2 ALTERNATIVES

2.1 Introduction

This chapter describes each of the six Build Alternatives and the No Project Alternative that the California High-Speed Rail (HSR) Authority (Authority) is considering in this Draft Environmental Impact Report/Environmental Impact Statement (EIR/EIS). This chapter addresses the following topics:

- Environmental context for the Palmdale to Burbank Project Section
- The background and development of the California HSR System and the Palmdale to Burbank Project Section
- A general description of California HSR System infrastructure and the individual components of the Palmdale to Burbank Project Section Build Alternatives
- Potential alternatives considered during the alternatives screening process and not carried forward for full evaluation in this Draft EIR/EIS
- The No Project (No Action) Alternative and each of the six Build Alternatives evaluated in this Draft EIR/EIS, which include the Refined SR14, SR14A, E1, E1A, E2, and E2A Build Alternatives described in Section 2.5
- Travel demand and ridership forecasts
- Operations and service plan
- Construction plan and phased implementation strategy
- Permits and approvals required

The following appendices provide more detailed information on the Palmdale to Burbank Project Section:

- Appendix 2-A, Road Crossings, Closures, and Detours
- Appendix 2-B, Railroad Crossings
- Appendix 2-C, Operations and Service Plan
- Appendix 2-D, Applicable Design Standards
- Appendix 2-E, Impact Avoidance and Minimization Features
- Appendix 2-F, Summary of Requirements for Maintenance Facilities
- Appendix 2-G, Emergency and Safety Plans
- Appendix 2-H, Regional and Local Policy Consistency Analysis
- Appendix 2-I, Potential Disposal Plan for Spoils Generated during Construction Activities

2.1.1 Context for the Palmdale to Burbank Project Section

Implementing an HSR system in the Palmdale to Burbank Project Section region presents unique challenges in terms of topography, natural resources, and the human environment that have shaped the development of the alternatives.

2.1.1.1 Topography

The Palmdale to Burbank Project Section region encompasses diverse topography and substantial changes in elevation, extending from the Antelope Valley, through and under the San Gabriel Mountains, and into the San Fernando Valley. The southern boundary of the Antelope Valley is a broad, relatively flat, closed basin at the western edge of the Mojave Desert. Typical elevations in the Antelope Valley range between 2,270 and 3,500 feet above mean sea level. The Antelope Valley is largely bordered by the San Gabriel Mountains to the southwest, which reach elevations greater than 10,000 feet above mean sea level. The San Gabriel Mountains experience regular seismic activity from multiple hazardous fault complexes in the region. Active uplift and erosion in this area has produced steep canyons, rugged topography, landslide deposits, and extensive alluvial sedimentation. The San Fernando Valley is a lowland plain southwest of the San Gabriel Mountains with elevations ranging from 250 to 1,200 feet above mean sea level. Notable geologic features in this valley include the San Fernando and Verdugo Fault Zones.

The dramatic changes in elevation along with other topographical features in each of these areas pose challenges for each of the six Build Alternative alignments to meet engineering standards. A direct route across the San Gabriel Mountains would exceed the established vertical gradient and pose a danger from landslides for the Build Alternatives and their immediate surroundings. Additionally, the earthquake faults in the Palmdale to Burbank Project Section region create a hazard for potential alignments. To reduce seismic risks associated with earthquakes, the alignment must achieve appropriate gradients and must include design features to minimize hazards resulting from seismic activity, particularly at fault crossings.

2.1.1.2 Natural Resources

Differing levels of biologic diversity are associated with the varying topography and land uses in the Palmdale to Burbank Project Section region. The urbanized areas of Palmdale and the San Fernando Valley contain fewer sensitive biological resources compared to the undeveloped expanse of the San Gabriel Mountains, which contains a greater array and concentration of sensitive biological resources within the Angeles National Forest (ANF), including the San Gabriel Mountains National Monument (SGMNM).

> *U.S. Forest Service Lands*
>
> The San Gabriel Mountains National Monument (SGMNM) is located within northern portions of the Angeles National Forest (ANF) and the San Bernardino National Forest. As none of the six Build Alternative alignments would traverse the San Bernardino National Forest, this document uses the terminology “ANF including the SGMNM” when referring to conditions shared between the two jurisdictions and “ANF” for conditions specific to the ANF.

Within the Antelope Valley, large areas of undeveloped and natural lands surround the urban and suburban communities of Lancaster and Palmdale and contain areas with sensitive biological resources. Regional wildlife movement is constrained within the Antelope Valley because of urbanization and habitat fragmentation.

The San Gabriel Mountains contain substantial natural resources. Vast areas of alpine and subalpine habitats remain intact and undisturbed because large areas of the San Gabriel Mountains benefit from certain protections afforded lands that are part of the National Forest system. The ANF is managed by the U.S. Forest Service (USFS) consistent with its land management plans. Among the objectives of these land management plans are the protection and conservation of natural resources. In 2014, President Obama designated several hundred thousand acres of the ANF and a portion of the neighboring San Bernardino National Forest as the SGMNM. National monument status affords additional protections to historic landmarks, historic and prehistoric structures, and other objects of historic or scientific interest within the designated monument area. Comparatively, the valley west of the San Gabriel Mountains (separating the San Gabriel Mountains from the Sierra Pelona Mountains) contains suburban development—including the communities of Agua Dulce, Acton, and Santa Clarita—as well as transportation corridors (notably, State Route (SR) 14 freeway and the Metrolink Antelope Valley line).

Most of the land in the San Fernando Valley is developed, with limited open space other than established parks and recreational areas. Although areas with sensitive biological resources is limited in most of the San Fernando Valley, this area contains the Big Tujunga Wash and the Tujunga Valley/Hansen Dam Significant Ecological Area, which contain biological resources of local, regional, and statewide significance, and which provide wildlife movement corridors. The San Fernando Valley perimeter also includes relatively undisturbed areas that provide a transition into natural open spaces, including the Verdugo Mountains and the San Gabriel Mountains.

There are three major watersheds within the project area: the Antelope Valley Watershed, the Santa Clara River Watershed, and the Los Angeles River Watershed. Prominent water features within the project area include the Santa Clara River, Lake Palmdale, Una Lake, Big Tujunga Wash, Aliso Canyon, and Arrastre Canyon. These watersheds provide corridors and linkage zones that are essential for connectivity and resource values within the historical movement zones for local wildlife.

2.1.1.3 Human Environment

The Palmdale to Burbank Project Section region encompasses dense urban centers, rural communities, suburban single-family residential neighborhoods, and large areas of the sparsely populated ANF, including the SGMNM.

Unincorporated, low-density, rural residential communities south of Palmdale include Acton and Agua Dulce. South of Palmdale, one significant community facility in this area is Vasquez High School, near the intersection of Sierra Highway and Red Rover Mine Road.

About halfway between Palmdale and Burbank is the City of Santa Clarita. Santa Clarita is the third-largest City in Los Angeles County and consists of predominantly suburban residential development. To the east and south of Santa Clarita is the ANF, which was established as a national forest in 1892. The ANF encompasses approximately 700,000 acres. On October 10, 2014, President Barack Obama created the SGMNM, which comprises 342,177 acres of the ANF and 4,002 acres of the neighboring San Bernardino National Forest. The ANF offers substantial recreation opportunities, including visitor amenities, hiking trails, skiing trails, picnic areas, horseback riding, and campgrounds. Many of these recreational opportunities are located within the SGMNM. The ANF, including the SGMNM, also contains residential “in-holdings,” which are parcels of private land on which residences have been constructed. These in-holdings are scattered throughout the ANF, including the SGMNM, with many concentrated along Little Tujunga Canyon Road.

The San Fernando Valley is at the southern end of the Palmdale to Burbank Project Section region and consists of several dense urban areas (Glendale, Burbank, San Fernando, Panorama City, North Hollywood, and Van Nuys).The San Fernando Valley is diverse in both ethnicity and income levels. The Hollywood Burbank Airport (formerly Bob Hope Airport) is located in the City of Burbank at the southern end of the Palmdale to Burbank Project Section and is the location of a proposed HSR station.

2.1.2 Independent Utility

As discussed in Chapter 1, Project Purpose, Need, and Objectives, following the Tier 1 decisions, the Authority and FRA divided the California HSR System into individual project sections for Tier 2 planning, environmental review, and decision-making (see Figure 1-2 in Chapter 1). The Authority, consistent with regulations issued by the Federal Highway Administration (FHWA) and Federal Transit Administration, considered three criteria when determining the scope of a project to be considered in an EIS: (1) whether it connects “logical termini” and has “sufficient length to address environmental matters on a broad scope”; (2) whether it has “independent utility or independent significance,” meaning that it will “be usable and be a reasonable expenditure even if no additional transportation improvements in the area are made”; and (3) whether it will “restrict consideration of alternatives for other reasonably foreseeable transportation improvements” (23 Code of Federal Regulations 771.111(f)). FHWA defines *logical termini* as the rational starting and ending points for a transportation improvement project and for review of the environmental impacts of the project (FHWA 1993).[1] The Palmdale to Burbank Project Section connects logical termini at planned passenger stations where HSR service could be provided: at the Palmdale Transportation Center (Palmdale TC) to the north and at Hollywood Burbank Airport to the south.

[1] The FHWA criteria for determining project scope, as established in 23 Code of Federal Regulations 771.111(f), do not specifically address the scope of individual projects considered in the second tier of a tiered NEPA process. With the tiered NEPA process, the same general principles apply, but they are applied in the context of the decisions made in Tier 1 (in this case, the decision to build the California HSR System as a whole). Therefore, in determining the scope of individual project sections for Tier 2 studies, the Authority has focused primarily on determining whether each project section could serve a useful transportation purpose on its own and ensuring that a decision in one project section does not limit consideration of reasonable alternatives for completing the California HSR System in an adjacent project section for which the NEPA process has not yet been completed.

The Palmdale TC currently offers connections between Antelope Valley Transit Authority local and commuter bus services, Metrolink commuter rail service, Santa Clarita Transit, Greyhound bus service, and Amtrak Thruway bus service. If other sections of the California HSR System are not completed, the Palmdale to Burbank Project Section has independent utility because the infrastructure could be used by regional and intercity services to improve their capacity, reliability, and performance (Authority 2009a).

2.2 Background

2.2.1 California High-Speed Rail System Background

The Authority is responsible for planning, designing, constructing, and operating the California HSR System. The Authority's statutory mandate under the High-Speed Rail Act is to develop an HSR system coordinated with California's existing transportation network, which includes intercity rail and bus lines, regional commuter rail lines, urban rail and bus transit lines, highways, and airports. The California HSR System will use electrically powered, high-speed, steel-wheel-on-steel rail technology with trains capable of operating up to 200 miles per hour over a fully grade-separated, dedicated track alignment. Figure 1-1 in Chapter 1, Project Purpose, Need, and Objectives, depicts the California HSR System and Phase 1 and Phase 2 of its implementation. Figure 1-2 in Chapter 1depicts the individual project sections, including the Palmdale to Burbank Project Section.

2.2.2 Palmdale to Burbank Project Section Background

The Palmdale to Burbank Project Section is a critical link in the Phase 1 California HSR System connecting San Francisco and the Bay Area to Los Angeles and Anaheim. In 2005, the Authority relied on the Statewide Program EIR/EIS (see Section 1.1.2) to select the Soledad Canyon and Los Angeles County Metropolitan Transportation Authority (Metro)/Metrolink corridors for further study between Palmdale and Burbank. As shown on Figure 2-1, this was a geographic area that was the focus of the public scoping process in 2007 (see Section 2.4). An important consideration at the time was the Authority's choice to serve the Antelope Valley with HSR service rather than bypassing it by selecting a corridor that proceeds south from Bakersfield along I-5 (see Section 2.4.2.2).

Source: Authority 2007

Figure 2-1 Los Angeles to Palmdale Project Section

The Tier 1 decision formed the basis for the Authority's Tier 2 planning and environmental analysis. The Tier 2 planning process, described in detail in Section 2.4.2.2, included scoping and alternatives development for a section initially defined as Palmdale to Los Angeles, followed by a redefinition of the section as the Palmdale to Burbank Project Section. Early alternatives developed focused on routes following the SR 14 freeway corridor from the Antelope Valley to Santa Clarita, and then the Metrolink and the Union Pacific railroad corridor through the San Fernando Valley to Burbank. During scoping in 2014, the Authority received comments regarding impacts on communities along the Metrolink corridor in the San Fernando Valley, along with requests for the Authority to consider alternatives to avoid or reduce these effects. The Authority also received requests to evaluate alignments that included tunnels through/near Acton and Santa Clarita. The use of tunnels in this area would avoid a recently approved job creation center, existing neighborhoods, and two elementary schools located close to the SR 14 alignment at that time. In order to avoid these community facilities, the Authority evaluated alternatives that would cross the San Gabriel Mountains. Given the topography of the area, the only feasible option would be the use of tunnels. Based on this analysis and input from associated communities through community meetings, briefings, and presentations for the Palmdale to Burbank Project Section, the Authority decided to proceed forward with alternatives that deviated from the SR 14 corridor to varying degrees. These alternatives involved the use of tunnels under the San Gabriel Mountains to reduce impacts on communities along the SR 14 freeway and in the northern portion of the San Fernando Valley, while still reaching the Burbank Airport Station. In the 2015 Supplemental Alternatives Analysis (SAA) Report, the Authority brought forth the east corridor alternatives. Based on the analysis in the 2015 SAA, the Authority determined that alignments that would tunnel under the San Gabriel Mountains would be feasible based upon additional research regarding tunnels nationally and internationally. During this time, the Authority also decided to eliminate from further consideration other station location alternatives under consideration within the San Fernando Valley, deciding to carry forward the Burbank Airport Station location for evaluation in the Draft EIR/EIS.

The six Build Alternatives described in this chapter have evolved since the 2005 Tier 1 decisions, based on the lengthy planning, public outreach, and design effort; however, they are largely consistent with the Tier 1 decisions, particularly in their focus on serving the Antelope Valley with an HSR station in Palmdale. Two Build Alternatives (the Refined SR14 and SR14A Build Alternatives) utilize the selected Tier 1 corridors, with modifications. Four Build Alternatives (E1, E1A, E2, and E2A Build Alternatives) utilize a corridor to the east (Figure 2-2).

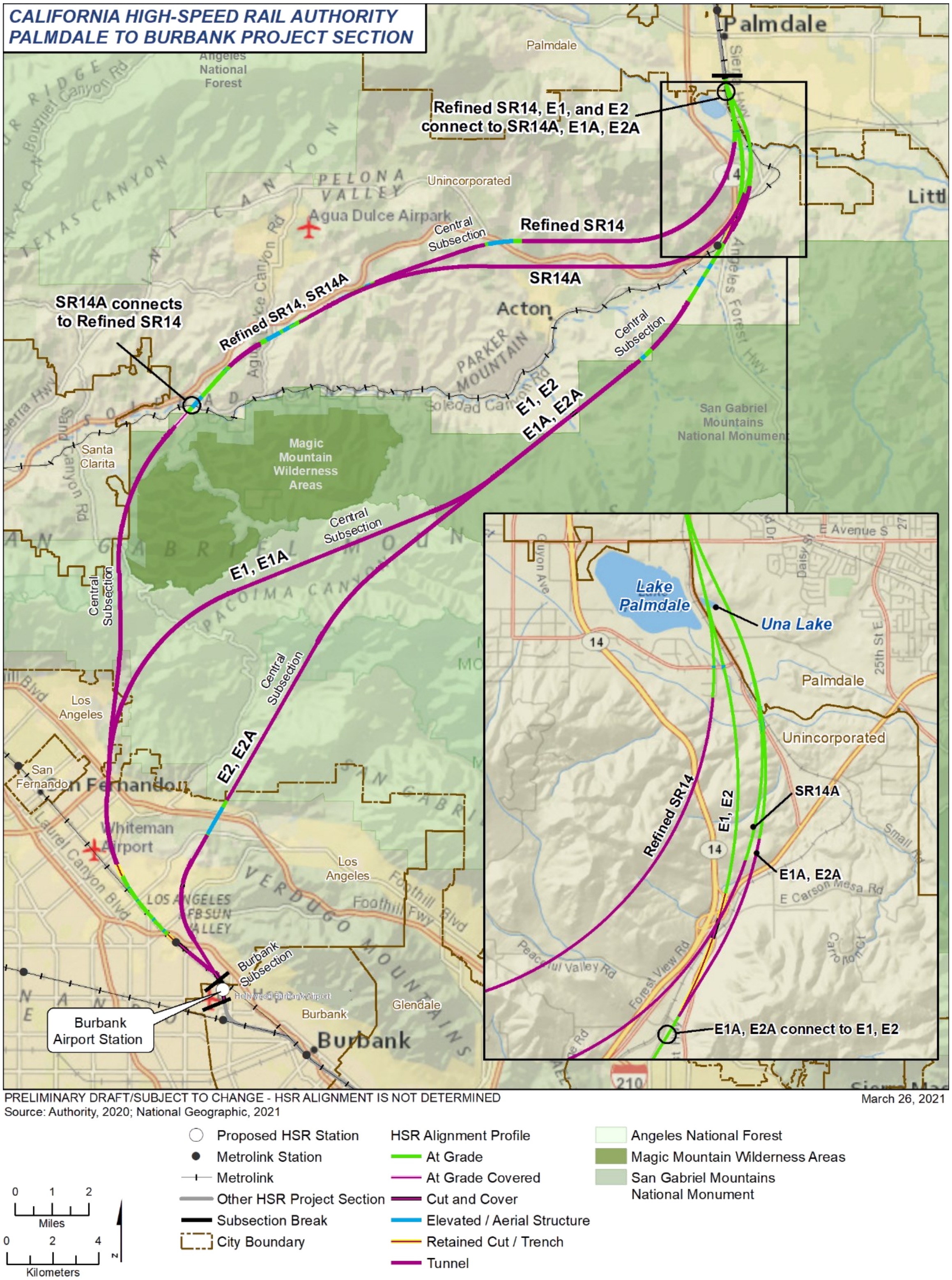


Figure 2-2 Palmdale to Burbank Project Section Build Alternatives and Stations

2.3 High-Speed Rail System Infrastructure

The following section provides general information about the performance criteria, infrastructure components and systems, and function of the proposed California HSR System as a whole. Refer to Section 2.5.2.2 for discussion of modifications to state highways and existing railroad facilities required for the Palmdale to Burbank Project Section. Detailed information on each of the six Build Alternatives considered in the Palmdale to Burbank Project Section is provided in Section 2.5.3, including alignment, traction power, utility power, station location, and modifications to existing roadway and railroad facilities specific to each of the six Build Alternatives. As mentioned above, the California HSR System is envisioned as a state-of-the-art, electrically powered, high-speed, steel-wheel-on-steel-rail technology, which would employ the latest technology, safety, signaling, and automatic train control (ATC) systems. The trains would be capable of operating at speeds of up to 220 miles per hour (mph) over fully grade-separated, dedicated track.

The infrastructure and systems of the each of the six Build Alternatives consist of trains (i.e., rolling stock), tracks, grade-separate right-of-way, stations, train control, power systems, and maintenance facilities. Each of the six Build Alternatives includes a double-track rail system to accommodate planned HSR operations needs for high-capacity rail movement. Additionally, the HSR safety criteria recommend avoiding surface intersections on dedicated HSR alignments. This means that, in planning the California HSR System, the Authority has sought to utilize grade-separated overheads or underpasses for roadways, or roadway closures and modifications to existing systems that do not span planned rights-of-way. Each of the six Build Alternatives would be fully grade-separated.

2.3.1 System Design Performance, Safety, and Security

The proposed California HSR System is designed for optimal performance in conformance with industry standards and federal and State safety regulations (Table 2-1). In dedicated California HSR System sections, such as the Palmdale to Burbank Project Section, the HSR right-of-way would be fully grade-separated and access-controlled with intrusion detection and monitoring systems. The capital cost estimates, presented in Chapter 6 of this Draft EIR/EIS, include allowances for appropriate barriers (fences and walls), state-of-the-art communication, access control, and monitoring and detection systems. Not only would the guideway be designed to keep persons, animals, and obstructions off the tracks, the ends of the HSR trainsets would include a collision response management system to minimize the effects of a collision. The California HSR System would conform to the latest federal requirements regarding transportation security. The HSR trainsets (i.e., train cars) would be pressure-sealed to maintain passenger comfort regardless of aerodynamic change, much like an airplane body does. Additional information regarding system safety and security is provided in Section 3.11, Safety and Security. In areas where the California HSR System operates at speeds greater than 125 mph and is adjacent to existing freight railroads, intrusion protection barriers would be required to prevent encroachment into the HSR guideway.

Table 2-1 High-Speed Rail Performance Criteria

Category	Criteria[1]
System design criteria	▪ Electric propulsion system ▪ Fully grade-separated guideway ▪ Fully access-controlled guideway with intrusion monitoring systems where required ▪ Track geometry to maintain passenger comfort criteria (smoothness of ride, lateral or vertical acceleration less than 0.1 g [i.e., acceleration due to gravity])
System capabilities	▪ Capable of going from San Francisco to Los Angeles in approximately 2 hours and 40 minutes ▪ Capable of all-weather/all-season operation

Category	Criteria[1]
	▪ Capable of sustained vertical gradient of 2.5 percent without considerable degradation in performance[2] ▪ Capable of operating parcel and special freight service as a secondary use ▪ Capable of safe, comfortable, and efficient operation at speeds over 200 mph ▪ Capable of maintaining operations at 5-minute headways ▪ Equipped with high-capacity, redundant communications systems capable of supporting fully automatic train control
System capacity	▪ Fully dual track mainline with off-line station stopping tracks ▪ Capable of accommodating a wide range of passenger demand (up to 20,000 passengers per hour per direction) ▪ Capable of accommodating normal maintenance activities without disruption to daily operations
Level of service	▪ Capable of accommodating a wide range of service types (express, semi-express/limited stop and local)

Source: Authority, 2017a
[1] These criteria apply to dedicated HSR sections.
[2] Variances have been considered and approved where constraints warrant such consideration, and the variances are feasible.
Authority = California High-Speed Rail Authority; HSR = high-speed rail; mph = miles per hour

California HSR System operations would follow safety and security plans developed by the Authority. These plans include the following:

- A Safety and Security Management Program Plan, including a Safety and Security Certification Program, has been developed to address safety, security, and emergency response as they relate to the day-to-day operation of the system.
- A Threat and Vulnerability Assessment for security, a Preliminary Hazard Analysis, and Vehicle Hazard Analysis produced a comprehensive design criterion for safety and security requirements mandated by local, state, and federal regulations and industry best practices.
- A Fire and Life Safety and System Security Program (Technical Memorandum 500.4 [Authority 2012d]) has been developed, and a System Security Plan is in development. Under federal and state guidelines and criteria, the Authority established the Fire and Life Safety Plan and Security Program to address California HSR System design features intended to maintain security at the stations, within the trackwork right-of-way, and onboard trains.

Design criteria would address FRA safety standards and requirements as well as a possible Petition for Rule of Particular Applicability that addresses specifications for key design elements for the system. FRA is currently developing HSR safety requirements for HSR systems in the U.S. FRA will require that the California HSR System safety regulations be met prior to revenue service operations. The following section describes the system components pertinent to the Palmdale to Burbank Project Section.

2.3.2 Vehicles

Although the exact vehicle type has not yet been selected, the environmental analyses considered the impacts associated with the HSR vehicles produced in the world that meet the Authority's criteria. All of the world's HSR systems in operation today use electric propulsion with power supplied by an overhead system. These include the Train à Grande Vitesse in France, the Shinkansen in Japan and Taiwan, and the InterCity Express in Germany. Figure 2-3 shows examples of typical HSR trains.

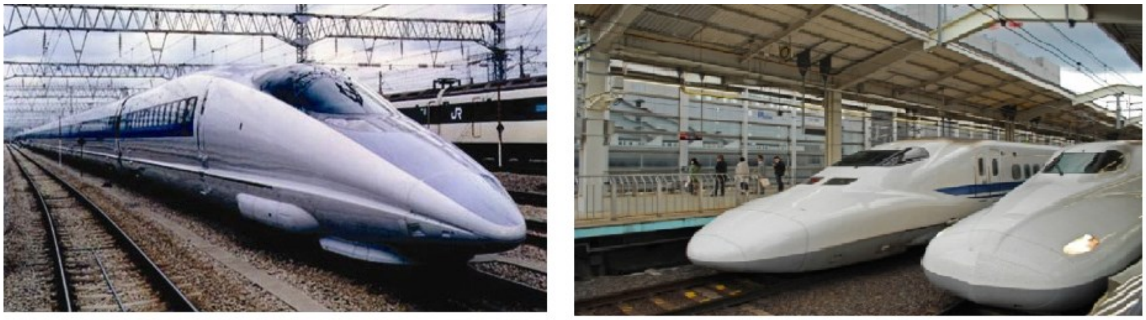


Figure 2-3 Examples of Japanese Shinkansen High-Speed Trains

The Authority is considering an electric multiple-unit concept that would equip several train cars (including both end cars) with traction motors in contrast to a locomotive-hauled train (i.e., with one engine in the front and one in the rear). Each train car would have an active suspension, and each powered car would have an independent regenerative braking system that returns power to the power system. The body would be made of lightweight but strong material and would be aerodynamically shaped to minimize air resistance, much like a curved airplane body.

A typical train would be 9 to 11 feet wide, consisting of two trainsets, each approximately 660 feet long and eight cars. A train of two trainsets would seat up to 1,000 passengers and be approximately 1,320 feet long with 16 cars. The power would be distributed to each train car via the overhead contact system (OCS) (which is a series of wires strung above the tracks) and through a pair of pantographs that reach like antennae above the train (Figure 2-4). Each trainset would have a train control system that could be independently monitored with override control while also communicating with the systemwide Operations Control Center. Phase 1 of the California HSR System service is expected to need up to 78 sets of trains in 2040, depending on the HSR fares charged and ridership levels (Authority 2017).[2]

A computer-based ATC system would control the trains. The ATC system would provide for the FRA-mandated positive train control safety requirements, including safe separation of trains, over-speed prevention, and work-zone protection. The ATC would use a radio-based communications network that would include a fiber optic backbone and communications towers approximately every 2–3 miles, depending on the terrain and selected radio frequency. Ideally, the towers would be near the HSR corridor in a fenced area approximately 40 feet by 25 feet, including a 10-foot by 8-foot communications shelter and a 6- to 8-foot-diameter (and up to 100-foot-high) communications pole. These communications facilities could be co-located with the traction power substations (TPSS).

[2] The *Horizon Year 2040 Operations and Service Plan* envisions the need for 71 revenue train sets. The total estimated trainsets include allowance for spare trainsets for maintenance and repair, substitute and hot standby trainsets, and extra trainsets to accommodate higher demand on peak-demand days, resulting in an overall estimated fleet of 78 total units. The 10 percent total spare ratio falls within the mid-range of spare ratios for other U.S. and international intercity and HSR fleets.

Figure 2-4 Example of At-Grade Profile Showing Contact Wire System and Vertical Arms of Pantograph Power Pickups

2.3.3 Stations

Stations are sized for projected HSR ridership and designed to provide flexibility to accommodate future growth. Station facilities include public and nonpublic areas, station site improvements to facilitate intermodal connectivity and station accessibility, and ancillary facilities. For existing stations modified for California HSR System service, public areas and station site improvements would be shared with other rail operators serving the stations.

Station design is first developed at a concept level for project-level environmental analysis and documentation, sufficient for disclosing the environmental impact of building and operating a station. Figure 2-5 shows examples of station components from existing systems overseas; Figure 2-6 shows a potential “functional” station and a plan view of various station components. The functional station is a basic design that could be more elaborate with cooperation from the local jurisdiction; the station has the potential to be an iconic building that would help define a downtown transit core.

Station Parking Facilities

Parking demand estimates are based on HSR system ridership forecasts that initially assume unconstrained parking availability—meaning that 100 percent of parking demand is met. These projections provide a “high” starting point to inform discussions with cities where stations are proposed. Based on a constraints analysis undertaken in consultation with station cities, this Draft EIR/EIS identifies locations for parking facilities needed to satisfy the maximum forecast constrained demand. Station access facilities are anticipated to be developed over time in phases while access to the California HSR System is also prioritized through modes such as transit, which could lead to lower parking demand. See System Ridership and Station Area Parking in Section 2.6.3 for additional information.

Preliminary station planning and design are based on dimensional data from the Station Platform Geometric Design guidance (Authority 2010b) and volumetric data from the Station Program Design Guidelines (Authority 2011b), and incorporate the Authority’s Urban Design Guidelines (Authority 2011c). All stations would be designed in accordance with Americans with Disabilities Act accessibility guidelines. The Palmdale to Burbank Project Section would include one station, located in the city of Burbank. The Authority has also evaluated the Palmdale Station and the Burbank Airport Station as elements of the Bakersfield to Palmdale Project Section and the Burbank to Los Angeles Project Section, respectively. The Palmdale Station elements are included throughout this Draft EIR/EIS for context, reference, and to provide additional information.

Figure 2-5 Examples of Existing High-Speed Rail Stations

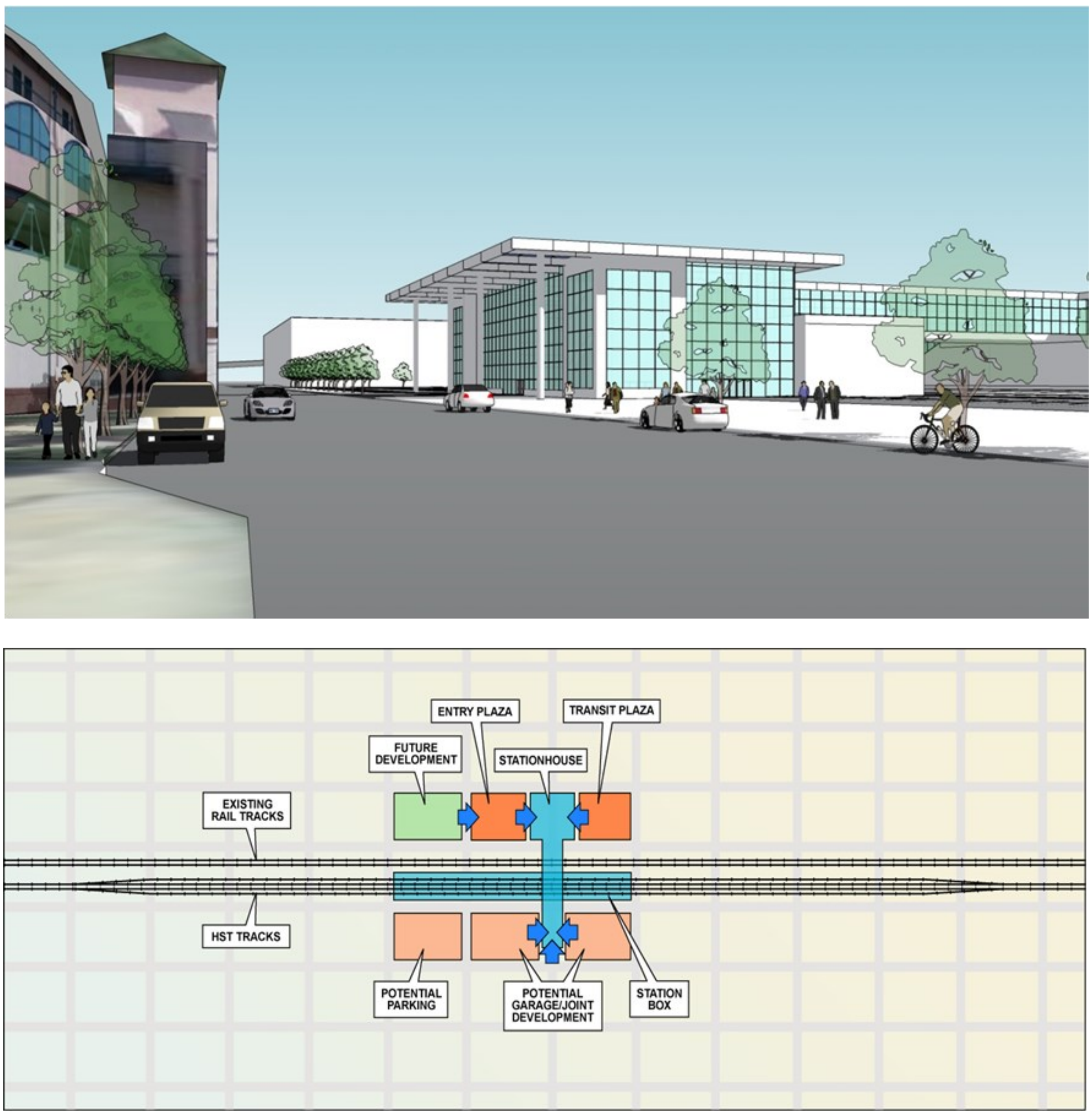


Figure 2-6 Simulated and Plan Views of Functional High-Speed Rail Station and Various Components

2.3.3.1 Station Platform and Trackway (Station Box)

The station would provide a sheltered area and platforms for passengers waiting, and circulation elements (stairs, elevators, escalators). Of the four tracks passing through the station, the two express tracks (for trains that would not stop at the station) would be separated from those that stop at the station and the platforms. To allow enough distance for safe deceleration of trains, a platform track would diverge from each mainline track beginning 3,000 feet from the center of the 1,410-foot station platform. The acceleration track from the platform to the mainline requires a shorter distance. An additional 1,650-foot stub-end refuge track would be provided to temporally store HSR trains in case of mechanical difficulty, for special scheduling purposes, and for daytime storage of maintenance of infrastructure work trains during periods when structure and track maintenance is being performed along the line around the station. The combination of deceleration, acceleration, and refuge track would extend the wider footprint of the four-track section to a minimum total length of 6,000 feet. Figure 2-7 and Figure 2-8 illustrate cross sections of two- and four-train station platforms.

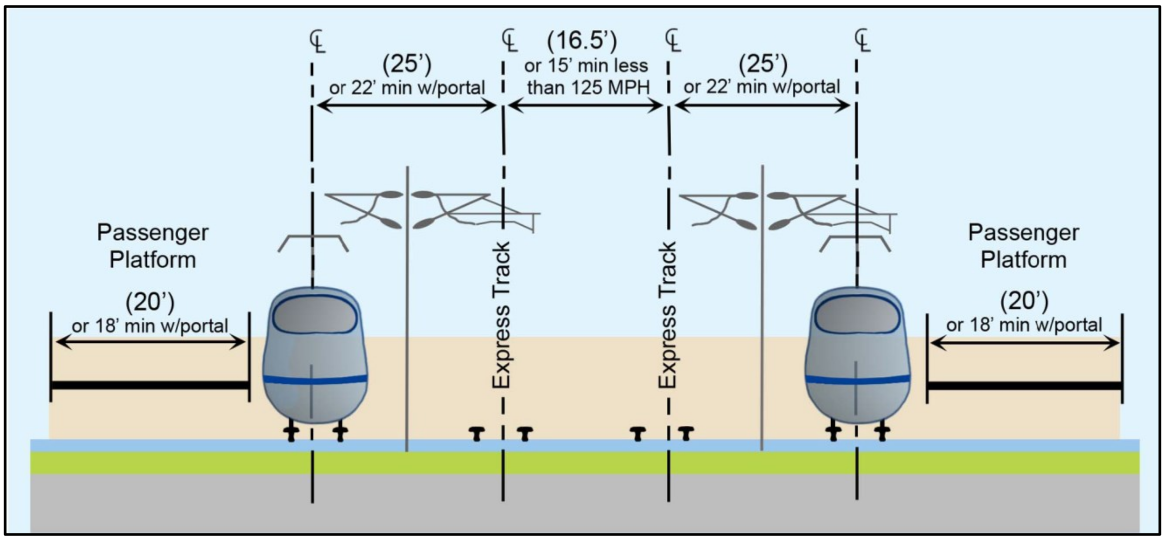
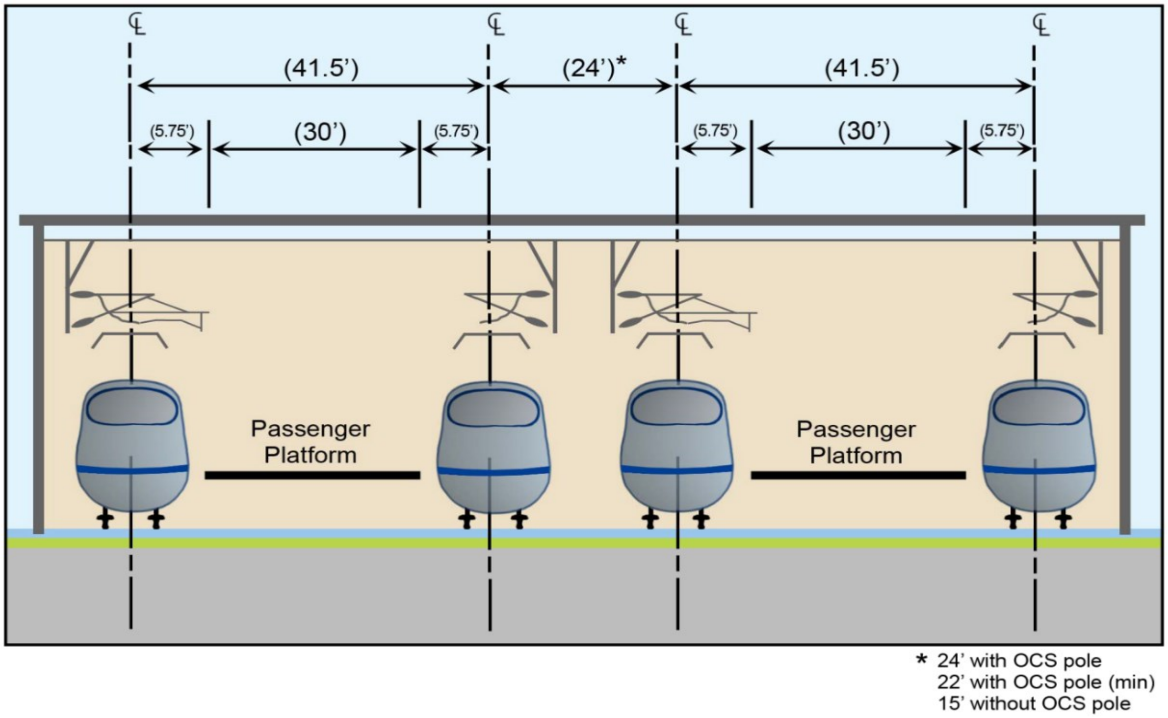


Figure 2-7 Typical High-Speed Rail Two-Train Station Platform Cross Section



OCS – overhead catenary system

Figure 2-8 Typical High-Speed Rail Four-Train Station Platform Cross Section

2.3.3.2 Station Facilities Building

Station public areas include entry plazas and building entrances; ticketing; wayfinding/signage; publicly accessible restrooms; concessionaire-provided amenities such as food service, rental car counters, and retail uses; vertical circulation; concourse or mezzanine areas with passenger waiting areas; fare gates; controlled paid areas; and platforms. Pedestrian over-track bridges and under-track passageways enable public access across the rail right-of-way at stations. Station nonpublic areas include administrative, maintenance, operations, safety/security, loading, and back-of-house circulation areas.

Station site improvements provide safe and efficient access for pedestrians, bicycles, transit, and personal vehicles to and from the station. Pick-up and drop-off zones offer direct and convenient access for taxis, ride hailing/sharing services, shuttles, transit, and private and commercial vehicles. Parking supply estimates are based on projected parking demand and local conditions. Station site plans are configured to support transit-oriented development (TOD). Ancillary facilities are unoccupied back-of-house spaces required for station operations and maintenance, including normal, back-up, and emergency power systems.

2.3.4 Infrastructure Components

The dedicated, fully grade-separated infrastructure needed to operate high-speed trains has more stringent alignment requirements than those needed for lower-speed trains. Each of the six Build Alternatives would use six different track profiles: (1) at-grade, (2) at-grade covered, (3) cut-and-cover, (4) retained cut/trench profile, (5) tunnel, and (6) elevated/aerial structure. These profile types are discussed below. Types of bridges that might be built include full channel spans, large box culverts, and, for some wider river crossings, limited piers within the ordinary high water channel. A single tunnel can be built using standard drill and blast or sequential excavation methods. Dual-bore tunnels are planned for tunnels greater than 1 mile in length and include evenly spaced cross passages for maintenance and emergency access. The dual-bored tunnels are smaller in diameter than the single tunnels, and it is expected that it would be more economical for them to be built using a tunnel boring machine (TBM). The various track sections are described below.

2.3.4.1 At-Grade Profile

At-grade track sections (Figure 2-9) are best suited for areas where the ground is relatively flat and in rural areas where interference with local roadways is infrequent. The at-grade track would be built on compacted soil and ballast material (a thick bed of angular rock) to minimize subsidence or changes in the track service from soil movement. For at-grade track, the rail would be built above the 100-year floodplain or higher. The height of at-grade sections may vary to accommodate slight changes in topography and to provide clearance for stormwater culverts and structures to allow water flow as well as occasional wildlife movement. Off-site culverts would be placed to convey off-site flow. Figure 2-10 represents a typical cross section of an at-grade cut, and Figure 2-11 depicts a typical cross section of an at-grade fill in constrained situations.

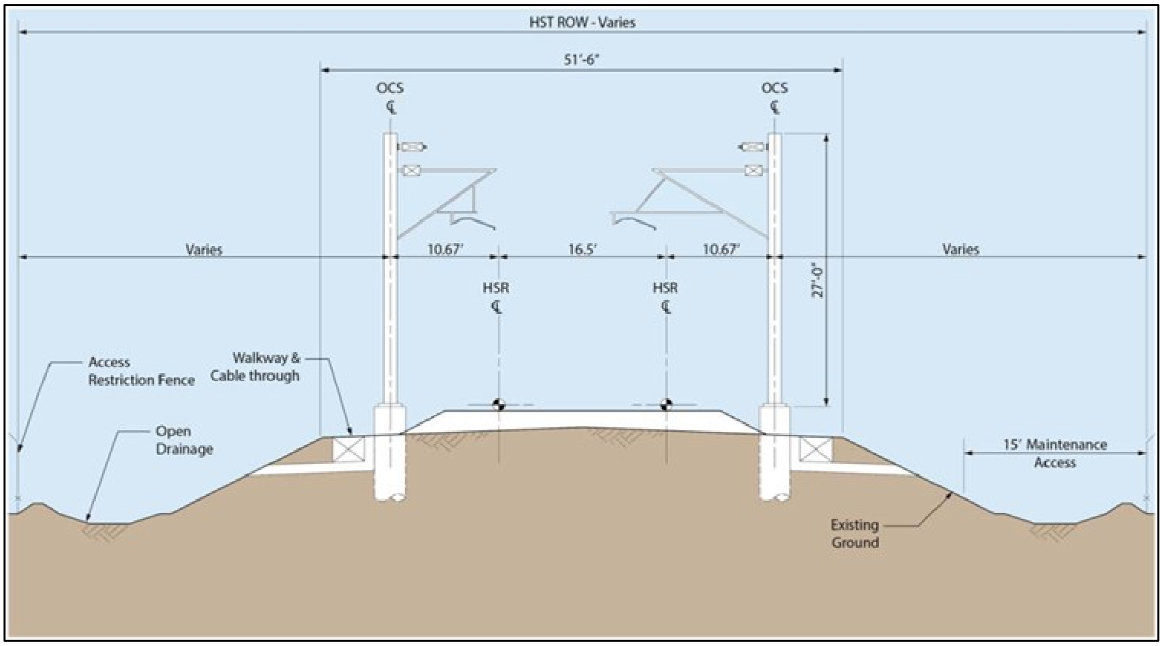


Figure 2-9 Typical High-Speed Rail At-Grade Cross Section

Cut Sections

Cut sections (Figure 2-10) are used only for short distances in highly urbanized or constrained situations, such as when the rail alignment crosses under existing surface-level rail tracks, roads, or highways, or passes through mountainous regions with right of way constraints. Cut sections are also used for roads or highways when it is desirable to depress the roadway underneath surface HSR tracks.

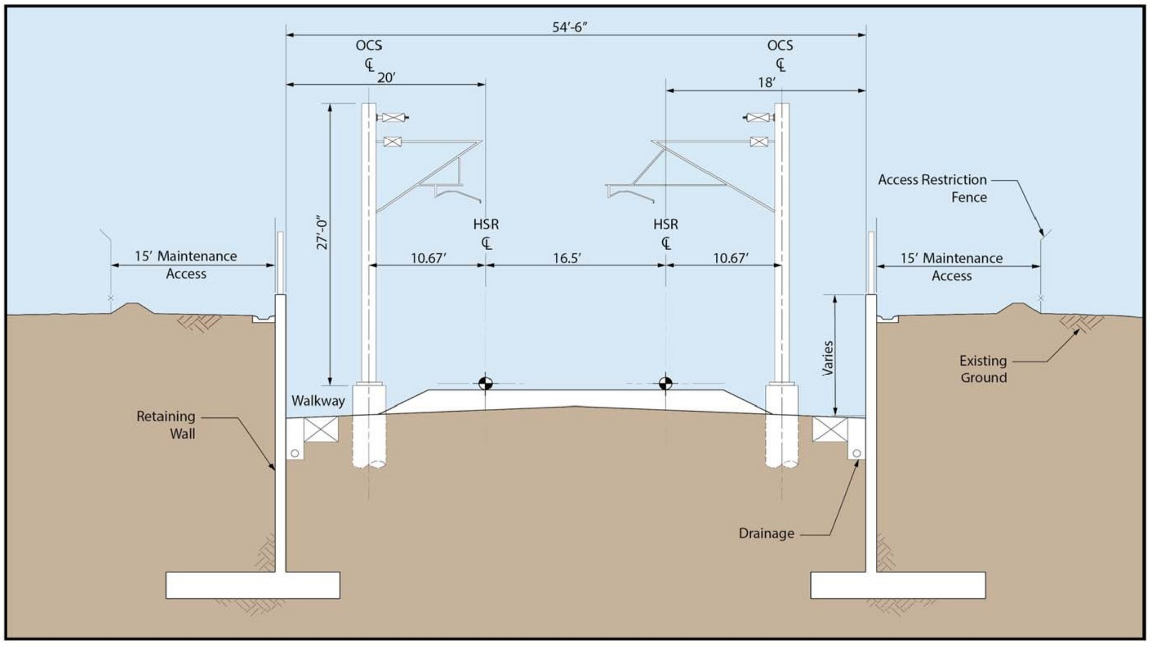


Figure 2-10 Typical High-Speed Rail At-Grade Cross Section (Cut)

Fill Sections

Embankment profiles (Figure 2-11) are mainly used in mountainous terrain where the HSR profile must be above original ground level and the corridor is not constrained. Side slopes are generally suitable for vegetation. Retained walls in embankment profiles are also used for short distances in highly urbanized or constrained situations such us when the right-of-way is too narrow to allow side slopes, or in the proximity of elevated structures when the rail alignment crosses over existing surface-level rail tracks, roads, or highways. Fill sections are also used for roads or highways when it is desirable to elevate the roadway over surface HSR tracks.

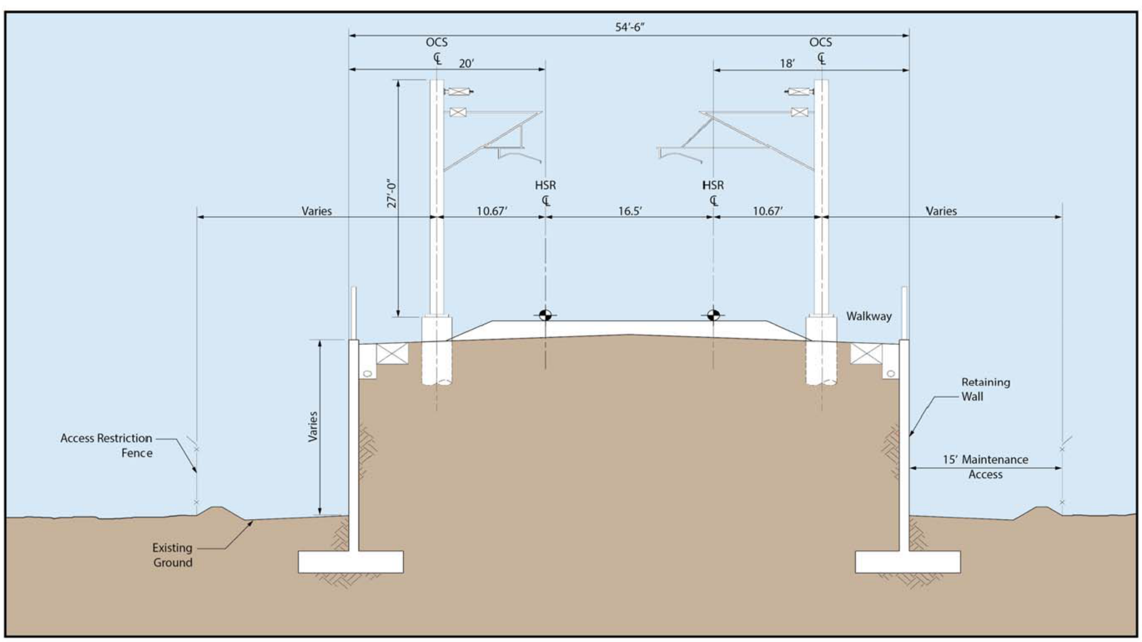


Figure 2-11 Typical High-Speed Rail At-Grade Cross Section (Fill)

2.3.4.2 At-Grade Covered Profile

An at-grade covered profile (Figure 2-12) would put the HSR in a (potentially prefabricated) tunnel that placed at-grade and covered with earth to create an above-ground structure. Such a profile is advantageous in locations where the vertical alignment of the rail would normally be at-grade but enclosure is preferred. For example, the Refined SR14 and SR14A Build Alternatives would utilize this profile south of their crossing of the Santa Clara River to allow for restoration to occur over the Build Alternative footprint.

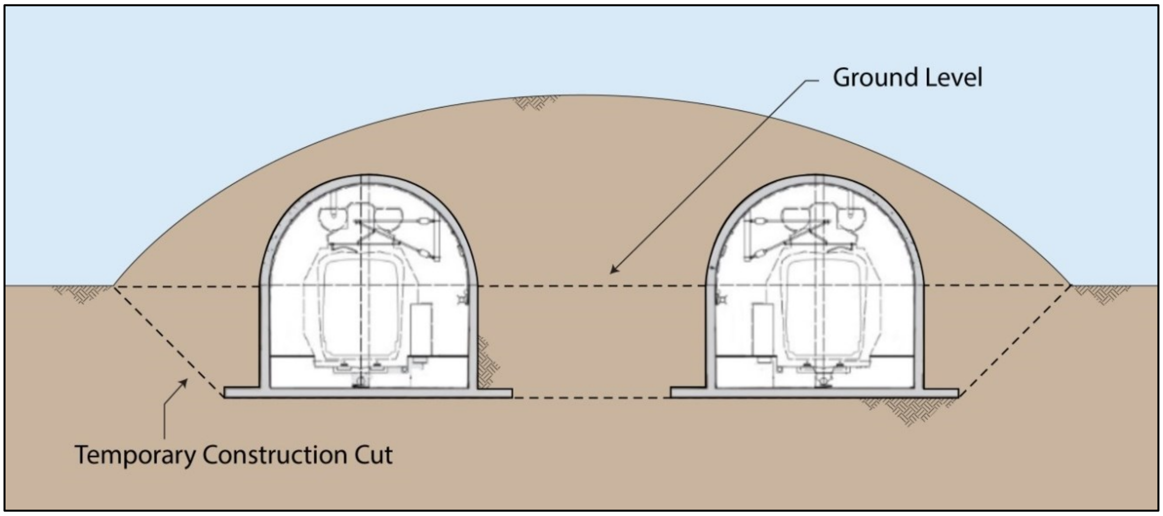


Figure 2-12 Typical High-Speed Rail At-Grade Covered Tunnel Cross Section

2.3.4.3 Cut-and-Cover Profile

A cut-and-cover profile (Figure 2-13) would place the HSR into a covered trench, more commonly known as a cut-and-cover tunnel. "Clearance" as shown in this Figure 2-13 refers to a required distance between the alignment and existing or future infrastructure. Cut-and-cover tunneling is used when the vertical profile of the alignment would be below ground surface at a depth that makes shallow bored-tunneling infeasible. For example, each of the six Build Alternatives would use a cut-and-cover profile within Hollywood Burbank Airport property in the approach to the Burbank Airport Station to transition from bored tunnels to the station site, which would be closer to the surface. Cut-and-cover tunneling therefore requires that land clearance and structures or features above cut-and-cover areas would need to be removed during construction.

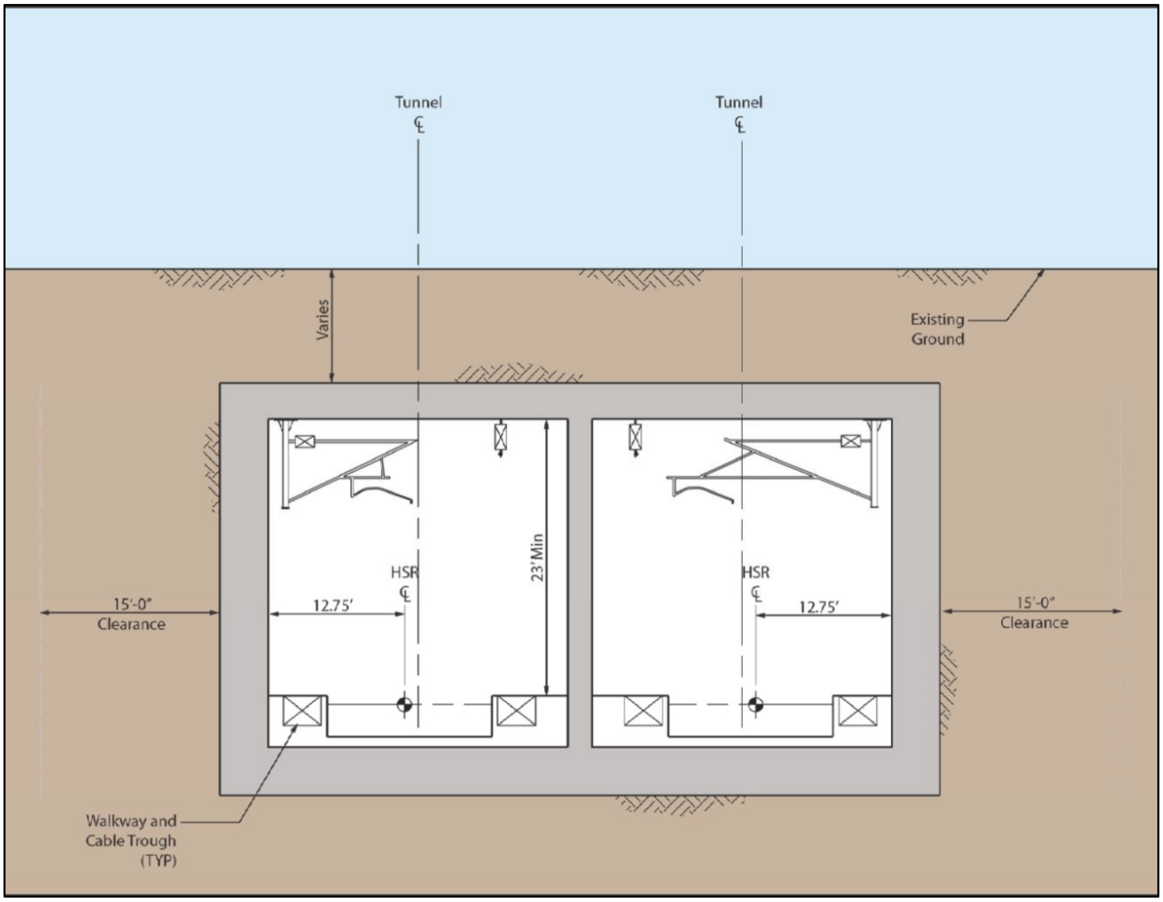


Figure 2-13 High-Speed Rail Cut-and-Cover Typical Cross Section

2.3.4.4 Retained Cut/Trench Profile

A trench or retained cut consists of a vertically retained excavation below ground level with lateral retaining walls embedded in the terrain. Unlike in a cut-and-cover profile, the trench would remain uncovered after construction. Figure 2-14 shows a typical cross section. This profile type is often used in highly urbanized and constrained situations. In some cases, it is less disruptive to the existing traffic network to depress the Build Alternative under these crossing roadways. The Refined SR14, SR14A, E1, and E1A Build Alternatives would utilize this profile in the highly-developed San Fernando Valley. The E1 and E2 Build Alternatives would also utilize the retained cut/trench profile north of the Vincent Substation.

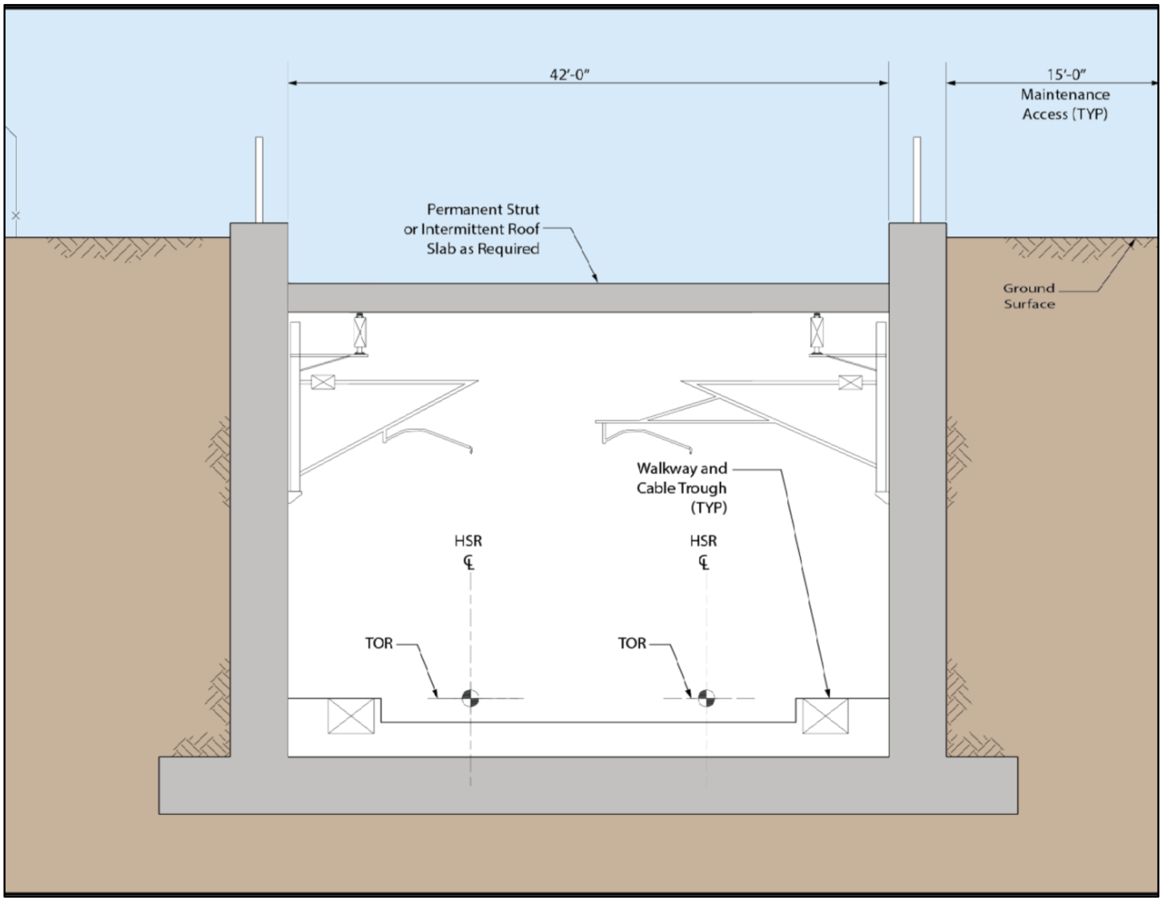


Figure 2-14 Typical High-Speed Rail Retained Cut/Trench Cross Section

2.3.4.5 *Tunnel Profile*

Tunnel sections (Figure 2-15 and Figure 2-16) are often used when the rail alignment traverses highly variable topography or highly constrained, densely developed urban situations, and the HSR must be deep below original ground level. Tunnel sections reduce track distance and curvature needed to maintain acceptable vertical grades and horizontal curvature in mountainous terrain. Tunnels are typically bored or mined so that the original ground surface is preserved. Within the Palmdale to Burbank Project Section, bored tunnels would be used to traverse the San Gabriel Mountains with long tunnels for all six of the Build Alternatives passing beneath the ANF, including the SGMNM. The Refined SR14 and SR14A Build Alternatives would also require tunneling in Acton and Agua Dulce.

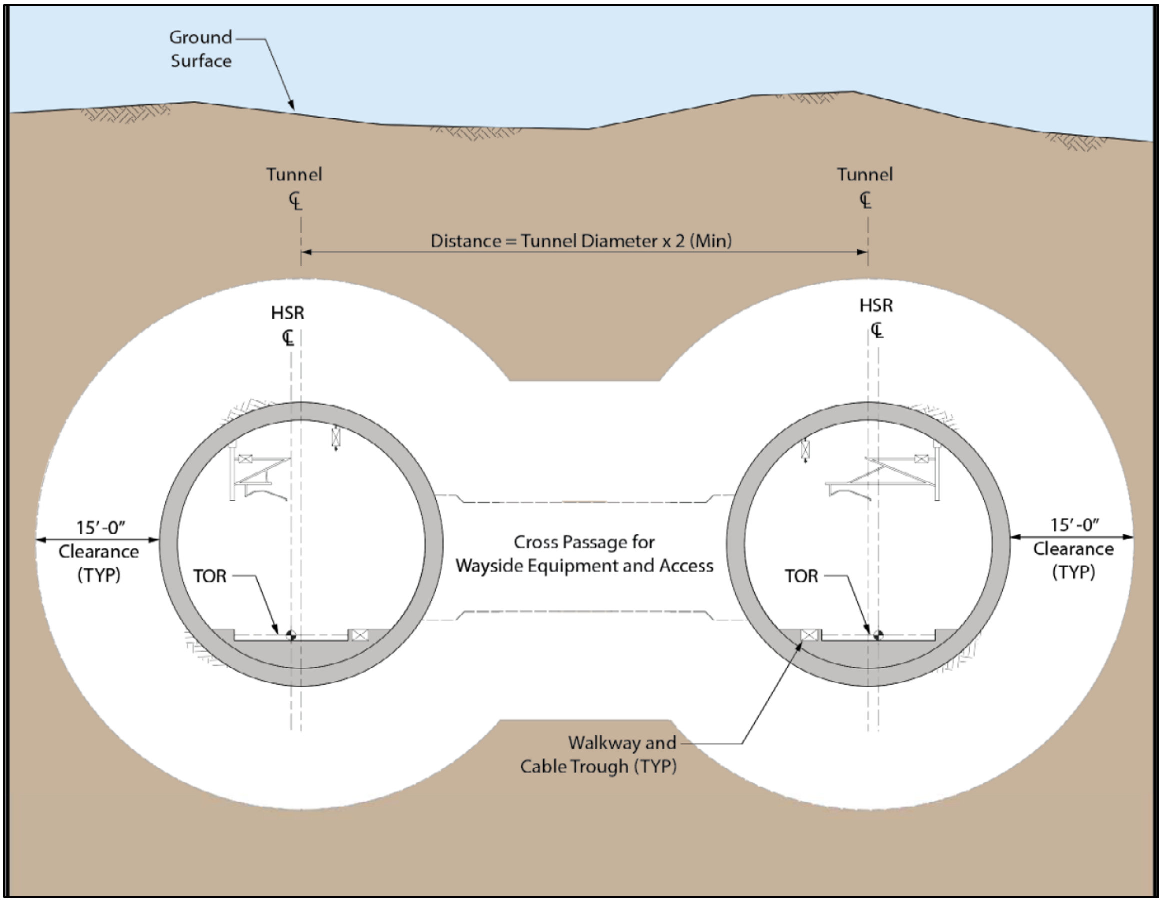


Figure 2-15 Typical High-Speed Rail Tunnel Cross Section in Double Tunnel

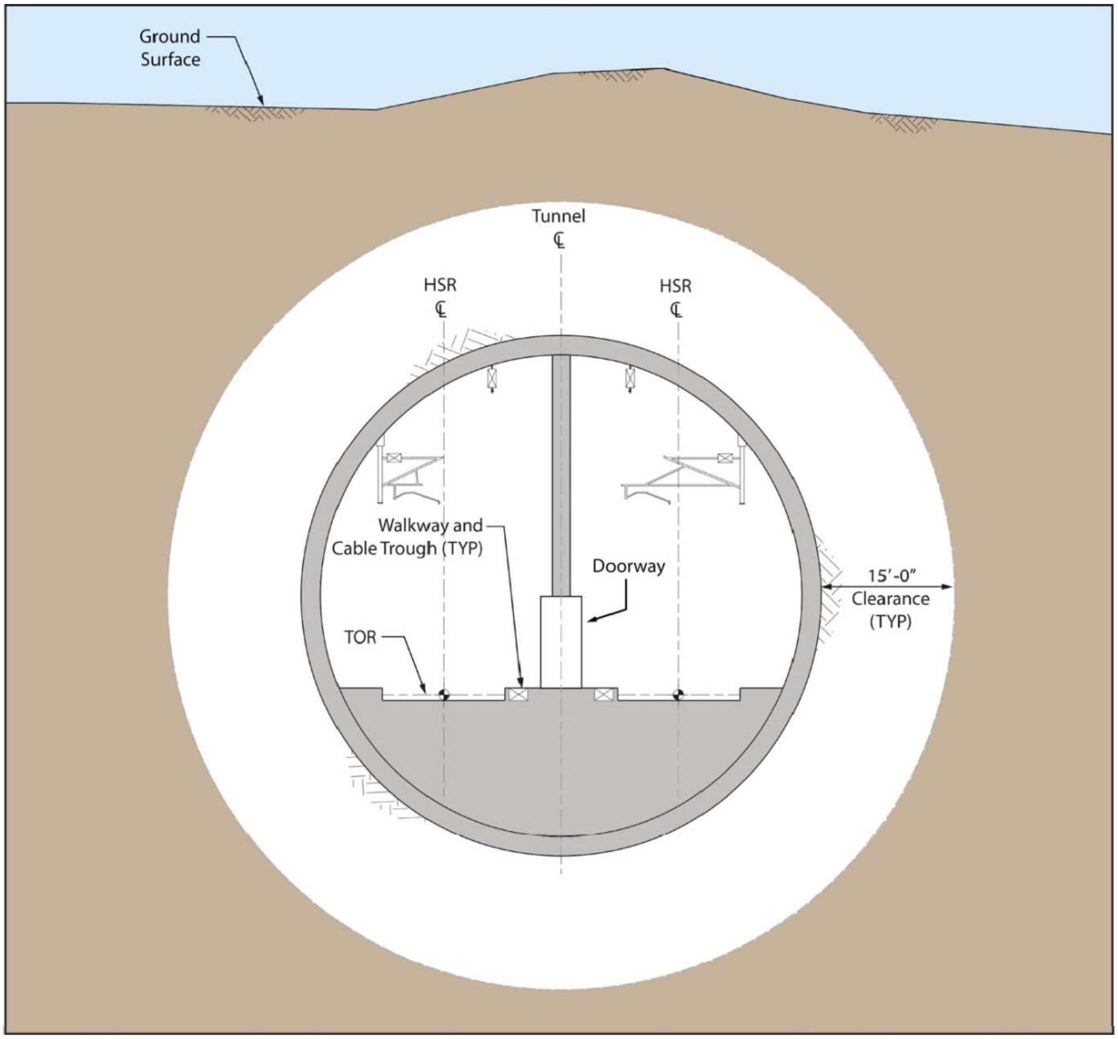


Figure 2-16 Typical High-Speed Rail Tunnel Cross Section in Single Tunnel

2.3.4.6 Tunnel Portals

Tunnel portals provide a transition from tunneled sections to cut, at-grade, or elevated sections. Figure 2-17 shows an example of a tunnel portal. During construction, portals serve as the primary access to the tunnels. In the permanent configuration, facilities and infrastructure elements would be located at the portals to support HSR tunnel operations, including all provisions needed to meet first responder, fire and life safety, and ventilation requirements. *High-Speed Train Tunnel Portal Facilities*, *Technical Memorandum 2.4.6* (Authority 2010a) describes the permanent structures associated with the tunnel portals for the Palmdale to Burbank Project Section, including a representative layout of these elements. It also provides general guidance used to determine which elements of the portal infrastructure are required; the principal factors influencing these decisions are tunnel length, accessibility, and environmental impacts.

