2015)

April 5, 2016

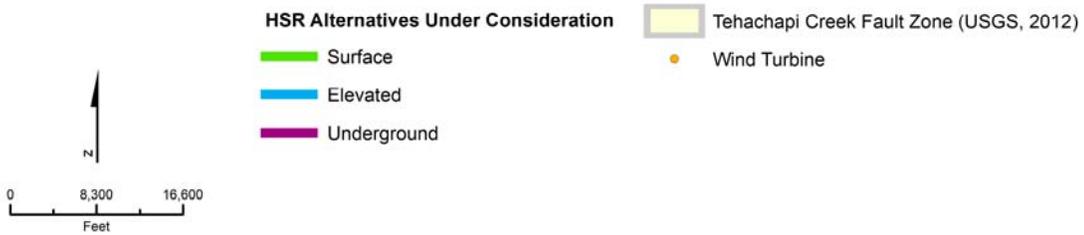


Figure 2.3-2 Tehachapi Area Detail Map

The High-Speed Rail alignment would proceed eastward along the existing freeway alignment to Towerline Road, where the relocated freeway would tie back into existing SR 58 as it curves away from Edison Highway. The High-Speed Rail alignment would continue parallel to Edison Highway toward Caliente Creek.

From Caliente Creek to Bealville Road, the Alternative 1 centerline follows the existing Tejon Ranch Conservancy easement boundary very closely, as illustrated on Figure 2.3-2. Previous alignments bisected Tejon Ranch Conservancy land parcels. The Alternative 1 centerline avoids bisecting conservancy lands, and the centerline follows the conservancy's natural terrain in a location that allows the climb up the Tehachapi Mountains to start at a point closer to the community of Edison. The design modifications that allow the Alternative 1 centerline to start closer to Edison also result in a flatter 2.8 percent climbing grade up the mountain in Tehachapi. The climb would require a viaduct over Caliente Creek, and tunnel design configurations focused on reducing impacts to natural resources in the conservancy. The tunnel design configurations for the Alternative 1 centerline would include a combination of tunnels and viaducts starting south of Tehachapi-Willow Springs Road, continuing along the intersection of the Alternative 1 centerline and Cameron Canyon Road, and continuing with additional tunnel design configurations south of Cameron Canyon Road to the area where the Alternative 1 centerline more or less intersects with Tehachapi-Willow Springs Road again. Compared to previous alignments, the Alternative 1 centerline and its tunnel design configurations would result in a reduction of 3,925 feet of tunnel compared to the 2012 alignment.

The alignment follows the SR 58 freeway while weaving between the newly defined (2015) Tehachapi Creek fault locations from Bealville Road to Broome Road.

This horizontal location was preferred as it avoided the longer tunnels proposed in the 2014 Revised New T3 alignment that was shifted northeasterly to avoid the previously wider definition of the Tehachapi Creek Fault Corridor. The continued climb would require tunnel and viaduct design configurations: a 6,000-foot tunnel, a viaduct over the Union Pacific Railroad (UPRR), followed by a 2,025-foot tunnel, followed by a viaduct over the creek near the National Chavez Center, a 5,250-foot tunnel, and a viaduct over SR 58.

From the SR 58/Broome Road interchange, Alternative 1 runs southeast along SR 58 at varying distances ranging from 0.1 to 0.3 mile to the northeast side. Proceeding southeast toward the City of Tehachapi, Alternative 1 converges with SR 58 and crosses to the south side on a viaduct just southeast of the Broome Road interchange. The alignment then passes back and forth across the freeway as it passes to the north of the Golden Hills community. As SR 58 curves to the south toward the City of Tehachapi, Alternative 1 continues on a more easterly path, skirting the City's future development area through a 6,510-foot tunnel. The alignment then curves further south and passes to the east of the city, crossing SR 58 near Arabian Drive. Alternative 1 then continues southeast on a long tangent alignment and passes through the mountains east of Tehachapi in a long, 12,750-foot tunnel roughly following Tehachapi-Willow Springs Road. As Alternative 1 begins the 2.8 percent descending grade into the northern Antelope Valley, it crosses Tehachapi-Willow Springs Road near the Cameron Canyon Road intersection, where it also passes over the Pacific Crest Trail on a viaduct. The High-Speed Rail alignment passes just west of the CalPortland Cement limestone quarry in a long, 9,460-foot tunnel. The alignment continues southeast past the east side of Willow Springs Raceway where it proceeds across Antelope Valley toward the north end of the City of Lancaster at Avenue H, and ultimately joining the Sierra Highway/UPRR corridor.

Figure 2.3-3 shows a detailed view of the alternative alignments in the Lancaster area. From H Street through the City of Lancaster, this alternative combines the High-Speed Rail, the UPRR, and MetroLink rail corridors into one combined at-grade corridor. The existing UPRR/MetroLink right-of-way through the city is highly irregular in width, with some areas just wide enough to accommodate the needed rail improvements and others significantly wider. Alternative 1 proposes the creation of a new combined rail corridor that matches the current westerly extent of the existing rail right-of-way and widens the corridor to the east, as necessary, to accommodate

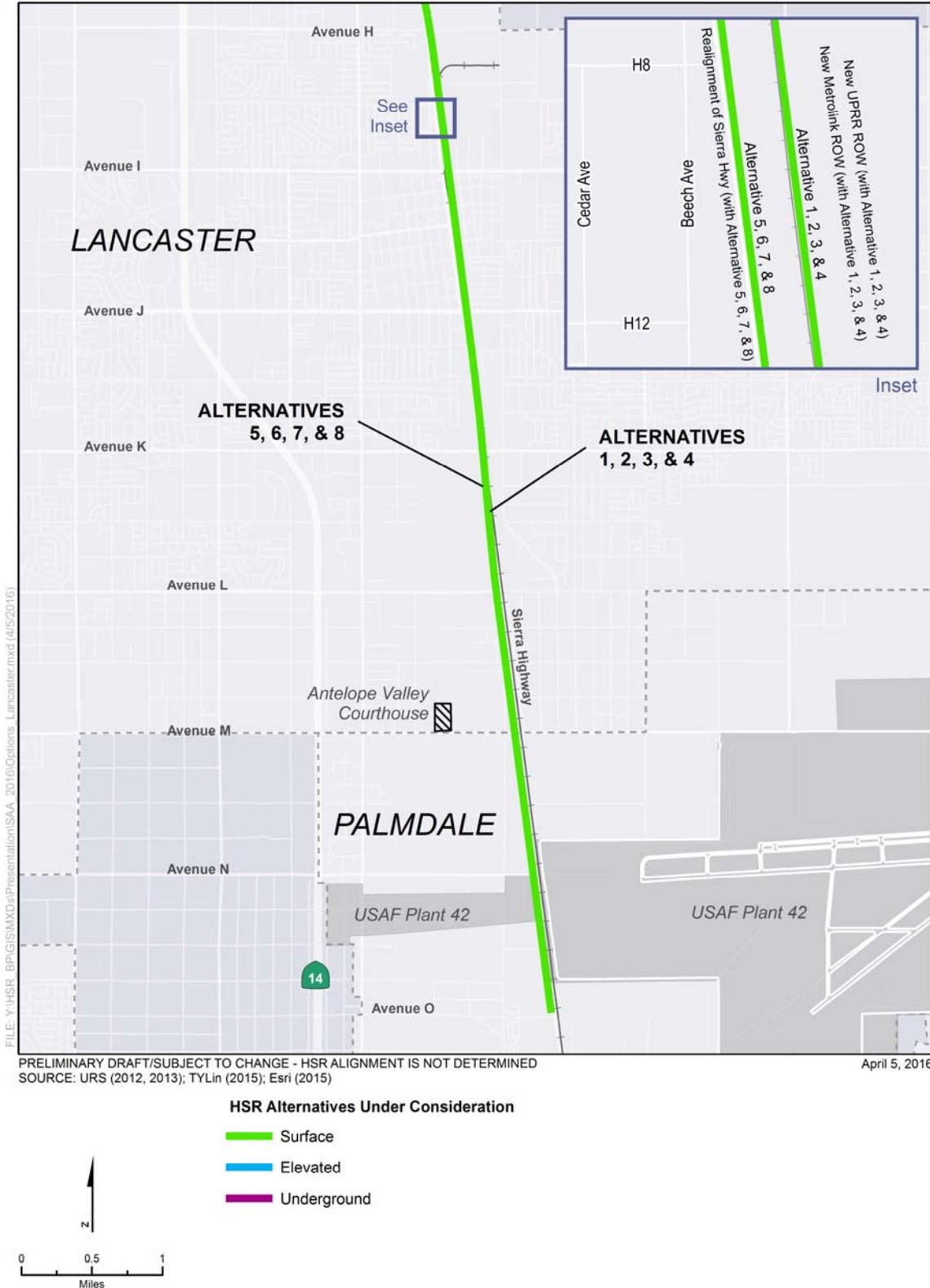


Figure 2.3-3 Lancaster Area Detail Map

all three rail systems and their respective separation requirements. The alignment would require the relocation of all the UPRR and MetroLink facilities in the corridor.

This refinement would result in an at-grade rail corridor with the following benefits:

- Meeting the City of Lancaster's desire to eliminate the elevated High-Speed Rail within the city limits
- Minimization of potential impacts to businesses, institutions, and roadways
- Elimination of safety issues involved with existing at-grade rail crossings by grade-separating all major roadway intersections
- Improvement of local traffic circulation

The movement of the corridor easterly would enter into a more undeveloped area of the City, reducing the number of businesses impacted.

To avoid airspace restrictions from the United States Air Force Plant 42 Airport to the south, the Alternative 1 centerline begins a transition to the west at Avenue K and continues the transition approximately 180 feet west to Avenue M, where the new High-Speed Rail alignment moves west of the existing UPRR/MetroLink right-of-way. The alignment then continues south, parallel to and along the westerly side of the existing rail corridor until the section terminus at Avenue O, where it meets the northerly terminus of the Palmdale to Burbank Section. The westerly transition of the alignment from Avenue K to Avenue O would require the relocation of Sierra Highway to the west. Preliminary routes for this highway relocation would be within undeveloped properties roughly 1,500 feet west of its existing location. This would provide a separation between the rail corridor and the highway, allowing future development along each side of the relocated Sierra Highway, a city-preferred benefit over the single-sided development currently available in this reach due to Sierra Highway's current close proximity to the existing rail corridor.

### **2.3.1.2 Description of Alternative 2**

Alternative 2 follows the same alignment from Bakersfield to Palmdale as Alternative 1 except through the community of Edison. Figure 2.3-1 shows a detailed view of the alternative alignments in the Edison area, including the variations between Alternative 2 and Alternative 1 between Edison Road and Towerline Road, where the High-Speed Rail alignment runs along the south side of existing SR 58 on an elevated embankment. Alternative 2 would allow the SR 58 freeway to remain on its current alignment without relocation but would require an elevated structure spanning the SR 58/Edison Road interchange diagonally. A second elevated structure crossing back over SR 58 would be required just past Towerline Road. Alternative 2 would move the High-Speed Rail tracks 240 feet further away from Edison Middle School, which would reduce any potential High-Speed Rail noise and vibration impacts to the school. It would also place the High-Speed Rail alignment further away from the existing fault zone.

### **2.3.1.3 Description of Alternative 3**

Alternative 3 follows the same alignment from Bakersfield to Palmdale as Alternative 1 except along the base of the Tehachapi Mountains. Figure 2.3-2 shows a detailed view of the alternative alignments in the Tehachapi area. Alternative 3 varies from Alternative 1 just south of Tehachapi in the vicinity of the CalPortland Cement Company property, where the alignment is located approximately 3,000 feet west of Alternative 1, placing the High-Speed Rail route in closer proximity to Tehachapi-Willow Springs Road.

This portion of the alignment also increases the cumulative tunnel length of the last two most southerly tunnels, which would be located in south Tehachapi, by a distance of 4,290 feet when compared to Alternative 1. These two most southerly tunnels, while in the same general location as Alternative 1, consist of a 13,500-foot tunnel and a 13,000-foot tunnel. South of Tehachapi, Alternative 3 splits off on a more westerly alignment than Alternative 1 until it reconnects at the common connection point of Alternative 1, approximately 17 miles south of Tehachapi.

The design objectives of Alternative 3 are similar to those of Alternative 1. Alternative 3 also has the design objective to identify a different alignment through the CalPortland Cement Company property that locates the High-Speed Rail alignment further away from the CalPortland active limestone quarry and in closer proximity to Tehachapi-Willow Springs Road.

Although Alternative 3 combines transportation corridors between the High-Speed Rail and Tehachapi-Willow Springs Road, it would potentially have greater impacts to existing operations at the CalPortland Cement Company as compared to Alternative 1.

#### **2.3.1.4 Description of Alternative 4**

Alternative 4 follows the same alignment from Bakersfield to Palmdale as Alternative 1 except in two areas:

Alternative 4 varies from Alternative 1 between Edison Road and Towerline Road, where the High-Speed Rail alignment runs along the south side of existing SR 58 on an elevated embankment, as shown on Figure 2.3-1. This would allow SR 58 to remain on its current alignment without relocation but would require an elevated structure spanning the SR 58/Edison Road interchange diagonally. A second elevated structure crossing back over SR 58 would be required just past Towerline Road. This option moves the High-Speed Rail tracks 240 feet further away from Edison Middle School, which would reduce any potential High-Speed Rail noise and vibration impacts to the school. Alternative 4 also places the High-Speed Rail alignment further away from the existing fault zone.

Alternative 4 also varies from Alternative 1 along the base of the Tehachapi Mountains, just south of Tehachapi in the vicinity of the CalPortland Cement Company property (Figure 2.3-2). At this point, the alignment is located approximately 3,000 feet west of Alternative 1, placing the High-Speed Rail route in closer proximity to Tehachapi-Willow Springs Road. This portion of the alignment also increases the cumulative tunnel length of the two most southerly tunnels that would be located south of Tehachapi by a distance of 4,290 feet when compared to Alternative 1. The two most southerly tunnels, while in the same general location as Alternative 1, consist of a 13,500-foot tunnel and a 13,000-foot tunnel. South of Tehachapi, Alternative 4 splits off on a more westerly alignment than Alternative 1 until it reconnects at the common connection point of Alternative 1, approximately 17 miles south of Tehachapi.

The design objectives of Alternative 4 are similar to those of Alternative 1. Alternative 4 also has the design objective to identify a different alignment through the CalPortland Cement Company property that locates the High-Speed Rail alignment further away from the CalPortland active limestone quarry and in closer proximity to Tehachapi-Willow Springs Road.

Like Alternative 3, Alternative 4 combines transportation corridors between the High-Speed Rail and Tehachapi-Willow Springs Road in an effort to reduce potential impacts to the CalPortland Cement Company's existing operations, as compared to Alternative 1.

#### **2.3.1.5 Description of Alternative 5**

Alternative 5 follows the same alignment from Bakersfield to Palmdale as Alternative 1 except in the City of Lancaster. Figure 2.3-3 shows a detailed view of the alternative alignments in the Lancaster area. Between Avenue H and Avenue M in the City of Lancaster, Alternative 5 proposes to avoid the UPRR and MetroLink facilities and relocate Sierra Highway. The primary goal of this alternative is to place the High-Speed Rail as close as possible to the existing rail facilities (60 feet closer than the 2012 alternatives) while still avoiding as many businesses as possible. The alignment has no tunnels or below-grade sections within the City of Lancaster.

#### **2.3.1.6 Description of Alternative 6**

Alternative 6 follows the same alignment from Bakersfield to Palmdale as Alternative 1 except through the community of Edison and the City of Lancaster.

Alternative 6 varies from Alternative 1 between Edison Road and Towerline Road, where the High-Speed Rail alignment runs along the south side of existing SR 58 on an elevated

embankment, as shown on Figure 2.3-1. This would allow SR 58 to remain on its current alignment without relocation but would require an elevated structure spanning the SR 58/Edison Road interchange diagonally. A second elevated structure crossing back over SR 58 would be required just past Towerline Road. This option moves the High-Speed Rail tracks 240 feet further away from Edison Middle School, which would reduce any potential noise and vibration impacts to the school. Alternative 6 also places the High-Speed Rail alignment further away from the existing fault zone.

In the City of Lancaster, between Avenue H and Avenue M, Alternative 6 would avoid the UPRR and MetroLink facilities and relocate Sierra Highway (Figure 2.3-3). The primary goal of this alternative is to place the High-Speed Rail right-of-way as close as possible to existing rail facilities while avoiding as many businesses as possible. The Alternative 6 centerline places the High-Speed Rail right-of-way 60 feet closer to existing rail facilities as compared to the 2012 alternatives. Within the City of Lancaster, Alternative 6 does not require tunnels or below-grade sections, thereby, focusing on reducing the Lancaster community concerns.

### **2.3.1.7 Description of Alternative 7**

Alternative 7 follows the same alignment from Bakersfield to Palmdale as Alternative 1 except along the base of the Tehachapi Mountains and the City of Lancaster.

Alternative 7 varies from Alternative 1 just south of Tehachapi, as shown on Figure 2.3-2, in the vicinity of the CalPortland Cement Company property, where the alignment is located approximately 3,000 feet west of Alternative 1, placing the High-Speed Rail route in closer proximity to Tehachapi-Willow Springs Road. This portion of the alignment also increases the cumulative tunnel length of the last two tunnels by 4,290 feet when compared to Alternative 1. The last two tunnels, while in the same general location as Alternative 1, consist of a 13,500-foot tunnel and a 13,000-foot tunnel.

South of Tehachapi, Alternative 7 splits off on a more westerly alignment than Alternative 1 until it reconnects at the common connection point of Alternative 1, approximately 17 miles south of Tehachapi.

The design objectives of Alternative 7 are similar to those of Alternative 1, with the exception that an objective of Alternative 7 identifies a different alignment through the CalPortland Cement Company property that locates the High-Speed Rail alignment further away from the CalPortland active limestone quarry and in closer proximity to Tehachapi-Willow Springs Road. Although Alternative 7 combines transportation corridors between the High-Speed Rail and Tehachapi-Willow Springs Road in an effort to reduce potential impacts to the CalPortland Cement Company operations, it would have a greater impact to future plant operations than Alternative 1.

In Lancaster, between Avenue H and Avenue M, Alternative 7 proposes to avoid the UPRR and MetroLink facilities and relocate Sierra Highway (Figure 2.3-3). The primary goal of this alternative is to place the High-Speed Rail as close as possible to the existing rail facilities (60 feet closer than the 2012 alternatives) while avoiding as many businesses as possible. The alignment has no tunnels or below-grade sections within the City of Lancaster.

### **2.3.1.8 Description of Alternative 8**

Alternative 8 follows the same alignment from Bakersfield to Palmdale as Alternative 1 except in Edison, Tehachapi, and Lancaster.

In Edison, Alternative 8 varies from Alternative 1 between Edison Road and Towerline Road, where the High-Speed Rail alignment runs along the south side of existing SR 58 on an elevated embankment, as shown on Figure 2.3-1. This allows SR 58 to remain on its current alignment without relocation but would require an elevated structure spanning the SR 58/Edison Road interchange diagonally. A second elevated structure crossing back over SR 58 would be required just past Towerline Road. This option moves the High-Speed Rail tracks 240 feet further away from Edison Middle School, which would reduce any potential High-Speed Rail noise and

vibration impacts to the school. Alternative 8 also places the High-Speed Rail alignment further away from the existing fault zone.

Near the base of the Tehachapi Mountains, Alternative 8 also varies from Alternative 1 just south of Tehachapi in the vicinity of the CalPortland Cement Company property (Figure 2.3-2). Here, the alignment is located approximately 3,000 feet west of Alternative 1, placing the High-Speed Rail route in closer proximity to Tehachapi-Willow Springs Road.

This portion of the alignment also increases the cumulative tunnel length of the two most southerly tunnels in south Tehachapi by 4,290 feet when compared to Alternative 1. The two most southerly tunnels, while in the same general location as Alternative 1, consist of a 13,500-foot tunnel and a 13,000-foot tunnel. South of Tehachapi, Alternative 8 splits off on a more westerly alignment than Alternative 1 until it reconnects at the common connection point of Alternative 1, approximately 17 miles south of Tehachapi.

In Lancaster, between Avenue H and Avenue M, Alternative 8 proposes to avoid the UPRR and MetroLink facilities and relocate Sierra Highway, as shown on Figure 2.3-3. The primary goal of this alternative is to place the High-Speed Rail as close as possible to existing rail facilities (60 feet closer than the 2012 alternatives) while avoiding as many businesses as possible.

### 2.3.2 Alternative Evaluation Overview

Table 2.3-1 describes the methodology used for analysis of the evaluation criteria in terms of constructability, land use, disruption to communities, and environmental resources. See the detailed evaluation tables in Appendix B for a listing of the potential impacts for each evaluation measure by alternative. The following discussion describes the methods used for analyzing the various evaluation measures and identifies those criteria determined to be critical differentiators between each alternative. For an evaluation criterion to be considered a critical differentiator between alternatives, it must meet two conditions:

- The evaluation results for that criterion must differ across alternatives. For example, impacts to United States Fish and Wildlife Service Critical Habitat do not vary by alternative. However, impacts to California Natural Diversity Database species vary by alternative. Due to the variations across alternatives for various evaluation criteria (aquatic resources and habitat, etc.) within the general biological resources category, biological resources are considered a critical differentiator.
- Evaluation criteria must be considered a key consideration in whether or not an alternative is practicable or feasible. For example, impacts to Section 4(f) resources must be avoided before they are minimized in the alternatives development process. However, impacts to agricultural resources can be either minimized or mitigated at a later stage in the environmental review process. A critical differentiator, which is a key consideration as to whether or not an alternative is practicable or feasible, is governed by a specific agency, law, or regulation, such as Section 4(f)(codified at 49 United States Code 303).

If the same potential impacts would occur under each alternative, an evaluation criterion is not considered a critical differentiator.

Table 2.3-2 provides a summary of each alternative's relative impact for each evaluation measure based on the number of quantitative differentiators as listed below:

- "+" Indicates the highest potential impacts/difficult constructability
- "++" Indicates medium potential impacts/average constructability
- "+++" Indicates low potential impacts/easier constructability

Table 2.3-2 is also a roll-up table of the detailed evaluation tables provided in Appendix B and focuses only on those evaluation criteria identified as critical differentiators in Table 2.3-1. Refer to Appendix B for a detailed listing and quantitative analysis of the potential impacts for each evaluation measure by alternative. A more detailed comparative evaluation of the alternatives recommended to be carried forward will be presented in the draft environmental document for the Bakersfield to Palmdale Section.