Source: Authority and FRA 2014

Figure 2-17 High-Speed Rail Tunnel Portal

Permanent Portal Facilities

The following major infrastructure elements are incorporated in the portal design, based on preliminary engineering design, and are subject to change as the design of the Palmdale to Burbank Project Section is refined:

- Noise Attenuation Hood
    - Up to 150 feet long to prevent aerodynamic noise effects at the portals
- Portal Ventilation Building
    - Three-story, roughly 65-foot-high building housing fan assemblies at the portals to extract smoke from the tunnels in the event of fire
    - Requires direct access to the tunnels and is located immediately over the tunnel portal

- Access Road
  - Provides access to portals required by emergency responders, evacuating passengers, and maintenance staff
  - A 22-foot-wide road that runs up and around the portal ventilation building to provide access to the third floor
- Emergency Vehicle Assembly and Turnaround Area
  - Located adjacent to the tunnel portal
  - Minimum 75-foot by 75-foot area
- Rescue Area/Passenger Assembly Area
  - 5,000-square-foot minimum
  - As close as practical to the tunnel portal
  - Well lit
- Fire Hydrants and Water Supply
  - Needed for tunnel firefighting purposes
  - Supplied by 4-inch water line proposed along the alignment for tunnel water needs
- Area Lighting
  - Lighting system to illuminate the portal site during a train evacuation
- Train Surface Evacuation and Fire Control Zone
  - Located immediately outside the portal where a train exiting a tunnel under emergency conditions can stop to allow passengers to safely disembark
  - Allows emergency responders to reach the train for emergency situations
- Communication Facilities
  - Communication tower (approximately 100 feet high and 6 feet in diameter) may be required to enable reliable transmission
- Rock Fall and Debris Containment
  - Trench excavations or berms to prevent materials from slopes in the portal area cannot reach the tracks or damage equipment or structures
- Detention Pond
  - Required to handle stormwater runoff for each portal location (detention pond less than 1 acre in size)
- Parking for Tunnel Maintenance and Traction Power Facilities
  - Approximately eight spaces for maintenance staff
- Public Utilities
  - May include water, electricity, telephone, and sewer lines

Authority Technical Memorandum 2.4.6 also establishes general guidance for determining which elements of the portal infrastructure are required. The principal factors influencing this decision are:

- Length of tunnel
- Proximity of one tunnel to another
- Accessibility of portal locations
- Environmental impacts at portal location

2.3.4.7 Elevated/Aerial Structure Profile

Elevated profiles (Figure 2-18 and Figure 2-19) can be used in urban areas where extensive road networks must be maintained. They may also be used in rugged, mountainous, or otherwise uneven terrain to ensure a level track and reduce the impacts associated with very tall fill section heights or other grade-stabilizing measures. Each of the six Build Alternatives would require the use of elevated sections, primarily to traverse mountainous areas and water features within the San Gabriel Mountains. Elevated sections must have a minimum clearance of approximately 16.5 feet over roadways and approximately 24 feet over railroads. Pier supports would vary between 8 feet and 20 feet in diameter at ground level. Such structures could also be used to cross waterbodies; even though the trackway might be at-grade on either side, the width of the water channel could require a bridge at the same level, which would be built in the same way as the elevated sections. The following figures represent typical design types and do not indicate the actual height of elevated structures.

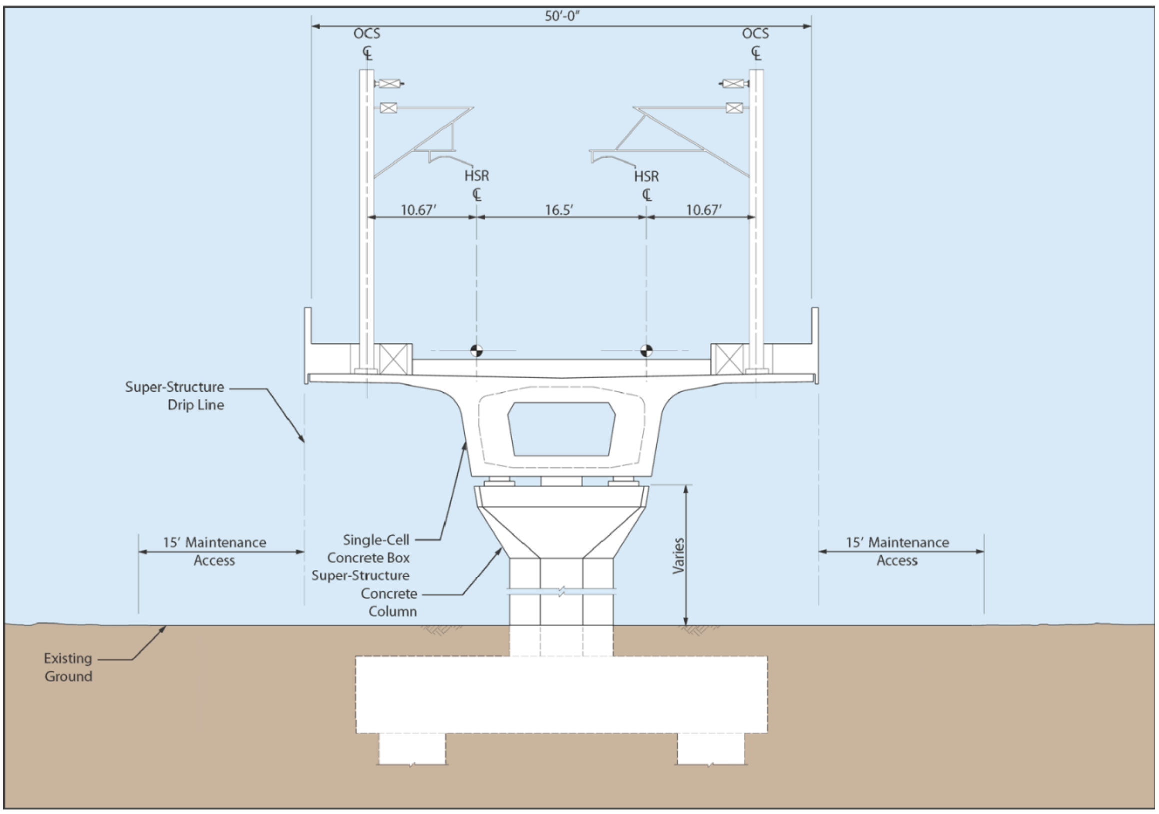


Figure 2-18 Typical High-Speed Rail Two-Track Elevated Cross Section

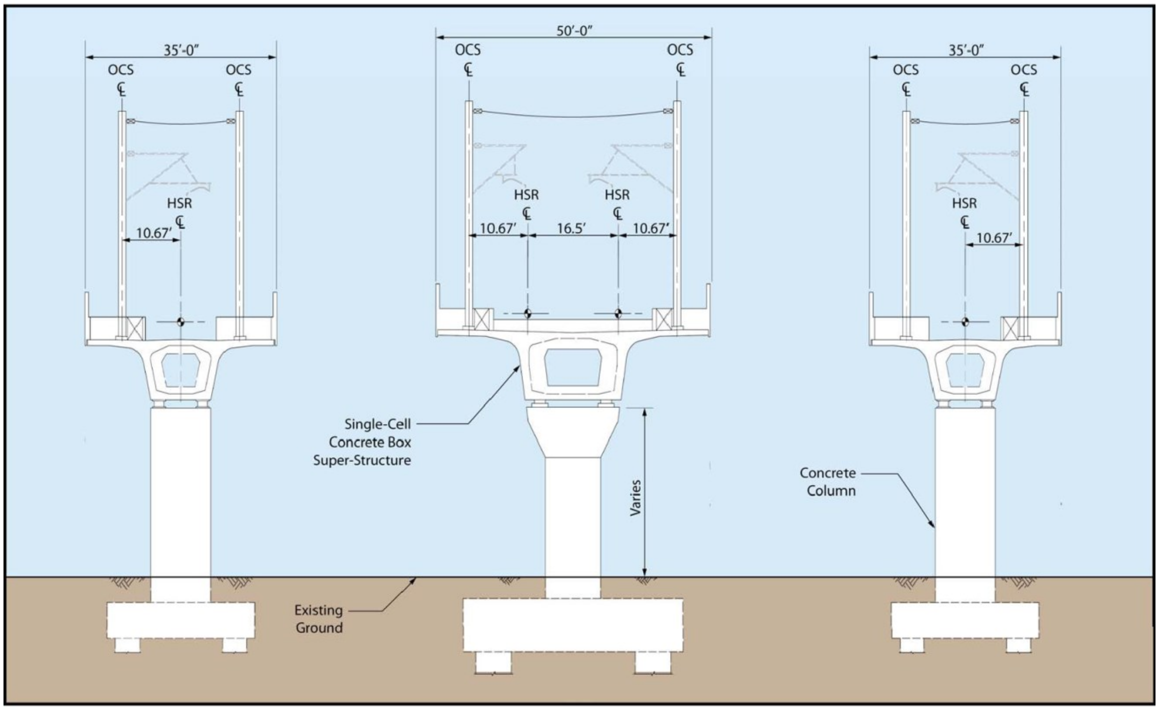


Figure 2-19 Typical High-Speed Rail Four-Track Elevated Cross Sections

Straddle Bents

When the HSR elevated profile crosses over a roadway or railway on an extremely sharp skew (degree of difference from the perpendicular), a straddle bent makes sure that the piers are outside of the functional/operational limit of the roadway or railway. As shown on Figure 2-20, a straddle bent is a pier structure that spans (or "straddles") the functional/operational limit of a roadway, highway, or railway. Typical roadway and highway crossings that have a small skew angle (i.e., the crossing is nearly perpendicular) generally use intermediate piers in medians and span the functional right-of-way. However, for larger-skew-angle crossing conditions, median piers would result in excessively long spans that are not feasible. Straddle bents that clear the functional right-of-way can be spaced as needed (typically 110 feet apart) to provide feasible span lengths for bridge crossings at larger skew angles.

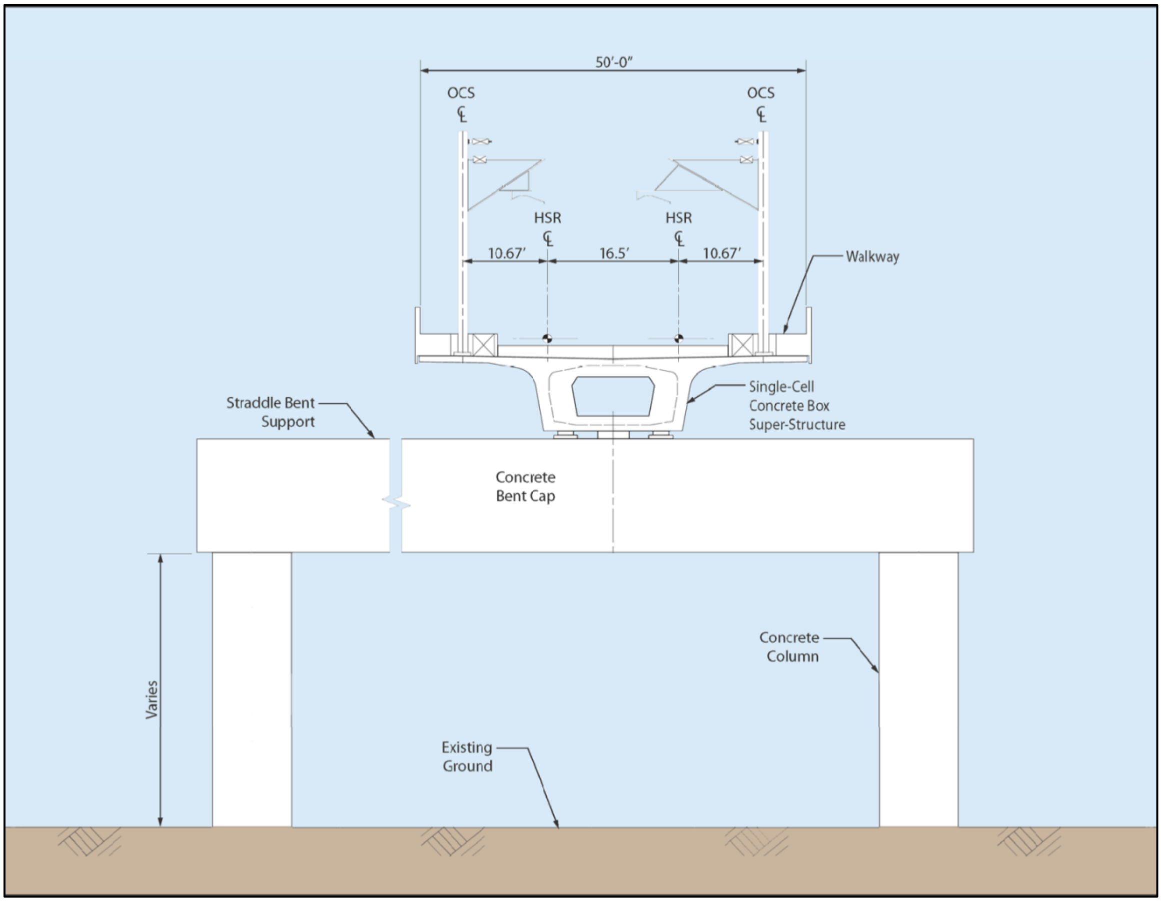


Figure 2-20 High-Speed Rail Straddle Bent Typical Cross Section

2.3.5 High-Speed Rail Ancillary Features

The Build Alternative footprints include all components of the Palmdale to Burbank Project Section and right-of-way needed to construct, operate, and maintain all permanent HSR features. This includes features that provide necessary support for the construction, operations, and maintenance of the Build Alternatives, otherwise known as ancillary features.

Each of the six Build Alternative footprints includes ancillary features such as equipment storage areas, temporary and permanent access roads, TPSS, switching stations and PSs, train signaling and communication facilities, temporary and permanent access roads, grade separations (overcrossings and undercrossings), intrusion protection barriers, and wildlife crossing structures. Each of the six Build Alternative footprints also includes areas for utility relocation, roadway relocation, electrical power connection, and construction activities (including laydown, storage, and similar areas).

Additionally, construction of deep bored tunnels could require some temporary surface impact areas such as adits and intermediate windows. These ancillary features are described in detail below.

2.3.5.1 Adits

Adits are intermediate tunnel access shafts to facilitate construction of bored tunnels. An adit can serve as a TBM entry or exit point and can enable the use of multiple TBMs to shorten construction time. Adits may also facilitate construction of fault chambers and other similar design requirements that increase safety for HSR operations and maintenance in seismically active areas. After construction is completed, a small permanent structure and associated power facilities for emergency egress, maintenance, and ventilation equipment could be installed at selected adit locations.

A typical adit consists of an inclined access gallery, or deep vertical shaft, connecting the surface to an underground cavern and trackway tunnels. Distinct access galleries and temporary construction staging areas (CSA) have been defined for all adit options.

Several potential adit location options have been identified for each Build Alternative. These sites were selected based on engineering and feasibility considerations, including the presence of existing access roads, location of known faults and fault traces, available space for construction staging, opportunities to shorten construction duration, and potential use as a starting point for conventional construction methods (i.e., if the adit is in a fault zone, it could be more convenient to build a portion of the tunnel with mined methods, as this technique allows for better and easier execution of ground treatments than other methods). Specific adit locations cannot be chosen at this point because ventilation requirements have yet to be established for the tunnel alternatives. Therefore, for the purpose of this analysis, several adit location options have been included in the footprint to allow for refined selection in a more advanced design stage, and not all of the adits analyzed in this Draft EIR/EIS would be constructed. Refer to Section 2.5.3 for additional discussion of adit options.

2.3.5.2 Intermediate Windows

An intermediate window is a vertical shaft connecting to an underground construction area that would comprise an elevator and gantry cranes to provide access, water, power, ventilation, and other support during construction. After construction is complete, a small structure for permanent access, and possibly ventilation equipment, would remain at the surface. Figure 2-21 shows a typical intermediate window.

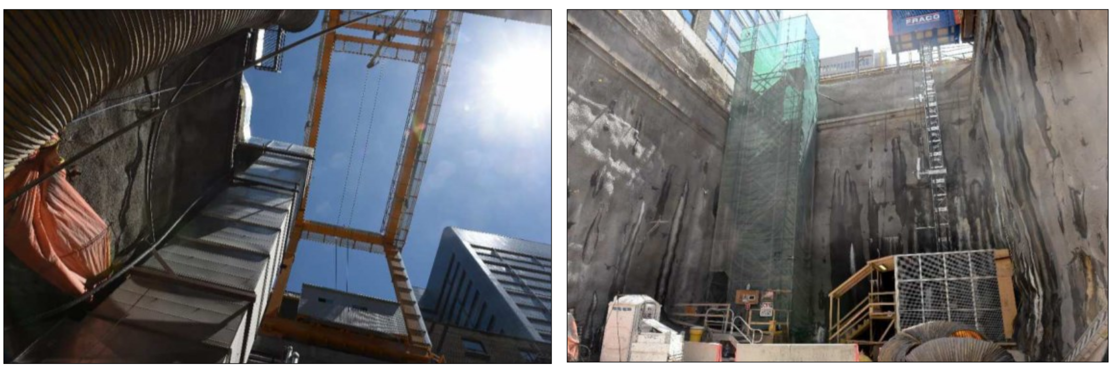


Figure 2-21 Typical Intermediate Window

Similar to the approach to adits in this draft, several intermediate window locations are identified for each Build Alternative. In some instances, an intermediate window location cannot yet be chosen because the tunnel design has yet to determine ventilation requirements; therefore, at this point, the most suitable locations are included in the footprint. Section 2.5.3 discusses intermediate window options for each Build Alternative.

2.3.5.3 Access Roads

Access roads to provide emergency and maintenance access from public roadways to HSR facilities would be required. Access roads would be constructed at TPSSs (Section 2.3.7.1) and at portal facilities as listed in Section 2.5.3. Access roads within the HSR right-of-way would be paved, with a minimum width of 22 feet. Access roads within the HSR right-of-way would be restricted to use by authorized HSR personnel and emergency responders. Use would be unrestricted from public roads to the HSR right-of-way. All parcels would have roadway access or would be acquired if access to the parcel cannot reasonably be otherwise provided. For more detail on right-of-way acquisitions, see Section 3.12, Socioeconomics and Communities.

2.3.6 Grade Separations

An optimally operating HSR system consists of a fully access-controlled and largely grade-separated guideway. Unlike existing passenger and freight trains in the project vicinity, the Palmdale to Burbank Project Section would not include at-grade road crossings, nor would the rail alignment be shared with freight trains. The following list describes possible scenarios for HSR grade separations:

- **Elevated HSR Road Crossings**—In urban areas, raising the HSR (as shown on Figure 2-19 and Figure 2-20) might be more feasible than elevating roads over the HSR. This could be especially applicable in densely developed urban areas where use of an elevated HSR guideway would minimize impacts on the existing roadway system.
- **Roadway Overcrossings**—There are many roadways and state route facilities that currently cross at-grade with or over the Metrolink railroad tracks. Figure 2-22 illustrates how a roadway would be grade-separated over both the HSR and the existing railroad in these situations. Figure 2-22 illustrates a typical roadway overcrossing of the HSR tracks. Overcrossings would generally be constructed to match lane counts and widths of existing roads, depending on average daily traffic volumes. Minimum clearance would be 27 feet over the HSR. Specifications would be based on county road standards, and, where applicable, other freight/passenger railroad standards.
- **Local Road Overcrossings**—Similar conditions to those described above for roadway overcrossings would apply when at-grade HSR tracks cross a local road. Figure 2-23 illustrates a typical roadway overcrossing of HSR tracks.
- **Roadway Undercrossings**—HSR Build Alternatives may require undercrossings for the HSR to pass over roadways. Figure 2-24 illustrates how a roadway would be grade-separated below the HSR guideway.

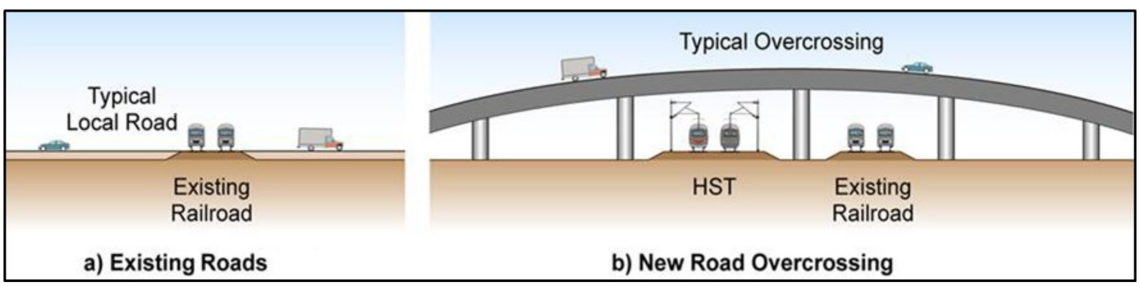


Figure 2-22 Replacing At-Grade Crossing with Overcrossing

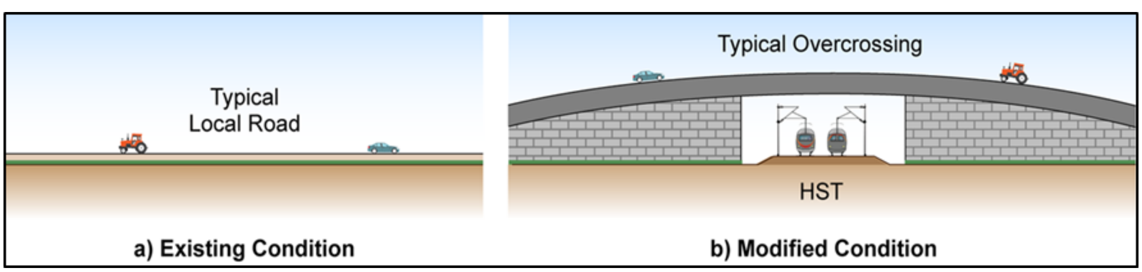


Figure 2-23 Replacing Local Road with Overcrossing

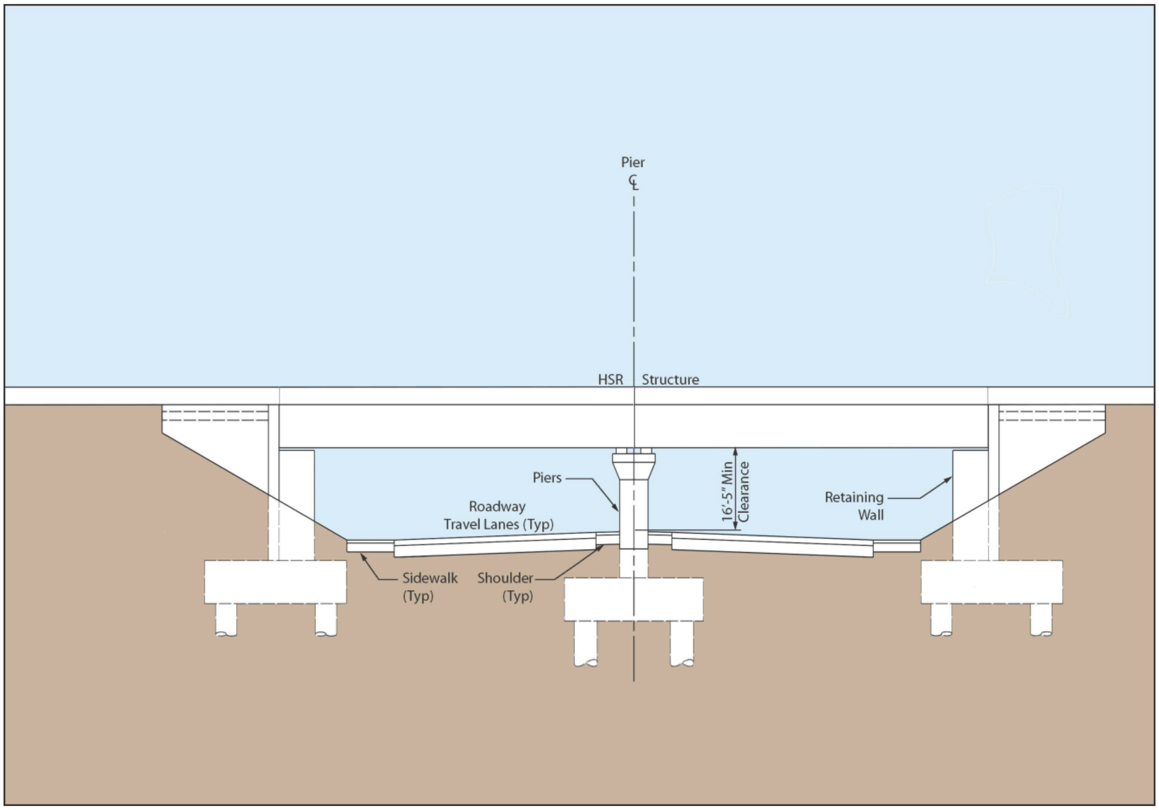


Figure 2-24 Typical Cross Section of Roadway Grade-Separated Beneath High-Speed Rail Guideway

- **Irrigation and Drainage Facilities**—The HSR tracks would affect some existing drainage and irrigation facilities. Depending on the extent of the impact, existing facilities would be modified, improved, or replaced as needed to maintain existing drainage and irrigation functions and to support HSR drainage requirements.
- **Wildlife Crossing Structures**—Wildlife crossing opportunities would be available through a variety of engineered structures. In addition to dedicated wildlife crossing structures, other options for wildlife crossing would include elevated portions of the alignment, bridges over riparian corridors, road overcrossings and undercrossings, and drainage facilities (i.e., large-diameter culverts and paired 30-inch culverts).

Each of the six Build Alternatives would include extensive use of tunnels and elevated portions of trackway; therefore, the use of wildlife crossing features would be limited because of design constraints and the fact that the culverts included in the design would provide wildlife crossing opportunities. The Refined SR14 and E1A Build Alternatives would not include wildlife crossing structures. The E1 and E2 Build Alternatives would each require one potential wildlife crossing structure immediately south of the California Aqueduct, while the E2A Build Alternative would require a potential wildlife crossing structure farther south. The SR14A Build Alternative would include one potential wildlife crossing structure north of the California Aqueduct and one to the south of the California Aqueduct. Wildlife crossings are described in Section 3.7, Biological and Aquatic Resources.

At locations where stormwater swales parallel the embankment, the approach to wildlife crossing structures would be designed to minimize the amount of surface water runoff entering the structure. A small berm (or lip) would be constructed at the entrance of the wildlife structure to prevent water from entering during small storm events. Swales would be directed around this lip. To allow wildlife free passage over the crossing structures, HSR right-of-way fencing would be constructed at the toe of the slope, up the embankment, and around the entrance of the structure. At locations where an intrusion protection barrier parallels a proposed wildlife crossing structure, the crossing structure would be extended and designed to pass through the barrier to allow free passage for wildlife.[3]

Additional wildlife crossing structure designs could include circular or elliptical pipe culverts and larger (longer) culverts with crossing-structure distances of up to 100 feet. However, changes to wildlife crossing structure design must be constrained by a minimum of 3 feet of vertical clearance (crossing-structure height), depressed no more than 1.5 feet below-grade (half of the vertical clearance), and must meet or exceed the minimum 0.41 openness factor.

2.3.7 Traction Power Distribution

The state's electricity grid would power the proposed California HSR System. A 2008 study determined that it would not be feasible to physically control the flow of electricity from particular grid sources (Navigant 2008). However, it would be feasible for the Authority to obtain the quantity of power required for the HSR from 100 percent clean, renewable energy sources through a variety of mechanisms, such as paying a clean-energy premium for the electricity consumed. In 2014, the Authority verified the feasibility of powering the California HSR System with 100 percent renewable energy sources (Authority 2014c). The Palmdale to Burbank Project Section would not include the construction of a separate power source, but it would require the extension of underground or overhead power transmission lines to a series of power substations positioned along the HSR corridor. These power substations would be needed to even out the power feed to the train system. Working in coordination with power supply companies and per design requirements, the Authority has identified frequency and right-of-way requirements for these facilities.

Trains would draw electric power from an overhead contact system with the running rails acting as the other conductor. The contact system would consist of a series of mast poles approximately 23.5 feet higher than the top of the rail, with contact wires suspended from the mast poles between 17 and 19 feet from the top of the rail. The train would have an arm, called a pantograph, to maintain contact with this wire to provide power to the train. The mast poles would be spaced approximately every 200 feet along straight portions of the track down to approximately every 70 feet in tight-turn track areas. The contact system would be connected to the substations, required at approximately 30-mile intervals. Statewide, the power supply would consist of a 2-kilovolt (kV) by 25 kV overhead contact system for all electrified portions of the statewide system.

2.3.7.1 Traction Power Substations

Based on the California HSR System's estimated power needs, each TPSS would need to be approximately 32,000 square feet (200 feet by 160 feet) and be located at approximately 30-mile intervals. Figure 2-25 shows a typical TPSS. Figure 2-26 shows a typical TPSS overhead catenary system (OCS) feeder gantry.

[3] The California HSR System cross sections include provisions for a 102-foot separation of the HSR track centerline from conventional rail systems to avoid intrusion without the need for physical protection from adjacent freight lines. In areas where it is not feasible to provide this separation distance, protection is required to prevent encroachment on the HSR right-of-way. Protection would consist of a swale, berm, or barrier (wall), depending on the separation.

Figure 2-25 Traction Power Substation

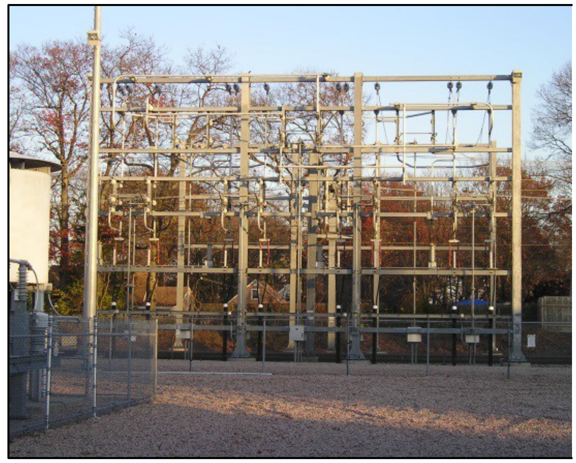


Figure 2-26 Traction Power Substation Overhead Catenary System Gantry

A buffer area would be required around TPSSs for safety purposes. For the Palmdale to Burbank Project Section, electrical substations would be constructed at locations where high-voltage power lines cross the Build Alternatives. The TPSS and associated feeder gantry could be screened from view with a perimeter wall or fence. Each TPSS site would have a 20-foot-wide access road (or easement) from the street access point to the protective fence perimeter. Each site would require a parcel of up to 2 acres. Each substation would include an approximately 450-square-foot control room (each Build Alternative design includes these facilities, as appropriate).

Power would be supplied either by Southern California Edison (SCE) or the Los Angeles Department of Water and Power (LADWP) transmission lines. SCE has indicated that serving the Palmdale to Burbank Project Section could require reconstruction of some existing lines. This could consist of reconductoring or of installing new power poles. Where electrification of the system is required, power companies would design and implement changes to their transmission lines, which include environmental review and clearance of the reconstruction. If the engineering design for new or upgraded SCE facilities involves new or different significant environmental impacts, additional environmental review, and analysis of the new equipment, including reconstruction of transmission lines, would be completed as part of the California Public Utilities Commission permit application process prior to construction.

During construction and operation, portals, adits, temporary work sites, and certain other ancillary facilities would also require power supplies. These would generally connect to the nearest existing overhead transmission lines.

2.3.7.2 *Switching and Paralleling Stations*

Switching and paralleling stations (PS) work together to balance the electrical load between tracks, and to turn power on or off to either track in an emergency. Switching stations (Figure 2-27) would be required at approximately 15-mile intervals, midway between the TPSSs. Switching stations would need to be approximately 14,400 square feet (160 feet by 90 feet).

PSs would be required at approximately 5-mile intervals between the switching stations and the TPSSs. The PSs would each need to be approximately 9,600 square feet (120 feet by 80 feet). Each PS would include an approximately 450-square-foot (18 feet by 25 feet) control room. Figure 2-28 shows a typical PS. Figure 2-29 shows a typical PS OCS feeder gantry (overhead wires that feed electricity to a rail vehicle).

The switching and PSs and associated feeder gantries could be screened from view with perimeter walls or fences. TPSSs, traction power switching, and PSs are included in each Build Alternative design as appropriate.

Figure 2-27 Switching Station

Figure 2-28 Paralleling Station

Figure 2-29 Paralleling Station Overhead Catenary System Gantry

2.3.7.3 Backup and Emergency Power Supply Sources for Stations and Facilities

During normal system operations, power would be provided by the local utility or a TPSS. Should the flow of power be interrupted, the system would automatically switch to a backup power source: an emergency standby generator, an uninterruptable power supply, or a direct current (DC) battery system.

For the Palmdale to Burbank Project Section, permanent emergency standby generators are anticipated to be located at passenger stations and terminal layup/storage. Standby generators are required to be tested (typically once a month for a short duration) in accordance with the National Fire Protection Association (NFPA) to verify readiness for backup and emergency use. If needed, portable generators could also be transported to other trackside facilities to reduce the impact of power interruptions on system operations.

2.3.7.4 Electrical Interconnections

As described above, each TPSS would have two 115/50-kilovolt (kV) or 230/50 kV single-phase transformers. These transformers would interconnect the TPSS to two breaker-and-a-half bays,[4] built at a new utility switching station within the fence line of an existing utility facility. Interconnection would be made by a short section of 230 kV transmission or 115 kV power lines (tie-lines). Per Authority requirements, the proposed interconnection points would need redundant transmission (i.e., double-circuit electrical lines) from the point of interconnection, with each interconnection connected only to two phases of the transmission source. A new utility switching station would encompass approximately 32,200 square feet (160 by 220 feet) and include an approximately 975-square-foot (15 by 65 feet) control building, a 525-square-foot (15 by 35 feet) battery building, and, if required, a retention basin. The utility switching station could be screened from view with perimeter walls or fences. Figure 2-30 shows a typical electrical interconnection between a typical TPSS and a transmission power line.

Figure 2-30 Electrical Interconnections

[4] A *breaker and a half* is a common design of overlapping circuits and circuit breakers to provide system reliability.

2.3.7.5 Network Upgrades

Providers of electric power service, such as SCE or the LADWP, will provide the necessary electrical service, including high-voltage electrical lines and substations, for the operations of the Palmdale to Burbank Project Section. Electric power providers have indicated that new lines and facilities need to be built and that existing lines and facilities need to be upgraded or reconductored to serve the system. The work required in constructing, upgrading, or reconductoring high-voltage electrical lines and/or substations may include the installation of new equipment, support structures, and power poles/structures. When electrifying the selected Preferred Alternative, electric power providers will design and implement changes to the system's high-voltage electrical lines, including height clearances of the existing electrical lines, and constructing or upgrading utility switching stations and/or utility substations. Each of the six Build Alternatives analyzed in this Draft EIR/EIS have incorporated preliminary utility system improvements provided by electric power providers.

2.3.8 Signaling and Train Control Elements

A computer-based, enhanced ATC system would control the trains. The enhanced ATC system would comply with FRA-mandated positive train control requirements, including safe separation of trains, over-speed prevention, and work-zone protection. The ATC system would use a radio-based communications network, including a fiber optic backbone and communications towers at intervals of approximately 1.5 to 3 miles along aboveground alignment areas, depending on the terrain and selected radio frequency. Communications towers would not be placed within tunnels but are located at portal facilities. Signaling and train control elements within the right-of-way would include 10-foot-by-8-foot communications shelters or signal huts/bungalows that house signal relay components and microprocessor components, cabling to the field hardware and track, signals, and switch machines on the track. Train control facilities ranging from 2,450 square feet (70 by 35 feet) to 7,175 square feet (110 by 65 feet) would be along the track. Each communications tower within these facilities would use a 6- to 8-foot diameter pole that would extend to a height of 100 feet above the tracks. The communications facilities would be in the vicinity of track switches and would be grouped with other traction power, maintenance, station, and similar HSR facilities where possible. Where communications towers could not be located with TPSSs or other HSR facilities, the communications facilities would be near the HSR corridor in a fenced area of approximately 25 feet by 40 feet. Figure 2-31 illustrates a typical at-grade profile with traction power, signaling, and train-control features.

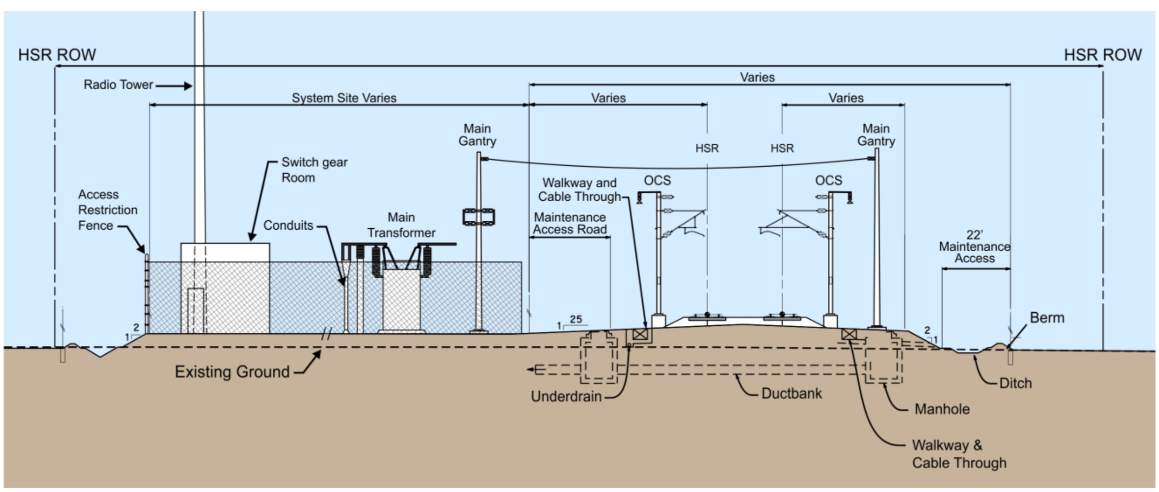


Figure 2-31 Typical High-Speed Rail Cross Section of At-Grade Profile with Traction Power, Signaling, and Train-Control Features

2.3.9 Track Structure

The track structure would consist of either a direct fixation system (with track, rail fasteners, and slab), or ballasted track, depending on local conditions and decisions to be made in later design phases. Ballasted track requires more frequent maintenance than slab track, as described below, but is less expensive to install.

Slab track (or ballast-less track) is a concrete or asphalt structure that is generally stiff and rigid while ballasted track is typically made of crushed stone packed between, below, and surrounding the rail fasteners. For purposes of environmental review, slab track is assumed for elevated structure, tunnel, cut-and-cover, and retained cut/trench profiles longer than 1 mile; ballasted track is assumed for the at-grade alignment profile.

2.3.10 Maintenance Facilities

The California HSR System includes four types of maintenance facilities: light maintenance facilities (LMF), maintenance of way facilities (MOWF), maintenance of infrastructure sidings (MOIS), and heavy maintenance facilities (HMF).

2.4 Potential Alternatives Considered during Alternatives Screening Process

This section explains how the alternatives were developed, taking into account alignment and station development considerations in both Palmdale and Burbank. Design options within individual alternatives were evaluated to isolate concerns and to screen and refine the alternatives to avoid adverse environmental effects or to improve performance. The alternatives that were not carried forward for detailed analysis had greater direct and indirect environmental impacts, were impracticable, or failed to meet the project purpose, need, and objectives. Alternatives included in the Preliminary Alternatives Analysis (PAA) Report (Authority 2010c) are discussed in more detail below. Additional information on alternatives preliminarily considered but not carried forward for full evaluation in this Draft EIR/EIS can be found in the PAA Report (Authority 2010c), the 2012 SAA Report (Authority 2012a, 2012b), the 2016 SAA Report, and the Alternatives Screening Memorandum (Authority 2016a).

While the alternatives analysis process considered multiple criteria, the project objective to maximize the use of existing transportation corridors and available rights-of-way to the extent feasible was emphasized as a way of minimizing impacts otherwise caused by creating an entirely new linear transportation corridor. Additionally, the engineering, geologic, and grade-requirement challenges within this project section have influenced the alternative alignments. The following sections summarize the alternatives included in the Statewide Program EIR/EIS, the PAA Report, and the SAA Reports.

2.4.1 High-Speed Rail Project-Level Alternatives Development Process

The purpose of the alternatives analysis process is to determine a reasonable range of HSR alternatives that the Draft EIR/EIS will analyze in detail. Several project alternatives were preliminarily developed and analyzed in the alternatives analysis process described below to determine which alternatives would be carried forward into the Draft EIR/EIS.

2.4.1.1 Project Definition Framework and Alternatives Development

Definition of the California HSR System begins with the corridor(s) and station locations selected by the Authority and FRA in the 2005 Statewide Program EIR/EIS and concludes with identification of the Preferred Alternative in this Draft EIR/EIS. Project definition then becomes increasingly detailed to meet the analytical and decision-making needs at progressive stages of the California Environmental Quality Act (CEQA)/National Environmental Policy Act (NEPA) and NEPA/404/408 Integration process.

Section 2.4.1.2 describes the framework for progressive California HSR System definition through the alternatives development and evaluation processes. The framework correlates an increasingly complete, detailed, and precise project description/footprint with the coordinated stages of the Draft EIR/EIS and NEPA/404/408 Integration processes, Authority guidance for HSR design and analysis, and stakeholder input. The purpose of this framework is to identify the appropriate levels of project information at different stages of environmental analysis, show the corresponding milestones of the NEPA/CEQA processes, inventory applicable program and project guidance, and identify the type and range of stakeholder participation essential for successful progress through the environmental documentation and regulatory permitting processes.

2.4.1.2 Summary of High-Speed Rail Project-Level Alternatives Development Process

An EIR/EIS is required to analyze the impacts of a range of reasonable alternatives (14 California Code of Regulations 15126.6; 40 Code of Federal Regulations Part 1502.14(a)). Under CEQA, the alternatives are to include a No Project Alternative and a range of potentially feasible alternatives that would (1) meet most of the project's basic objectives, and (2) avoid or substantially lessen one or more of the project's significant adverse effects (14 California Code of Regulations 15126.6(c)). In determining the alternatives to be examined in the EIR, the lead agency must describe its reasons for excluding other potential alternatives. There is no ironclad rule governing the range of alternatives to be studied in an EIR other than the "rule of reason." Under the "rule of reason," an EIR is required to study a sufficient range of alternatives to permit a reasoned choice (14 California Code of Regulations 15126.6(f)). It is not required that all possible alternatives be studied.

Under NEPA, an EIR/EIS examines reasonable alternatives to the proposed action, as well as a No Action Alternative.[5] Pursuant to Section 14(l) of the FRA's Procedures for Considering Environmental Impacts (FRA 1999), these include "all reasonable alternative courses of action that could satisfy the [project's] purpose and need" (64 *Federal Register* 28546). There is no minimum number of alternatives that must be considered in an EIS.

The development of HSR project-level alternatives followed the process described in *Alternatives Analysis Methods for Project-Level EIR/EIS* (Authority 2011a). The assessment of potential alternatives involved both qualitative and quantitative measures that address applicable policy and technical considerations. These included field inspections of corridors; project team input and review, considering local issues that could affect alignments; qualitative assessment of constructability, accessibility, operations, maintenance, right-of-way, public infrastructure impacts, railway infrastructure impacts, and environmental impacts; engineering assessment of Palmdale to Burbank Project Section length, travel time, and configuration of key features of the alignment, such as the presence of existing infrastructure; and geographic information system-based analysis of impacts on farmland, water resources, wetlands, threatened and endangered species, cultural resources, current urban development, and infrastructure.

The applicable policy and technical considerations, including the following:

- HSR system performance criteria evaluated the operational characteristics that the Palmdale to Burbank Project Section must achieve as part of the California HSR System, including consistency with project purpose, needs, and objectives.
- Environmental criteria considered the potential effects of the proposed alternatives on the natural and human environment, including the extent to which an alternative minimizes impacts on natural resources.

[5] *No Action Alternative* is a NEPA term and *No Project Alternative* is a CEQA term. For this document, the *No Project Alternative* is being used to also refer to the *No Action Alternative*.

- Land use criteria measured the extent to which a proposed station alternative supports transit use; is consistent with existing adopted local, regional, and state plans; and is supported by existing and future growth areas.
- Constructability criteria measured the feasibility of construction and the extent to which right-of-way is obtainable or constrained.
- Community impacts criteria measured the extent of disruption to neighborhoods and communities, such as potential to minimize (1) right-of-way acquisitions, (2) division of an established community, and (3) conflicts with community resources.

For Clean Water Act Section 404(b)(1) compliance, the United States Army Corps of Engineers (USACE) must take into consideration the applicant’s needs in the context of the geographic area of the proposed project in concurring with the project purpose. FRA, the Authority, USACE, and the United States Environmental Protection Agency (USEPA) signed the *Memorandum of Understanding - National Environmental Policy Act (42 U.S.C. 4321 et seq) and Clean Water Act Section 404 (33 U.S.C. 1344) and Rivers and Harbors Act Section 14 (33 U.S.C. 408) - Integration Process for the California High-Speed Train Program* (NEPA-404 MOU) in November 2010 to coordinate environmental reviews under NEPA with the regulatory processes under Section 14 of the Rivers and Harbors Act (Section 408) and Section 404 of the Clean Water Act. The NEPA-404 MOU provides a structure for this process that includes several “checkpoint” reports. Pursuant to the NEPA-404 MOU, Checkpoint A sets out the purpose and need for the Tier 2 project, Checkpoint B identifies the range of alternatives to be analyzed in the project EIR/EIS, and Checkpoint C includes an analysis to determine the preliminary least environmentally damaging practicable alternative. USACE and United States Environmental Protection Agency (USEPA) provided concurrence on the Palmdale to Burbank Project Section purpose statement in December 2014. USACE and USEPA concurred on December 17, 2020, and December 16, 2020, respectively, with alternatives recommended in Checkpoint B for inclusion in the EIR/EIS.

2.4.2 Range of Potential Alternatives Considered and Findings

This section discusses the range of potential alignment alternatives and station locations considered throughout the alternatives development process. The following documents provided alternative analyses during the alternatives development process:

- Preliminary Palmdale to Los Angeles Alternatives Analysis Report (July 2010)
- Supplemental Palmdale to Los Angeles Alternatives Analysis Report (April 2012)
- Palmdale to Los Angeles Supplemental Alternatives Analysis Report, Volumes 1 and 2: Sylmar-Palmdale Subsection (April 2012)
- Palmdale to Los Angeles Supplemental Alternatives Analysis Report (May 2014)
- Palmdale to Burbank Project Section Supplemental Alternatives Analysis Report (June 2015)
- Palmdale to Burbank Project Section Supplemental Alternatives Analysis Report (April 2016)

2.4.2.1 Geographic Segments of the Palmdale to Burbank Project Section

To facilitate screening of the alignment alternatives and station options, the Palmdale to Los Angeles Project Section was initially divided into subsections. The approximate geographic limits of each subsection were established at points where Build Alternatives meet, such that the alternatives for each subsection could be “mixed and matched” with those from each adjacent subsection. The subsections, as analyzed in the PAA Report and subsequent SAA Reports, are listed below from north to south.

Palmdale to Los Angeles Preliminary Alternatives Analysis Report (2010 PAA Report)

- Palmdale to Sylmar Subsection—Beginning at Avenue M in the city of Palmdale and terminating at the boundary between the community of Sylmar neighborhood of Los Angeles and the city of San Fernando.

- Sylmar to SR 2 Subsection—Beginning at the boundary between the Sylmar neighborhood of Los Angeles and the city of San Fernando and terminating at the SR 2 overcrossing in the city of Glendale.
- SR 2 to Metrolink Central Maintenance Facility Subsection—Beginning at the SR 2 overcrossing in the city of Glendale and terminating at the Metrolink Central Maintenance Facility (CMF) (just north of the SR 110 and I-5 intersection).
- Metrolink CMF to LA Union Station Subsection—Beginning at the Metrolink CMF (just north of the SR 110 and I-5 intersection) and terminating at Los Angeles Union Station (LAUS).

Palmdale to Los Angeles Supplemental Alternative Analysis Reports (2012, 2012, 2014 SAA Reports)

- Palmdale Subsection—Beginning near Avenue O in the city of Palmdale and terminating approximately 2 miles east of Lang Station Road.
- Santa Clarita Subsection—Beginning approximately 2 miles east of Lang Station Road and terminating at the boundary between the Sylmar neighborhood of Los Angeles and the city of San Fernando.
- San Fernando Valley Subsection—Beginning at the boundary between the Sylmar neighborhood of Los Angeles and the city of San Fernando and terminating at the Burbank Airport Station in the city of Burbank.
- Los Angeles Subsection—Beginning at the Burbank Airport Station and terminating at LAUS.

Palmdale to Burbank Supplemental Alternative Analysis Reports (2015, 2016 SAA Reports)

The 2015 SAA Report was the first report not to include geographic subsections. The 2015 and 2016 Palmdale to Burbank SAA Reports recommended station-to-station alternatives in the project area from the Palmdale TC to the Burbank Airport Station.

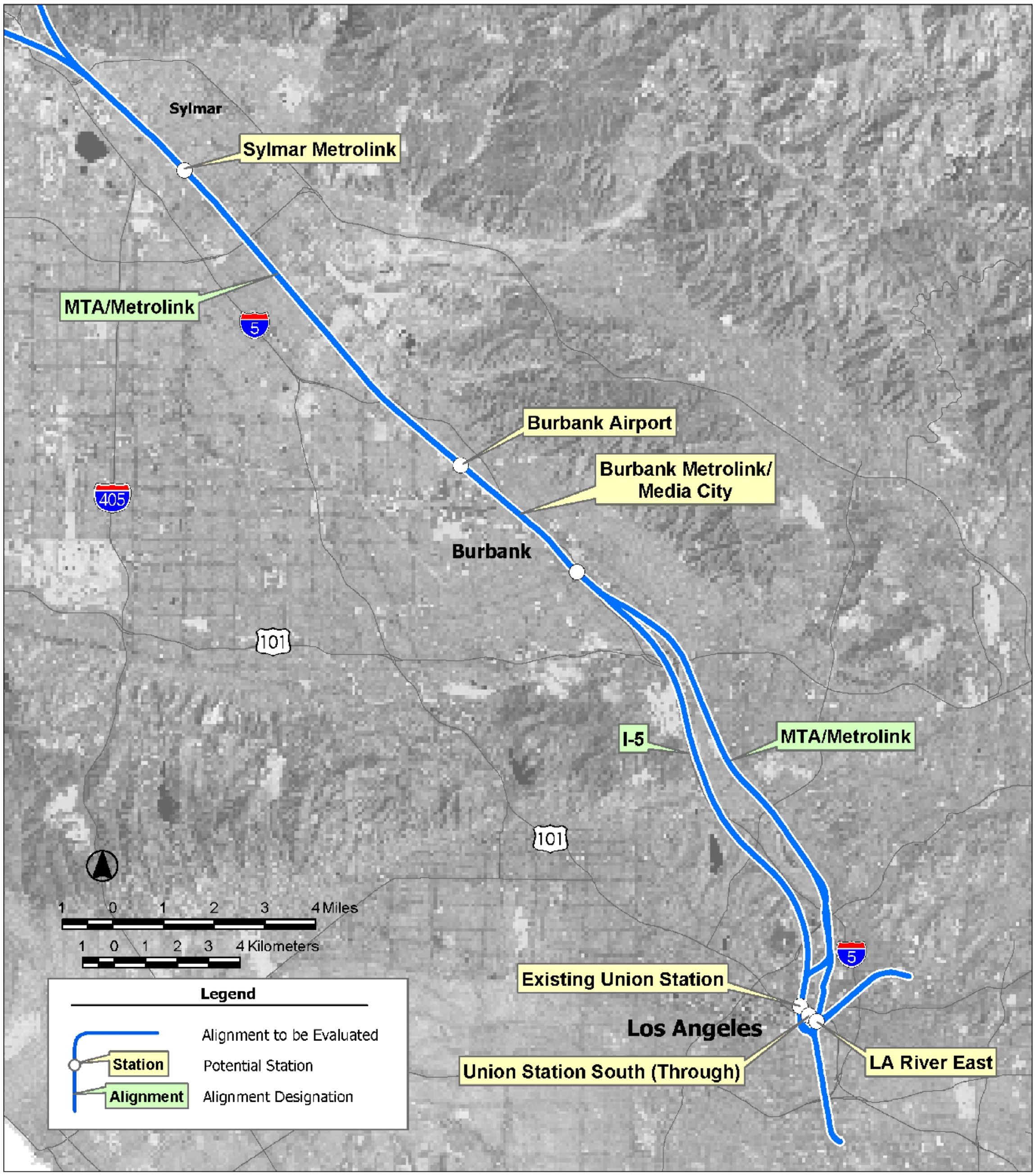
2.4.2.2 Alternatives Considered and Findings

Over the course of Tier 1 and Tier 2 planning spanning nearly two decades, the Authority has considered multiple alternatives for HSR to connect the southern Central Valley to the Los Angeles Basin. The following discussion briefly describes alignment and station alternatives the Authority did not carry forward for detailed study in this Draft EIR/EIS. The PAA Report, SAA Reports, and Checkpoint B Summary Report provide additional details.

2005 Statewide Program EIR/EIS

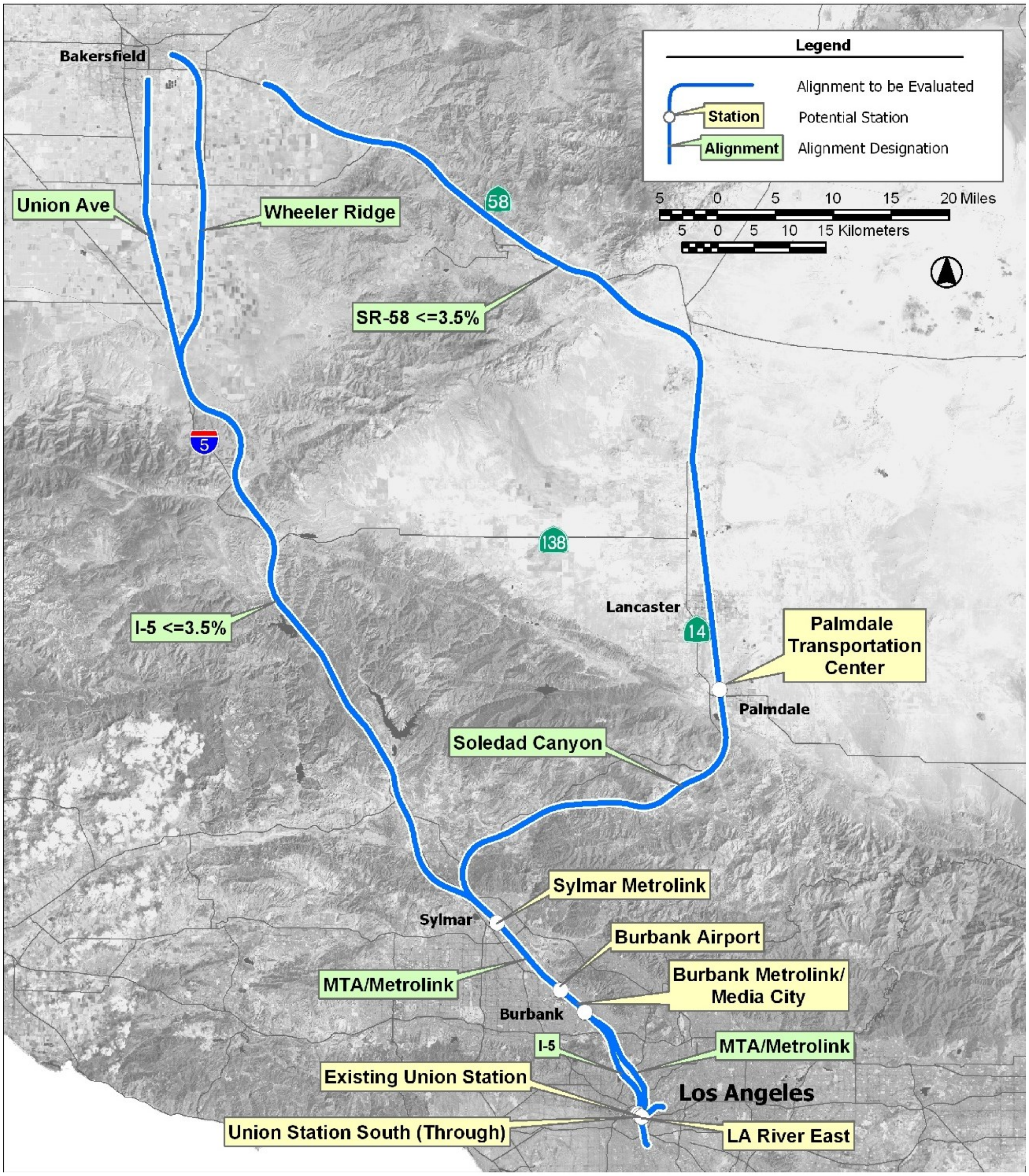
In the 2005 Statewide Program EIR/EIS, the Authority defined a broad corridor between Bakersfield and Los Angeles, which was further divided into two segments: (1) Sylmar to Los Angeles (Figure 2-32) and (2) Bakersfield to Sylmar (Figure 2-33). The screening evaluation conducted as part of the Statewide Program EIR/EIS initially considered six general alignment corridors for the Bakersfield to Sylmar segment:

- SR 138 (Soledad Canyon or SR 14)
- Aqueduct (Soledad Canyon or SR 14)
- I-5 via Comanche Point
- I-5 (2.5 percent maximum grade) (Union Avenue or Wheeler Ridge)
- I-5 (3.5 percent maximum grade) (Union Avenue or Wheeler Ridge)



Source: Authority and FRA, 2005

Figure 2-32 Sylmar to Los Angeles Corridor Alignments and Station Sites Carried Forward



Source: Authority and FRA, 2005

Figure 2-33 Bakersfield to Los Angeles Corridor Alignments and Station Sites Carried Forward

As a result of the screening evaluation, the SR 138, Aqueduct, I-5 via Comanche Point, and I-5 (2.5 percent maximum grade) Corridors were eliminated from study in the 2005 Statewide Program EIR/EIS. These alignments were eliminated based on seismic constraints because each would have required long tunnels through seismic zones, either crossing active faults in long tunnels or paralleling them for long distances. The 2005 Statewide Program EIR/EIS therefore studied two corridors for Bakersfield to Sylmar: the SR 58/Soledad Canyon corridor and the I-5 3.5 percent maximum grade corridor, as shown in Figure 2-33.

Between Sylmar and LAUS, the 2005 Statewide Program EIR/EIS examined corridors that would generally follow the I-5 freeway or the Metro/Metrolink Antelope Valley Line. Station options at Sylmar, Burbank, and Los Angeles were evaluated, as shown in Figure 2-32. The Authority determined at the time that sharing existing commuter and freight tracks would not meet the California HSR System's purpose and that dedicated tracks would be necessary to achieve the performance goals of the California HSR System.

Based on the 2005 Statewide Program EIR/EIS, the Authority and FRA selected the SR 58/ Soledad Canyon corridor (Antelope Valley) and MTA/Metrolink corridors to advance for further Tier 2 (project-level) study, with stations in Palmdale, Sylmar, Burbank, and Los Angeles. (Authority and FRA 2005). Serving the Antelope Valley and providing HSR service to the Palmdale/Lancaster area, thereby increasing transportation connectivity to this fast-growing area, was a key factor in the Authority and FRA's decision in selecting the Antelope Valley corridor over the I-5 corridor. The Antelope Valley corridor also would have, on balance, fewer environmental impacts, would be less subject to seismic activity, and would have less tunneling and fewer constructability issues.

In terms of environmental impacts, the Antelope Valley alignment was estimated to affect more cultural resources than the I-5 alignment options and to have slightly more impacts on biological resources. However, the Antelope Valley alignment would have less water-related impacts because the impacts are related to the relatively small seasonal streams in Soledad Canyon, and based on information available at the time, the alignment was considered to not encroach on lakes, including Una Lake. The Antelope Valley corridor also had fewer impacts on wetlands and nonwetland waters than the I-5 corridor. In addition, the Antelope Valley option was forecast to have fewer growth-inducing impacts on urbanized land and farmland conversion than the I-5 options because the I-5 options would result in more growth in the Central Valley. The most significant difference with regard to environmental impacts between the Antelope Valley option and the I-5 alignments was related to major parklands. The Antelope Valley corridor would not go through major parks or national forests. In contrast, the I-5 corridor would affect Fort Tejon Historic Park, ANF, Los Padres National Forest, the Hungry Valley State Vehicular Recreation Area, Pyramid Lake, and other local parks.

The Antelope Valley corridor traversed less challenging terrain than the I-5 corridor, which, based on the information available at the time, would result in considerably less tunneling overall (13 miles of tunneling for the Antelope Valley option versus 23 miles for the I-5 options), and considerably shorter tunnels (maximum length of 3.4 miles for the Antelope Valley option versus two tunnels longer than 5 miles for the I-5 option), which would, in turn, result in fewer constructability issues. Although the Antelope Valley option is about 35 miles longer than the I-5 alignment options, it was determined to be slightly less expensive to construct as a result of less tunneling through the Tehachapi Mountains. In addition, because of its gentler gradient, geology, topology, and other features, the SR 58/Soledad Canyon Corridor offered greater opportunities for potential alignment variations, particularly through the mountainous areas of the corridor, to avoid impacts on environmental resources. In contrast, the more challenging terrain of the I-5 corridor greatly limits the ability to avoid sensitive resources and seismic constraints.

The MTA/Metrolink corridor was selected over the Combined I-5/Metrolink Corridor based on fewer impacts on parks, particularly the Taylor Yard and Cornfield properties owned by California State Parks. The MTA/Metrolink corridor also offered opportunities to reduce impacts as the design involved more than the Combined I-5/Metrolink Corridor.

Palmdale to Los Angeles Project Section EIR/EIS Scoping and Alternatives Development

The 2005 Tier 1 decisions formed the basis for scoping and alternatives development for the previously defined Palmdale to Los Angeles Project Section between 2007 and 2014, as reflected in the *Palmdale to Los Angeles Project Section Scoping Report* (Authority 2007), the *Palmdale to Los Angeles Project Section PAA Report* (Authority and FRA 2010) and *Addendum* (Authority 2010b), and the *Palmdale to Los Angeles Project Section SAA Reports* (Authority and FRA 2012a; Authority and FRA 2012b; Authority and FRA 2014). Figure 2-1 in 2.2.2 depicts the broad HSR corridor identified for the Palmdale to Los Angeles region and included in the 2007 Scoping Report, which provided the foundation for the alternatives development and screening process.

Palmdale to Los Angeles Project Section Preliminary Alternatives Analysis Report (2010 PAA Report)

Following scoping, the Authority and FRA developed potential alignment alternatives between Palmdale and Los Angeles and station options in Palmdale, the San Fernando Valley, and Los Angeles through an extensive outreach and engineering effort (Authority and FRA 2010). Developing potential alternatives in the mountain passes that could achieve HSR performance criteria, including crossing major faults at grade, presented a particular challenge. The Quantum analytical tool was used to support identification of alternatives with consideration of design requirements and environmental constraints.

In consideration of the varying setting and terrain covered in the 2010 PAA Report, the Palmdale to Los Angeles Project Section was divided into four subsections (described in Section 2.4.2.1), and multiple alignment alternatives were carried for each subsection for further evaluation (Figure 2-34):

- Sylmar to Palmdale Subsection
  - SR14 East—Alignment passes close to the SR 14 highway through the Acton area and east of Palmdale Lake to follow the existing railroad right-of-way into Palmdale.
  - SR14 West—Alignment passes close to the SR 14 highway through the Acton area and west of Palmdale Lake before rejoining the existing railroad right-of-way in Palmdale north of the Palmdale TC.
- SR 2 to Sylmar Subsection
  - Alignment ESS—HSR would run within the existing Metrolink/Union Pacific Railroad (UPRR) railroad corridor, sharing the right-of-way, with the dedicated HSR tracks placed to the east and the Metrolink/freight tracks relocated to the west. This alignment would allow for progressively increasing speeds to the north as it follows the existing Metrolink/UPRR corridor. It would run predominantly at grade, with the following profiles to deal with existing at-grade road crossings:
    - Elevated Profile A—HSR would be selectively elevated to create grade separations.
    - At-grade Profile B1—Roads would be elevated to cross over HSR, which would be at grade.
    - At-grade Profile B2—Roads would be depressed to cross under HSR, which would be at grade.
    - Trench Profile C—HSR would be selectively depressed to create grade separations.
- Metrolink CMF to SR 2 Subsection
  - San Fernando Road Alignment—A partially covered trench would run along San Fernando Road along the east side of Rio de Los Angeles State Park.
  - Metrolink Trench Alternative—A partially covered trench would run in the existing Metro right-of-way along the west side of Rio de Los Angeles State Park.

- LAUS to Metrolink CMF Subsection
  - Alternative LAPT1—Alignment would originate from an at-grade HSR station at LAUS that includes a tunnel between Spring Street and Metrolink CMF with a cut-and-cover section through Los Angeles State Historic Park.
  - Alternative LAPT2—Alignment would originate from an elevated or at-grade HSR station at LAUS that includes a tunnel between Broadway and Metrolink CMF.
    - Alternative LAPT3—Alignment would originate from an at-grade HSR station at LAUS that includes a tunnel between Spring Street and Metrolink CMF, passing beneath Los Angeles State Historic Park in a bored tunnel.
    - Alternative LAP1C—Alignment would originate from an elevated or at-grade HSR station at LAUS that would follow Main Street on viaduct then cross the river just north of the Main Street Bridge to the east bank of the Los Angeles River and follow the Metrolink tracks.
- Station Options
  - Los Angeles—LAUS (as defined for the Los Angles to Anaheim California HSR System).
  - San Fernando Valley—Single station between LAUS and Palmdale at one of the following locations:
    - Burbank Buena Vista Alternative—In the city of Burbank between North Buena Vista Street and Hollywood Way, in proximity to Hollywood Burbank Airport.
    - Branford Alternative—Between Tujunga Wash and Branford Street in the city of Los Angeles/Pacoima.
    - Pacoima Wash Alternative—Between the SR 118 freeway and the Pacoima Wash, in the city of Los Angeles/Pacoima and immediately adjacent to the city of San Fernando.
    - Sylmar/San Fernando Alternative—Between Maclay Street and Hubbard Avenue in the city of San Fernando.
- Palmdale Station Option 1—Near the Palmdale TC, in conjunction with the SR14 East alignment alternative
- Palmdale Station Option 2—Near Avenue P west of the Palmdale TC, in conjunction with the SR14 West alignment alternative

Alternatives Eliminated from Further Consideration

Through the 2010 PAA Report, the Authority determined that several potential alignment and station alternatives did not merit continued consideration. Between Sylmar and Palmdale, the SR14 South and Soledad Canyon alignments were eliminated from further consideration based on increased environmental impacts, along with increase route mileage and journey time, as compared to the SR14 East and SR14 West alternatives carried forward (see Figure 2-34). The Soledad Canyon alignments would traverse areas granted by the Bureau of Land Management for mineral extraction and negatively impact the ANF. The SR 14 South alignment would negatively impact the existing visual setting and also traverse areas granted by the Bureau of Land Management for mineral extraction. Additionally, USEPA and other resources agencies raised concerns regarding impacts on sensitive resources in the Soledad Canyon and Santa Clara River environments.

A potential station in Santa Clarita was eliminated from further consideration based on comparatively higher displacements. A potential station in Lancaster was eliminated based on not sufficiently meeting the project purpose and objectives of providing transportation connectivity as compared to station sites in Palmdale. Between Sylmar and SR 2, alternatives that would have placed the California HSR System outside the existing right-of-way to the east and west were eliminated from further consideration due to high displacement of residential, commercial, and industrial properties, and an alternative that would have required several long viaducts sharing the existing right-of-way was eliminated due to the complexity and visual intrusiveness of the long viaducts. The use of the existing right-of-way would also reduce train travel times. Trains between Palmdale and downtown Burbank have a run time that varies from 1 hour 24 minutes to 1 hour 53 minutes. Proposition 1A requires that HSR trains meet a travel time objective of 2 hours and 40 minutes from San Francisco to Los Angeles; it would not be possible to meet that mandate if the section between Palmdale and Burbank required this much time to traverse.

Potential stations at Burbank North and South, Hollywood Way, Sunland Boulevard, and Sylmar North were eliminated from further consideration based on location/proximity to other stations, constructability issues and costs, and environmental impacts compared to the station alternatives carried forward.[6]

Conceptual I-5 Corridor Study (2012 I-5 Study)

In May of 2011, the Authority decided to revisit the I-5 alignment between Bakersfield and Sylmar in light of estimated capital cost increases and environmental impacts for developing alternatives along SR 58/Soledad Canyon (Authority 2012a) The purpose of the 2012 I-5 Study was to determine if new conditions and factors would justify reconsidering the 2005 Tier 1 decision to drop the I-5 corridor in favor of the Antelope Valley corridor. In January 2012, upon completion of the additional investigation, the Authority determined that most of the factors that lead to the selection of the Antelope Valley corridor in 2005 had not substantially changed, and that on balance the investigation supported a continued focus on the Antelope Valley corridor in the Tier 2 environmental process (Authority 2012b).

[6] See the 2010 PAA Report for a discussion of alternatives not carried forward between SR 2 and LAUS.