**Table 2.3-1 Evaluation Criteria and Methods**

Constructability	Evaluation Method	Critical Differentiator
Alignment Miles	This evaluation measure is the length of the alignment between Bakersfield and Palmdale. The alignment length is the same for all alternatives (approximately 80 miles). Therefore, this evaluation measure is not a critical differentiator.	NO
Intermodal Connections	This evaluation measure is based on the number of intermodal connections within 100 feet of the centerline of the alignment that would be affected by the alternative alignments. All alternatives would result in the same potential impacts to intermodal connections. Therefore, this evaluation measure is not a critical differentiator.	NO
Tunnel Length	This evaluation measure is the length of the tunnel segments of each alignment. Tunnel segment lengths vary between alternatives, and tunnel segment length is a key consideration as to whether or not an alternative is practicable or feasible. Therefore, this evaluation measure is a critical differentiator.	YES
Operating Costs	This evaluation measure has not yet been determined. Therefore, this evaluation measure is not a critical differentiator.	NO
Capital Costs	This evaluation measure is based on a percent baseline, where 100 percent is the lowest-cost alternative. Alternatives 1 and 2 are the lowest cost at 100 percent, and Alternatives 7 and 8 are the highest cost at 109.1 percent. Capital costs vary between alternatives, and capital costs are a key consideration as to whether or not an alternative is practicable or feasible. Therefore, this evaluation measure is a critical differentiator.	YES
Constructability	This evaluation measure is based on the number of grade separations, the number of construction issues associated with construction around key facilities, the construction of viaducts, and the realignment of roadways. Constructability varies between alternatives, and constructability is a key consideration as to whether or not an alternative is practicable or feasible. Therefore, this evaluation measure is a critical differentiator.	YES
Land Use	Evaluation Method	Critical Differentiator
Consistency with Other Planning Efforts	This evaluation measure was assessed based on information on both existing and planned land uses within 100 feet of the centerline for each alternative under consideration. Potential impacts to land uses vary significantly between alternatives, and consistency with other planning efforts is a key consideration as to whether or not an alternative is practicable or feasible. Therefore, existing land uses are a critical differentiator. Planned land uses did not differ by alternative; therefore, this evaluation measure is not a critical differentiator.	YES—Existing Land Uses NO—Planned Land Uses
Disruption to Communities	Evaluation Method	Critical Differentiator
Disruption to Existing Community Residents, Businesses, and Industrial Owners	This evaluation measure is based on potential impacts to community residents, businesses, and industrial owners within 100 feet of the centerline of the alignment. Potential impacts as a result of displacements vary between alternatives, and potential impacts as a result of displacements are a key consideration as to whether or not an alternative is practicable or feasible. Therefore, this evaluation measure is a critical differentiator.	YES
Disruption to and Relocation of Utilities  Note: Please refer to Appendix A for a discussion of ROW displacements in the Lancaster area. Please refer to Appendix B for a detailed listing of displacements for each alternative.	This evaluation measure is based on potential impacts to both high-risk (natural gas and petroleum) and low-risk (electrical substation, telecom, fiber-optic, water, sewer, and storm water) utilities within 100 feet of the centerline of the alignment for each alternative. Potential impacts to storm water, sewer, fiber-optic, electrical substation, and petroleum and fuel utilities are the same for each alternative and, therefore, are not a critical differentiator. Although potential impacts to utilities vary across evaluation measures within the Disruption to and Relocation of Utilities category, impacts to utilities are not considered as a key consideration as to whether or not an alternative is practicable and feasible. Therefore, overall potential impacts to utilities are not a critical differentiator.	NO
Disruption to and Relocation of Wind Turbines	This evaluation measure is based on the number of wind turbines within 100 feet of the centerline of the alignment for each alternative. All alternatives would result in the same potential impacts to wind turbines (11 turbines). Therefore, this evaluation measure is not a critical differentiator.	NO
Demographics, Socioeconomic Composition, and Communities of Environmental Justice Concern	This evaluation measure is based on potential impacts to communities of environmental justice concern. There are portions of 24 census tracts within 100 feet of the centerline of the alignment. Of these census tracts, 6 have a population of racial minorities 10 percent higher than the county average, 9 have an elderly population (age 65 and over) 5 percent higher than the county average, and 13 have a below-poverty-level population 5 percent higher than the county average. Potential impacts to communities of environmental justice concern are the same for each alternative. Therefore, this evaluation measure is not a critical differentiator.	NO
Proximity to Schools	This evaluation measure is based on potential impacts to schools within 100 feet of the centerline of the alignment for each alternative. The number of schools within 100 feet and 1,500 feet (1 and 7, respectively) is the same for each alternative. Therefore, this evaluation measure is not a critical differentiator.	NO
Proximity to Landfills	This evaluation measure is based on potential impacts to landfills within 100 feet of the centerline of the alignment for each alternative. The number of landfills within 100 feet and 1,500 feet is 0, and is the same for each alternative. Therefore, this evaluation measure is not a critical differentiator.	NO

Proximity to Hazardous Waste and Materials	This evaluation measure is based on potential impacts as a result of hazardous waste/materials facilities within 100 feet of the centerline of the alignment for each alternative. Therefore, this evaluation measure is a critical differentiator.	YES
<b>Environmental Resources</b>	<b>Evaluation Method</b>	<b>Critical Differentiator</b>
Potential Section 4(f) and 6(f) Resources <sup>1</sup>	This evaluation measure is based on the number of potential Section 4(f) resources within 100 feet of the centerline of the alignment, including existing and proposed recreation resource, and cultural resources. Potential uses of Section 4(f) and 6(f) resources vary between alternatives, and potential uses of Section 4(f) and 6(f) resources are a key consideration as to whether or not an alternative is practicable or feasible. Therefore, this evaluation measure is a critical differentiator.	YES
Biological Resources	This evaluation measure is based on data from the United States Fish and Wildlife Service for Critical Habitat, the California Natural Diversity Database. The number of acres within 100 feet of the centerline for each alternative alignment (for various conservation areas, Habitat Conservation Plans, conservation easements, and acquisition areas) has also been considered in the analysis of potential biological impacts. Potential impacts to biological resources vary between alternative, and potential impacts as a result of some biological resources are a key consideration as to whether or not an alternative is practicable or feasible. Therefore, this evaluation measure is a critical differentiator.	YES
Cultural Resources	This evaluation measure was analyzed based on the number of potential cultural resources (built environment and archaeological) within 100 feet of the centerline of the alignment. Based on the information provided by records searches (i.e., strictly archival research), none of these potential archaeological/built environment resources are listed on, or determined eligible for inclusion in, the National Register of Historic Places or the California Register of Historical Resources. However, the eligibility of these potential resources has not been formally assessed or undergone review through consultation with the State Historic Preservation Officer. Therefore, their eligibility status cannot be definitively identified at this time. Potential impacts to cultural resources vary between alternatives, and potential impacts to cultural resources are a key consideration as to whether or not an alternative is practicable or feasible.	YES
Paleontological Resources	This evaluation measure was analyzed based on highly sensitive geologic formations within 100 feet of the centerline of the alignment. These highly sensitive geologic formations are known to or are likely to contain significant nonrenewable paleontological resources. Although there are differences in potential impacts to paleontological resources under the various alternatives, this evaluation measure is not considered a key consideration as to whether or not an alternative is practicable or feasible. Therefore, this evaluation measure is not a critical differentiator.	NO
Agricultural Resources	This evaluation measure was analyzed based on Williamson Act lands, grazing lands, and Prime/Statewide/Unique Farmlands within 100 feet of the centerline of the alignment. Although potential impacts to agricultural resources vary across categories (i.e., acres of grazing land affected), overall potential impacts to agricultural resources across evaluation measures vary by alternative (i.e., some alternatives have low potential impacts to Williamson Act Lands but high potential impacts to grazing lands, and vice versa). Because potential impacts to agricultural resources vary across evaluation measures within the agricultural resources category, impacts to agricultural resources are not considered as a key consideration as to whether or not an alternative is practicable and feasible. Therefore, overall potential impacts to agricultural resources are not a critical differentiator.	NO
Community Resources Potentially Significant to Affected Communities	Potential impacts to community resources potentially significant to affected communities were analyzed based on the number of existing and proposed community resources within 100 feet of the centerline of the alignment. Potential impacts to community resources potentially significant to affected communities vary between alternatives, and potential impacts community resources potentially significant to affected communities are a key consideration as to whether or not an alternative is practicable or feasible. Therefore, this evaluation measure is a critical differentiator.	YES
Change in Visual and Scenic Resources	Potential impacts to visual resources were determined by assessing potential impacts to visual character and views and vistas as a result of embankments greater than 20 feet and viaducts. This assessment focuses on a comparative analysis of areas where the alignment alternatives diverge most in terms of the location of the centerline (i.e., where one alternative might be closer to a sensitive visual resource than another) and the proposed track type (i.e., viaduct, at-grade, or tunnel). For this analysis area, sensitive viewers are assumed to be residents and visitors to recreational areas. Therefore, residential areas and recreation sites and facilities within the project area represent sensitive viewing locations. Potential impacts to visual resources vary between alternatives, and potential impacts to visual resources are a key consideration as to whether or not an alternative is practicable or feasible. Therefore, this evaluation measure is a critical differentiator.	YES
Noise and Vibration	This evaluation measure was analyzed based on parcels within 100 feet of the centerline of each alignment that were identified as receptor parcels based on applicable noise criteria. Potential impacts as a result of noise and vibration vary between alternatives, and potential impacts as a result of noise and vibration are a key consideration as to whether or not an alternative is practicable or feasible. Therefore, this evaluation measure is a critical differentiator.	YES
Geotechnical Constraints	This evaluation measure was analyzed based on the length of the alternative alignment within each fault zone within 100 feet of the centerline of the alignment. All alternatives would result in the same potential impacts as a result of fault zones. This evaluation measure is not a critical differentiator.	NO
Fire Hazard	This evaluation measure was analyzed based on the length of each alternative alignment within fire hazard areas within 100 feet of the centerline of the alignment. Although potential impacts as a result of fire hazards vary between alternatives, and potential impacts as a result of fire hazards are not considered to be a key consideration as to whether or not an alternative is practicable or feasible. Therefore, this evaluation measure is not a critical differentiator.	NO
Hydrology and Water Resources	This evaluation measure was analyzed based on the length of the alternative alignment within each flood hazard zone (Zones A, AH, and AO) within 100 feet of the centerline of the alignment. The alternatives' length within floodplains varies by 0.25 mile at most; therefore, this evaluation measure is not a critical differentiator.	NO
Oil, Gas, and Geothermal Resources	This evaluation measure was analyzed based on the number of wells within 100 feet of the centerline of the alignment. All alternatives would result in 6–7 wells within 100 feet of the alignment centerlines; therefore, this evaluation measure is not a critical differentiator.	NO

<sup>1</sup> Section 4(f) of the United States Department of Transportation Act protects park and recreation lands, wildlife and waterfowl refuges, and historic sites of national, state, or local significance that are both publicly owned and open to the public, which can also include facilities such as wildlife management areas, school playgrounds, fairgrounds, public multiple-use land holdings, wild and scenic rivers, bodies of water, planned facilities, bikeways, trails, and scenic byways. Section 6(f) protects lands and facilities acquired with Land and Water Conservation Act funds. Potential Section 4(f) or Section 6(f) resources associated with each alternative must be identified in the Alternatives Analysis deliverables. Evaluation of Section 4(f) and Section 6(f) uses will require research and outreach to authorities of jurisdiction during the environmental review process to determine the presence or absence of these resources and their significance.

ROW = right-of-way

**Table 2.3-2 Bakersfield to Palmdale Alignment Alternatives Critical Differentiator Summary Evaluation**

Measurement Criteria	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6	Alternative 7	Alternative 8
<b>Constructability</b>								
Tunnel Length	+++	+++	++	++	+++	+++	++	++
Capital Costs	+++	+++	++	++	++	++	+	+
Constructability	+++	+++	+++	+++	++	++	++	++
<b>Land Use</b>								
Consistency with Other Planning Efforts	Existing Land Uses: +++	Existing Land Uses: ++	Existing Land Uses: +++	Existing Land Uses: ++	Existing Land Uses: ++	Existing Land Uses: +	Existing Land Uses: ++	Existing Land Uses: +
<b>Disruption to Communities</b>								
Disruption to Existing Community Residents, Businesses, and Industrial Owners (within 100 feet of the centerline of the alignment) Note: Please refer to Appendix A for a discussion of ROW displacements in the Lancaster area. Please refer to Appendix B for a detailed listing of displacements for each alternative.	Residential Parcels:	+++	+++	++	++	++	++	+
	Commercial (Business) Parcels:	+++	+++	++	++	++	+	++
	Industrial (Business) Parcels:	+	++	++	++	++	++	+++
	Cement Plant Parcels:	+	+	+++	+++	+	+	+++
Proximity to Hazardous Materials and Waste Sites (within 100 feet on either side of the centerline)	+	+	+	+	+++	+++	+++	+++
<b>Environmental Resources</b>								
Potential Section 4(f) and 6(f) Resources (Please note that for cultural resources [consisting of archaeological and historic architecture sites], there is a potential for both direct and indirect potential impacts to resources.)	+++	++	++	+	+++	++	++	+
Biological Resources Western Mojave Desert Tortoise Recovery Plan Area (within 100 feet of the centerline) Note: Recovery plans are non-binding conservation recommendations used for guidance purposes.	+	+	+++	+++	++	++	++	+++
Biological Resources California Natural Diversity Database	+	+	+++	+++	+	+	+++	+++
Biological Resources Special-Status Plant Communities	++	+	+++	++	+++	+	++	++
Bureau of Land Management West Mojave Planning Area (within the California Desert Conservation Area boundary) (within 100 feet of the centerline)	+	+	++	++	+	+	+	+++
Biological Resources Pacific Gas & Electric Company San Joaquin Valley Operations and Maintenance Habitat Conservation Plan (within 100 feet of the centerline)	+	+	+	+	+	+++	+	+

Measurement Criteria		Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6	Alternative 7	Alternative 8
Biological Resources Aquatic Resources National Hydrography Dataset (within 100 feet of the centerline)	Stream Crossings:	+++	+++	+	+	+++	+++	+	+
	Stream Miles:	+++	+++	+	+	+++	+++	+	+
	Freshwater Emergent Wetland:	+	+	+++	+++	+	+	+++	+++
	Freshwater Forested/Shrub:	+	+	+++	+++	+	+	+++	+++
	Freshwater Pond:	+	+++	+	+++	+	+++	+	+++
	Riverine:	+++	+	+++	+	+++	+	+++	+
Cultural Resources (within 100 feet of the centerline) Note: Based on the information provided by records searches (i.e., strictly archival research), none of these archaeological/built environment resources are listed on, or been determined eligible for inclusion in, the National Register of Historic Places or the California Register of Historical Resources. However, the eligibility of these resources has not been formally assessed or undergone review through consultation with the State Historic Preservation Officer. Therefore, their eligibility status cannot be definitively identified at this time.		+++	+++	++	++	++	+	+	+
Community Resources Potentially Significant to Affected Communities (The numbers shown are the total number of facilities within 100 feet on either side of the High-Speed Rail centerline alignment.)		Existing: +++	Existing: +++	Existing: +++	Existing: +++	Existing: +	Existing: +	Existing: +	Existing: +
Displacement of Community Resources Potentially Significant to Affected Communities (The numbers shown are the total number of facilities located within 100 feet on either side of the High-Speed Rail centerline alignment and would be potentially displaced.)		Proposed: +++	Proposed: +++	Proposed: +++	Proposed: +++	Proposed: +	Proposed: +	Proposed: +	Proposed: +
Change in Visual and Scenic Resources	Viaducts (residential parcels within 100 feet):	+	+	++	++	+	+	++	+
	Viaducts (residential parcels within 0.25 mile):	+++	++	++	+	++	++	++	++
	Embankment 20 feet or higher (residential parcels within 100 feet):	+++	+++	++	+	+++	+++	++	++
	Embankment 20 feet or higher (residential parcels within 0.25 mile):	++	++	++	+	++	++	++	+
	Total length in miles of embankment over 200 feet in height:	+	++	++	+++	+	++	++	+
Noise and Vibration Number of Sensitive Receptors by Type and Total Number of Occurrence (within 100 feet of the centerline)	Commercial: 5 Institutional: 0 Residential: 13 Total Number of Sensitive Noise Receptors: 18	Commercial: 5 Institutional: 0 Residential: 13 Total Number of Sensitive Noise Receptors: 18	Commercial: 5 Institutional: 0 Residential: 13 Total Number of Sensitive Noise Receptors: 18	Commercial: 5 Institutional: 0 Residential: 13 Total Number of Sensitive Noise Receptors: 18	Commercial: 5 Institutional: 0 Residential: 13 Total Number of Sensitive Noise Receptors: 18	Commercial: 2 Institutional: 1 Residential: 12 Total Number of Sensitive Noise Receptors: 15	Commercial: 2 Institutional: 1 Residential: 12 Total Number of Sensitive Noise Receptors: 15	Commercial: 2 Institutional: 1 Residential: 12 Total Number of Sensitive Noise Receptors: 15	Commercial: 2 Institutional: 1 Residential: 12 Total Number of Sensitive Noise Receptors: 15

Note: A "+++" symbol corresponds to the least impacts/most constructible alternative for each measurement criteria. A "+" symbol corresponds to the most impacts/least constructible alternative for each measurement criteria. A "++" symbol corresponds with alternatives that do not have the highest/lowest impacts or are the most/least constructible, but are in between these two grades.  
ROW = right-of-way

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### 3 RECOMMENDATION

The alternatives recommended for further consideration and evaluation in the Bakersfield to Palmdale Section project-level environmental document are listed below and summarized in Table 3.1-1. Evaluation of these alternatives guidance from the Authority’s performance objectives are discussed in the SAA Memorandum dated November 14, 2014 (“Methods employed in the Merced to Fresno: Central Valley Wye Supplemental Alternatives Analysis”).

*Section 3 at a Glance—In this section, you will find the following information:*

- ▶ Alignment Alternatives Recommended to be Carried Forward or Withdrawn

#### 3.1 Analysis of Critical Differentiators

As shown in Table 3.1-1, Alternatives 1, 2, 3, and 5 are recommended to be carried forward and Alternatives 4, 6, 7, and 8 are recommended to be withdrawn from further consideration. These recommendations are based on the detailed evaluation tables presented in Appendix B. The sections below summarize the analysis of the critical differentiators discussed earlier in Tables 2.3-1 and 2.3-2. Table 3.1-1 highlights whether these critical differentiators were primary or secondary reasons for recommending withdrawal of Alternatives 4, 6, 7, and 8 from further consideration.

##### 3.1.1 Constructability

*Critical Differentiators:*

- ▶ Tunnel Length
- ▶ Constructability
- ▶ Capital Costs

Alternatives 1, 2, 5, and 6 have 5.4 miles of tunnel over the length of the alignments as compared to Alternatives 3, 4, 7, and 8, which have a total tunnel length of 6.3 miles. Alternatives 1, 2, 3, and 4 would optimize constructability as compared to Alternatives 5, 6, 7, and 8. Capital costs are associated with tunnel length and constructability, and as a result, Alternatives 1 and 2 would minimize capital costs compared to the other alternatives. Alternative 5 meets

the requirements of the City of Lancaster and avoids UPRR facilities as compared to Alternative 4.

##### 3.1.2 Land Use

Alternatives 1 and 3 are most consistent with existing land uses, while Alternatives 6 and 8 are least consistent with existing land uses.

*Critical Differentiators:*

- ▶ Consistency with Existing Land Uses

##### 3.1.3 Disruption to Communities

*Critical Differentiators:*

- ▶ Disruption to Existing Community Residents and Businesses
- ▶ Proximity to Hazardous Waste and Materials

Alternatives 1 and 2 minimize potential impacts to residential parcels compared to Alternatives 7 and 8, which would result in the most impacts to residential parcels. Alternative 8 minimizes potential impacts to commercial and industrial business parcels while Alternatives 1 and 3 would result in the most impacts to commercial and industrial business parcels.

Alternatives 1, 2, 3, and 4 would be located within 100 feet of two additional hazardous waste sites compared to Alternatives 5, 6, 7, and 8.

**Table 3.1-1 Evaluation Summary**

Alignment Alternatives	Overall Score <sup>1</sup>	Alternatives Analysis Decision					Reasons for Elimination*									
		Carried Forward	Withdrawn	Engineering			Land Use	Disruption to Communities			Environmental Resources					
				Tunnel Length <sup>2</sup>	Capital Costs <sup>3</sup>	Constructability <sup>4</sup>	Consistency with Other Planning Efforts <sup>45</sup>	Disruption to Existing Property Owners <sup>6</sup>	Hazardous Materials/Wastes <sup>7</sup>	Potential Section 4(f) Resources <sup>8</sup>	Cultural Resources <sup>9</sup>	Wetlands/Aquatic Resources <sup>10</sup>	Biological Resources <sup>11</sup>	Community Resources <sup>12</sup>	Noise and Vibration <sup>13</sup>	Visual and Scenic Resources <sup>14</sup>
Alternative 1	62	✓														
Alternative 2	60	✓														
Alternative 3	65	✓														
Alternative 4	60		✓	S				S	S	P	S	P	S		S	S
Alternative 5	58	✓														
Alternative 6	55		✓		S	S	S	P		S	P	S	S	S	S	
Alternative 7	58		✓	S	P	S		S		P	P	P	S	S	S	S
Alternative 8	56		✓	S	P	S	S	S		P	P	P	S	S	S	

Source: Supplemental Alternatives Analysis, Appendix B (March 2016)

\* Reasons for Elimination: P – Primary Reason: Highest Impacts/Least Constructability; S – Secondary Reason: Medium Impacts/Medium Constructability.

<sup>1</sup> Overall Score: Indicates the number of “+” marks received for a given alternative, as shown in Table 2.3-2 above. A higher number indicates fewer impacts/less difficult to construct while a lower number indicates more impacts/more difficult to construct. Alternative 5 was chosen over Alternative 4 despite the fact that Alternative 4 scored slightly higher because Alternative 4 would require relocation of the Pacific Crest Trail, which Alternative 5 would not. Alternative 5 was chosen over Alternative 7 because Alternative 7 would result in the use of more potential Section 4(f) resources compared to Alternative 5. Potential uses of Section 4(f) resources must be avoided wherever possible.

<sup>2</sup> Tunnel Length: Construction of the alternative would require a greater total bored tunnel length, which presents engineering constraints and challenges.

<sup>3</sup> Capital Costs: Construction of the alternative would require greater capital expenditure due to engineering constraints.

<sup>4</sup> Constructability: Construction of the alternative is undesirable in terms of engineering challenges, which are assessed using capital costs and key construction issues as the critical discriminators.

<sup>5</sup> Consistency with Other Planning Efforts: The alternative does not minimize potential impacts to existing land uses.

<sup>6</sup> The alternative does not minimize disruption to local communities by assessing the total numbers of residential, commercial, and industrial parcels potentially disrupted.

<sup>7</sup> Hazardous Materials/Wastes: The alternative does not minimize disruption to local communities as a result of proximity to hazardous materials and wastes.

<sup>8</sup> Potential Section 4(f) Resources: An environmental resource criterion; the alternative does not minimize potential uses of existing and potential Section 4(f) resources.

<sup>9</sup> Cultural Resources: An environmental resource criterion; the alternative does not minimize potential impacts to potential cultural resources.

<sup>10</sup> Wetlands/Aquatic Resources: An environmental resource criterion; the alternative does not minimize potential impacts to wetlands/aquatic resources.

<sup>11</sup> Biological Resources: An environmental resource criterion; the alternative does not minimize potential impacts to biological resources.

<sup>12</sup> Community Resources: An environmental resource criterion; the alternative does not minimize potential impacts to community resources.

<sup>13</sup> Noise and Vibration: An environmental resource criterion; the alternative does not minimize potential impacts as a result of noise and vibration.

<sup>14</sup> Visual and Scenic Resources: An environmental resource criterion; the alternative does not minimize potential impacts to visual resources.

### 3.1.4 Environmental Resources

#### 3.1.4.1 Potential Section 4(f) and 6(f) Resources

The FRA must avoid potential uses of Section 4(f) resources whenever possible before considering minimization measures.

Alternatives 1, 2, 3, and 4 would result in fewer uses of existing and proposed Section 4(f) parks and recreation resources compared to Alternatives 5, 6, 7, and 8.

Alternatives 1, 2, 3, and 4 would result in fewer uses of potential Section 4(f) built environment resources. If these resources are determined eligible for listing in the National Register of Historic Places, they would be considered Section 4(f) resources.

Alternatives 1 and 2 would result in the fewest uses of potential Section 4(f) archaeological sites considered as potential Section 4(f) resources. If these resources are determined eligible for listing in the National Register of Historic Places, they would be considered Section 4(f) resources.

Alternative 4 results in the uses of fewer potential Section 4(f) and 6(f) recreation resources than Alternative 5; however, Alternative 4 intersects the Pacific Crest Trail and would require its relocation at that intersection.

Overall, Alternatives 4 and 8 would result in the most uses of Section 4(f) resources, while Alternatives 1 and 5 would result in the fewest uses of Section 4(f) resources.

---

#### *Critical Environmental Resource Differentiators:*

- ▶ Potential Section 4(f) and 6(f) resources
  - ▶ Biological Resources
  - ▶ Cultural Resources
  - ▶ Community Resources
  - ▶ Visual and Scenic Resources
  - ▶ Noise and Vibration
- 

#### 3.1.4.2 Biological and Aquatic Resources

At the alternatives screening stage, potential impacts to biological resources among all alternatives were compared based on:

- The amount of aquatic resources potentially affected
- The amount of California Natural Diversity Database Critical Habitat communities potentially affected (e.g., special-status plant species or habitats)
- The amount of Habitat Conservation Plan and/or planning areas area affected for a potential particular species (e.g., conservation plan areas in Tejon Ranch Conservancy Lands)
- The amount of threatened and endangered species Recovery Plan areas potentially affected

---

#### *Biological and Aquatic Resources Differentiators:*

- ▶ Aquatic Resources
  - ▶ California Natural Diversity Database Critical Habitat
  - ▶ Habitat Conservation Plan/Recovery Plan Areas
- 

For aquatic resources, Alternatives 1, 2, 5, and 6 would potentially impact 5.80 miles of streams and would require a total of 79 stream crossings. Alternatives 3, 4, 7, and 8 would potentially impact 6.30 miles of streams and would require a total of 86 stream crossings.

In addition to stream miles and stream crossings, other aquatic resources evaluated include:

- Freshwater Emergent Wetlands
- Freshwater Forested/Shrub
- Freshwater Pond
- Riverine

Impacts to the aquatic resources listed above vary slightly across the alternatives, with a maximum difference of less than one acre between Alternatives 1 and 5 (4.14 acres) and Alternatives 4 and 8 (3.38 acres). Therefore, although aquatic resources are a critical differentiator in that impacts to these resources vary across alternatives and are of high

importance to the Authority and regulatory agencies such as the United States Army Corps of Engineers, when considering impacts to streams and other aquatic resources, these evaluation criteria do not warrant withdrawal of an alternative based solely on aquatic resources as a critical differentiator.

Potential impacts to biological resources are based on the quantitative data presented in Appendix B. The quantitative differences between alternatives, though subtle at this screening level, were secondary factors in the recommended withdrawal of four out of the eight alternatives.

The Bakersfield to Palmdale corridor is constrained from an engineering standpoint in this area with regard to where the alignment can be located to maintain a maximum 2.8 percent grade both in the Tehachapi Mountains and south of the Tehachapi Mountains as the alignment descends into the Antelope Valley. This results in only a modest difference in the alignment between Alternatives 1, 2, 5, and 6, and Alternatives 3, 4, 7, and 8 in the Tehachapi area. Therefore, differences in impacts to biological resources such as California Natural Diversity Database Critical Habitat and habitat conservation plan and planning areas vary only slightly by alternative. Therefore, although biological resources are a critical differentiator in that impacts to these resources vary across alternatives and are of high importance to the Authority, when considering impacts to biological resources such as California Natural Diversity Database Critical Habitat and habitat conservation plan areas, these evaluation criteria do not warrant withdrawal of an alternative based solely on biological resources as a critical differentiator.

#### **3.1.4.3 Cultural Resources**

Alternatives 1 and 2 would result in the fewest potential impacts to cultural resources including archaeological and built environment sites. Alternatives 6, 7, and 8 would result in the most potential impacts to cultural resources.

#### **3.1.4.4 Community Resources Potentially Significant to Affected Communities**

Overall, Alternatives 1, 2, 3, and 4 would have the least potential impacts on community resources while Alternatives 5, 6, 7, and 8 would have the most potential impacts on community resources within the community of Edison. Alternative 4 would result in greater impacts to community resources as a result of viaduct construction along SR 58, which is not required under Alternative 5.

#### **3.1.4.5 Noise and Vibration**

Alternatives 5, 6, 7, and 8 would potentially impact 15 sensitive noise receptors, while Alternatives 1, 2, 3, and 4 would potentially impact 18 sensitive noise receptors.

#### **3.1.4.6 Change in Visual and Scenic Resources**

Alternatives 1, 2, 3, 5, and 6 would result in the least impacts to views and vistas as a result of proximity of parcels to a viaduct or embankment. Alternatives 4 and 8 would result in the greatest visual impacts to views and vistas.

### **3.2 Summary**

Alternatives 1, 2, 3, and 5 would be generally more constructible (fewer tunnel miles and lower capital costs) and would generally have lower potential impacts to right-of-way and displacements, potential Section 4(f) resources, cultural resources, and community resources compared to Alternatives 4, 6, 7, and 8.

Therefore, Alternatives 4, 6, 7, and 8 are recommended for withdrawal, as summarized below:

- ✓ Alternative 1: Carried Forward
- ✓ Alternative 2: Carried Forward
- ✓ Alternative 3: Carried Forward
- Alternative 4: Withdrawn

- ✓ Alternative 5: Carried Forward
- Alternative 6: Withdrawn
- Alternative 7: Withdrawn
- Alternative 8: Withdrawn

A comparative evaluation of all alternatives carried forward will be conducted and prepared as part of the draft environmental document that will be circulated for public review and comment.

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**APPENDIX A**  
**ALTERNATIVE SCREENING MEMORANDUM**

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## **Memorandum**

**DATE:** 01/15/2016

**TO:** Kavita Mehta, Don Smith, Juan Carlos Velasquez, Rick Simon

**FROM:** Stephen Smith, TYLIN International (Regional Consultant)

**CC:** Grant Wilson, Rob McCann, Anna Noyola, Mark Ashley, Joseph Yesbeck

**SUBJECT:** Bakersfield to Palmdale High Speed Rail – Alternatives Screening Memorandum

### ***DRAFT MEMORANDUM***

This memorandum is prepared in reference to the Bakersfield to Palmdale Supplemental Alternatives Analysis (SAA) presented by the California High Speed Rail Authority Board in February 2012. The purpose of the memo is twofold. The first section of this memorandum presents the rationale for screening several subsection options for the Bakersfield to Palmdale High Speed Rail project (the Project) that present major design and environmental constraints.

The second section of this memorandum outlines the naming convention and consolidation of the remaining subsection options into complete end-to-end alternatives to be evaluated in the 2016 SAA Report.

### **SUMMARY**

Since the 2012 SAA Report for the Bakersfield to Palmdale Section, the Authority has continued work to refine the alignment alternatives by responding to stakeholder, agency, and public comments, performing additional engineering and environmental review. The environmental review has been conducted pursuant to California Environmental Quality Act (CEQA) and National Environmental Policy Act (NEPA) requirements. This additional work has been divided into two phases:

1. Work performed between the conclusion of the 2012 SAA and January 2014, resulting in an interim Draft SAA report dated January 2014.
2. Work performed since January 2014 resulting in continued refinements and adjustments to previous alignments due to new stakeholder, agency, environmental, and engineering input.

The route between Bakersfield and Palmdale had been established in the programmatic Environmental Impact Report/Environmental Impact Statement (EIR/EIS) for the entire California High Speed Train project (2005). After the programmatic EIR/EIS was approved, numerous alignment options evolved along four key subsections of the route to address local concerns and issues in each subsection. These subsections are: Edison, Keene, Tehachapi, and Lancaster.

This document provides a screening analysis to identify which options in each subsection are either recommended for withdrawal from further analysis or carried forward in the 2016 SAA Report.

#### Edison Subsection:

- Carry forward: Edison Baseline and Edison A
- Withdraw: E2B, New E2, E4, New E4, and Edison B

Keene Subsection:

- Carry forward: Keene Baseline
- Withdraw: T3-1, New T3, and T3-2

Tehachapi Subsection:

- Carry forward: Tehachapi Alternate 1 and Tehachapi Alternate 2
- Withdraw: T3-1, New T3, T3-2, Revised New T3, and Oak Creek Pass

Lancaster Subsection:

- Carry forward: Lancaster Baseline and Lancaster A
- Withdraw: AV3B, New AV3B, AV4, and New AV4

A naming convention and consolidation of the selected subsection options into complete end-to-end alternatives has been prepared. The resultant number of selected options yields two in Edison, one in Keene, two in Tehachapi, and two in Lancaster. This combines into eight end-to-end alignments as follows:

2015 Bakersfield to Palmdale Alternatives							
Alternative	Edison		Keene	Tehachapi		Lancaster	
#	Baseline	Option A	Baseline	1	2	Baseline	Option
1	x		x	x		x	
2		x	x	x		x	
3	x		x		x	x	
4		x	x		x	x	
5	x		x	x			x
6		x	x	x			x
7	x		x		x		x
8		x	x		x		x

**Community and Stakeholder Engagement**

Public Scoping for the Bakersfield to Palmdale Section was conducted in the fall of 2009, followed by the Authority Board’s review of an Alternatives Analysis for the section in September 2010. The outreach team provided support to the environmental and engineering teams throughout the course of these activities.

Following the review of the Supplemental Alternatives Analysis (SAA) report by the Authority’s Board in February 2012, the outreach team has been conducting ongoing stakeholder coordination activities in support of the engineering and environmental teams to help further refine the proposed alignment alternatives and design options.

General public informational meetings were held in the project section in late September and early October 2015 as part of the refinement process to be included in an updated SAA. As shown in Table 1, these meetings were held in Edison, Tehachapi, Mojave, Rosamond, and Lancaster in an open house format. Public input from those meetings gathered through direct interaction with project staff, submittal of comment cards at the meetings, and subsequent feedback by electronic means, has since been used in consideration of a further refinement of alignments under development.

**Table 1: Bakersfield to Palmdale Public Information Meetings (September/October 2015)**

Meeting	Location	Date
Community of Edison	Edison Middle School (Gym) 721 S. Edison Road Bakersfield, CA 93307	Wednesday, September 30, 2015, 5:30 p.m. to 7:30 p.m.
Tehachapi	West Park Activity Center 410 West "D" Street Tehachapi, CA 93561	Thursday, October 1, 2015, 5:30 p.m. to 7:30 p.m.
Mojave	Mojave Elementary School (Gym and Auditorium) 15800 "O" Street Mojave, CA 93501	Monday, October 5, 2015, 5:30 p.m. to 7:30 p.m.
Rosamond	Wayside Chapel Community Church (Gym) 2584 Felsite Avenue Rosamond, CA 93560	Tuesday, October 6, 2015, 5:30 p.m. to 7:30 p.m.
Lancaster	University of Antelope Valley (Grand Ballroom) 44055 North Sierra Highway Lancaster, CA 93534	Wednesday, October 7, 2015, 5:30 p.m. to 7:30 p.m.

*Source: VMA Associates, Inc., December 2015*

The Authority has engaged in a proactive coordination effort with key project section stakeholders, including elected officials, local government agencies, impacted property owners and regional civic/business organizations. These stakeholders are listed below:

- City of Palmdale
- City of Lancaster
- Office of Assembly Member Fox
- Office of Supervisor Antonovich
- High Desert Corridor/Express West/AV Transit
- Steve Perez, Rosamond General Manager
- Antelope Valley Board of Trade Transportation Committee Leadership
- United States Air Force Plant 42
- Office of State Senator Steve Knight
- Antelope Valley Democratic Club
- Kern County Farm Bureau
- Kern County Separation Grade District
- Kern County Council of Governments (COG)
- Kern Transportation Foundation
- Office of Supervisor Zack Scrivner
- Kern County Planning
- California Black Chamber of Commerce Business and Economic Summit

- National Counter Terrorism Center
- Office of Kern County Supervisor Leticia Perez, 5th District
- Los Angeles Economic Development Council Jobs Defense Council
- Reginal Hispanic Chamber of Commerce
- Greater Bakersfield Chamber of Commerce
- Cal State University Bakersfield
- Office of Kern County Supervisor Mike Maggard, 3rd District

These efforts have been primarily focused on small group or one-on-one meetings with key stakeholder groups to support the efforts of the engineering and environmental team in the development of alignment alternatives that address stakeholder concerns while meeting the needs of the overall program.

As part of general outreach efforts to the community at-large, Authority representatives presented and participated in major conferences and workshops, as well as conducting outreach to Activity Centers including staffing booths and distributing project information at small business conferences and workshops, local fairs and community festivals throughout the project section.

## Options Considered

In September 2010, the Authority issued a Preliminary Alternatives Analysis (PAA) Report for the Bakersfield to Palmdale High-Speed Rail Section that introduced an initial range of project alternatives. In February 2012, a Supplemental Alternatives Analysis (SAA) Report was released that presented a refined Range of Alternatives for the Section based on new information obtained since the previous study. Since the 2012 SAA Report, the Authority has continued work to refine the alternatives by responding to stakeholder, agency, and public comments, performing additional engineering and environmental review, and by maintaining and ensuring consistency with Authority's design objectives. This additional work has been divided into two phases:

1. Work performed between the conclusion of the 2012 SAA and January 2014, resulting in an interim Draft SAA report dated January 2014.
2. Work performed since January 2014 resulting in continued refinements and adjustments to previous alignments due to new stakeholder, agency, environmental, and engineering input.

The 2010 PAA, 2012 SAA, and interim Draft 2014 SAA Reports, and additional input since those reports all identified and recommended a high-speed rail route between Bakersfield and Palmdale that generally followed existing transportation corridors, including Edison Highway, State Route (SR) 58 and Sierra Highway. While the route between Bakersfield and Palmdale had been established, numerous alignment options evolved along four key subsections of the route to address local concerns and issues in each subsection. New options are also being considered in Bakersfield, for which a Supplemental EIS to the Fresno to Bakersfield document is being prepared to address designs for an F Street Station alternative. Information from that EIS will be incorporated into the Bakersfield to Palmdale EIR/EIS as it may pertain to a common station area. Since none of the Bakersfield to Palmdale subsections overlap, all options for all subsections are compatible with each other. Each subsection is described as follows (Figure1):

- Edison Subsection: This subsection begins at Oswell Street and Edison Highway at the northern terminus of the section just outside the Bakersfield southeastern city limit. It then runs southeasterly along Edison Highway and, depending upon the alignment option, either remains along Edison Highway or transitions over to SR 58 before reaching the Edison Road Interchange. Between the Edison Road and Towerline Road interchanges, the High-Speed Rail alignment follows either SR 58 or Edison Highway to a point roughly 11 miles southeast of the project beginning (near the intersection of Bena Road and Edison Highway).



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PRELIMINARY DRAFT/SUBJECT TO CHANGE - HSR ALIGNMENT IS NOT DETERMINED  
 SOURCE: TYLin (2015); Esri (2015)

April 5, 2016



**Figure 1**

Overview Map of Alignment Subsections

- Keene Subsection: From the north, this subsection alignment begins climbing into the Tehachapi Mountains as the High-Speed Rail line crosses Caliente Creek. The alignment generally parallels the SR 58 freeway running approximately 1.4 miles to the north of the freeway, and following a straight southeast path through Tejon Ranch, climbs the mountain towards the City of Tehachapi. Approaching Bealville Road, the alignment converges toward SR 58 and passes through Cummings Ranch on an alignment approximately 0.50 mile north of SR 58. The 17-mile subsection continues to the north side of the Cesar Chavez Center and terminates at the Broome Road Interchange with SR 58.
- Tehachapi Subsection: The Tehachapi Subsection covers the portion of the High-Speed Rail alignment that traverses the highest portions of the Tehachapi Mountains, involving significant tunneling, and continues down into the Antelope Valley to end in the City of Lancaster over the course of 40 miles. It begins in the north at the Broome Road Interchange with SR 58, continues on an uphill climb to a point roughly 1.1 miles northwest of the new Tehachapi Hospital Site, begins to crest out its climbing in a tunnel through the Tehachapi Valley, and continues southerly down the south side of the Tehachapi Mountains into the Antelope Valley, terminating at the intersection of Avenue H and Sierra Highway in the City of Lancaster.
- Lancaster Subsection: Beginning at the terminus of the Tehachapi Subsection at Avenue H and Sierra Highway, this subsection then continues south adjacent to the Sierra Highway and Union Pacific Railroad (UPRR) right-of-way through the City of Lancaster. It then continues south along the same course into the City of Palmdale to a terminus at the intersection of Avenue O and the Sierra Highway. The total length of the Lancaster subsection is 7 miles.

## Edison Options Considered

The following Range of Alternatives for the Edison subsection was developed from the 2012 SAA, 2014 interim draft SAA, and continued 2015 studies (Figure 2). A summation of these options is shown in Table 2.

**2012 SAA Report:** This report made the following recommendations:

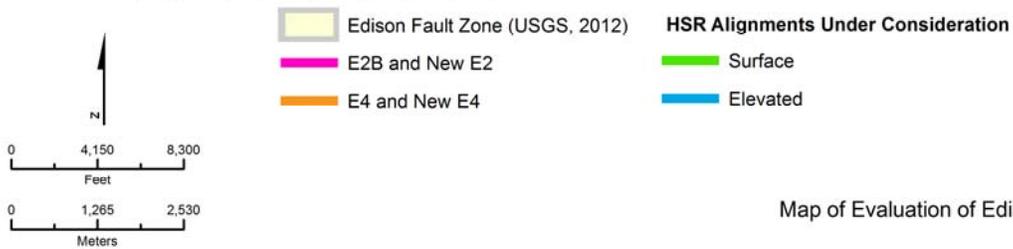
- Carry Forward Alternative E2B: E2B is an entirely elevated option running on viaduct for 11.2 miles. Beginning at Oswell Street, just outside the Bakersfield southeastern city limit, E2B runs down the south side of Edison Highway on a viaduct structure. The line begins converging toward SR 58 at SR 184/Weedpatch Highway/Morning Drive meeting SR 58 just north of the Edison Road interchange. It then parallels SR 58 on the north side until it diverges from the freeway alignment near Caliente Creek.
- Carry Forward Alternative New E2: This is primarily an at-grade modification of the E2B alignment adjacent to the north side of SR 58. It reduces the length of elevated structures from 11.2 to 3.3 miles, thereby reducing the construction costs significantly. In place of the elevated viaduct along SR 58, New E2 drops the profile down to a through-cut section that conflicts with 6 major roadway crossings along the alignment.
- Carry Forward Alternative E4: The E4 alignment is an entirely elevated option running on viaduct for 11.2 miles. Beginning at Oswell Street, just outside the Bakersfield southeastern city limit, E4 runs down the south side of Edison Highway on a viaduct structure for its entire length until it diverges from the highway near Caliente Creek.
- Carry Forward Alternative New E4: This is primarily an at-grade modification of the E4 alignment adjacent to the south side of the Edison Highway. It reduces the length of elevated structures from 11.2 to 4.8 miles, thereby reducing the construction costs significantly. In place of the elevated viaduct along SR 58, New E4 drops the profile down to a through-cut section that conflicts with 5 major roadway crossings, 5 grade separated UPRR crossings, and 4 at-grade UPRR crossings along the alignment.



FILE: Y:\HSR\_BPG\GIS\MapDocs\Presentation\SAAs\_2016\SAAs\2015\MemoMaps\_Edison.mxd (4/5/2016)

PRELIMINARY DRAFT/SUBJECT TO CHANGE - HSR ALIGNMENT IS NOT DETERMINED  
 SOURCE: USGS (2012); URS (2012, 2013); TYLin (2015); Esri (2015)

April 5, 2016



**Figure 2**

Map of Evaluation of Edison Options

**Table 2: Summary Evaluation of Edison Options**

Option	2012 SAA Recommendation	2014 Draft SAA Recommendation	2015 Recommendation	Reason for Refinement	Key Reasons for Carrying Forward	Key Reasons for Withdrawal
1	"E2B"	Carry Forward "E2B"	Withdraw "E2B"	N/A	N/A	<ul style="list-style-type: none"> <li>High costs with all viaduct contrary to High-Speed Rail objectives to provide an economically viable project</li> <li>Some portions of alignment remain parallel to fault zone contrary to Design Guidelines</li> <li>Close proximity to school and environmental justice communities</li> </ul>
2	"New E2"	Carry Forward "New E2"	Withdraw "New E2"	<ul style="list-style-type: none"> <li>Reduced viaducts and costs vs. E2B</li> </ul>	N/A	<ul style="list-style-type: none"> <li>Some portions of alignment remain parallel to fault zone contrary to Design Guidelines</li> <li>Close proximity to School and Environmental Justice communities</li> </ul>
3	"E4"	Withdraw "E4"	N/A	N/A	N/A	<ul style="list-style-type: none"> <li>High costs with all viaduct contrary to High-Speed Rail objectives to provide an economically viable project</li> <li>All structures in fault zone contrary to Design Guidelines</li> </ul>
4	"New E4"	Withdraw "New E4"	N/A	<ul style="list-style-type: none"> <li>Reduced viaducts and costs vs. E4</li> </ul>	N/A	<ul style="list-style-type: none"> <li>Some structures in fault zone contrary to Design Guidelines</li> <li>Strong objections from local business and schools</li> </ul>
5	N/A	N/A	Add "Edison Baseline"	<ul style="list-style-type: none"> <li>Reduce costs</li> <li>Minimize impacts to school and Environmental Justice communities</li> <li>Avoid fault zones</li> </ul>	<ul style="list-style-type: none"> <li>Improves overall combined transportation corridor with SR 58 in accordance to design objectives</li> <li>Provides a smaller project footprint</li> <li>Moves whole Transportation corridor further away from School and Environmental Justice communities</li> </ul>	N/A
6	N/A	N/A	Add "Edison A"	<ul style="list-style-type: none"> <li>Reduce costs</li> <li>Minimize impacts to schools and Environmental Justice communities</li> <li>Avoid fault zones</li> </ul>	<ul style="list-style-type: none"> <li>Moves High-Speed Rail further away from School and Environmental Justice communities</li> <li>Minimizes Impacts to SR 58</li> <li>Reduces Costs</li> </ul>	N/A
7	N/A	N/A	Withdraw "Edison A"	<ul style="list-style-type: none"> <li>Reduce costs</li> <li>Minimize impacts to school and potential Environmental Justice communities</li> <li>Avoid fault zones</li> </ul>	N/A	<ul style="list-style-type: none"> <li>Significant impacts to businesses along Edison highway</li> </ul>

N/A = Not Applicable  
SAA = Streambed Alteration Agreement  
SR = State Route

**2014 Interim Draft SAA:** This Draft SAA did not offer any new options in the Edison Subsection, but rather restudied the 4 options suggested in the 2012 SAA and made further recommendations based upon more recent input from stakeholders. The 2014 Interim Draft SAA was submitted as a Public Records Act request by the previous regional consultant, but was not presented to the Board or the public. The current regional consultant used the 2014 Interim Draft SAA as a starting point for subsequent analysis discussed below in the 2015 studies section. The recommendations from the 2014 Interim Draft SAA were:

- Carry Forward Alternative E2B: Adjacent to the north side of SR 58, elevated profile.
- Carry Forward Alternative New E2: Adjacent to the north side of SR 58, at-grade profile.
- Withdraw Alternative E4: Due to additional geotechnical research, it was determined that there was a seismic fault along Edison Highway adjacent to alignment E4. Since E4 was entirely on elevated structures, it was determined that the Authority's design guideline for keeping High-Speed Rail structures out of fault zones was not being met. E4 was, therefore, proposed to be withdrawn.
- Withdraw New E4: Even though E4 was proposed to be withdrawn due to structures being in fault zones, New E4 proposed to put a significant portion of the alignment at-grade. However, the at-grade portions of the alignment imposed a significantly larger footprint and thereby generated significant impacts to the businesses and civic institutions in Edison. Specifically, New E4 directly impacted several packing and shipping facilities, the Edison Middle School schoolyard, and other impacts to the Edison Fire Station and Post Office. Because of these impacts, the Edison school and local businesses strongly objected to this alignment. New E4 was, therefore, proposed to be withdrawn.