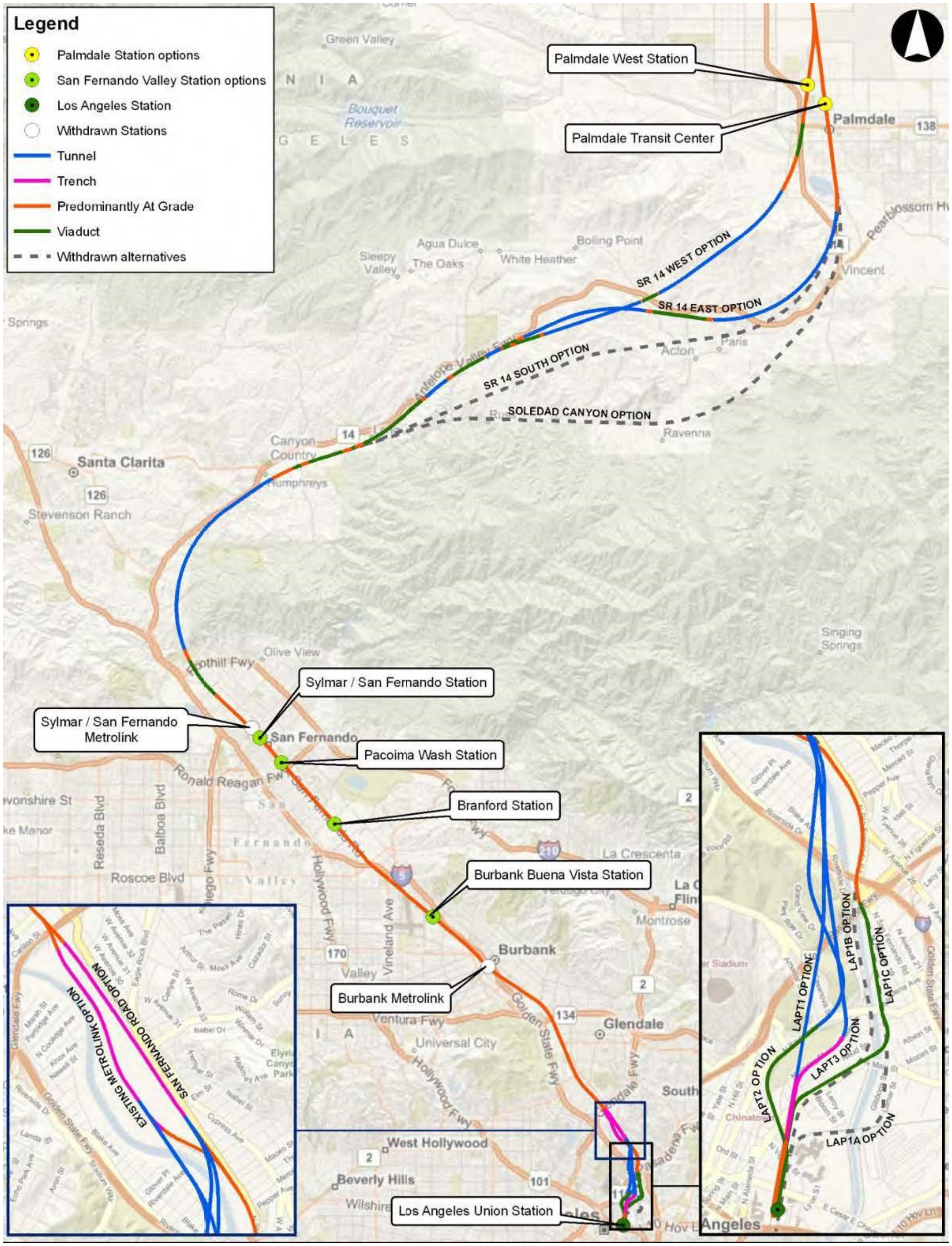


Figure 2-34 Alignment and Station Alternatives Analyzed in 2010 Preliminary Alternatives Analysis Report

Palmdale to Los Angeles Supplemental Alternatives Analysis Report: LAUS to Sylmar (2011 SAA Report)

The 2011 SAA Report (Authority and FRA 2011) refined alignment corridors and station sites in the southern portion of the Palmdale to Los Angeles corridor between Sylmar and LAUS, utilizing the three separate "subsections" as presented in the 2010 PAA Report: Sylmar to SR 2, SR 2 to Metrolink CMF, and Metrolink CMF to LAUS. The 2011 SAA Report introduced the following refinements to alternatives and eliminated other alternatives (mapped on Figure 2-35):

- LAUS to Metrolink CMF Subsection:
  - Alternative LAPT1—If the gradient were increased and the track layout adjusted in the approach to LAUS, bored tunnel construction could be used under the Los Angeles State Historic Park, avoiding sensitive subsurface cultural resources and temporary surface impacts on the park during construction. LAPT1 was recommended to be carried forward.
  - Alternative LAPT2—Alternative LAPT2 included a refined alignment made consistent with the elevated LAUS. LAPT2 was not recommended to be carried forward because it would have greater impacts and slower journey times than LAPT3.
  - Alternative LAPT3—If the gradient were increased and the track layout adjusted in the approach to LAUS, alternative LAPT3 could be made consistent with the elevated LAUS option and a bored tunnel under the Los Angeles State Historic Park. LAPT3 was recommended to be carried forward.
  - Alternative LAP1C—Alternative LAP1C was unchanged from the 2010 PAA Report and was recommended to be carried forward.
- Metrolink CMF to SR 2 Subsection:
  - Following comments from stakeholders, a variation of the tunnel alternatives was considered with a bored tunnel extended under Rio de Los Angeles State Park and the new high school, emerging into a trench north of the school and rising to pass through the SR 2 bridge at grade. This tunnel alternative was recommended to be carried forward.
  - Following further discussions with existing train operators and the California Department of Parks and Recreation, the at-grade option on the Metrolink alignment, not carried forward in the 2010 PAA Report, was re-evaluated and was recommended to be carried forward in preference to the trench alignments along the Metrolink alignment or along San Fernando Road.
- SR 2 to Sylmar Subsection:
  - The seismic risk associated with the Verdugo Fault has restricted the profile options between Hollywood Burbank Airport and San Fernando to an at-grade alignment, which would allow the quickest service recovery time should a major seismic event occur.
  - The Authority Board requested evaluation of a station located in downtown Burbank at the existing Burbank Metrolink station. A nonstandard layout to bring the tracks closer to the existing right-of-way, reducing some of the impacts illustrated in the 2010 PAA Report, was considered. As a result of the remaining impacts of this station location on the surrounding area and the need to reconstruct the existing bridges over the alignment, this alternative was not recommended to be carried forward for evaluation in the Draft EIR/EIS.
  - The seismic risk associated with the Verdugo Fault, the impacts on new development south of SR 118, and the construction challenges and visual impact associated with the elevated Pacoima Wash Station result in this alternative no longer being recommended to be carried forward. Extensive adverse impacts on adjacent freeways and intersections

mean that an alternative at-grade Pacoima Wash option was not recommended to be carried forward.

Palmdale to Los Angeles Supplemental Alternatives Analysis Report, Sylmar to Palmdale (2012 SAA Report)

The 2012 SAA Report (Authority and FRA 2012) split the Palmdale to Sylmar Subsection as previously included in the 2010 PAA Report into the Santa Clarita Subsection and the Palmdale Subsection and further evaluated potential alignment alternatives within these two new subsection limits. The 2012 SAA Report focused solely on the Santa Clarita and Palmdale Subsections (Figure 2-36) and made no other changes to the alignment or station options within other subsections carried forward from the previous 2012 SAA Report.

The 2012 SAA Report refined the SR14 East and the SR14 West Alignments to create an East/West Hybrid option. The 2012 SAA Report recommended that the alternatives described below be carried forward for further study.

Palmdale Subsection

Because of residents' concerns in the area of Acton and Agua Dulce regarding noise and visual impacts, impacts on schools, and general community impacts, the 2012 SAA Report investigated options to refine the SR14 East and the SR14 West alignments to reduce impacts. The 2012 SAA Report explained that an alternative suggested by stakeholders that would follow the SR 14 median would require slow train speeds and would not meet the project purpose or objectives of providing HSR service and was therefore eliminated from consideration. An alternative that would join tunnels in the area to create a roughly 12-mile tunnel through Acton was eliminated due to operational, maintenance, and safety issues and high capital and operational costs associated with tunnels. Based on the 2012 SAA Report, three alignments were carried forward for continued consideration.

- SR14 East Option—Refined to avoid direct impacts on Vasquez High School.
- SR14 West Option—Refined to avoid the Ward Road interchange bridge.
- SR14 East/West Hybrid Option—Developed in response to public concerns raised by residents of Acton and Agua Dulce related to noise, vibration, and visual impacts.

Santa Clarita Subsection

In response to concerns in the Sand Canyon area and suggestions from stakeholders, the 2012 SAA Report explained that alternatives that would closely follow SR 14 or Metrolink through Sand Canyon would have slow train speeds and would not meet the project purpose or objectives of providing HSR service. An alternative that would extend the tunnel through Sand Canyon was considered infeasible and not reasonable at the time due to operational and safety issues, along with high capital and operational costs. The 2012 SAA Report also eliminated an alternative that would have traversed the Santa Clara River at grade, due to high environmental impacts. Based on the 2012 SAA Report, two alignments through Sand Canyon were carried forward for continued consideration:

- Sand Canyon Preliminary AA Option—Renamed Santa Clarita North
- Sand Canyon Metrolink 200 Option—Renamed Santa Clarita South

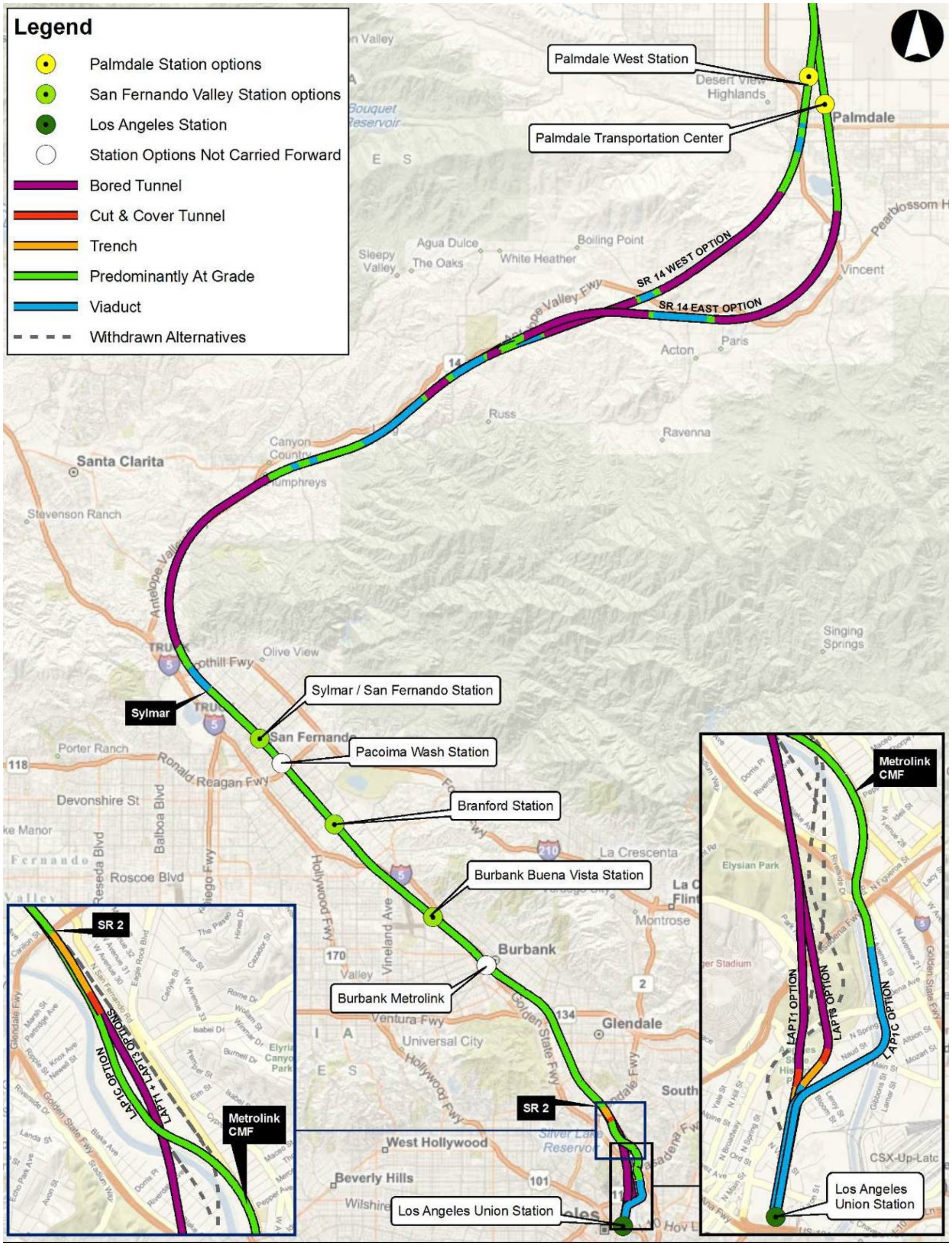


Figure 2-35 Alignment and Station Alternatives Analyzed in the 2011 Supplemental Alternatives Analysis Report—Los Angeles Union Station to Sylmar

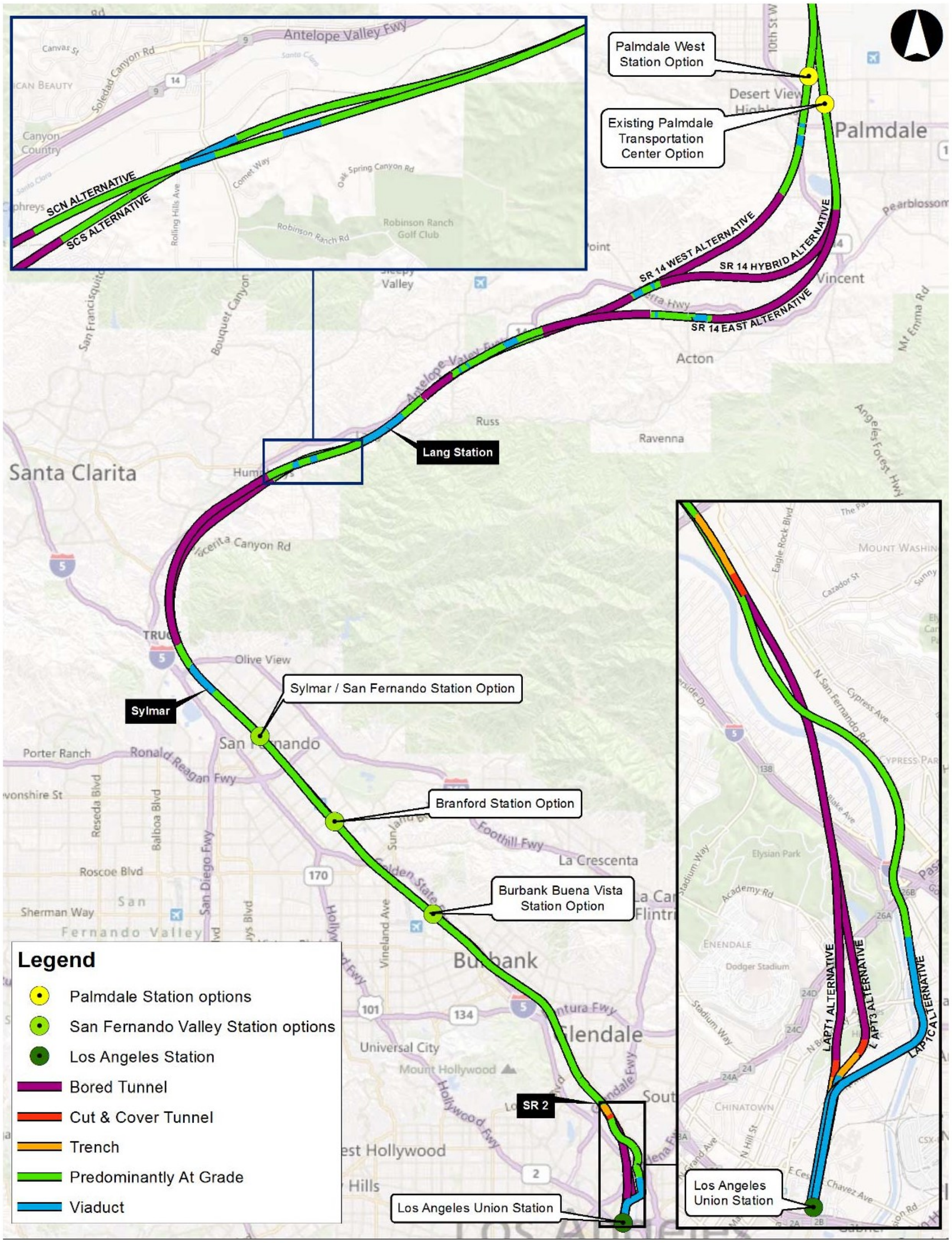


Figure 2-36 Alignment and Station Alternatives Carried Forward from the 2012 Supplemental Alternatives Analysis Report

Palmdale to Los Angeles Supplemental Alternatives Analysis Report (2014 SAA Report)

The 2014 SAA Report (Authority and FRA 2014) recommended that the Palmdale to Los Angeles Project Section would be better advanced if divided into two project sections (Palmdale to Burbank and Burbank to Los Angeles). In addition, the 2014 SAA Report evaluated project alternatives from the 2012 SAA Report in light of California HSR System phasing in the 2012/2014 Business Plans. Both Business Plans called for an Initial Operating Segment (IOS) with a temporary terminus station in the San Fernando Valley that would be fully integrated with the existing metropolitan rail infrastructure, to provide connections to all of Southern California while construction of the California HSR System to LAUS and beyond continues. The Business Plans' phased implementation strategy contained the following goals intended to make the best use of existing railroad infrastructure:

- A commitment to a blended system that focuses on new high-speed infrastructure development between the State's metropolitan regions while using, to the maximum extent possible, existing regional and commuter rail systems in urban areas.
- A commitment to blended operations at all phases of development that seeks to use new and existing rail infrastructure more efficiently through coordinated delivery of services, including interlining of trains from one system to another as well as integrated scheduling to create seamless connections.
- An IOS to connect the Central Valley to the Los Angeles Basin in the San Fernando Valley, integrating high-speed infrastructure with existing modes of transportation and closing the rail gap between Bakersfield and Palmdale.
- Making early investments in the "bookends," defined as San Francisco and the Los Angeles Basin, to upgrade existing services, build ridership, and lay the foundation for expansion of the California HSR System.

The 2014 SAA Report also considered new information that had developed since the 2012 SAA Report, including the emergence of the Brightline West HSR project (Brightline West Project) from Las Vegas to Victorville, the addition of the high-speed rail corridor of the High Desert Corridor project from Victorville to Palmdale, the incorporation of a Transit Village Specific Plan into the Palmdale General Plan, and planning for land use and transportation by the City of Burbank and the Burbank-Glendale-Pasadena Airport Authority around the Hollywood Burbank Airport.

The 2014 SAA Report recommended certain alternatives for further investigation (mapped on Figure 2-37) and eliminated others.

Palmdale Subsection

The Palmdale West Station Option and its connecting SR14 West alignment were eliminated from consideration because the station would not be supported by land uses that emphasize TOD and would not support the proposed High Desert Corridor project and a future HSR connection with Brightline West HSR service to Las Vegas. Furthermore, the Palmdale West Station Option and the SR14 West Alignment would not connect to Metrolink or the existing bus network at the Palmdale TC, and therefore did not offer interconnectivity with the existing transportation system. The Palmdale West Station Option would require the construction of tunnels or viaduct through the San Andreas Fault Zone. This portion of the San Andreas Fault is likely to experience a seismic event during the operational lifetime of the California HSR System. The placement of tunnels or viaduct within the San Andreas Fault Zone would not be practicable because HSR engineering criteria prohibits the alignment to be elevated or underground across Hazardous Faults to all practical extent. Tunnel or viaduct structures in a Hazardous Fault would pose an unacceptably high seismic public safety risk. Moreover, in the event of seismic activity at the fault resulting in catastrophic failure, the time necessary to rebuild HSR tunnels or viaduct would render the system inoperable for a protracted period of time and jeopardize the financial viability of the California HSR System. For the above reasons, this station option and its associated alternative (SR14 West) were withdrawn from further consideration. The remaining Palmdale

Subsection alignment alternatives—the SR14 East alignment alternative and the SR14 E/W Hybrid were carried forward for further evaluation, along with a station at the Palmdale TC, which would support intermodal connectivity and TOD.

Santa Clarita Subsection

The 2012 SAA Report recommended two alignment alternatives to be studied in future environmental documentation: Santa Clarita North and Santa Clarita South. The 2014 SAA Report recommended no changes to Santa Clarita South; however, the 2012 SAA Report Santa Clarita North configuration did not meet the requirements of a standing Authority Technical Memorandum (2.1.2) for curvature or speed. The 2014 SAA Report therefore revaluated and updated the Santa Clarita North profile to eliminate nonstandard alignment features and meet geometric standards for curvature and segment lengths. Both the Santa Clarita South and Santa Clarita North alignment alternatives were recommended for further evaluation.

San Fernando Valley Subsection

This subsection (previously called the Sylmar to SR 2 Subsection) contained two alternative alignments originally evaluated in the 2010 PAA Report: the alignment on the west side of Metrolink and the alignment on the east side of Metrolink. Both alignment alternatives were carried forward for further consideration without refinements.

The San Fernando Valley Subsection station options were examined with the intention of blending systems and operations with existing infrastructure. The central criteria for each station option were intermodal connectivity, the potential for TOD, and avoiding significant environmental impacts. The Burbank Airport Station Option (formerly called Buena Vista Station) was carried forward because it provided the best intermodal connectivity of all three San Fernando Valley Subsection station options as a result of its proximity to the Hollywood Burbank Airport, connection to Metrolink, and planned Regional Intermodal Transportation Center. Additionally, there were more than 100 acres near this station option under examination for potential TOD opportunities. The San Fernando and Branford Street station options were eliminated from further consideration because of their lack of consistency with the 2012/2014 Business Plan criteria and goals.

Los Angeles Subsection

The 2014 SAA Report consolidated two adjacent subsections analyzed in previous SAA Reports (Metrolink CMF to LAUS and SR 2 to Metrolink CMF) into the Los Angeles Subsection, which included three alignment alternatives: one surface alignment alternative (LAP1C, renamed “Surface Alternative”) and two tunnel alternatives (LAPT1 and LAPT3).

The Surface Alternative and LAPT3 remained unchanged in the 2014 SAA Report. However, LAPT1 was refined to utilize a higher platform at LAUS. This refinement provided flexibility to match the preferred high-speed rail platform location proposed by the LAUS Master Plan developed by Metro (Metro 2014). Therefore, the Surface Alternative, LAPT3, and LAPT1 were carried forward for further evaluation in the Los Angeles Subsection.

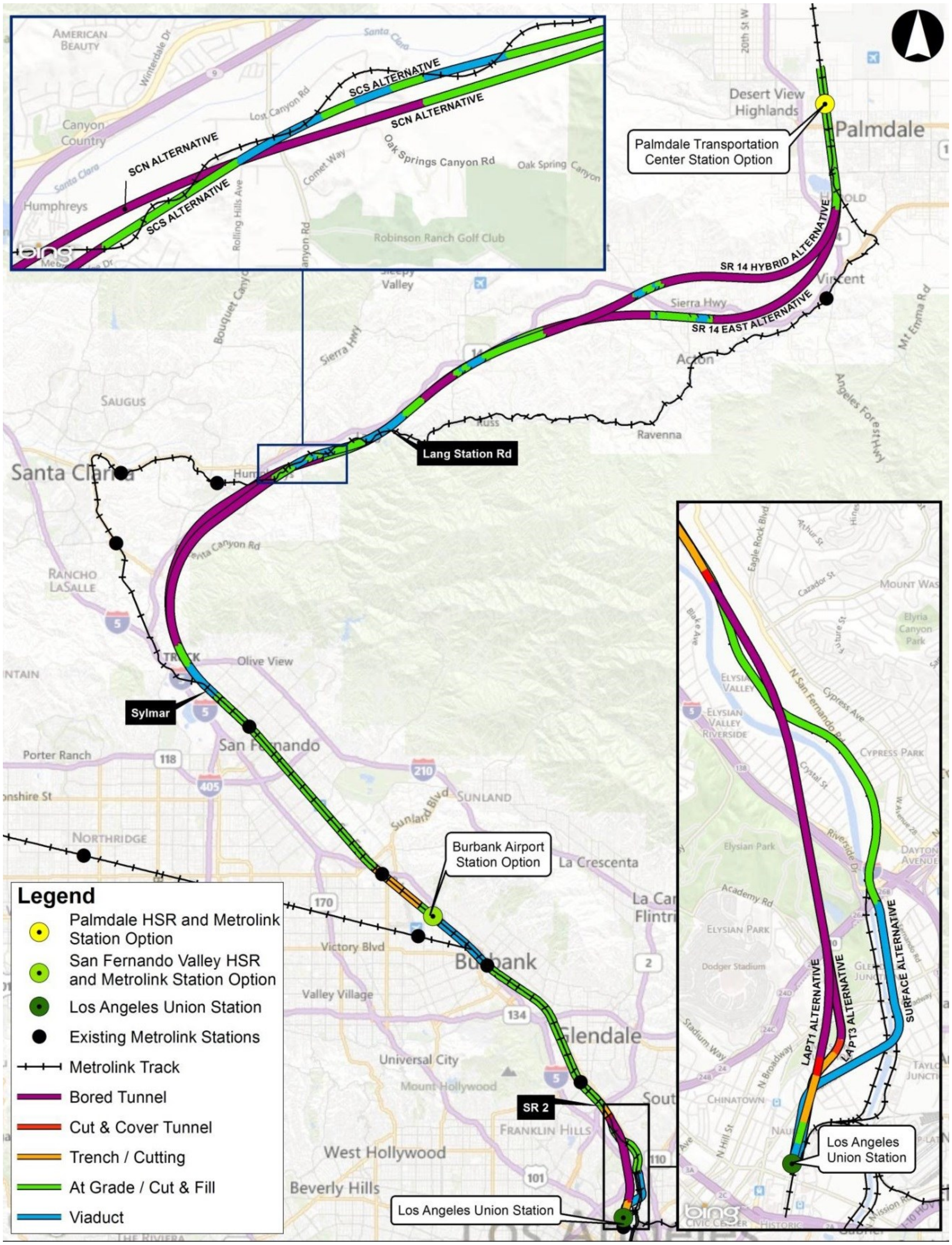


Figure 2-37 Alignment and Station Alternatives Carried Forward from the 2014 Supplemental Alternatives Analysis Report

Palmdale to Burbank Project Section Scoping (2014 Scoping Report and 2015 Scoping Report Errata)

Following the recommendation of the May 2014 SAA Report, the Authority and FRA conducted a second public scoping period from July to September 2014 for the newly defined Palmdale to Burbank Project Section. In response to stakeholder and public feedback, the scoping process introduced a second corridor to the east that would provide a more direct connection between Palmdale and Burbank (Figure 2-38) (Authority 2014b). The identification of the east corridor was based in part on public input encouraging the Authority to explore innovative ways to reach the Los Angeles Basin with reduced community impacts, and in part on the further evolution of tunneling technologies that made longer tunnels more feasible for consideration (Authority and FRA 2014c and Authority 2014d).

Palmdale to Burbank Project Section Supplemental Alternatives Analysis Report (2015 SAA Report)

Informed by the 2014 scoping process, the Authority and FRA continued to refine and consider alternatives between Palmdale and Burbank, including refining the SR 14 corridor and introducing alternatives on the east corridor. Figure 2-39 shows the alignment and station alternatives carried forward from the 2015 Palmdale to Burbank SAA Report (Authority and FRA 2015).

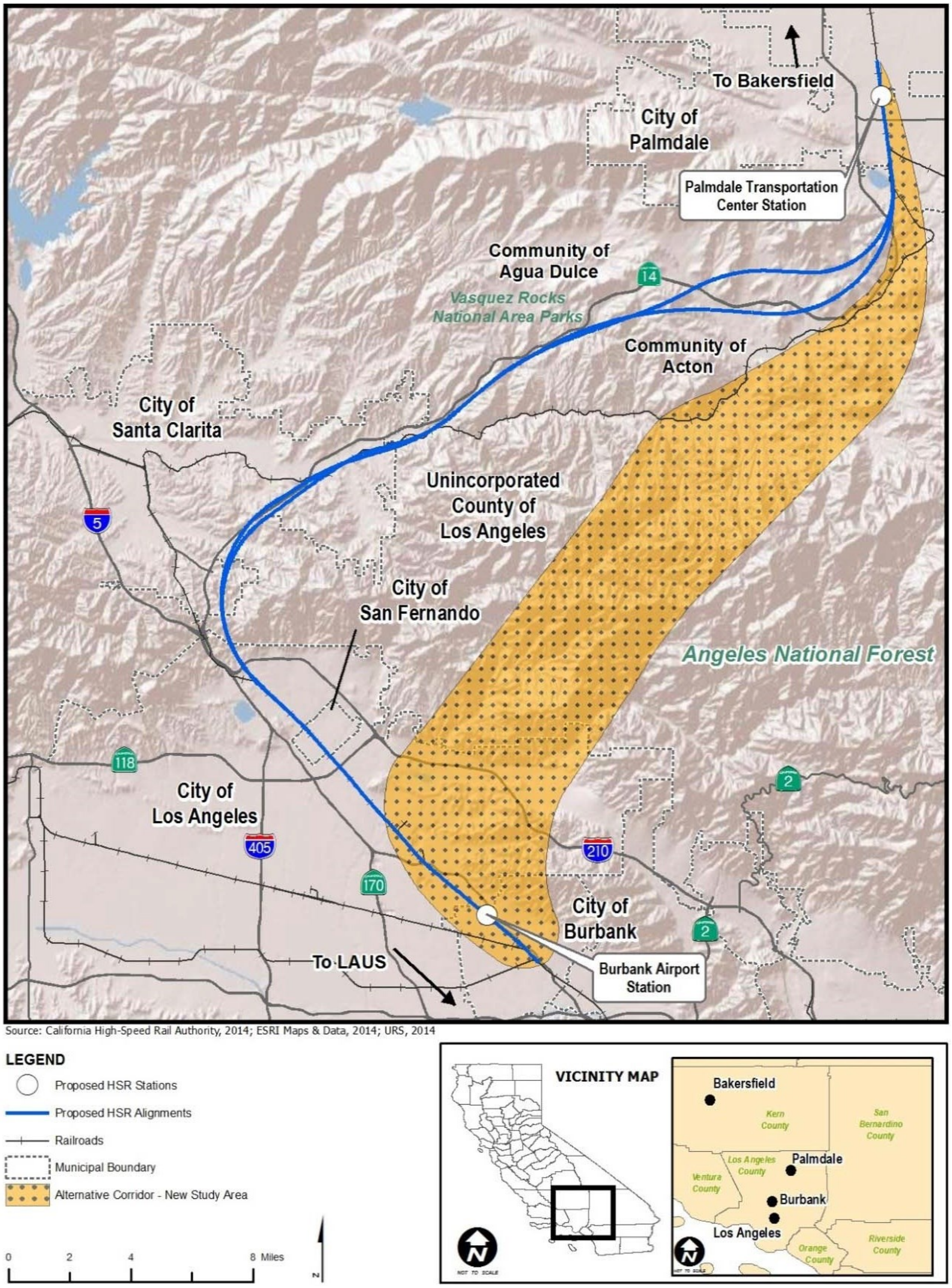
SR 14 Corridor

The 2015 SAA Report reevaluated all alignment alternatives and station options of the SR 14 corridor. The 2015 SAA Report shifted the proposed station in Palmdale to begin near Avenue O, which would avoid Lake Palmdale (requiring relocation of Una Lake) and minimize impacts in the community of Acton. The report also refined Santa Clarita North (now known as Santa Clara Long Tunnel) to have the same horizontal location as the Santa Clarita South alignment and withdrew consideration of HSR tracks east of Metrolink in the San Fernando Valley Subsection. Alignment alternatives along the SR 14 corridor were analyzed on an end-to-end basis by combining the Palmdale Subsection options (East, West, and Hybrid), the Santa Clarita Subsection options (Santa Clarita South and Santa Clara Long Tunnel), and the San Fernando Valley Subsection alignment options (HSR aligned west of Metrolink).

The 2015 SAA Report made the following recommendations along the SR 14 Corridor:

- SR 14-1 (Hybrid/Santa Clara Long Tunnel/Santa Clarita North [SCN]/San Fernando West) – carried forward
- SR 14-2 (Hybrid/Santa Clarita South [SCS]/San Fernando West) – carried forward
- SR 14-3 (East/Santa Clara Long Tunnel/SCN/San Fernando West) – withdrawn
- SR 14-4 (East/SCS /San Fernando West) – withdrawn

Figure 2-40 shows the SR 14 Corridor alignment alternatives considered in the 2015 SAA Report. SR 14-3 and SR 14-4 encountered the most schools located within a 1.25-mile radius of the alignment (21). In particular, these alignments passed near Vasquez High School and High Desert Middle School in the community of Acton with an at-grade profile. High Desert Middle School serves a variety of functions for the small, rural community of Acton, and thus, these alignments could result in community impacts. Figure 2-39 shows SR 14 corridor alignments, East Corridor alignments (discussed below), and station options carried forward in the 2015 SAA Report.



Source: Authority, 2014b

Figure 2-38 Alignment and Station Alternatives Analyzed in the 2014 Scoping Report

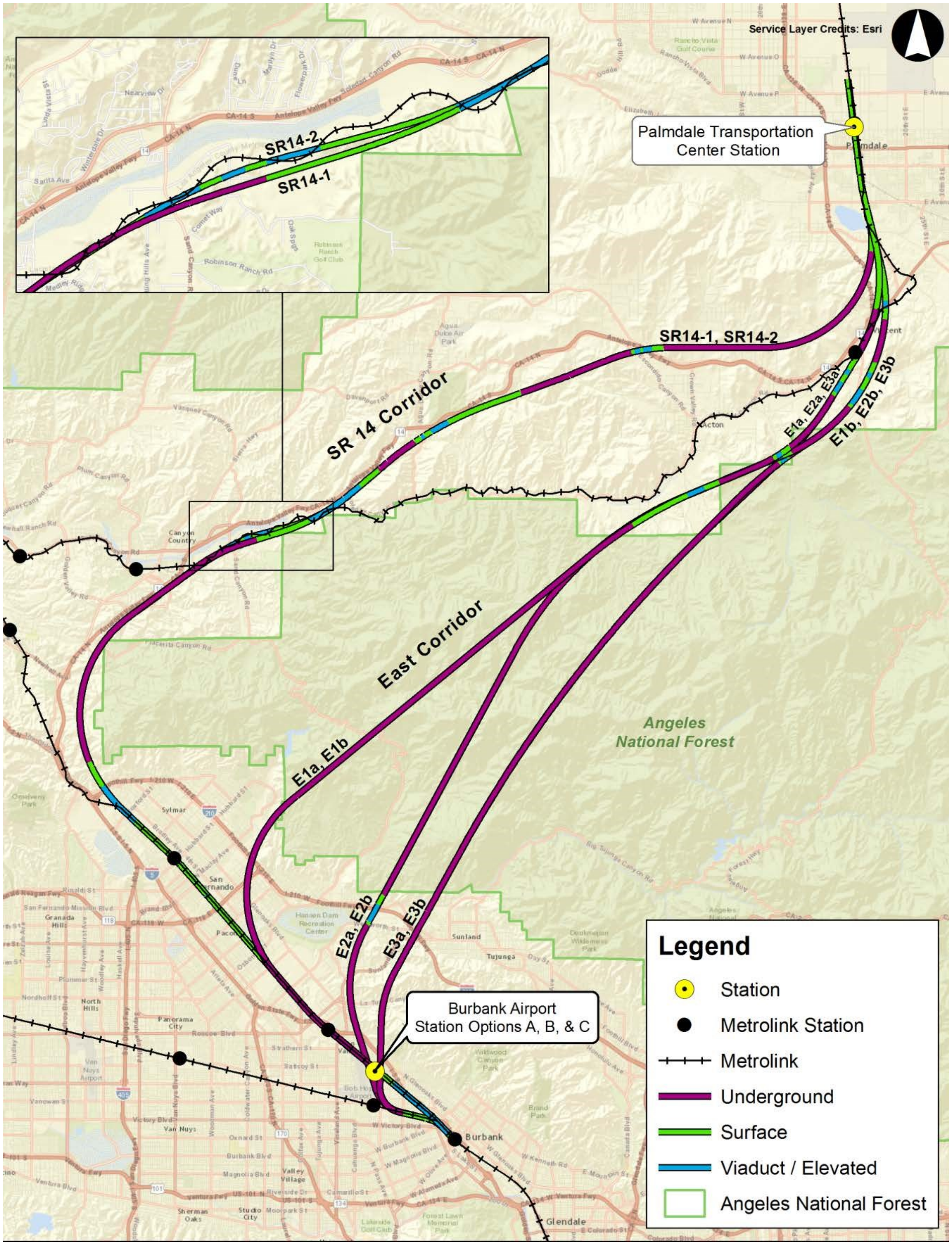


Figure 2-39 Alignment and Station Alternatives Carried Forward from the 2015 Supplemental Alternatives Analysis Report

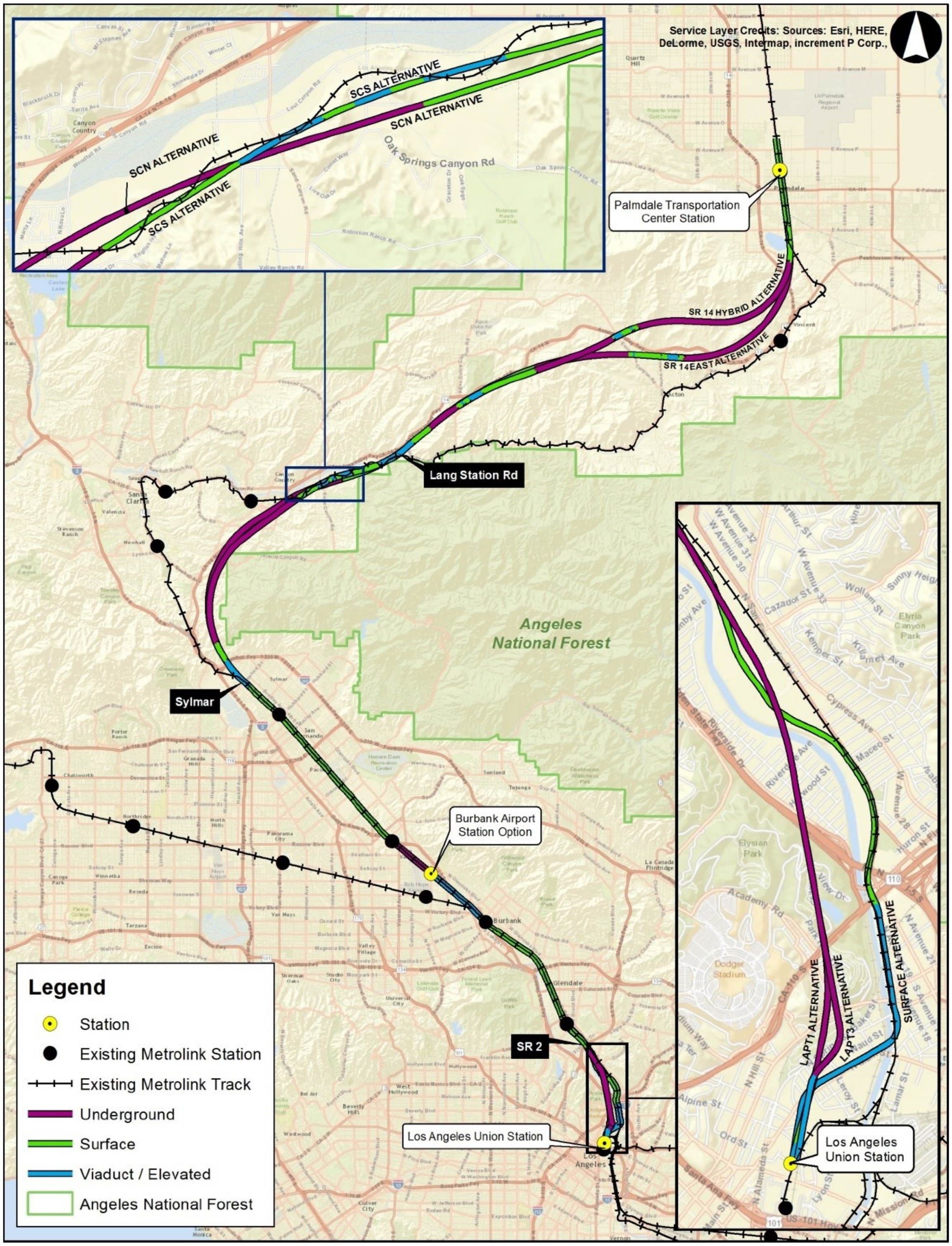


Figure 2-40 SR 14 Corridor Alignment Alternatives Considered in the 2015 Supplemental Alternatives Analysis Report

East Corridor

The 2015 SAA Report also introduced additional alignments that generally follow a second proposed corridor, the East Corridor, through a portion of the San Gabriel Mountains. The East Corridor alignments were introduced to reduce travel time, avoid surface impacts along the SR 14 Corridor, and respond to public comments for consideration of more direct routes between Palmdale and Burbank by way of the ANF, including the SGMNM. East of the community of Acton, these routes would enter a tunnel beneath the ANF, including the SGMNM, emerging at the surface in the northeast San Fernando Valley to share an aboveground corridor with the existing Metrolink Antelope Valley Line. These alignments were developed to use deep tunnels beneath the San Gabriel Mountains to avoid surface impacts within the ANF, including the SGMNM, and the Magic Mountain Wilderness Area. The 2015 SAA Report proposed six new East Corridor alignments: E1a, E1b, E2a, E2b, E3a, and E3b. E3 alignments were proposed as the easternmost alignments, and E1 alignments were proposed as the westernmost alignments. The East Corridor alignments would be constructed through the east side of the community of Acton, cross the ANF, including the SGMNM, and enter the northeast San Fernando Valley, eventually sharing the corridor with the existing Metrolink Antelope Valley Line.

Station Options

The 2015 SAA Report identified a Burbank Airport Station as the proposed station alternative within the San Fernando Valley. Station Option A shifted the station location northwest within the existing railroad right-of-way to improve connectivity with the Hollywood Burbank Airport. Station Options B and C were proposed to accommodate the East Corridor alignment alternatives. These Burbank Airport Station Options, along with the previously analyzed Palmdale TC, were carried forward for further evaluation.

Palmdale to Burbank Project Section Supplemental Alternatives Analysis Report (2016 SAA Report)

The 2016 Palmdale to Burbank SAA Report (Authority and FRA 2016) reevaluated all SR 14 Corridor and East Corridor alignment alternatives and station options carried forward from the 2015 SAA Report (Figure 2-41). The 2016 SAA Report incorporated alignment and station refinements originally presented in the 2015 SAA Report to reduce environmental impacts and improve operational performance and travel time. Furthermore, the SR 14 and East Corridor alignments were further refined to minimize surface encounters with sensitive community and environmental resources by tunneling in a more direct route between Palmdale and Burbank. In coordination with USFS, geotechnical investigations were completed within the ANF, including the SGMNM, to obtain subsurface field data to help evaluate potential environmental impacts (i.e., groundwater, hydrogeology, and surface water resources), design constraints, and construction considerations for the tunnel portions of alignments.

SR 14 Corridor

The 2016 SAA Report evaluated the two SR14 alternatives carried forward in the 2015 SAA Report (SR 14-1 and SR 14-2) and introduced the Refined SR14 Build Alternative. The Authority reviewed the critical environmental issues associated with SR 14-1 and SR 14-2, especially the strong potential for environmental justice effects on communities in the northeast San Fernando Valley (including the city of San Fernando). Furthermore, adhering closely to the SR 14 Freeway corridor through this area increased the mileage and travel time between Palmdale and Burbank, particularly relative to the Eastern Corridor alignments that took a more direct route underground. The 2016 SAA Report withdrew SR 14-1 and SR 14-2 and proposed SR14 Refined for further evaluation based on the following key criteria:

- SR14 Refined would tunnel under the ANF, including the SGMNM, resulting in fewer residential and business displacements, fewer impacts on minority or environmental justice communities, fewer noise and vibration effects on residential properties and schools, and fewer visual impacts than SR 14-1 or SR 14-2.

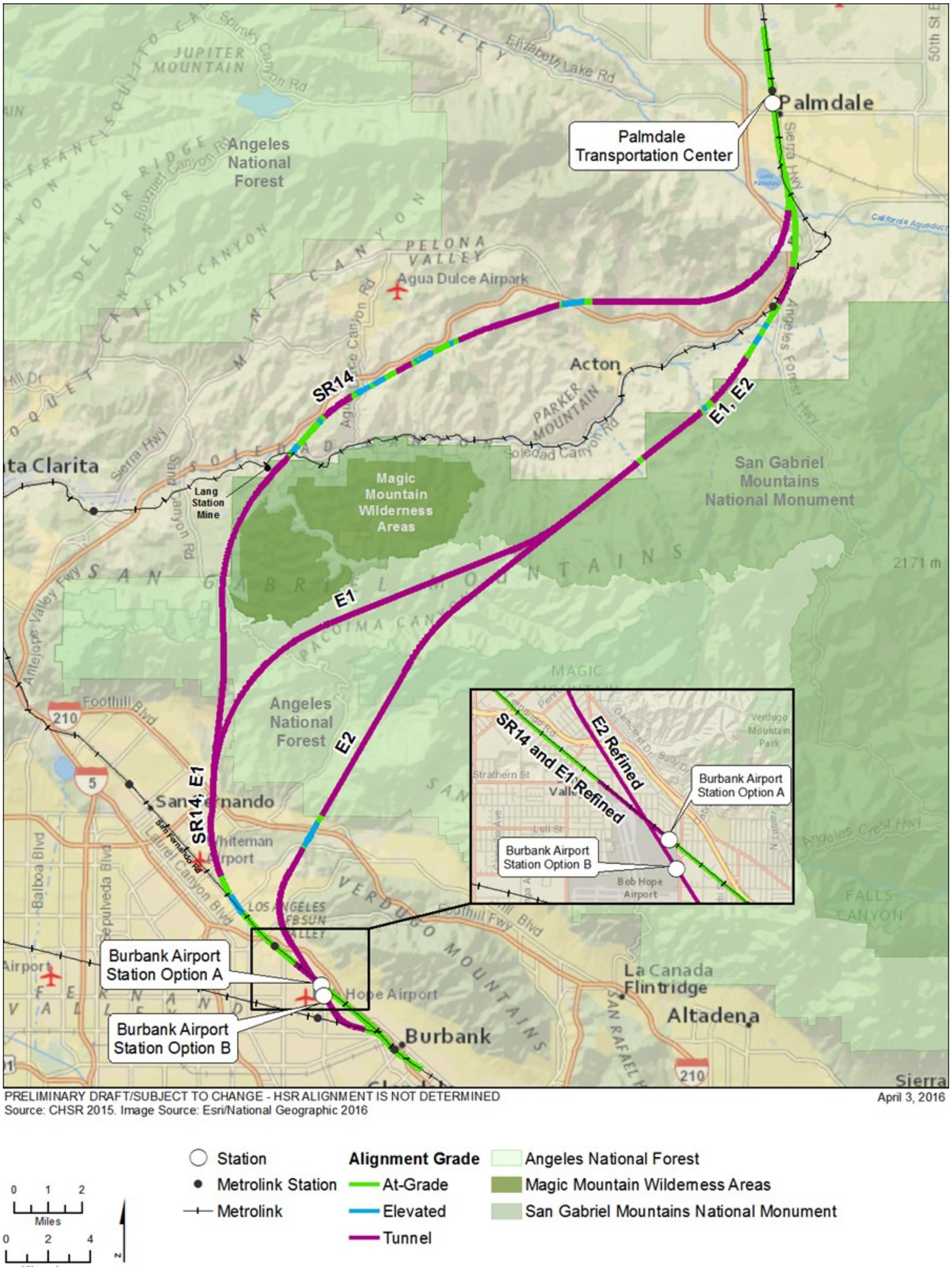


Figure 2-41 Alignment and Station Alternatives Carried Forward in the 2016 Supplemental Alternatives Analysis Report

- SR14 Refined would have a reduced overall length than SR 14-1 or SR 14-2, which would comply with the California HSR System objective to provide a sustainable reduction in travel time between major urban centers.
- SR14 Refined would avoid the Magic Mountain Wilderness Area.
- Construction of the SR14 Refined alignment would present the opportunity to remediate potential hazardous contamination that may exist (where SR14 Refined would transition into a tunnel underneath the ANF, including the SGMNM) and engage in habitat restoration at the Lang Station (Vulcan) mine. SR 14-1 and SR 14-2 did not present this opportunity.
- SR14 Refined would optimize the Santa Clara River crossing, resulting in fewer impacts on aquatic resources and critical habitat for the arroyo toad (*Anaxyrus californicus*) than SR 14-1 or SR 14-2 and no impacts on coastal California gnatcatcher (*Polioptila californica californica*) critical habitat.

East Corridor

The E1 Refined alternative introduced in the 2016 SAA Report was designed to improve constructability by reducing tunnel grade and depths. Overall travel time would be reduced under E1 Refined because of reduced track curvature (which would allow for higher travel speeds). The 2016 SAA Report withdrew E1a and E1b and proposed E1 Refined for further evaluation based on the following key criteria:

- E1 Refined would be approximately 1 mile longer than E1a or E1b. However, near the Arrastre Canyon area, E1 Refined would include an additional 4 to 6 miles of trackway within tunnels compared to the extent of tunnels in E1a and E1b. This would reduce the amount of at-grade or elevated alignment overall. E1 Refined would tunnel beneath the ANF, including the SGMNM, thereby reducing potential surface effects.
- In comparison to the E1a and E1b alignments, E1 Refined would avoid impacts on critical biological habitat of the arroyo toad. The number of miles of elevated and at-grade alignment within a floodplain or within 1 mile of perennial streams or springs would be reduced.
- Less of the E1 Refined alignment would fall within a fire hazard area, and E1 Refined would cross fewer faults in comparison to the E1a and E1b alternatives.

The E2 Refined alternative introduced in the 2016 SAA Report was designed to reduce surface impacts by increasing tunnel length and avoiding the mitigation area within Big Tujunga Wash. The 2016 SAA Report withdrew E2a and E2b and proposed E2 Refined for further evaluation based on the following key criteria:

- The overall length of E2 Refined would be similar to the length of E2a and E2b. However, an additional 2 miles would be within tunnels near Arrastre Canyon in the E2 Refined alternative, reducing the amount of at-grade or elevated alignment overall. E2 Refined would also tunnel beneath the ANF, including the SGMNM, thereby reducing surface effects, including reduced impacts on critical biological habitat, wetlands, streams, creeks, and canals; it would also have fewer visual impacts as a result of aboveground alignment.
- Less of the E1 Refined alignment would fall within a fire hazard area compared to the E2a and E2b alternatives.
- E2 Refined would optimize the Big Tujunga Wash crossing design to avoid crossing over a designated mitigation area within the wash that is owned by the Los Angeles County Flood Control District.
- Although E2 Refined would potentially displace more businesses than E2a and E2b, E2 Refined would potentially displace fewer residences than E2a and E2b.

During the refinement process, the Authority explored possible modifications to improve E3a and E3b. The potential E3 Refined alignment considered by the Authority had the same key design, constructability, and operational issues as the E3a and E3b alternatives. Although the potential

E3 Refined alignment would have followed the most direct route of the alternative alignments explored during the refinement process, it would have had the deepest tunnels, the most constrained design, the longest construction schedule, major restrictions during operation, and increased maintenance costs. Therefore, the E3 corridor was not carried forward for further consideration.

Una Lake Avoidance Alternatives (2019)

Building on the Alternatives Analysis process and consultation with USACE and USEPA, the Authority explored additional options to avoid or minimize impacts to Una Lake, which is a water of the State and the U.S. As a result of this process, the Authority developed the SR14A, E1A, and E2A Build Alternatives as shown previously in Figure 2-2 and proposed these Build Alternatives for study in this Draft EIR/EIS (Authority 2020). USACE and USEPA concurred on December 17, 2020, and December 16, 2020, respectively, with alternatives recommended in Checkpoint B for inclusion in the EIR/EIS.[7] A number of alternatives were considered to avoid waters but were proved to be impracticable as discussed in Checkpoint B.

Summary of Alternatives and Stations Screening Process

Based on the foundational efforts in the 2010 PAA Report, the 2012 SAA Reports, and the 2014 SAA Report, followed by the refinements and new alternatives evaluated in the 2015 SAA Report, the 2016 SAA Report, and the Una Lake Avoidance Alternatives, the alignment and station alternatives proposed within the limits of the Palmdale to Burbank Project Section (first defined in the 2014 SAA Report) carried forward for detailed evaluation in this document and those eliminated from further study are listed below. Figure 2-42 shows the evolution of the Palmdale to Burbank Project Section alternatives between 2010 and 2016, while Figure 2-2 shows all six Build Alternatives evaluated in this Draft EIR/EIS.

Several station alternatives have been evaluated over time in the 2010 PAA Report, the 2012 SAA Reports, and the 2014 SAA Report. The station alternatives, as analyzed in the PAA Report and subsequent SAA Reports, are listed below.

Alignment Alternatives

- Alignment ESS—not carried forward
- Aqueduct—not carried forward
- SR14-1—not carried forward
- SR14-2—not carried forward
- SR14-3—not carried forward
- SR14-4—not carried forward
- SR14 East Option—not carried forward
- SR14 West Option—not carried forward
- SR14 East/West Hybrid Option—not carried forward
- SR14 Refined—carried forward as “Refined SR14 Build Alternative”
- SR14A—carried forward
- SR14 East—not carried forward
- SR14 West—not carried forward
- SR 58/Soledad Canyon—not carried forward
- SR 138—not carried forward
- Sand Canyon Preliminary AA Option—not carried forward
- Sand Canyon Metrolink 200 Option—not carried forward
- E1a—not carried forward
- E1b—not carried forward
- E1 Refined—carried forward as “E1 Build Alternative”
- E1A—carried forward

[7] The Checkpoint B Summary Report identifies the range of alternatives carried forward in the Draft EIR/EIS.

- E2a—not carried forward
- E2b—not carried forward
- E2 Refined—carried forward as “E2 Build Alternative”
- E2A—carried forward
- E3a—not carried forward
- E3b—not carried forward
- E3b—not carried forward

Station Alternatives

- Palmdale TC (termed the “Palmdale Station”)—carried forward[8]
- Palmdale Station Option 1—not carried forward
- Palmdale Station Option 2—not carried forward
- Burbank Airport Station Option A—not carried forward
- Burbank Airport Station Option B—carried forward
- Burbank Airport Station Option C—not carried forward
- San Fernando Valley—not carried forward

Palmdale Station

In Section 2.5.2.2, Palmdale Station elements are analyzed in the Bakersfield to Palmdale EIR/EIS and are included in certain sections of this Draft EIR/EIS for context, reference, and to provide additional information. The Palmdale Station concept was first evaluated in the 2014 SAA Report. The Palmdale Station was approved as part of the Bakersfield to Palmdale Project Section Record of Decision in August 2021.

Burbank Airport Station

The Palmdale to Burbank Project Section considered several Burbank Airport Station options, which were analyzed in the 2016 SAA Report. The 2016 SAA Report evaluated three station options in Burbank: Option A, which featured mostly at-grade and above-grade facilities within the city of Burbank and the Sun Valley community; Option B, which featured both at-grade and underground facilities within the city of Burbank; and Option C, which featured both at-grade and underground facilities aligned in a north-south orientation parallel to North Hollywood Way, within the city of Burbank. Upon further evaluation of the three Burbank Airport Station options, the 2016 Palmdale to Burbank SAA carried forward Option A and Option B due to corresponding Palmdale to Burbank alignment alternatives carried forward, while Option C was withdrawn, as the associated Palmdale to Burbank alignment alternative was also withdrawn in this SAA. The engineering within the Palmdale to Burbank Project Section was advanced sufficiently to make it practical for the proposed Palmdale to Burbank alignment alternatives to connect to either Burbank Airport Station Platform Configuration Option A or Option B. Therefore, in 2018, the Authority withdrew Option A based on the Burbank Airport Station Option Screening Report (Authority 2018), primarily due to community and potential environmental justice concerns. Option A had the greatest amount of residential and business displacements and noise/vibration and visual impacts, and it also had the worst intermodal connections. Station Option B was carried forward as part of the HSR Build Alternative, and then further refined to minimize impacts (Figure 2-43). Option B Refined was designed to locate the platforms closer to the future location of the Hollywood Burbank Airport terminal, reduce the station depth, improve constructability, reduce commercial and industrial property takes, and eliminate the tunnel length underneath residential neighborhoods to the south.

[8] This facility is included in the Bakersfield to Palmdale Project Section.

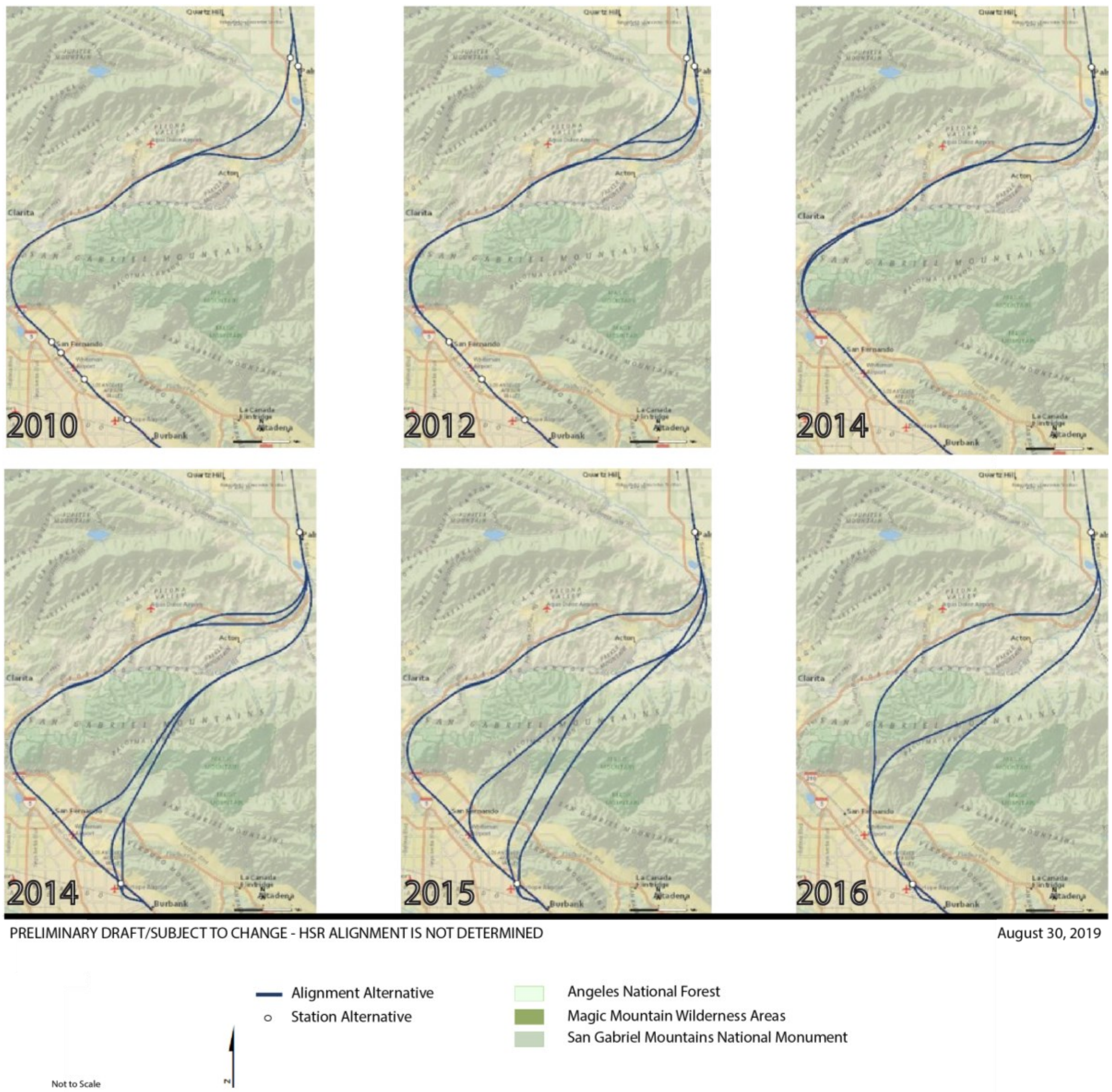


Figure 2-42 Evolution of the Palmdale to Burbank Project Section Alternatives

Figure 2-43 Burbank Airport Station Options Carried Forward in 2016 Supplemental Alternatives Analysis

2.5 Alignment and Station Alternatives Evaluated in This Draft EIR/EIS

This section describes the Build Alternatives carried forward for further analysis in this Draft EIR/EIS, including the No Project Alternative and the HSR Build Alternatives.

Appendix 2-A contains a list of associated roadway modifications required to accommodate the California HSR System. Appendix 2-B contains a detailed list of railroad crossings required to accommodate the California HSR System.

2.5.1 No Project Alternative – Planned Improvements

The No Project Alternative assumes that the Palmdale to Burbank Project Section would not be constructed. In assessing future conditions, it was assumed that all currently known, programmed, and funded improvements to the intercity transportation system (highway, rail, and transit) and reasonably foreseeable local development projects (with funding sources already identified) would be developed as planned by 2040.

The No Project Alternative is based on a review of all city and county general plans, regional transportation plans for all modes of travel, and agency-provided lists of pending and approved projects within Los Angeles County. For the environmental analysis, the No Project Alternative considers the effects of growth planned for the region, as well as existing and planned improvements to the highway, aviation, conventional passenger rail, and freight rail systems in the Palmdale to Burbank Project Section area through 2040. The scenario is based on future development projects and improvements to the intercity transportation system that are programmed and funded for construction. The current and future projects described below are as listed by the California Department of Transportation (Caltrans), Metro, Los Angeles Department of Transportation, and Southern California Association of Governments (SCAG).

2.5.1.1 Planned Land Use

According to the Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS) (SCAG 2016), Los Angeles County is home to approximately 9.8 million people. That population is projected to grow to approximately 11.5 million people by 2040. By 2040, the 1,343,708 new inhabitants projected for Los Angeles County would require 689,000 new dwelling units and 979,200 new jobs. Table 2-2 shows the projected population growth, and Table 2-3 shows projected employment growth for Los Angeles County and cities within the study area through 2040. Table 2-4 lists adopted General Plans, Specific Plans, and Community Plans within the Palmdale to Burbank Project Section; these plans would help meet the transportation demand associated with the anticipated population growth. Major planned residential developments in the Palmdale to Burbank Project Section region are listed in Table 2-5. See Appendix 3.19-A, Cumulative Project List, for an expanded list of development projects.

Table 2-2 Projected Population Growth in the Study Area

Area	Population (2015)	Population (2040)	Change 2015–2040		Annual Average Increase
			Population	Percentage	
Los Angeles County	10,170,292	11,514,000	1,343,708	13.2%	0.9%
City of Palmdale	158,351	201,500	43,149	27.2%	1.8%
City of Los Angeles	3,971,883	4,609,400	637,517	16.1%	1.1%
City of Burbank	105,319	118,700	13,381	12.7%	0.8%
Unincorporated Los Angeles County	1,050,987	1,273,700	222,713	21.2%	1.4%

Sources: U.S. Census, 2015; SCAG, 2016; DOF, 2016
DOF = California Department of Finance; SCAG = Southern California Association of Governments

Table 2-3 Projected Employment Growth in Study Area

Area	Employment in 2012	Employment in 2040	Change 2012–2040		Annual Average Increase
			Employment	Percentage	
Los Angeles County	4,246,000	5,225,800	979,200	23%	0.8%
City of Lancaster	45,800	59,600	13,800	23.2%	0.8%
City of Palmdale	29,300	40,300	11,000	27.3%	1.0%
City of Los Angeles	1,696,400	2,169,100	472,700	21.8%	0.8%
City of Burbank	106,800	145,000	38,200	26.3%	0.9%
Unincorporated Los Angeles County	222,900	288,400	65,500	22.7%	0.8%

Source: SCAG, 2016
[1] The SCAG 2016 *Regional Transportation Plan/Sustainable Communities Strategy* uses 2012 as a baseline year for employment projections.
SCAG = Southern California Association of Governments

Table 2-4 Adopted Plans in the Study Area

Jurisdiction	Plan	Year Adopted
Los Angeles County	Los Angeles County General Plan	2015
Los Angeles County	Santa Clarita Valley Area Plan	2012
Los Angeles County	Antelope Valley Areawide General Plan - Town & Country	2015
City of Palmdale	Palmdale General Plan	1993
City of Palmdale	Palmdale Trade and Commerce Center Specific Plan	1990 (amended 2014)
City of Palmdale	City of Palmdale Energy Action Plan	2011
City of Palmdale	Plant 10 (Lockheed) Palmdale Specific Plan	1992
City of Palmdale	Palmdale Transit Village Specific Plan	2007
City of Palmdale	City of Palmdale Avenue S Corridor Area Plan	1998
City of Santa Clarita	Santa Clarita General Plan	2011
City of Santa Clarita	Canyon Park Specific Plan	1986
City of Los Angeles	Los Angeles General Plan	1996
City of Los Angeles	Arleta Pacoima Community Plan	1996
City of Los Angeles	San Gabriel / Verdugo Mountains Scenic Preservation Specific Plan	2003
City of Los Angeles	Sunland / Tujunga / Lake View Terrace / Shadow Hills / East La Tuna Canyon Community Plan	1997
City of Los Angeles	Sun Valley / La Tuna Canyon Community Plan	1999
City of Los Angeles	Sylmar Community Plan	1997
City of Burbank	Burbank 2035 General Plan	2013
City of Burbank	Burbank Center Plan	1997
City of Burbank	North San Fernando Boulevard Master Plan	2012

Table 2-5 Planned Residential Development Projects within the Communities Traversed by the Palmdale to Burbank Project Section

Plan/Project	General Location	Planned Development
Golden State Specific Plan	East and South of the Hollywood Burbank Airport	600 acres of industrial, commercial, and residential land
Palmdale Transit Village Specific Plan	City of Palmdale	Transit-oriented-development project including medium- and high-density residential land uses.
Downtown Lancaster Specific Plan	Downtown Lancaster	This project would allow for a mix of land uses including retail, office, residential and civic uses within the seven districts.
Sand Canyon Plaza Mixed-Use Project	Immediately north of Soledad Canyon Road, east of Sand Canyon Road, north of SR 14, and west of the Pinetree residential community	Redevelopment of an approximately 87-acre project site with a mixed-use community with commercial, apartment, townhome, and single-family neighborhood areas.
Mancara at Robinson Ranch Project	East of the intersection of Oak Spring Canyon Road and Lost Canyon Road	187.3-acre residential development of 109 single-family homes.
Vista Canyon Specific Plan	Immediately south of SR 14, west of La Veda Avenue, north of Metrolink rail line, and east of the Colony Townhome community	Contains plans, regulations, guidelines, and implementation program necessary to develop 185 acres of residential, mixed-use, and non-residential transit-oriented development in Vista Canyon, a proposed new annexation area for the city of Santa Clarita.

Sources: City of Burbank; 2017b, CEQAnet 2017, City of Lancaster 2008b, City of Santa Clarita 2010b, City of Santa Clarita 2011b, City of Santa Clarita 2010a
SR = State Route

2.5.1.2 Planned Highway Improvements

Future highway improvements considered under the No Project Alternative include efforts planned by Caltrans and Los Angeles County to address anticipated vehicle miles traveled (VMT) and the resulting congestion on the roadway system. Table 2-6 notes the daily VMT changes anticipated within Los Angeles County.

Table 2-6 Change in Total Daily Vehicle Miles Traveled in Los Angeles County

County	Daily Vehicle Miles Traveled			
	2012 Existing Conditions[1]	Annual Growth Rate	Year 2040 Projection	Percent Increase
Los Angeles County	213,344,500	-0.025 percent	211,857,600	-0.7 percent

Source: SCAG, 2016
[1] The SCAG 2016 *Regional Transportation Plan/Sustainable Communities Strategy* uses 2012 as a base year.
SCAG = Southern California Association of Governments

The No Project Alternative includes the funded and programmed improvements on the intercity highway network based on financially constrained plans developed by regional transportation planning agencies. Table 2-7 summarizes transportation improvements in the project area listed in the SCAG 2016 RTP/SCS. Figure 2-44 shows the locations of these planned transportation improvements (numbered as indicated in the table).

Table 2-7 Planned Highway Improvements within the Project Area

Map No.	Route	Planned Improvements	RTP ID	Lead Agency	Completion Year
1	I-5	HOV and mixed flow lane widening	LA0D73-LA0D73	Caltrans	2019
2	I-5	HOV and auxiliary lane improvements	1TL1001	Caltrans	2025
3	I-5	HOV lanes	LA000358	Caltrans	2019
4	I-5	HOV, truck, and auxiliary lanes	LAE0465-LA0G440	Caltrans	2017–2020
5	I-5	Planning and environmental studies for HOV and mixed flow lane widening	LAE2577	Caltrans	2023
6	I-5	Carpool lane partial connector	1H0103	Caltrans	2029
7	SR 14	HOV lanes	1H0101	Caltrans	2027
8	SR 138	Corridor improvement project	1122004	Not Listed	2020
9	SR 138	Widening and lane addition	LA0D451	Caltrans	2019
10	138	Planning and environmental studies for freeway and toll facility	LA0G1099-LA0G665	Caltrans	2021
11	SR 138	Right-of-way acquisition for future SR 138	LA962212	Caltrans	2019
12	138	Planning and environmental studies for highway facility	1OM0702-LA0G949	Metro	2018

Source: SCAG, 2016
Caltrans = California Department of Transportation; HOV = high-occupancy vehicle; I- = Interstate; Metro = Los Angeles County Metropolitan Transportation Authority; RTP = regional transportation plan; SCAG = Southern California Association of Governments; SR = State Route

Figure 2-44 Planned Transportation Improvements within the Project Area

2.5.1.3 Planned Aviation Improvements

The primary commercial service airport in the Palmdale to Burbank Project Section is Hollywood Burbank Airport. City of Burbank voters approved the Hollywood Burbank Airport Terminal Replacement project under Measure B in November 2016.The project does not propose to increase the number of gates, the overall size of the airport, or the number of daily flights. The airport therefore will have limited growth in new vehicle trips to and from the site as a result of the improvements.