**2015 Studies:** The Authority has continued looking at new options or refining existing options already proposed in previous studies. The refinements have been developed as a result of further research, engineering and environmental study of the project area, and additional public, stakeholder and agency feedback. Based upon this additional input, the 2015 analysis recommends the following additional options:

- Edison Baseline: Beginning at Oswell Street, just outside the Bakersfield southeastern city limit, the Baseline alignment runs down the center of Edison Highway on a viaduct. Although all previous alignments proposed a route that went down the south side of Edison Highway, this old route introduced significant impacts to the businesses along Edison Highway. Further discussion with Authority staff and local stakeholders introduced the concept to put an elevated alignment down the Edison Highway Right-of-way rather than along the private properties on the south. This idea maintained compliance with the project Purpose and Need, Authority design standards, and was encouraged by the local community. This refinement was, therefore, included because it minimizes impacts to businesses along the south side of Edison Highway as compared to previous alignments.

The alignment then begins converging toward SR 58 at SR 184/Weedpatch Highway/Morning Drive. Once clear of the Edison Highway right-of-way, the High-Speed Rail profile descends and transitions from viaduct to elevated embankment and then to a shallow cut section. The High-Speed Rail line meets SR 58 at Edison Road, at which point the freeway would be relocated to the south allowing the High-Speed Rail line to run on the existing SR 58 alignment and along the north side of the relocated freeway section. This refinement moves the High-Speed Rail tracks 100 feet further away from Edison Middle School than the 2012 alternatives and moves freeway traffic further from the school, which should result in improved air quality and decreased noise impacts at the school. It also consolidates the SR 58 transportation corridor and provides a smaller combined transportation corridor footprint, reducing impacts to nearby agricultural properties. Moving the alignment to the south also keeps the High-Speed Rail further away from the existing fault zones paralleling SR 58.

The High-Speed Rail line would proceed eastward along the existing freeway alignment to Towerline Road, where the relocated freeway would tie back into existing SR 58 as it curves

away from Edison Highway. The High-Speed Rail line would continue parallel to Edison Highway toward Caliente Creek.

- Edison Option A: This option varies from the baseline option between Edison Road and Towerline Road, where the High-Speed Rail line would run along the south side of existing SR 58 on an elevated embankment. This would allow SR 58 to remain on its current alignment without relocation but would require an elevated structure spanning diagonally over the SR 58/Edison Road interchange. A second elevated structure crossing back over SR 58 would be required just past Towerline Road. This option moves the High-Speed Rail tracks 240 feet further away from Edison Middle School, which will reduce any High-Speed Rail noise and vibration impacts to the school. It also places the High-Speed Rail alignment further away from the existing fault zone.
- Edison Option B: In order to avoid the long diagonal elevated viaduct proposed in Option A above, this option proposes transitioning toward SR 58 earlier at Fairfax Road rather than SR 184/Weedpatch Highway/Morning Drive. The alignment would span over the existing SR 58 freeway at Vineland Road on an elevated structure. Similar to Option A, the High-Speed Rail line would then run along the south side of existing SR 58 on an elevated embankment and cross back over SR 58 on an elevated structure just past Towerline Road.

## Summary and Recommendation

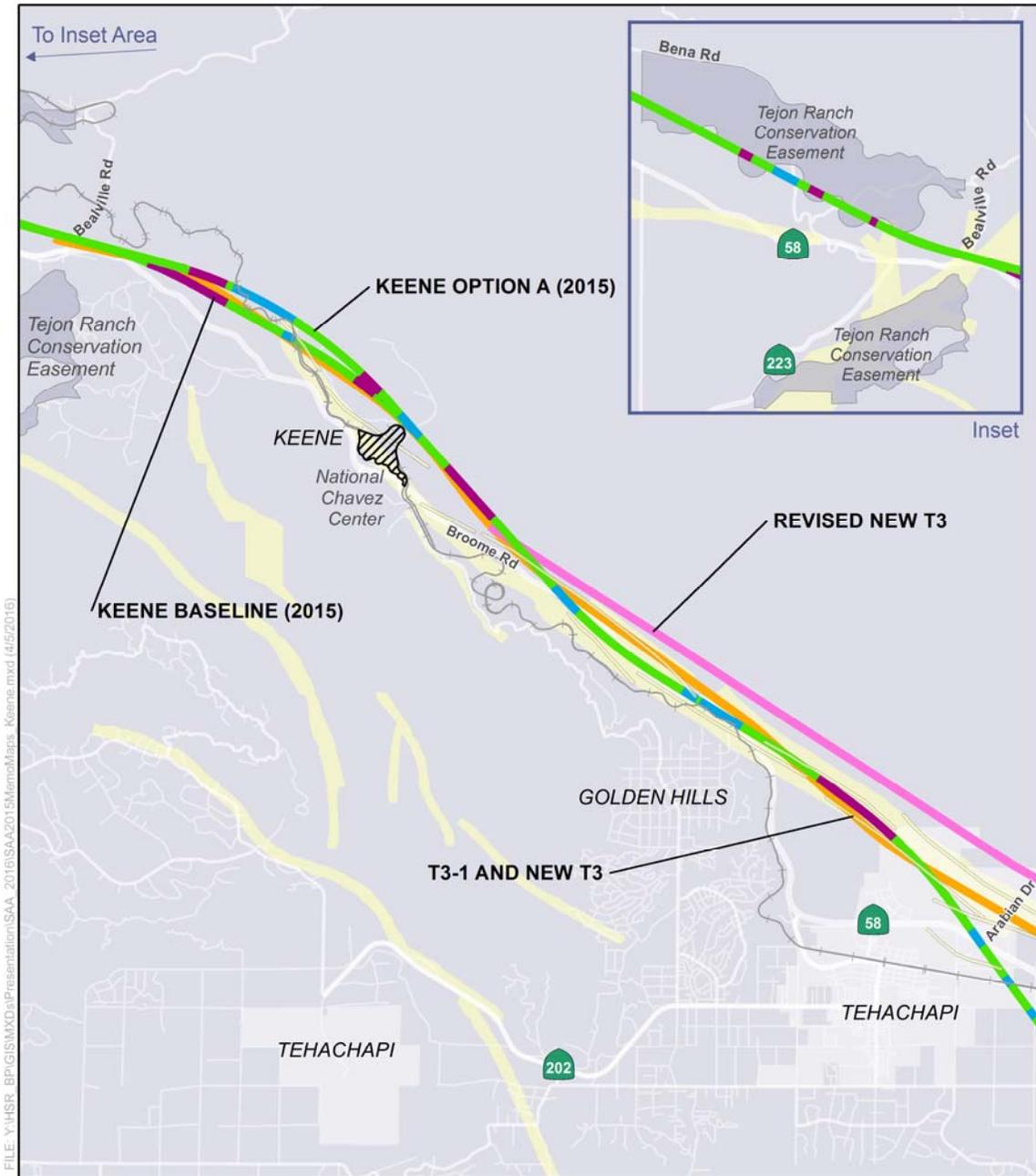
The above seven options were compiled and evaluated as shown in Table 2. Due to the continued research and public outreach performed by the Authority since 2012, numerous new issues have been identified in the areas of geotechnical seismic zones, local business concerns, school district concerns, conformance to design guidelines, and proximity to Environmental Justice Communities. Out of the seven options analyzed, two options (Edison Baseline and Edison A) clearly demonstrate an ability to address these newer issues to a much higher degree than the other five options and are hereby recommended to proceed forward in the future SAA (Table 2).

## Keene Options Considered

The following Range of Alternatives for the Keene subsection was developed from the 2012 SAA, 2014 interim draft SAA, and continued 2015 studies (Figure 3). A summation of these options is shown in Table 3.

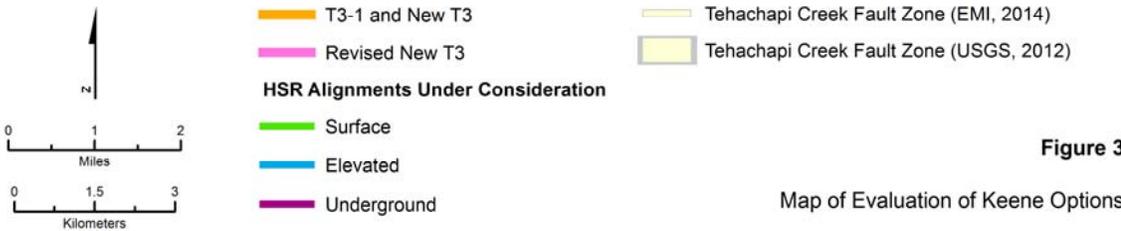
**2012 SAA Report:** This report made the following recommendations:

- Carry forward Alternative T3-1: Leaving Edison, T3-1 diverges from SR 58 and begins climbing into the Tehachapi Mountains as the High-Speed Rail line crosses Caliente Creek. T3-1 generally parallels SR 58 running approximately 0.7 miles to the north of the freeway through Tejon Ranch. Approaching Bealville Road, T3-1 converges toward SR 58 and passes through Cummings Ranch on an alignment approximately 0.3 mile north of SR 58. Approximately 1.7 miles north of Keene, the alignment crosses the UPRR and continues southeast to a point roughly 300 feet northeast of the existing UPRR curve around the Cesar Chavez Center in Keene. Approaching the end of the subsection at Broome road, the alignment converges back towards SR 58. From Caliente Creek, T3-1 ascends to Broome Road at sustained grades ranging between 2.5 percent to 2.72 percent.
- Carry forward Alternative New T3: This is primarily an identical horizontal alignment as T3-1 for this subsection. It differs from T3-1 in profile by attempting to follow the natural terrain more closely to reduce viaduct and tunnel lengths. The vertical profile, therefore, ends up more undular to fit the natural terrain with resultant grades varying from 0.63 percent to sustained grades of 3.3 percent.



FILE: Y:\HSR\_BP\GIS\MapXDs\Presentation\ISAA\_2016\ISAA2015\MemoMaps\_Keene.mxd (4/5/2016)

PRELIMINARY DRAFT/SUBJECT TO CHANGE - HSR ALIGNMENT IS NOT DETERMINED  
 SOURCE: USGS (2012); URS (2012, 2013); EMI (2014); TYLin (2015); Esri (2015) April 5, 2016



**Figure 3**  
 Map of Evaluation of Keene Options

**Table 3: Detailed Evaluation of Keene Options**

Option	2012 SAA Recommendation	2014 Draft SAA Recommendation	2015 Recommendation	Reason for Refinement	Key Reasons for Carrying Forward	Key Reasons for Withdrawal
1	T3-1	Withdraw "T3-1"	N/A	N/A	N/A	<ul style="list-style-type: none"> <li>Some structures are in the Tehachapi Creek Fault Zone contrary to Design Guidelines</li> <li>The alignment bisects a portion of the Tejon Ranch Conservancy property</li> </ul>
2	New T3	Withdraw "New T3"	N/A	<ul style="list-style-type: none"> <li>Reduced viaducts and tunnel costs vs.T3-1</li> </ul>	N/A	<ul style="list-style-type: none"> <li>Some structures are in the Tehachapi Creek Fault Zone contrary to Design Guidelines</li> <li>The alignment bisects a portion of the Tejon Ranch Conservancy property</li> <li>The vertical profile grades exceeds the recommended 2.8%</li> </ul>
3	T3-2	Withdraw "T3-2"	N/A	N/A	N/A	<ul style="list-style-type: none"> <li>Some structures are in the Tehachapi Creek Fault Zone contrary to Design Guidelines</li> </ul>
4	N/A	Add "Revised New T3"	Withdraw "Revised New T3"	<ul style="list-style-type: none"> <li>Refine location of alignment to avoid the Tehachapi Creek Fault as defined in the 2014 geotechnical studies.</li> <li>Reduce tunnel lengths and costs by increasing vertical profile grade vs. New T3</li> </ul>	N/A	<ul style="list-style-type: none"> <li>The fault zone that the alignment was based on has since been revised significantly affecting the potential locations for alignments</li> <li>Increases tunnel lengths and costs based upon horizontal location of alignment</li> <li>The vertical profile grades exceeds the recommended 2.8%</li> </ul>
5	N/A	N/A	Add "Keene Baseline"	<ul style="list-style-type: none"> <li>Reduce tunnel lengths, costs, and project footprint</li> <li>Optimize alignment through the Tehachapi Creek Fault as defined in the revised 2015 geotechnical studies</li> <li>Shorten and straighten the alignment</li> <li>Minimize impacts to the Tejon Ranch Conservancy</li> </ul>	<ul style="list-style-type: none"> <li>Alignment does not propose any structures in seismic fault zones in compliance to Design Guidelines</li> <li>Alignment utilizes maximum optimal vertical grade of 2.8% which provides a balanced approach between economy, constraints, and overall project footprint</li> <li>Shorter and straighter alignment through Tejon Ranch reduces costs and travel time</li> <li>Reduce impacts to the Tejon Ranch Conservancy by being closer to the existing Conservancy boundary line</li> <li>Reduce tunnel lengths, costs, and project footprint by moving starting point for the climb up the Tehachapi Mountains closer to Edison</li> </ul>	N/A
6	N/A	N/A	Withdraw "Keene A"	<ul style="list-style-type: none"> <li>Reduce tunnel lengths</li> </ul>		<ul style="list-style-type: none"> <li>Creates costly viaducts exceeding 250 feet high</li> <li>Tunnel to viaduct length exceeds Authority Guidelines</li> <li>Tunnel portal and bridge abutments over UPRR may be infeasible to construct</li> <li>Difficult or infeasible to provide access road to tunnel portal</li> <li>Alignment location less desirable to Cummings Ranch owner</li> </ul>

N/A = Not Applicable  
 UPRR = Union Pacific Railroad

- Carry forward and refine Alternative T3-2: T3-2 varies from the T3-1 alignment between Caliente Creek and Bealville Road where it cuts the corner paralleling SR 58 approximately 1.2 miles to the northeast. This divergence from the T3-1 alignment provides 3 key advantages over the T3-1 alignment: 1) the alignment is roughly 400 feet shorter; 2) it more closely follows the existing Tejon Ranch Conservancy boundary avoiding the previous bisecting of conservancy lands; and 3) it follows the natural terrain in a location that allows the climb up the Tehachapi Mountains to start at a point closer to Edison, resulting in flatter climbing grades up the mountain. The profile for T3-2 ascends from Caliente Creek to Broome Road at a sustained grade of 2.49 percent.

The 2012 SAA recommended a refinement to this alternative to lower the vertical profile in an attempt to reduce viaduct heights, lengths, and project costs.

**2014 Interim Draft SAA:** Since the work performed on the 2012 SAA Report, continued geotechnical studies in the area identified potential conflicts with a relatively inactive seismic fault (the Tehachapi Creek Fault) that very closely paralleled the proposed 2012 alignment alternatives. Since there was not very much information available on this fault, a very broad corridor was assumed to be at risk in the general area of the fault. In light of this geotechnical discovery, the following recommendations were proposed. The 2014 Interim Draft SAA was submitted as a Public Records Act request by the previous regional consultant, but was not presented to the Board or the public. The current regional consultant used the 2014 Interim Draft SAA as a starting point for subsequent analysis discussed below in the 2015 studies section. The recommendations from the 2014 Interim Draft SAA were:

- Withdraw Alternative T3-1: Due to the longitudinal encroachment into the newly defined fault corridor by T3-1, it was determined that the Authority's design guideline for keeping High-Speed Rail structures out of fault zones was not being met. T3-1 was, therefore, proposed to be withdrawn.
- Withdraw Alternative New T3: Due to the longitudinal encroachment into the newly defined fault corridor by New T3, it was determined that the Authority's design guideline for keeping High-Speed Rail structures out of fault zones was not being met. New T3 was, therefore, proposed to be withdrawn.
- Withdraw Alternative T3-2: Due to the longitudinal encroachment into the newly defined fault corridor by T3-2, it was determined that the Authority's design guideline for keeping High-Speed Rail structures out of fault zones was not being met. T3-2 was, therefore, proposed to be withdrawn.
- Add and Carry Forward Revised New T3: The Revised New T3 alignment was prepared primarily to avoid the Tehachapi Creek Fault Corridor. Through this subsection, this refined alignment split the 2012 alternatives into two key areas north and south of Bealville Road. The northern area utilized the horizontal alignments of T3-1 and T3-2 and suggested using either alignment. The southern area relocated the T3-1 alignment roughly 900 feet to the northeast skirting the Tehachapi Creek Fault Corridor on the northeast side. An effort was also made to reduce the length of tunnels by increasing the grades climbing the mountain towards Tehachapi. The profile ascends from Caliente Creek to Broome Road at a sustained grade of 3.5 percent.

**2015 Current Analysis and Refinements:** The Authority has continued looking at new options or refining existing options already proposed in previous studies. The refinements have been developed as a result of further research, engineering and environmental study of the project area, and additional public, stakeholder and agency feedback.

The 2012 and 2014 studies all suggested steeper vertical profile grades to help reduce the number and length of tunnels, meet the constraints of crossing seismic faults at-grade, reduce overall project costs, and reduce the project environmental footprint. These steeper vertical profile grades exceed the Authorities Design Guidelines for High-Speed Rail and could possibly introduce impacts to operating costs, maximum train speed, and route travel time. A more detailed study was, therefore, prepared to identify a more preferred balance between cost

effectiveness, long-term maintenance, and travel time for this particular climb over the Tehachapi Mountains. Profile grades ranging from 2.5 percent to 3.5 percent were evaluated to quantify the earthwork, lengths of tunnels, and lengths of viaducts for each grade. Numerous meetings between High-Speed Rail operations, engineering and environmental team members were held to review and discuss each grade option and determine the maximum grade, which proposed the best balance between all of these constraints and issues. The consensus of these meetings yielded a maximum vertical profile grade of 2.8 percent for this section of High-Speed Rail.

In addition to the above studies, further geotechnical studies were performed on the Tehachapi Creek Fault Corridor to more narrowly define the likely fault zone location, and evaluate the potential for related seismic hazards including landslides. The initial review was conducted using the existing aerial photographs (1-foot pixel aerial images by USGS), previous geologic mapping, groundwater studies, and regional topographic mapping. No field studies were conducted for this review. The area of concern begins approximately 2.3 miles northwest of Keene and extends southeasterly approximately 15 miles along and to the north of the Hwy 58/UPRR corridor. Maps were compiled using 1-foot contour LIDAR information combined with the aerial photography. New fault locations were then mapped with 100-foot buffers on each side of the defined fault line. Although it was determined that the fault is not a hazardous fault, the photographic analysis and review of existing data could not determine if it is an inactive fault according to Authority Guidelines.

Based upon these meetings and the additional input mentioned above, the 2015 analysis recommends the following additional options:

- Keene Baseline: From Edison to Bealville Road, the Keene Baseline alignment follows the T3-2 alignment. This alignment was selected because it is 400 feet shorter, it more closely follows the existing Tejon Ranch Conservancy boundary avoiding the previous bisecting of conservancy lands, and it follows the natural terrain in a location that allows the climb up the Tehachapi Mountains to start at a point closer to Edison, resulting in flatter climbing grades up the mountain.

From Bealville Road to Broome Road, the alignment closely follows the horizontal alignment of T3-1 with minor refinements to weave between the 2015 newly defined Tehachapi Creek fault locations. This horizontal location was preferred as it avoided the longer tunnels proposed in the 2014 Revised New T3 alignment that was shifted northeasterly to avoid the previously wider definition of the Tehachapi Creek Fault Corridor.

The new Keene Baseline alternative uses the optimal 2.8 percent maximum vertical profile grade discussed with the Authority to provide the best balance between economy and impacts as the Tehachapi Mountains are climbed by the High-Speed Rail.

- Keene Option A: The Keene Option A was developed in an effort to reduce the tunnel length between Bealville Road and Broome Road. The alignment swings to the northeast a maximum of 0.2 miles from the Keene Baseline Alignment at its widest separation, thereby avoiding some of the deeper cuts and longer tunnels. While this tunnel reduction objective was achieved, this newer alignment developed the following additional impacts when compared to the Baseline Alignment: (1) a very long and very high viaduct was created (roughly 275 feet high) adding additional cost and potential constructability issues; (2) the terrain in this new location dictated that the tunnel portal to viaduct distance be reduced to a point where it does not comply with current Authority Design Guidelines; (3) the tunnel portal to viaduct connection occurs at a point immediately on top of the existing UPRR tracks posing the issue that the site may not be constructible; (4) the tunnel portal to viaduct connection occurs at a point where the steepness of the existing terrain makes the construction of an access road very difficult or unfeasible; and (5) the new location traverses the Cummings Ranch in a location that is less desirable to the landowner.

Keene Option A also uses the optimal 2.8 percent maximum vertical profile grade discussed with the Authority to provide the best balance between economy and impacts as the Tehachapi Mountains are climbed by the High-Speed Rail.

The above six options were compiled and evaluated as shown in Table 3. Due to the continued research and public outreach performed by the Authority since 2012 and 2014, numerous clarifications have been identified in the areas of geotechnical seismic zones, maximum vertical profile grade, local landowner concerns, and conformance to design guidelines that have had significant influences on the alignments in this subsection. Out of the six options analyzed, one option (Keene Baseline) clearly demonstrates an ability to address these newer issues and clarifications to a much higher degree than the other five options and is hereby recommended to proceed forward in the future SAA (Table 3).