The *Environmental Impact Report for a Replacement Airline Passenger Terminal at Burbank Bob Hope Airport* (RS&H, Inc. 2016) was issued in May 2021. The report indicates that the forecast for passenger activity within the upcoming 10-year period (the study horizon) will not exceed the maximum levels experienced in 2008. The SCAG 2012–2035 RTP/SCS has estimated that annual activity at the airport would reach 9.4 million passengers by 2035 (SCAG 2012). This growth would be from regional growth trends over the 24-year forecast period.

The adjacent Avion Burbank development, a 60-acre campus with six industrial buildings, will generate some new local-area vehicle trips. However, land use projections are included in the SCAG model. Therefore, the applied growth rates in the opening-year and future-year analysis take this project into account.

Construction of the HSR Build Alternatives or operation of the HSR station facilities would not affect airport ground traffic or air operations. The HSR Build Alternatives would not directly affect ground access to and from local airport properties within the study area.

Other airports along the corridor include Los Angeles International Airport, Palmdale Regional Airport (which has no commercial flight service), Whiteman Airport (in the Pacoima area of the San Fernando Valley), and Agua Dulce Airpark. Whiteman Airport and Agua Dulce Airpark are general aviation airports. Table 2-8 summarizes enplanements (boarding passengers) at each of the airports in the vicinity of the Palmdale to Burbank Project Section. Table 2-9 lists planned airport development projects in the project area.

Table 2-8 Aviation Boardings in Project Area

Airport	2000	2005	2010	2015
Los Angeles International (LAX)	32,168,000	29,372,000	28,858,000	36,351,000
Hollywood Burbank	2,381,000	2,761,000	2,240,000	1,973,000
Total	**34,549,000**	**32,136,000**	**31,098,000**	**38,324,000**

Source: Federal Aviation Administration, 2016

Table 2-9 Planned Aviation Improvements

Airport	Project Name	Planned Improvements	Project Timeline
Los Angeles International (LAX)	LAX Landside Access Modernization Program	This program includes a new passenger concourse facility approved as part of the LAX Master Plan in 2004. The facility would be in the central area of the airfield, west of Tom Bradley International Terminal. The program includes a central terminal processor, conveyance systems for passengers and baggage, and new taxiways/taxi-lanes and airport aprons. The program would permit greater flexibility in scheduling improvements at other facilities without disrupting day-to-day airline operations, reduce reliance on remote gates, and ensure a high level of service for LAX passengers during modernization upgrades, which could at times require closure of existing gates. The gates would not increase the total number of passengers or aircraft at LAX but would ensure uninterrupted operations and schedules during construction at other terminals.	Completion anticipated in 2023
	Northside Plan Update	This project involves creating a design plan that facilitates quality development on 340 acres of land between the north side of the airport and the community of Westchester. This plan would complement community efforts to revitalize and support local businesses, provide jobs, meet the needs of the airport and local groups, and address the growing demand for open space for the surrounding communities.	Completion anticipated by 2022
Hollywood Burbank Airport	Burbank Replacement Terminal	This proposed 14-gate, 355,000-square-foot replacement terminal at Hollywood Burbank Airport would be on an adjacent property north of the existing terminal and northeast of the two runways. The replacement terminal would have a separate utility building, airfield service building, replacement cargo building, a new terminal loop over Parking Lot A, new parking structures on an adjacent property, a new authority office building, and a taxiway. After completion of the replacement terminal, the existing terminal would be demolished.	Completion anticipated in 2025

Sources: Burbank-Glendale-Pasadena Airport Authority, 2016; Los Angeles World Airports, 2017

2.5.1.4 Intercity Transit Element

Conventional Passenger Rail

Existing Passenger Rail Services

The Palmdale to Burbank Project Section rail corridor is used by UPRR, Metrolink, and Amtrak, with freight operations under the purview of BNSF Railway (BNSF) and passenger service provided by Amtrak and Metrolink. Table 2-10 shows existing intercity, commuter, and urban rail services in California.

Table 2-10 Existing Passenger Rail Services in California

Service	Type	Operator	Service Name	Service Area
Intercity rail	Railroad	Amtrak System (100% Amtrak Supported)	Pacific Surfliner[1]	San Luis Obispo-Santa Barbara-Los Angeles-San Diego
			Coast Starlight	Seattle-Portland-Los Angeles
			San Joaquin	San Francisco Bay Area/Sacramento-Bakersfield/Southern California
			Southwest Chief	Chicago-Albuquerque-Los Angeles
			Sunset Limited	New Orleans-San Antonio-Los Angeles
Commuter rail		Southern California Regional Rail Authority	Metrolink: Ventura Line, Antelope Valley Line, San Bernardino Line, Riverside Line, Orange County Line, and 91/Perris Valley Line	Los Angeles-Oxnard-Montalvo; Los Angeles-Palmdale-Lancaster; Los Angeles-Claremont-San Bernardino; Los Angeles-Pomona-Riverside; Los Angeles-Santa Ana-Oceanside; San Bernardino-Santa Ana-Oceanside; Los Angeles-Fullerton-Riverside-Perris
Urban rail Transit	Heavy rail transit	Metro	Metro Rail: Red Line and Purple Line	Los Angeles-Hollywood/Vine-North Hollywood; Los Angeles-Wilshire/Western
	Light rail transit	Metro	Metro Rail: Blue Line, Gold Line, Expo Line, and Green Line	Los Angeles-Compton-Long Beach; East Los Angeles-Los Angeles-Highland Park-Pasadena-Azusa; Downtown Los Angeles-Santa Monica; Redondo Beach-Aviation/LAX-Lynwood-Norwalk

Sources: Amtrak, 2015; Southern California Regional Rail Authority, 2015; Metro, 2016
[1] State supports 70% of all service; Amtrak supports 30%.
Metro = Los Angeles County Metropolitan Transportation Authority

Amtrak provides intercity passenger rail service in California on five principal corridors covering more than 1,300 linear route miles and spanning nearly the entire State. The No Project Alternative passenger rail element includes one of these corridors, the Pacific Surfliner Route, which provides five northbound trips and six southbound trips daily between LAUS and Hollywood Burbank Airport.

Metrolink is operated by the Southern California Regional Rail Authority, which is a Joint Powers Authority composed of five transportation planning agencies: Metro, Orange County Transportation Authority, Riverside County Transportation Commission, San Bernardino Associated Governments, and Ventura County Transportation Commission. As of August 2016, Metrolink operates nine daily trips in each direction between LAUS and the Palmdale TC.

The Metrolink Antelope Valley Line is a 75-mile-long rail corridor providing passenger rail service between Lancaster and LAUS.

Future Passenger Train Projects

This section describes major future passenger train projects. Other intercity passenger rail system improvements identified in the California State Rail Plan are summarized in Table 2-11.

Table 2-11 Programmed Improvements in 2018 California State Rail Plan in the Project Region

Project Title	Target Completion Year[1]
LOSSAN North Frequency Expansion and Corridor Performance and Travel Time Improvement, including Van Nuys Station Double Tracking	By 2022
Seacliff Siding and Extension	By 2022
Laguna Niguel-San Juan Capistrano Passing Siding Project	By 2022
San Onofre-Pulgas Phase 2	By 2022
San Elijo Lagoon Double Track	By 2022
Batiquitos Lagoon Double Track	By 2022
Poinsettia Station Improvements	By 2022
San Diego River Bridge, Elvira-Morena Double Track	By 2022
U.S.-Mexico Network and Service Integration Project Development	By 2022
Metro-Statewide Network Service Integration Project Development	By 2022
Rosecrans / Marquardt Avenue Grade Separation	By 2022
Metro Frequency Improvement @ LAUS	By 2022
Redlands Passenger Rail Project	By 2022
HSR-Connected Corridors Network & Service Integration Project Development; Blue Ribbon Commission for CA-AZ Rail Service	By 2022
Bi-hourly Express Service Goleta-LA	By 2027
Hourly Local Service Chatsworth-LA	By 2027
Hourly Local Service Santa Clarita-LA	By 2027
1st Phase Integrated Local and Express Service LA-Anaheim-San Diego	By 2027
LAUS Passenger Capacity Expansion & Run-Through Tracks	By 2027
Corridor Capacity & Grade Separation Projects for 1st Phase of Integrated Local and Express Service	By 2027
Hourly Express Service Goleta-LA	By 2040
Implement Half-Hourly Local Rail Service Chatsworth-LA	By 2040
Implement Half-Hourly Local Rail Service Santa Clarita-LA	By 2040
1st Phase Integrated Local and Express Service Los Angeles-San Bernardino	By 2040
1st Phase Integrated Local and Express Service Los Angeles-Riverside	By 2040
1st Phase Integrated Local Service Riverside-Orange County	By 2040
Initial Service to Coachella Valley	By 2040
Hourly Express Service Goleta-LA	By 2040
Implement Half-Hourly Express & Local Rail Service Chatsworth-LA	By 2040
Implement Half-Hourly Local Rail Service Santa Clarita-LA	By 2040

Project Title	Target Completion Year[1]
Integrated Local and Express Service Los Angeles-San Bernardino	By 2040
Integrated Local and Express Service Los Angeles-Riverside	By 2040
Integrated Local Service Riverside-Orange County	By 2040
Blended Rail Services from Los Angeles, Riverside, and San Bernardino to Ontario Airport	By 2040
High-Speed Rail Services from San Diego to Ontario Airport, continuing to Inland Empire and Los Angeles on Blended Service corridors	By 2040
Integrated Local Service Extension to Hemet	By 2040
Integrated Express Rail Service on New Alignment to Coachella Valley	By 2040
Implement Half-Hourly Local and Express Services LA-Anaheim-San Diego	By 2040
Implement Enhanced Rail Service to Mexican Border	By 2040

Source: Caltrans, 2018
[1]These dates reflect the completion targets presented in the California State Rail Plan
Caltrans = California Department of Transportation; HSR = high-speed rail; LA = Los Angeles; LAUS = Los Angeles Union Station; LOSSAN = Los Angeles – San Diego – San Luis Obispo; Metro = Los Angeles County Metropolitan Transportation Authority

Regional Connector Transit Corridor Project

The Regional Connector Transit Corridor is under construction and would create an approximately 2-mile transit link between the Gold Line and Blue Line light rail transit (LRT) systems through downtown Los Angeles. The Regional Connector LRT extension would provide a continuous trip between the Pasadena Gold Line and Blue Line, and between the Eastside Gold Line and Expo Gold Line, as well as serve several new downtown stations and allow through-service between the regional LRT lines. The Regional Connector is expected to improve access to both local and regional destinations and would enable all Los Angeles County rail and bus transit, as well as all intercity transit service, to operate more efficiently. This project is expected to be completed by 2022 (Metro 2020a).

Link Union Station Project

Formerly known as the Southern California Regional Interconnector Project, Link Union Station would enable trains to exit LAUS through a five-track throat that would add train capacity and improve timing for Metrolink and Amtrak trains. Turning around a train at LAUS currently averages 15 minutes, resulting in 42 cumulative hours of idling time per day; Link Union Station is expected to reduce dwell time to 2 minutes, saving travel time and labor hours and reducing greenhouse gas emissions and airborne particulate matter. Moreover, with the construction of the California HSR System and an expected increase in Metrolink and Amtrak trips, Link Union Station is expected to address the need for additional throughput at LAUS.

East San Fernando Valley Transit Corridor Project

The East San Fernando Valley Transit Corridor Project is a major mass transit project that would operate in the center or curb lane for 9.2 miles along Van Nuys Boulevard from the Van Nuys Metro Orange Line station north to San Fernando Road where it would proceed northwest along San Fernando Road to the Sylmar/San Fernando Metrolink station. In November 2016, Los Angeles County voters approved Measure M, which will provide $1.3 billion for the East San Fernando Valley Transit Corridor (ESFVTC), which is sufficient to build either an at-grade LRT or Bus Rapid Transit project for the 9.2-mile corridor. On June 28, 2018, Metro’s Board of Directors chose LRT as the preferred alternative for the ESFVTC project. A Final EIR/EIS was issued in 2020 and construction is anticipated to begin in 2022 (Metro 2020b).

Brightline West Project and High Desert Corridor

The Brightline West project is an approved HSR passenger train that would connect Victorville, California, to Las Vegas, Nevada. In 2011, FRA published a Record of Decision for the project (then called "DesertXpress"). Brightline is currently studying a future extension, which would connect to Rancho Cucamonga in San Bernardino County.

Separately, the High Desert Corridor project proposes construction of a new multimodal link between the SR 14 freeway corridor in Los Angeles County and SR 18 in San Bernardino County. Caltrans published both a Draft (2014) and Final (2016) EIR/EIS for this project, which includes an HSR feeder line connecting the Palmdale Transit Center to the Brightline station approved in the Victorville area. Currently, the High Desert Corridor Joint Powers Authority is pursing federal approval of the HSR element of the project.

Coast Daylight

Coast Daylight service is a proposed new intercity rail route to supplement the Coast Starlight and fill the gap in rail service between the cities of San Francisco, San Jose, Salinas, San Luis Obispo, Santa Barbara, Ventura, and Los Angeles. The 474-mile Coast Corridor currently serves a mix of regional commuters and intercity leisure travelers. Current passenger rail services are operated by Caltrain, Amtrak, and Metrolink. Coast Daylight service would complement the Coast Starlight schedule with reliable intercity service to address the needs of communities between the San Francisco Bay Area and Los Angeles, with more than twice as many stops to provide better access to local markets (Caltrans 2018).

2.5.1.5 Intercity Passenger Bus Service

Regional bus providers in the project area include Greyhound, Megabus, and Bolt Bus. Greyhound has scheduled bus service through the city of Los Angeles and provides daily service from its Los Angeles station to Santa Ana, Anaheim, San Jose, San Francisco, Sacramento, San Diego, and Las Vegas. There are no anticipated changes in the Greyhound bus service. Megabus has bus terminals in Los Angeles, Burbank, Anaheim, and Riverside, with service from Los Angeles to San Jose, San Francisco, Oakland, and Las Vegas. Bolt Bus has daily bus service from Los Angeles to Barstow, San Jose, San Francisco, Oakland, and Las Vegas.

Local bus services within the Palmdale to Burbank Project Section are provided by several different operators. Within the vicinity of the proposed Palmdale Station, Antelope Valley Transit provides local bus and commuter bus services. Within the vicinity of the Burbank Airport Station, local and commuter bus service is provided by several operators, including the Los Angeles Department of Transportation, Metro, Burbank Bus, and Santa Clarita Transit.

Another important regional multimodal hub is the existing Palmdale TC, which offers connections between Antelope Valley Transit Authority local and commuter bus services, Metrolink commuter rail service, Santa Clarita Transit, Greyhound bus service, and Amtrak Thruway bus service. No changes in the transit service are expected.

2.5.1.6 Freight Rail Element

The freight rail system in the Palmdale to Burbank Project Section is operated by UPRR and BNSF, which provide Class I rail service[9] from the Port of Los Angeles and the Port of Long Beach to the San Joaquin Valley, the Inland Empire, and national destinations beyond. Freight trains operate daily along several regional corridors, including the Alameda Corridor, BNSF San Bernardino Subdivision, UPRR Los Angeles Subdivision, UPRR Alhambra Subdivision, UPRR Coast Line, and the Antelope Valley or UPRR Mojave Subdivision (SCAG 2016). In 2012, peak-day train volume on segments throughout this system varied from 37–89 trains per day. Significant growth in freight rail traffic is expected on most segments of the SCAG regional rail system by 2040, increasing the range of peak-day train volumes to 80–139 trains per day.

[9] Class I refers to freight rail companies with annual operating revenues of $250 million or more.

According to SCAG, there are no planned freight rail improvement projects in the Palmdale to Burbank Project Section region. Within Los Angeles County, BNSF plans to add a third and fourth main track along the San Bernardino Subdivision, and planned improvements to the UPRR Alhambra Subdivision include double tracking key segments and route connections. In addition, the Ports of Los Angeles and Long Beach have proposed many rail improvements to support rail services to the ports (SCAG 2016).

2.5.1.7 Planned Port Improvements

The Port of Los Angeles and the Port of Long Beach serve the regional transport system, thereby influencing the travel demand and congestion in the Palmdale to Burbank Project Section region. Approximately 40 percent of imports into the U.S. and 24 percent of export volumes are handled through these ports. Future development of ports and associated goods transport systems are important aspects of the regional circulation system of the Palmdale to Burbank Project Section.

The Port of Los Angeles and Port of Long Beach are both approximately 20 miles south of downtown Los Angeles in San Pedro Bay. The Port of Los Angeles and Port of Long Beach are served by the I-710 freeway, which connects to I-5 south of Burbank. The Port of Los Angeles and Port of Long Beach are also served by trains. The cornerstone of the ports' intermodal train traffic network is the Alameda Corridor, a 20-mile-long cargo expressway. The Alameda Corridor is the primary connection for cargo-carrying train traffic moving between the Ports of Los Angeles and Long Beach and the transcontinental rail network based near downtown Los Angeles.

The Port of Los Angeles Master Plan (Port of Los Angeles 2018) aims to establish policies and guidelines to direct the future development of the port while also promoting and safely accommodating foreign and domestic waterborne commerce, navigation, and fisheries in the national, State, and local public interest. Additionally, the 2018–2022 Strategic Plan (Port of Los Angeles 2018) outlines initiatives to meet each of the Master Plan objectives.

According to the Strategic Plan, more than 80 percent of the Port of Los Angeles's business revenue comes from container cargo shipping. The Port of Los Angeles is the largest container port, by volume shipped, in North America. However, it expects competitive challenges in future years as other ports expand their facilities to attract more cargo. To achieve the port's vision of retaining its position as the largest cargo container port, by volume, the Port of Los Angeles improvement initiatives include attracting new cargo volumes, optimizing inbound and outbound container flow on trucks and trains, expanding port activities on existing holdings to increase port facility utilization, and developing a capital improvement program that focuses on terminal and transportation improvements. Expanded cargo shipping operations and facilities would result in increased demand on the rail network as well as significant freeway congestion on I-710, which the Port of Los Angeles would work with Caltrans to mitigate.

In 2006, the Port of Long Beach published its first strategic plan in more than two decades (Port of Long Beach 2009). The Strategic Plan articulated a vision for the decade spanning 2006 to 2016. During the recession of 2009, the 2006 Strategic Plan was updated to reflect ongoing changes in the operating environment. Subsequently, the port published the Fiscal Year 2017 Strategic Plan (Port of Long Beach 2016), which highlights the port's mission and goals. The Master Plan Update (Port of Long Beach 1990) built upon the 1978 and 1983 Master Plans. Since 1990, the port has completed several project-specific amendments to the Master Plan. The Port of Long Beach also published a Master Plan Overview (Port of Long Beach 2008) that compiled the 1990 plan with all the subsequent amendments.

The Port of Long Beach has several planned projects, including the Gerald Desmond Bridge Replacement Project; the Middle Harbor (Piers D/E/F) Project; Dredging Projects; the Sewer, Street, Water, and Stormwater Capital Improvement Program; the Port-Wide Rail Program; and Fire Safety/Security Projects. Much like the neighboring Port of Los Angeles, the Port of Long Beach is focused on increasing cargo-handling efficiency. Increased cargo-handling efficiency would result in increased demand on the port's transportation network, including the surrounding rail and freeway.

2.5.2 Palmdale to Burbank Project Section High-Speed Rail Build Alternatives – Overview

Temporary and permanent environmental footprints were developed to inform the analysis of environmental project impacts. The temporary environmental footprint areas would be used to support construction activities, including staging, laydown areas, utility relocations, traffic detours, and temporary access roads.

Permanent environmental footprint areas would include dedicated California HSR System right-of-way for facilities, including aerial track, at-grade track, tunnels, access roads, stations, traction power distribution infrastructure and radio communication sites. Access roads not within HSR right-of-way would require obtaining the necessary right-of-way or a permanent-access easement across private land. The permanent environmental footprint areas also include permanent improvements built in support of the California HSR System, such as public roadway improvements, grade separations, and railroad improvements. The following sections provide an overview and summary of design features that are part of the Palmdale to Burbank Project Section, as well as a detailed description of the Build Alternatives.

2.5.2.1 High-Speed Rail Project Impact Avoidance and Minimization Features

The Authority committed to integrate design features to avoid and minimize impacts as part of its Tier 1 decisions. These features, called impact avoidance and minimization features (IAMF), have been incorporated in the six Build Alternatives to avoid or minimize environmental and community impacts. The IAMFs are considered as part of all six Build Alternatives.

The Authority would implement IAMFs during design and construction of the selected Preferred Alternative. The IAMFs are described in detail in Appendix 2-E and listed below by resource topic.[10] Although these IAMFs are listed by the most relevant resource topic, they may also apply to additional topics as described in each applicable section of Chapter 3, Affected Environment, Environmental Consequences, and Mitigation Measures.

- Transportation
  - **TR-IAMF#1**: Protection of Public Roadways during Construction
  - **TR-IAMF#2**: Construction Transportation Plan
  - **TR-IAMF#3**: Off-Street Parking for Construction-Related Vehicles
  - **TR-IAMF#4**: Maintenance of Pedestrian Access
  - **TR-IAMF#5**: Maintenance of Bicycle Access
  - **TR-IAMF#6**: Restriction on Construction Hours
  - **TR-IAMF#7**: Construction Truck Routes
  - **TR-IAMF#8**: Construction during Special Events
  - **TR-IAMF#9**: Protection of Freight and Passenger Rail during Construction
  - **TR-IAMF#11**: Maintenance of Transit Access
  - **TR-IAMF#12**: Pedestrian and Bicycle Safety
- Air Quality and Global Climate Change
  - **AQ-IAMF#1**: Fugitive Dust Emissions (Control)
  - **AQ-IAMF#2**: Selection of Coatings (Low-Volatile Organic Compound Paint)
  - **AQ-IAMF#3**: Renewable Diesel
  - **AQ-IAMF#4**: Reduce Criteria Exhaust Emissions from Construction Equipment
  - **AQ-IAMF#5**: Reduce Criteria Exhaust Emissions from On-Road Construction Equipment
  - **AQ-IAMF#6**: Reduce the Potential Impact of Concrete Batch Plants

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[10] IAMFs are programmatic and as such are considered for implementation across all project sections. Not all programmatic IAMFs apply to each project section, however IAMFs retain their numbering program wide. In addition, some IAMFs are developed for specific project sections and may not be featured in other Project Section EIR/EIS documents.

- Noise and Vibration
  - **NV-IAMF#1**: Noise and Vibration (Construction and Operation)
- Electromagnetic Fields and Electromagnetic Interference
  - **EMI/EMF-IAMF#1**: Preventing Interference with Adjacent Railroad
  - **EMI/EMF-IAMF#2**: Controlling Electromagnetic Fields/Electromagnetic Interference
- Public Utilities and Energy
  - **PUE-IAMF#1**: Design Measures
  - **PUE-IAMF#2**: Irrigation Facility Relocation
  - **PUE-IAMF#3**: Public Notifications
  - **PUE-IAMF#4**: Utilities and Energy
- Biological Resources and Wetlands
  - **BIO-IAMF#1**: Designate Project Biologist, Designated Biologists, Species-Specific Biological Monitors and General Biological Monitors
  - **BIO-IAMF#2**: Facilitate Agency Access (to Project Site)
  - **BIO-IAMF#3**: Prepare Worker Evaluation and Planning (WEAP) Training Materials and Conduct Construction Period WEAP Training
  - **BIO-IAMF#4**: Conduct Operation and Maintenance Period WEAP Training
  - **BIO-IAMF#5**: Prepare and Implement a Biological Resources Management Plan
  - **BIO-IAMF#6**: Establish Monofilament Restrictions
  - **BIO-IAMF#7**: Prevent Entrapment in Construction Materials and Excavations
  - **BIO-IAMF#8**: Delineate Equipment Staging Areas and Traffic Routes
  - **BIO-IAMF#9**: Dispose of Construction Spoils and Waste
  - **BIO-IAMF#10**: Clean Construction Equipment
  - **BIO-IAMF#11**: Maintain Construction Sites
  - **BIO-IAMF#12**: Design the Project to be Bird Safe
- Hydrology and Water Resources
  - **HYD-IAMF#1**: Storm Water Management
  - **HYD-IAMF#2**: Flood Protection
  - **HYD-IAMF#3**: Prepare and Implement a Construction Stormwater Pollution Prevention Plan
  - **HYD-IAMF#4**: Prepare and Implement an Industrial Stormwater Pollution Prevention Plan
  - **HYD-IAMF#5**: Tunnel Boring Machine Design and Features
  - **HYD-IAMF#6**: Tunnel Lining Systems
  - **HYD-IAMF#7**: Grouting
- Geology, Soils, Seismicity and Paleontological Resources
  - **GEO-IAMF#1**: Geologic Hazards
  - **GEO-IAMF#2**: Slope Monitoring
  - **GEO-IAMF#3**: Gas Monitoring
  - **GEO-IAMF#4**: Historic or Abandoned Mines
  - **GEO-IAMF#5**: Hazardous Minerals
  - **GEO-IAMF#6**: Ground Rupture Early Warning Systems
  - **GEO-IAMF#7**: Evaluate and Design for Large Seismic Ground Shaking
  - **GEO-IAMF#8**: Suspension of Operations during an Earthquake
  - **GEO-IAMF#9**: Subsidence Monitoring
  - **GEO-IAMF#10**: Geology and Soils
  - **GEO-IAMF#11**: Engage a Qualified Paleontological Resource Specialist
  - **GEO-IAMF#12**: Perform Final Design Review and Triggers Evaluation
  - **GEO-IAMF#13**: Prepare and Implement Paleontological Resources Monitoring and Mitigation Plan (PRMMP)

  - **GEO-IAMF#14**: Provide WEAP Training for Paleontological Resources
  - **GEO-IAMF#15**: Halt Construction, Evaluate, and Treat if Paleontological Resources Are Found
- Hazardous Materials and Wastes
  - **HMW-IAMF#1**: Property Acquisition Phase I and Phase II Environmental Site Assessments
  - **HMW-IAMF#2**: Landfill
  - **HMW-IAMF#3**: Work Barriers
  - **HMW-IAMF#4**: Undocumented Contamination
  - **HMW-IAMF#5**: Demolition Plans
  - **HMW-IAMF#6**: Spill Prevention
  - **HMW-IAMF#7**: Transport of Materials
  - **HMW-IAMF#8**: Permit Conditions
  - **HMW-IAMF#9**: Environmental Management System
  - **HMW-IAMF#10**: Hazardous Materials Plans
- Safety and Security
  - **SS-IAMF#1**: Construction Safety Transportation Management Plan
  - **SS-IAMF#2**: Safety and Security Management Plan
  - **SS-IAMF#3**: Hazard Analyses
  - **SS-IAMF#4**: Oil and Gas Wells
- Socioeconomics and Communities
  - **SOCIO-IAMF#1**: Construction Management Plan
  - **SOCIO-IAMF#2**: Compliance with Uniform Relocation Assistance and Real Property Acquisition Policies Act
  - **SOCIO-IAMF#3**: Relocation Mitigation Plan
- Station Planning and Land Use
  - **LU-IAMF#1**: HSR Station Area Development: General Principles and Guidelines
  - **LU-IAMF#2**: Station Area Planning and Local Agency Coordination
  - **LU-IAMF#3**: Restoration of Land Used Temporarily during Construction
- Agricultural Farmland and Forest Land
  - **AG-IAMF#1**: Restoration of Important Farmland Used for Temporary Staging Areas
  - **AG-IAMF#2**: Permit Assistance
  - **AG-IAMF#3**: Farmland Consolidation Program
  - **AG-IAMF#4**: Notification to Agricultural Property Owners
  - **AG-IAMF#5**: Temporary Livestock and Equipment Crossings
  - **AG-IAMF#6**: Equipment Crossings
- Parks, Recreation, and Open Space
  - **PK-IAMF#1**: Parks, Recreation, and Open Space (Construction and Operation)
- Aesthetics and Visual Resources
  - **AVQ-IAMF#1**: Aesthetic Options
  - **AVQ-IAMF#2**: Aesthetic Review Process
- Cultural Resources
  - **CUL-IAMF#1**: Geospatial Data Layer and Archaeological Sensitivity Map
  - **CUL-IAMF#2**: WEAP Training Session
  - **CUL-IAMF#3**: Pre-Construction Cultural Resource Surveys
  - **CUL-IAMF#5**: Archaeological Monitoring Plan and Implementation

- **CUL-IAMF#6**: Pre-Construction Conditions Assessment, Plan for Protection of Historic Built Resources, and Repair of Inadvertent Damage
- **CUL-IAMF#7**: Built Environment Monitoring Plan
- **CUL-IAMF#8**: Implement Protection and/or Stabilization Measures

2.5.2.2 Summary of Design Features

Alignments and Ancillary Features

The Palmdale to Burbank Project Section of the California HSR System has six Build Alternatives and one station location (the Burbank Airport Station). The Palmdale Station, and the alignment to Spruce Court in Palmdale, were evaluated as part of the Bakersfield to Palmdale Project Section, which was approved by the Authority Board in August 2021. The Burbank Airport Station was evaluated as part of the Burbank to Los Angeles Project Section. The Final EIR/EIS for the Burbank to Los Angeles Project Section was released on November 5, 2021, and the Authority's Board approved the Burbank to Los Angeles Project Section Preferred Alternative, including the Burbank Airport Station on January 20, 2022. The Build Alternatives presented in this Draft EIR/EIS reflect design refinements and modifications to avoid and minimize impacts on known environmental and community resources.

A key performance measure of each of the six Build Alternatives is the travel time between key destinations. The State-legislated California HSR System would meet the requirements of Proposition 1A, including nonstop service between San Francisco and Los Angeles designed to achieve a time of 2 hours and 40 minutes. Because all six Build Alternatives are located along the same corridor, travel times by Build Alternative are similar and each of the six Build Alternatives would allow for the achievement of this key performance measure. The Authority has identified the SR14A Build Alternative as the Preferred Alternative for the Palmdale to Burbank Project Section, through weighing a variety of issues, including natural resource and community impacts. The SR14A Build Alternative would result in fewer hydrogeological impacts within the ANF, including the SGMNM, would avoid impacts on aquatic resources at Una Lake, and would result in fewer impacts related to other environmental and community resources fully described in Chapter 8, Preferred Alternative and Station Site(s).

This Draft EIR/EIS analyzes six Build Alternatives in the Palmdale to Burbank Project Section:

- Refined SR14
- SR14A
- E1
- E1A
- E2
- E2A

Section 2.6.3 describes these Build Alternatives and Table 2-12 summarizes key design features. Table 2-13 identifies tunnel portal facilities and infrastructure elements for the proposed Palmdale to Burbank Project Section tunnels. The SR14A Build Alternative is the CEQA proposed project for purposes of CEQA Guidelines Section 15124.

Table 2-12 Summary of Design Features for the Build Alternatives

Design Feature	Refined SR14	SR14A	E1	E1A	E2	E2A
Total length (linear miles)	37.08	38.38	35.04	36.12	31.24	31.64
At-grade profile (linear miles)	10.32	10.38	10.66	9.94	9.07	8.35
At-grade covered tunnel (linear miles)	0.47	0.47	0	0	0	0
Cut-and-cover tunnel (linear miles)	1.52	1.52	2.61	1.60	1.85	0.85
Bored/Mined tunnel (linear miles)	25.58	27.95	24.64	26.31	22.48	24.14

Design Feature	Refined SR14	SR14A	E1	E1A	E2	E2A
Elevated profile (linear miles)	2.91	1.56	0.86	1.07	1.53	1.74
Number of straddle bents	1	2	1	2	1	2
Number of railroad crossings	3	5	3	5	2	5
Number of major water crossings	25	19	12	12	13	13
Number of at-grade road crossings	0	0	0	0	0	0
Approximate number of public and private roadway closures	9	5	13	12	11	10
Number of new roadway overcrossings and undercrossings	11	9	10	9	11	10

Table 2-13 Proposed Tunnel Portal Facilities and Infrastructure Elements

Portal Facilities and Infrastructure Elements	Tunnels 1, 2, and 3 (< 0.5 mile)		Tunnel 5 (length varies)		Tunnel 6 (> 0.5 mile; < 1 mile)		Tunnels 4, 7, 8, and 9 (> 1 mile)	
	North Portal	South Portal	North Portal	South Portal	North Portal	South Portal	North Portal	South Portal
Noise Attenuation Hood	X	FA	X	X	X	X	X	X
Portal Ventilation Building	X	NR	X	X	X	X	X	X
Access Road	X	X	X	X	X	X	X	X
Emergency Vehicle Assembly and Turnaround Area	X	X	X	X	X	X	X	X
Rescue Area/Passenger Assembly Area	X	X	X	X	X	X	X	X
Fire Hydrants and Water Supply	X	X	X	X	X	X	X	X
Area Lighting	X	FA	X	X	X	X	X	X
Train Surface Evacuation and Fire Control Zone	X	X	X	X	X	X	X	X
Communication Facilities	X	X	X	X	X	X	X	X
Rock Fall and Debris Containment	X	X	X	X	X	X	X	X
Detention Pond	FA	FA	FA	FA	FA	FA	FA	FA
Parking for Tunnel Maintenance and Traction Power Facilities	X	X	X	X	X	X	X	X
Public Utilities	X	X	X	X	X	X	X	X

Authority = California High-Speed Rail Authority; FA = Further Analysis; NR = Not Required; X = Required

Station Sites

The analysis developed for the Palmdale to Burbank Project Section assumes connection to stations in Palmdale and Burbank. As such, this Draft EIR/EIS provides a discussion of both the

Palmdale Station and the Burbank Airport Station, including their associated station areas and HSR alignment in various sections throughout Chapter 3, Affected Environment, Environmental Consequences, and Mitigation Measures.

The Authority evaluated the Palmdale Station, including the track alignment north of Spruce Court in Palmdale, as an element of the Bakersfield to Palmdale Project Section, and the Authority Board approved the Palmdale Station in August 2021. The discussion and analysis of the Palmdale Station is included in this Draft EIR/EIS for reference purposes only. For more information about the Palmdale Station and track alignment north of Spruce Court in Palmdale, please refer to the Bakersfield to Palmdale Project Section Final EIR/EIS, available on the Authority's website.

The Burbank Airport Station, which is located at the southern end of the Palmdale to Burbank Project Section, and included in the alternatives description in this chapter, was also evaluated as part of the Burbank to Los Angeles Project Section. Figure 2-45 below depicts the 'overlap area' including in both the Palmdale to Burbank and Burbank to Los Angeles Project Sections. The Burbank to Los Angeles Project Section Final EIR/EIS was released on November 2, 2021, and the Authority's Board approved the Burbank to Los Angeles Project Section Preferred Alternative, including the Burbank Airport Station, on January 20, 2022. The Board's approval of the Burbank to Los Angeles Project Section Preferred Alternative extends to the southern edge of San Fernando Boulevard (between Lockheed Drive and Hollywood Way). The information and analysis within this Draft EIR/EIS above the Burbank Airport Station overlap area should be understood as information and for reference only. For the most updated information about the Burbank Airport Station, please refer to the Burbank to Los Angeles Final EIR/EIS, available on the Authority's website.

Table 2-14 Summary of Station Site

Design Feature	Burbank Airport Station
2040 Average daily boardings	25,670
2040 Constrained parking demand	3,210
Platform length	1,410 feet
Combined width of platform and trackway (width of station box and right-of-way)	220 feet
Storage track locations/configurations	None
Blended system/operations features	None

Modification of State Highway or Route Facilities

State Highway Underpasses

Where the Build Alternative alignments would cross over state highway facilities at various locations as an aerial structure, the possibility of encroachment into the Caltrans right-of-way would depend on the placement of the HSR aerial structure columns. Temporary closure of the Caltrans right-of-way could be required for placement of precast aerial structure sections. In such cases, traffic would be detoured onto local streets.

Roadway Overcrossings

Where the Build Alternatives would be at grade and parallel to state facilities, access would be severed where an at-grade leg of an intersection crosses a Build Alternative. Therefore, road overcrossings would be required to maintain function of the state highway and local road systems. Intersecting roads would be realigned horizontally and adjusted vertically to cross over the state highway. The possibility of encroachment into the Caltrans right-of-way would depend on the placement of the overcrossing columns. The design intent of these crossings is to maintain the existing intersection and traffic patterns during construction. However, some short-term closures could be required; in such cases, local traffic would use one of the other overcrossings or intersections in the vicinity.

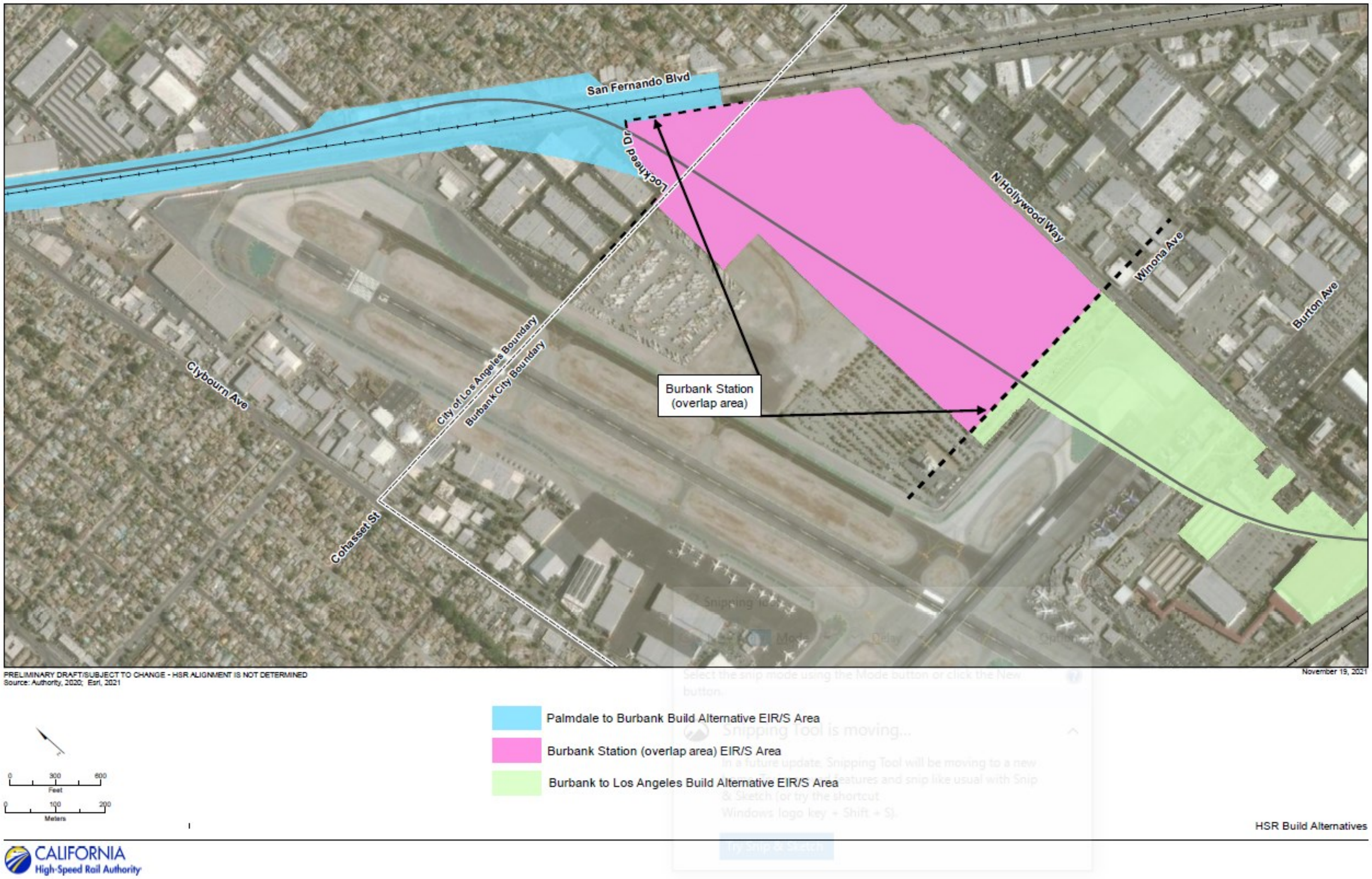


Figure 2-45 Burbank Airport Station Overlap Area

Eliminating Leg of Intersections

The elimination of one leg of an existing at-grade intersection with a state highway is deemed necessary where the road is in proximity to other accessible, proposed overcrossings, or its existing average annual daily traffic is not high enough to warrant its own overcrossing. In such circumstances, access would be severed along the leg of the intersection traversed by the HSR track. There would be no impacts on the Caltrans right-of-way because no structures are required. Local traffic would utilize one of the other overcrossings in the vicinity.

Ramp Modifications

Ramp modifications would be required where the HSR track is on an aerial structure and the proposed columns directly affect the existing alignments of roadways or off-ramps. These ramps would be modified to avoid the proposed columns and to accommodate other roadway realignments that result from placement of the aerial structure columns. Although the modifications would be slight, additional right-of-way could be required for the realigned off-ramps. Roadway traffic would likely use existing facilities while the realigned ramps were being constructed.

All six of the Build Alternatives would cross Caltrans State Route facilities. Depending on the HSR guideway type at these crossings, the guideway would require construction easements; easements for columns, subsurface foundations, and supports within a State facility; or modification of overcrossings by the HSR Build Alternatives. Such modifications could require approval from local agencies with jurisdiction over the affected facility. Table 2-15 summarizes the various modification requirements for each of these facilities, which are depicted on Figure 2-46.

Table 2-15 Palmdale to Burbank Project Section Proposed Modifications to California Department of Transportation State Highway Facilities

Map No.	Dist-County-Hwy-PM	Location	Proposed Modifications		Build Alternative(s)
			Modify	Easement	
1	07-LA-Future High Desert Corridor-TBD	Sierra Hwy / Future High Desert Corridor	Future highway over HSR	Perm ROW, easement and TCE	All six Build Alternatives
2	07-LA-138-44.0 / 44.8	Palmdale Boulevard	Grade separation	Perm ROW, easement and TCE	All six Build Alternatives
3	07-LA-14-55.8	South of existing Courson Road UC PM R56.32	HSR in tunnel	Perm underground easement	Refined SR14
4	07-LA-14-54.2-54.8	Pearblossom Highway Interchange	HSR cut-and-cover tunnel	Perm ROW, easement and TCE	E1 / E2
5	07-LA-14-47.1	North of existing Ward Road OC PM 46.76	HSR overpass	Perm ROW, easement and TCE	Refined SR14
6	07-LA-210-6.0	I-210 at SR 118 existing fwy-to-fwy separation	HSR in tunnel	Perm underground easement	Refined SR14 / SR14A / E1 / E1A
7	07-LA-210-9.3	Between existing Christy and Wheatland UCs	HSR overpass	Perm ROW, easement and TCE	E2 / E2A
8	07-LA-5-34.5	I-5 at existing Sun Valley OC PM 34.58	HSR under existing structure	Perm ROW, easement and TCE	Refined SR14 / SR14A / E1 / E1A

Map No.	Dist-County-Hwy-PM	Location	Proposed Modifications		Build Alternative(s)
			Modify	Easement	
9	07-LA-5-33.6	Between existing Roscoe and Sunland Blvd OCs	HSR in tunnel	Perm underground easement	E2 / E2A
10	07-LA-14-53.5	Near existing Peakland Road	HSR in tunnel	Perm underground easement	SR14A
11	07-LA-14-50.7	Santiago Road Interchange	HSR in tunnel	Perm underground easement	SR14A

Sources: Caltrans, 2016; Authority, 2016b
fwy = freeway; Hwy = highway; HSR = high-speed rail; I- = Interstate; OC = overcrossing; perm = permanent; PM = post mile; ROW = right-of-way; R = State Route; TCE = temporary construction easement; UC = undercrossing

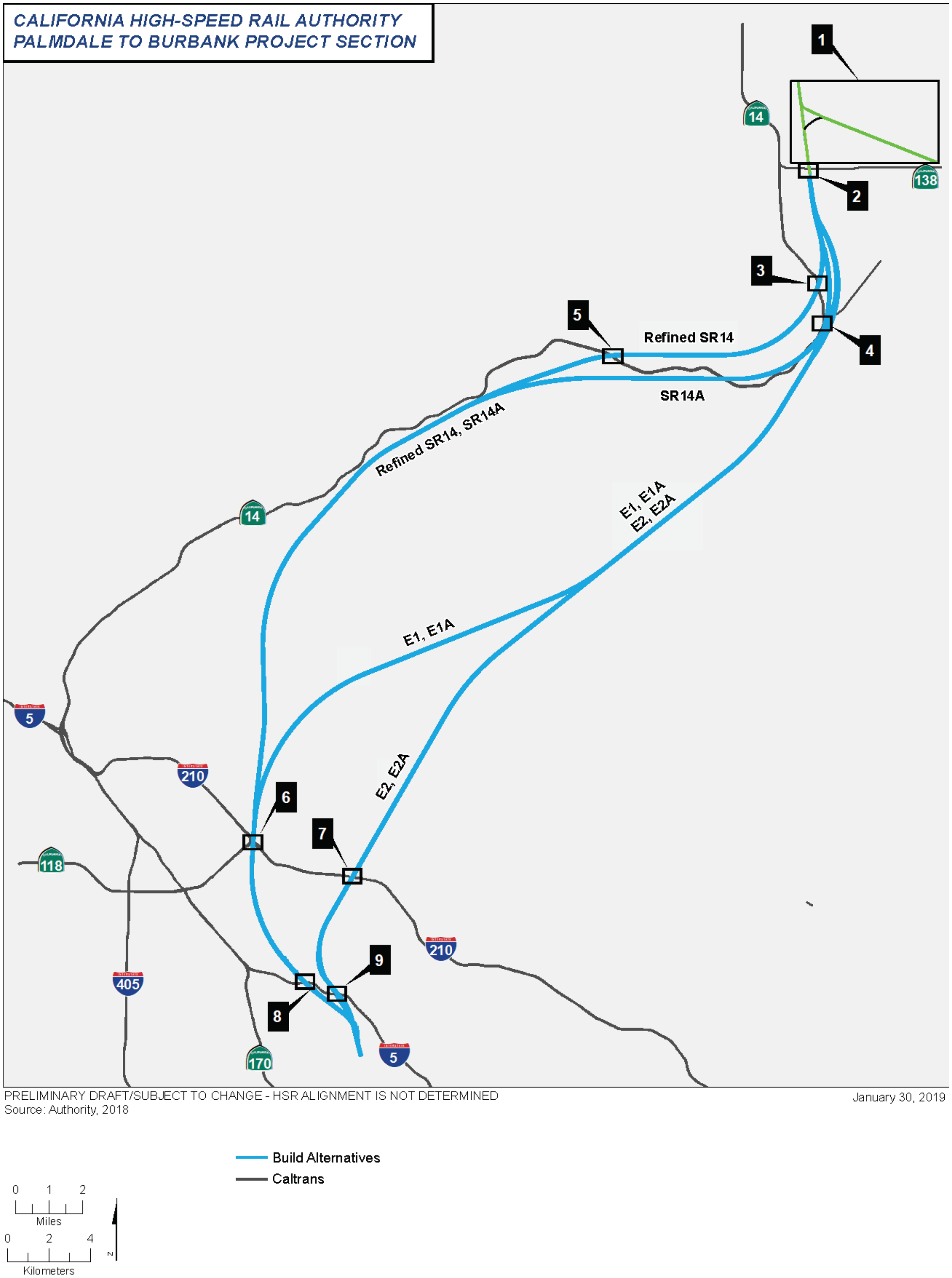


Figure 2-46 High-Speed Rail Build Alternatives and Caltrans State Highway Facilities

Modification of Freight or Passenger Railroad Routes or Facilities

Grade Modifications or Separations

The following changes would occur for all six Build Alternatives:

- The existing East Avenue S at-grade crossing would be eliminated, and a new overhead structure would be built near milepost (MP) 66.9.

The following changes are specific to the Refined SR14, SR14A, E1, and E1A Build Alternatives:

- The Sunland Boulevard at-grade crossing near MP 15.1 would be modified.
- The existing at-grade crossing at Penrose Street near MP 15.68 would be closed and removed.
- A replacement railroad bridge is proposed for Tuxford Street to cross under near MP 15.95.
- The existing at-grade crossing at Sheldon Street near MP 17.05 would be separated with a new railroad bridge over Sheldon Street underpass.

Branch or Other Track Re-routes or Closures (excludes Mainline Alignment Changes)

For the Refined SR14, E1, and E2 Build Alternatives, the following changes are proposed. South of the UPRR Colton Cutoff connection at Control Point (CP) Harold (MP 67.5), the existing Metrolink/UPRR tracks would be realigned to be east of the Refined SR14, E1, and E2 Build Alternatives through the Una Lake area. This realignment would begin north of Avenue S and extend through Una Lake before tying back into the existing tracks at Barrel Springs Road.

For the Refined SR14, SR14A, E1, and E1A Build Alternatives, the Vulcan Industrial lead from CP Tuxford (MP 16.05) to CP Sheldon (MP 17.0) would be relocated and lengthened. The Metrolink tracks would also be realigned from Tuxford Street (MP 15.95) to Sunland Boulevard (MP 15.06).

Acquisition of Rail Rights-of-Way

For all six Build Alternatives, the following are proposed areas of required additional right-of-way:

- From MP 13.5 to MP 14.4, a Metrolink parcel of up to 100 feet wide to the north.
- From MP 15.5 to MP 17.4, a Metrolink parcel up to 60 feet wide to the north.
- From MP 67.2 to MP 69.1, a UPRR parcel up to 25 feet wide to the south.

For the Refined SR14, E1 and E2 Build Alternatives, the following are proposed areas of required additional right-of-way:

- From MP 66.1 to MP 67.2, a UPRR parcel up to 50 feet wide to the north.

Operating Speed Changes

For all six Build Alternatives, the following would be the permanent effect on existing operating speeds:

- MP 13.5 to MP 17.5, no change in posted operating speeds or other restrictions.
- MP 65.8 to MP 66.28, no change in posted operating speeds or other restrictions.
- MP 67.40 to MP 69.1, no change in posted operating speeds or other restrictions.

For the Refined SR14, E1, and E2 Build Alternatives, the following would be the permanent effect on existing operating speeds:

- MP 66.28 to MP 67.40, an increase in passenger speeds from 55 mph to 79 mph, with no change for freight.

Temporary Actions during High-Speed Rail Construction Periods

For all six Build Alternatives, the following conditions would require minor periods of track closure to allow for construction activities:

> ***Shoofly***
>
> A shoofly is a temporary track to allow for movement around obstacles that prevent movement on the original track section.

- MP 15.06—Construction of temporary shoofly to allow new railroad bridge
- MP 16.05 CP Tuxford—Tie-in of Vulcan industrial lead to new track.
- MP 17.0 CP Sheldon—Tie-in of Vulcan industrial lead to new track.
- MP 17.05—Construction of temporary shoofly to allow new railroad bridge.
- MP 17.5—Tie-in of new main tracks to existing.
- MP 68.3—Tie-in of new main track to existing.
- MP 69.1—Tie-in of second main track to existing.
- MP 69.2—Tie-in of shifted main track to existing.
- MP 69.5—Construction of temporary shoofly to allow construction of new railroad bridge and proposed Sierra Highway undercrossing.
- MP 69.8—Tie-in of shifted main track to existing.

For Refined SR14, E1 and E2 Build Alternatives, the following conditions would require minor periods of track closure to allow for construction activities:

- MP 66.3—Tie-in of new main track to existing.
- MP 67.9—Construction of temporary shoofly to allow construction of new railroad bridge and proposed Sierra Highway undercrossing.

For SR14A, E1A, and E2A Build Alternatives, the following conditions would require minor periods of track closure to allow for construction activities:

- From MP 66.3 to MP 67.9— Construction of temporary shoofly to allow construction of new railroad bridge over HSR and proposed Avenue S overpass.

For E2 and E2A Build Alternatives, the following conditions would require minor periods of track closure to allow for construction activities:

- From MP 13.80 to MP 14.50.

2.5.3 High-Speed Rail Build Alternatives – Detailed Description

2.5.3.1 Refined SR14 Build Alternative

As described in Chapter 1, Project Purpose, Need, and Objectives, a specific objective for the Palmdale to Burbank Project Section is for rail alignments to “follow existing transportation or utility corridors to the extent feasible.” This objective is based on the premise that placing a new rail alignment within or adjacent to an existing transportation corridor would generally avoid, minimize, or reduce environmental and social effects. Consistent with this objective, the Authority has in the past proposed several rail alignments that would generally follow the route of the SR 14 freeway. Since 2010, more than 25 different rail alignments following the SR 14 freeway corridor have been considered (including Palmdale to Los Angeles alternatives before the Palmdale to Los Angles Project Section was split into the Palmdale to Burbank and Burbank to Los Angeles Project Sections).

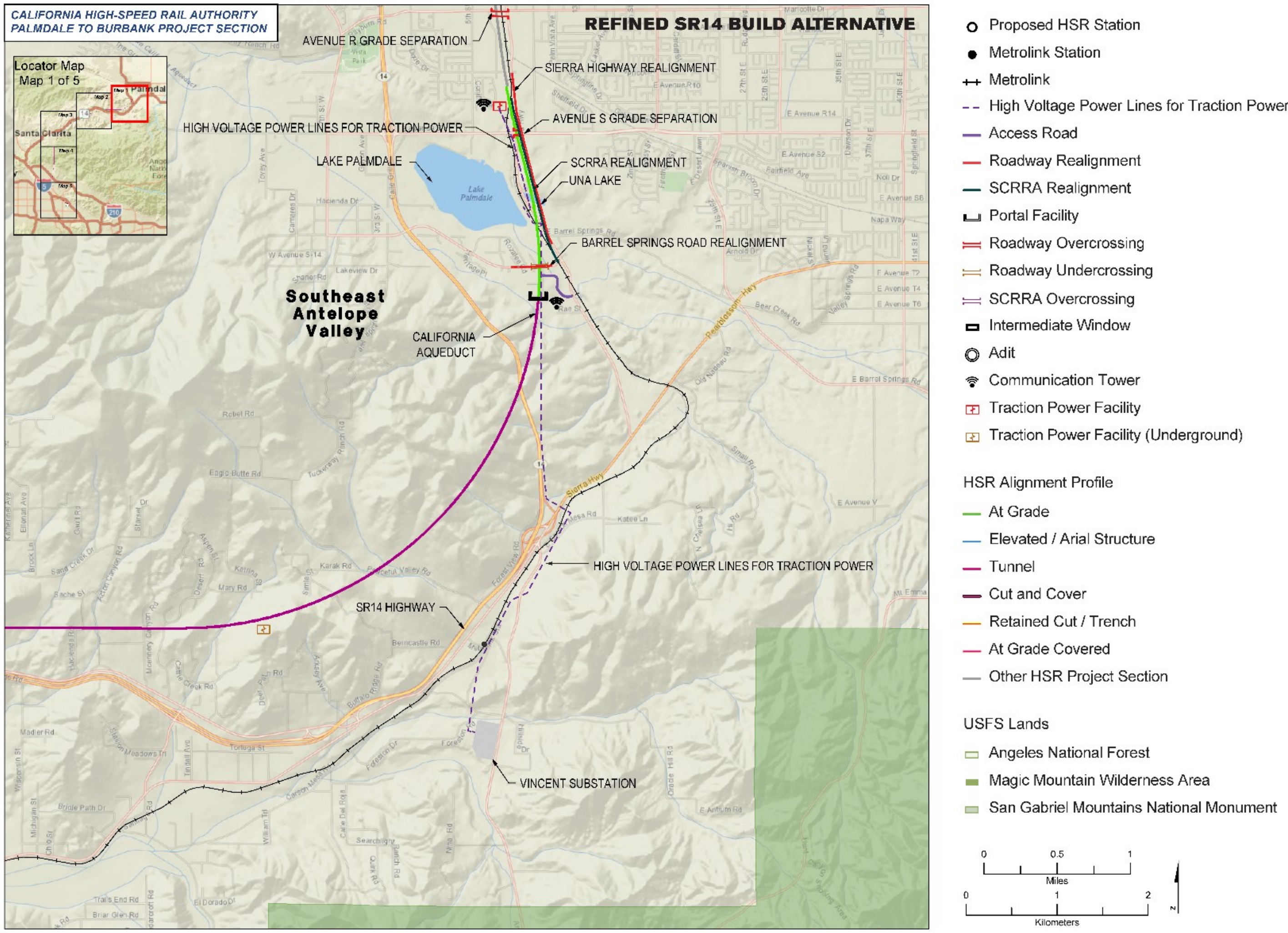
The 2015 and 2016 SAA Reports documented that following the existing transportation corridors (the SR 14 freeway and the Metrolink Antelope Valley corridor) into the San Fernando Valley would result in substantial community and environmental justice impacts, particularly in the city of San Fernando. In response, the 2016 SAA Report recommended modifying the Refined SR14 Build Alternative to avoid the northeast San Fernando Valley and associated community and environmental justice impacts.

Each of the six Build Alternatives—Refined SR14, SR14A, E1, E1A, E2, and E2A—would begin and end at the same location. The northern terminus of the Build Alternatives is Spruce Court in the City of Palmdale, which connects the Palmdale to Burbank Project Section to the approved Bakersfield to Palmdale Project Section. The southern terminus of the six Build Alternatives is the Burbank Airport Station. South of the Burbank Airport Station, the HSR alignment would continue towards Los Angeles, which is the Burbank to Los Angeles Project Section.

Figure 2-47 through Figure 2-52 show the proposed Refined SR14 Build Alternative. The current Refined SR14 alignment between Palmdale and the Santa Clara River crossing (just outside the city of Santa Clarita) would follow the SR 14 freeway corridor. After crossing the Santa Clara River near Lang Station Road, the Refined SR14 Build Alternative would turn southerly and enter a 13-mile-long tunnel beneath portions of the ANF, including the SGMNM. The Refined SR14 Build Alternative would emerge from the tunnel and transition to an at-grade alignment near Branford Street in the Pacoima neighborhood of the city of Los Angeles.

The Refined SR14 Build Alternative is divided into two subsections for discussion: Central Subsection and Burbank Subsection.

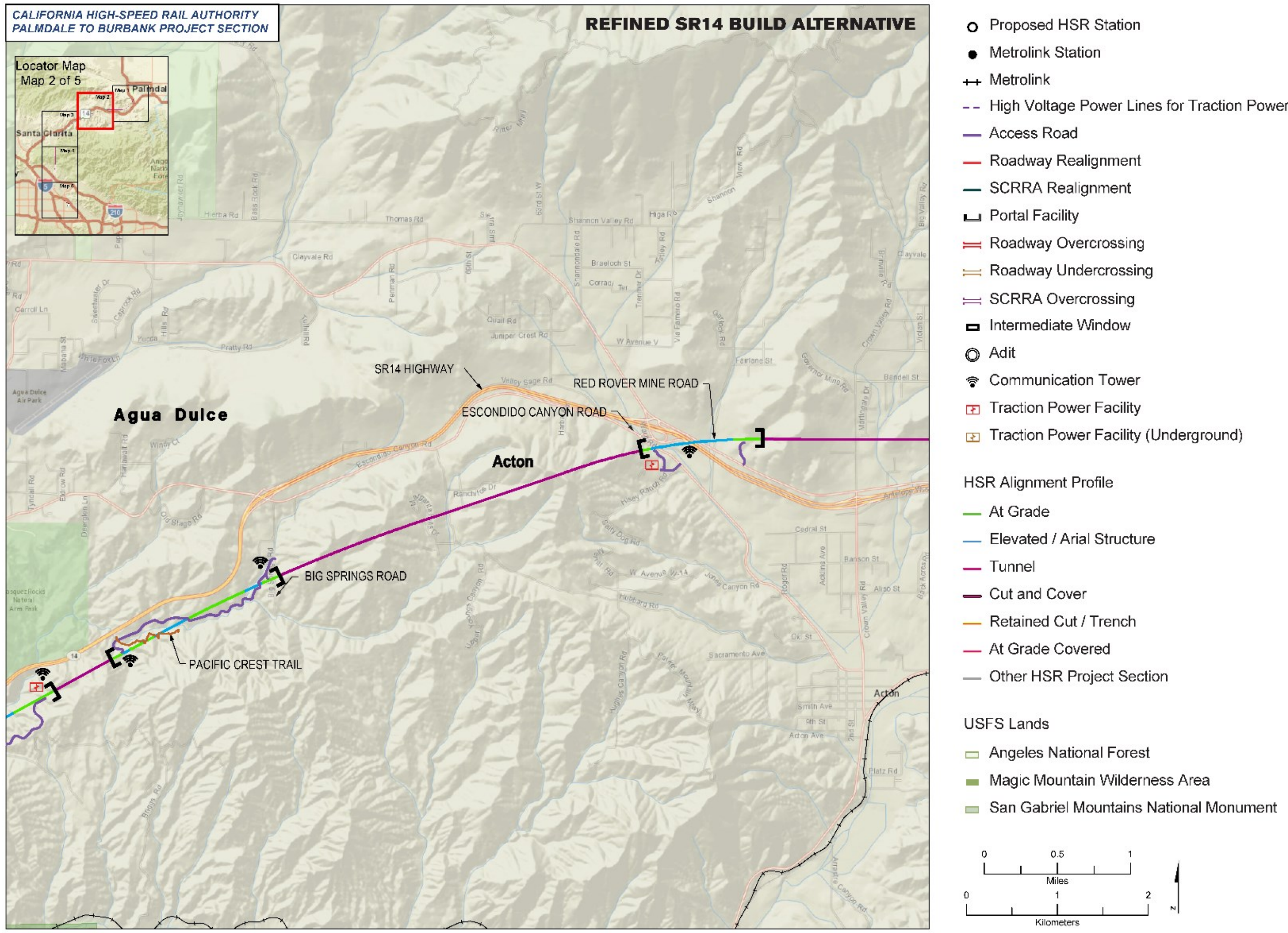
Figure 2-47 Refined SR14 Build Alternative Overview Map



PRELIMINARY DRAFT/SUBJECT TO CHANGE - HSR ALIGNMENT IS NOT DETERMINED
Source: Authority, 2021; National Geographic/Esri, 2021

May 14, 2021

Figure 2-48 Refined SR14 Build Alternative (Map 1 of 5)



PRELIMINARY DRAFT/SUBJECT TO CHANGE - HSR ALIGNMENT IS NOT DETERMINED
Source: Authority, 2021; National Geographic/Esri, 2021

May 14, 2021

Figure 2-49 Refined SR14 Build Alternative (Map 2 of 5)

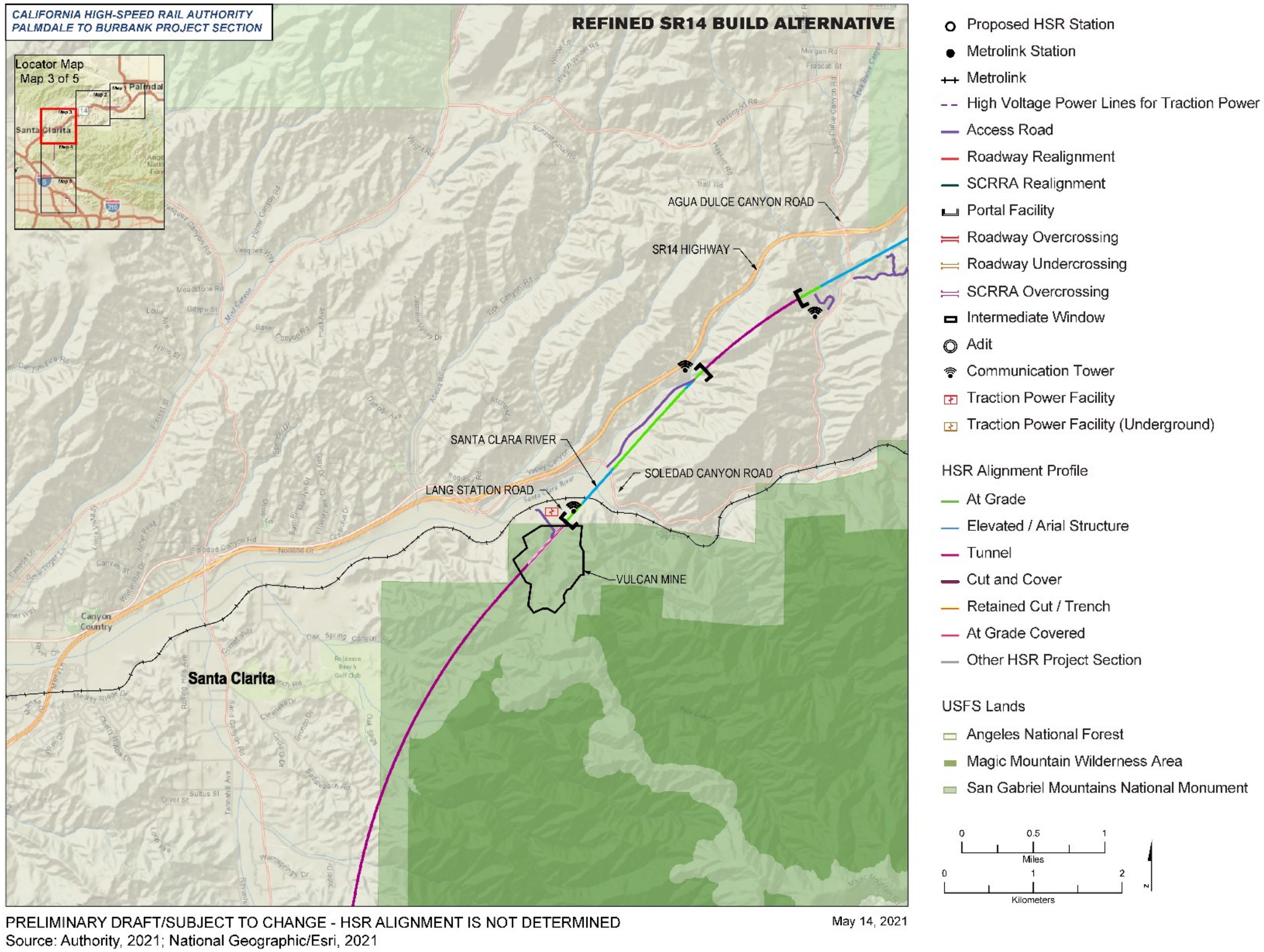
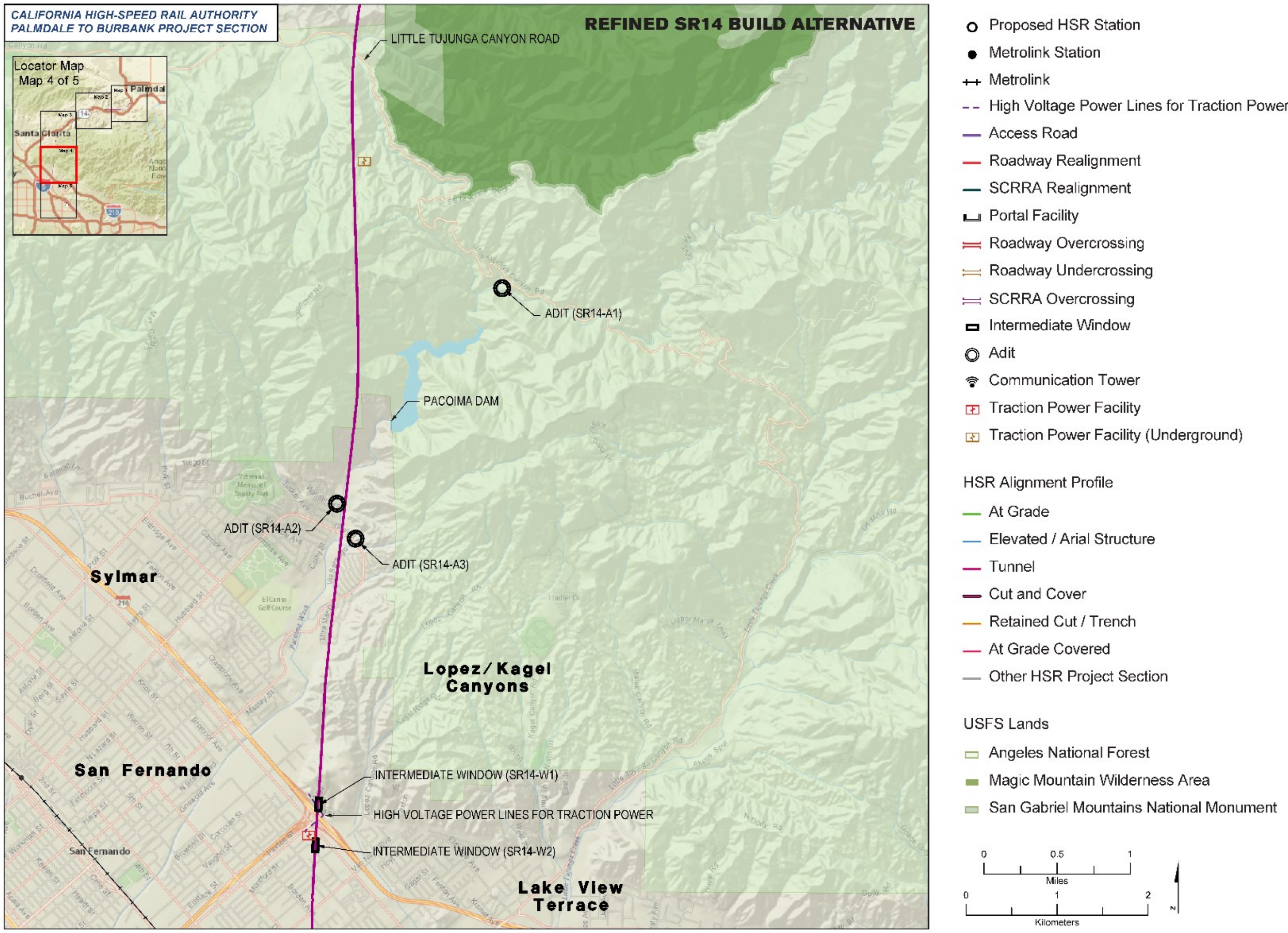


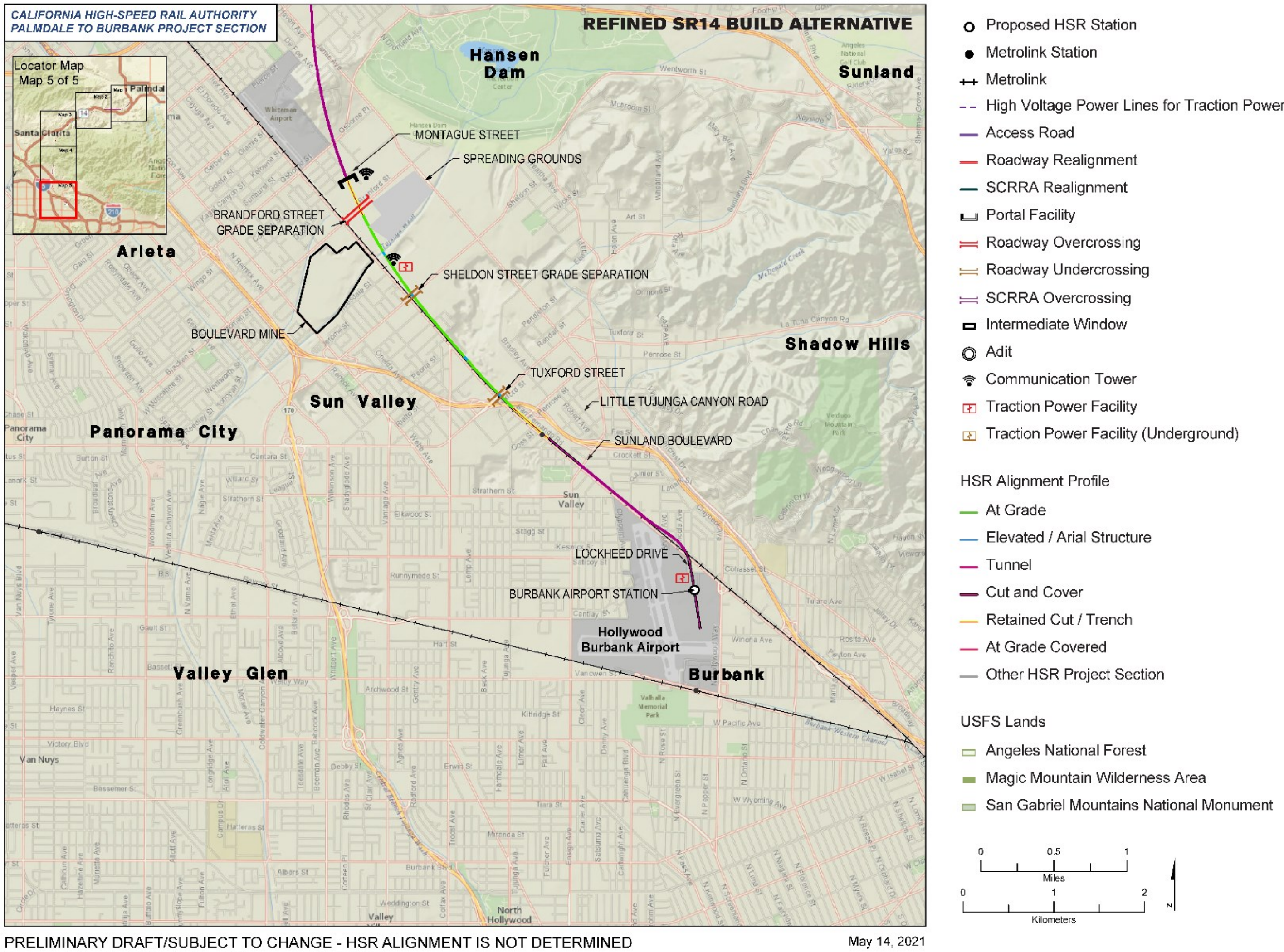
Figure 2-50 Refined SR14 Build Alternative (Map 3 of 5)



PRELIMINARY DRAFT/SUBJECT TO CHANGE - HSR ALIGNMENT IS NOT DETERMINED
Source: Authority, 2021; National Geographic/Esri, 2021

May 14, 2021

Figure 2-51 Refined SR14 Build Alternative (Map 4 of 5)



Source: Authority, 2021; National Geographic/Esri, 2021

Figure 2-52 Refined SR14 Build Alternative (Map 5 of 5)

Refined SR14 Central Subsection

Alignment

As shown on Figure 2-47 through Figure 2-52, the Refined SR14 alignment would begin at grade in the vicinity of Spruce Court, west of the current alignment of Sierra Highway near the intersection of Avenue S. The alignment would cross Una Lake on an embankment, requiring partial filling of the lake. North and south of Una Lake, the alignment would cross the San Andreas Fault Zone. Approximately 0.25 mile south of the current location of Una Lake, the Refined SR14 alignment would cross the current alignments of Sierra Highway and the Metrolink rail line, each of which would be relocated within the Refined SR14 Central Subsection.

As further described below, in the 19 miles between Una Lake and Lang Station, the Refined SR14 alignment would traverse a series of short tunnels, viaducts, and at-grade sections.

Continuing south from where the alignment would cross the current Sierra Highway and Metrolink corridor alignments, the Refined SR14 alignment would cross over Barrel Springs Road and continue for approximately 0.6 mile at grade before entering twin tunnels for 7.3 miles. These tunnels would have a maximum depth of 920 feet below ground surface. The tunnels would pass beneath the California Aqueduct, the SR 14 freeway, and various residential communities (including Peaceful Valley Road and other residential areas north of SR 14 freeway near the unincorporated Acton area of Los Angeles County).

After emerging from the tunnel east of Red Rover Mine Road, the Refined SR14 alignment would continue west at grade and on a viaduct over Red Rover Mine Road, Sierra Highway, the SR 14 freeway, and Escondido Canyon Road. The Refined SR14 alignment would then enter twin bored tunnels approximately 3.1 miles long (maximum depth approximately 780 feet) and would emerge east of Big Springs Road.

Continuing southwest from Big Springs Road, the Refined SR14 alignment would be constructed at grade and on viaduct for approximately 1.5 miles before entering 0.5-mile-long twin tunnels (maximum depth approximately 250 feet). The alignment would emerge from the tunnels approximately 1.0 mile east of Agua Dulce Canyon Road. From this point, the Refined SR14 alignment would continue southwest at grade and on viaducts for approximately 1.5 miles, passing over Agua Dulce Canyon Road on a viaduct structure.

From a point about 0.5 mile west of Agua Dulce Canyon Road, the alignment would enter approximately 0.9-mile-long twin tunnels (maximum depth approximately 470 feet), following a southwesterly direction. Upon emerging from the tunnels, the alignment would continue at grade or on viaduct for approximately 1.7 miles, crossing the Santa Clara River, Soledad Canyon Road, and the existing Metrolink rail alignment on viaduct structures. Bents and columns of the viaducts would be placed to avoid/minimize disturbance within ecologically sensitive portions of the river.

Continuing from the Santa Clara River toward Lang Station Road, the Refined SR14 Build Alternative alignment would enter approximately 0.5-mile-long, at-grade, covered twin tunnels that would be constructed to the south through the Soledad Canyon Mining Operations (Vulcan Mine), California Mine Identification Number 91-19-0038, which is almost entirely within the boundaries of the ANF, including the SGMNM. From this point, the Refined SR14 alignment would enter twin-bored tunnels for approximately 13 miles, which would be constructed underneath portions of the ANF, including the SGMNM, the city of Santa Clarita, and the Pacoima neighborhood of Los Angeles. These tunnels would have a maximum depth of 2,080 feet. The twin tunnels would pass through the San Gabriel Fault Zone and the Sierra Madre Fault Zone. Upon completion of the tunnels, the Vulcan Mine site would be regraded to better reflect surrounding topography.

The Refined SR14 alignment would emerge east of the existing Antelope Valley Metrolink Corridor near Montague Street in the Pacoima neighborhood of Los Angeles. From Montague Street, Refined SR14 would continue south for approximately 0.4 mile in a retained cut/trench, transitioning up to ground level, and passing over the existing Hansen Spreading Grounds on embankment before crossing over the Los Angeles County Flood Control Channel on a bridge and entering the existing Metrolink corridor near Sheldon Street. Continuing along the east side of the Metrolink Corridor, the Refined SR14 Build alignment would continue southerly at grade for approximately 1.0 mile where it would cross over Tuxford Street and under the I-5 freeway. Continuing southeast from the I-5 undercrossing, the Refined SR14 alignment would transition below-grade in an open trench to just north of Olinda Street. From just north of Olinda Street to just south of Sunland Boulevard, the Refined SR14 alignment would be below-ground in a cut-and-cover box structure. Metrolink would remain on the surface, and the Sun Valley Metrolink station would be reconstructed south of Olinda Street on the surface. South of Sunland Boulevard the Refined SR14 alignment would continue in a mined or bored tunnel until reaching Lockheed Drive, the southern limit of this subsection. The Refined SR14 Central Subsection would continue in the cut-and-cover tunnel adjacent to and underneath the realigned Metrolink rail alignment from Olinda Street until reaching the southern limit of this subsection, Lockheed Drive.

Ancillary Features

Irrigation and Drainage Facilities

- Between the SR 14 freeway and the Vulcan Mine, the Refined SR14 alignment drainage facilities would be along the viaduct structures with perpendicular culvert crossings to convey surface drainage across the alignment.
- Improvements at the Vulcan Mine would involve recontouring the existing surface grade and installing drainage facilities to intercept and convey surface drainage away from the Vulcan Mine.

The remaining proposed drainage facilities within the mountainous areas include the following:

- Natural-lined or concrete-lined drainage ditches/channels
- Culvert crossings
- Detention basins

Proposed changes to the existing drainage system at Tuxford Street include modifying and upgrading the existing pump station and reconfiguring the existing storm drain to accommodate the proposed underpass.

Operations Facilities

- TPSSs:
  - A TPSS would be north of East Avenue S and west of the proposed alignment.
  - A TPSS would be directly east of the I-210/SR 118 interchange.
- PSs:
  - A PS would be at Station 599+00, underground within a tunnel.
  - A PS would be at Station 818+00, within the Portal 3 facilities footprint.
  - A PS would be at Station 1325+00, within the Portal 9 facilities footprint.
  - A PS would be at Station 1590+00, underground within a tunnel.
  - A PS would be at Station 2037+00, close to the LADWP Valley Power Station.
- Switching stations:
  - A switching station would be at Station 1103+00, within the Portal 6 facility footprint.
- CTs:
  - All open-air traction power facilities would include a 100-foot CT inside the footprint.
- Power transmission lines:
  - A 230 kV power line would connect a TPSS at Station 305+00 with the Edison (Edison SCE) Vincent Substation in Acton. This line would be 4 miles long.

Utilities

The Refined SR14 Central Subsection would cross several high risk utilities, including 2 underground electrical lines, 16 natural-gas distribution lines, 4 petroleum and fuel pipelines, and 30 water pipelines. Low-risk utilities within the Refined SR14 Central Subsection include sanitary sewer, telecommunications, storm drainage, and fiber optic. In addition, the Refined SR14 Central Subsection would pass underneath the California Aqueduct in a bored tunnel.

Access Roads

Access roads to portals are intended for both construction access and for tunnel maintenance and emergency access during operation. In mountainous areas (as opposed to urban areas), the portals would be furnished with infrastructure elements related to tunnel ventilation, noise mitigation, traction power, emergency and rescue facilities, firefighting, communications utilities, and rock fall containment. A tunnel portal area, if equipped with all elements of infrastructure considered necessary, could require 6.5-7 acres of usable (flat) site area, which is reflected in the footprint.

- **Tunnel Portal 1**—This access road would connect the existing Sierra Highway to Portal 1 utilizing a portion of an existing dirt road behind a residential area. Grading for this access road would be minimal because the terrain in this location is mostly flat.
- **Tunnel Portal 2—**This access road would connect existing Sierra Highway to Portal 2 utilizing the existing concrete driveway of a residential home. Minor grading would be required for this access road because of the flatness of the site.
- **Tunnel Portal 3**—This access road would connect Escondido Canyon Road to Portal 3 and would utilize an existing dirt road (53rd Street West).
- **Tunnel Portal 4**—Two access roads are proposed on the northern and southern ends of Portal 4. The connection point from the north end is from Big Springs Road. This access road would traverse an existing ridgeline. The southern connection point would access both Portal 4 and Portal 5. The southern access road would follow the existing terrain adjacent to an existing natural drainage course. The southern access road would cross under the proposed rail alignment to the north side of the alignment at approximately the midway point between Portal 4 and Portal 5.
- **Tunnel Portal 5**—This access road would cross the Pacific Crest Trail to access Portal 5 and would require a passage for pedestrians under the roadway through a culvert-type structure.
- **Tunnel Portal 6**—The access road connection point would be from Agua Dulce Canyon Road. Approximately half of the access road would utilize Briggs Edison Road, an existing dirt road, which would require widening to accommodate the new access road. The second half of the access road would traverse mountainous terrain and would require major grading to achieve a minimum width of 22 feet for slope stabilization. Cut slopes would be 2 horizontal to 1 vertical unless otherwise recommended by the soils report or the Geotechnical Engineer.
- **Tunnel Portal 7**—The access road would begin along an existing dirt road off Agua Dulce Canyon Road.
- **Tunnel Portal 8**—The access road is proposed along an existing fire access road off Soledad Canyon Road. The road would be widened, and grading would be minimal.
- **Tunnel Portal 9**—The access road is proposed along the existing Lang Station Road. The road would be widened, and grading would be minimal.

Adits and Intermediate Windows

The Refined SR14 Build Alternative includes three options for adits, only one of which would be selected. The three adit options, as described in Table 2-16, would be accessible by existing roadways. One of the adit options (SR14-A1) would be within the ANF along Little Tujunga Canyon Road and in proximity to the aforementioned fault zones. The other two adit options

(SR14-A2 and SR14-A3) would be just south of the Pacoima Dam. SR14-A2 would surface west of the Refined SR14 alignment and connect to Wallabi Avenue, and SR14-A3 would surface east of the Refined SR14 alignment and connect to Gavina Avenue.

Table 2-16 Refined SR14 Build Alternative Adit and Intermediate Window Options

Feature Name	Location	Associated Map(s)
Adit		
SR14-A1	Located within the ANF along Little Tujunga Canyon Road	Figure 2-51
SR14-A2	Located just south of Pacoima Dam; would surface west of the Refined SR14 alignment and connect to Gavina Avenue	Figure 2-51
SR14-A3	Located just south of Pacoima Dam; would surface east of the Refined SR14 alignment and connect to Wallabi Avenue	Figure 2-51
Intermediate Window		
SR14-W1	Located directly north of the I-210/SR 118 interchange	Figure 2-51
SR14-W2	Located directly south of the I-210/SR 118 interchange	Figure 2-51

ANF = Angeles National Forest; I- = Interstate; SR = State Route

The Refined SR14 Build Alternative also includes two options for an intermediate window, only one of which would be selected to provide construction access to tunnels. As described in Table 2-16 and shown on Figure 2-51, both intermediate window options would be in proximity to the I-210/SR 118 interchange. The first option (SR14-W1) would be directly north of the intersection of these freeways, and the second option (SR14-W2) would be south of the intersection of these freeways.

Each of the adit and window options would require temporary and permanent ground disturbance to accommodate ancillary features such as temporary CSAs, temporary water supply for construction purposes, and permanent electrical utility facilities. Additionally, the selected adit might serve as a mid-tunnel ventilation structure. This structure would be approximately 50 feet wide by 50 feet long by 18 feet high, occupying approximately 20,000 square feet. Table 2-17 shows the land needed for each of the adit and intermediate window options.

Table 2-17 Area Required for the Refined SR14 Build Alternative Adit and Intermediate Window Options

	Adit Options (acres)			Window Options (acres)	
Footprint	SR14-A1	SR14-A2	SR14-A3	SR14-W1	SR14-W2
Temporary					
CSA	32.8	10.6	36.8	19.6	8.3
Permanent					
HSR right-of-way[1]	0.5	0.5	0.5	10.2	12.9
Power lines/facility	49.3	0	0	9.1	0
Utility easement	21.5	6.3	6.7	2.3	13.7
Total					
Total Area Required	**104.1**	**17.4**	**44.0**	**41.2**	**34.9**

[1] HSR right-of-way includes area required for the mid-tunnel ventilation structure at the adit location and land required for the open cavern of the intermediate window.
CSA = construction staging area; HSR = high-speed rail; SR = State Route

Station Sites

No station sites are proposed in the Refined SR14 Central Subsection.

State Highway or Local Roadway Modifications

Table 2-18 summarizes state highway and local roadway modifications in the Refined SR14 Central Subsection.

Freight or Passenger Railroad Modifications

The Refined SR14 Central Subsection would require the following railroad relocations:

- Approximately 1.5 miles of the existing Metrolink railroad between the Spruce Court cul-de-sac and East Barrel Springs Road would be relocated.
- The Metrolink Valley Subdivision tracks are proposed to be reprofiled from the Tujunga Wash to Tuxford Street to facilitate the new grade separation over Sheldon Street.
- The Vulcan Lead track would be reconstructed for approximately 6,000 feet.

Land Use and Community Modifications

The Refined SR14 Central Subsection would require land conversion of several non-transportation uses (both existing and planned) to a permanent (rail) transportation use. Conversion of existing land uses would include 130 to 142 acres of Industrial, 13 to 16 acres of Commercial, 143 to 153 acres of Residential, 13 acres of Agricultural, less than 1 acres of Recreational, 82 to 83 acres of Public, 7 acres of Institutional, and 945 to 973 acres of Vacant. Conversion of planned land uses would include 104 to 119 acres of Industrial, 41 acres of Commercial, 1 acre of Medium-High-Density Residential, 825 to 826 acres of Low-Density Residential, 238 acres of Agricultural/Open Space, 216 to 282 acres of ANF, including the SGMNM, and 107 to 113 acres of Public Facility/Institutional.

Additionally, as noted in Section 2.9.5.3, some spoils generated by construction of the Refined SR14 Build Alternative would be deposited at the Vulcan Mine, filling the existing mine pit. Once Build Alternative construction and spoils deposition are complete, the Vulcan Mine area within the ANF, including the SGMNM, would be regraded to better reflect the surrounding topography. Deposition of spoils at the Vulcan Mine would require an agreement with the mine owner and coordination with the USFS.

Table 2-18 Refined SR14 Central Subsection Roadway Modifications

City	Road	Proposed Modification	Description of Proposed Work	Existing # of Lanes	Proposed # of Lanes
Palmdale	Sierra Highway (from East Avenue R8 to East Barrel Springs Road)	Road realignment	Sierra Highway would be realigned from East Avenue R8 to East Barrel Springs Road.	2 NB lanes and 2 SB lanes to Una Lake, then reduced to 1 NB lane and 1 SB lane to Barrel Springs Road	1 NB lane and 1 SB lane
Palmdale	East Avenue S	Overcrossing	East Avenue S is a proposed grade-separation crossing over HSR, Metrolink, and proposed Sierra Highway realignment. The roadway improvement limits extend from 5th Street East to Windy Creek Street.	2 EB lanes and 2 WB lanes	3 EB lanes and 3 WB lanes
Palmdale	East 10th Street	Road realignment	East 10th Street would be vertically realigned to connect to the proposed East Avenue S.	1 EB lane and 1 WB lane	2 EB lanes and 2 WB lanes
Palmdale	East Avenue R11	New road	Due to the grade separation at East Avenue S, it is necessary to enlarge East Avenue R11 to complete the crossing above the rail tracks.	Currently is a narrow back access to a building	1 NB lane and 1 SB lane with connections to Sierra Highway and East 10th Street
Unincorporated Los Angeles County	East Barrel Springs Road	Undercrossing	East Barrel Springs Road would be relocated to an underpass beneath proposed HSR tracks.	1 EB lane and 1 WB lane	2 EB lanes and 2 WB lanes
Unincorporated Los Angeles County	Harold 3rd Street, Harold 5th Street, Rozalee Drive	Conversion to Cul-de-sacs	These residential roads would be converted to cul-de-sacs and no longer tie into East Barrel Springs Road.	1 NB lane and 1 SB lane with connections to East Barrel Springs Road	1 NB lane and 1 SB lane dead-ends
Unincorporated Los Angeles County	Burnwell Court Road Access	New driveway	Due to the grade separation at Barrel Springs Road, it is necessary to restore the access to Burnwell Court and Carob Court.	Not applicable	1 NB lane and 1 SB lane with connections to East Barrel Springs Road
Pacoima / Sun Valley	Branford Street	Overcrossing	Branford Street would be a grade-separated crossing over HSR tracks from San Fernando Boulevard to the existing detention basin.	2 EB lanes and 2 WB lanes	2 EB lanes and 2 WB lanes
Pacoima / Sun Valley	Sheldon Street	Undercrossing	Sheldon Street would be a grade-separated crossing under HSR tracks from El Dorado Avenue along 2540. It Involves a vertical realignment in San Fernando Road and the creation of a private road (#1).	2 EB lanes and 2 WB lanes	2 EB lanes and 2 WB lanes

City	Road	Proposed Modification	Description of Proposed Work	Existing # of Lanes	Proposed # of Lanes
Pacoima / Sun Valley	San Fernando Road	Road vertical realignment	San Fernando Road would be depressed to fit the proposed undercrossing at Sheldon Street.	2 NB lanes and 2 SB lanes	2 NB lanes and 2 SB lanes
Pacoima / Sun Valley	Ralston Avenue	New road	A new road is required to the proposed Sheldon Street underpass to maintain access to San Fernando Road from the eastern side of the tracks.	2 NB lanes and 2 SB lanes	2 NB lanes and 2 SB lanes
Sun Valley	Tuxford Street	Undercrossing	Tuxford Street is an existing underpass beneath existing Metrolink tracks. Tuxford Street would remain an underpass and would be modified to accommodate the proposed HSR tracks and Metrolink tracks.	2 EB lanes and 2 WB lanes	2 EB lanes and 2 WB lanes
Sun Valley	Olinda Street	Roadway connection / overcrossing	Olinda Street would be a grade-separated crossing over the HSR tracks.	1 EB lane and 1 WB lane, disconnected	1 EB lane and 1 WB lane, 2 EB lanes and 2 WB lanes at overcrossing
Sun Valley	Sunland Boulevard	Overcrossing	Sunland Boulevard is an existing at-grade crossing across a single Metrolink track. It would remain an at-grade crossing across the proposed Metrolink tracks. It is a proposed grade separation over HSR. The HSR tracks are in a covered trench at this location.	2 NB lanes and 2 SB lanes	2 NB lanes and 2 SB lanes
Sun Valley	Penrose Street	Closed	Penrose Street is an existing at-grade crossing and would be closed at the railroad crossing, and a new at-grade crossing at Olinda Street would be added (HSR tracks in cut-and-cover tunnel at Olinda Street) with the California HSR System.	2 EB lanes and 2 WB lanes	Road disconnected over rail corridors
Sun Valley	San Fernando Road	Road realignment	San Fernando Road would be realigned easterly from Penrose Street to Olinda Street to accommodate the HSR tracks.	1 EB lane and 1 WB lane	1 EB lane and 1 WB lane

EB = eastbound; HSR = high-speed rail; NB = northbound; SB = southbound; WB = westbound

Refined SR14 Burbank Subsection

Lockheed Drive represents the northern limit of the Refined SR14 Burbank Subsection. From Lockheed Drive, the Refined SR14 Build Alternative alignment would continue in a cut-and-cover box until entering the Burbank Airport Station. The Burbank Airport Station would be an underground station, beginning near Kenwood Street and extending to just north of Winona Avenue and the Burbank Airport east/west runway. South of the Burbank Airport Station, the Build Alternatives would join with the bored tunnel alignment proposed within the Burbank to Los Angeles Project Section.

Ancillary Features

Irrigation and Drainage Facilities

Irrigation and drainage improvements within the Refined SR14 Burbank Subsection are described below under Station Sites.

Operations Facilities

- PSs—A PS for Burbank Airport Station would be within the Burbank Airport Station area footprint, south of Lockheed Drive.
- CTs—All open-air traction power facilities would include a 100-foot CT inside the footprint.

Utilities

The Refined SR14 Burbank Subsection would cross several high risk utilities, including three natural gas distribution lines and six water pipelines. Low-risk utilities within the Refined SR14 Burbank Subsection include telecommunications, sewer, storm drainage, and fiber optic facilities.

Access Roads

Because the Refined SR14 Burbank Subsection is within a fully urbanized area, no new access roads would be needed to construct or maintain the rail alignment. However, the proposed Burbank Airport Station (described below) would include permanent access roads to allow for passenger access.

Adits and Intermediate Windows

No adits are proposed for this subsection.

Station Site

Burbank Airport Station

The Burbank Airport Station site would be located west of Hollywood Way and east of Hollywood Burbank Airport. The airport and ancillary properties occupy much of the land south of the Burbank Airport Station site,[11] while industrial and light industrial land uses are located to the east and residential land uses are found to the north. I-5 runs parallel to the Burbank Airport Station site, approximately 0.25 mile north of the proposed Metrolink platform.

The Burbank Airport Station would have both underground and above-ground facilities. Above-ground facilities would span approximately 70 acres and would include a station building (which would house ticketing areas, passenger waiting areas, restrooms, and related facilities), pick-up/drop-off facilities for private automobiles, a transit center for buses and shuttles, surface parking areas, and stormwater capture/drainage facilities. Underground portions of the station, which include the train boarding platforms, would be beneath Cohasset Street, along which runs the boundary between the city of Los Angeles to the north and the city of Burbank to the south. There would be two HSR tracks at the Burbank Airport Station.

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[11] The Burbank Airport Station would not encroach on or interfere with the Hollywood Burbank Airport Replacement Terminal project.

The Burbank Airport Station would have up to 3,210 surface parking spaces in multiple lots by 2040. Approximately 1,640 of these spaces would be available by the start of operations of the selected Preferred Alternative. Proposed surface parking would be in addition to any parking spaces that might be included in the replacement terminal project. The preliminary station layout concept plan is shown on Figure 2-53 and a cross section of the underground and above-ground facilities are shown in Figure 2-54. This Draft EIR/EIS includes an analysis of the Burbank Airport Station project footprint displayed on Figure 2-53 as permanently affected and no additional temporary construction easements are identified beyond the permanent area required to construct, operate, and maintain the station. This assumption is based on the current level of design.

The Burbank Airport Station was also evaluated as part of the Burbank to Los Angeles Project Section. The Burbank to Los Angeles Project Section Final EIR/EIS was released on November 5, 2021, and the Authority’s Board approved the Burbank to Los Angeles Project Section Preferred Alternative, including the Burbank Airport Station, on January 20, 2022. For the most updated information about the Burbank Airport Station recently approved by the Authority, please refer to the Burbank to Los Angeles Final EIR/EIS, available on the Authority’s website.

State Highway or Local Roadway Modifications

There are no state highway or local roadway modifications in the Refined SR14 Burbank Subsection.

Freight or Passenger Railway Modifications

The Refined SR14 Burbank Subsection would require the Metrolink Valley Subdivision tracks to be reprofiled from the Tujunga Wash to Tuxford Street to facilitate the new grade separation over Sheldon Street.

Land Use and Community Modifications

The Refined SR14 Burbank Subsection would require land conversion of several non-transportation uses (both existing and planned) to a permanent (rail) transportation use. Conversion of existing land uses would include 25 acres of Industrial, 9 acres of Commercial, 62 acres of Public, 25 acres of Institutional, and 2 acres of Vacant. The conversion of planned land uses would include 77 acres of Industrial and 1 acre of Public Facility/Institutional.

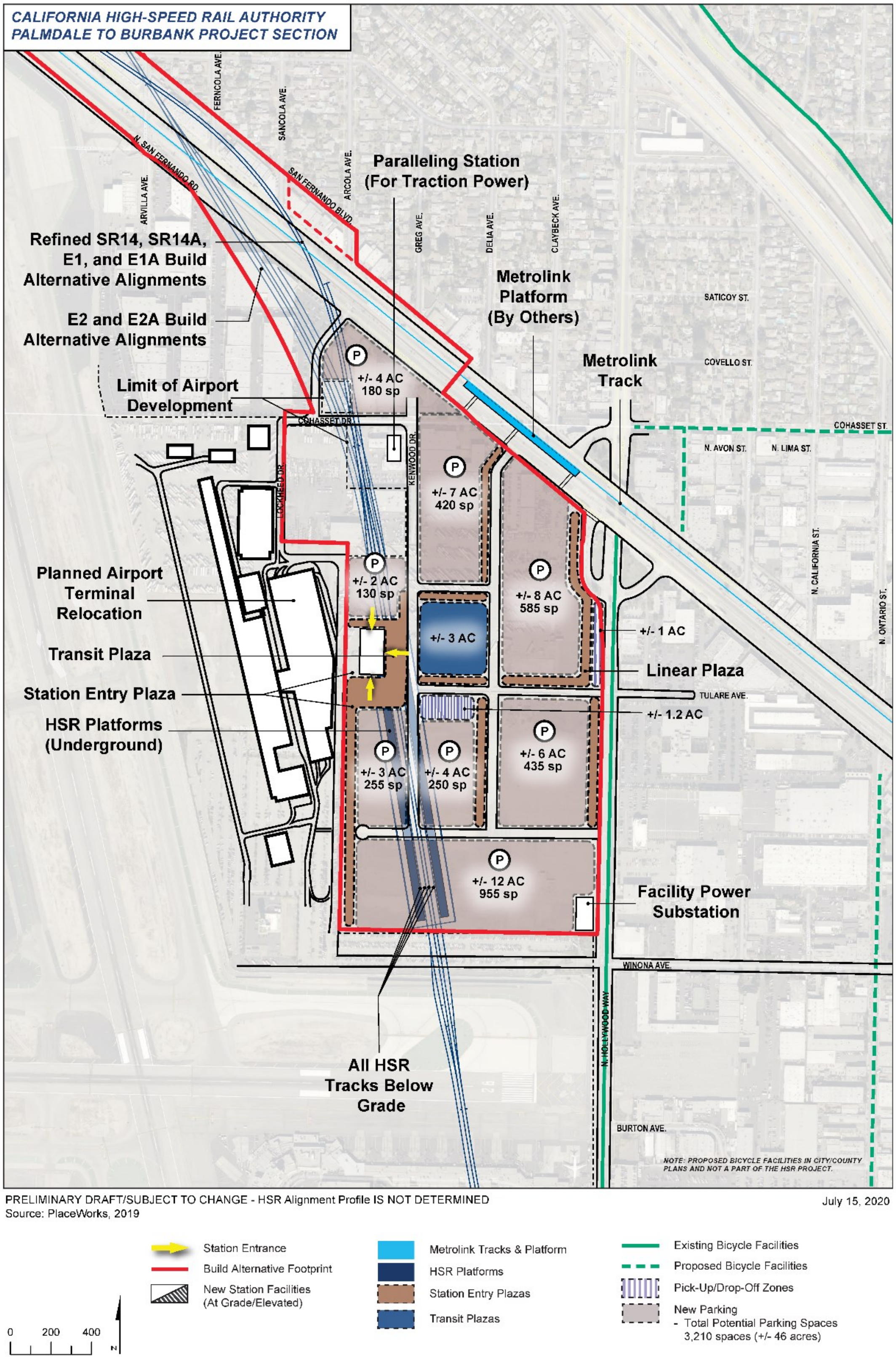


Figure 2-53 Burbank Airport Station Preliminary Station Concept Layout Plan

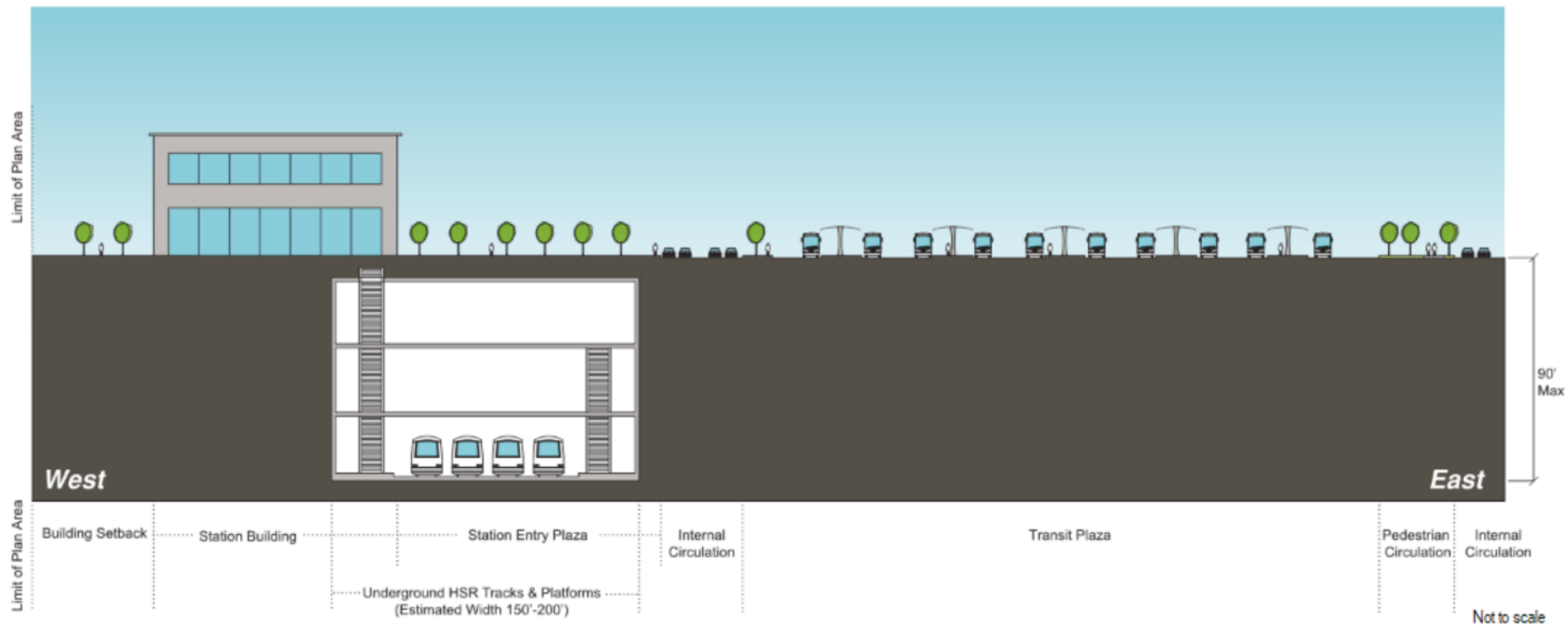
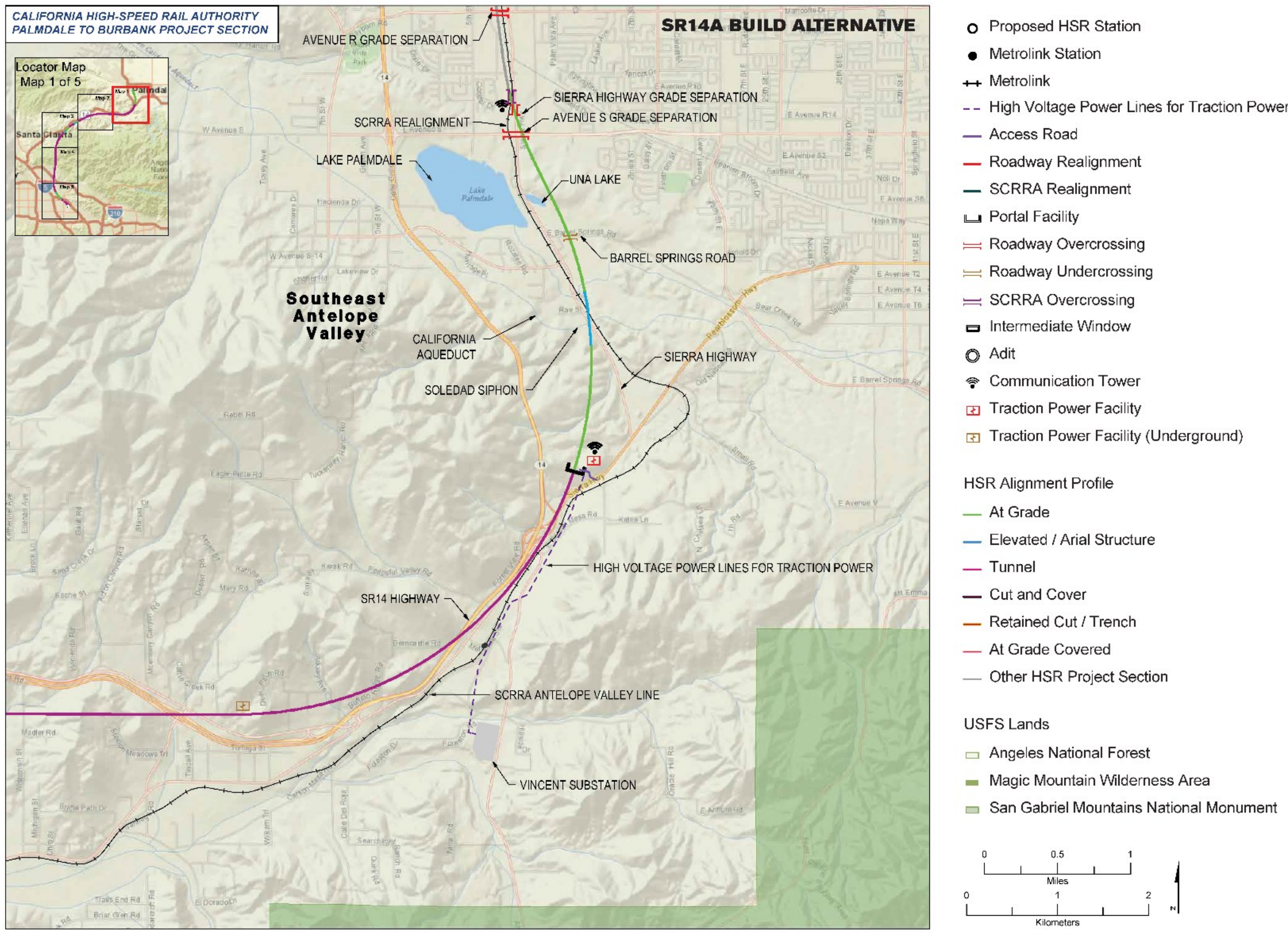


Figure 2-54 Burbank Airport Station Preliminary Station Concept Layout Plan—Cross Section

2.5.3.2 SR14A Build Alternative (Preferred Alternative/CEQA Proposed Project)

Through consultation with resource agencies, the Authority developed the SR14A Build Alternative to reduce impacts on aquatic resources south of the city of Palmdale. Figure 2-55 through Figure 2-60 show the proposed SR14A Build Alternative.

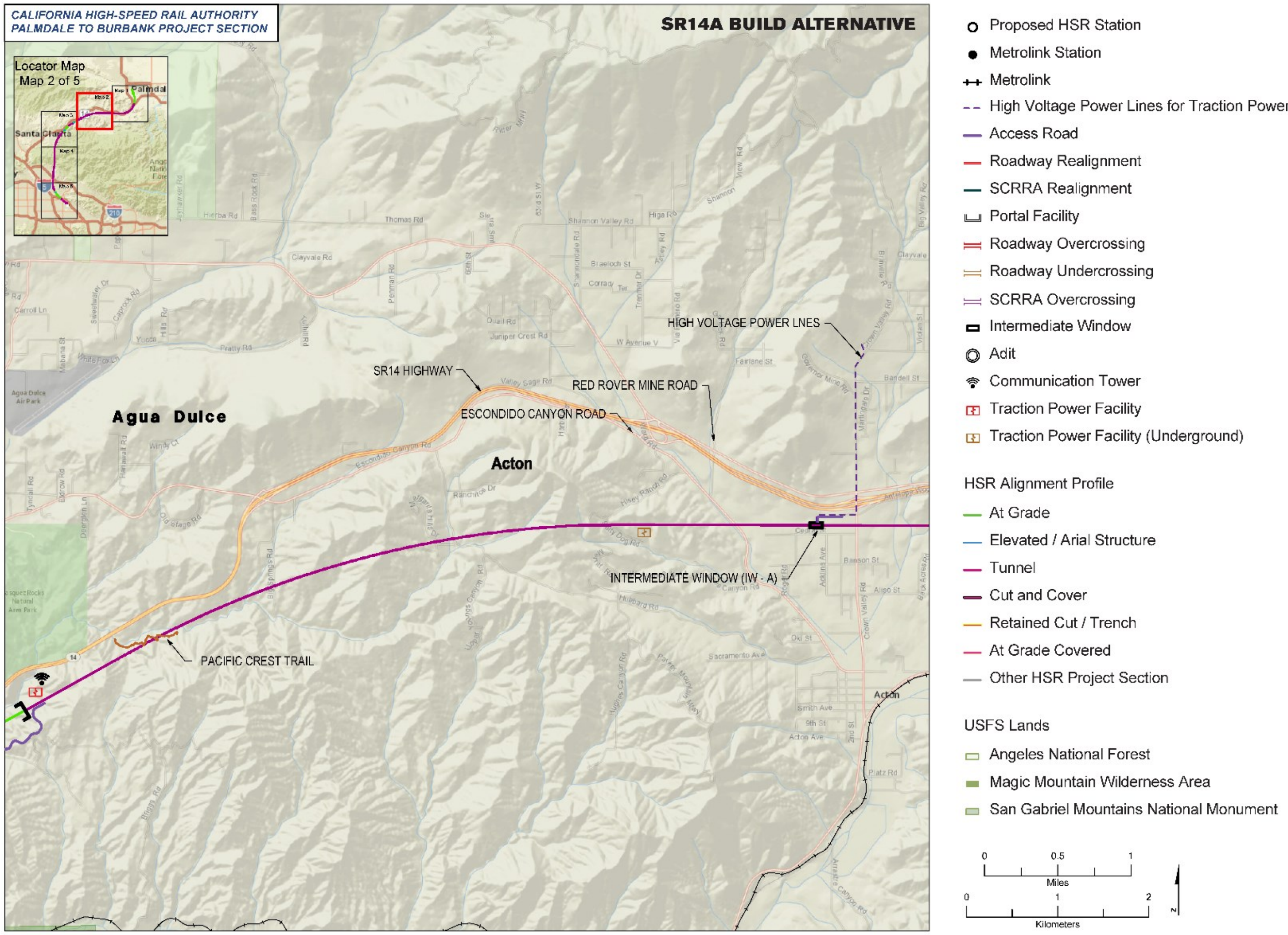
Figure 2-55 SR14A Build Alternative Overview Map



PRELIMINARY DRAFT/SUBJECT TO CHANGE - HSR ALIGNMENT IS NOT DETERMINED
Source: Authority, 2021; National Geographic/Esri, 2021

May 14, 2021

Figure 2-56 SR14A Build Alternative (Map 1 of 5)



PRELIMINARY DRAFT/SUBJECT TO CHANGE - HSR ALIGNMENT IS NOT DETERMINED
Source: Authority, 2021; National Geographic/Esri, 2021

May 14, 2021

Figure 2-57 SR14A Build Alternative (Map 2 of 5)

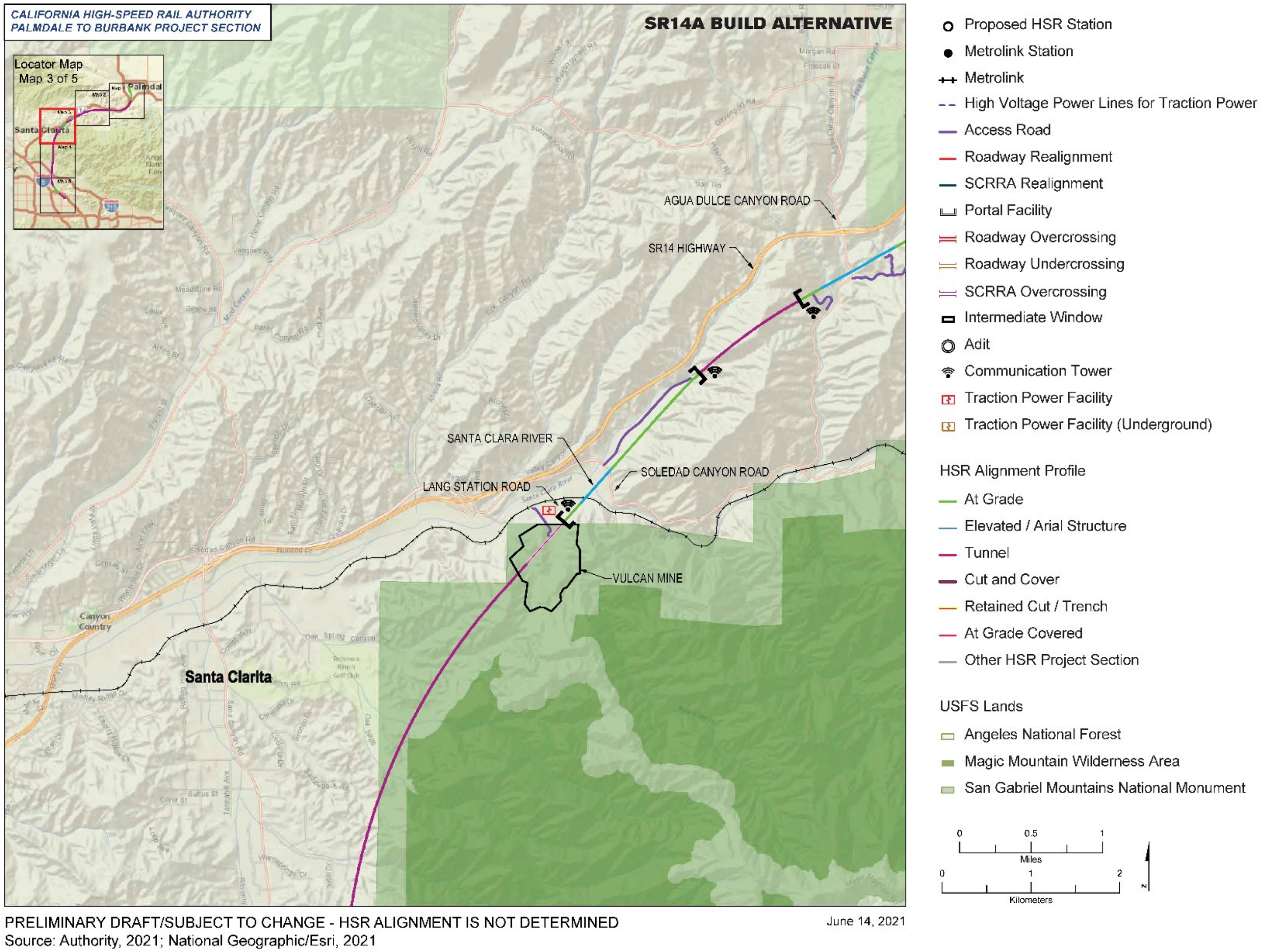
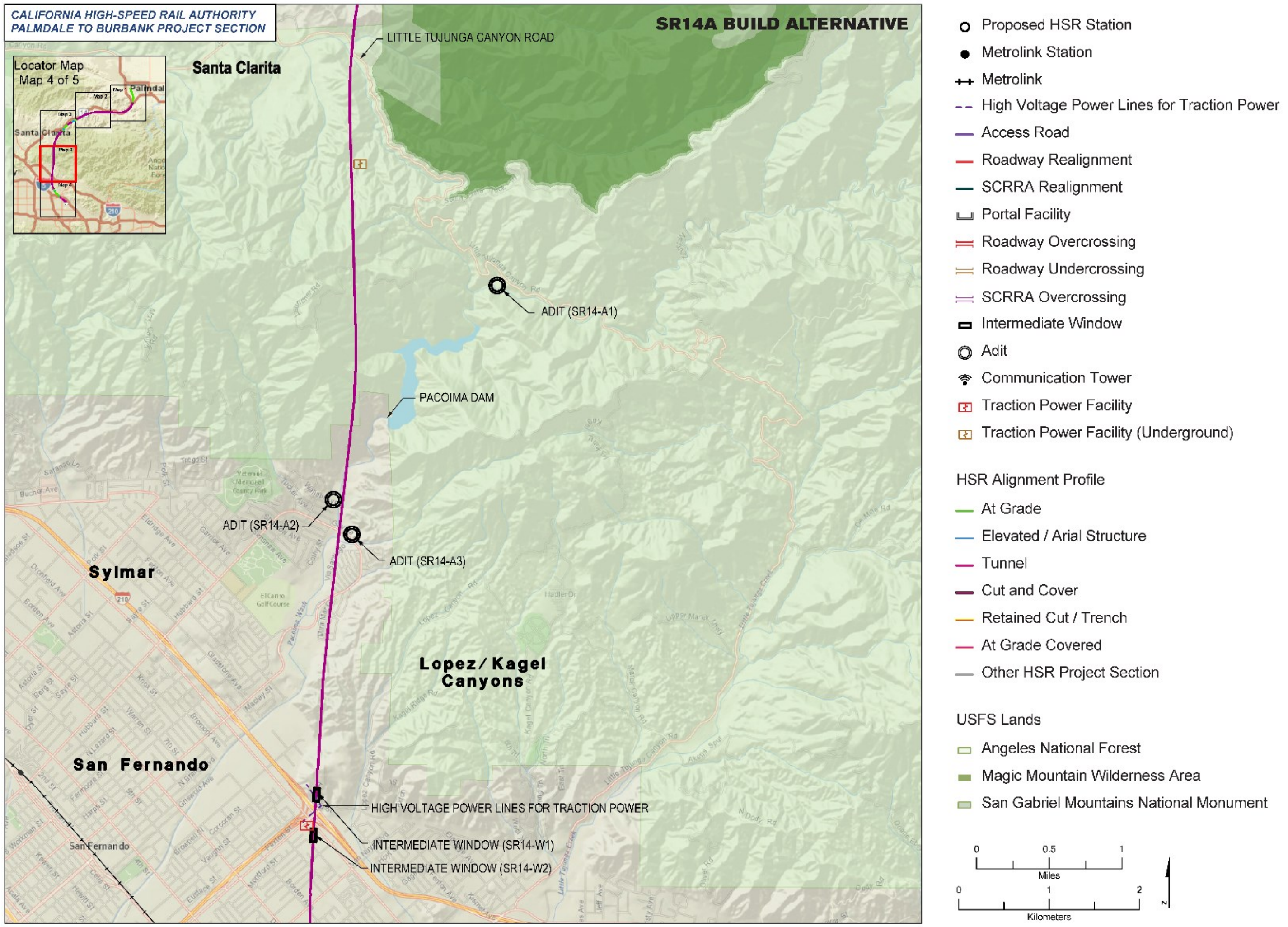


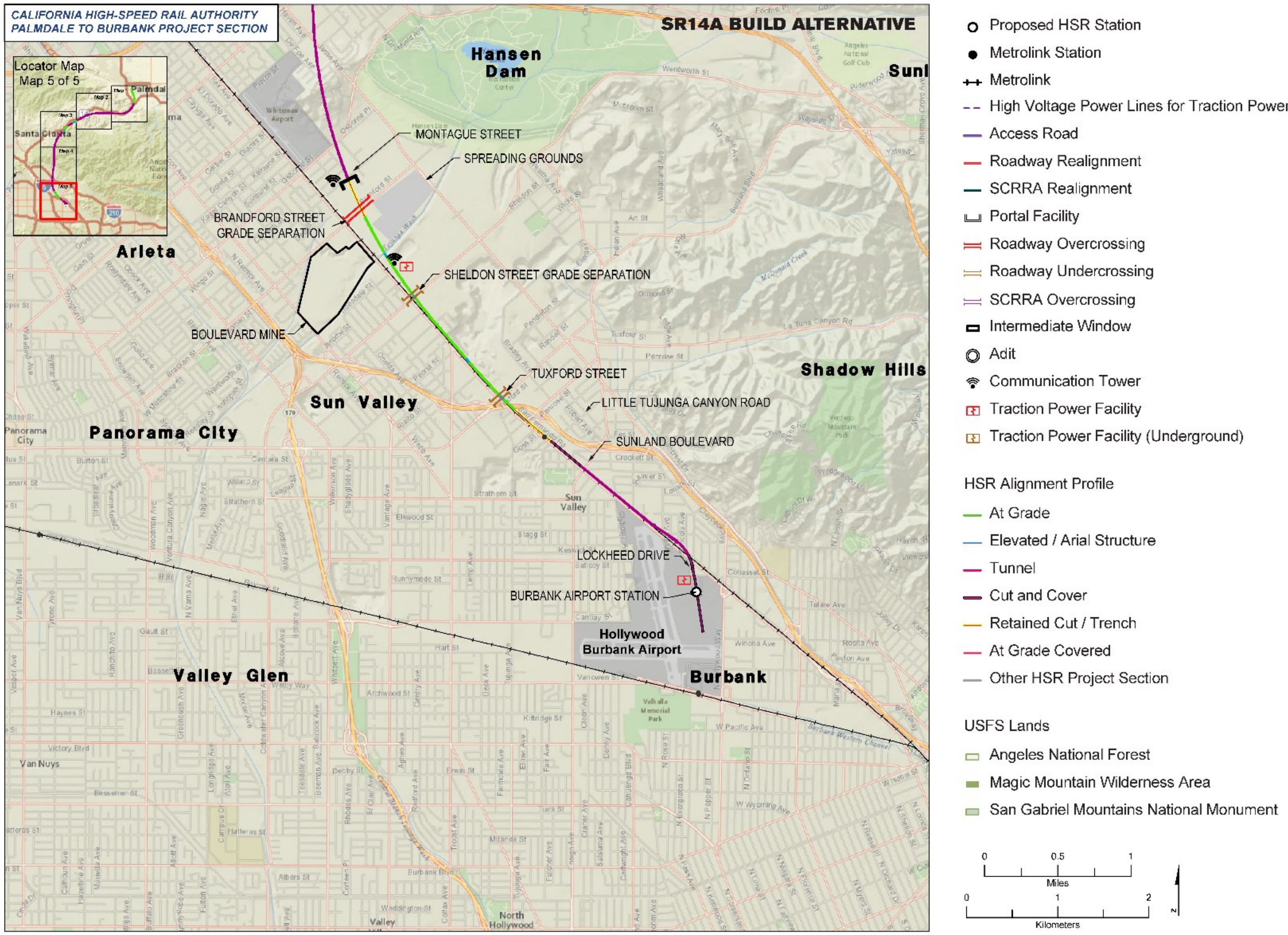
Figure 2-58 SR14A Build Alternative (Map 3 of 5)



PRELIMINARY DRAFT/SUBJECT TO CHANGE - HSR ALIGNMENT IS NOT DETERMINED
Source: Authority, 2021; National Geographic/Esri, 2021

May 14, 2021

Figure 2-59 SR14A Build Alternative (Map 4 of 5)



PRELIMINARY DRAFT/SUBJECT TO CHANGE - HSR ALIGNMENT IS NOT DETERMINED
Source: Authority, 2021; National Geographic/Esri, 2021

May 14, 2021

Figure 2-60 SR14A Build Alternative (Map 5 of 5)

SR14A Central Subsection

Alignment

The SR14A Build Alternative alignment would begin at grade in the vicinity of Spruce Court, crossing the current alignment of Sierra Highway just north of the East Avenue S, continuing south and curving eastward to travel approximately 300 feet east of Una Lake. South of Una Lake, the SR14A Build Alternative alignment would curve westward, cross over the Metrolink Antelope Valley Line, Sierra Highway, and the Soledad Siphon, and continue southwest and enter a tunnel portal approximately 0.5 mile northeast of the Sierra Highway/Pearblossom Highway intersection. The SR14A Build Alternative alignment would then continue westward in an approximately 13-mile-long tunnel before surfacing approximately 0.75 mile east of Agua Dulce Canyon Road. The alignment would transition between at-grade and elevated profiles closely paralleling SR 14 before entering an approximately 1-mile-long tunnel. Transitioning from tunnel to at grade, the SR14A Build Alternative alignment would converge with the Refined SR14 Build Alternative alignment at the Soledad Canyon Mining Operations (Vulcan Mine) site. The remaining SR14A Build Alternative alignment south of the Vulcan Mine site would be identical to the Refined SR14 Build Alternative alignment.

Ancillary Features

Irrigation and Drainage Facilities

Irrigation and drainage facilities required for the SR14A Build Alternative would be identical to those described for the Refined SR14 Build Alternative.

Operations Facilities

- TPSSs:
    - A TPSS would be at Station 460+00, close to Portal 1A.
    - A TPSS would be directly east of the I-210/SR 118 interchange.
- PSs:
    - A PS would be at Station 700+00, underground within a tunnel.
    - A PS would be at Station 940+00, underground within a tunnel.
    - A PS would be at Station 1381+90, within the Portal 9 facilities footprint.
    - A PS would be at Station 1590+00, underground within a tunnel.
    - A PS would be at Station 2037+00, close to the LADWP Valley Power Station.
- Switching stations:
    - A switching station would be at Station1170+00, within the Portal P2A facility footprint.
- CTs:
    - All open-air traction power facilities and tunnel portals would include a 100-foot CT inside the footprint.
- Power transmission lines:
    - A power line would connect a TPSS at Station 460+00 with the Edison SCE Vincent Substation in Acton.
    - A power line would connect a TPSS at Station 1880+00 with an existing high-voltage transmission line owned by SCE.

Utilities

The SR14A Central Subsection would cross several high risk utilities, including 71 natural-gas distribution lines, 13 petroleum and fuel pipelines, and 125 water pipelines. Low-risk utilities within the SR14A Central Subsection include sanitary sewer, telecommunications, storm drainage, and fiber optic.

Access Roads

Access roads to portals are intended both for construction access and for tunnel maintenance and emergency access during operation. In mountainous areas (as opposed to urban areas), the portals would be furnished with a series of infrastructure elements including tunnel ventilation, noise mitigation, traction power, emergency and rescue facilities, firefighting, communications utilities, rock fall containment, and others. Access roads within the SR14A Central Subsection would include the following:

- **Tunnel Portal 1A**—This access road would connect the existing Sierra Highway to Portal 1A and TPSS 17A. The access road would traverse mountainous terrain and would require moderate grading.
- **Intermediate Window IWA**—This access road would connect existing Crown Valley Road to Intermediate Window IWA. Approximately half of the access road would utilize existing Antelope Woods Road, which would require widening to accommodate the new access road. The second half of the access road would require minor grading because of the flatness of the site.
- **Tunnel Portal 2A**—The access road connection point would be from Agua Dulce Canyon Road. Approximately half of the access road would utilize Briggs Edison Road, an existing dirt road, which would require widening to accommodate the new access road. The second half of the access road would traverse mountainous terrain and would require major grading to achieve a minimum width of 22 feet for slope stabilization. Cut slopes would be 2 horizontal to 1 vertical unless otherwise recommended by the soils report or the Geotechnical Engineer.
- **Tunnel Portal 3A**—The access road would begin along an existing dirt road off Agua Dulce Canyon Road.
- **Tunnel Portal 4A**—The access road is proposed along an existing fire access road off Soledad Canyon Road. The road would be widened, and grading would be minimal.
- **Tunnel Portal 9**—The access road is proposed along the existing Lang Station Road. The road would be widened, and grading would be minimal.

Adits and Intermediate Windows

The SR14A Build Alternative includes three options for adits, only one of which would be selected. The three adit options, as described in Table 2-19, would be accessible by existing roadways. One of the adit options (SR14-A1) would be within the ANF along Little Tujunga Canyon Road. The other two adit options (SR14-A2 and SR14-A3) would be located just south of the Pacoima Dam. SR14-A2 would be situated west of the SR14A Build Alternative alignment and connect to Wallabi Avenue, and SR14-A3 would be located east of the SR14A Build Alternative alignment and connect to Gavina Avenue.

Table 2-19 SR14A Build Alternative Adit and Intermediate Window Options

Feature Name	Location	Associated Map(s)
Adit		
SR14-A1	Located within the ANF along Little Tujunga Canyon Road	Figure 2-59
SR14-A2	Located just south of Pacoima Dam; would surface west of the Refined SR14 alignment and connect to Gavina Avenue	Figure 2-59
SR14-A3	Located just south of Pacoima Dam; would surface east of the Refined SR14 alignment and connect to Wallabi Avenue	Figure 2-59

Feature Name	Location	Associated Map(s)
Intermediate Window		
SR14-W1	Located directly north of the I-210/SR 118 interchange	Figure 2-59
SR14-W2	Located directly south of the I-210/SR 118 interchange	Figure 2-59
IWA	Located south of SR 14 in Acton	Figure 2-57

ANF = Angeles National Forest; I- = Interstate; SR = State Route

The SR14A Build Alternative includes an intermediate window (IWA) south of SR 14 in Acton. The SR14A Build Alternative also includes two options for an additional intermediate window, only one of which would be selected to provide construction access to tunnels. As described in Table 2-19, both intermediate window options would be in proximity to the I-210/SR 118 interchange. The first option (SR14-W1) would be directly north of the intersection of these freeways, and the second option (SR14-W2) would be south of the intersection of these freeways.

Each of the adit and window options would require temporary and permanent ground disturbance to accommodate ancillary features such as temporary construction staging areas (CSAs), temporary water supply for construction purposes, and permanent electrical utility facilities. Additionally, the selected adit might serve as a mid-tunnel ventilation structure. This structure would be approximately 50 feet wide by 50 feet long by 18 feet high, occupying approximately 20,000 square feet. Table 2-20 shows the land needed for each of the adit and intermediate window options.

Table 2-20 Area Required for the SR14A Build Alternative Adit and Intermediate Window Options

Footprint	Adit Options (acres)			Window Options (acres)	
	SR14-A1	SR14-A2	SR14-A3	SR14-W1	SR14-W2
Temporary					
CSA	32.8	10.6	36.8	19.6	8.3
Permanent					
HSR right-of-way[1]	0.5	0.5	0.5	10.2	12.9
Power lines/facility	49.3	0	0	9.1	0
Utility easement	21.5	6.3	6.7	2.3	13.7
Total					
Total Area Required	**104.1**	**17.4**	**44.0**	**41.2**	**34.9**

Source: Sener, 2017
[1] HSR right-of-way includes area required for the mid-tunnel ventilation structure at the adit location and land required for the open cavern of the intermediate window.
CSA = construction staging area; HSR = high-speed rail

Station Sites

There are no station sites proposed within the SR14A Central Subsection.

State Highway or Local Roadway Modifications

Table 2-21 summarizes state highway and local roadway modifications in the Refined SR14A Central Subsection.

Freight or Passenger Railroad Modifications

The SR14A Central Subsection would require the following railroad relocations:

- Approximately 1.5 miles of the existing Metrolink railroad between Avenue R and Una Lake would be reprofiled.
- The Metrolink Valley Subdivision tracks are proposed to be reprofiled from the Tujunga Wash to Tuxford Street to facilitate the new grade separation over Sheldon Street.
- The Vulcan Lead track would be reconstructed for approximately 6,000 feet.

Land Use and Community Modifications

The SR14A Central Subsection would require land conversion of several non-transportation uses (both existing and planned) to a permanent (rail) transportation use. Conversion of existing land uses would include 125 to 138 acres of Industrial, 14 to 17 acres of Commercial, 18 acres of Agricultural, 65 to 73 acres of Residential, less than 1 acre of Recreational, 46 acres of Public, 7 acres of Institutional, and 826 to 885 acres of Vacant. Conversion of planned land uses would include 106 to 113 acres of Industrial, 26 acres of Commercial, 3 acres of Medium-High-Density Residential, 612 acres of Low-Density Residential, 170 acres of Agricultural/Open Space, 204 to 270 acres of ANF, including the SGMNM land, and 103 to 104 acres of Public Facility/Institutional.

Additionally, as noted in Section 2.9.5.3, some spoils generated by construction of the Refined SR14 Build Alternative would be disposed of at the Vulcan Mine, filling the existing mine pit. Once Build Alternative construction and spoils disposal are complete, the Vulcan Mine area within the ANF, including the SGMNM, would be regraded to better reflect the surrounding topography. Disposal of spoils at the Vulcan Mine would require an agreement with the mine owner and coordination with the USFS.

SR14A Burbank Subsection

All features within the SR14A Burbank Subsection, including alignment, ancillary features, and station sites, would be identical to the features described for the Refined SR14 Burbank Subsection.

Table 2-21 SR14A Central Subsection Roadway Modifications

City	Road	Proposed Modification	Description of Proposed Work	Existing # of Lanes	Proposed # of Lanes
Palmdale	Sierra Highway (from East Avenue R8 to Jefferson Avenue)	Road vertical realignment	Sierra Highway would be vertically realigned from East Avenue R8 to Jefferson Avenue to cross over the SR14 Build Alternative alignment and under realigned Avenue S.	2 NB lanes and 2 SB lanes	2 NB lanes and 2 SB lanes
Palmdale	East Avenue S	Overcrossing	East Avenue S is a proposed grade-separation crossing over the SR14 Build Alternative alignment, Metrolink, and proposed Sierra Highway realignment. The roadway improvement limits extend from 5th Street East to Windy Creek Street.	2 EB lanes and 2 WB lanes	3 EB lanes and 3 WB lanes
Palmdale	East 10th Street	Road realignment	East 10th Street would be vertically realigned to connect to the proposed East Avenue S.	1 EB lane and 1 WB lane	2 EB lanes and 2 WB lanes
Palmdale	East Avenue R11	New road	Due to the grade separation at East Avenue S, it is necessary to enlarge East Avenue R11 to complete the crossing above the rail tracks.	Currently is a narrow back access to a building	1 NB lane and 1 SB lane with connections to Sierra Highway and East 10th Street
Palmdale	Valley Forge Road Patrick Henry Place Jefferson Avenue	Road realignment	Due to the new SR14 Build Alternative alignment Valley Forge Road would be displaced to the east approximately 100 feet, relocating the intersections with Patrick Henry Place and Jefferson Avenue.	1 EB lane and 1 WB lane	1 EB lane and 1 WB lane
Pacoima / Sun Valley	Branford Street	Overcrossing	Branford Street would be a grade-separated crossing over HSR tracks from San Fernando Boulevard to the existing detention basin.	2 EB lanes and 2 WB lanes	2 EB lanes and 2 WB lanes
Pacoima / Sun Valley	Sheldon Street	Undercrossing	Sheldon Street would be a grade-separated crossing under HSR tracks from El Dorado Avenue along 2540. It Involves a vertical realignment in San Fernando Road and the creation of a private road (#1).	2 EB lanes and 2 WB lanes	2 EB lanes and 2 WB lanes
Pacoima / Sun Valley	San Fernando Road	Road vertical realignment	San Fernando Road would be depressed to fit the proposed undercrossing at Sheldon Street.	2 NB lanes and 2 SB lanes	2 NB lanes and 2 SB lanes

City	Road	Proposed Modification	Description of Proposed Work	Existing # of Lanes	Proposed # of Lanes
Pacoima / Sun Valley	Ralston Avenue	New road	A new road is required to the proposed Sheldon Street underpass to maintain access to San Fernando Road from the eastern side of the tracks.	2 NB lanes and 2 SB lanes	2 NB lanes and 2 SB lanes
Sun Valley	Tuxford Street	Undercrossing	Tuxford Street is an existing underpass beneath existing Metrolink tracks. Tuxford Street would remain an underpass and would be modified to accommodate the proposed HSR tracks and Metrolink tracks.	2 EB lanes and 2 WB lanes	2 EB lanes and 2 WB lanes
Sun Valley	Olinda Street	Roadway connection / overcrossing	Olinda Street would be a grade-separated crossing over the HSR tracks.	1 EB lane and 1 WB lane, disconnected	1 EB lane and 1 WB lane, 2 EB lanes and 2 WB lanes at overcrossing
Sun Valley	Sunland Boulevard	Overcrossing	Sunland Boulevard is an existing at-grade crossing across a single Metrolink track. It would remain an at-grade crossing across the proposed Metrolink tracks. It is a proposed grade separation over HSR. The HSR tracks are in a covered trench at this location.	2 NB lanes and 2 SB lanes	2 NB lanes and 2 SB lanes
Sun Valley	Penrose Street	Closed	Penrose Street is an existing at-grade crossing and would be closed at the railroad crossing, and a new at-grade crossing at Olinda Street would be added (HSR tracks in cut-and-cover tunnel at Olinda Street) with the California HSR System.	2 EB lanes and 2 WB lanes	Road disconnected over rail corridors
Sun Valley	San Fernando Road	Road realignment	San Fernando Road would be realigned easterly from Penrose Street to Olinda Street to accommodate the HSR tracks.	1 EB lane and 1 WB lane	1 EB lane and 1 WB lane

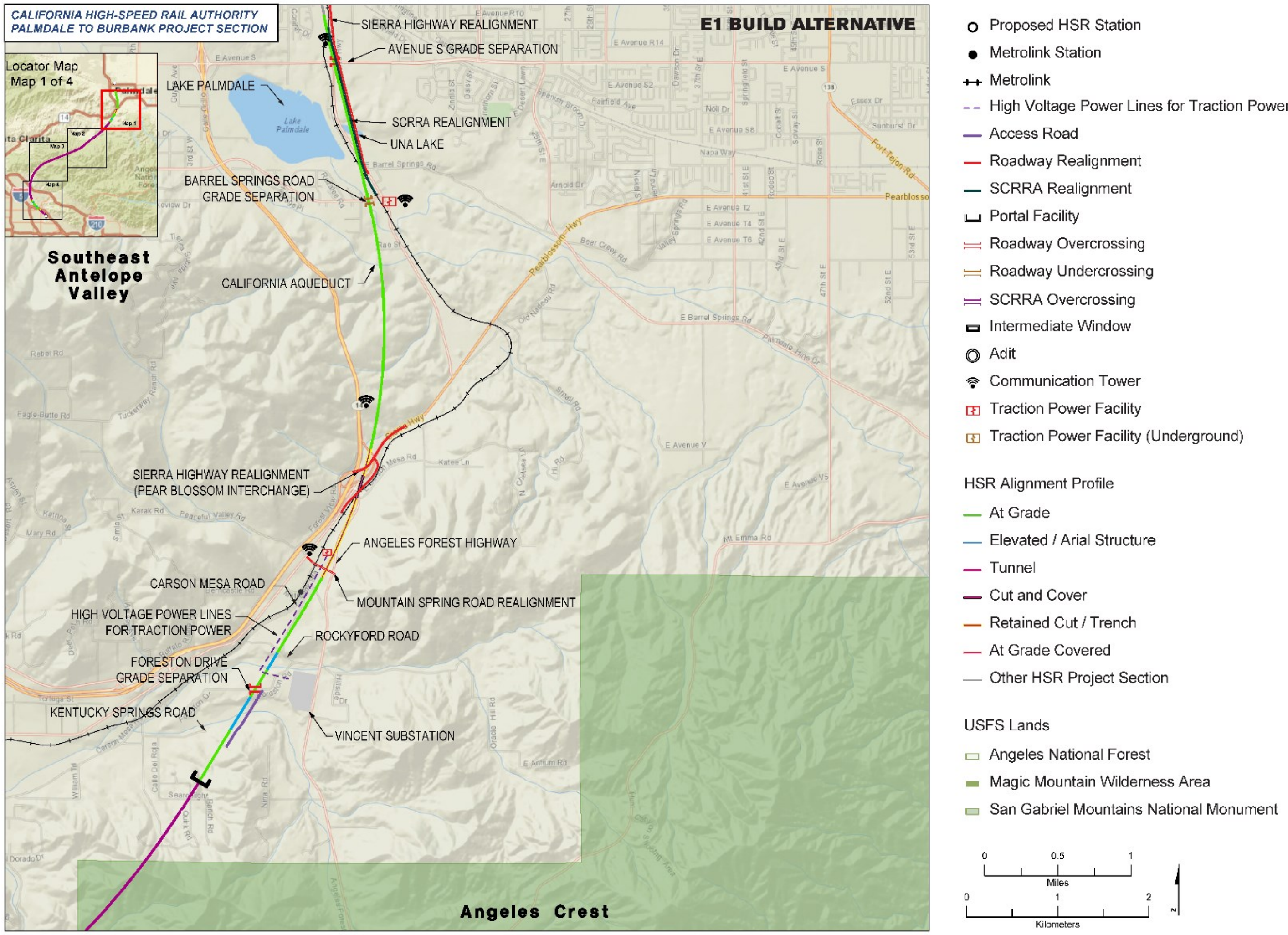
EB = eastbound; HSR = high-speed rail; NB = northbound; SB = southbound; WB = westbound

2.5.3.3 E1 Build Alternative

The 2015 SAA Report introduced several East Corridor alignments that make a more direct connection between Palmdale and Burbank than previous options, by incorporating long tunnels beneath portions of the ANF, including the SGMNM.