## Tehachapi Options Considered

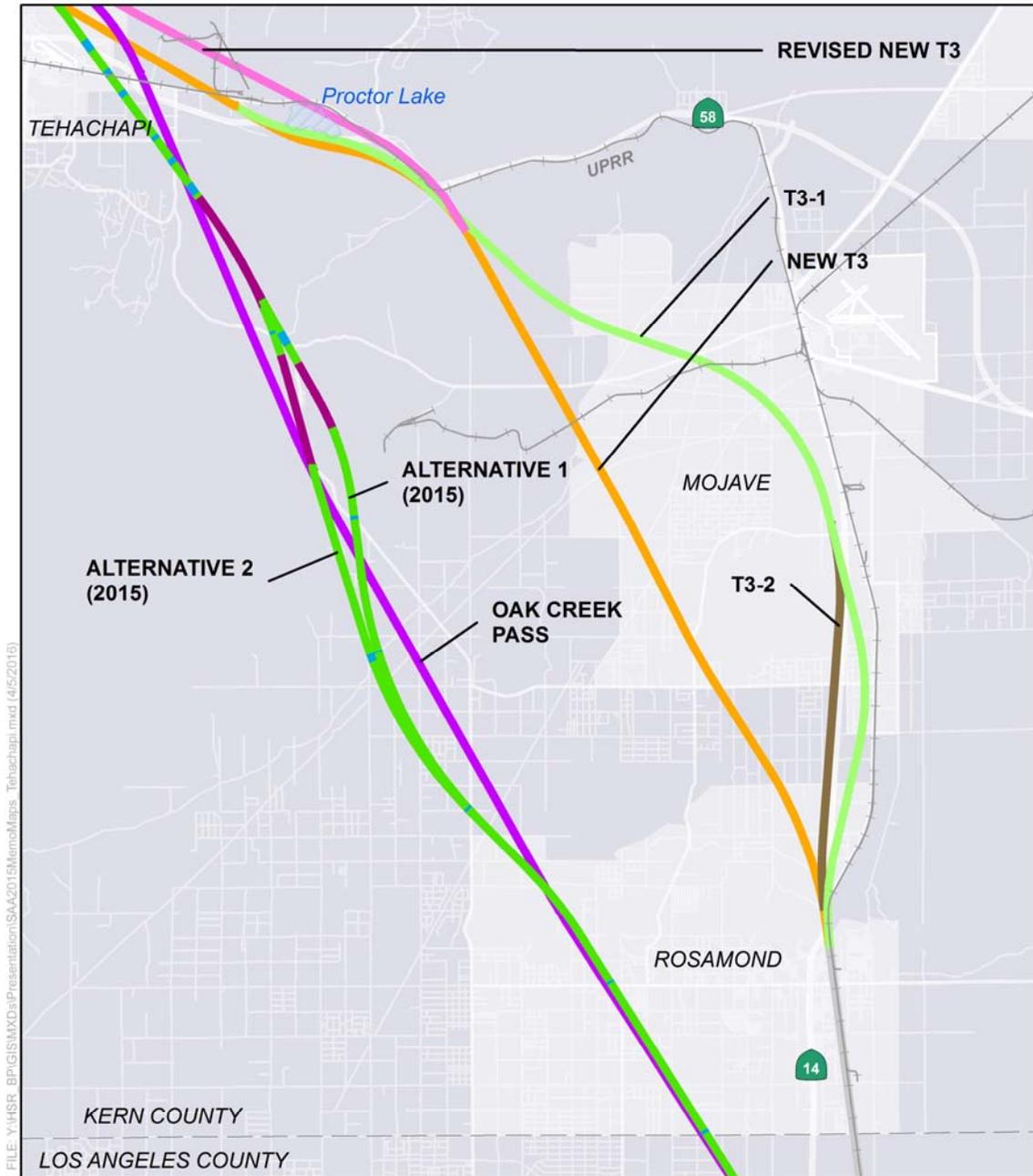
The following Range of Alternatives for the Tehachapi subsection was developed from the 2012 SAA, 2014 interim draft SAA, and continued 2015 studies (Figure 4). A summation of these options is shown in Table 4.

**2012 SAA Report:** This report made the following recommendations:

- Carry forward Alternative T3-1: Leaving the Keene Subsection at Broome Road, T3-1 runs southeast along SR 58 at varying distances ranging 0.1 to 0.3 miles to the northeast side. It then diverges from SR 58 and heads into the City of Tehachapi roughly 0.5 miles northeast of the new hospital site. After traversing the northeastern mountainous portion of the incorporated City, T3-1 continues southeast towards Proctor Lake, where it crosses over to the south side of SR 58. It then runs southeast to a point where it crosses Cameron Canyon Road roughly 0.2 miles south of SR 58. Then leaving the SR 58 corridor, it continues southeast crossing the Garlock Fault and adjacent mountain range into the Antelope Valley where it crosses the southwest corner of the incorporated City of Mojave. T3-1 continues southeast until it converges on the SR 14 corridor near the community of Rosamond, where it splits from SR 14 and follows the Sierra highway and UPRR tracks southerly into the City of Lancaster at Avenue H. From Broome Road, T3-1 ascends at a 2.8 percent grade to Tehachapi, flattens out to an almost flat grade through the Tehachapi Valley, and then descends into the Antelope Valley with grades varying between 2.3 percent to 3.2 percent.
- Carry forward Alternative New T3: This is primarily an identical horizontal alignment as T3-1 for this subsection except that it avoids Proctor Lake and the City of Mojave. This divergence from T3-1 begins near the Monroe High School in Tehachapi, swings south of Proctor Lake, and then crosses Cameron Canyon Road 0.2 miles south of SR 58. New T3 then diverges southerly from T3-1 taking a direct path towards a convergent point with the SR 14 corridor on the north side of the community of Rosamond. It then joins back into T3-1 following the Sierra Highway/UPRR corridor south into Lancaster. From Broome Road, New T3 ascends at a 3.3 percent grade to Tehachapi, flattens out to an almost flat grade through the Tehachapi Valley, and then descends into the Antelope Valley with grades varying between 1.5 percent and 2.6 percent.
- Carry forward and refine Alternative T3-2: T3-2 does not vary horizontally from the T3-1 alignment in this subsection. From Broome Road T3-2 ascends at a 2.49 percent grade to Tehachapi, flattens out to an almost flat grade through the Tehachapi Valley, and then descends into the Antelope Valley with varying grades between 2.3 percent to 3.2 percent.

The 2012 SAA recommended a refinement to this alternative to lower the vertical profile in an attempt to reduce viaduct heights, lengths, and project costs.

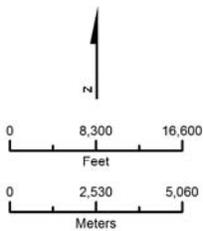
**2014 Interim Draft SAA:** Since the work performed on the 2012 SAA Report, continued geotechnical studies in the area identified potential conflicts with a relatively inactive seismic fault (the Tehachapi Creek Fault) that very closely paralleled the proposed 2012 alignment alternatives. Since there was not very much information available on this fault, a very broad corridor was assumed to be at risk in the general area of the fault. In light of this geotechnical discovery, the following recommendations were proposed. The 2014 Interim Draft SAA was submitted as a Public Records Act request by the previous regional consultant, but was not presented to the Board or the public. The current regional consultant used the 2014 Interim Draft



FILE: Y:\HSR\_BPG\GIS\MapXds\Presentation\ISAA\2015\Memo\Maps\_Tehachapi.mxd (4/5/2016)

PRELIMINARY DRAFT/SUBJECT TO CHANGE - HSR ALIGNMENT IS NOT DETERMINED  
 SOURCE: URS (2012, 2013); TYLin (2015); Esri (2015)

April 5, 2016



- |  |  |
|--|--|
| <span style="color: lightgreen;">—</span> T3-1       | <b>HSR Alignments Under Consideration</b>          |
| <span style="color: brown;">—</span> T3-2            | <span style="color: purple;">—</span> Underground  |
| <span style="color: orange;">—</span> New T3         | <span style="color: lightgreen;">—</span> At-Grade |
| <span style="color: pink;">—</span> Revised New T3   | <span style="color: blue;">—</span> Elevated       |
| <span style="color: purple;">—</span> Oak Creek Pass |  |

**Figure 4**

Map of Evaluation of Tehachapi Options

**Table 4: Detailed Evaluation of Tehachapi Options**

Option	2012 SAA Recommendation	2014 Draft SAA Recommendation	2015 Recommendation	Reason for Refinement	Key Reasons for Carrying Forward	Key Reasons for Withdrawal
1	Carry Forward "T3-1"	Withdraw "T3-1"	Alignment Previously Withdrawn	N/A	N/A	<ul style="list-style-type: none"> <li>Some structures are in the Tehachapi Creek Fault Zone contrary to Design Guidelines</li> <li>The alignment runs through Proctor Lake</li> <li>The alignment goes through Mojave Airport planning and FAA areas</li> </ul>
2	Add "New T3"	Withdraw "New T3"	Alignment Previously Withdrawn	Refine the 2010 AA T3-1 and T3-2 alignments to: <ul style="list-style-type: none"> <li>Reduce Costs by increasing vertical profile grade</li> <li>Avoid Impacting Proctor Lake</li> <li>Avoid potential land use and FAA restrictions by the Mojave Airport</li> <li>Shorten the overall alignment length</li> </ul>	N/A	<ul style="list-style-type: none"> <li>Some structures are in the Tehachapi Creek Fault Zone contrary to Design Guidelines</li> <li>The vertical profile grades exceeds the optimal 2.8%</li> </ul>
3	Carry Forward "T3-2"	Withdraw "T3-2"	Alignment Previously Withdrawn	N/A	N/A	<ul style="list-style-type: none"> <li>Some structures are in the Tehachapi Creek Fault Zone contrary to Design Guidelines</li> <li>The alignment runs through Proctor Lake</li> <li>The alignment goes through Mojave Airport planning and FAA areas</li> </ul>
4	N/A	Add "Revised New T3"	Withdraw "Revised New T3"	Refine the 2012 SAA "New T3" alignment to: <ul style="list-style-type: none"> <li>Avoid the Tehachapi Creek Fault as defined in the 2014 geotechnical studies.</li> </ul>	N/A	<ul style="list-style-type: none"> <li>The fault zone that the alignment was based on has since been revised significantly affecting the potential locations for alignments</li> <li>Increases tunnel lengths and costs based upon horizontal location of alignment due to fault avoidance</li> <li>The vertical profile grades exceeds the optimal 2.8% grade</li> <li>Wind Turbine impacts are high (85 impacted turbines)</li> </ul>
5	N/A	Add "Oak Creek Pass"	Withdraw "Oak Creek Pass"	Refine the 2012 SAA alignments to: <ul style="list-style-type: none"> <li>Minimize wind turbine impacts</li> <li>Reduce Costs by increasing vertical profile grade</li> <li>Shorten the overall alignment length</li> </ul>	N/A	<ul style="list-style-type: none"> <li>The fault zone that the alignment was based on has since been revised significantly affecting the potential locations for alignments</li> <li>Increases tunnel lengths and costs based upon horizontal location of alignment due to fault avoidance</li> <li>The vertical profile grades exceeds the optimal 2.8%</li> <li>Wind Turbine Impacts are still high as compared to new Alternatives 1 and 2 ( 26 impacts vs 10)</li> </ul>
6	N/A	N/A	Add "Alternative 1"	<ul style="list-style-type: none"> <li>Refine the 2014 Draft SAA "Oak Creek" alignment to:</li> <li>Minimize Wind Turbine Impacts</li> <li>Reduce costs and project footprint by utilizing optimal vertical profile grade</li> <li>Avoid the Tehachapi Creek Fault as defined in the revised 2015 geotechnical studies</li> <li>Shorten the overall alignment length</li> </ul>	<ul style="list-style-type: none"> <li>Minimal wind Turbine impacts</li> <li>Reduced tunnel lengths, costs, and footprint</li> <li>No structures in seismic fault zones in compliance to Design Guidelines</li> <li>Alignment utilizes maximum optimal vertical grade which provides a balanced approach between economy, constraints, and overall project footprint</li> <li>Shorter and straighter alignment that reduces costs</li> </ul>	N/A
7	N/A	N/A	Add "Alternative 2"	<ul style="list-style-type: none"> <li>Refine the 2014 Draft SAA "Oak Creek" alignment to:</li> <li>Minimize Wind Turbine Impacts</li> <li>Reduce costs and project footprint by utilizing optimal vertical profile grade</li> <li>Avoid the Tehachapi Creek Fault as defined in the revised 2015 geotechnical studies</li> <li>Shorten the overall alignment length</li> <li>Seek a High-Speed Rail corridor closer to Tehachapi-Willow Springs Road</li> </ul>	<ul style="list-style-type: none"> <li>Minimal wind Turbine impacts</li> <li>Reduced tunnel lengths, costs, and project footprint</li> <li>Alignment does not propose any structures in seismic fault zones in compliance to Design Guidelines</li> <li>Alignment utilizes maximum optimal vertical grade which provides a balanced approach between economy, constraints, and overall project footprint</li> <li>Shorter and straighter alignment that reduces costs</li> <li>High-Speed Rail corridor closer to Tehachapi-Willow Springs Road</li> </ul>	N/A

AA = Alternatives Analysis  
 FAA = Federal Aviation Administration  
 N/A = Not Applicable  
 SAA = Streambed Alteration Agreement

SAA as a starting point for subsequent analysis discussed below in the 2015 studies section. The recommendations from the 2014 Interim Draft SAA were:

- Withdraw Alternative T3-1: Due to the longitudinal encroachment into the 2014 defined fault corridor by T3-1, it was determined that the Authority's design guideline for keeping High-Speed Rail structures out of fault zones was not being met. T3-1 was, therefore, proposed to be withdrawn.
- Withdraw Alternative New T3: Due to the longitudinal encroachment into the 2014 defined fault corridor by New T3, it was determined that the Authority's design guideline for keeping High-Speed Rail structures out of fault zones was not being met. New T3 was, therefore, proposed to be withdrawn.
- Withdraw Alternative T3-2: Due to the longitudinal encroachment into the 2014 defined fault corridor by T3-2, it was determined that the Authority's design guideline for keeping High-Speed Rail structures out of fault zones was not being met. T3-2 was, therefore, proposed to be withdrawn.
- Add and Carry Forward Revised New T3: The Revised New T3 alignment was prepared primarily to avoid the Tehachapi Creek Fault Corridor. Through this subsection, this refined alignment split the 2012 alternatives into two key areas north and south of Bealville Road. The northern area utilized the horizontal alignments of T3-1 and T3-2 and suggested using either alignment. The southern area relocated the New T3 alignment roughly 900 feet to the northeast skirting the 2014 defined Tehachapi Creek Fault Corridor on the northeast side. An effort was also made to reduce the length of tunnels by increasing the grades climbing the mountain towards Tehachapi. From Broome Road Revised New T3 ascends at a 3.5 percent grade to Tehachapi, flattens out to an almost flat grade through the Tehachapi Valley, and then descends into the Antelope Valley with a grade of 3.5 percent.
- Add and Carry Forward Oak Creek Pass Alternative: The Oak Creek Pass alignment was primarily developed to address two key issues:
  - Kern County's concern regarding the amount of wind turbines affected by the alignments – The Revised New T3 alignment impacted approximately 85 wind turbines. The Oak Creek Pass alignment reduced the impacts to roughly 26 wind turbines.
  - Environmental Justice impacts in Rosamond along the Sierra Highway – The Oak Creek Pass alignment bypassed the Environmental Justice areas along the Sierra Highway moving the alignment west into lower density areas of the City. This movement to the west actually shortened the overall alignment length by roughly 2 miles, thereby providing a cost savings and reduction in travel time.

This alignment is the same as the Revised New T3 on the north, but begins to diverge to the south adjacent to the new Tehachapi Hospital. It continues southeast to a crossing with both East Tehachapi Boulevard and SR 58, roughly 0.1 mile east of the existing intersection of these two roadways. From this point, the alignment runs southeast traversing CalPortland Cement Properties and the Garlock Fault in a similar corridor with Tehachapi-Willow Springs Road. It then continues southeast to the northeast corner of the Willow Springs Raceway and beyond to an intersection with SR 14 roughly 0.4 mile south of West Avenue D. Here, the alignment begins a southerly curve to tie into the Sierra Highway and UPRR corridors at Avenue H on the north end of Lancaster.

Similar to Revised New T3, an effort was also made to reduce the length of tunnels by increasing the grades climbing the mountain towards Tehachapi and descending into the Antelope Valley. From Broome Road, the Oak Creek Pass Alternative ascends at a 3.5 percent grade to Tehachapi, flattens out to an almost flat grade through the Tehachapi Valley, and then descends into the Antelope Valley with a grade of 3.5 percent.

**2015 Studies:** The Authority has continued looking at new options or refining existing options already proposed in previous studies. The refinements have been developed as a result of further

research, engineering and environmental study of the project area, and additional public, stakeholder and agency feedback.

As stated previously, the 2015 studies included additional analysis and research on the geotechnical issues of the Tehachapi Creek Fault to better define its extent and movement characteristics, and the development of the optimum 2.8 percent grade for climbing and descending the Tehachapi Mountains. For this subsection, the 2015 studies additionally addressed the Kern County concerns regarding the numbers of wind turbines being impacted by the project. The 2014 Interim Draft SAA Report introduced the Oak Creek Pass alignment, which significantly reduced the numbers of wind turbines being impacted from 85 to 26. It also straightened the alignment reducing its overall length, costs, and travel time. The 2015 studies continued on the same approach and refined the Oak Creek Pass alternative into two newer alternatives that further reduced the number of wind turbine impacts from 26 down to 10. The 2015 studies, therefore, introduce two alignment refinements (very similar to the Oak Creek Alignment) that are based upon these three criteria:

1. Take advantage of the redefined Tehachapi Creek Fault zone to refine the alignment through flatter terrain while still missing the fault.
2. Use a maximum vertical profile grade of 2.8 percent grade to optimize the climb and descent of the Tehachapi Mountains.
3. Select a path through the Wind Farm areas that minimizes the impacts to wind turbines.

Based upon these criteria, the 2015 analysis recommends the following additional options:

- Alternative 1: Leaving the Keene Subsection at Broome Road, Alternative 1 runs southeast along SR 58 at varying distances ranging 0.1 to 0.3 mile to the northeast side. Proceeding southeast toward the City of Tehachapi, Alternative 1 converges with SR 58 and crosses to the south side on a viaduct just southeast of the Broome Road interchange. It then passes back and forth across the winding freeway as it passes to the north of the Golden Hills community. As SR 58 curves to the south toward the City of Tehachapi, Alternative 1 continues on a more easterly path skirting the City's future development area. The alignment then curves further south and passes to the east of the City, crossing SR 58 near Arabian Drive. Alternative 1 then continues southeast on a long tangent alignment and passes through the mountains east of Tehachapi in a long tunnel roughly following Tehachapi-Willow Springs Road (very similar the Oak Creek Pass Alternative). As Alternative 1 begins descending into the northern Antelope Valley, it crosses Tehachapi-Willow Springs Road near the Cameron Canyon Road intersection, where it also passes over the Pacific Crest Trail on a viaduct. The High-Speed Rail line passes just to the west of the CalPortland Cement limestone quarry in a long tunnel. The alignment continues southeast past the east side of the Willow Springs Raceway and proceeds across Antelope Valley toward the north end of the City of Lancaster at Avenue H where it joins the Sierra Highway/UPRR corridor.

From Broome Road, Alternative 1 ascends at a 2.8 percent grade to Tehachapi, flattens out to an almost flat grade through the Tehachapi Valley, and then descends into the Antelope Valley with a grade of 2.8 percent.

- Alternative 2: As shown on Figure 4, Alternative 2 follows the same alignment from Broome Road to Lancaster as Alternative 1, except through the northern Antelope Valley between Tehachapi and Lancaster in the vicinity of the CalPortland Cement Company property where the alignment is located approximately 3,000 feet west of Alternative 1 placing the High-Speed Rail route in closer proximity to Tehachapi-Willow Springs Road. South of Tehachapi, Alternative 2 splits off on a more westerly alignment than Alternative 1 until it reconnects at the common join point of Alternative 1 approximately 17 miles south of Tehachapi.

The design objectives of Alternative 2 are similar to Alternative 1, with the exception that an objective of Alternative 2 is to identify a different alignment through the CalPortland Cement Company property that locates the High-Speed Rail alignment further away from the CalPortland active limestone quarry and in closer proximity to Tehachapi-Willow Springs Road. Although

Alternative 2 tries to combine transportation corridors between the High-Speed Rail and Tehachapi-Willow Springs road in an effort to reduce impacts to the CalPortland Cement operations, the CalPortland Cement owners stated a preference to Alternative 1 in that the Company has indicated that it would have a lesser impact on future plant operations.

From Broome Road, Alternative 2 ascends at a 2.8 percent grade to Tehachapi, flattens out to an almost flat grade through the Tehachapi Valley for 5 miles, and then descends into the Antelope Valley with a grade of 2.8 percent.

The above seven options were compiled and evaluated as shown in Table 4. Due to the continued research and public outreach performed by the Authority since 2012 and 2014, numerous clarifications have been identified in the areas of geotechnical seismic zones, maximum vertical profile grade, local landowner concerns, and conformance to design guidelines that have had significant influences on the alignments in this subsection. Out of the seven options analyzed, two options (Alternative 1 and Alternative 2) clearly demonstrate an ability to address these newer issues and clarifications to a much higher degree than the other five options and are, hereby, recommended to proceed forward in the future SAA (Table 4).

## Lancaster Options Considered

The following Range of Alternatives for the Lancaster subsection was developed from the 2012 SAA, 2014 interim draft SAA, and continued 2015 studies (Figure 5). A summation of these options is shown in Table 5.

- 2012 SAA Report: This report made the following recommendations:
- Carry forward Alternative AV3B: Leaving the Tehachapi Subsection at Avenue H in Lancaster, AV3B runs south through the City of Lancaster on an elevated structure crossing over all existing cross streets. It proposes a 60-foot-wide High-Speed Rail right-of-way immediately adjacent to the existing UPRR/MetroLink right-of-way corridor. This places the closest High-Speed Rail track centerline within 30 feet of the closest existing operating rail track, but grade separated due to the elevated structure.
- Carry forward Alternative New AV3B: New AV3B is in the same horizontal location as AV3B but runs at grade through the City rather than on elevated structures. This alignment requires numerous grade separation structures for each cross street in the City.
- Carry forward Alternative AV4: Leaving the Tehachapi Subsection at Avenue H in Lancaster, AV4 runs south through the City of Lancaster on an elevated structure crossing over all existing cross streets. It proposes a 60-foot-wide High-Speed Rail right-of-way immediately adjacent to and east of the existing Sierra Highway right-of-way corridor, and then switches to the west side of the Sierra Highway south of Avenue J. This places the closest High-Speed Rail track centerline within 130 feet of the closest existing operating rail track.
- Carry forward Alternative New AV4: New AV4 is in the same horizontal location as AV4 but runs at grade through the City rather than on elevated structures. This alignment requires numerous grade separation structures for each cross street in the City and will require the relocation of the Sierra Highway in some locations.

**2014 Interim Draft SAA:** Since the work performed on the 2012 SAA Report, continued outreach work continued with the local stakeholders in the City of Lancaster. In light of this additional input, the following recommendations were proposed. The 2014 Interim Draft SAA was submitted as a Public Records Act request by the previous regional consultant, but was not presented to the Board or the public. The current regional consultant used the 2014 Interim Draft SAA as a starting point for subsequent analysis discussed below in the 2015 studies section. The recommendations from the 2014 Interim Draft SAA were:

- Carry forward Alternative AV3B: This alternative proposes a totally elevated structure through the City of Lancaster immediately adjacent to the west side of the UPRR/MetroLink right-of-way.



**Table 5: Detailed Evaluation of Lancaster Options**

Option	2012 SAA Recommendation	2014 Draft SAA Recommendation	2015 Recommendation	Reason for Refinement	Key Reasons for Carrying Forward	Key Reasons for Withdrawal
1	AV3B	Carry Forward "AV3B"	Withdraw "AV3B"	N/A	N/A	<ul style="list-style-type: none"> <li>Alignment is totally on elevated structures contrary to City desires</li> <li>High costs due to extensive elevated structures</li> </ul>
2	New AV3B	Carry Forward "New AV3B"	Withdraw "New AV3B"	<ul style="list-style-type: none"> <li>Reduce costs by placing AV3B vertical profile at-grade</li> </ul>	N/A	<ul style="list-style-type: none"> <li>Alignment does not comply with UPRR Memorandum of Understanding separation requirements</li> </ul>
3	AV4	Carry Forward "AV4"	Withdraw "AV4"	N/A	N/A	<ul style="list-style-type: none"> <li>Alignment is totally on elevated structures contrary to City desires</li> <li>High costs due to extensive elevated structures</li> </ul>
4	New AV4	Withdraw "New AV4"	N/A	<ul style="list-style-type: none"> <li>Reduce costs by placing AV4 vertical profile at-grade</li> </ul>	N/A	<ul style="list-style-type: none"> <li>Significantly impacts numerous businesses on westerly side of Sierra Highway</li> <li>Portions of alignment sandwich the Sierra Highway between High-Speed Rail and the existing UPRR/MetroLink corridors eliminating access to the Sierra Highway</li> <li>City does not want this alignment</li> </ul>
5	N/A	N/A	ADD "Lancaster Baseline"	<ul style="list-style-type: none"> <li>Remove elevated High-Speed Rail through City. Reduce impacts to westerly businesses, institutions, and roadways</li> <li>Comply with new UPRR separation requirements</li> </ul>	<ul style="list-style-type: none"> <li>Reduces overall rail corridor width by consolidation into one combined corridor</li> <li>Improves traffic safety by grade separating all major intersections</li> <li>Reduces impacts to westerly businesses, institutions, and roadways</li> <li>Complies with UPRR Memorandum of Understanding requirements</li> <li>Improves traffic circulation in City</li> </ul>	N/A
6	N/A	N/A	Add "Lancaster A"	<ul style="list-style-type: none"> <li>Avoid relocation of UPRR and MetroLink facilities</li> <li>Comply with UPRR separation requirements</li> </ul>	<ul style="list-style-type: none"> <li>Avoids relocation of UPRR and MetroLink facilities</li> <li>Improves traffic safety by grade separating all major intersections</li> <li>Complies with UPRR Memorandum of Understanding requirements</li> <li>Improves traffic circulation in City</li> </ul>	N/A

N/A = Not Applicable  
SAA = Supplemental Alternatives Analysis  
UPRR = Union Pacific Railroad

- Carry forward Alternative New AV3B: New AV3B is in the same horizontal location as AV3B but runs at grade through the City rather than on elevated structures. This alignment requires numerous grade separation structures for each cross street in the City.
- Carry forward Alternative AV4: This alternative proposes a totally elevated structure through the City of Lancaster immediately adjacent to the Sierra Highway right-of-way.
- Withdraw Alternative New AV4: New AV4 is in the same horizontal location as AV4 but runs at grade through the city rather than on elevated structures. This alignment requires numerous grade separation structures for each cross street in the City and will require the relocation of the Sierra Highway in some locations. It will also sever access to and possibly displace numerous businesses and institutions bordering the west side of the Sierra Highway. There are also portions of the alignment that would sandwich Sierra Highway between the High-Speed Rail and the existing UPRR/MetroLink corridor, thereby limiting access to Sierra Highway.