The E1 Build Alternative was one of several options introduced in the 2015 SAA Report, substantially refined in the 2016 SAA Report, and recommended in the Checkpoint B Summary Report for further analysis in this Draft EIR/EIS. The E1 Build Alternative is intended to provide a shorter, faster, less disruptive route to connect Palmdale and Burbank compared to a corridor along the SR 14 freeway. Figure 2-61 through Figure 2-65 show the proposed E1 Build Alternative.

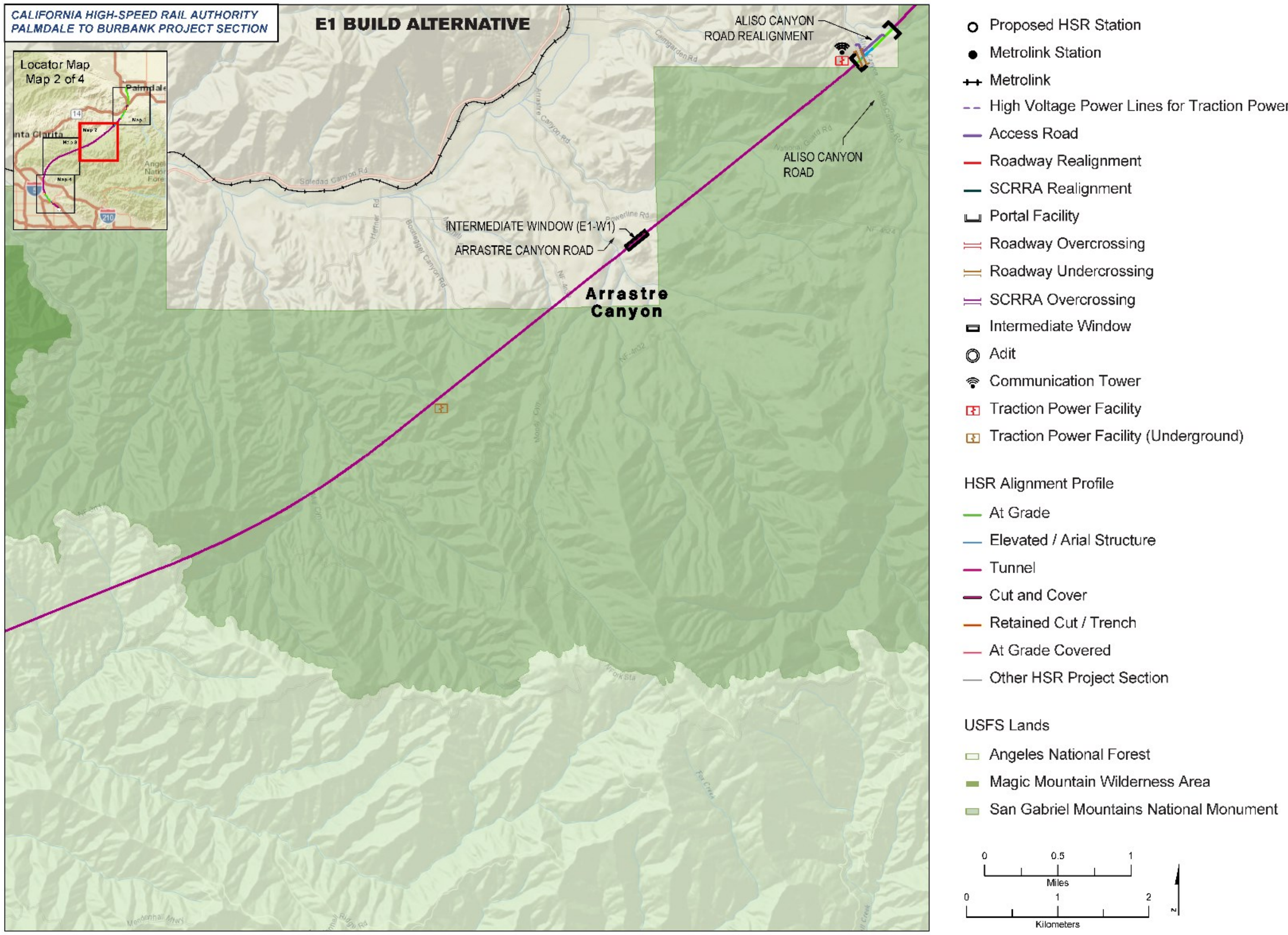
Figure 2-61 E1 Build Alternative Overview Map



PRELIMINARY DRAFT/SUBJECT TO CHANGE - HSR ALIGNMENT IS NOT DETERMINED
Source: Authority, 2021; National Geographic/Esri, 2021

May 14, 2021

Figure 2-62 E1 Build Alternative (Map 1 of 4)



PRELIMINARY DRAFT/SUBJECT TO CHANGE - HSR ALIGNMENT IS NOT DETERMINED
Source: Authority, 2021; National Geographic/Esri, 2021

May 14, 2021

Figure 2-63 E1 Build Alternative (Map 2 of 4)

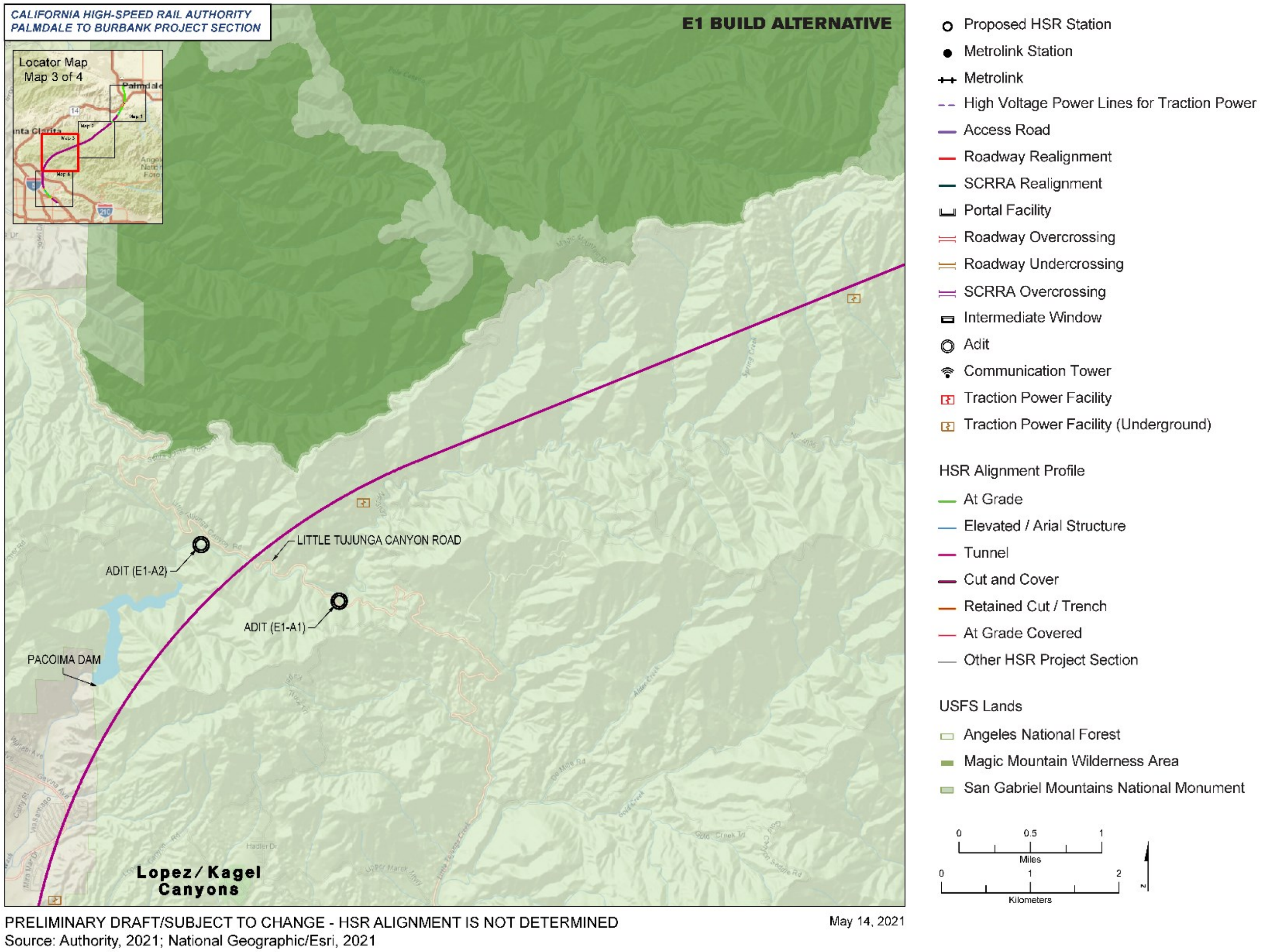
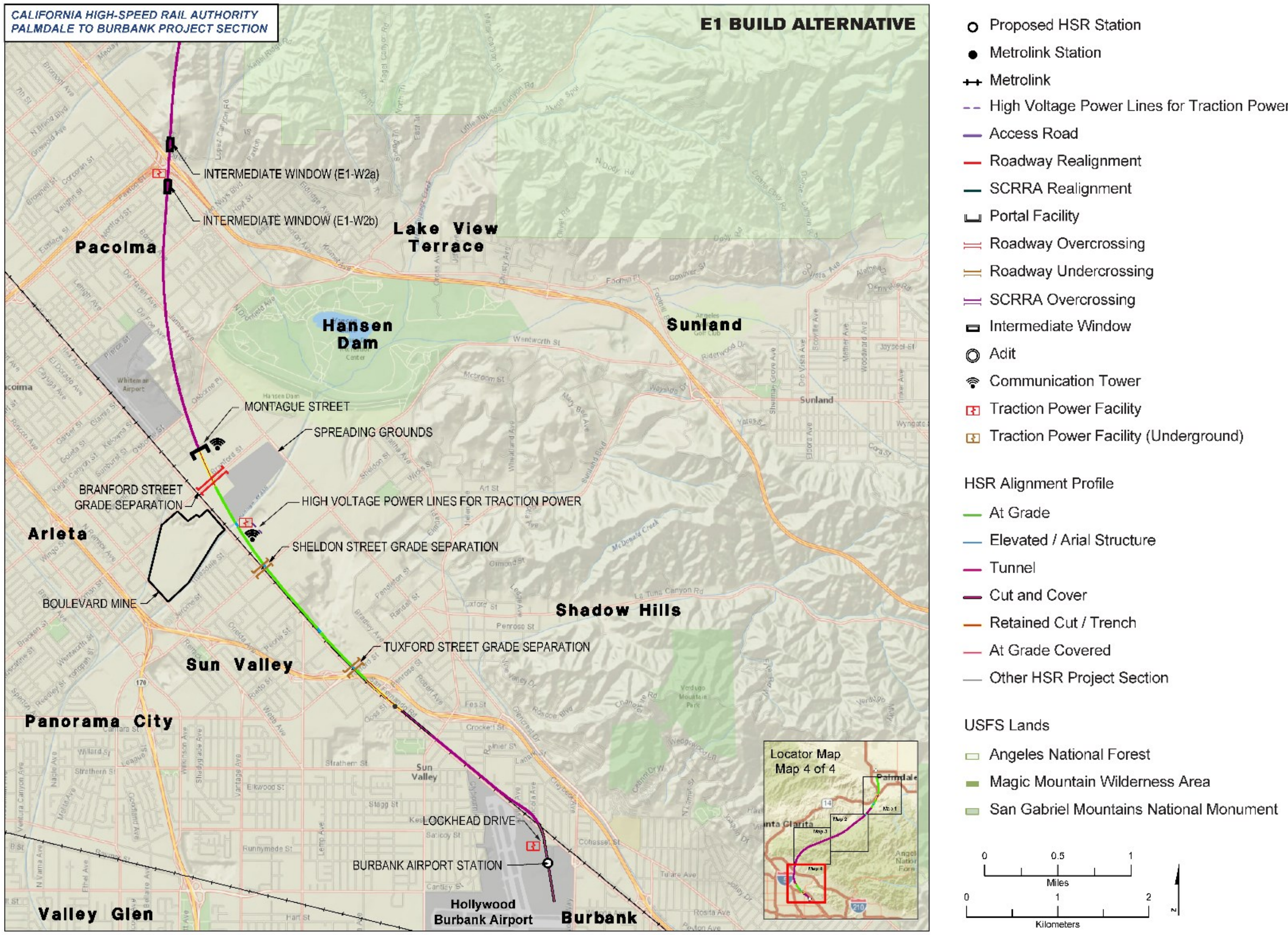


Figure 2-64 E1 Build Alternative (Map 3 of 4)



PRELIMINARY DRAFT/SUBJECT TO CHANGE - HSR ALIGNMENT IS NOT DETERMINED
Source: Authority, 2021; National Geographic/Esri, 2021

May 14, 2021

Figure 2-65 E1 Build Alternative (Map 4 of 4)

E1 Central Subsection

Alignment

The E1 Build Alternative would begin at grade in the vicinity of Spruce Court and would generally follow the existing Sierra Highway alignment. The alignment would continue at grade across Una Lake, which would be partially filled. South of Una Lake, the E1 alignment would curve west, crossing the existing Sierra Highway and Metrolink corridors, which would be realigned to the east. In the vicinity of Una Lake, the alignment would cross the San Andreas Fault Zone.

East of the Harold neighborhood and after passing over Barrel Springs Road, the E1 Build Alternative would reach the California Aqueduct approximately 0.2 mile west of where the aqueduct currently passes beneath Sierra Highway. The E1 alignment would require relocation of an approximately 0.9-mile-long portion of the California Aqueduct; tracks would then cross the Aqueduct right-of-way at grade. The E1 alignment would continue south of the Aqueduct at grade for approximately 1.5 miles before entering a 1.0-mile stretch of retained cut/trench and cut-and-cover tunnel that would be constructed beneath the Pearblossom Highway/SR 14 freeway interchange, Sierra Highway, Metrolink corridor, Carson Mesa Road, and an extension of Mountain Springs Road. The alignment would emerge to ground level between Angeles Forest Highway and the existing Vincent Grade/Acton Metrolink Station.

The E1 Build Alternative would continue at grade in a southwesterly direction for 0.7 mile immediately south of Rockyford Road, then transition from at grade to a viaduct structure (approximately 700 feet in length) to cross an unnamed wash area northwest of the existing Vincent Substation. The E1 alignment would then continue at grade at the southern bank of the wash and pass underneath Foreston Drive. Immediately south of Foreston Drive, the E1 alignment would be on a viaduct (approximately 1,500 feet in length) to cross another unnamed drainage area. The E1 alignment would then continue at grade approximately 0.2 mile east of the terminus of Kentucky Springs Road. This at-grade section would continue for approximately 0.5 mile. Approximately 0.2 mile south of the Enchanted Hills Road western terminus, the E1 alignment would enter approximately 1.6-mile-long twin tunnels (maximum depth approximately 700 feet) that would pass beneath rural residences and then under the ANF, including the SGMNM.

The E1 alignment would emerge from these twin tunnels outside the ANF boundaries in the Aliso Canyon Road area. The alignment would continue at grade for approximately 0.2 mile before crossing a tributary of the Santa Clara River via a 700-foot-long viaduct. The E1 alignment would continue at grade for approximately 300 feet until entering twin tunnels (22 miles in length, maximum depth approximately 2,200 feet) immediately west of Aliso Canyon Road. The initial 10.5 miles of the tunnels would be constructed beneath ANF lands, including approximately 6 miles of the SGMNM.

After crossing beneath Little Tujunga Canyon Road and the San Gabriel fault, the E1 alignment would continue in a more southwesterly direction, in tunnels approximately 0.3 mile east of the Pacoima Reservoir and would exit the ANF (remaining underground) beneath the Sylmar neighborhood of the city of Los Angeles. The E1 alignment would continue underground, crossing the Sierra Madre Fault Zone, and then passing beneath the I-210/SR 118 interchange in the Pacoima neighborhood of the city of Los Angeles where the alignment would curve from a southerly to southeasterly direction. The E1 alignment would emerge from the tunnels immediately after passing beneath Montague Street in Pacoima.

From Montague Street, the E1 alignment would follow the same routing as described for Refined SR14 Build Alternative from the Refined SR14 alignment's emergence near Montague Street to the end of the Central Subsection at Lockheed Drive.

Ancillary Features

Irrigation and Drainage Facilities

- Drainage along the HSR tracks from the Soledad Siphon to the SR 14/Sierra Highway intersection would consist of perpendicular culvert crossings through the HSR cut sections to allow drainage to be conveyed from the west side to the outlet on the east side.
- Drainage from the SR 14/Sierra Highway interchange south to Rockyford Road would be intercepted with a drainage channel and conveyed south to the outlet of the existing natural wash south of Rockyford Road.
- Drainage from Vincent View Road to the Vincent Substation would remain within the existing natural washes. HSR tracks would cross over the washes on proposed rail viaducts.
- Drainage channels are proposed between the two existing washes on both sides of the HSR tracks.
- The drainage runoff at tunnel portals would be intercepted with proposed drainage channels. The runoff would be conveyed around the tunnel portals and released back into the existing natural watercourse.

The remaining proposed drainage facilities within the mountain areas would include the following:

- Natural-lined or concrete-lined drainage ditches/channels
- Culvert crossings
- Detention basins
- Proposed drainage modifications to the existing drainage system at Tuxford Street include modifying and upgrading the existing pump station and reconfiguring the existing storm drain to accommodate the proposed underpass.

Operations Facilities

- TPSSs:
- A TPSS would be at Station 530+00, close to the Edison SCE Vincent Substation in Acton.
- A TPSS would be at Station 1937+82, close to the LADWP Valley Power Station.
- PSs:
    - A PS would be at Station 377+00, south of Palmdale Station, close to Avenue S.
    - A PS would be at Station 745+00, within the tunnel Portal 3 facilities footprint.
    - A PS would be at Station 982+00, underground within a tunnel.
    - A PS would be at Station 1456+00, underground within a tunnel.
    - A PS would be at Station 1693+00, underground within a tunnel.
- Switching stations:
    - A switching station would be at Station 1219+00, underground within a tunnel.
- CTs:
    - All open-air traction power facilities would include a 100-foot CT inside the footprint.
    - The following CTs would be near the tracks to provide additional coverage:
        - CT at Station 307+00
        - CT at Station 464+00

- Power transmission lines:
  - A power line would connect the TPSS at Station 1930+00 with LADWP Valley Power Station.
    - A power line would connect a TPSS to a substation owned by SCE.

Utilities

The E1 Central Subsection would cross several high risk utilities, including 2 electrical lines, 16 natural gas lines, 4 petroleum and fuel pipelines, and 27 water pipelines. Low-risk utilities within the E1 Central Subsection include water, sewer, telecommunications, storm drainage, and fiber optic. The E1 Central Subsection would also cross the California Aqueduct at grade; to achieve this crossing, the Aqueduct, which is in a siphon at this location, would need to be modified and extended.

Access Roads

Access roads to portals are intended both for construction access and for tunnel maintenance and emergency access during operation. In mountainous areas (as opposed to urban areas), the portals would be furnished with a series of infrastructure elements including tunnel ventilation, noise mitigation, traction power, emergency and rescue facilities, firefighting, communications utilities, rock fall containment, and others. Access roads within the E1 Central Subsection would include the following:

- **Tunnel Portal 1—**This access road is proposed off Foreston Drive, on the east side of the HSR tracks, and would run parallel for approximately 2,700 feet to Portal 1. This access road would be near the Vincent Substation.
- **Tunnel Portal 2—**This access road would be located off Aliso Canyon Road. It would parallel the HSR tracks and extend across the existing floodplain to the entrance of Portal 2.
- **Tunnel Portal 3—**This portal would not require a new access road. Access to this portal would be from existing Aliso Canyon Road.

Adits and Intermediate Windows

There are two adit options for the E1 Build Alternative, only one of which would be selected. As shown in Table 2-22 and on Figure 2-64, both adit options are located along Little Tujunga Canyon Road, within the ANF. The first adit option (E1-A1) would extend east from the underground cavern to a CSA along Little Tujunga Canyon Road, and the second adit option (E1-A2) would extend west from the underground cavern to a CSA north of Little Tujunga Canyon Road. The selected adit site may also serve as a permanent mid-tunnel ventilation structure.

Table 2-22 E1 Build Alternative Adit and Intermediate Window Options

Feature Name	Location	Associated Map
Adits		
E1-A1	Located along Little Tujunga Canyon Road, within the ANF. Would extend east from the underground cavern to a CSA north of Little Tujunga Canyon Road	Figure 2-64
E1-A2	Located along Little Tujunga Canyon Road, within the ANF. Would extend west from the underground cavern to a CSA along Little Tujunga Canyon Road	Figure 2-64

Feature Name	Location	Associated Map
Intermediate Windows		
E1-W1	Located north of Arrastre Canyon, just outside the ANF boundary	Figure 2-63
E1-W2a	Located directly north of the intersection of the I-210 and SR 118 freeways	Figure 2-65
E1-W2b3	Located directly south the intersection of the I-210 and SR 118 freeways	Figure 2-65

ANF = Angeles National Forest; CSA = construction staging area; I- = Interstate; SR = State Route

The E1 Build Alternative also has three options for intermediate windows, two of which would be selected. The first intermediate window (E1-W1) would be north of Arrastre Canyon, just outside the ANF boundary (Figure 2-63). The second option for an intermediate window (E1-W2) and the third option (E1-W3) would be in proximity to the intersection of the I-210 and SR 118 freeways (Figure 2-65). The window option E1-W2 would be located directly north of the intersection of these freeways, while window option E1-W3 would be south of the intersection of these freeways. Given the similar access provided by intermediate window E1-W2 and E1-W3, only one of these two options would be selected, in addition to the E1-W1 option.

Each of the adit and window options would require temporary and permanent ground disturbance to accommodate ancillary features such as temporary CSAs, temporary water supply for construction purposes, and permanent electrical utility facilities. Additionally, the selected adit would serve as a mid-tunnel ventilation structure. This structure would be approximately 50 feet wide by 50 feet long by 18 feet high, occupying approximately 20,000 square feet. Table 2-23 shows the land needed for each of the adit and intermediate window options.

Table 2-23 Area Required for the E1 Build Alternative Adit and Intermediate Window Options

Footprint	Adit Options (acres)		Window Options (acres)		
	E1-A1	E1-A2	E1-W1	E1-W2a	E1-W2b
Temporary					
CSA	32.8	28.0	32.2	19.6	8.3
Permanent					
HSR right-of-way[1]	0.5	0.5	23.6	10.2	13.0
Power lines/facility	49.3	28.5	4.4	7.3	0
Utility easement	21.5	29.8	11.9	2.3	13.7
Total					
Total Area Required	**104.1**	**86.8**	**72.1**	**39.4**	**35.0**

[1] HSR right-of-way includes area required for the mid-tunnel ventilation structure at the adit location and land required for the open cavern of the intermediate window.
CSA = construction staging area; HSR = high-speed rail

Station Sites

There are no station sites proposed within the E1 Central Subsection.

State Highway or Local Roadway Modifications

Table 2-24 summarizes state highway and local roadway modifications in the E1 Central Subsection.

Freight or Passenger Railroad Modifications

The E1 Central Subsection would require the following railroad relocations:

- Approximately 1.5 miles of the existing Metrolink railroad between the Spruce Court cul-de-sac and East Barrel Springs Road would be relocated.
- The Metrolink Valley Subdivision tracks are proposed to be reprofiled from the Tujunga Wash to Tuxford Street to facilitate the new grade separation over Sheldon Street.
- The Vulcan lead track would be reconstructed for approximately 6,000 feet.

Land Use and Community Modifications

The E1 Central Subsection would require land conversion of several non-transportation uses (both existing and planned) to a permanent (rail) transportation use. Conversion of existing land uses would include 83 to 95 acres of Industrial, 13 to 16 acres of Commercial, 149 to 158 acres of Residential, less than 1 acre of Agricultural, 64 to 65 acres of Public, 1 acre of Institutional, and 643 to 672 acres of Vacant. Conversion of planned land uses would include 118 to 133 acres of Industrial, 47 acres of Commercial, 1 acre of Medium-High-Density Residential, 632 acres of Low-Density Residential, 185 acres of Agricultural/Open Space, 38–104 acres of ANF, including the SGMNM, and 134 to 140 acres of Public Facility/Institutional.

E1 Burbank Subsection

Lockheed Drive represents the northern limit of the E1 Burbank Subsection. South of Lockheed Drive, all E1 Build Alternative alignment, ancillary features, and station sites within the Burbank Subsection would be identical to the features described for the Refined SR14 Burbank Subsection.

Table 2-24 E1 Central Subsection Roadway Modifications

City	Road	Proposed Modification	Description of Proposed Work	Existing # of Lanes	Proposed # of Lanes
Palmdale	Sierra Highway (from East Avenue R8 to East Barrel Springs Road)	Road realignment	Sierra Highway would be realigned from East Avenue R8 to East Barrel Springs Road.	2 NB lanes and 2 SB lanes to Una Lake, then reduced to 1 NB lane and 1 SB lane to Barrel Springs Road	1 NB lane and 1 SB lane
Palmdale	East Avenue S	Overcrossing	East Avenue S is a proposed grade-separation crossing over HSR, Metrolink, and proposed Sierra Highway realignment. The roadway improvement limits extend from 5th Street East to Windy Creek Street.	2 EB lanes and 2 WB lanes	3 EB lanes and 3 WB lanes
Palmdale	East 10th Street	Road realignment	East 10th Street would be vertically realigned to connect to the proposed East Avenue S.	1 EB lane and 1 WB lane	2 EB lanes and 2 WB lanes
Palmdale	East Avenue R11	New road	Due to the grade separation at East Avenue S, it is necessary to enlarge East Avenue R11 to complete the crossing above the rail tracks.	Currently is a narrow back access to a building	1 NB lane and 1 SB lane with connections to Sierra Highway and East 10th Street
Unincorporated Los Angeles County	SR 14/Sierra Highway Interchange	Road realignment	The existing interchange would be reconfigured. The northbound SR 14 off-ramp and on-ramp would be realigned to the southwest of the existing Sierra Highway intersection. Existing Sierra Highway connection to the southbound off-ramp and on-ramp would be re-profiled but follow the same path. Sierra Highway to the south of the existing intersection would diverge to the east and reconnect to existing Sierra Highway adjacent to existing northbound off-ramp.	2 NB lanes and 2 SB lanes before interchange, 1 NB lane and 1 SB lane after interchange, 1 EB on-ramp, 1 EB off-ramp, 1 WB on-ramp, 1 WB off-ramp	2 NB lanes and 2 SB lanes before interchange, 1 NB lane and 1 SB lane after interchange, 1 EB on-ramp, 1 EB off-ramp, 1 WB on-ramp, 1 WB off-ramp
Unincorporated Los Angeles County	Angeles Forest Highway	Road realignment	Angeles Forest Highway would be realigned easterly from Vincent View Road to East Carson Mesa Road.	1 NB lane and 1 SB lane	1 NB lane and 1 SB lane

City	Road	Proposed Modification	Description of Proposed Work	Existing # of Lanes	Proposed # of Lanes
Unincorporated Los Angeles County	Mountain Springs Road	Overcrossing	Mountain Springs Road would be extended from Sierra Highway to the realigned Angeles Forest Highway. It would be grade separated over the existing Metrolink tracks.	1 WB lane and 1 EB lane	1 WB lane and 1 EB lane
Unincorporated Los Angeles County	Carson Mesa Road	Road extension	Carson Mesa Road would be extended from Vincent View Road to the intersection of Mountain Springs Road.	1 NB lane and 1 SB lane	1 NB lane and 1 SB lane
Unincorporated Los Angeles County	Foreston Drive	Overcrossing	Foreston Drive would be grade separated as an overpass over the HSR tracks and widened from approximately 900 feet west of the HSR tracks to the intersection of Angeles Forest Highway.	1 WB lane and 1 EB lane	1 WB lane and 1 EB lane
Unincorporated Los Angeles County	Aliso Canyon Road	Overcrossing	Aliso Canyon Road would be modified vertically to accommodate the HSR tracks.	1 NB lane and 1 SB lane	1 NB lane and 1 SB lane (plus space for future ultimate widening)
Pacoima / Sun Valley	Branford Street	Overcrossing	Branford Street would be a grade-separated crossing over HSR tracks from San Fernando Boulevard to the existing detention basin.	2 EB lanes and 2 WB lanes	2 EB lanes and 2 WB lanes
Pacoima / Sun Valley	Sheldon Street	Undercrossing	Sheldon Street would be a grade-separated crossing under HSR tracks from El Dorado Avenue along 2540. It Involves a vertical realignment in San Fernando Road and the creation of a private road (#1).	2 EB lanes and 2 WB lanes	2 EB lanes and 2 WB lanes
Pacoima / Sun Valley	San Fernando Road	Road vertical realignment	San Fernando Road would be depressed to fit the proposed undercrossing at Sheldon Street.	2 NB lanes and 2 SB lanes	2 NB lanes and 2 SB lanes
Pacoima / Sun Valley	Ralston Avenue	New road	Due to the proposed Sheldon Street Underpass, a new road is required to maintain access to San Fernando Road from the eastern side of the tracks.	2 NB lanes and 2 SB lanes	2 NB lanes and 2 SB lanes
Sun Valley	Tuxford Street	Undercrossing	Tuxford Street is an existing underpass beneath existing Metrolink tracks. Tuxford Street would remain an underpass and would be modified to accommodate the proposed HSR tracks and Metrolink tracks.	2 EB lanes and 2 WB lanes	2 EB lanes and 2 WB lanes

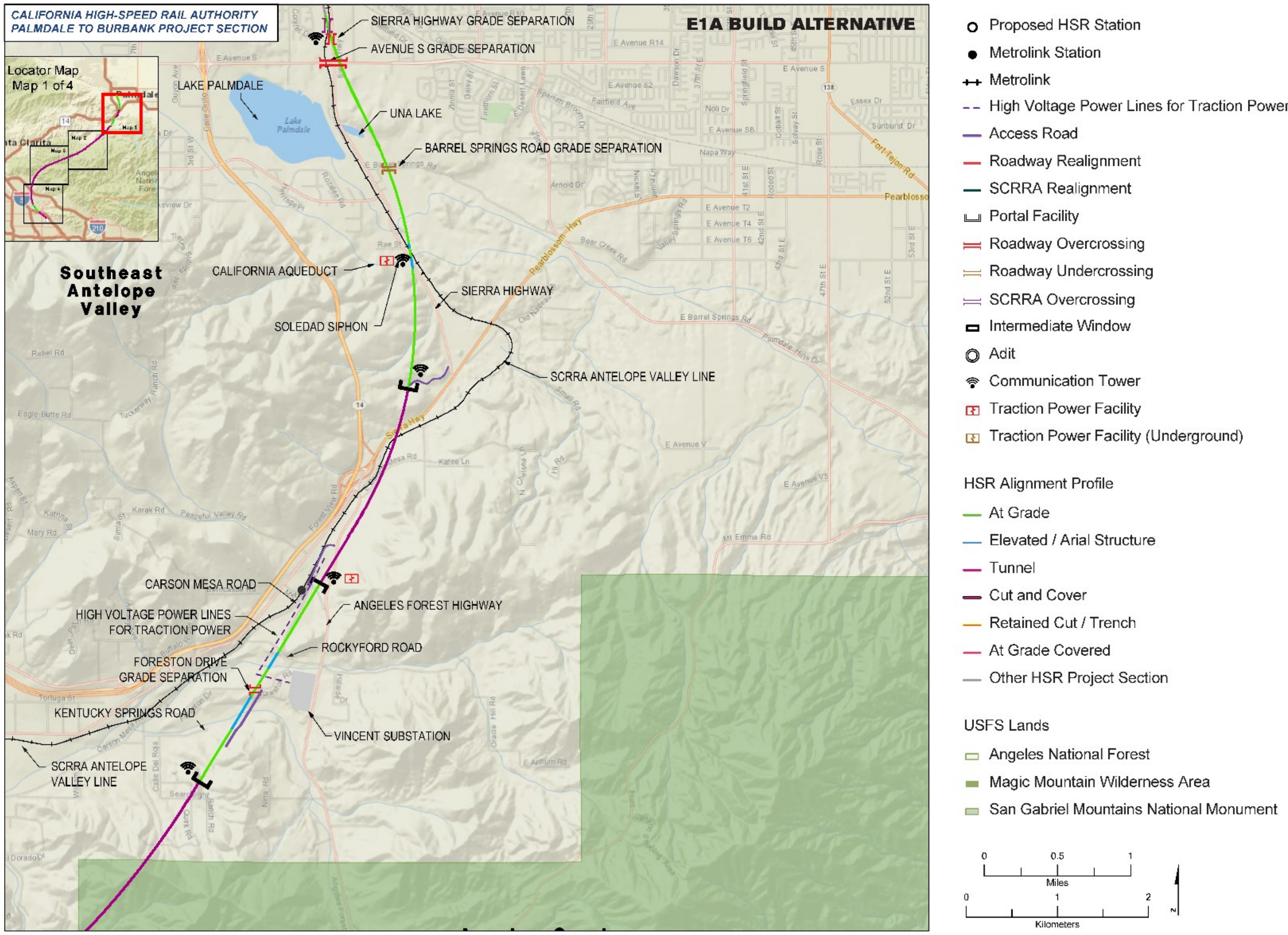
City	Road	Proposed Modification	Description of Proposed Work	Existing # of Lanes	Proposed # of Lanes
Sun Valley	Olinda Street	Roadway connection / overcrossing	Olinda Street would be a grade-separated crossing over the HSR tracks, which would be in a covered trench.	1 EB lane and 1 WB lane, disconnected	1 EB lane and 1 WB lane, 2 EB lanes and 2 WB lanes at overcrossing
Sun Valley	Sunland Boulevard	Overcrossing	Sunland Boulevard is an existing at-grade crossing across a single Metrolink track. It would remain an at-grade crossing across the proposed Metrolink tracks. The HSR tracks would be in a covered trench at this location.	2 NB lanes and 2 SB lanes	2 NB lanes and 2 SB lanes
Sun Valley	Penrose Street	Closed	Penrose Street is an existing at-grade crossing and would be closed with the California HSR System.	2 EB lanes and 2 WB lanes	Road disconnected over rail corridors
Sun Valley	San Fernando Road	Road realignment	San Fernando Road would be realigned easterly from Penrose Street to Olinda Street to accommodate the HSR tracks.	1 EB lane and 1 WB lane	1 EB lane and 1 WB lane

EB = eastbound; HSR = high-speed rail; NB = northbound; SB = southbound; WB = westbound

2.5.3.4 E1A Build Alternative

The Authority developed the E1A Build Alternative to reduce impacts on aquatic resources south of the city of Palmdale. As the E1A Build Alternative was developed based on the E1 Build Alternative, the above description of the E1 Build Alternative applies to the E1A Build Alternative, unless otherwise noted. Figure 2-66 through Figure 2-70 show the proposed E1A Build Alternative.

Figure 2-66 E1A Build Alternative Overview Map



PRELIMINARY DRAFT/SUBJECT TO CHANGE - HSR ALIGNMENT IS NOT DETERMINED
Source: Authority, 2021; National Geographic/Esri, 2021

June 14, 2021

Figure 2-67 E1A Build Alternative (Map 1 of 4)

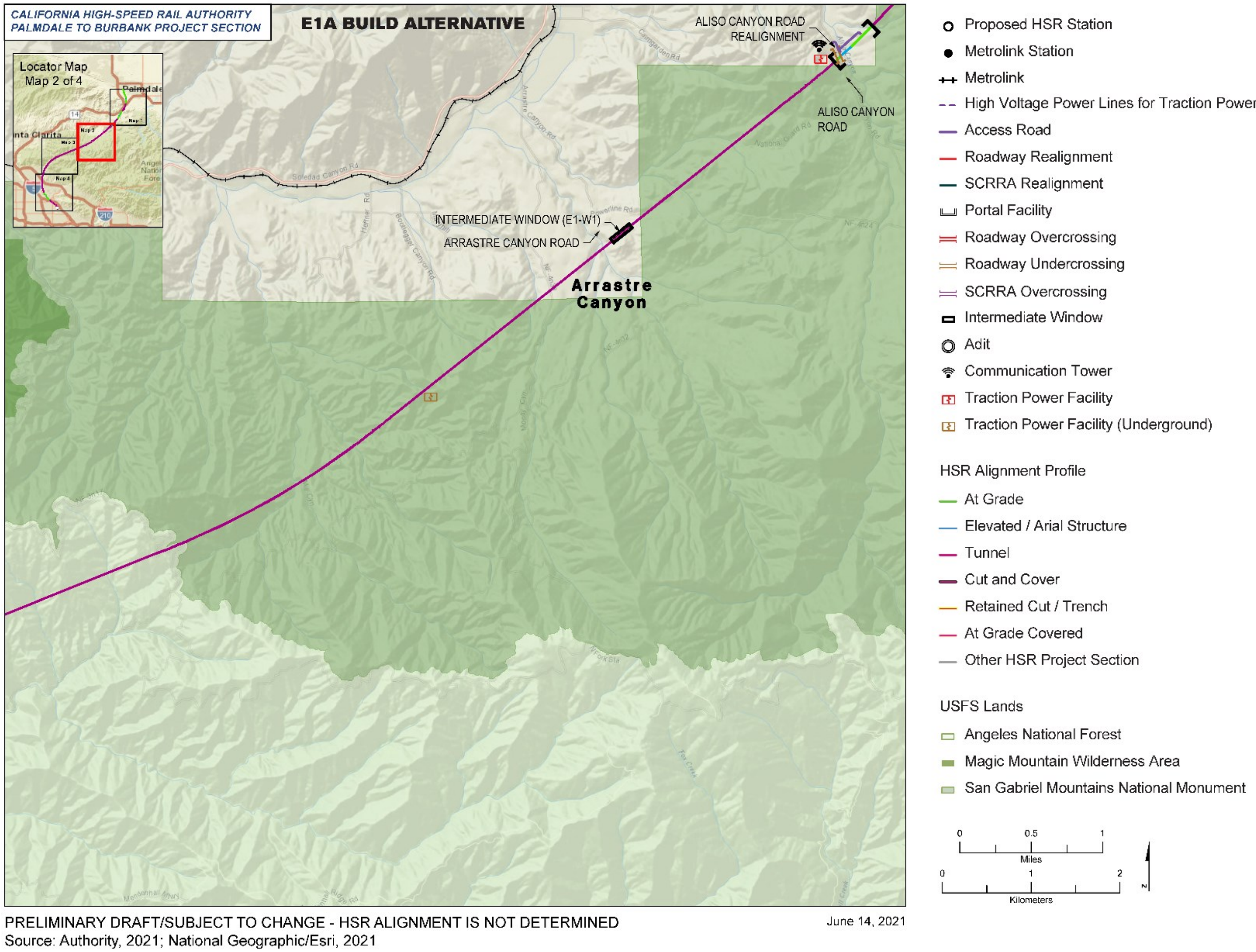
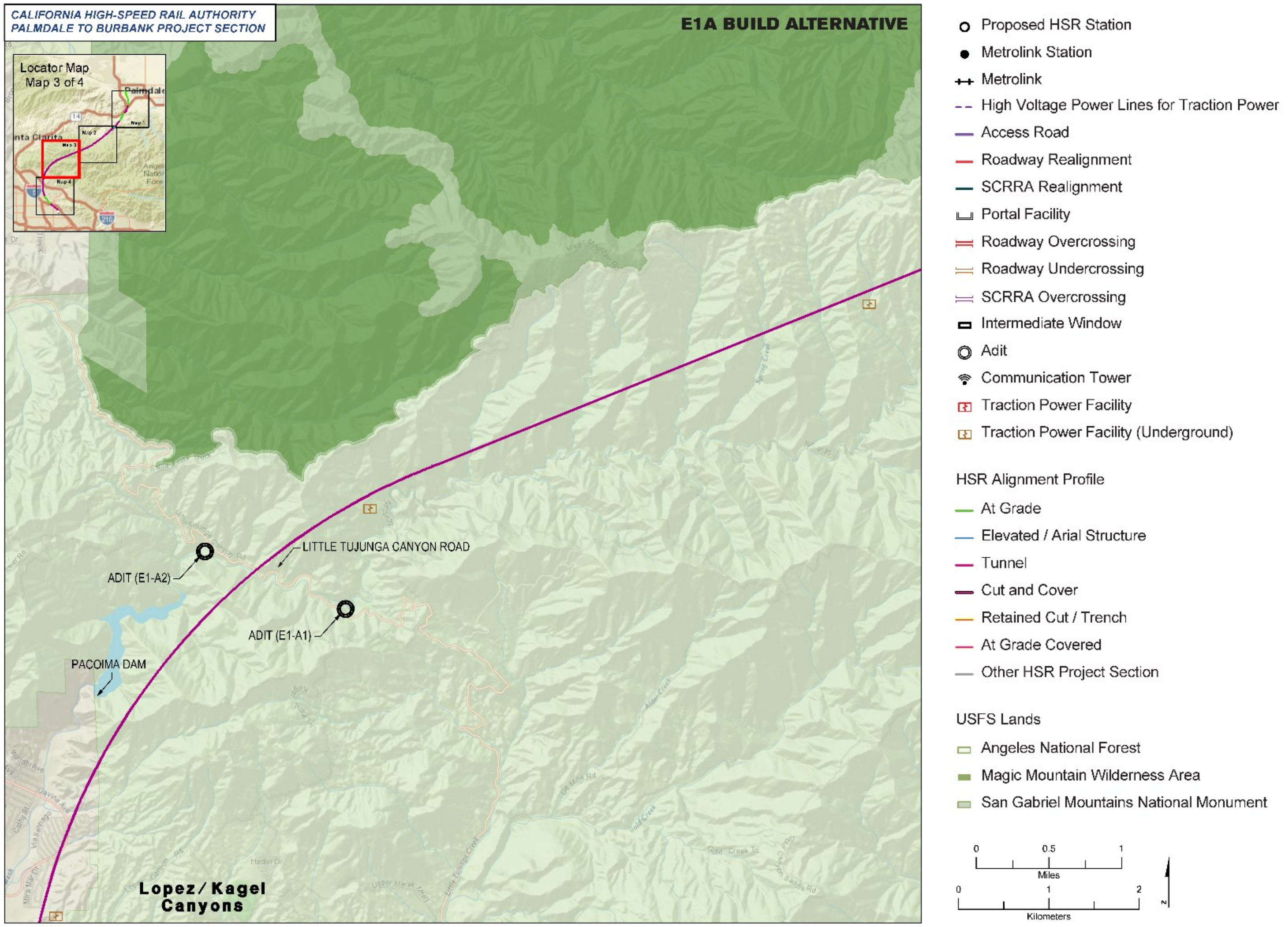


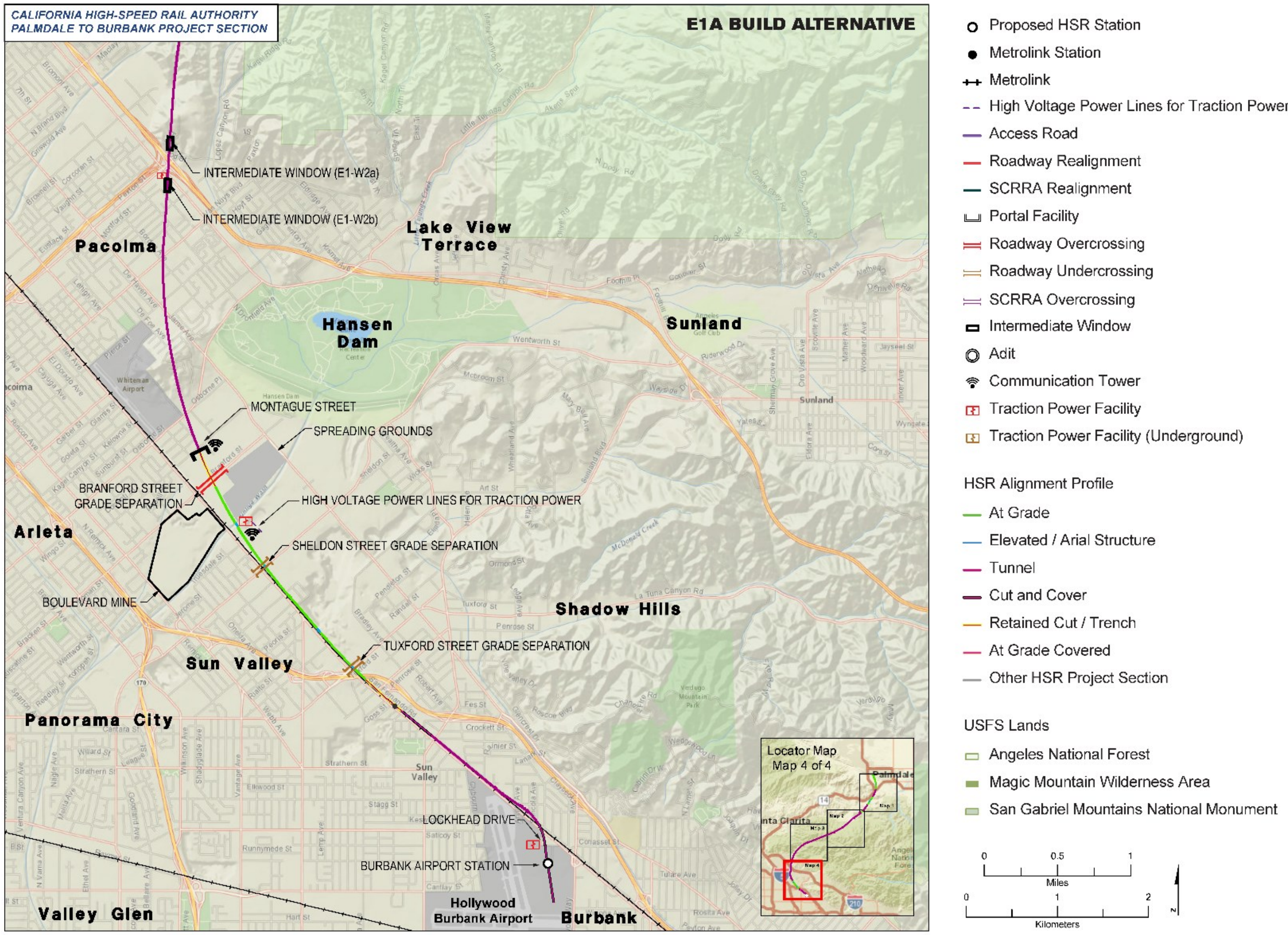
Figure 2-68 E1A Build Alternative (Map 2 of 4)



PRELIMINARY DRAFT/SUBJECT TO CHANGE - HSR ALIGNMENT IS NOT DETERMINED
Source: Authority, 2021; National Geographic/Esri, 2021

June 14, 2021

Figure 2-69 E1A Build Alternative (Map 3 of 4)



PRELIMINARY DRAFT/SUBJECT TO CHANGE - HSR ALIGNMENT IS NOT DETERMINED
Source: Authority, 2021; National Geographic/Esri, 2021

June 14, 2021

Figure 2-70 E1A Build Alternative (Map 4 of 4)

E1A Central Subsection

Alignment

The E1A Build Alternative would begin at grade in the vicinity of Spruce Court, crossing the current alignment of Sierra Highway just north of East Avenue S, continuing south and curving eastward to travel approximately 300 feet east of Una Lake. In contrast to the E1 Build Alternative alignment, the E1A Build Alternative alignment would include elevated structures to cross over the California Aqueduct before entering a tunnel portal approximately 1,900 feet southwest of the Sierra Highway/Pearblossom Highway intersection. After continuing underground for approximately 1.5 miles, the E1A Build Alternative alignment would transition to an at-grade profile approximately 350 feet north of Vincent View Road. Just south of Vincent View Road, the E1A Build Alternative alignment would converge with the E1 Build Alternative alignment. The remaining E1A Build Alternative alignment south of Vincent View Road, under the ANF, including the SGMNM, into the San Fernando Valley, and to the southern terminus of the Central Subsection would be identical to the E1 Build Alternative alignment.

Ancillary Features

Irrigation and Drainage Facilities

- Drainage along the HSR tracks from the Soledad Siphon to Portal 1A would be conveyed to a drainage basin south of Soledad Siphon.
- Drainage from Portal 3A near Vincent View Road to Portal 1 south of Kentucky Springs Road would be conveyed to the two existing natural washes. HSR tracks would cross over the washes on proposed rail viaducts.
- The drainage runoff at tunnel portals would be intercepted with proposed drainage channels. The runoff would be conveyed around the tunnel portals and released back into the existing natural watercourse.

The remaining proposed drainage facilities within the mountain areas would include the following:

- Natural-lined or concrete-lined drainage ditches/channels.
- Culvert crossings.
- Detention basins.
- Proposed drainage modifications to the existing drainage system at Tuxford Street include modifying and upgrading the existing pump station and reconfiguring the existing storm drain to accommodate the proposed underpass.

Operations Facilities

- TPSSs:
  - TPSS 17B would be at Station 550+00, close to the Edison SCE Vincent Substation in Acton.
  - TPSS 18B would be at Station 1937+82, close to the LADWP Valley Power Station.
- PSs:
  - A PS would be at Station 412+00, south of Palmdale Station, close to Avenue S.
  - A PS would be at Station 745+00, within tunnel Portal 3 facilities footprint.
  - A PS would be at Station 982+00, underground within a tunnel.
  - A PS would be at Station 1456+00, underground within a tunnel.
  - A PS would be at Station 1693+00, underground within a tunnel.
- Switching stations:
  - A switching station would be at Station 1219+00, underground within a tunnel.

- CTs:
  - All open-air Traction Power Facilities and Tunnel Portals would include a 100-foot CT inside the footprint.
  - The following CT would be near the tracks to provide additional coverage:
    - CT at Station 307+00
- Power transmission lines:
  - The proposed connection to Vincent Substation is an elevated, 2.9-mile high-voltage transportation power line (230 kV) that would connect the SCE substation with the TPSS 17B.
  - A short 230 kV connection would be needed to connect TPSS 18B at Station 1937+00 with LADWP Valley Power Station.

Utilities

The E1A Central Subsection would cross several high risk utilities, including 53 natural gas lines, 9 petroleum and fuel pipelines, and 108 water pipelines. Low-risk utilities within the E1A Central Subsection include water, sewer, telecommunications, storm drainage, and fiber optic.

Access Roads

Access roads to portals are intended both for construction access and for tunnel maintenance and emergency access during operation. In mountainous areas (as opposed to urban areas), the portals would be furnished with a series of infrastructure elements including tunnel ventilation, noise mitigation, traction power, emergency and rescue facilities, firefighting, communications utilities, rock fall containment, and others. Access roads within the E1A Central Subsection would include the following:

- **Tunnel Portal 1A—**This access road would connect the existing Sierra Highway, near the intersection with Pearblossom Highway to Portal 1A. The access road would traverse mountainous terrain and would require moderate grading.
- **Tunnel Portal 3A—**This access road would connect the existing Angeles Forest Highway to Portal 3A and would run parallel to West Carson Mesa Road. The access road would require minor grading because of the flatness of the site.
- **Tunnel Portal 1—**This access road is proposed off Foreston Drive, on the east side of the HSR tracks, and would run parallel for approximately 2,700 feet to Portal 1. This access road would be near the Vincent Substation.
- **Tunnel Portal 2—**This access road would be located off Aliso Canyon Road. It would parallel the HSR tracks and extend across the existing floodplain to the entrance of Portal 2.
- **Tunnel Portal 3—**This portal would not require a new access road. Access to this portal would be from existing Aliso Canyon Road.

Adits and Intermediate Windows

Adits and intermediate windows for the E1A Central Subsection would be identical to those described for the E1 Central Subsection.

Station Sites

There are no station sites proposed within the E1A Central Subsection.

State Highway or Local Roadway Modifications

Table 2-25 summarizes state highway and local roadway modifications in the E1A Central Subsection.

Freight or Passenger Railroad Modifications

The E1A Central Subsection would require the following railroad relocations:

- Approximately 1.5 miles of the existing Metrolink railroad between Avenue R and Una Lake would be relocated.
- The Metrolink Valley Subdivision tracks are proposed to be reprofiled from the Tujunga Wash to Tuxford Street to facilitate the new grade separation over Sheldon Street.
- The Vulcan lead track would be reconstructed for approximately 6,000 feet.

Land Use and Community Modifications

The E1A Central Subsection would require land conversion of several non-transportation uses (both existing and planned) to a permanent (rail) transportation use. Conversion of existing uses would include 80 to 92 acres of Industrial, 12 to 15 acres of Commercial, 137 to 143 acres of Residential, 5 acres of Agricultural, less than 1 acre of Recreational, 56 acres of Public, 1 to 13 acres of Institutional, and 577 to 594 acres of Vacant. Conversion of planned land uses would include 128 to 135 acres of Industrial, 21 acres of Commercial, 3 acres of Medium-High-Density Residential, 506 acres of Low-Density Residential, 165 acres of Agricultural/Open Space, 38 to 104 acres of ANF, including the SGMNM, land, and 120 acres of Public Facility/Institutional.

E1A Burbank Subsection

Lockheed Drive represents the northern limit of the E1A Burbank Subsection. South of Lockheed Drive, all E1A Build Alternative alignment, ancillary features, and station sites within the Burbank Subsection would be identical to the features described for the Refined SR14 and E1 Burbank Subsection.

Table 2-25 E1A Central Subsection Roadway Modifications

City	Road	Proposed Modification	Description of Proposed Work	Existing # of Lanes	Proposed # of Lanes
Palmdale	Sierra Highway (from East Avenue R8 to Jefferson Avenue)	Road vertical realignment	Sierra Highway would be vertically realigned from East Avenue R8 to Jefferson Avenue to cross over the HSR tracks and under realigned Avenue S.	2 NB lanes and 2 SB lanes	2 NB lanes and 2 SB lanes
Palmdale	East Avenue S	Overcrossing	East Avenue S is a proposed grade-separation crossing over HSR tracks, Metrolink, and proposed Sierra Highway realignment. The roadway improvement limits extend from 5th Street East to Windy Creek Street.	2 EB lanes and 2 WB lanes	3 EB lanes and 3 WB lanes
Palmdale	East 10th Street	Road realignment	East 10th Street would be vertically realigned to connect to the proposed East Avenue S.	1 EB lane and 1 WB lane	2 EB lanes and 2 WB lanes
Palmdale	East Avenue R11	New road	Due to the grade separation at E Avenue S, it is necessary to enlarge East Avenue R11 to complete the crossing above the rail tracks.	Currently is a narrow back access to a building	1 NB lane and 1 SB lane with connections to Sierra Highway and East 10th Street
Palmdale	Valley Forge Road Patrick Henry Place Jefferson Avenue	Road realignment	Due to the new HSR tracks, Valley Forge Road would be displaced to the east approximately 100 feet, relocating the intersections with Patrick Henry Place and Jefferson Avenue.	1 EB lane and 1 WB lane	1 EB lane and 1 WB lane
Unincorporated Los Angeles County	Foreston Drive	Overcrossing	Foreston Drive would be grade separated as an overpass over the HSR tracks and widened from approximately 900 feet west of the HSR tracks to the intersection of Angeles Forest Highway.	1 WB lane and 1 EB lane	1 WB lane and 1 EB lane
Unincorporated Los Angeles County	Aliso Canyon Road	Overcrossing	Aliso Canyon Road would be modified vertically to accommodate the HSR tracks.	1 NB lane and 1 SB lane	1 NB lane and 1 SB lane (plus space for future ultimate widening)
Pacoima / Sun Valley	Branford Street	Overcrossing	Branford Street would be a grade-separated crossing over HSR tracks from San Fernando Boulevard to the existing detention basin.	2 EB lanes and 2 WB lanes	2 EB lanes and 2 WB lanes

City	Road	Proposed Modification	Description of Proposed Work	Existing # of Lanes	Proposed # of Lanes
Pacoima / Sun Valley	Sheldon Street	Undercrossing	Sheldon Street would be a grade-separated crossing under HSR tracks from El Dorado Avenue along 2540. It Involves a vertical realignment in San Fernando Road and the creation of a private road (#1).	2 EB lanes and 2 WB lanes	2 EB lanes and 2 WB lanes
Pacoima / Sun Valley	San Fernando Road	Road vertical realignment	San Fernando Road would be depressed to fit the proposed undercrossing at Sheldon Street.	2 NB lanes and 2 SB lanes	2 NB lanes and 2 SB lanes
Pacoima / Sun Valley	Ralston Avenue	New road	Due to the proposed Sheldon Street Underpass, a new road is required to maintain access to San Fernando Road from the eastern side of the tracks.	2 NB lanes and 2 SB lanes	2 NB lanes and 2 SB lanes
Sun Valley	Tuxford Street	Undercrossing	Tuxford Street is an existing underpass beneath existing Metrolink tracks. Tuxford Street would remain an underpass and would be modified to accommodate the proposed HSR tracks and Metrolink tracks.	2 EB lanes and 2 WB lanes	2 EB lanes and 2 WB lanes
Sun Valley	Olinda Street	Roadway connection / overcrossing	Olinda Street would be a grade-separated crossing over the HSR tracks, which would be in a covered trench.	1 EB lane and 1 WB lane, disconnected	1 EB lane and 1 WB lane, 2 EB lanes and 2 WB lanes at overcrossing
Sun Valley	Sunland Boulevard	Overcrossing	Sunland Boulevard is an existing at-grade crossing across a single Metrolink track. It would remain an at-grade crossing across the proposed Metrolink tracks. The HSR tracks would be in a covered trench at this location.	2 NB lanes and 2 SB lanes	2 NB lanes and 2 SB lanes
Sun Valley	Penrose Street	Closed	Penrose Street is an existing at-grade crossing and would be closed with the California HSR System.	2 EB lanes and 2 WB lanes	Road disconnected over rail corridors
Sun Valley	San Fernando Road	Road realignment	San Fernando Road would be realigned easterly from Penrose Street to Olinda Street to accommodate the HSR tracks.	1 EB lane and 1 WB lane	1 EB lane and 1 WB lane

EB = eastbound; HSR = high-speed rail; NB = northbound; SB = southbound; WB = westbound

2.5.3.5 E2 Build Alternative

The E2 alignment was one of several options introduced in the 2015 SAA Report, substantially refined in the 2016 SAA Report, and recommended in the Checkpoint B Summary Report for further analysis in this Draft EIR/EIS. E2 is intended to provide a shorter, faster, and potentially less disruptive route to connect Palmdale and Burbank than alignments more strictly following the SR 14 freeway corridor. Figure 2-71 through Figure 2-75 show the proposed E2 Build Alternative.

Figure 2-71 E2 Build Alternative Overview Map

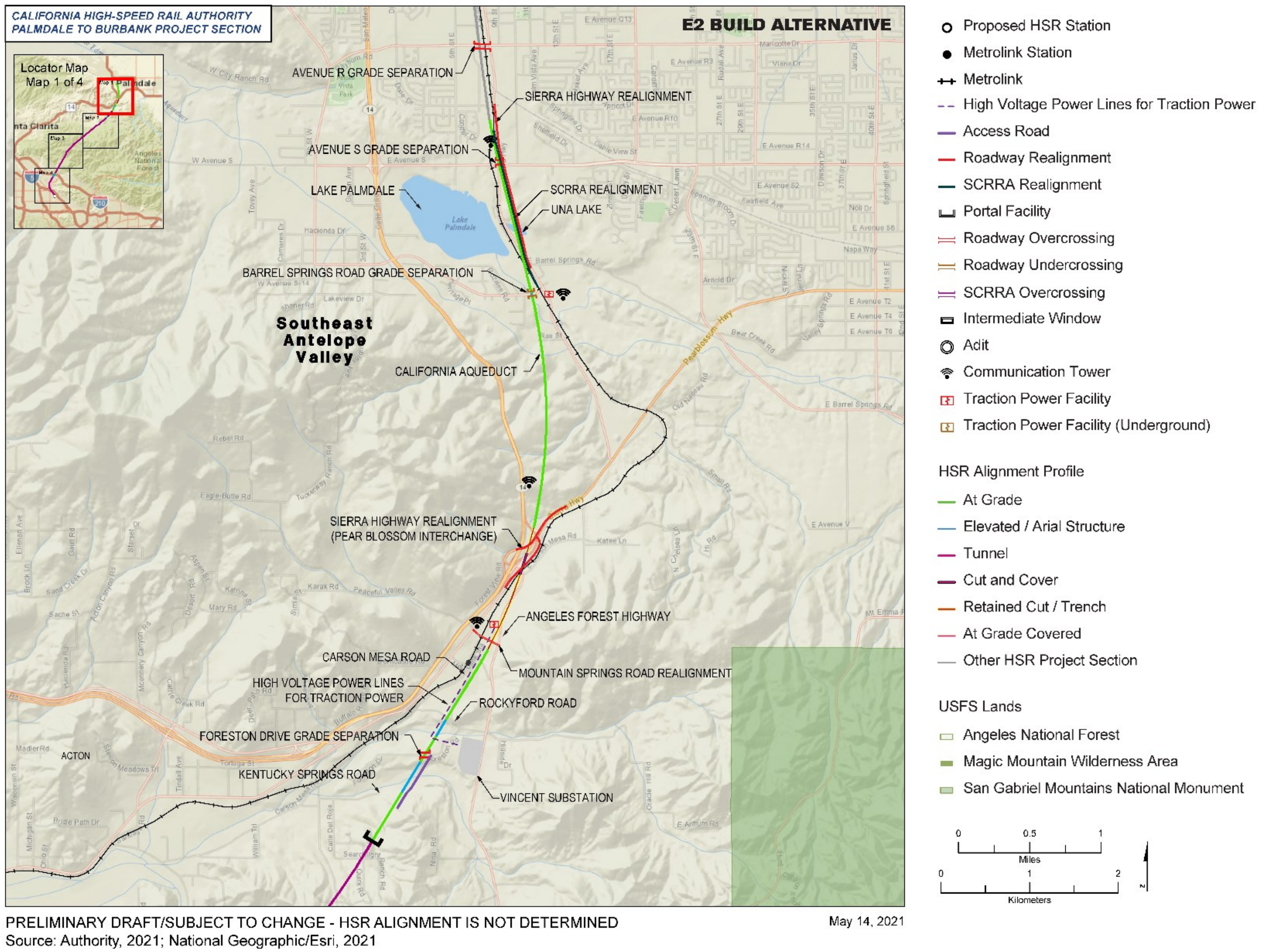


Figure 2-72 E2 Build Alternative (Map 1 of 4)

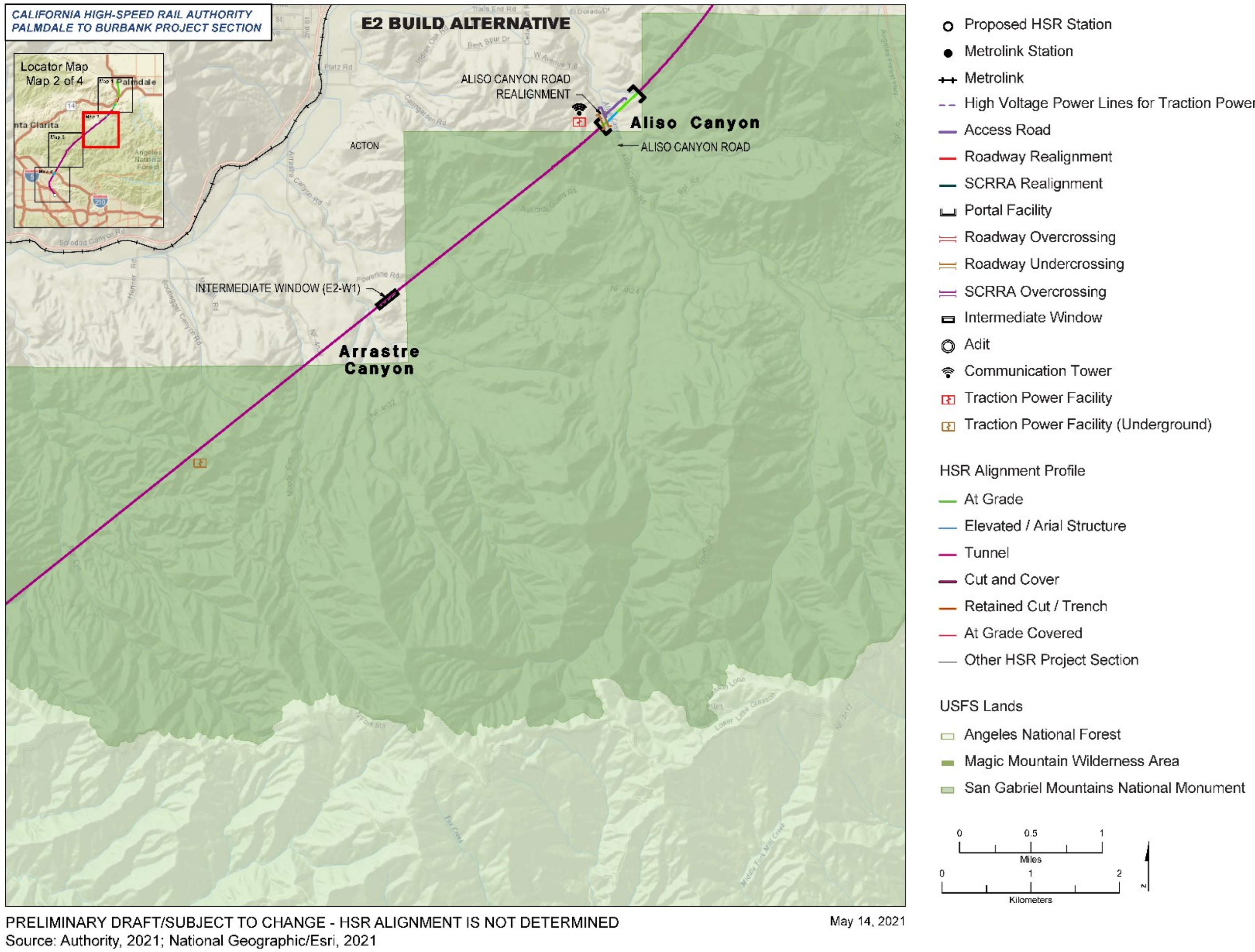
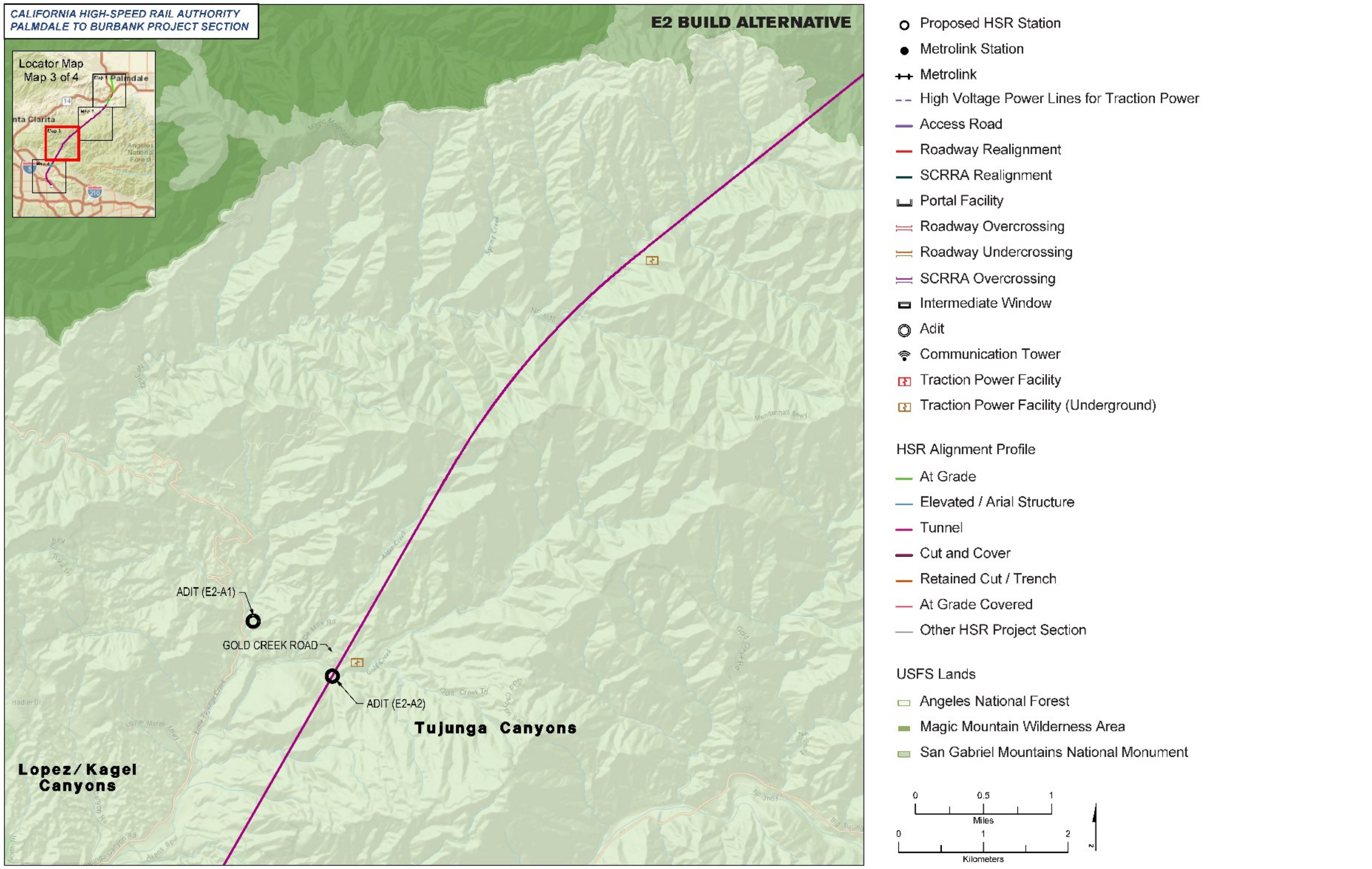


Figure 2-73 E2 Build Alternative (Map 2 of 4)



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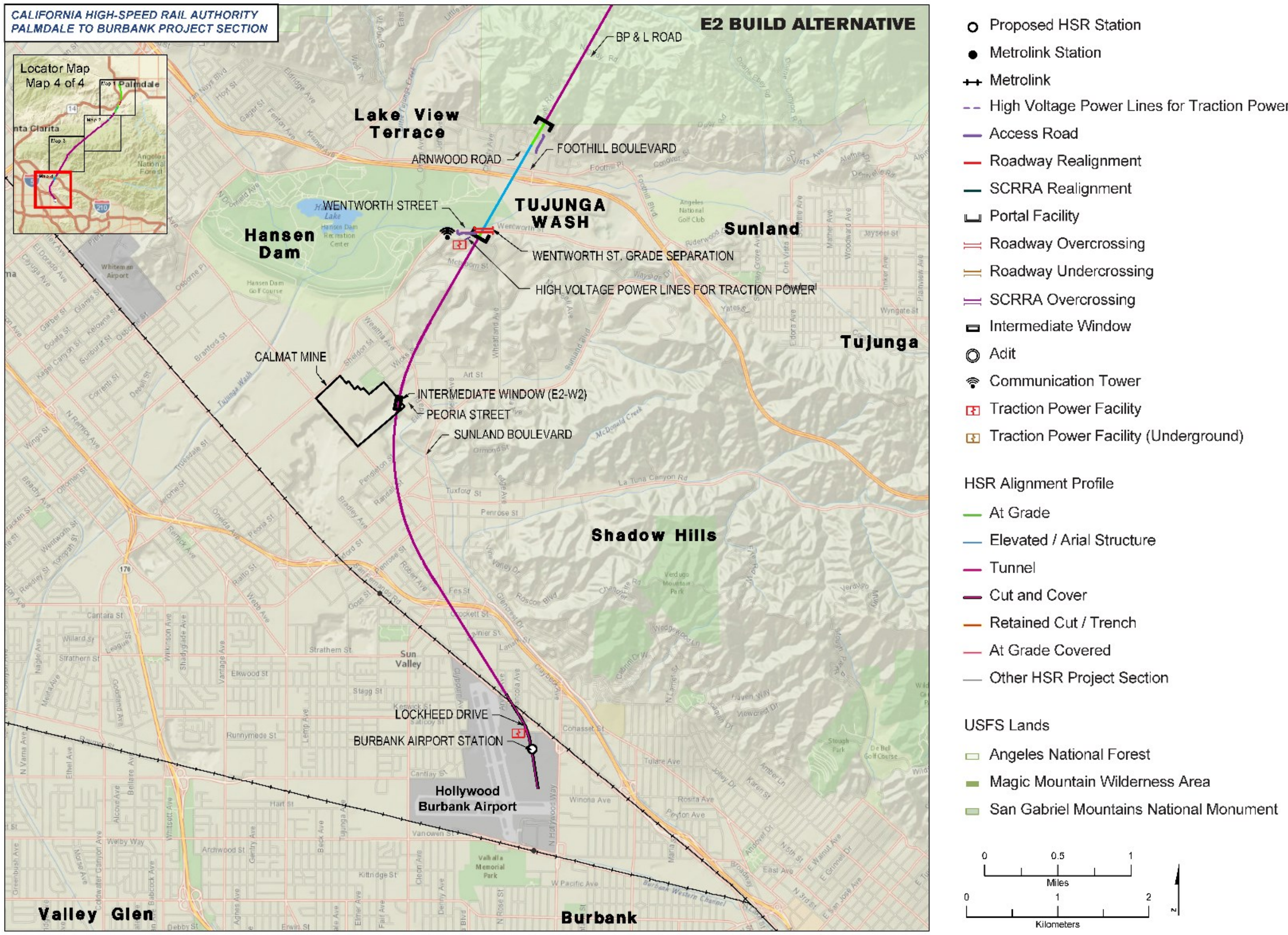
Source: Authority, 2021; National Geographic/Esri, 2021

May 14, 2021

Figure 2-74 E2 Build Alternative (Map 3 of 4)



PRELIMINARY DRAFT/SUBJECT TO CHANGE - HSR ALIGNMENT IS NOT DETERMINED
Source: Authority, 2021; National Geographic/Esri, 2021

May 14, 2021

Figure 2-75 E2 Build Alternative (Map 4 of 4)

E2 Central Subsection

Alignment

The E2 Build Alternative would be identical to the E1 alignment from Spruce Court to Aliso Canyon Road. This includes the area passing through Una Lake, the San Andreas Fault Zone, the California Aqueduct, the Santa Clara River tributary, and Aliso Canyon Road itself.

To the immediate west of Aliso Canyon Road, the E2 alignment would enter twin 16.6-mile-long tunnels, initially following a path to the southwest (maximum depth of 2,670 feet). The initial 7 miles of this tunnel would be constructed beneath the ANF, including the SGMNM. The alignment would continue southwesterly, curving to a more south-southwesterly direction as the alignment passes beneath Mendenhall Ridge Road and then through the San Gabriel Fault.

The E2 alignment would transition from tunnel to at grade in the hills above the Lake View Terrace neighborhood of Los Angeles, near the private, unimproved BP & L Road. This tunnel portal would require approximately 28.9 acres of additional surface area disturbance within the ANF for grading and slope stabilization. After crossing the Sierra Madre Fault Zone, the alignment would continue at grade for approximately 0.2 mile before transitioning to an elevated viaduct structure. The 0.75-mile viaduct would cross over Arnwood Road, Foothill Boulevard, and the I-210 freeway and then would continue to cross Big Tujunga Wash and cross below Wentworth Street in the Shadow Hills neighborhood of the city of Los Angeles.

After crossing Wentworth Street, the E2 alignment would continue along a relatively short (200-foot) at-grade section before transitioning to a bored/mined tunnel (maximum depth of 240 feet) for approximately 1.5 miles. This portion of the alignment would continue in the same south-southwesterly direction until approximately Peoria Street in the Sun Valley neighborhood of the city of Los Angeles. Beneath Peoria Street, the E2 alignment would curve to the southeast. At Peoria Street, the tunnel construction method could also change. North of Peoria Street, the tunnels would be bored, but between Peoria Street and approximately Fleetwood Street (0.9 mile), they would either be open cut-and-cover (maximum depth approximately 120 feet) or in continuous bored tunnels. For the purpose of this environmental review, it is assumed that the alignment would transition to a cut-and-cover tunnel in this location. Cut-and-cover is assumed because it would have impacts at the ground surface and thus would capture the maximum extent of effects. At Fleetwood Street, bored/mined tunneling would resume (maximum depth of 120 feet) as the E2 alignment would pass beneath Sunland Boulevard, I-5, and San Fernando Road. This tunnel would extend until San Fernando Road. At this point, the alignment would transition into a cut-and-cover tunnel that would cross San Fernando Road until Lockheed Drive, which is the southern limit of this subsection.

Ancillary Features

Irrigation and Drainage Facilities

- Drainage along the HSR tracks from the Soledad Siphon to the SR 14/Sierra Highway interchange would consist of perpendicular culvert crossings through the HSR cut sections to allow runoff to be conveyed from the west side to outlets on the east side.
- Drainage from the SR 14/Sierra Highway interchange south to Rockyford Road would be intercepted with a drainage channel and conveyed south to the outlet of the existing natural wash south of Rockyford Road.
- Drainage from Vincent View Road to the Vincent Substation would remain within the existing natural washes. HSR would cross over the washes on proposed rail viaducts.
- Drainage channels are proposed between the two existing washes on both sides of the tracks.
- The drainage runoff at tunnel portals would be intercepted by proposed drainage channels. The runoff would be conveyed around the tunnel portals and released back into the existing natural watercourse.

The remaining proposed drainage facilities within the mountain areas would include the following:

- Natural-lined or concrete-lined drainage ditches/channels
- Culvert crossings
- Detention basins

Operations Facilities

- TPSSs:
  - A TPSS would be at Station 530+00, close to the Edison SCE Vincent Substation in Acton.
  - A TPSS would be at Station 1680+00, within the Portal 5 facilities footprint.
- PSs:
  - A PS would be at Station 412+00, south of Palmdale Station, close to Avenue S.
  - A PS would be at Station 745+00, within the tunnel Portal 3 facilities footprint.
  - A PS would be at Station 982+00, underground within a tunnel.
  - A PS would be at Station 1448+00, underground within a tunnel.
- Switching stations:
  - A switching station would be at Station 1216+00, underground within a tunnel.
- CTs:
  - All open-air traction power facilities would include a 100-foot CT inside the footprint. The following CTs would be near the tracks to provide additional coverage:
    - CT at Station 307+00
    - CT at Station 464+00

Utilities

The E2 Central Subsection would cross several high risk utilities including 8 natural gas lines and 18 water pipelines. Low-risk utilities within the E2 Central Subsection include water, sewer, telecommunications, storm drainage, and fiber optic. The E2 Central Subsection would also cross the California Aqueduct at grade; to achieve this crossing, the Aqueduct, which is in a siphon at this location, would need to be modified and the siphon extended.

Access Roads

Access roads to portals are intended both for construction access and for tunnel maintenance and emergency access during operation. In mountainous areas (as opposed to urban areas), the portals would be furnished with a series of infrastructure elements related to tunnel ventilation, noise mitigation, traction power, emergency and rescue facilities, firefighting, communications utilities, and rock fall containment, among others.

- **Tunnel Portal 1—**This access road is proposed off Foreston Drive, on the east side of the E2 alignment, and would run parallel for approximately 2,700 feet to Portal 1. This road would be near the Vincent Substation.
- **Tunnel Portal 2—**This access road would be located off Aliso Canyon Road. It would parallel the HSR tracks and extend across the existing floodplain to the entrance of Portal 2.
- **Tunnel Portal 3—**This portal does not require a new access road. Access to this portal would be from the existing Aliso Canyon Road.
- **Tunnel Portal 4—**Wheatland Avenue would be extended northerly by approximately 800 feet to access this portal.
- **Tunnel Portal 5—**The access road to this portal would be constructed off Wentworth Street along the south side.

Adits and Intermediate Windows

The E2 Build Alternative includes two options for adits, only one of which would be selected. As shown on Figure 2-75 and described in Table 2-26, both adit options for the E2 Build Alternative would connect to Little Tujunga Canyon Road within the ANF. The first adit option (E2-A1) would extend west from the underground cavern to a temporary CSA within an in-holding (an in-holding is privately owned property within the boundary of a national park, in this case the ANF) approximately 0.4 mile north of Gold Creek Road. The second adit option (E2-A2) would also extend west from the underground cavern to a temporary CSA within an in-holding along Gold Creek Road.

Table 2-26 E2 Build Alternative Adit Options and Intermediate Windows

Feature Name	Location	Associated Map
Adits		
E2-A1	Connects to Little Tujunga Canyon Road within the ANF; extends west from the underground cavern to a temporary CSA within an in-holding approximately 0.4 mile north of Gold Creek Road	Figure 2-74
E2-A2	Connects to Little Tujunga Canyon Road within the ANF; extends west from the underground cavern to a temporary CSA within an in-holding along Gold Creek Road	Figure 2-74
Intermediate Windows		
E2-W1	Located just outside the ANF, north of Arrastre Canyon	Figure 2-73
E2-W2	Located at the current site of the CalMat Mine in Sun Valley	Figure 2-75

ANF = Angeles National Forest; CSA = construction staging area

As shown on Figure 2-73 and Figure 2-75 and summarized in Table 2-26, the E2 Build Alternative includes two intermediate window locations to provide construction access to tunnels, both of which would be selected. The first intermediate window (E2-W1) is just outside the ANF, north of Arrastre Canyon; the second intermediate window (E2-W2) is at the current site of the Vulcan Landfill in Sun Valley.

Each of the adit and window options would require temporary and permanent ground disturbance to accommodate ancillary features such as temporary CSAs, temporary water supply for construction purposes, and permanent electrical utility facilities. Additionally, the selected adit may serve as a mid-tunnel ventilation structure. This structure would be approximately 50 feet wide by 50 feet long by 18 feet high, occupying approximately 20,000 square feet. Table 2-27 shows the land needed for each of the adit and intermediate window options.

Table 2-27 Area Required (acres) for the E2 Build Alternative Adit and Intermediate Window Options

Footprint	Adit Options		Window Options	
	E2-A1	E2-A2	E2-W1	E2-W2
Temporary				
CSA	35.9	23.2	32.2	29.9
Permanent				
HSR right-of-way[1]	2.1	2.1	23.6	0
Power lines/facility	8.8	19.7	4.4	0
Utility easement	21.1	23.7	11.9	4.0
Total				
Total Area Required	**67.9**	**68.7**	**72.1**	**33.9**

[1] HSR right-of-way includes area required for the mid-tunnel ventilation structure at the adit location and land required for the open cavern of the intermediate window.
CSA = construction staging area; HSR = high-speed rail

Station Sites

No station sites are proposed in the E2 Central Subsection.

State Highway or Local Roadway Modifications

Table 2-28 lists roadway modifications within the E2 Central Subsection.

Freight or Passenger Railroad Modifications

The E2 Central Subsection would require relocation of approximately 1.5 mile of the existing Metrolink railroad between the Spruce Court cul-de-sac and East Barrel Springs Road.

Land Use and Community Modifications

The E2 Central Subsection would require land conversion of several non-transportation uses (both existing and planned) to a permanent (rail) transportation use. Conversion of existing land uses would include 20 acres of Institutional, 6 to 7 acres of Commercial, 184 to 189 acres of Residential, less than 1 acre of Agricultural, less than 1 acre of Recreational, 35 acres of Public, 0 to 1 acre of Institutional, and 690 to 700 acres of Vacant. Conversion of planned land uses would include 55 acres of Industrial, 44 acres of Commercial, 1 acre of Medium-High-Density Residential, 680 to 681 acres of Low-Density Residential, 164 acres of Agricultural/Open Space, 64 to 87 acres of ANF, including the SGMNM, and 78 acres of Public Facility/Institutional.

E2 Burbank Subsection

Lockheed Drive represents the northern limit of the E2 Burbank Subsection. South of Lockheed Drive, all E2 Build Alternative alignment, ancillary features, and station sites within the Burbank Subsection would be identical to the features described for the Refined SR14 Burbank Subsection.

Table 2-28 E2 Build Alternative Central Subsection Roadway Modifications

City	Road	Proposed Modification	Description of Proposed Work	Existing # of Lanes	Proposed # of Lanes
Palmdale	Sierra Highway	Road realignment	Sierra Highway would be realigned from East Avenue R8 to East Barrel Springs Road.	2 NB lanes and 2 SB lanes to Una Lake, then reduced to 1 NB lane and 1 SB lane to Barrel Springs Road	1 NB lane and 1 SB lane
Palmdale	East Avenue S	Overcrossing	East Avenue S would be grade separated as an overpass over HSR tracks, Metrolink tracks, and proposed realigned Sierra Highway from 5th Street to 900 feet east of 10th Street.	2 EB lanes and 2 WB lanes	3 EB lanes and 3 WB lanes
Palmdale	East 10th Street	Road realignment	East 10th Street would be vertically realigned to connect to the proposed East Avenue S	1 EB lane and 1 WB lane	2 EB lanes and 2 WB lanes
Palmdale	East Avenue R11	New road	Due to the grade separation at E Avenue S, it is necessary to enlarge East Avenue R11 to complete the crossing above the rail tracks	Currently is a narrow back access to a building	1 NB lane and 1 SB lane with connections to Sierra Highway and East 10th Street
Unincorporated Los Angeles County	SR 14/Sierra Highway Interchange	Road realignment	The existing interchange would be reconfigured. The northbound SR 14 off-ramp and on-ramp would be realigned to the southwest of the existing Sierra Highway intersection. The existing Sierra Highway connection to the southbound off-ramp and on-ramp would be reprofiled but would follow the same path. Sierra Highway to the south of the existing intersection would diverge to the east and reconnect to existing Sierra Highway adjacent to the existing northbound off-ramp.	2 NB lanes and 2 SB lanes before interchange, 1 NB lane and 1 SB lane after interchange, 1 EB on-ramp, 1 EB off-ramp, 1 WB on-ramp, 1 WB off-ramp	2 NB lanes and 2 SB lanes before interchange, 1 NB lane and 1 SB lane after interchange, 1 EB on-ramp, 1 EB off-ramp, 1 WB on-ramp, 1 WB off-ramp
Unincorporated Los Angeles County	Angeles Forest Highway	Road realignment	Angeles Forest Highway would be realigned easterly from Vincent View Road to East Carson Mesa Road.	1 NB lane and 1 SB lane	1 NB lane and 1 SB lane
Unincorporated Los Angeles County	Mountain Springs Road	Overcrossing	Mountain Springs Road would be extended from Sierra Highway to the realigned Angeles Forest Highway. It would be grade separated over the existing Metrolink tracks.	1 WB lane and 1 EB lane	1 WB lane and 1 EB lane

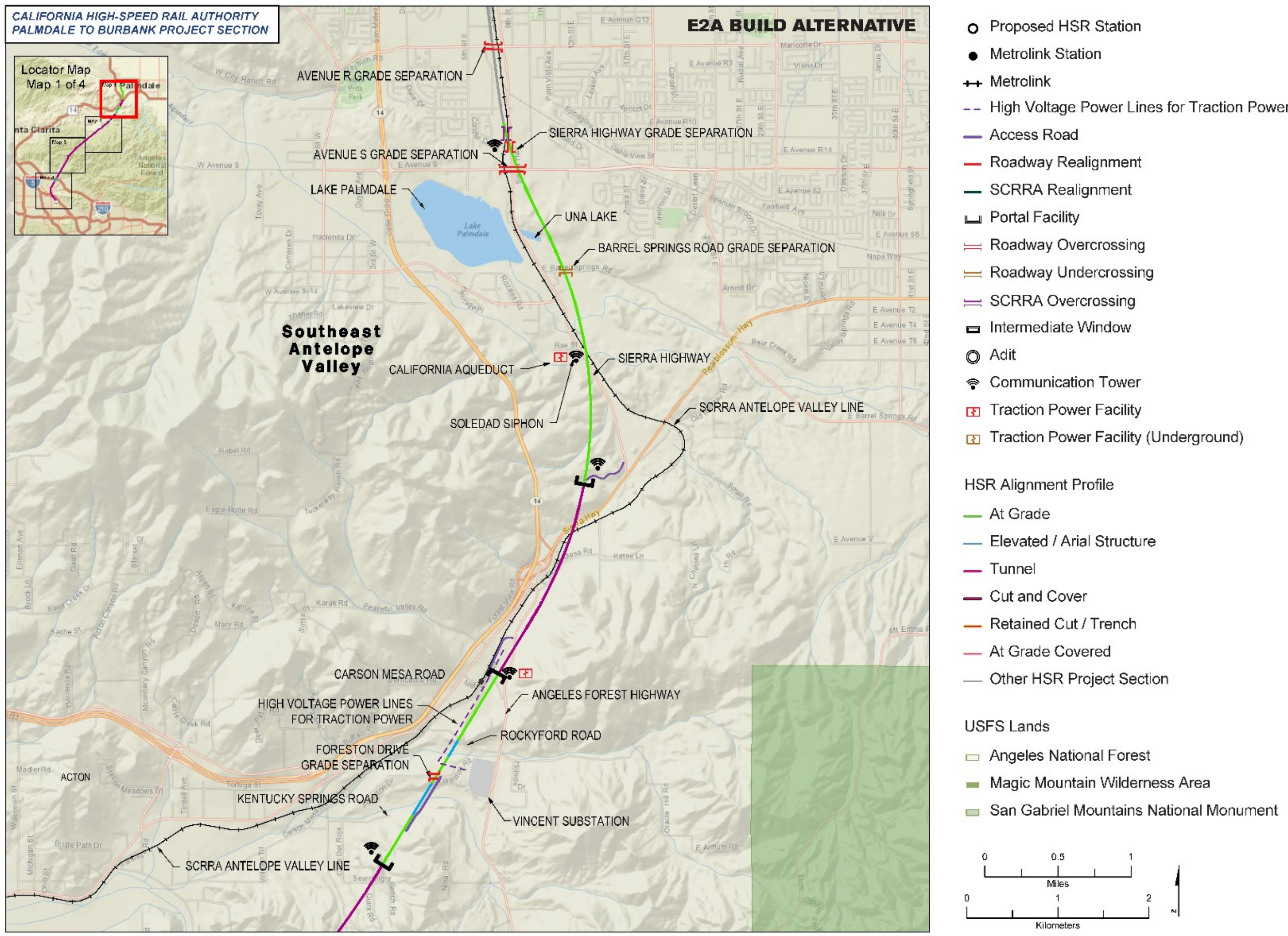
City	Road	Proposed Modification	Description of Proposed Work	Existing # of Lanes	Proposed # of Lanes
Unincorporated Los Angeles County	Carson Mesa Road	Road extension	Carson Mesa Road would be extended from Vincent View Road to the intersection of Mountain Springs Road.	1 NB lane and 1 SB lane	1 NB lane and 1 SB lane
Unincorporated Los Angeles County	Foreston Drive	Overcrossing	Foreston Drive would be grade separated as an overpass over the HSR tracks and widened from approximately 900 feet west of the HSR tracks to the intersection of Angeles Forest Highway.	1 WB lane and 1 EB lane	1 WB lane and 1 EB lane
Unincorporated Los Angeles County	Aliso Canyon Road	Overcrossing	Aliso Canyon Road would be modified vertically to accommodate the HSR tracks.	1 NB lane and 1 SB lane	1 NB lane and 1 SB lane (plus space for future ultimate widening)
Sunland / Tujunga	Wentworth Street	Overcrossing	HSR would bridge over existing Wentworth Street.	2 EB lanes and 2 WB lanes	2 EB lanes and 2 WB lanes

EB = eastbound; HSR = high-speed rail; NB = northbound; SB = southbound; WB = westbound

2.5.3.6 E2A Build Alternative

Through consultation with resource agencies, the Authority developed the E2A Build Alternative to reduce impacts on aquatic resources south of the city of Palmdale. As the E2A Build Alternative was developed based on the E2 Build Alternative, the above description of the E2 Build Alternative applies to the E2A Build Alternative, unless otherwise noted. Figure 2-76 through Figure 2-80 show the proposed E2A Build Alternative.

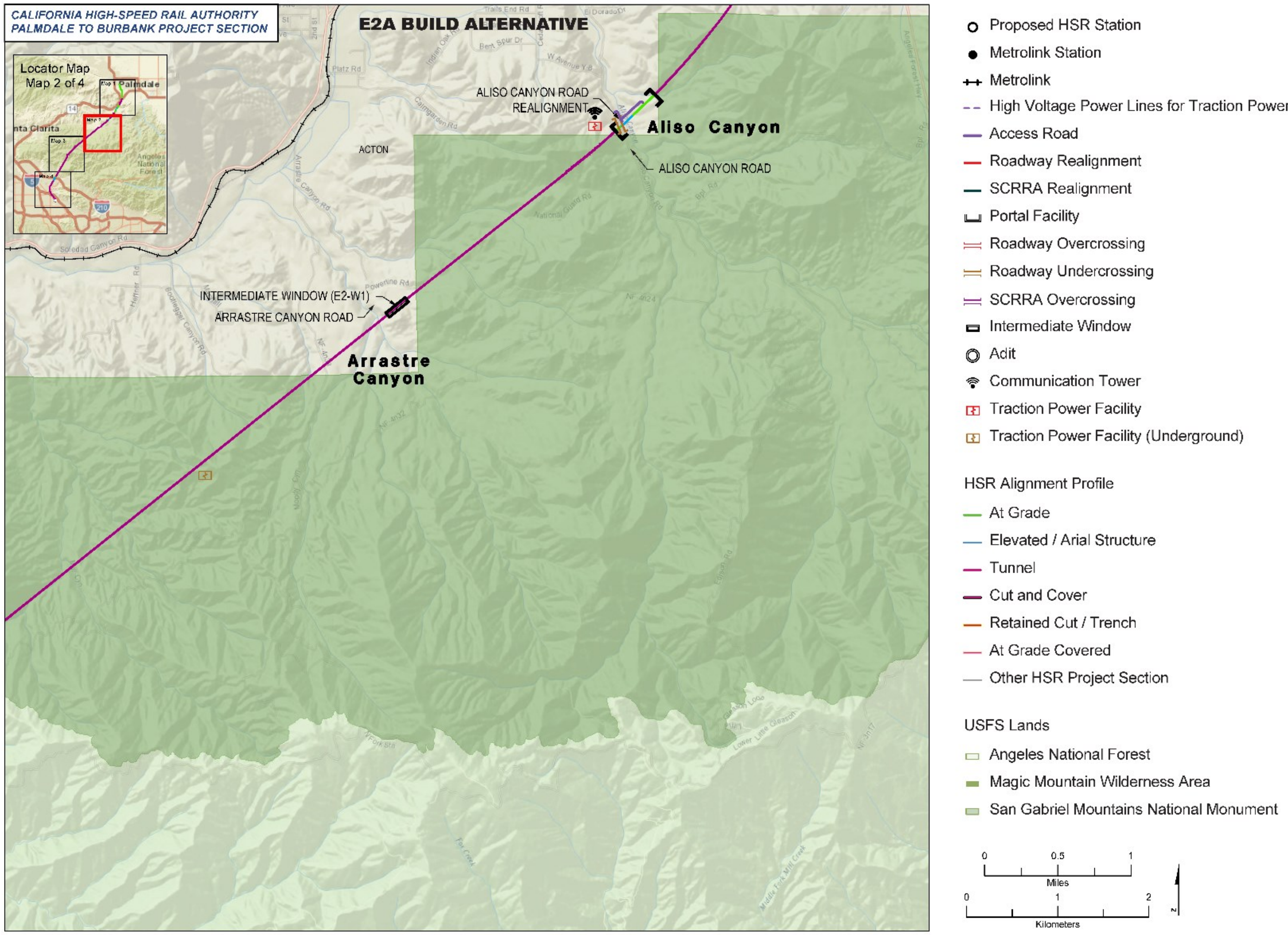
Figure 2-76 E2A Build Alternative Overview Map



PRELIMINARY DRAFT/SUBJECT TO CHANGE - HSR ALIGNMENT IS NOT DETERMINED
Source: Authority, 2021; National Geographic/Esri, 2021

May 14, 2021

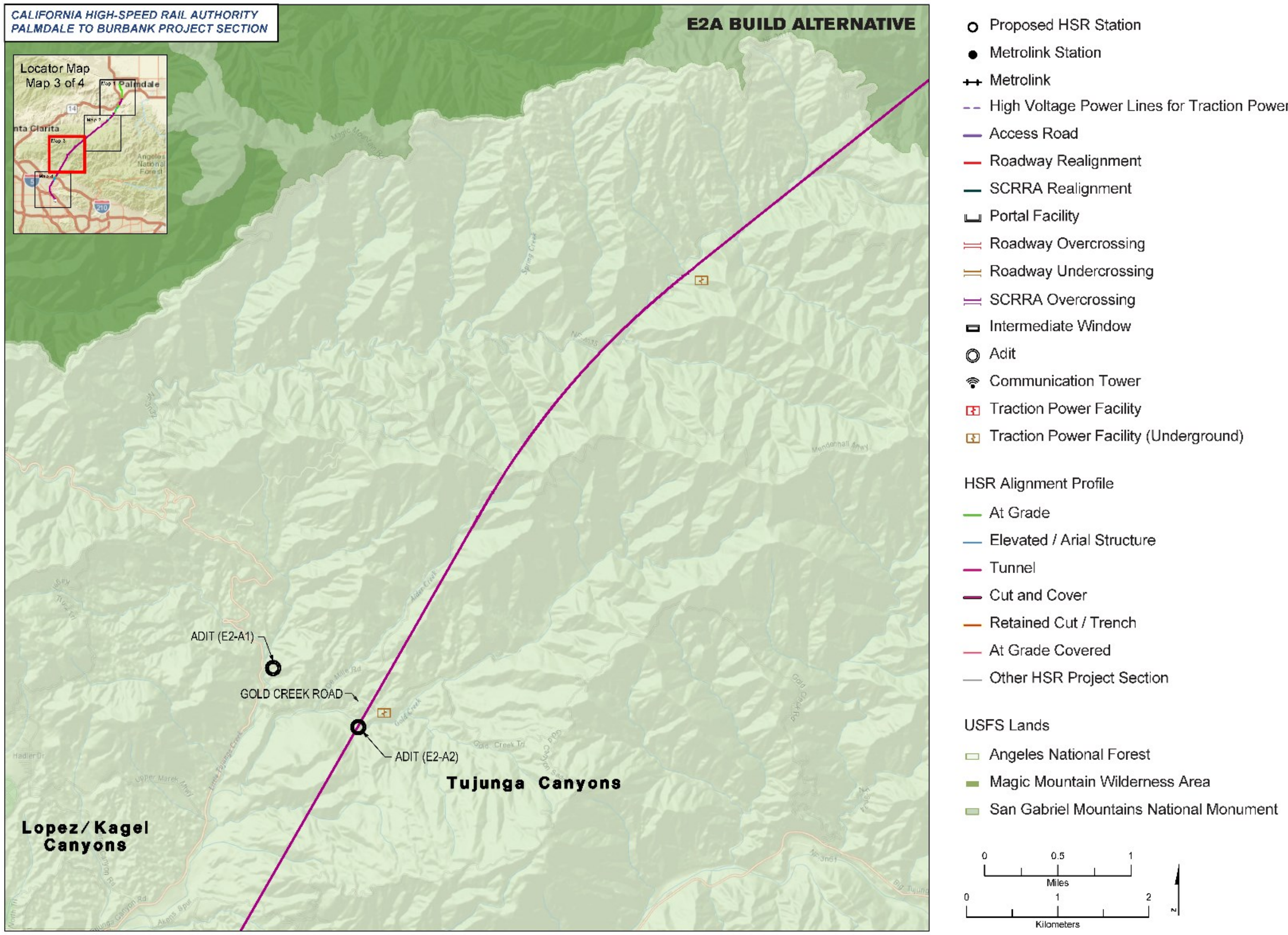
Figure 2-77 E2A Build Alternative (Map 1 of 4)



PRELIMINARY DRAFT/SUBJECT TO CHANGE - HSR ALIGNMENT IS NOT DETERMINED
Source: Authority, 2021; National Geographic/Esri, 2021

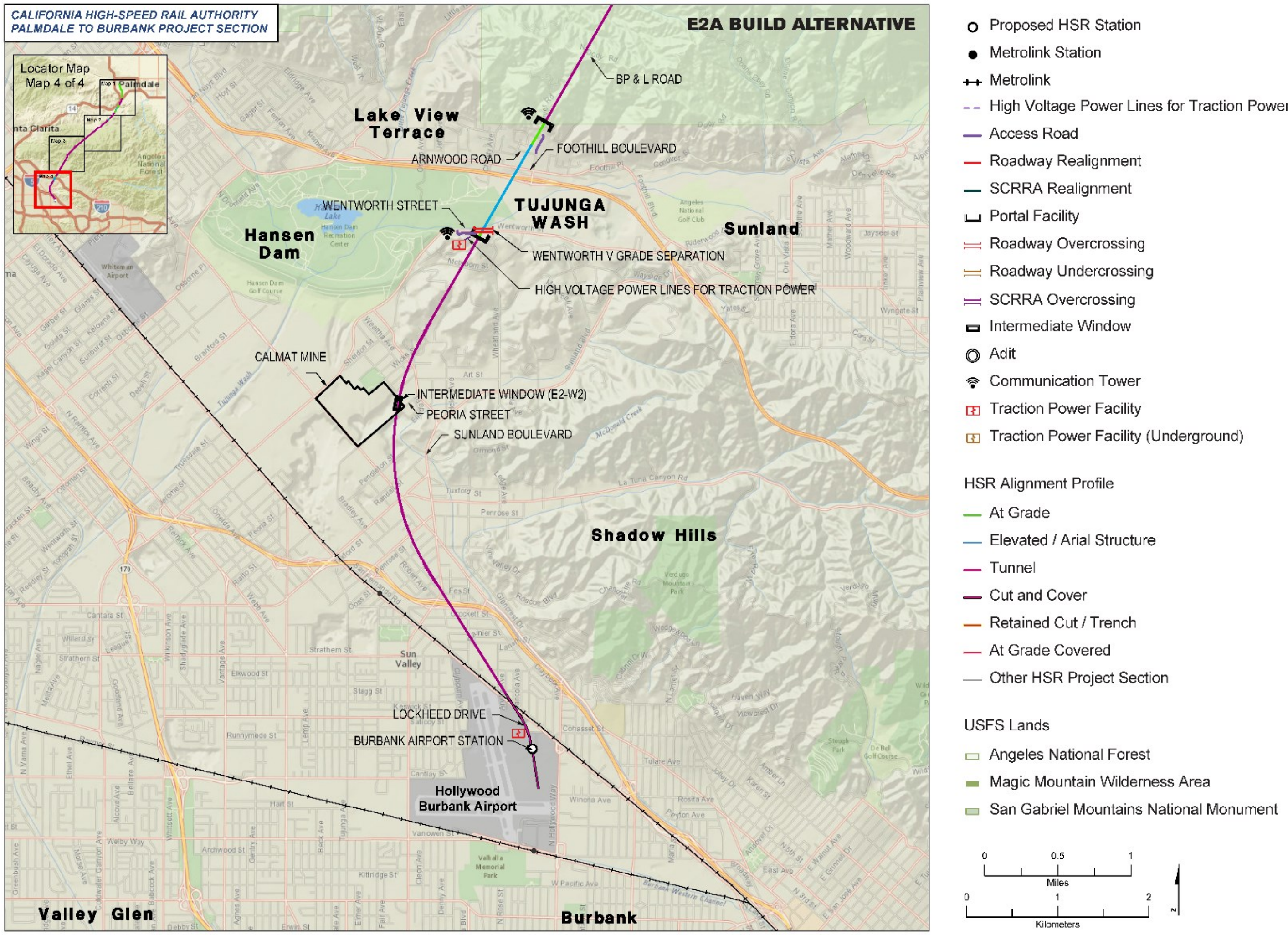
May 14, 2021

Figure 2-78 E2A Build Alternative (Map 2 of 4)



PRELIMINARY DRAFT/SUBJECT TO CHANGE - HSR ALIGNMENT IS NOT DETERMINED May 14, 2021
Source: Authority, 2021; National Geographic/Esri, 2021

Figure 2-79 E2A Build Alternative (Map 3 of 4)



PRELIMINARY DRAFT/SUBJECT TO CHANGE - HSR ALIGNMENT IS NOT DETERMINED
Source: Authority, 2021; National Geographic/Esri, 2021

May 14, 2021

Figure 2-80 E2A Build Alternative (Map 4 of 4)

E2A Central Subsection

Alignment

The E2A Build Alternative would be identical to the E1A Build Alternative from Spruce Court to Vincent View Road, where it would rejoin with the E2 Build Alternative Alignment. The remaining E2A Build Alternative alignment south of Vincent View Road, under the ANF, into the San Fernando Valley, and to the southern terminus of the Central Subsection would be identical to the E2 Build Alternative alignment.

Ancillary Features

Irrigation and Drainage Facilities

- Drainage along the HSR tracks from the Soledad Siphon to Portal 1A would be conveyed to a drainage basin south of Soledad Siphon.
- Drainage from Portal 3A near Vincent View Road to Portal 1 south of Kentucky Springs Road would be conveyed to the two existing natural washes. HSR tracks would cross over the washes on proposed rail viaducts.
- The drainage runoff at tunnel portals would be intercepted with proposed drainage channels. The runoff would be conveyed around the tunnel portals and released back into the existing natural watercourse.

The remaining proposed drainage facilities within the mountain areas would include the following:

- Natural-lined or concrete-lined drainage ditches/channels
- Culvert crossings
- Detention basins

Operations Facilities

- TPSSs:
  - TPSS17C would be at Station 550+00, close to the Edison SCE Vincent Substation in Acton.
  - TPSS18C would be at Station 1680+00, within the Portal 5 footprint.
- PSs:
  - A PS would be at Station 412+00, south of Palmdale Station, close to Avenue S.
  - A PS would be at Station 745+00, within Portal 3 footprint.
  - A PS would be at Station 982+00, underground within a tunnel.
  - A PS would be at Station 1448+00, underground within a tunnel.
- Switching stations:
  - A switching station would be at Station 1216+00, underground within a tunnel.
- CTs:
  - All open-air Traction Power Facilities and Tunnel Portals would include a 100-foot CT inside the footprint.
  - The following CTs would be near the tracks to provide additional coverage:
    - CT at Station 307+00

Utilities

The E2A Central Subsection would cross several high risk utilities, including 34 natural gas lines, 3 petroleum and fuel pipelines, and 75 water pipelines. Low-risk utilities within the E2A Central Subsection include water, sewer, telecommunications, storm drainage, and fiber optic.

Access Roads

Access roads to portals are intended both for construction access and for tunnel maintenance and emergency access during operation. In mountainous areas (as opposed to urban areas), the portals would be furnished with a series of infrastructure elements related to tunnel ventilation, noise mitigation, traction power, emergency and rescue facilities, firefighting, communications utilities, and rock fall containment, among others.

- **Tunnel Portal 1A—**This access road would connect the existing Sierra Highway, near the intersection with Pearblossom Highway to Portal 1A. The access road would traverse mountainous terrain and would require moderate grading
- **Tunnel Portal 3A—**This access road would connect the existing Angeles Forest Highway to Portal 3A and would run parallel to West Carson Mesa Road. The access road would require minor grading because of the flatness of the site.
- **Tunnel Portal 1—**This access road is proposed off Foreston Drive, on the east side of the E2A alignment, and would run parallel for approximately 2,700 feet to Portal 1. This road would be near the Vincent Substation.
- **Tunnel Portal 2—**This access road would be located off Aliso Canyon Road. It would parallel the HSR tracks and extend across the existing floodplain to the entrance of Portal 2.
- **Tunnel Portal 3—**This portal does not require a new access road. Access to this portal would be from the existing Aliso Canyon Road.
- **Tunnel Portal 4—**Wheatland Avenue would be extended northerly by approximately 800 feet to access this portal.
- **Tunnel Portal 5—**The access road to this portal would be constructed off Wentworth Street along the south side.

Adits and Intermediate Windows

Adits and intermediate windows for the E2A Central Subsection would be identical to those described for the E2 Central Subsection.

Station Sites

There are no station sites proposed within the E2A Central Subsection.

State Highway or Local Roadway Modifications

Table 2-29 summarizes state highway and local roadway modifications in the E2A Central Subsection.

Freight or Passenger Railroad Modifications

The E2A Central Subsection would require the relocation of approximately 1.5 miles of the existing Metrolink railroad between Avenue R and Una Lake.

Land Use and Community Modifications

The E2A Central Subsection would require land conversion of several non-transportation uses (both existing and planned) to a permanent (rail) transportation use. Conversion of existing land uses would include 18 acres of Institutional, 5 acres of Commercial, 175 to 176 acres of Residential, 5 acres of Agricultural, less than 1 acre of Recreational, 27 acres of Public, up to 1 acre of Institutional, and 574 to 586 acres of Vacant. Conversion of planned land uses would include 61 acres of Industrial, 19 acres of Commercial, 0 to less than 1 acre of Medium-High-Density Residential, 555 acres of Low-Density Residential, 143 acres of Agricultural/Open Space, 64 to 87 acres of ANF, including the SGMNM, and 59 acres of Public Facility/Institutional.

E2A Burbank Subsection

Lockheed Drive represents the northern limit of the E2A Burbank Subsection. South of Lockheed Drive, all E2A Build Alternative alignment, ancillary features, and station sites within the Burbank Subsection would be identical to the features described for the Refined SR14 and E2 Burbank Subsection.

Table 2-29 E2A Build Alternative Central Subsection Roadway Modifications

City	Road	Proposed Modification	Description of Proposed Work	Existing # of Lanes	Proposed # of Lanes
Palmdale	Sierra Highway (from East Avenue R8 to Jefferson Avenue)	Road vertical realignment	Sierra Highway would be vertically realigned from East Avenue R8 to Jefferson Avenue to cross over HSR and under realigned Avenue S.	2 NB lanes and 2 SB lanes	2 NB lanes and 2 SB lanes
Palmdale	East Avenue S	Overcrossing	East Avenue S is a proposed grade-separation crossing over HSR, Metrolink, and proposed Sierra Highway realignment. The roadway improvement limits extend from 5th Street East to Windy Creek Street.	2 EB lanes and 2 WB lanes	3 EB lanes and 3 WB lanes
Palmdale	East 10th Street	Road realignment	East 10th Street would be vertically realigned to connect to the proposed East Avenue S.	1 EB lane and 1 WB lane	2 EB lanes and 2 WB lanes
Palmdale	East Avenue R11	New road	Due to the grade separation at East Avenue S, it is necessary to enlarge East Avenue R11 to complete the crossing above the rail tracks.	Currently is a narrow back access to a building	1 NB lane and 1 SB lane with connections to Sierra Highway and East 10th Street
Palmdale	Valley Forge Road Patrick Henry Place Jefferson Avenue	Road realignment	Due to the new HSR tracks, Valley Forge Road would be displaced to the east approximately 100 feet, relocating the intersections with Patrick Henry Place and Jefferson Avenue.	1 EB lane and 1 WB lane	1 EB lane and 1 WB lane
Unincorporated Los Angeles County	Foreston Drive	Overcrossing	Foreston Drive would be grade separated as an overpass over the HSR tracks and widened from approximately 900 feet west of the HSR tracks to the intersection of Angeles Forest Highway.	1 WB lane and 1 EB lane	1 WB lane and 1 EB lane
Unincorporated Los Angeles County	Aliso Canyon Road	Overcrossing	Aliso Canyon Road would be modified vertically to accommodate the HSR tracks.	1 NB lane and 1 SB lane	1 NB lane and 1 SB lane (plus space for future ultimate widening)
Sunland / Tujunga	Wentworth Street	Overcrossing	HSR would bridge over existing Wentworth Street.	2 EB lanes and 2 WB lanes	2 EB lanes and 2 WB lanes

EB = eastbound; HSR = high-speed rail; NB = northbound; SB = southbound; WB = westbound

2.5.4 High-Speed Rail Build Alternatives – Description of Facilities within the ANF, including SGMNM

This section describes the elements of each of the six Build Alternatives that would be located within the ANF, including the SGMNM. Within the ANF the alignments of all six Build Alternatives would primarily be located underground in single-track twin tunnels with inner diameters of approximately 28 feet and a tunnel axes separation of approximately 66 feet. Short tunnels connecting the twin tunnels would be mined with a horseshoe-shaped cross section. The twin tunnels would be bored with a circular cross section using a TBM in most cases. Typical cross sections of mined and bored tunnels are shown in Section 2.3.4.5.

2.5.4.1 Refined SR14 Build Alternative

The Refined SR14 Build Alternative alignment would enter the ANF after crossing Soledad Canyon Road and the Santa Clara River (Figure 2-81). At this location, the Refined SR14 Build Alternative alignment would consist of a 12-mile-long tunnel, of which approximately 6.0 miles would be located beneath the ANF. Approximately 2.7 miles of the tunnel segment under the ANF would be within the SGMNM. The tunnels would reach a maximum depth of 2,080 feet. As the tunnels would follow a southerly direction under the ANF they would avoid passing under the Magic Mountain Wilderness Area. The tunnels would exit the ANF west of the Pacoima Reservoir.

The initial approximately 0.5 mile of the 12-mile tunnel, which would be located at the Vulcan Mine site, would be constructed at grade and covered. A portion of the Vulcan Mine site is situated within the ANF, including the SGMNM (Figure 2-82). Upon completion of the tunnel, the Vulcan Mine site would be regraded to better reflect the surrounding topography. The finished tunnel opening would be located outside of the ANF. As shown on Figure 2-81, construction activities associated with this tunnel portal would occur within the ANF, including the SGMNM, south of Lang Station Road. Construction activities associated with portal construction would include grading, restoration of the area around the Vulcan Mine, and installation of access roads. To the extent feasible, water pipelines to support construction activities would be co-located, on a temporary basis, within the footprint of existing roads within the ANF.

During construction, temporary power lines would be installed that extend southeast from the intersection of Soledad Canyon Road and Lang Station Road, across the Antelope Valley Metrolink Corridor, and along the northern boundary of the ANF. The CSA for these activities would extend from the Antelope Valley Metrolink Corridor into the ANF, east of the Vulcan Mine. About 5.8 acres of temporary CSA would be within the ANF, including the SGMNM. The tunnel portal construction would disturb approximately 91.7 acres of surface area through excavation and grading within the ANF, including the SGMNM. Additionally, approximately 127.2 acres of land around the Vulcan Mine and within the ANF, including areas within the SGMNM, would be used for the deposition of tunnel spoils. Rock and soil from tunnel construction would be used to fill a substantial portion of the existing Vulcan Mine pit, allowing this area to be regraded to better reflect surrounding topography after tunnel construction is complete. Within the ANF, including the SGMNM, approximately 0.6 acre would be used for access roadways, and 0.5 acre would be used for electrical utility facilities. After construction, approximately 219 acres of land at the Vulcan Mine site within the ANF would be regraded to better reflect the surrounding topography.

Adits

The Refined SR14 Build Alternative includes three options for 35-foot-wide tunnel access shafts, which are known as adits (as defined in Section 2.3.5.1). Of the three adit options for the Refined SR14 Build Alternative, one option (SR14-A1) would be located within the ANF, along Little Tujunga Canyon Road, southwest of the Magic Mountain Wilderness Area (Figure 2-82). The temporary CSA associated with this adit option would be within in-holdings within the ANF. As shown on Figure 2-83, the two other adit options (SR14-A2 and SR14-A3) would be just south of Pacoima Dam, outside the ANF. Only one of these potential adit sites would be selected. Table 2-30 describes temporary and permanent features within the ANF, related to SR14-A1. Prospective adit sites may be used for mid-tunnel ventilation structures.

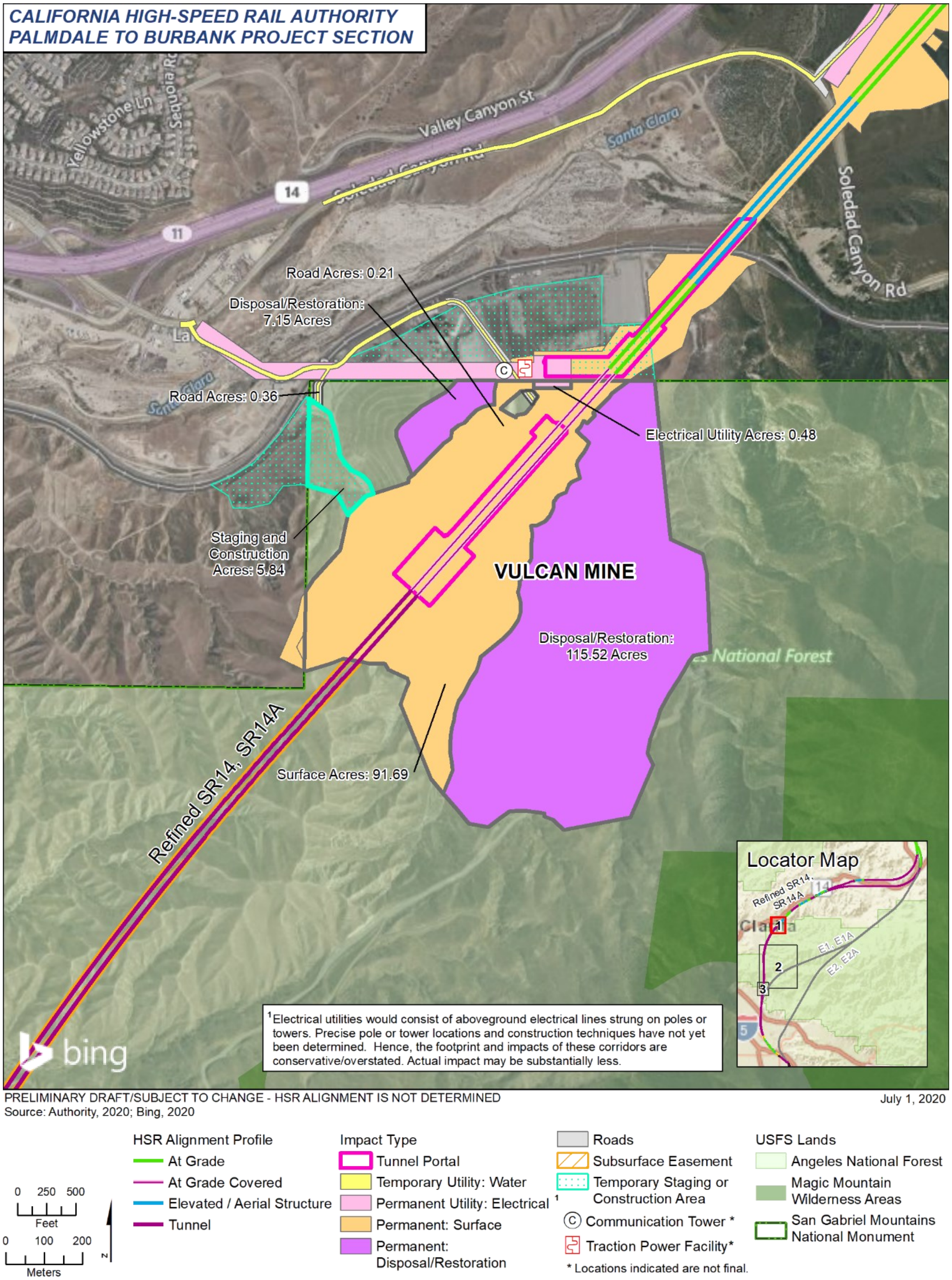


Figure 2-81 Refined SR14 Facilities within Angeles National Forest including the San Gabriel Mountains National Monument – Vulcan Mine Area

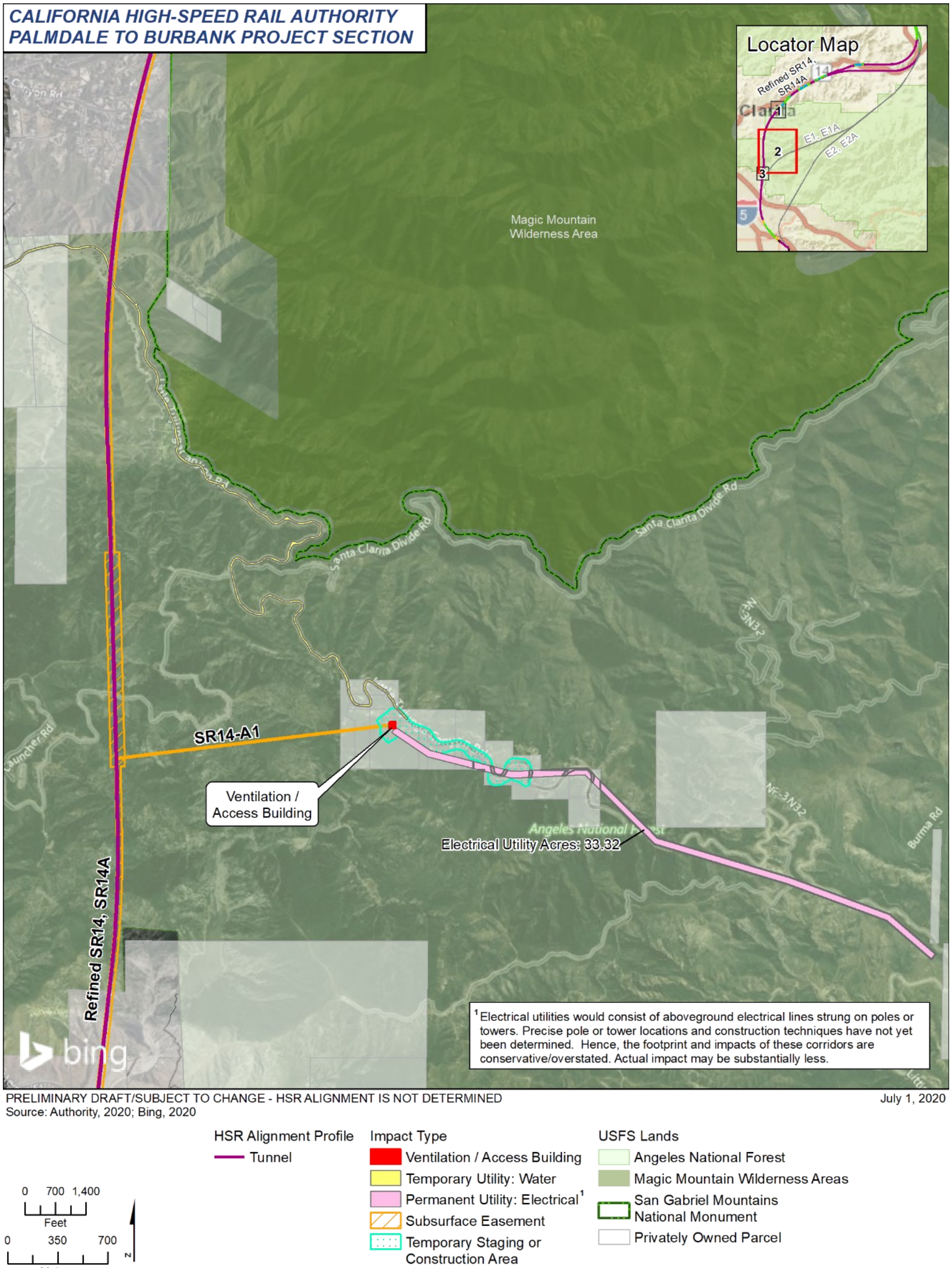


Figure 2-82 Refined SR14 Facilities within Angeles National Forest – Adit Option SR14- A1

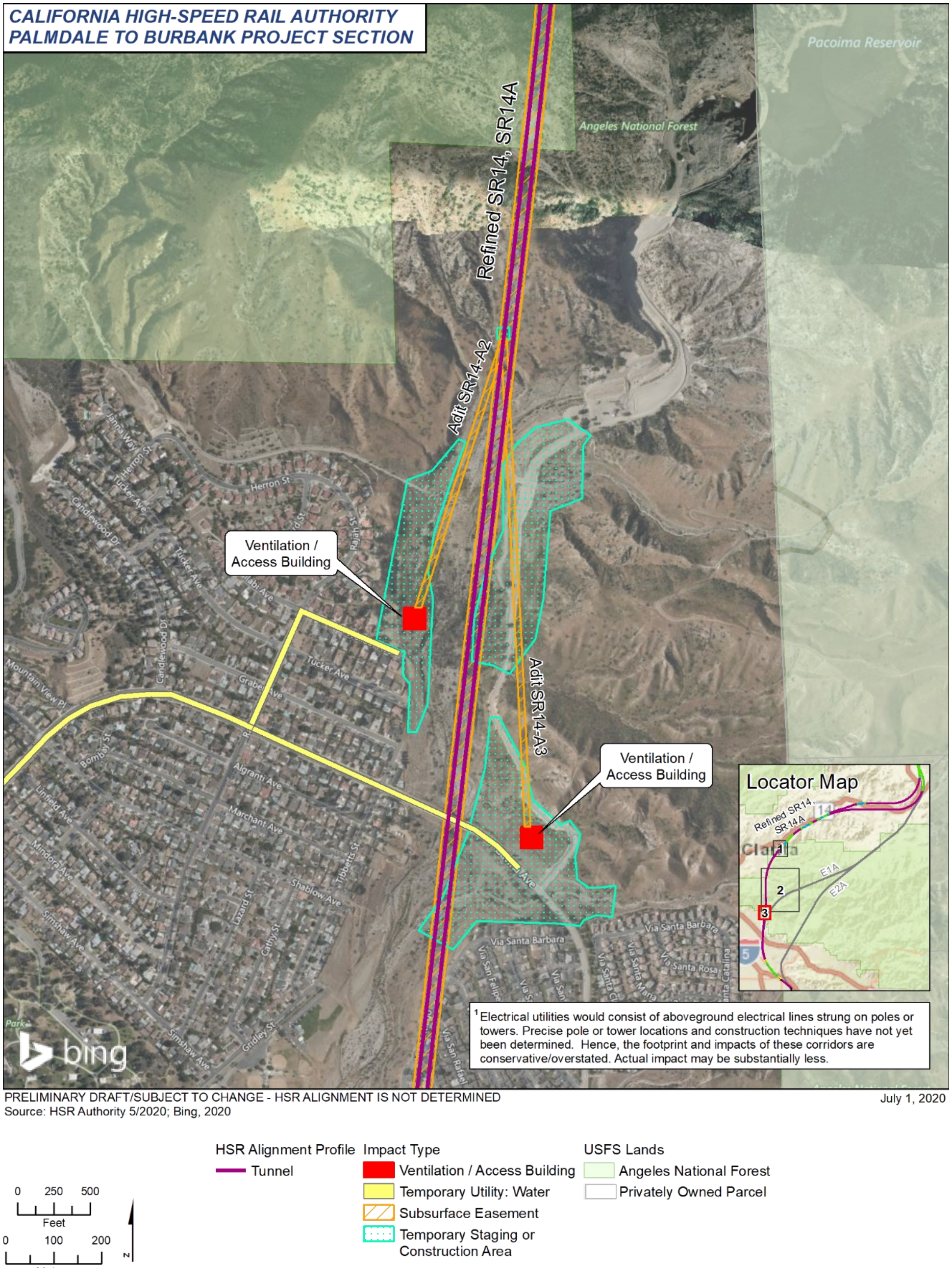


Figure 2-83 Refined SR14 Facilities within Angeles National Forest –Adit Option SR14-A2/A3

Table 2-30 Refined SR14 Adit Facilities within Angeles National Forest

Facility	Facility Description
Temporary Facilities	
SR14-A1 Temporary CSA	Approximately 32.8 acres of temporary CSA would be associated with SR14-A1. The CSA would be located on privately owned parcels within the ANF. Approximately 5.8 acres of temporary CSA would be within the Vulcan Mine area.
SR14-A1 Temporary water supply for construction purposes	Water would be delivered to the SR14-A1 CSA through a temporary pipeline extending from existing water facilities at the intersection of Able Street and Sand Canyon Road. The footprint for this pipeline would be located within existing roadways, including Sand Canyon Road and Little Tujunga Canyon Road.
Potential Permanent Facilities	
Mid-tunnel ventilation building (TBD)	The adit site within the ANF may potentially be used for a mid-tunnel ventilation building. This structure would be approximately 50 feet wide by 50 feet long by 18 feet high, occupying approximately 20,000 square feet.
Power lines	A power line originating in the SR14-A1 CSA would parallel Little Tujunga Canyon Road to the east for 2.5 miles to bring power to the adit in the ANF (if selected) and would require approximately 33.3 acres. This power line would be permanent and used during construction and operations.

CSA = construction staging area; TBD = to be determined

2.5.4.2 SR14A Build Alternative

All SR14A Build Alternative alignment and ancillary features within the ANF, including the SGMNM, would be identical to the features described for the Refined SR14 Build Alternative.

2.5.4.3 E1 Build Alternative

The E1 Build Alternative alignment would enter the ANF underground in single-track twin tunnels approximately 0.2 mile south of the Enchanted Hills Road western terminus (Figure 2-84). The twin tunnels would continue southwest beneath the ANF for approximately 1.6 miles. In this area, the tunnels would have an approximate maximum depth of 880 feet.

The E1 Build Alternative alignment would exit the tunnels outside the ANF in the vicinity of Aliso Canyon Road, continue on a viaduct across Aliso Canyon Road, and then re-enter the ANF through a second set of twin tunnels (Figure 2-85). The tunnels would be approximately 21.7 miles long and would reach a maximum depth of approximately 2,063 feet. The initial 16.5 miles of these tunnels would be constructed beneath the ANF, including 6 miles within the SGMNM.

Although the tunnel portals on either side of Aliso Canyon Road would be outside of the ANF, grading and slope stabilization would be required on adjacent/nearby lands that are within the ANF. Water pipelines necessary to support construction would be co-located along existing roads on a temporary basis and would extend into the tunnel portal area. Power lines would also be placed in the ANF, including the SGMNM, along Aliso Canyon Road south for approximately 0.8 mile. In addition, Aliso Canyon Road would be reprofiled in the area where the road approaches the rail alignment. The roadway would be lowered to allow for it to operate beneath the E1 Build Alternative alignment. The tunnel portal construction would require approximately 25.2 acres of surface area disturbance within the ANF, including areas within the SGMNM (Figure 2-85). Additionally, approximately 6.5 acres would be needed accommodate the modifications to Aliso Canyon Road, and an additional 6.2 acres would be needed for the installation of the electrical utility line.

South of Aliso Canyon, the E1 Build Alternative alignment would continue through tunnels and exit the ANF east of Arrastre Canyon Road (Figure 2-86). Installation of this portal facility would not result in surface impacts within the ANF.

Continuing southwest from Arrastre Canyon Road, the E1 Build Alternative alignment would re-enter the ANF in a tunnel near Moody Truck Trail. The E1 Build Alternative alignment would curve south-southwest under the ANF, exit the national forest, and continue underground beneath the Sylmar neighborhood of the city of Los Angeles.

Adits

The E1 Build Alternative includes two options for 35-foot-wide adits. Potential E1 Build Alternative adit options would be located within the ANF, but only one of these potential adit sites would be used. The underground alignment/tunnel access for Adit Option E1-A1 would extend east from the underground cavern to a CSA north of Little Tujunga Canyon Road (Figure 2-87). E1-A2 would extend west from the underground cavern to a CSA located along Little Tujunga Canyon Road (Figure 2-88). Both of the temporary CSAs associated with these adit options would be located on in-holdings within the ANF. Table 2-31 shows temporary and permanent features within the ANF related to E1-A1 and E1-A2. Prospective adit sites may potentially serve as a mid-tunnel ventilation structures.

Table 2-31 E1 Adit Facilities within the Angeles National Forest

Facility	Facility Description
Temporary Facilities	
E1-A1 Temporary CSA	Approximately 32.8 acres of temporary CSA would be associated with E1-A1. The CSA would be located on privately owned parcels within the ANF.
E1-A2 Temporary CSA	Approximately 28.0 acres of temporary CSA would be associated with E1-A2. The CSA would be located on privately owned parcels within the ANF.
E1-A1 and E1-A2 Temporary water supply for construction purposes	Water would be delivered to the E1-A1 and E1-A2 CSAs via a temporary pipeline extending from existing water facilities at Sand Canyon Road, approximately 4.5 miles from the adit. The footprint for this pipeline would be within existing roadways, including Sand Canyon Road and Little Tujunga Canyon Road.
Potential Permanent Facilities	
Mid-tunnel ventilation building (TBD)	The adit site within the ANF may potentially be used for a mid-tunnel ventilation building. This structure would be approximately 50 feet wide by 50 feet long by 18 feet high, occupying approximately 20,000 square feet.
E1-A1 Power lines	A power line originating in the E1-A1 CSA would parallel Little Tujunga Canyon Road to the East for 2.5 miles to bring power to the adit in the ANF (if selected) and would require approximately 33.3 acres. This power line would be permanent and used during construction and operations.
E1-A2 Power lines	A power line originating in the E1-A1 CSA would parallel Little Tujunga Canyon Road to the East for 2.5 miles to bring power to the adit in the ANF (if selected) and would require approximately 26.8 acres. This power line would be permanent and used during construction and operations.