**2015 Studies:** The Authority has continued looking at new options or refining existing options already proposed in previous studies. The refinements have been developed as a result of further research, engineering, and environmental study of the project area, and additional public, stakeholder and agency feedback.

The 2015 outreach efforts have continued to seek input from the City of Lancaster. One key criterion that has developed through this outreach effort stemmed from the concerns expressed by the City regarding elevated structures, that being to eliminate all elevated High-Speed Rail structures throughout the City. This criterion alone would exclude Alternatives AV3B and AV4. In addition, new information stemming from the more recent Memorandum of Understanding with the UPRR has added a criterion to keep a 102-foot separation between the closest UPRR track centerline and the High-Speed Rail track centerline. This criterion has significant impacts on the remaining New AV3B alternative, which currently locates High-Speed Rail tracks within 30 feet from the UPRR. These two criteria, therefore, eliminate all the recommendations from the 2014 Draft SAA Report and create a need to develop new alternatives.

The 2015 studies, therefore, began a new approach to thread some alternatives through the City that would meet all the new and previous criteria. Due to air space restrictions at the Plant 42 Airport on the south end of the City, both alignments presented below follow the same path from Avenue M to Avenue O. The results of the 2015 analysis recommend the following two options:

- Lancaster Baseline: The basic premise of this alternative is to combine the High-Speed Rail, UPRR, and MetroLink rail corridors into one combined at-grade corridor. The existing UPRR/MetroLink right-of-way through the City is very irregular in width, with some areas just wide enough to accommodate the needed rail improvements and others significantly wider. The Lancaster Baseline alternative proposes the creation of a new corridor that matches the current westerly extent of the existing rail right-of-way and widens the corridor to the east by a distance of 0 ft to 230 ft, as necessary, to accommodate all three rail systems and their respective separation requirements. It would require the relocation of all the UPRR and MetroLink facilities in the corridor. The result would be an at-grade rail corridor with the following benefits:
  - Meeting the City's desire to eliminate elevated High-Speed Rail in the City
  - Minimizing impacts to westerly businesses, institutions, and roadways
  - Eliminating safety issues involved with existing at-grade rail crossings by grade separating all major roadway intersections
  - Improving local traffic circulation
  - Complying with UPRR Memorandum of Understanding requirements

The movement of the corridor easterly would enter into a more undeveloped area of the City, thereby reducing the numbers of businesses impacted.

- Lancaster A: Differing from the Lancaster Baseline alternative, Lancaster A proposes to avoid the UPRR and MetroLink facilities and relocate Sierra Highway. The primary theme of this alternative is to place the High-Speed Rail as close as possible to the existing rail facilities while still meeting all the separation requirements. This option is also a totally at-grade alignment with grade separations at all major intersections.

The above six options were compiled and evaluated as shown in Table 5. Out of the six options analyzed, two options (Lancaster Baseline and Lancaster A) clearly demonstrate an ability to address these newer issues and clarifications to a much higher degree than the other four options and are hereby recommended to proceed forward in the future SAA (Table 5).

## Conclusions

The following conclusions and recommendations are being made to the Authority based upon the evaluations presented for the Edison, Keene, Tehachapi, and Lancaster Subsections:

### Edison Subsection:

- Carry forward: Edison Baseline and Edison A
- Withdraw: E2B, New E2, E4, New E4, and Edison B

### Keene Subsection:

- Carry forward: Keene Baseline
- Withdraw: T3-1, New T3, and T3-2

### Tehachapi Subsection:

- Carry forward: Alternate 1 and Alternate 2
- Withdraw: T3-1, New T3, T3-2, Revised New T3, and Oak Creek Pass

### Lancaster Subsection:

- Carry forward: Lancaster Baseline and Lancaster A
- Withdraw: AV3B, New AV3B, Av4, and New AV4

Moving forward into the 2015 SAA Report evaluation, a naming convention and consolidation of the selected subsection options into complete end-to-end alternatives has been prepared. The resultant number of selected options yields two in Edison, one in Keene, two in Tehachapi, and two in Lancaster. This combines into eight end-to-end alignments as follows:

2015 Bakersfield to Palmdale Alternatives							
Alternative	Edison		Keene	Tehachapi		Lancaster	
#	Baseline	Option A	Baseline	1	2	Baseline	Option
1	x		x	x		x	
2		x	x	x		x	
3	x		x		x	x	
4		x	x		x	x	
5	x		x	x			x
6		x	x	x			x
7	x		x		x		x
8		x	x		x		x

## **APPENDIX B DETAILED EVALUATION TABLES**

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**Table B-1 Bakersfield to Palmdale Alignment Alternatives Detailed Evaluation**

NOTE: There are no stations in this section and, therefore, station evaluation is not conducted.

Measurement Criteria	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6	Alternative 7	Alternative 8
<b>Constructability</b>								
Total Alignment Miles, Bakersfield to Palmdale	80 miles	Same as Alternative 1						
Intermodal Connections	Achieves the High-Speed Rail objective of integrating High-Speed Rail with existing intercity and regional rail routes at Bakersfield and Palmdale, provides a direct connection to MetroLink services at Palmdale.	Same as Alternative 1						
Tunnel Length	Total Length: 5.4 miles	Total Length: 5.4 miles	Total Length: 6.3 miles	Total Length: 6.3 miles	Total Length: 5.4 miles	Total Length: 5.4 miles	Total Length: 6.3 miles	Total Length: 6.3 miles
Operating Costs	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Capital Costs Capital costs are based on a percent baseline, where 100% is the lowest-cost alternative.	101.7% Alternatives 1 and 2 are the lowest-cost at 100%.	100.0% Alternatives 1 and 2 are the lowest-cost at 100%.	104.2%	102.6%	108.0%	106.2%	110.6% Alternatives 7 and 8 are 9.1% higher than Alternatives 1 and 2.	108.8% Alternatives 7 and 8 are 9.1% higher than Alternatives 1 and 2.
Constructability	SR 58 realignment in Edison	SR 58 will not be realigned, but the High-Speed Rail alignment will require two elevated structures over SR 58:	SR 58 realignment in Edison	SR 58 will not be realigned, but the High-Speed Rail alignment will require two elevated structures over SR 58:	SR 58 realignment in Edison Sierra Highway realignment in Lancaster to avoid UPRR and MetroLink facilities	SR 58 will not be realigned, but the High-Speed Rail alignment will require two elevated structures over SR 58	SR 58 realignment in Edison	SR 58 will not be realigned, but the High-Speed Rail alignment will require two elevated structures over SR 58
		At SR 58/Edison Road interchange and SR 58/Towerline Road		At SR 58/Edison Road interchange and SR 58/Towerline Road		At SR 58/Edison Road interchange and SR 58/Towerline Road		At SR 58/Edison Road interchange and SR 58/Towerline Road
	Requires realignment of Sierra Highway south of Avenue K, in Lancaster	Requires realignment of Sierra Highway south of Avenue K in Lancaster	Requires realignment of Sierra Highway south of Avenue K in Lancaster	Requires realignment of Sierra Highway south of Avenue K in Lancaster		Sierra Highway realignment in Lancaster to avoid UPRR and MetroLink facilities	Sierra Highway realignment in Lancaster to avoid UPRR and MetroLink facilities	Sierra Highway realignment in Lancaster to avoid UPRR and MetroLink facilities
	Requires viaduct over Los Angeles Aqueduct	Requires viaduct over Los Angeles Aqueduct	Requires viaduct over Los Angeles Aqueduct	Requires viaduct over Los Angeles Aqueduct	Requires viaduct over Los Angeles Aqueduct	Requires viaduct over Los Angeles Aqueduct	Requires viaduct over Los Angeles Aqueduct	Requires viaduct over Los Angeles Aqueduct
	Construction around Kern#1 Transmission Line Sierra Highway Bike Path realignment in Lancaster Avenue K-8 Bike Path realignment in Lancaster	Construction around Kern#1 Transmission Line Sierra Highway Bike Path realignment in Lancaster Avenue K-8 Bike Path realignment in Lancaster	Construction around Kern#1 Transmission Line Sierra Highway Bike Path realignment in Lancaster Avenue K-8 Bike Path realignment in Lancaster	Construction around Kern#1 Transmission Line Sierra Highway Bike Path realignment in Lancaster Avenue K-8 Bike Path realignment in Lancaster	Construction around Kern#1 Transmission Line Sierra Highway Bike Path realignment in Lancaster Avenue K-8 Bike Path realignment in Lancaster	Construction around Kern#1 Transmission Line Sierra Highway Bike Path realignment in Lancaster Avenue K-8 Bike Path realignment in Lancaster	Construction around Kern#1 Transmission Line Sierra Highway Bike Path realignment in Lancaster Avenue K-8 Bike Path realignment in Lancaster	Construction around Kern#1 Transmission Line Sierra Highway Bike Path realignment in Lancaster Avenue K-8 Bike Path realignment in Lancaster

Measurement Criteria	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6	Alternative 7	Alternative 8
	59 grade separations	52 grade separations	58 grade separations	51 grade separations	59 grade separations	52 grade separations	58 grade separations	51 grade separations
	Requires construction of viaducts over the Pacific Crest Trail	Requires construction of viaducts over the Pacific Crest Trail	At-grade when intersecting the Pacific Crest Trail and will require relocation of the trail over or under High-Speed Rail alignment	At-grade when intersecting the Pacific Crest Trail and will require relocation of the trail over or under High-Speed Rail alignment	Requires construction of viaducts over the Pacific Crest Trail	Requires construction of viaducts over the Pacific Crest Trail	At-grade when intersecting the Pacific Crest Trail and will require relocation of the trail over or under High-Speed Rail alignment	At-grade when intersecting the Pacific Crest Trail and will require relocation of the trail over or under High-Speed Rail alignment
<b>Land Use</b>								
Consistency with other planning efforts	Existing Land Uses The alternative is inconsistent with existing land uses in the Cities of Bakersfield, Tehachapi, and Lancaster, where the alignment would displace existing businesses and existing residences.	Existing Land Uses The alternative is inconsistent with existing land uses in the Cities of Bakersfield, Tehachapi and Lancaster where the alignment would displace existing businesses and existing residences	Existing Land Uses The alternative is inconsistent with existing land uses in the Cities of Bakersfield, Tehachapi and Lancaster where the alignment would displace existing businesses and existing residences	Existing Land Uses The alternative is inconsistent with existing land uses in the Cities of Bakersfield, Tehachapi and Lancaster where the alignment would displace existing businesses and existing residences	Existing Land Uses The alternative is inconsistent with existing land uses in the Cities of Bakersfield, Tehachapi and Lancaster where the alignment would displace existing businesses and existing residences	Existing Land Uses The alternative is inconsistent with existing land uses in the Cities of Bakersfield, Tehachapi and Lancaster where the alignment would displace existing businesses and existing residences	Existing Land Uses The alternative is inconsistent with existing land uses in the Cities of Bakersfield, Tehachapi and Lancaster where the alignment would displace existing businesses and existing residences	Existing Land Uses The alternative is inconsistent with existing land uses in the Cities of Bakersfield, Tehachapi and Lancaster where the alignment would displace existing businesses and existing residences
		The alternative is inconsistent with existing land uses in Edison as elevated structures for alignment go over existing residences and businesses along SR 58		The alternative is inconsistent with existing land uses in Edison as elevated structures for alignment go over existing residences and businesses along SR 58	The alternative is inconsistent with existing land uses in Lancaster as realignment of Sierra Highway may displace existing residences and businesses along Sierra Highway	The alternative is inconsistent with existing land uses in Edison as elevated structures for alignment go over existing residences and businesses along SR 58	The alternative is inconsistent with existing land uses in Lancaster as realignment of Sierra Highway may displace existing residences and businesses along Sierra Highway	The alternative is inconsistent with existing land uses in Edison as elevated structures for alignment go over existing residences and businesses along SR 58
						The alternative is inconsistent with existing land uses in Lancaster as realignment of Sierra Highway may displace existing residences and businesses along Sierra Highway		The alternative is inconsistent with existing land uses in Lancaster as realignment of Sierra Highway may displace existing residences and businesses along Sierra Highway

Measurement Criteria	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6	Alternative 7	Alternative 8
	<p>Planned Land Uses</p> <p>The alternative is inconsistent with portions of the following plans:</p> <ul style="list-style-type: none"> <li>Kern County General Plan and Appendices</li> <li>Keene Rural Community Plan</li> <li>Kern County Golden Hills Specific Plan</li> <li>Rosamond Specific Plan</li> <li>Tehachapi General Plan</li> <li>Keene Ranch Specific Plan</li> <li>Metropolitan Bakersfield General Plan</li> <li>Lancaster Specific Plan</li> <li>Palmdale General Plan</li> <li>Los Angeles County General Plan</li> <li>Los Angeles County Bicycle Master Plan</li> </ul>	<p>Planned Land Uses</p> <p>The alternative is inconsistent with portions of the same plans as Alternative 1.</p>	<p>Planned Land Uses</p> <p>The alternative is inconsistent with portions of the same plans as Alternative 1.</p>	<p>Planned Land Uses</p> <p>The alternative is inconsistent with portions of the same plans as Alternative 1.</p>	<p>Planned Land Uses</p> <p>The alternative is inconsistent with portions of the same plans as Alternative 1.</p>	<p>Planned Land Uses</p> <p>The alternative is inconsistent with portions of the same plans as Alternative 1.</p>	<p>Planned Land Uses</p> <p>The alternative is inconsistent with portions of the same plans as Alternative 1.</p>	<p>Planned Land Uses</p> <p>The alternative is inconsistent with portions of the same plans as Alternative 1.</p>
<b>Disruption to Communities</b>								
<p>Disruption to Existing Intermodal Connections for Transportation</p>	<p>Alignment requires relocation of:</p> <ul style="list-style-type: none"> <li>Sierra Highway Bike Path</li> <li>Avenue K-8 Bike Path</li> <li>Proposed Avenue K-8 Bike Path Bridge</li> </ul>	Same as Alternative 1	Same as Alternative 1	Same as Alternative 1	Same as Alternative 1	Same as Alternative 1	Same as Alternative 1	Same as Alternative 1
<p>Disruption to Existing Community Residents, and Business and Industrial Owners</p> <p>(The numbers shown are the total number of parcels within 100 feet on each side of the High-Speed Rail centerline alignment.)</p>	<p>Residential Parcels: 210</p> <p>Commercial (Business) Parcels: 254</p> <p>Industrial (Business) Parcels: 283</p> <p>Cement Plant Parcels: 63</p> <p>Agricultural Parcels: 272</p>	<p>Residential Parcels: 210</p> <p>Commercial (Business) Parcels: 254</p> <p>Industrial (Business) Parcels : 276</p> <p>Cement Plant Parcels: 63</p> <p>Agricultural Parcels: 272</p>	<p>Residential Parcels: 216</p> <p>Commercial (Business) Parcels: 255</p> <p>Industrial (Business) Parcels: 282</p> <p>Cement Plant Parcels: 46</p> <p>Agricultural Parcels: 272</p>	<p>Residential Parcels: 217</p> <p>Commercial (Business) Parcels: 256</p> <p>Industrial (Business) Parcels: 256</p> <p>Cement Plant Parcels: 46</p> <p>Agricultural Parcels: 272</p>	<p>Residential Parcels: 216</p> <p>Commercial (Business) Parcels: 300</p> <p>Industrial (Business) Parcels: 185</p> <p>Cement Plant Parcels: 63</p> <p>Agricultural Parcels: 272</p>	<p>Residential Parcels: 217</p> <p>Commercial (Business) Parcels: 304</p> <p>Industrial (Business) Parcels: 184</p> <p>Cement Plant Parcels: 63</p> <p>Agricultural Parcels: 272</p>	<p>Residential Parcels: 221</p> <p>Commercial (Business) Parcels: 301</p> <p>Industrial (Business) Parcels: 184</p> <p>Cement Plant Parcels: 46</p> <p>Agricultural Parcels: 272</p>	<p>Residential Parcels: 222</p> <p>Commercial (Business) Parcels: 301</p> <p>Industrial (Business) Parcels: 179</p> <p>Cement Plant Parcels: 46</p> <p>Agricultural Parcels: 272</p>
<p>Disruption to and Relocation of Utilities</p>	<p>High-Risk Utilities Crossings:</p> <ul style="list-style-type: none"> <li>Natural Gas: 7</li> <li>Petroleum/fuel: 5</li> </ul>	<p>High-Risk Utilities Crossings:</p> <ul style="list-style-type: none"> <li>Natural Gas: 9</li> <li>Petroleum/Fuel: 5</li> </ul>	<p>High-Risk Utilities Crossings:</p> <ul style="list-style-type: none"> <li>Natural Gas: 7</li> <li>Petroleum/Fuel: 5</li> </ul>	<p>High-Risk Utilities Crossings:</p> <ul style="list-style-type: none"> <li>Natural Gas: 9</li> <li>Petroleum/Fuel: 5</li> </ul>	<p>High-Risk Utilities Crossings:</p> <ul style="list-style-type: none"> <li>Natural Gas: 7</li> <li>Petroleum/Fuel: 5</li> </ul>	<p>High-Risk Utilities Crossings:</p> <ul style="list-style-type: none"> <li>Natural Gas: 7</li> <li>Petroleum/Fuel: 5</li> </ul>	<p>High-Risk Utilities Crossings:</p> <ul style="list-style-type: none"> <li>Natural Gas: 7</li> <li>Petroleum/Fuel: 5</li> </ul>	<p>High-Risk Utilities Crossings:</p> <ul style="list-style-type: none"> <li>Natural Gas: 9</li> <li>Petroleum/Fuel: 5</li> </ul>

Measurement Criteria	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6	Alternative 7	Alternative 8
<p>Utilities crossings are divided into high-risk and low-risk facilities based on High-Speed Rail standards. (The numbers shown are the total number of utility crossings within 100 feet on each side of the High-Speed Rail centerline alignment.)</p>	<p>Low-Risk Utilities Crossings: Electrical Substation: 46 Telecom: 646 Fiber-Optic: 21 Water: 364 Sewer: 75 Storm Water : 94</p>	<p>Low-Risk Utilities Crossings: Electrical Substation: 46 Telecom: 562 Fiber-Optic: 21 Water: 361 Sewer: 72 Storm Water : 94</p>	<p>Low-Risk Utilities Crossings: Electrical Substation: 46 Telecom: 646 Fiber-Optic: 21 Water: 364 Sewer: 75 Storm Water : 94</p>	<p>Low-Risk Utilities Crossings: Electrical Substation: 46 Telecom: 562 Fiber-Optic: 21 Water: 361 Sewer: 72 Storm Water : 94</p>	<p>Low-Risk Utilities Crossings: Electrical Substation: 46 Telecom: 646 Fiber-Optic: 21 Water: 364 Sewer: 75 Storm Water : 94</p>	<p>Low-Risk Utilities Crossings: Electrical Substation: 46 Telecom: 646 Fiber-Optic: 21 Water: 364 Sewer: 75 Storm Water : 94</p>	<p>Low-Risk Utilities Crossings: Electrical Substation: 46 Telecom: 646 Fiber-Optic: 21 Water: 361 Sewer: 75 Storm Water : 94</p>	<p>Low-Risk Utilities Crossings: Electrical Substation: 46 Telecom: 562 Fiber-Optic: 21 Water: 364 Sewer: 75 Storm Water : 94</p>
<p>Disruption to and Relocation of Wind Turbines (The numbers shown are the total number of potential wind turbine impacts within 100 feet on each side of the High-Speed Rail centerline alignment.)</p>	<p>Existing: 11 potential wind turbine impacts Proposed: 0</p>	Same as Alternative 1						
<p>Demographics, Socioeconomic Composition, and Communities of Environmental Justice Concern (The numbers shown are the total number of census tracts within 100 feet on each side of the High-Speed Rail centerline alignment.)</p>	<p>Demographic and Socioeconomic Composition Census Tracts with Population Living Below the Poverty Level Environmental Justice Community Criteria: 5% higher than county average (<math>\geq 27\%</math> Kern County and <math>\geq 22\%</math> Los Angeles County): 13 census tracts</p>	Same as Alternative 1						
	<p>Census Tracts with Population of Racial Minorities Environmental Justice Community Criteria: 10% higher than county average (<math>\geq 71\%</math> Kern County and <math>\geq 82\%</math> Los Angeles County): 6 census tracts</p>							

Measurement Criteria	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6	Alternative 7	Alternative 8
<p>Census Total Tracts with Population Aged 65 and Above</p> <p>Environmental Justice Criteria: 5% higher than the county Average (<math>\geq 14\%</math> Kern County and <math>\geq 17\%</math> Los Angeles County): 9 census tracts</p>								
The total number of census tracts containing at least one environmental justice community is the same for each alternative.								
<p>Proximity to Schools</p> <p>(The numbers shown are the total number of schools within 100 feet on each side of the High-Speed Rail centerline alignment.)</p>	Existing: 7 Proposed: 0	Same as Alternative 1						
<p>Proximity to Landfills</p> <p>(The numbers shown are the total number of landfills within 100 feet on either side of the High-Speed Rail centerline alignment.)</p>	Existing: 0 Proposed: 0							
<p>Proximity to Hazardous Materials and Waste</p> <p>(The numbers shown are the total number of sites within 100 feet on either side of the High-Speed Rail centerline alignment.)</p>	42 sites Demolition of existing structures may encounter asbestos, lead-paint, and other hazardous materials requiring proper disposal.	42 sites Demolition of existing structures may encounter asbestos, lead-paint, and other hazardous materials requiring proper disposal.	42 sites Demolition of existing structures may encounter asbestos, lead-paint, and other hazardous materials requiring proper disposal.	42 sites Demolition of existing structures may encounter asbestos, lead-paint, and other hazardous materials requiring proper disposal.	40 sites Demolition of existing structures may encounter asbestos, lead-paint, and other hazardous materials requiring proper disposal.	40 sites Demolition of existing structures may encounter asbestos, lead-paint, and other hazardous materials requiring proper disposal.	40 sites Demolition of existing structures may encounter asbestos, lead-paint, and other hazardous materials requiring proper disposal.	40 sites Demolition of existing structures may encounter asbestos, lead-paint, and other hazardous materials requiring proper disposal.
	Along major highway right-of-way, there is the potential for encountering aerially deposited lead in shallow soil. Within and adjacent to existing rail alignments expect hydrocarbons, lead, and arsenic in near surface soils.	Along major highway right-of-way, there is the potential for encountering aerially deposited lead in shallow soil. Within and adjacent to existing rail alignments expect hydrocarbons, lead, and arsenic in near surface soils.	Along major highway right-of-way, there is the potential for encountering aerially deposited lead in shallow soil. Within and adjacent to existing rail alignments expect hydrocarbons, lead, and arsenic in near surface soils.	Along major highway right-of-way, there is the potential for encountering aerially deposited lead in shallow soil. Within and adjacent to existing rail alignments expect hydrocarbons, lead, and arsenic in near surface soils.	Along major highway right-of-way, there is the potential for encountering aerially deposited lead in shallow soil. Within and adjacent to existing rail alignments expect hydrocarbons, lead, and arsenic in near surface soils.	Along major highway right-of-way, there is the potential for encountering aerially deposited lead in shallow soil. Within and adjacent to existing rail alignments expect hydrocarbons, lead, and arsenic in near surface soils.	Along major highway right-of-way, there is the potential for encountering aerially deposited lead in shallow soil. Within and adjacent to existing rail alignments expect hydrocarbons, lead, and arsenic in near surface soils.	Along major highway right-of-way, there is the potential for encountering aerially deposited lead in shallow soil. Within and adjacent to existing rail alignments expect hydrocarbons, lead, and arsenic in near surface soils.

Measurement Criteria	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6	Alternative 7	Alternative 8
<b>Environmental Resources</b>								
Potential Section 4(f) and 6(f) Resources Please note that for cultural resources (consisting of archaeological and historic architecture sites), there is a potential for both direct and indirect potential use of these resources. (The total area/miles affected within 100 feet on either side of the High-Speed Rail centerline alignment).	Recreation Resources Existing: 3 Pacific Crest Trail (indirect effect due to viaduct over the Pacific Crest Trail) (0 miles) Sierra Highway Bike Path (1.57 miles) Avenue K-8 Bike Path (200 feet)	Recreation Resources Existing: 3 Pacific Crest Trail (indirect effect due to viaduct over the Pacific Crest Trail) (0 miles) Sierra Highway Bike Path (1.57 miles) Avenue K-8 Bike Path (200 feet)	Recreation Resources Existing: 3 Pacific Crest Trail (200 feet) Sierra Highway Bike Path (1.57 miles) Avenue K-8 Bike Path (200 feet)	Recreation Resources Existing: 3 Pacific Crest Trail (200 feet) Sierra Highway Bike Path (1.57 miles) Avenue K-8 Bike Path (200 feet)	Recreation Resources Existing: 4 Pacific Crest Trail (indirect effect due to viaduct over the Pacific Crest Trail) (0 miles) Sierra Highway Bike Path (1.57 miles) Avenue K-8 Bike Path (200 feet) Whit Carter Park: (0.47 acre)	Recreation Resources Existing: 4 Pacific Crest Trail (indirect effect due to viaduct over the Pacific Crest Trail) (0 miles) Sierra Highway Bike Path (1.57 miles) Avenue K-8 Bike Path (200 feet) Whit Carter Park (0.47 acre)	Recreation Resources Existing: 4 Pacific Crest Trail (200 feet) Sierra Highway Bike Path (1.57 miles) Avenue K-8 Bike Path (200 feet) Whit Carter Park (0.47 acre)	Recreation Resources Existing: 4 Pacific Crest Trail (200 feet) Sierra Highway Bike Path (1.57 miles) Avenue K-8 Bike Path (200 feet) Whit Carter Park (0.47 acre)
	Proposed: 1 Proposed Avenue K-8 Bike Path Bridge (6 feet) Cultural Resources Willow Springs International Raceway (0.08 acre) Giumarra Bros. Fruit Co. (4 acres) Kern #1 Transmission Line (200 feet) Los Angeles Aqueduct (282 feet) 7 archaeological sites are within 100 feet of the centerline (National Register eligibility still to be determined).	Proposed: 1 Proposed Avenue K-8 Bike Path Bridge (6 feet) Cultural Resources Willow Springs International Raceway (0.08 acre) Giumarra Bros. Fruit Co. (5.7 acres) Kern #1 Transmission Line (200 feet) Los Angeles Aqueduct (267 feet) 7 archaeological sites are within 100 feet of the centerline (National Register eligibility still to be determined).	Proposed: 1 Proposed Avenue K-8 Bike Path Bridge (6 feet) Cultural Resources Willow Springs International Raceway (0.08 acre) Giumarra Bros. Fruit Co. (4 acres) Kern #1 Transmission Line (200 feet) Los Angeles Aqueduct (267 feet) 8 archaeological sites are within 100 feet of the centerline (National Register eligibility still to be determined).	Proposed: 1 Proposed Avenue K-8 Bike Path Bridge (6 feet) Cultural Resources Willow Springs International Raceway (0.08 acre) Giumarra Bros. Fruit Co. (5.7 acres) Kern #1 Transmission Line (200 feet) Los Angeles Aqueduct (267 feet) 8 archaeological sites are within 100 feet of the centerline (National Register eligibility still to be determined).	Proposed: 2 Proposed Avenue K-8 Bike Path Bridge (22 feet) Whit Carter Park Expansion (3.36 acres) Cultural Resources Willow Springs International Raceway (0.08 acre) Giumarra Bros. Fruit Co. (4.0 acre) Corner Building (44851 Sierra Highway) (0.09 acre) Village Grille (Denny's #30) (0.30 acre) Kern #1 Transmission Line (200 feet) Los Angeles Aqueduct (282 feet) 8 archaeological sites are within 100 feet of the centerline (National Register eligibility still to be determined).	Proposed: 2 Proposed Avenue K-8 Bike Path Bridge (22 feet) Whit Carter Park Expansion (3.36 acres) Cultural Resources Willow Springs International Raceway (0.08 acre) Giumarra Bros. Fruit Co. (5.7 acres) Corner Building (44851 Sierra Highway) (0.09 acre) Village Grille (Denny's #30) (0.30 acre) Kern #1 Transmission Line (200 feet) Los Angeles Aqueduct (285 feet) 8 archaeological sites are within 100 feet of the centerline (National Register eligibility still to be determined).	Proposed: 2 Proposed Avenue K-8 Bike Path Bridge (22 feet) Whit Carter Park Expansion (3.36 acres) Cultural Resources Willow Springs International Raceway (0.08 acre) Giumarra Bros. Fruit Co. (4.0 acres) Corner Building (44851 Sierra Highway) (0.09 acre) Village Grille (Denny's #30) (0.30 acre) Kern #1 Transmission Line (200 feet) Los Angeles Aqueduct (267 feet) 9 archaeological sites are within 100 feet of the centerline (National Register eligibility still to be determined).	Proposed: 2 Proposed Avenue K-8 Bike Path Bridge (22 feet) Whit Carter Park Expansion (3.36 acres) Cultural Resources Willow Springs International Raceway (0.08 acre) Giumarra Bros. Fruit Co. (5.7 acres) Corner Building (44851 Sierra Highway) (0.09 acre) Village Grille (Denny's #30) (0.30 acre) Kern #1 Transmission Line (200 feet) Los Angeles Aqueduct (267 feet) 9 archaeological sites are within 100 feet of the centerline (National Register eligibility still to be determined).

Measurement Criteria	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6	Alternative 7	Alternative 8
Biological Resources United States Fish and Wildlife Service Critical Habitat (The numbers shown are the total number of acres within 100 feet on either side of the High-Speed Rail centerline alignment.)	0 acre	Same as Alternative 1						
Potential impacts are calculated based on the United States Fish and Wildlife Service Critical Habitat database for critical, endangered, and threatened habitats. These data were used to determine that no critical habitat occurs within the Bakersfield to Palmdale Section project vicinity. The nearest critical habitat to this subsection is for California condor and is located approximately 10 miles west of the High-Speed Rail centerline alignment.								
Biological Resources	X = Presence within 100 feet either side of the alternative centerline. 0 = No Presence within 100 feet either side of the alternative centerline The California Natural Diversity Database is a program that inventories the status and locations of rare plants and animals in California. These data were used to determine that only three species are present within 100 feet of either side of the alternative centerline.							
Coast Horned Lizard	X	X	X	X	X	X	X	X
Mohave Ground Squirrel	X	X	0	0	X	X	0	0
Ferruginous Hawk	X	X	X	X	X	X	X	X
Biological Resources Special-Status Plant Communities Ericameria linearifolia – Isomeris arborea Shrubland Alliance (Narrowleaf goldenbush scrub–Bladderpod scrub)	22.14 acres	22.14 acres	22.14 acres	22.14 acres	22.14 acres	22.14 acres	22.14 acres	22.14 acres
Biological Resources Special-Status Plant Communities Lepidospartum squamatum Shrubland Alliance (Scale broom scrub)	5.84 acres	6.88 acres	5.84 acres	6.88 acres	5.84 acres	6.88 acres	5.84 acres	6.88 acres
Biological Resources Special-Status Plant Communities Platanus racemosa Woodland Alliance (California sycamore woodlands)	0.11 acre	0.11 acre	0.11 acre	0.11 acre	0.11 acre	0.11 acre	0.11 acre	0.11 acre

Measurement Criteria	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6	Alternative 7	Alternative 8
Biological Resources Special-Status Plant Communities Prunus fasciculata Shrubland Alliance (Desert almond scrub)	0 acre	0 acre	0.61 acre	0.61 acre	0 acre	0 acre	0.61 acre	0.61 acre
Biological Resources Special-Status Plant Communities Quercus douglasii Woodland Alliance (Blue oak woodland)	252.67 acres							
Biological Resources Special-Status Plant Communities Quercus wislizeni Woodland Alliance (Interior live oak woodland)	3.87 acres							
Bureau of Land Management West Mojave Planning Area (within the California Desert Conservation Area boundary) (The numbers shown are the total number of acres within 100 feet on either side of the High-Speed Rail centerline alignment.)	959 acres	959 acres	958 acres	958 acres	959 acres	959 acres	959 acres	957 acres
Biological Resources Western Mojave Desert Tortoise Recovery Plan Area (The numbers shown are the total number of acres within 100 feet on either side of the High-Speed Rail centerline alignment.)	957 acres	957 acres	955 acres	955 acres	956 acres	956 acres	956 acres	955 acres

Measurement Criteria	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6	Alternative 7	Alternative 8
<p>Biological Resources Upland Species of the San Joaquin Valley Recovery Plan Area</p> <p>(The numbers shown are the total number of acres within 100 feet on either side of the High-Speed Rail centerline alignment.)</p>	<p>Linkage: 377 acres</p> <p>Satellite: 122 acres</p>	Same as Alternative 1						
<p>Biological Resources Pacific Gas and Electric Company San Joaquin Valley Operations and Maintenance HCP</p> <p>(The numbers shown are the total number of acres within 100 feet on either side of the High-Speed Rail centerline alignment.)</p>	716 acres	716 acres	716 acres	716 acres	716 acres	717 acres	716 acres	716 acres
<p>Biological Resources Kern County Valley Floor HCP</p> <p>(The numbers shown are the total number of acres within 100 feet on either side of the High-Speed Rail centerline alignment.)</p>	<p>Green Zone 254 acres</p> <p>Metropolitan Bakersfield HCP: 274 acres</p>	<p>Green Zone: 254 acres</p> <p>Metropolitan Bakersfield HCP: 274 acres</p>	<p>Green Zone: 254 acres</p> <p>Metropolitan Bakersfield HCP: 274 acres</p>	<p>Green Zone: 254 acres</p> <p>Metropolitan Bakersfield HCP: 274 acres</p>	<p>Green Zone: 254 acres</p> <p>Metropolitan Bakersfield HCP: 274 acres</p>	<p>Green Zone: 254 acres</p> <p>Metropolitan Bakersfield HCP: 275 acres</p>	<p>Green Zone: 254 acres</p> <p>Metropolitan Bakersfield HCP: 274 acres</p>	<p>Green Zone: 253 acres</p> <p>Metropolitan Bakersfield HCP: 275 acres</p>
<p>A Memorandum of Understanding was prepared in 1989 among the United States Fish and Wildlife Service, the Bureau of Land Management, the California Department of Fish and Wildlife (formerly the California Department of Fish and Game), the California Energy Commission, and the California Department of Conservation Division of Oil, Gas, and Geothermal Resources to establish the Kern County VFHCP. The proposed VFHCP utilizes a conservation strategy that would provide for preservation of the best remaining natural lands while still allowing economic growth to occur in the area. The VFHCP area consists of approximately 3,110 square miles within Kern County. The boundaries are Kings and Tulare Counties to the north, up to an approximate 2,000-foot elevation contour to the south and east, and San Luis Obispo County to the west. The VFHCP area would be divided into three habitat zone categories of red, green, and white based on habitat value. Red Zones contain the highest-valued conservation habitat and represent the best contiguous blocks of undisturbed or lightly disturbed habitat. Green Zones are second highest in priority classification, contain some disturbance, and are important for movement of species among the Red Zones. The White Zones contain the least amount of valuable habitat and have the lowest priority for conservation.</p>								
<p>Biological Resources Desert Renewable Energy Conservation Plan Area</p> <p>(The numbers shown are the total number of acres within 100 feet on either side of the High-Speed Rail centerline alignment.)</p>	1181 acres	1181 acres	1181 acres	1180 acres	1180 acres	1181 acres	1181 acres	1180 acres

Measurement Criteria	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6	Alternative 7	Alternative 8
Biological Resources Aquatic Resources National Hydrography Dataset (The numbers shown are the total number of stream crossings, stream miles, and acres within 100 feet on either side of the High-Speed Rail centerline alignment.)	Historic Lake Thompson Boundary (Although Historic Lake Thompson is currently a dry lakebed, claypans within the lakebed are remnants of the historic lake, and these are considered aquatic resources.) 353.54 acres	Historic Lake Thompson Boundary Same as Alternative 1.						
	Stream Crossings: 79	Stream Crossings: 79	Stream Crossings: 86	Stream Crossings: 86	Stream Crossings : 79	Stream Crossings: 79	Stream Crossings: 86	Stream Crossings: 86
	Stream Miles: 5.80 miles	Stream Miles: 5.80 miles	Stream Miles: 6.30 miles	Stream Miles: 6.30 miles	Stream Miles: 5.80 miles	Stream Miles: 5.80 miles	Stream Miles: 6.30 miles	Stream Miles: 6.30 miles
	Freshwater Emergent Wetland: 0.97 acre	Freshwater Emergent Wetland: 0.97 acre	Freshwater Emergent Wetland: 0.76 acre	Freshwater Emergent Wetland: 0.76 acre	Freshwater Emergent Wetland: 0.97 acre	Freshwater Emergent Wetland: 0.97 acre	Freshwater Emergent Wetland: 0.76 acre	Freshwater Emergent Wetland: 0.76 acre
	Freshwater Forested/Shrub: 0.46 acre	Freshwater Forested/Shrub: 0.46 acre	Freshwater Forested/Shrub: 0.10 acre	Freshwater Forested/Shrub: 0.10 acre	Freshwater Forested/Shrub: 0.46 acre	Freshwater Forested/Shrub: 0.46 acre	Freshwater Forested/Shrub: 0.10 acre	Freshwater Forested/Shrub: 0.10 acre
	Freshwater Pond: 0.74 acre	Freshwater Pond: 0.21 acre	Freshwater Pond: 0.74 acre	Freshwater Pond: 0.21 acre	Freshwater Pond: 0.74 acre	Freshwater Pond: 0.21 acre	Freshwater Pond: 0.74 acre	Freshwater Pond: 0.21 acre
	Riverine: 1.97 acres	Riverine: 2.31 acres	Riverine: 1.97 acres	Riverine: 2.31 acres	Riverine: 1.97 acres	Riverine: 2.31 acres	Riverine: 1.97 acres	Riverine: 2.31 acres
Biological Resources Tejon Ranch Conservation Lands (The numbers shown are the total number of acres within 100 feet on either side of the High-Speed Rail centerline alignment.)	Tejon Ranch White Wolf Acquisition Area + Conservation Easement (Ranchwide Management Plan): 171 acres	Same as Alternative 1						
Cultural Resources (The numbers shown are the total number of sites within 100 feet on either side of the High-Speed Rail centerline alignment.) Note: Based on the information provided by the records searches (i.e., strictly archival research), none of these archaeological/built environment resources are listed on, or determined eligible for inclusion in, the National Register or the California	10	10	11	11	11	12	12	12
The prehistoric and historic archaeological resources within the study boundary appear eligible for listing in the National Register for Historic Places; its status needs concurrence from Authority staff and the State Historic Preservation Officer. This information is based off records search data and survey coverage from previous cultural resources analyses.								

Measurement Criteria	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6	Alternative 7	Alternative 8
Register. However, the eligibility of these resources has not been formally assessed or undergone review through consultation with the State Historic Preservation Officer. Therefore, their eligibility status cannot be definitively identified at this time.								
Paleontological Resources (The numbers shown are the total number of acres within 100 feet on either side of the High-Speed Rail centerline alignment.)	1331 acres of High	1331 acres of High	1344 acres of High	1343 acres of High	1330 acres of High	1331 acres of High	1343 acres of High	1343 acres of High
	625 acres of Low/No	625 acres of Low/No	611 acres of Low/No	611 acres of Low/No	625 acres of Low/No	626 acres of Low/No	613 acres of Low/No	612 acres of Low/No
	Paleontological sensitivity consists of a three-tiered classification system to rank the sensitivity of geological formations containing fossil resources.							
	High Paleontological Sensitivity: Rock units that, based on previous studies, are known or likely to contain significant vertebrate, invertebrate, or plant fossils.							
	Low Paleontological Sensitivity: Sedimentary rock units that: (1) are potentially fossiliferous but have not yielded significant fossils in the past; (2) have not yielded fossils but have the potential to do so; or (3) contain common or widespread invertebrate fossils whose taxonomy, phylogeny, and ecology are well understood.							
No Paleontological Sensitivity: Rock units considered to have no potential to contain significant paleontological resources, such as rocks of intrusive igneous origin, most volcanic rocks, and moderate- to high-grade metamorphic rocks.								
Environmental Methodology Guidelines Version 5 (June 2014). Table 3.9-2								
Agricultural Lands (The numbers shown are the total number of acres within 100 feet on either side of the High-Speed Rail centerline alignment.)	Agricultural Land: Prime, Statewide and Unique	Agricultural Land: Prime, Statewide and Unique	Agricultural Land Prime, Statewide and Unique	Agricultural Land: Prime, Statewide and Unique	Agricultural Land: Prime, Statewide and Unique	Agricultural Land: Prime, Statewide and Unique	Agricultural Land: Prime, Statewide and Unique	Agricultural Land: Prime, Statewide and Unique
	1,056 acres	1,065 acres	1,054 acres	1,064 acres	1,056 acres	1,065 acres	1,056 acres	1,064 acres
	Grazing Land	Grazing Land	Grazing Land	Grazing Land	Grazing Land	Grazing Land	Grazing Land	Grazing Land
	879 acres	879 acres	878 acres	878 acres	879 acres	879 acres	879 acres	878 acres
Williamson Act Land 320 acres	Williamson Act Land	Williamson Act Land	Williamson Act Land	Williamson Act Land	Williamson Act Land	Williamson Act Land	Williamson Act Land	Williamson Act Land
	320 acres	316 acres	320 acres	316 acres	320 acres	316 acres	320 acres	316 acres
Community Resources Potentially Significant to Affected Communities (The numbers shown are the total number of facilities within 100 feet on either side of the High-Speed Rail centerline alignment.)	Existing	Existing	Existing	Existing	Existing	Existing	Existing	Existing
	0 Religious Facilities	0 Religious Facilities	0 Religious Facilities	0 Religious Facilities	1 Religious Facilities	1 Religious Facilities	1 Religious Facilities	1 Religious Facilities
	2 Government Facilities	2 Government Facilities	2 Government Facilities	2 Government Facilities	2 Government Facilities	2 Government Facilities	2 Government Facilities	2 Government Facilities
	0 Schools	0 Schools	0 Schools	0 Schools	1 School	1 School	1 School	1 School
	2 Bike Routes	2 Bike Routes	2 Bike Routes	2 Bike Routes	2 Bike Routes	2 Bike Routes	2 Bike Routes	2 Bike Routes
	6 Low-Income Housing	6 Low-Income Housing	6 Low-Income Housing	6 Low-Income Housing	6 Low-Income Housing	6 Low-Income Housing	6 Low-Income Housing	6 Low-Income Housing
	Facilities:	Facilities :	Facilities:	Facilities:	Facilities:	Facilities :	Facilities:	Facilities :
	Motel facilities potentially utilized for temporary housing	Motel facilities potentially utilized for temporary housing	Motel facilities potentially utilized for temporary housing	Motel facilities potentially utilized for temporary housing	Motel facilities potentially utilized for temporary housing	Motel facilities potentially utilized for temporary housing	Motel facilities potentially utilized for temporary housing	Motel facilities potentially utilized for temporary housing
	0 Parks	0 Parks	0 Parks	0 Parks	1 Park	1 Park	1 Park	1 Parks
	1 Healthcare Facility	1 Healthcare Facility	1 Healthcare Facility	1 Healthcare Facility	0 Healthcare Facility	0 Healthcare Facility	0 Healthcare Facility	0 Healthcare Facility
1 Retirement Facility	1 Retirement Facility	1 Retirement Facility	1 Retirement Facility	1 Retirement Facility	1 Retirement Facility	1 Retirement Facility	1 Retirement Facility	

Measurement Criteria	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6	Alternative 7	Alternative 8
Displacement of Community Resources Potentially Significant to Affected Communities (The numbers shown are the total number of facilities located within 100 feet on either side of the High-Speed Rail centerline alignment and would be potentially displaced.)	Proposed 0 Religious Facilities 0 Government Facilities 0 Schools 2 Bike Routes 0 Low-Income Housing Facilities 0 Parks 0 Healthcare Facilities	Proposed 0 Religious Facilities 0 Government Facilities 0 Schools 2 Bike Routes 0 Low-Income Housing Facilities 0 Parks 0 Healthcare Facilities	Proposed 0 Religious Facilities 0 Government Facilities 0 Schools 2 Bike Routes 0 Low-Income Housing Facilities 0 Parks 0 Healthcare Facilities	Proposed 0 Religious Facilities 0 Government Facilities 0 Schools 2 Bike Routes 0 Low-Income Housing Facilities 0 Parks 0 Healthcare Facilities	Proposed 0 Religious Facilities 0 Government Facilities 0 Schools 2 Bike Routes 0 Low-Income Housing Facilities 1 Park 0 Healthcare Facilities	Proposed 0 Religious Facilities 0 Government Facilities 0 Schools 2 Bike Routes 0 Low-Income Housing Facilities 1 Park 0 Healthcare Facilities	Proposed 0 Religious Facilities 0 Government Facilities 0 Schools 2 Bike Routes 0 Low-Income Housing Facilities 1 Park 0 Healthcare Facilities	Proposed 0 Religious Facilities 0 Government Facilities 0 Schools 2 Bike Routes 0 Low-Income Housing Facilities 1 Park 0 Healthcare Facilities
Change in Visual and Scenic Resources	Viaducts							
(The numbers shown are the total number of parcels located within 100 feet on either side of the High-Speed Rail centerline alignment.)	23	23	18	18	23	23	18	17
(The numbers shown are the total number of parcels located within 0.25 mile on either side of the High-Speed Rail centerline alignment.)	141	148	145	153	142	148	145	142
Embankments								
(The numbers shown are the total number of parcels located within 100 feet on either side of the High-Speed Rail centerline alignment within an embankment over 20 feet in height.)	86	86	88	89	86	86	88	88

Measurement Criteria	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6	Alternative 7	Alternative 8
(The numbers shown are the total number of parcels located within 0.25 mile on either side of the High-Speed Rail centerline alignment within an embankment over 20 feet in height.)	385	379	381	387	373	371	373	370
Total length in Miles of Embankments over 20 feet in height	27.67	26.80	26.07	25.20	27.67	26.80	26.07	25.20
	<p>Visual Character: The greatest potential for impacts to visual character is where the alignment has a high vertical profile, such as a viaduct.</p> <p>Views and Vistas: The presence of viaducts in the vicinity of areas with views and vistas would have the potential for adverse visual impacts.</p> <p>Potential visual impacts associated with the Bakersfield to Palmdale Section alignment alternatives are similar throughout the study area. This assessment focuses on a comparative analysis of areas where the alignment alternatives diverge most in terms of: (1) the location of the centerline (where one alternative might be closer to a sensitive visual resource than another), and (2) the proposed track type (viaduct, at-grade, or tunnel).</p> <p>For this analysis area, sensitive viewers are assumed to be residents and visitors to recreational areas. Therefore, residential areas and recreation sites and facilities within the project area represent sensitive viewing locations.</p>							
Noise and Vibration Number of Sensitive Receptors by Type and Total Number of Occurrence (The numbers shown are the total number of receptors within 100 feet on either side of the High-Speed Rail centerline alignment.)	Commercial: 5 Institutional: 0 Residential: 13 Total Number of Sensitive Noise Receptors: 18	Commercial: 5 Institutional: 0 Residential: 13 Total Number of Sensitive Noise Receptors: 18	Commercial: 5 Institutional: 0 Residential: 13 Total Number of Sensitive Noise Receptors: 18	Commercial: 5 Institutional: 0 Residential: 13 Total Number of Sensitive Noise Receptors: 18	Commercial: 2 Institutional: 1 Residential: 12 Total Number of Sensitive Noise Receptors: 15	Commercial: 2 Institutional: 1 Residential: 12 Total Number of Sensitive Noise Receptors: 15	Commercial: 2 Institutional: 1 Residential: 12 Total Number of Sensitive Noise Receptors: 15	Commercial: 2 Institutional: 1 Residential: 12 Total Number of Sensitive Noise Receptors: 15
	<p>The number of sensitive noise receptors is lower than the number of affected residential parcels described above on Page A-3 due to the difference in noise receptor criteria. The number of affected residential parcels is based on all parcel data. If the parcel was within the buffer area, it was counted as an affected residential parcel. In contrast, the noise receptors did not include every parcel, but only certain parcels deemed receptor parcels as determined by appropriate noise criteria.</p>							
Geotechnical Constraints (The numbers shown are the total number of miles within each fault zone crossed within the 200-foot buffer; or 100 feet on either side of the High-Speed Rail centerline.)	Antelope Valley Fault Zone: 1.3 miles Edison Fault Zone: 1 mile Garlock Fault Zone: 0.4 mile Rosamond Fault Zone: 0.3 mile Tehachapi Creek Fault Zone: 1.1 miles White Wolf Fault Zone: 1.2 miles	Antelope Valley Fault Zone: 1.3 miles Edison Fault Zone: 0.7 mile Garlock Fault Zone: 0.4 mile Rosamond Fault Zone: 0.3 mile Tehachapi Creek Fault Zone: 1.1 miles White Wolf Fault Zone: 1.2 miles	Antelope Valley Fault Zone: 1.3 miles Edison Fault Zone: 1 mile Garlock Fault Zone: 0.4 mile Rosamond Fault Zone: 0.3 mile Tehachapi Creek Fault Zone: 1.1 miles White Wolf Fault Zone: 1.2 miles	Antelope Valley Fault Zone: 1.3 miles Edison Fault Zone: 0.7 mile Garlock Fault Zone: 0.4 mile Rosamond Fault Zone: 0.3 mile Tehachapi Creek Fault Zone: 1.1 miles White Wolf Fault Zone: 1.2 miles	Antelope Valley Fault Zone: 1.3 miles Edison Fault Zone: 1 mile Garlock Fault Zone: 0.4 mile Rosamond Fault Zone: 0.3 mile Tehachapi Creek Fault Zone: 21.1 miles White Wolf Fault Zone: 1.2 miles	Antelope Valley Fault Zone: 1.3 miles Edison Fault Zone: 0.7 mile Garlock Fault Zone: 0.4 mile Rosamond Fault Zone: 0.3 mile Tehachapi Creek Fault Zone: 1.1 miles White Wolf Fault Zone: 1.2 miles	Antelope Valley Fault Zone: 1.3 miles Edison Fault Zone: 1 mile Garlock Fault Zone: 0.4 mile Rosamond Fault Zone: 0.3 mile Tehachapi Creek Fault Zone: 1.1 miles White Wolf Fault Zone: 1.2 miles	Antelope Valley Fault Zone: 1.3 miles Edison Fault Zone: 0.7 mile Garlock Fault Zone: 0.4 mile Rosamond Fault Zone: 0.3 mile Tehachapi Creek Fault Zone: 1.1 miles White Wolf Fault Zone: 1.2 miles
Fire Hazard at the State Classification Level	<p>Fire risk was analyzed using data from the California State Fire and Resource Assessment Program. Fire risk is very similar among the Bakersfield to Palmdale Section alignment alternatives. There is little to no risk within the urbanized areas of Lancaster and Palmdale. The length of the High-Speed Rail alignment within each of these fire risk zones is listed below:</p>							

Measurement Criteria	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6	Alternative 7	Alternative 8
(The numbers shown are the total number of miles within 100 feet on either side of the High-Speed Rail centerline alignment.)	Very High: 0 mile High: 19.6 miles Moderate: 25.1 miles	Very High: 0 mile High: 19.6 miles Moderate: 25.2 miles	Very High: 0.4 mile High: 20.9 miles Moderate: 23.4 miles	Very High: 0.4 mile High: 20.9 miles Moderate: 23.5 miles	Very High: 0 mile High: 19.6 miles Moderate: 25.1 miles	Very High: 0 mile High: 19.6 Moderate: 25.2 miles	Very High: 0.4 mile High: 20.9 miles Moderate: 23.4 miles	Very High: 0.4 mile High: 20.9 miles Moderate: 23.5 miles
Hydrology and Water Resources (The numbers shown are the total number of miles within each flood zone crossed within the 200-foot buffer; or 100 feet on either side of the High-Speed Rail centerline.)	Flood Zone A 18.0 miles Flood Zone AH 0.8 mile Flood Zone AO 2.5 miles Total Flood Zone 21.2 miles	Flood Zone A 18.0 miles Flood Zone AH 0.8 mile Flood Zone AO 2.5 miles Total Flood Zone 21.2 miles	Flood Zone A 17.8 miles Flood Zone AH 0.8 mile Flood Zone AO 2.5 miles Total Flood Zone 21.1 miles	Flood Zone A 17.8 miles Flood Zone AH 0.8 mile Flood Zone AO 2.5 miles Total Flood Zone 21.1 miles	Flood Zone A 18.0 miles Flood Zone AH 0.8 mile Flood Zone AO 2.5 miles Total Flood Zone 21.3 miles	Flood Zone A 18.0 miles Flood Zone AH 0.8 mile Flood Zone AO 2.5 miles Total Flood Zone 21.3 miles	Flood Zone A 17.8 miles Flood Zone AH 0.8 mile Flood Zone AO 2.5 miles Total Flood Zone 21.1 miles	Flood Zone A 17.8 miles Flood Zone AH 0.8 mile Flood Zone AO 2.5 miles Total Flood Zone 21.1 miles
Flood Zone A: Areas subject to inundation by the 1-percent-annual-chance flood event generally determined using approximate methodologies. Because detailed hydraulic analyses have not been performed, no base flood elevations or flood depths are shown. Flood Zone AH: Areas subject to inundation by 1-percent-annual-chance shallow flooding (usually areas of ponding) where average depths are between 1 and 3 feet. Base flood elevations derived from detailed hydraulic analyses are shown in this zone. Flood Zone AO: Areas subject to inundation by 1-percent-annual-chance shallow flooding (usually sheet flow on sloping terrain) where average depths are between 1 and 3 feet. Average flood depths derived from detailed hydraulic analyses are shown in this zone.								
Oil, Gas, and Geothermal Resources (The numbers shown are the total number of wells within 100 feet on either side of the High-Speed Rail centerline alignment.)	There are 7 wells and their associated sedimentary basins with oil, gas, and geothermal production.	There are 6 wells and their associated sedimentary basins with oil, gas, and geothermal production.	There are 7 wells and their associated sedimentary basins with oil, gas, and geothermal production.	There are 6 wells and their associated sedimentary basins with oil, gas, and geothermal production.	There are 7 wells and their associated sedimentary basins with oil, gas, and geothermal production.	There are 6 wells and their associated sedimentary basins with oil, gas, and geothermal production.	There are 7 wells and their associated sedimentary basins with oil, gas, and geothermal production.	There are 6 wells and their associated sedimentary basins with oil, gas, and geothermal production.

HCP = Habitat Conservation Plan  
 National Register = National Register of Historic Places  
 SR = State Route  
 TBD = To be determined  
 UPRR = Union Pacific Railroad  
 VFHCP = Valley Floor Habitat Conservation Plan

**APPENDIX C**  
**SUMMARY OF BAKERSFIELD TO PALMDALE PROJECT**  
**SECTION KEY STAKEHOLDER OUTREACH MEETINGS**  
**(JANUARY 2012–DECEMBER 2015)**

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**Table C-1 Summary of Bakersfield to Palmdale Section Key Stakeholder Outreach Meetings (January 2012–December 2015)**

No.	Date	Meeting	Category <sup>1</sup>	County
1	January 5, 2012	Tehachapi Mountain Democratic Club	GIO	Kern
2	March 21, 2012	Rosamond Community Services District	STO	Kern
3	March 22, 2012	City of Lancaster	EL	Los Angeles
4	March 22, 2012	United States Air Force Plant 42 Defense Contractors	STO	Los Angeles
5	April 19, 2012	Greater Antelope Valley Economic Alliance	STO	Los Angeles
6	May 9, 2012	Greater Antelope Valley Association of Realtors	STO	Los Angeles
7	May 15, 2012	Kern County Farm Bureau (Ben McFarland, President)	AS	Kern
8	May 16, 2012	City of Tehachapi	AS	Kern
9	June 19, 2012	Metrolink	AS	Los Angeles
10	June 26, 2012	Sempra	STO	Los Angeles
11	June 26, 2012	United States Air Force Plant 42 Defense Contractors	STO	Kern
12	June 27, 2012	Southern California Edison	STO	Los Angeles
13	June 28, 2012	Los Angeles Department of Water and Power	STO	Los Angeles
14	August 23, 2012	Rosamond Community Services District /Municipal Advisory Council	STO	Kern
15	August 23, 2012	Kern Wind Energy Association	STO	Kern
16	August 23, 2012	City of Lancaster	AS	Los Angeles
17	August 28, 2012	Los Angeles County Supervisor Mike Antonovich	EL	Los Angeles
18	August 28, 2012	Los Angeles County Sanitation Districts	AS	Los Angeles
19	October 9, 2012	United States Air Force Plant 42	STO	Kern
20	October 10, 2012	Rosamond Community Services District	STO	Kern
21	October 10, 2012	City of Lancaster	AS	Los Angeles
22	October 11, 2012	City of Palmdale	AS	Los Angeles
23	January 8, 2013	City of Palmdale	EL	Los Angeles
24	January 9, 2013	Antelope Valley Transportation Summit	PWG	Los Angeles
25	January 14, 2013	Los Angeles County Supervisor Mike Antonovich	EL	Los Angeles
26	January 15, 2013	City of Lancaster	AS	Los Angeles
27	January 15, 2013	City of Palmdale	AS	Los Angeles
28	January 30, 2013	Kern County Planning Department	AS	Kern
29	January 30, 2013	Kern County Roads Department	AS	Kern
30	January 30, 2013	Kern County Farm Bureau	STO	Kern

No.	Date	Meeting	Category <sup>1</sup>	County
31	January 31, 2013	City of Tehachapi	AS	Kern
32	January 31, 2013	Lehigh Southwest Cement Plant	STO	Kern
33	February 6, 2013	University of Antelope Valley	STO	Los Angeles
34	February 6, 2013	United States Air Force Plant 42	STO	Los Angeles
35	March 6, 2013	National Chavez Center	STO	Kern
36	March 6, 2013	Loop Ranch	STO	Kern
37	March 6, 2013	Tejon Ranch	STO	Kern
38	March 7, 2013	Edison Agricultural Businesses	TWG	Kern
39	March 7, 2013	Edison Middle School	STO	Kern
40	March 14, 2013	Kern County Planning and Community Development	AS	Kern
41	March 14, 2013	City of Tehachapi	AS	Kern
42	April 10, 2013	Willow Springs Raceway	STO	Kern
43	April 10, 2013	Bureau of Land Management – Ridgecrest Office	AS	Kern
44	April 11, 2013	Community of Rosamond	AS	Kern
45	April 11, 2013	Cummings Ranch (Steve Cummings)	STO	Kern
46	April 17, 2013	Antelope Valley Transportation Summit	PWG	Los Angeles
47	May 6, 2013	Union Pacific Railroad	STO	Sacramento
48	May 14, 2013	City of Lancaster	AS	Los Angeles
49	May 14, 2013	Los Angeles Supervisor Antonovich (Norm Hickling)	EL	Los Angeles
50	August 21, 2013	Los Angeles County Sanitation Districts	AS	Los Angeles
51	September 11, 2013	Palmdale Water District Presentation	GIO	Los Angeles
52	September 24, 2013	Antelope Valley Board of Trade Monthly Luncheon	GIO	Los Angeles
53	October 2, 2013	Antelope Valley Transportation Summit	PWG	Los Angeles
54	October 2, 2013	California Department of Transportation, District 6	AS	Kern
55	October 17, 2013	Kern County Fire Department	AS	Kern
56	November 14, 2013	Antelope Valley Board of Trade Transportation Committee Meeting	STO	Los Angeles
57	November 19, 2013	American Public Works Association – AV Chapter	GIO	Los Angeles
58	November 2013	EDF Renewable Energy – Avalon and Catalina Wind Farms	STO	Kern
59	April 16, 2014	City of Palmdale Coordination Meeting	AS	Los Angeles

No.	Date	Meeting	Category <sup>1</sup>	County
60	April 16, 2014	City of Lancaster Coordination Meeting	AS	Los Angeles
61	April 16, 2014	Office of Assembly Member Fox Briefing	EL	Los Angeles
62	April 23, 2014	Antelope Valley Transportation Summit	TWG	Los Angeles
63	April 23, 2014	High Desert Corridor/Xwest /AV Transit Meeting	TAG	Los Angeles
64	May 27, 2014	Steve Perez, Rosamond Community Services District	AS	Los Angeles
65	May 27, 2014	Antelope Valley Board of Trade Transportation Committee Leadership	STO	Los Angeles
66	May 29, 2014	United States Air Force Plant 42	STO	Los Angeles
67	June 19, 2014	California Public Agencies Procurement Summit	GIO	Los Angeles
68	July 9, 2014	Antelope Valley Transportation Summit	TWG	Los Angeles
69	July 9, 2014	Office of Senator Steve Knight	EL	Los Angeles
70	July 14, 2014	City of Palmdale Coordination Meeting	AS	Los Angeles
71	July 23, 2014	Antelope Valley Democratic Club	STO	Los Angeles
72	July 28, 2014	Kern County Farm Bureau	STO	Kern
73	July 28, 2014	Kern County Separation Grade District/Kern COG	STO	Kern
74	July 28, 2014	Kern Transportation Foundation	STO	Kern
75	July 28, 2014	Office of Supervisor Zack Scrivner Briefing	EL	Kern
76	July 28, 2014	Kern County Planning and Community Development	AS	Kern
77	August 22, 2014	California Black Chamber of Commerce Business and Economic Summit	STO	Los Angeles
78	August 27, 2014	North County Transportation Coalition	TAG/TWG	Los Angeles
79	August 28, 2014	Kern County Supervisor Leticia Perez	EL	Kern
80	September 5, 2014	Mobility 21 Summit	STO	Los Angeles
81	September 16, 2014	California High-Speed Rail Authority Board Meeting	PIM	Los Angeles
82	September 17, 2014	Los Angeles County Economic Development Corporation SoCal Jobs Defense Council	TAG/TWG	Los Angeles
83	October 3, 2014	Regional Hispanic Chamber of Commerce – Southern California Business Development Conference	STO	Los Angeles
84	October 6-7, 2014	Los Angeles Cleantech Incubator Cleantech Global Showcase 2014	STO	Los Angeles
85	October 9, 2014	The Women's and Girls' Fund Reception	STO	Kern
86	October 10, 2014	Greater Bakersfield Chamber of Commerce	TAG/TWG	Kern
87	October 10, 2014	California State University, Bakersfield	STO	Kern

No.	Date	Meeting	Category <sup>1</sup>	County
88	October 10, 2014	Office of Kern County Supervisor Mike Maggard, 3 <sup>rd</sup> District	EL	Kern
89	October 11, 2014	Neighborhood Sustainability Symposium	STO	Los Angeles
90	October 15, 2014	City of Palmdale Coordination Meeting	AS	Los Angeles
91	October 15, 2014	City of Lancaster Coordination Meeting	AS	Los Angeles
92	October 23, 2014	Successful Women in Business Leadership and Procurement Conference	STO	Los Angeles
93	October 23, 2014	Orange County Transportation Authority Business Expo	STO	Orange
94	October 29, 2014	Antelope Valley Transportation Summit	TAG/TWG	Los Angeles
95	December 2, 2014	High-Speed Rail Conference	STO	Los Angeles
96	December 12, 2014	Antelope Valley African-American Chamber of Commerce – Monthly Business Luncheon and Business Showcase	STO	Los Angeles
97	December 13, 2014	Anaheim Regional Transportation Intermodal Center Station Grand Opening	STO	Los Angeles
98	January 14, 2015	Antelope Valley Transportation Summit	TWG	Los Angeles
99	February 24, 2015	CalPortland Cement Company	P	Los Angeles
100	February 27, 2015	Antelope Valley 2015 Business Outlook Conference	P	Los Angeles
101	March 4, 2015	Greater Tehachapi Economic Development Council	STO	Kern
102	March 4, 2015	City of Tehachapi	AS	Kern
103	March 4, 2015	Cummings Ranch	P	Kern
104	March 4, 2015	National Chavez Center	STO	Kern
105	March 12, 2015	Tejon Ranch	STO	Kern
106	March 12, 2015	Kern County Farm Bureau	STO	Kern
107	March 12, 2015	Edison Elementary School District	STO	Kern
108	March 12, 2015	Kern County Planning and Community Development	AS	Kern
109	April 7, 2015	Building Ladders of Opportunity – A Pathway to Transportation	STO	Los Angeles
110	April 13, 2015	Rosamond Community Services District	AS	Kern
111	April 18–19, 2015	California Poppy Festival	P	Los Angeles
112	April 22, 2015	City of Tehachapi	AS	Kern
113	May 1–3, 2015	Women Building the Nation Conference	P	Los Angeles
114	May 4, 2015	City of Tehachapi Briefing	EL	Kern
115	May 6, 2015	Antelope Valley Transportation Summit	TWG	Los Angeles

No.	Date	Meeting	Category <sup>1</sup>	County
116	May 6, 2015	University of Antelope Valley	STO	Los Angeles
117	May 6, 2015	City of Lancaster Coordination Meeting	AS	Los Angeles
118	May 21, 2015	Women Can Build!	STO	Los Angeles
119	May 26, 2015	Antelope Valley Board of Trade – Monthly Business Luncheon	STO	Los Angeles
120	May 26, 2015	Meet and Greet – Rosamond Municipal Advisory Council	EL	Los Angeles
121	May 27–30, 2015	Sustainatopia	STO	Los Angeles
122	May 28, 2015	Mojave Chamber of Commerce – Monthly Meeting	STO	Los Angeles
123	June 2, 2015	CalPortland Cement Company	STO	Los Angeles
124	June 2, 2015	2015 Small Business Awards	STO	Los Angeles
125	June 16, 2015	Greater Tehachapi Chamber of Commerce Monthly Networking Luncheon	STO	Kern
126	June 22, 2015	City of Lancaster	EL	Los Angeles
127	June 24, 2015	University of Antelope Valley	STO	Los Angeles
128	June 24, 2015	City of Lancaster Coordination Meeting	EL	Los Angeles
129	July 2, 2015	Tehachapi Area Association of Realtors – General Membership Meeting	STO	Kern
130	July 16, 2015	Rosamond Municipal Advisory Council/Rosamond Chamber of Commerce	STO	Kern
131	July 30, 2015	Kern Wind Energy Association	STO	Kern
132	August 4, 2015	CalPortland Cement Company	STO	Los Angeles
133	August 5, 2015	Antelope Valley Transportation Summit	TWG	Los Angeles
134	September 8, 2015	R. Rex Parris, Mayor, City of Lancaster	STO	Los Angeles
135	September 15, 2015	Tehachapi Stakeholder Working Group Meeting	TWG	Kern
136	September 15, 2015	Edison Stakeholder Working Group Meeting	TWG	Kern
137	September 16, 2015	Rosamond Stakeholder Working Group Meeting	TWG	Kern
138	September 17, 2015	Lancaster Stakeholder Working Group Meeting	TWG	Los Angeles
139	September 26–27, 2015	Streets of Lancaster	P	Los Angeles
140	September 30, 2015	Edison Community Open House	PIM	Kern

No.	Date	Meeting	Category <sup>1</sup>	County
141	October 1, 2015	Tehachapi Community Open House	PIM	Kern
142	October 5, 2015	Mojave Community Open House	PIM	Kern
143	October 6, 2015	Brookfield Renewable Energy	STO	Kern
144	October 6, 2015	Rosamond Community Open House	PIM	Kern
145	October 7, 2015	Lancaster Community Open House	PIM	Los Angeles
146	November 2, 2015	Presentation to Lancaster High School STEM Students	STO	Los Angeles
147	November 3, 2015	Windland, Inc.	STO	Kern
148	November 4, 2015	Antelope Valley Transportation Summit	TWG	Los Angeles
149	November 5, 2015	Tribal Meeting	TWG	Kern
150	November 10, 2015	Traffic Analysis Kick-Off Conference Call (Tehachapi)	AS	Kern
151	November 10, 2015	Traffic Analysis Kick-Off Conference Call (Kern County)	AS	Kern
152	November 10, 2015	Traffic Analysis Kick-Off Conference Call (Bakersfield)	AS	Kern
153	November 12, 2015	Traffic Analysis Kick-Off Conference Call (Lancaster)	AS	Los Angeles
154	November 24, 2015	NRG Renew, LLC	STO	Los Angeles
155	December 3, 2015	Valley Small Business and Construction Report Business, Transportation and Construction Expo	P	Los Angeles
156	December 9, 2015	Smart Growth-Tehachapi Valleys	STO	Kern

<sup>1</sup> Category Key: AS = Agency Staff; EL = Elected; GIO = General Interest Organization; M = Media; P = Public; PIM = Public Information Meeting; PWG = Policy Working Group; SM = Scoping Meeting; STO = Stakeholder Organization; TAG/TWG = Technical Assessment Group/Technical Working Group