ANF = Angeles National Forest; CSA = construction staging area; TBD = to be determined

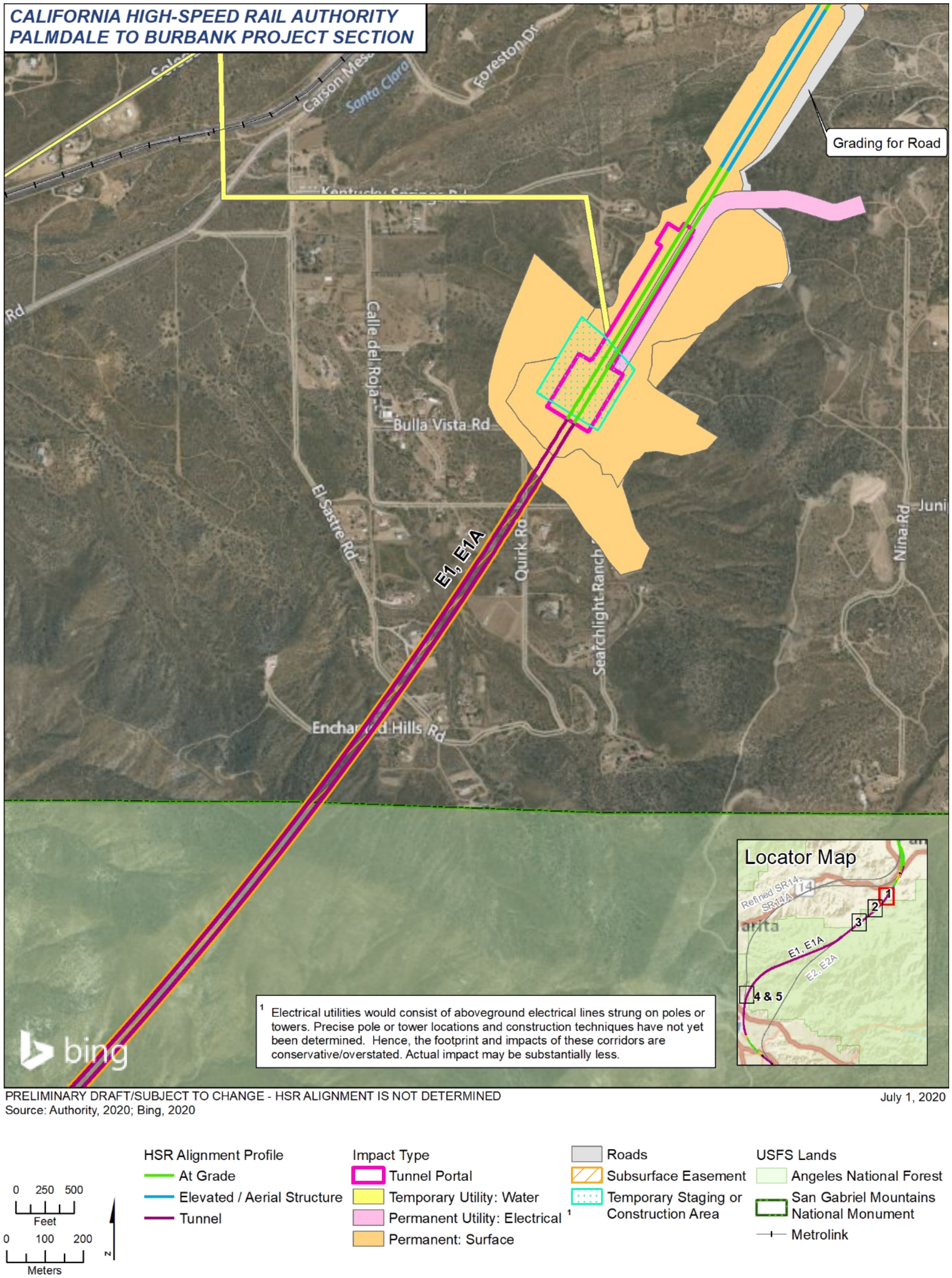


Figure 2-84 E1 Facilities within Angeles National Forest including San Gabriel Mountains National Monument – Tunnel Portal North

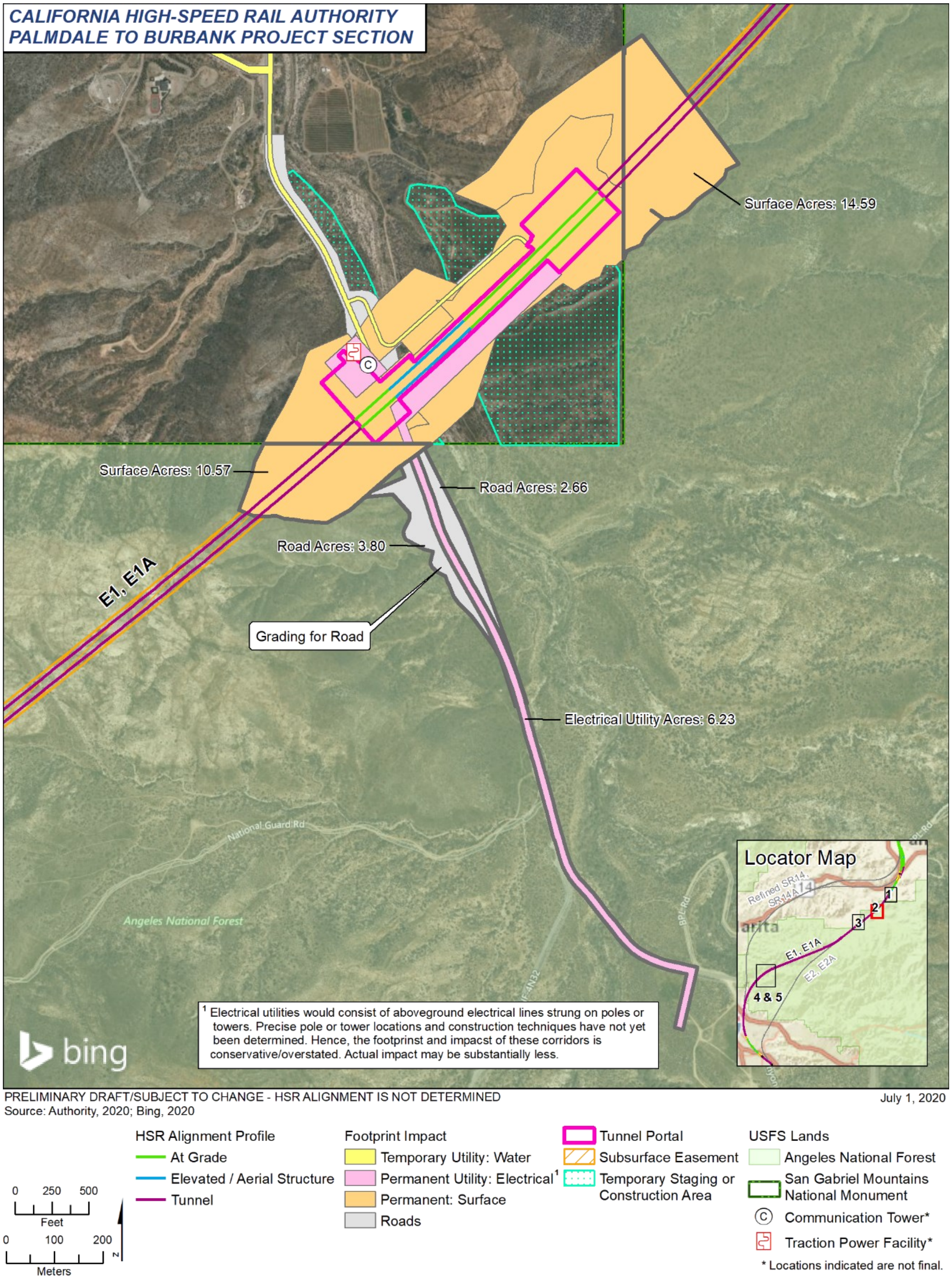


Figure 2-85 E1 Facilities within the Angeles National Forest including San Gabriel Mountains National Monument – Aliso Canyon Area

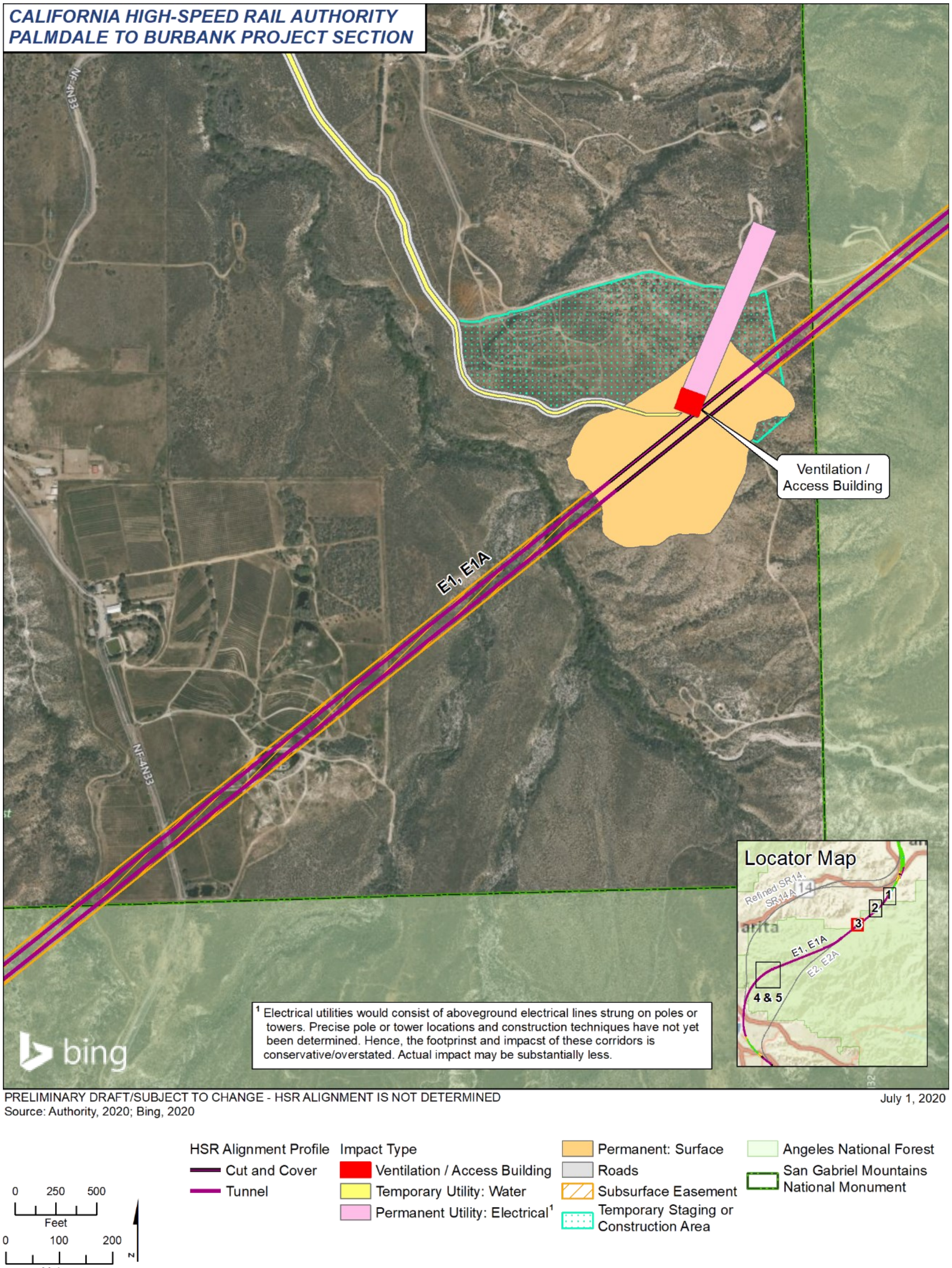


Figure 2-86 E1 Facilities within the Angeles National Forest including San Gabriel Mountains National Monument – Arrastre Canyon

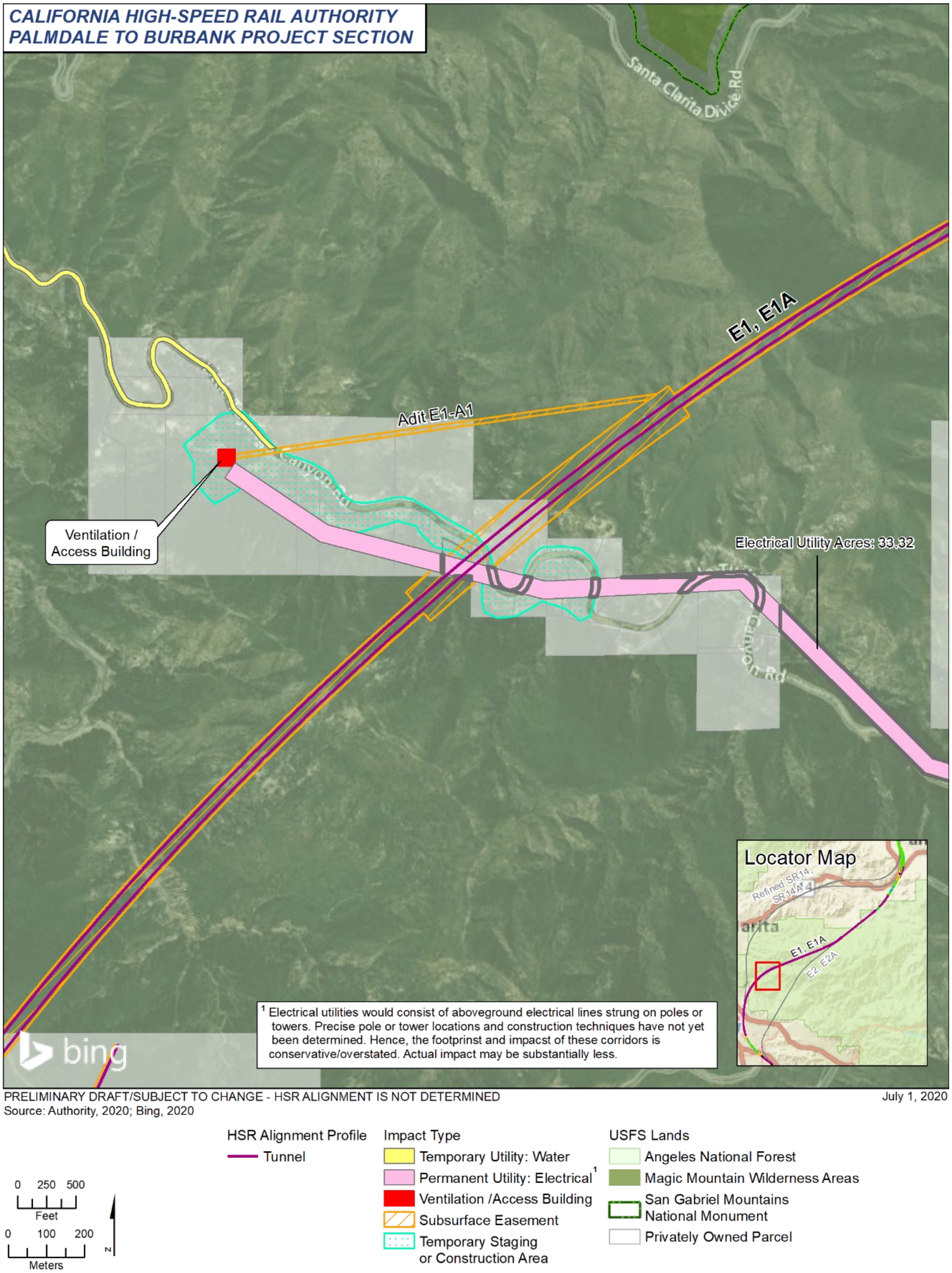


Figure 2-87 E1 Facilities within Angeles National Forest – Adit Option E1-A1

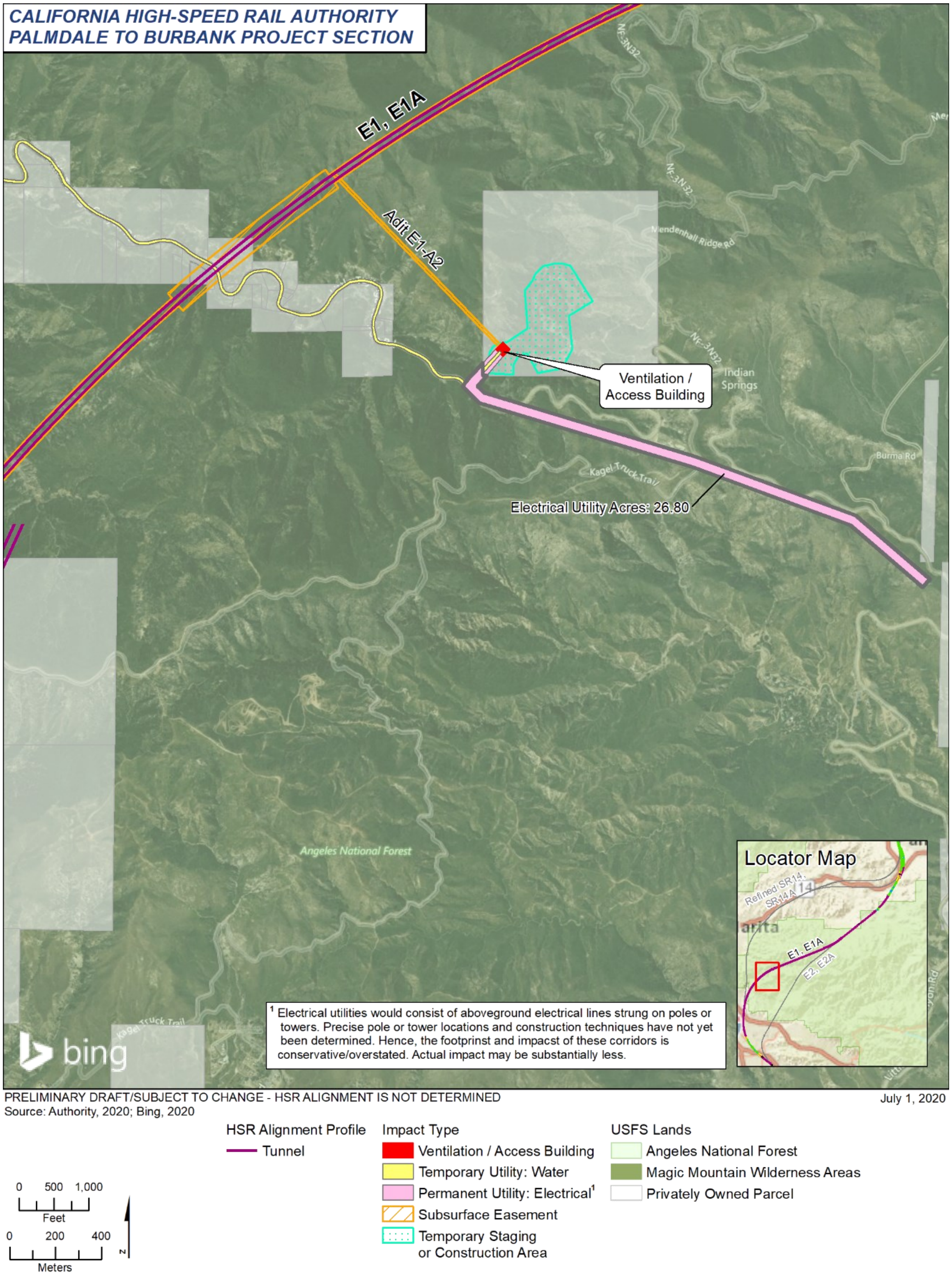


Figure 2-88 E1 Facilities within Angeles National Forest – Adit Option E1-A2

2.5.4.4 E1A Build Alternative

All E1A Build Alternative alignment and ancillary features within the ANF, including the SGMNM, would be identical to the features described for the E1 Build Alternative.

2.5.4.5 E2 Build Alternative

The E2 Build Alternative alignment would enter the ANF, including the SGMNM, while underground in single-track twin tunnels approximately 0.2 mile south of the Enchanted Hills Road western terminus (Figure 2-89). The twin tunnels would continue southwest beneath the ANF, including the SGMNM, for approximately 1.6 miles. In this area, the tunnels would have an approximate maximum depth of 880 feet.

The E2 Build Alternative alignment would exit the tunnels outside the ANF, including the SGMNM, in the vicinity of Aliso Canyon Road, continue on a viaduct across Aliso Canyon Road, and then re-enter the ANF, including the SGMNM, through a second set of twin tunnels (Figure 2-90). The tunnels would be 21.7 miles in length and would reach a maximum depth of 2,670 feet. The initial 16.5 miles of these tunnels would be constructed beneath ANF, including 6 miles of the SGMNM.

Water pipelines necessary to support construction would be co-located, on a temporary basis, along existing roads and would extend into the Aliso Canyon Road tunnel portal areas. Similar to the E1 Build Alternative alignment, the E2 Build Alternative alignment would require grading and slope stabilization on adjacent/nearby lands of Aliso Canyon Road that are within the boundaries ANF, including the SGMNM (Figure 2-90). During construction, power lines would also be installed within the ANF, including the SGMNM, along Aliso Canyon Road for approximately 0.8 mile to the south of this road. In addition, Aliso Canyon Road would be reprofiled in the area where the road approaches the rail alignment. The roadway would be lowered to allow for it to operate beneath the E2 Build Alternative alignment.

South of Aliso Canyon, the E2 Build Alternative alignment would remain in tunnel and exit the ANF, including the SGMNM, east of Arrastre Canyon Road (Figure 2-91). Installation of this facility would not result in surface impacts within the ANF, including the SGMNM.

Continuing southwest from Arrastre Canyon Road, the E2 Build Alternative alignment would re-enter the in tunnels near Moody Truck Trail. The E2 Build Alternative would curve south-southwest and would traverse the ANF, including the SGMNM, in tunnels. The tunnels would exit the ANF in the hills above the Lake View Terrace neighborhood of the city of Los Angeles where the alignment would transition from bored tunnels to at grade (Figure 2-92).

Adits

The E2 Build Alternative includes two options for 35-foot-wide adits within the ANF. Only one of these potential E2 Build Alternative adit sites would be used. Adit Option E2-A1 would extend west from the tunnel alignment to a temporary CSA within an in-holding approximately 0.4 mile north of Gold Creek Road (Figure 2-93). Adit Option E2-A2 would also extend west from the underground cavern to a temporary CSA located within an in-holding along Gold Creek Road (Figure 2-94). Table 2-32 describes the temporary and permanent features within the ANF related to the E2 adit options. Each adit site could potentially serve as a mid-tunnel ventilation structure.

2.5.4.6 E2A Build Alternative

All E2A Build Alternative alignment and ancillary features within the ANF, including the SGMNM, would be identical to the features described for the E2 Build Alternative.

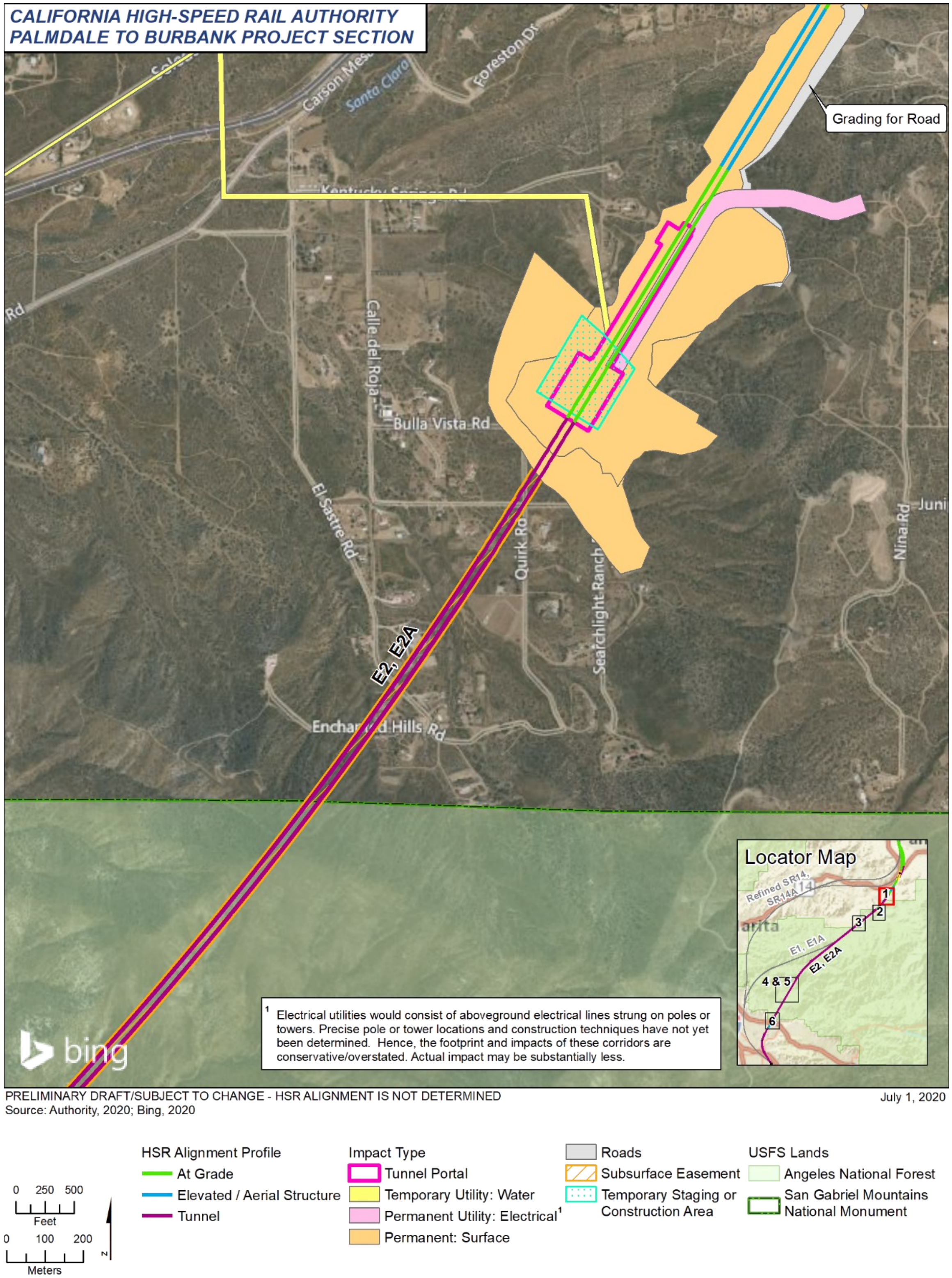


Figure 2-89 E2 Facilities within Angeles National Forest including San Gabriel Mountains National Monument – Tunnel Portal North

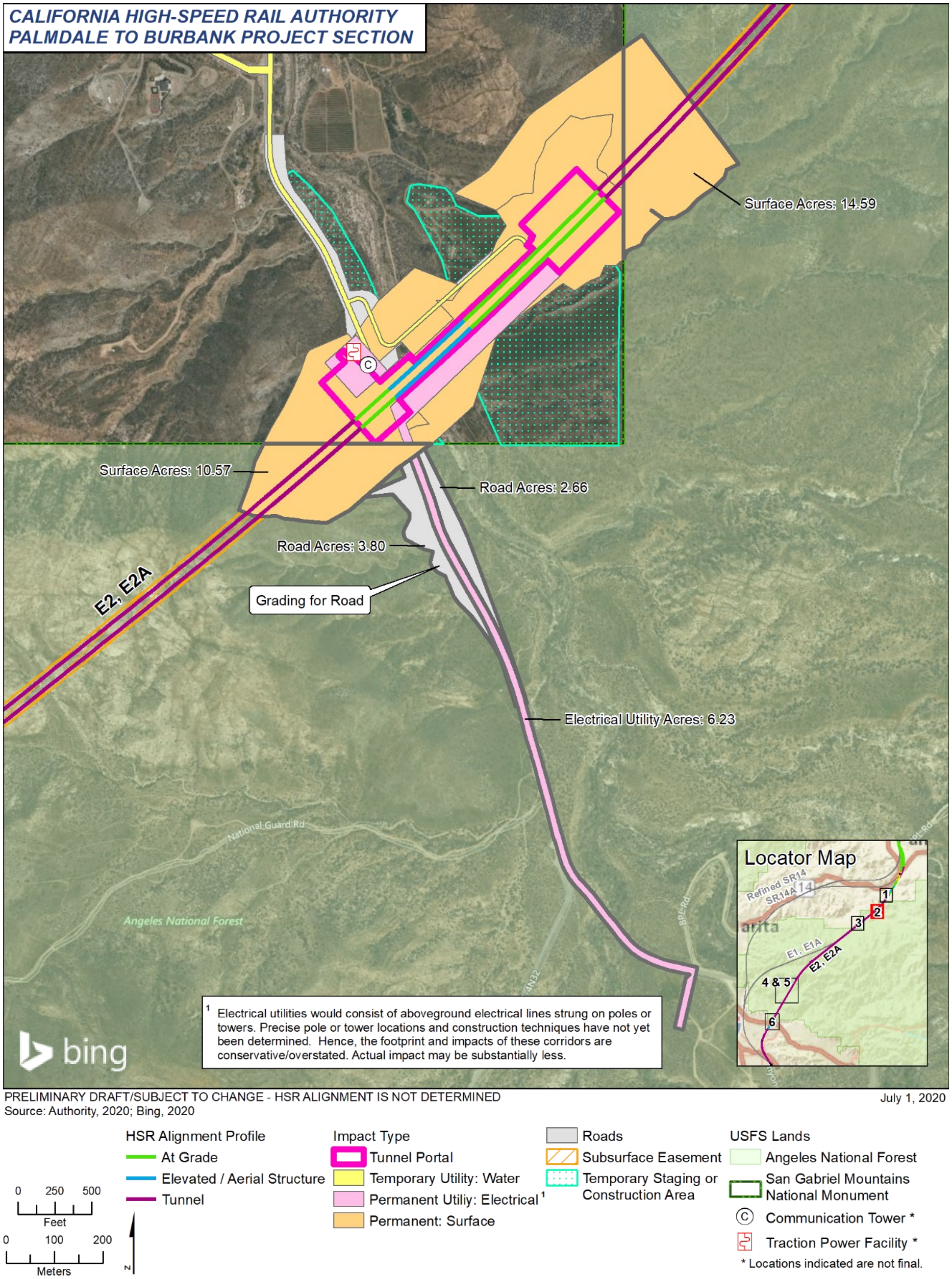


Figure 2-90 E2 Facilities within Angeles National Forest including San Gabriel Mountains National Monument – Aliso Canyon Area

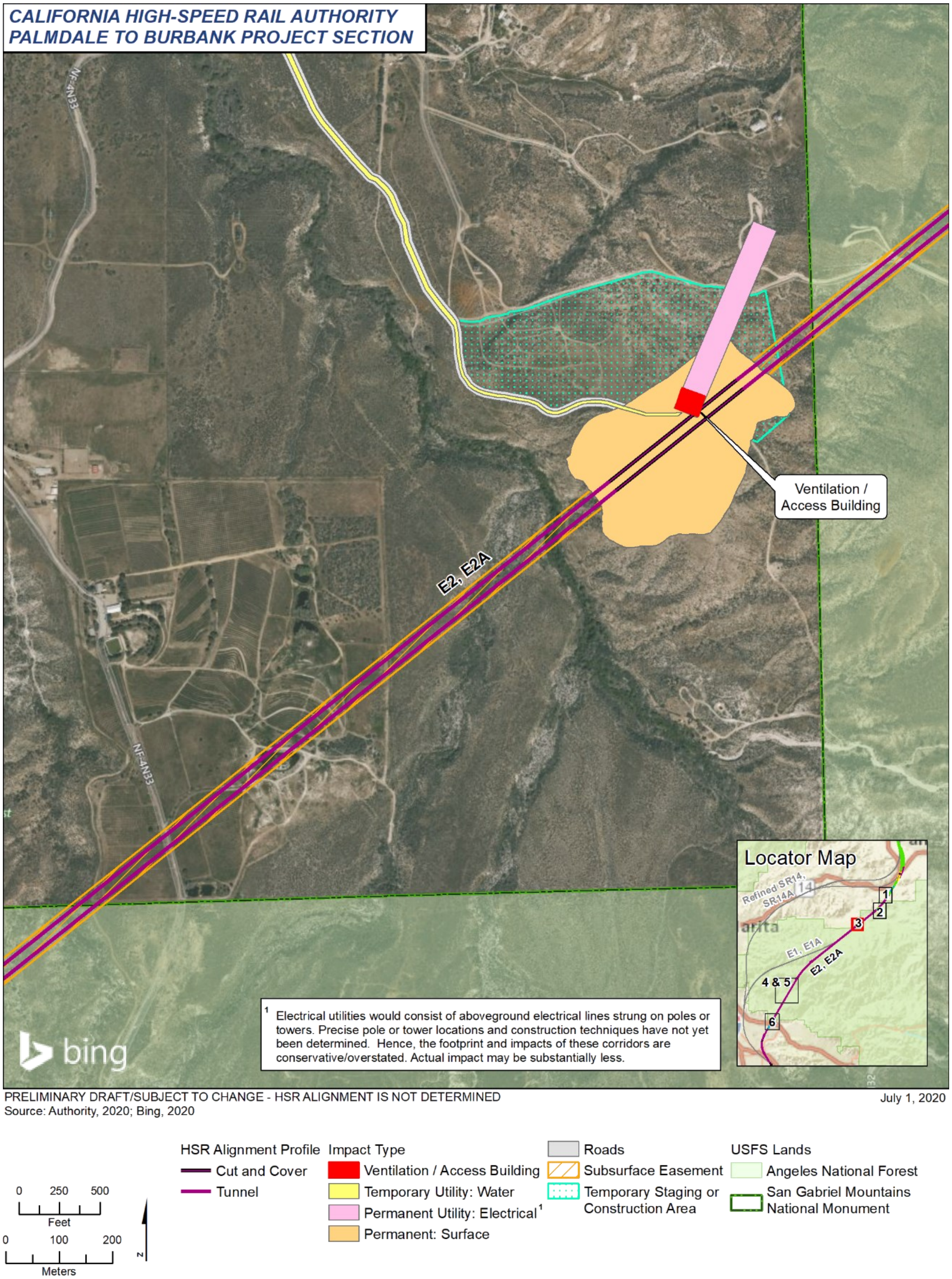


Figure 2-91 E2 Facilities within Angeles National Forest including San Gabriel Mountains National Monument – Arrastre Canyon Area

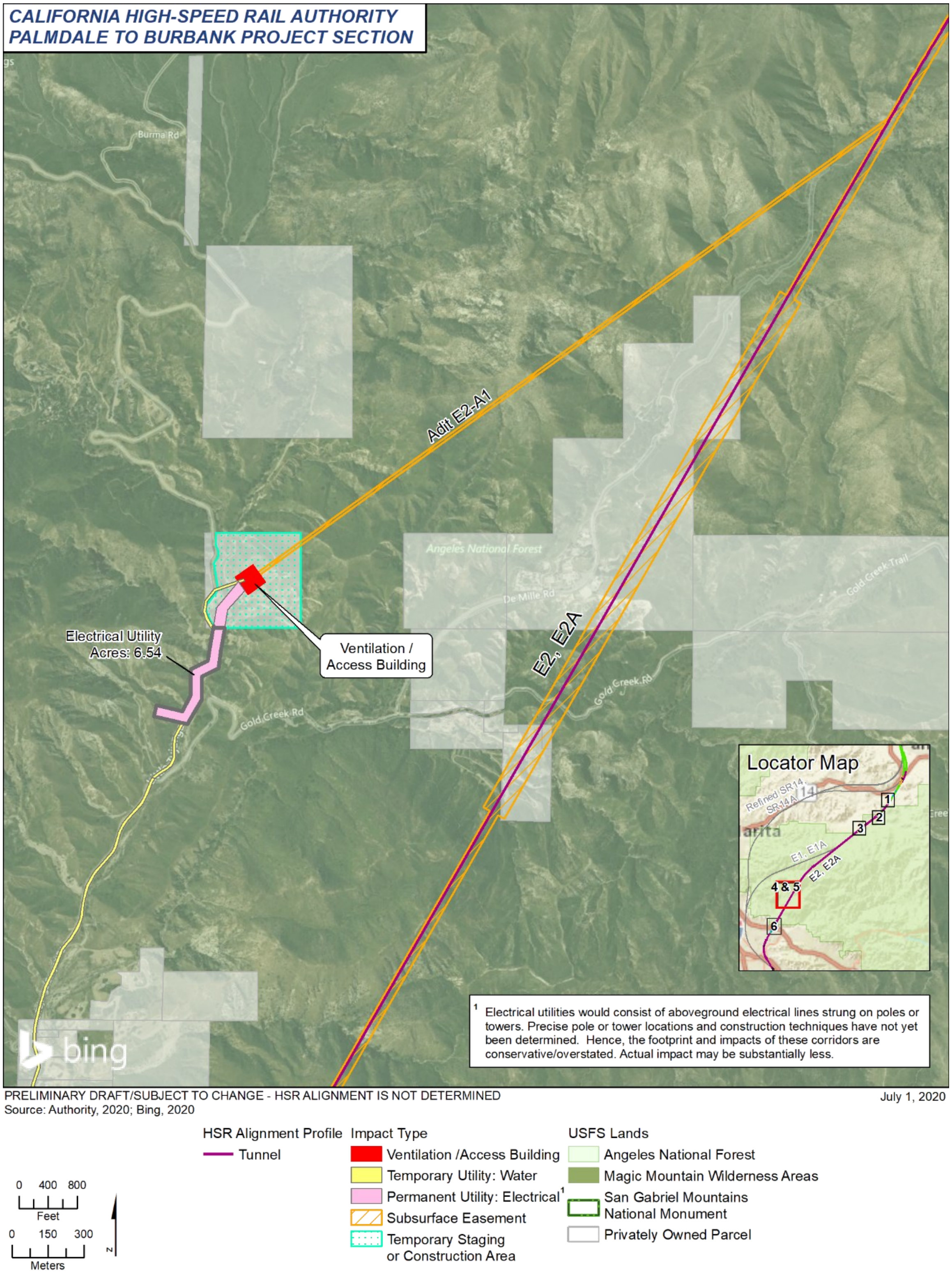


Figure 2-92 E2 Facilities within Angeles National Forest – Adit Option E2-A1

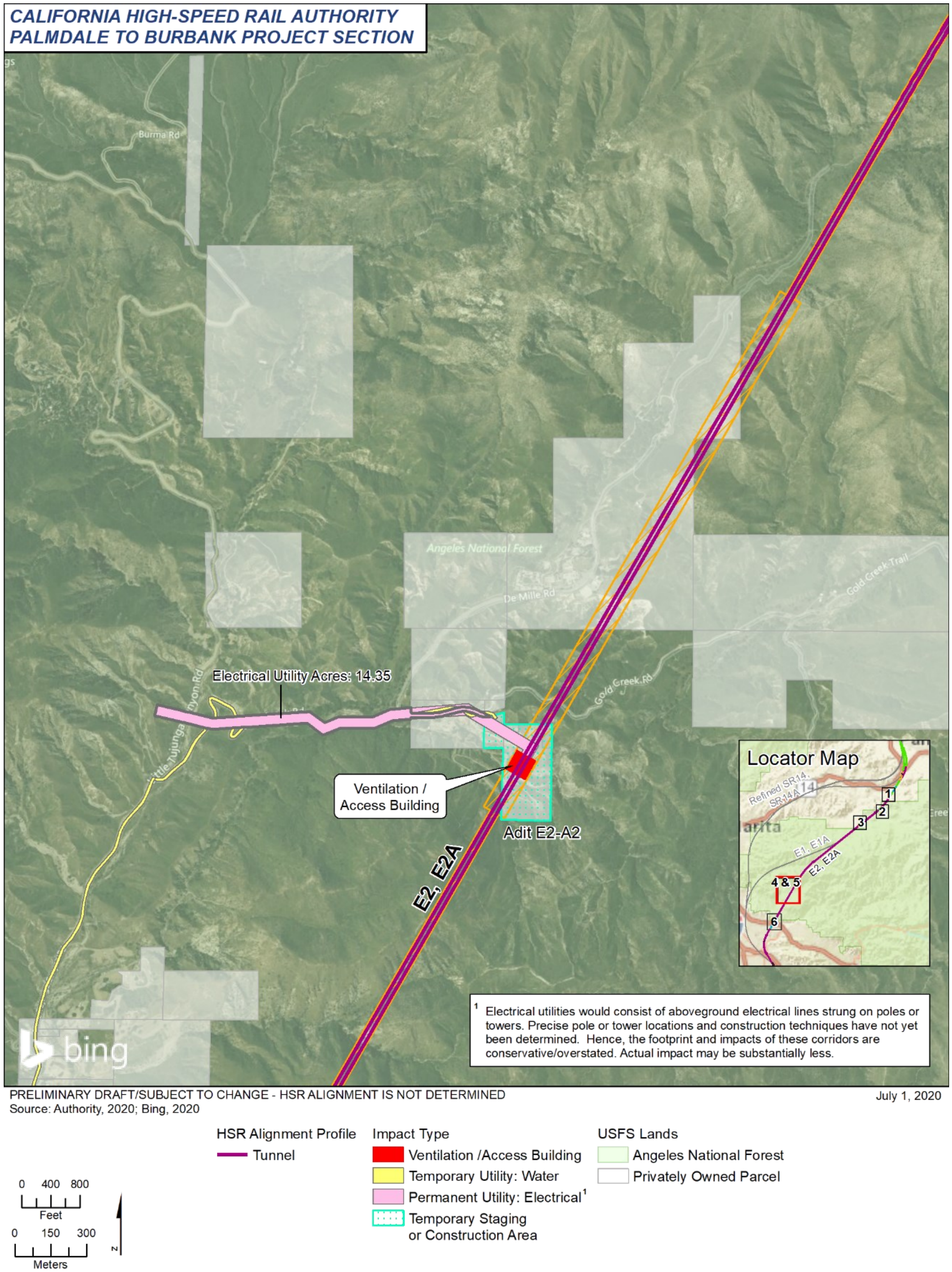


Figure 2-93 E2 Facilities within Angeles National Forest – Adit Option E2-A2

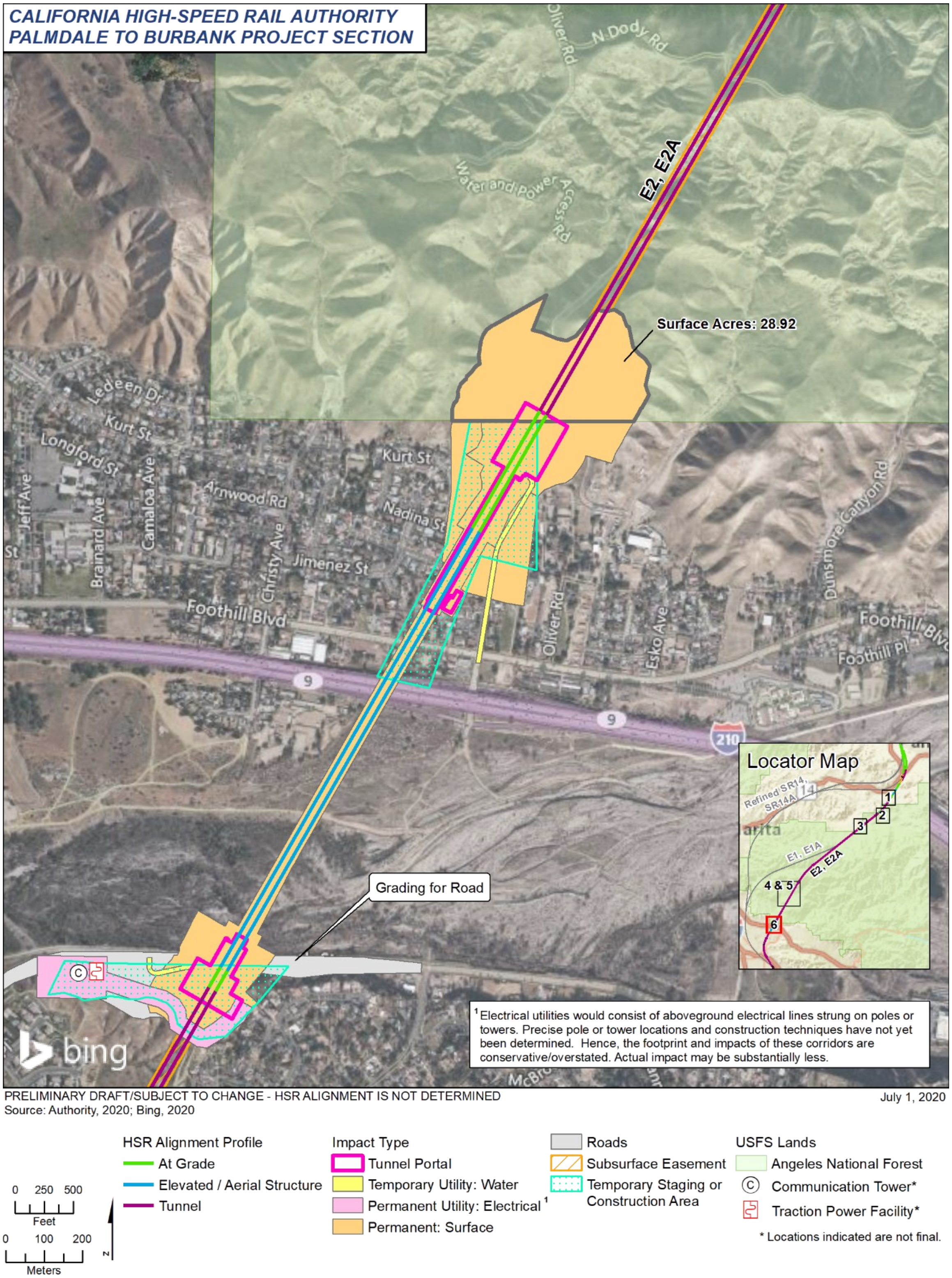


Figure 2-94 E2 Facilities within Angeles National Forest–Tunnel Portal at Southern Boundary of Angeles National Forest

Table 2-32 E2 Adit Facilities within Angeles National Forest

Facility	Facility Description
Temporary Facilities	
E2-A1 temporary CSA	Approximately 35.9 acres of temporary CSA would be associated with E2-A1. The CSA would be located on privately owned parcels within the ANF.
E2-A2 temporary CSA	Approximately 23.2 acres of temporary CSA would be associated with E2-A2. The CSA would be located on privately owned parcels within the ANF.
E2-A1 and E2-A2 temporary water supply for construction purposes	Water would be delivered to the E2-A1 and E2-A2 CSAs through a temporary pipeline extending from existing water facilities in the city of Los Angeles, approximately 4.5 miles southwest from the adit. The footprint for this temporary pipeline would be within the Little Tujunga Canyon Road roadway.
Potential Permanent Facilities	
Mid-tunnel ventilation building (TBD)	The adit site within the ANF may potentially be used for a mid-tunnel ventilation building. This structure would be approximately 50 feet wide by 50 feet long by 18 feet high, occupying approximately 20,000 square feet.
E2-A1 Power lines	A power line originating in the E2-A1 CSA would connect to existing transmission lines located approximately 500 feet west of Little Tujunga Canyon Road and would require approximately 6.5 acres. This power line would be permanent and used during construction and operations.
E2-A2 Power lines	A power line originating in the E2-A2 CSA would connect to existing transmission lines located approximately 500 feet west of Little Tujunga Canyon Road and would require approximately 14.4 acres. This power line would be permanent and used during construction and operations.

CSA = construction staging area; HSR = high-speed rail; TBD = to be determined

2.6 Travel Demand and Ridership Forecasts

Ridership forecasts were prepared to support ongoing planning for the California HSR System and the analysis in this Draft EIR/EIS. Cambridge Systematics, Inc., developed ridership forecasts for 2040 by using a refined ridership and revenue model, Business Plan Model Version 3 (BPM-V3).

The ridership forecasts for the 2016 Business Plan were based on two distinct implementation scenarios: (1) a “Valley to Valley” scenario, in which the Silicon Valley to Central Valley Line opens in 2025, and the Phase 1 California HSR System opens in 2029; and (2) a “Valley to Valley extended” scenario, in which the Silicon Valley to Central Valley Line opens with an extension to San Francisco and Bakersfield in 2025, and the Phase 1 California HSR System opens in 2029. For each scenario, the Business Plan presented “high,” “medium,” and “low” ridership forecasts, reflecting a range of probabilities.[12] Forecasts for each scenario were presented for a range of years from 2025 through 2060. Cambridge Systematics also prepared technical reports supporting the ridership forecasts.

The ridership forecasts presented in this Draft EIR/EIS are based on the “Valley to Valley” implementation scenario from the 2016 Business Plan. Both the “medium” and “high” ridership forecasts from the 2016 Business Plan are used in this Draft EIR/EIS. In general, the medium ridership forecast provides for a conservative analysis of Palmdale to Burbank Project Section benefits whereas the high ridership forecast provides for a conservative analysis of adverse

[12] The development of the 2016 Business Plan (Authority 2016c) forecasts included a probability assessment, which was generated though an analytical technique known as Monte Carlo simulations. Monte Carlo analysis involves running thousands of simulations to assess the likelihood that a given outcome would occur.

impacts.[13] For the year 2040, the 2016 Business Plan forecasts projected 42.8 million passengers under the medium ridership scenario, and 56.8 million passengers under the high ridership scenario.[14] The 2040 forecasts correspond to the horizon year used for impacts analysis in this Draft EIR/EIS; therefore, this Draft EIR/EIS focuses on the 2040 forecasts.

The *Business Plan Model Version 3* model refined the previous Version 2 model by fully integrating data gathered from the more recent stated preference and preference surveys. The model was further refined by incorporating a new variable that reduced the number of trips involving a relatively long trip to or from the HSR station combined with a relatively short trip on the HSR line itself. This variable reflected the disadvantage and low likelihood of those types of trips. In addition, several other small adjustments related to auto costs and transit networks were made to the model to produce updated forecasts. These data were then used to estimate the ridership levels shown in Table 2-33. Additional details regarding the modeling and forecasts are presented in the *California HSR 2016 Business Plan Ridership and Revenue Forecasting: Technical Supporting Document* (Authority 2016c).

Table 2-33 High-Speed Rail System Ridership Forecasts (in millions per year)

Forecasts	Silicon Valley to Central Valley Line (2025)	Phase 1 (2029)	Phase 1 (2040)
Medium	3.0	19.3	42.8
High	4.2	26.0	56.8

Source: Authority, 2016c

A 5-year ramp-up assumption was made regarding when each section will open for revenue service. The assumption is based on the premise that only 40 percent of the forecast ridership would materialize in the first year, 55 percent in the second, 70 percent in the third, 85 percent in the fourth, and 100 percent in the fifth. This ramp-up applies only to the incremental ridership in Phase 1. The *California High-Speed Rail 2016 Business Plan Ridership and Revenue Forecasting: Technical Supporting Document provides* additional details regarding the modeling and forecasts (Authority 2016d).

This range of ridership forecasts allowed for the development of certain aspects of the California HSR System design and certain portions of the environmental analysis, as described in more detail below. Eventual California HSR System ridership would depend on many factors, such as the price of gasoline or eventual cost of an HSR ticket. Accordingly, the California HSR System analyzed in this document is designed to accommodate a broad range of future ridership over the coming decades.

Since the 2016 Business Plan forecasts were developed, the Authority has adopted its 2018 Business Plan, which was accompanied by updated forecasts (*California High-Speed Rail 2016 Business Plan: Ridership and Revenue Forecasting Technical Supporting Document [Authority 2016c]; 2018 Business Plan: Technical Supporting Document: Ridership & Revenue Forecasting [2018]*). The 2016 and 2018 Business Plan ridership forecasts were developed using the same travel forecasting model; the forecasts differ because of changes in the model's inputs, including the HSR service plan, demographic forecasts, estimates of automobile operating costs and travel times, and airfares. The "medium" ridership forecast for 2040 decreased by 6.5 percent, from 42.8 to 40 million, and the "high" ridership forecast decreased by 10.1 percent, from 56.8 to 51.6 million. In addition, the 2018 Business Plan assumes an opening year of 2033 rather than 2029 for the full Phase 1 system.

A Draft 2020 Business Plan was issued February 12, 2020, with an initial 60-day public comment period that was extended due to the COVID-19 pandemic to June 1, 2020. Subsequently, a Revised Draft 2020 Business Plan was issued on February 9, 2021, including an additional 30-day comment period. The 2020 Business Plan was adopted by the Authority Board of Directors

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[13] For additional detail regarding the use of "medium" and "high" ridership forecasts in this Draft EIR/EIS, refer to Section 3.1, Introduction, in Chapter 3.

[14] See 2016 Business Plan, Exhibit 7.1 (Authority 2016c).

on Thursday, March 25, 2021, and submitted to the state legislature on Monday, April 12, 2021. The 2020 Business Plan forecasts were developed using the same travel forecasting model as the 2016 and 2018 Business Plans, updated for population and employment forecasts. The 2020 Business Plan Phase 1 medium-ridership forecast for 2040 is 38.6 million, and the high-ridership forecast is 50.0 million (Authority 2020).

To the extent that the lower ridership levels projected in the 2018 Business Plan or the 2020 Business Plan would result in fewer trains operating in 2040, the impacts associated with train operations in 2040 would be somewhat less than the impacts presented in this Draft EIR/EIS, and the benefits accruing to the Palmdale to Burbank Project Section (e.g., reduced VMT, reduced greenhouse gas emissions, reduced energy consumption) also would be less than the benefits presented in this Draft EIR/EIS. As with the impacts, the benefits would continue to build and accrue over time and would eventually reach the levels discussed in this Draft EIR/EIS for the Phase 1 system.

2.6.1 Ridership and High-Speed Rail System

The California HSR System analyzed in this Draft EIR/EIS is designed to provide adequate infrastructure and facilities for a state-of-the-art, high-speed passenger train system over many decades. Although much infrastructure would be designed and built for full utility, certain components of the California HSR System would be more flexible and could change depending on the growth of HSR ridership over time.

The Authority and the FRA weighed ridership and revenue potential in evaluating alignment and station alternatives in the Tier 1 Program EIR/EIS documents and the Tier 2 alternatives screening. However, the primary driver affecting the design of the California HSR System is not the total forecasted annual ridership, but rather the performance objectives and safety requirements stipulated by the Authority, the FRA, the U.S. Department of Transportation, and the regional transportation partners—including Caltrain, Amtrak, and other operators—whose systems will either use the shared segments of the California HSR System alignment or provide connections to the high-speed service.

In keeping with these objectives and requirements, the portion of the alignment that is fully dedicated to HSR service comprises a two-track system for the majority of the right-of-way, with four tracks at intermediate stations regardless of total annual ridership. Track geometry and profile, power distribution systems, train control/signal systems, types of rolling stock, and certain station elements will be the same in both the dedicated and blended corridors regardless of how many riders use the California HSR System. The locations of the HMF and LMF structures also follow the mandates stipulated by technical operating requirements rather than ridership.

While the performance objectives and safety requirements are the main factors affecting California HSR System design, ridership does influence some aspects of the system's design, including the size of the HMF and LMF structures (which are based on the 2040 high ridership forecast), to ensure that these facilities are large enough to accommodate maximum future needs. This approach is consistent with general planning and design practices for large infrastructure projects in which resilience and adaptability are achieved by acquiring enough land for future needs up front instead of trying to purchase property at a later date, when it may no longer be available or may be impractical to acquire. The use of ridership forecasts facilitates the early phases of the Maintenance Facility construction as well as subsequent expansion of the facility as fleet size and maintenance requirements grow.

Forecasted annual ridership and peak-period ridership also play a role in determining the size of some station components, such as the size of the public accessway/egressway to the California HSR System. The 2040 high ridership forecast formed the basis for the conceptual service plan, which in turn influenced station site planning by ensuring that station facilities would be sufficient to accommodate the anticipated increase over time of HSR use.

The 2040 high ridership forecast was also used, along with local conditions, to determine the maximum amount of parking needed at each station. Parking demand and supply were analyzed by considering many factors, including ridership demand, station area development opportunities, and availability of alternative multimodal access improvements, to inform the size of the parking facilities at each station and the anticipated schedule for the phased implementation of these facilities. The use of the 2040 high ridership forecast provides flexibility to change or even reduce the amount of station parking as these factors become more defined and resolved over time. (See Section 2.5.3 for additional information about parking in HSR station areas.)

2.6.2 Ridership and Environmental Impact Analysis

The level of annual HSR ridership plays a role in the analysis of environmental impacts and benefits for traffic, air quality, noise, and energy. For these topics, this Draft EIR/EIS uses both the medium and high ridership forecasts to analyze adverse environmental impacts and environmental benefits of operating the California HSR System. This is discussed in more detail in Section 3.1, Introduction.

2.6.3 Ridership and Station Area Parking

California HSR System ridership, parking demand, parking supply, and development around HSR stations are intertwined and are expected to evolve from the start of revenue service to full system operation in 2040. The Authority's goals are to support HSR ridership by promoting, in partnership with local agencies, TOD around HSR stations and the expansion of multimodal access to the California HSR System; this includes the expansion of local transit to bring riders to HSR stations, and the environmental clearance of, and land for, potential parking facilities.

This delicate balance would evolve over time and vary by station as some cities and regions would develop their station areas and local transit systems more than others by 2022 and 2040. In addition, technological advances, such as multimodal trip planning/payment software and autonomous vehicles, will affect parking demand and supply at each station, as will changes in the bundle of services available to consumers, such as ride-hailing services and bike- and car-sharing programs.

Research suggests that the percentage of transit passengers arriving at transit stations by car and needing to park decreases as land use development and population around stations increases (Authority 2017). The Authority's adopted station area development policies recognize this inverse relationship between parking demand and HSR station area development. The California HSR System will be most successful if stations are placed where there is or would be a high density of population, jobs, commercial activities, entertainment, and other activities that generate trips. The Authority's policies, therefore, encourage dense development around HSR stations, which supports system ridership while reducing parking demand.

Land use development around HSR stations would not take place immediately, however. The California HSR System would be a catalyst for such development, but local land use decisions and market conditions would dictate actual construction. In partnership with local government, the Authority would encourage station area development, as exemplified by the station area planning grants it has provided to the City of Fresno and offered to the City of Bakersfield; however, the Authority's power in this regard is limited. The actual demand for parking facilities, moreover, would depend on how HSR ridership grows over time, local decisions, and local conditions.

In light of the uncertainty over the need for station area parking, this Draft EIR/EIS conservatively identifies parking facilities to meet the maximum forecasted constrained parking demand for stations. This scenario is an upper bound on actual needs and discloses the maximum environmental impact. The Authority would therefore have the flexibility to make decisions.

The Authority, in consultation with local communities, would have the flexibility to make decisions regarding what parking facilities would be constructed initially and how additional parking might be phased in or adjusted depending on how the California HSR System ridership increases over time. For example, it is possible that some parking facilities might be constructed at the opening of the Palmdale to Burbank Project Section, only to be replaced in whole or in part, or augmented later with the development of other parking facilities. A multimodal access plan would be developed prior to the design and construction of parking facilities at each California HSR System station. These plans will be prepared in coordination with local agencies and will include a strategy that addresses and informs the final location, amount, and phasing of parking at each station.

2.7 Operations and Service Plan

2.7.1 High-Speed Rail Service

The conceptual HSR service plan for Phase 1 describes service from Anaheim and Los Angeles, through the Central Valley from Bakersfield to Merced, and northwest into the Bay Area (Appendix 2-C, Operations and Service Plan). Phase 2 of the California HSR System includes a southern extension from Los Angeles to San Diego via the Inland Empire and an extension from Merced north to Sacramento.

Three basic service types are planned for the California HSR System:

- Express trains, which would serve major stations only and provide fast travel times (i.e., a run time between downtown San Francisco and LAUS of 2 hours and 40 minutes)
- Limited-stop trains, which would skip stations along a route to provide faster service between stations
- All-stop trains, which would focus on regional service

Most trains would provide limited-stop services and would offer a relatively fast run time along with connectivity among various intermediate stations. Numerous limited-stop patterns would be provided to achieve a balanced level of service at the intermediate stations. The service plan envisions at least four limited-stop trains per hour in each direction, all day long, on the main route between San Francisco and Los Angeles. Each intermediate station in the Bay Area, the Central Valley between Fresno and Bakersfield, Palmdale in the high desert, and Sylmar and Burbank in the San Fernando Valley would be served by at least two limited-stop trains every hour—offering at least two reasonably fast trains per hour to San Francisco and Los Angeles. Selected limited-stop trains would be extended south of Los Angeles as appropriate to serve projected demand.

Including the limited-stop trains on the routes between Sacramento and Los Angeles and between Los Angeles and San Diego, and the frequent-stop local trains between San Francisco and Los Angeles and Anaheim and between Sacramento and San Diego, every station on the California HSR System would be served by at least two trains per hour per direction throughout the day and at least three trains per hour during the morning and afternoon peak periods. Stations with higher ridership demand would generally be served by more trains than those with lower estimated ridership demand.

The service plan would provide direct train service between most station pairs at least once per hour. Certain routes may not always be served directly, and some passengers would need to transfer from one train to another at an intermediate station, such as LAUS, to reach their final destination. Generally, the Phase 1 conceptual operations and service plan offers a wide spectrum of direct-service options and minimizes the need for passengers to transfer.

The *California High-Speed Rail 2016 Business Plan: Ridership and Revenue Forecasting* (Authority 2016d) assumes that Phase 1 of the California HSR System would open in stages, from 2025 through 2029. Upon completion, the Phase 1 California HSR System would extend from a north terminal in San Francisco to the south terminal in Anaheim. In combination with other Southern California project sections, the Palmdale to Burbank Project Section would increase connectivity between Northern California, the Central Valley, the Antelope Valley, and the Los Angeles area.

2.7.2 Maintenance Activities

The Authority would regularly perform maintenance along the track and railroad right-of-way, as well as on the power, train control, signalizing, communications, and other vital systems required for safe operation of the California HSR System. Maintenance methods are expected to be similar to those of existing European and Asian HSR systems, adapted to the specifics of the California HSR System. The brief descriptions of maintenance activities below are thus based on best professional judgment regarding future practices in California.

- **Track and Right-of-Way**—The track along the length of the alignment would be inspected several times per week using measurement and recording equipment aboard special measuring trains. These trains are of similar design to the regular trains but would operate at a lower speed. They would run between 12:00 a.m. and 5:00 a.m. and would usually pass over a given section of track once per night.

  Most adjustments to the track and routine maintenance would be accomplished in a single night, with crews and material brought by work trains along the line. When rail resurfacing (i.e., rail grinding) is needed (perhaps several times per year), specialized equipment would pass over the track sections at 5 to 10 mph.

  Approximately every 4 to 5 years, the ballasted track would require tamping. This more intensive maintenance of the track uses a train with a succession of specialized cars to raise, straighten, and tamp the track and vibrating “arms” to move and position the ballast under the ties. The train would typically cover a 1-mile-long section of track in the course of one night’s maintenance. Slab track, which is expected to be used on elevated sections, would not require this activity. No major track components are expected to require replacement through 2040.

  Other maintenance of the right-of-way, aerial structures, and bridge sections of the alignment would include drain cleaning, vegetation control, litter removal, and other inspection that would typically occur monthly to several times per year.

- **Power**—The OCS along the right-of-way would be inspected nightly, with repairs made when needed. These repairs would typically be accomplished during a one-night maintenance period. Other inspections would occur monthly. The status and many of the functions of substations and smaller facilities outside of the trackway would be monitored remotely. However, visits would be made to repair or replace minor items and would also be scheduled several times per month to check the general site. No major component replacements for the OCS or the substations are expected through 2040.
- **Structures**—Visual inspections of the structures along the right-of-way and testing of fire/life safety systems and equipment in or on structures would occur monthly; inspections of all structures for structural integrity would occur at least annually. Steel structures would also require painting every several years. Repair and replacement of lighting and communication components of tunnels and buildings would be performed on a routine basis. No major component replacements or reconstruction of structures are expected through 2040.
- **Signaling, Train Control, and Communications**—Inspection and maintenance of signaling and train control components would be guided by FRA regulations and standards to be adopted by the Authority. Typically, physical in-field inspection and testing of the system would occur four times per year using hand-operated tools and equipment. Communication components would be inspected and maintained routinely. This would usually occur at night although daytime work may be conducted if the work area is clear of the trackway. No major component replacement for these systems is expected through 2040.
- **Stations**—Each station would be inspected and cleaned daily. Inspections of the structures, including the platforms, would occur annually. Inspections of other major systems, such as escalators, the heating and ventilation system, ticket-vending machines, and the closed-circuit television system would be according to manufacturer’s recommendations. Major station components are not expected to require replacement through 2040.

- **Perimeter Fencing and Intrusion Protection**—Fencing and intrusion protection systems would be monitored remotely and inspected periodically. Maintenance would occur as needed; however, fencing or systems are not expected to require replacement before 2040.

2.8 Additional High-Speed Rail Development Considerations

2.8.1 Land Use Patterns and Development around High-Speed Rail Stations

In 2008, California voters approved bond funding for the California HSR System as Proposition 1A. Regarding urban development and land use patterns, Proposition 1A specifically mandated that HSR stations "…be located in areas with good access to local mass transit or other modes of transportation. The California HSR System also shall be planned and constructed in a manner that minimizes urban sprawl and impacts on the natural environment, including wildlife corridors."

In submitting Proposition 1A to the voters, the Legislature went further:

> *The continuing growth in California's population and the resulting increase in traffic congestion, air pollution, greenhouse gas emissions, and the continuation of urban sprawl make it imperative that the state proceed quickly to construct a state-of-the-art high-speed passenger train system to serve major metropolitan areas.*

As the Authority's 2005 Statewide Program EIR/EIS documents show and this Draft EIR/EIS supports, operation of the California HSR System by itself would reduce traffic congestion, air pollution, and greenhouse gas emissions. The Authority believes, however, that this is not sufficient. The HSR would be most successful and would best fulfill the intent of the voters and Legislature, if its planning is coordinated with sprawl-reducing and environment-improving land use development patterns (Authority 2014a). Accordingly, the Authority has adopted HSR Station Area Development Policies based on the following premise:

> *For the HSR to be the most useful and yield the most benefit, the stations should be placed where there would be a high density of population, jobs, commercial activities, entertainment, and other activities that generate personal trips. The success of HSR is highly dependent on land use patterns that also reduce urban sprawl, reduce conversion of farmland to development, reduce VMT by automobiles, and encourage high-density development in and around the HSR station.*

The Authority and its *Station Area Development Policies* (Authority 2014a) specifically advocate:

- **Higher-density development** in relation to the existing pattern of development in the surrounding area, along with minimum requirements for density.
- **A mix of land uses** (e.g., retail, office, hotels, entertainment, residential) and a mix of housing types to meet the needs of the local community.
- **Compact pedestrian-oriented design** that promotes walking, bicycle, and transit access with streetscapes that include landscaping, small parks, and pedestrian spaces.
- **Limits on the amount of parking for new development** and a preference that parking be placed in structures. TOD areas typically have reduced parking requirements for retail, office, and residential uses as a result of their transit and bicycle access, walkability, and potential for shared parking. Sufficient train passenger parking would be essential to the California HSR System viability, but this would be offered at market rates (not free) to encourage access by transit and other modes.
- **Infill development** around HSR stations on land that is already disturbed by existing development, parking lots, pavement, etc. rather than development on previously undisturbed land or on farmland. The Authority prefers to locate its stations in existing developed areas, particularly city centers.

The Authority recognizes that land use development around HSR stations is controlled by local government and the market and is influenced by public-interest groups. The Authority also recognizes that local transit is controlled by regional and local transit agencies. The Authority is committed, therefore, to working cooperatively with local government, transit agencies, public-interest groups, and the development community to realize a shared vision for land use and transit development around HSR stations consistent with the Authority's Station Area Development Policies, to the maximum extent possible.

Good land use planning is critical to optimum land use development. Planning for infill development, however, is particularly complicated. Infill areas (for example, established downtowns) typically involve numerous small parcels with different property owners. Therefore, no single property owner exists to pay for the planning, so the local government typically has to fund this planning. The economic downturn and the State's elimination of redevelopment agencies have limited local government resources. Accordingly, the Authority has committed to use its resources, both financial and other, to encourage good local government land use planning around HSR stations consistent with the above principles.

The Authority believes that implementation of its Station Area Development Policies and cooperative work with local government (including possible funding for planning) would result in the types of environmental benefits that the voters and the State Legislature contemplated when approving Proposition 1A in 2008. This Draft EIR/EIS forecasts that the California HSR System by itself would reduce VMT and related greenhouse gas emissions, reduce energy use, reduce traffic congestion and improve air quality. To be conservative and consistent with NEPA and CEQA requirements, these forecasts generally do not account for the additional benefit to HSR station areas that is expected from compact development patterns—patterns that the Authority's Station Area Development Policies support. The Authority began the "Vision California" study effort, with funds provided by the California Strategic Growth Council and the Authority, to help account for these additional sustainability benefits that would exceed the benefits reported in this Draft EIR/EIS.

Vision California was a first-of-its-kind effort to explore the role of land use and transportation investments in meeting the environmental, fiscal, and public-health challenges facing California in the coming decades. The project produced new scenario-development and analysis tools to examine the impacts of varying policy decisions and development patterns associated with accommodating the expected dramatic increase in California's population by 2050. Vision California's tools quantitatively illustrate the connections among land use patterns, water and energy use, housing affordability, public health, air quality, greenhouse gas emissions, farmland preservation, infrastructure investment, and economic development. The tools allow state agencies, regions, local governments, and the nonprofit community to measure the impacts of land use and transportation investment scenarios (Authority et al. 2010a).

Vision California involves two different models developed by Calthorpe Associates. One is an open-source geo-spatial model called UrbanFootprint that is map based and analyzes detailed base and scenario data at the 5.5-acre level across most parts of the state. The model is scalable to conduct analyses of local and regional land use and infrastructure decisions. Version 1 of the UrbanFootprint model is used by the Sacramento Area Council of Governments, SCAG, and San Diego Association of Governments for updating their Regional Transportation Plans and preparing Sustainable Communities Strategies. Another tool, called "Rapid Fire," has been deployed statewide and in regions across California. Two Vision California statewide growth scenarios—Business as Usual and Growing Smarter—were developed and analyzed in the Vision California process using RapidFire. Business as Usual assumes continuation of the past trend of less-compact development patterns. Growing Smarter assumes an increasing proportion of urban infill and compact growth.

The Growing Smarter scenario is closely linked to implementation of the California HSR System and supportive feeder transit services. This relationship is particularly true in regions of the state that currently lack high-quality transit facilities, such as the San Joaquin Valley, where the level of urban and compact growth envisioned in the Growing Smarter scenario would not be realized without the significant investment and mobility enhancements represented by the California HSR System.

Rapid Fire predicts that, by 2050, implementation of more-compact growth envisioned in the Growing Smarter scenario would produce the following benefits:

- Save more than $7,300 per household annually on automobile costs and utility bills
- Save $1.1 billion per year from lower infrastructure costs for new homes
- Save 18 million acre-feet of water by 2050—enough water to fill Hetch Hetchy Reservoir 50 times
- Cut residential and commercial building energy use by 15 percent—enough to power all homes in California for 8 years
- Save more than 3,700 square miles of land by 2050—more than the area of Rhode Island and Delaware combined
- Reduce fuel consumption through 2050 equivalent to 2 years of the United States' oil imports, which amounts to savings of $2,600 per year per household
- Reduce greenhouse gas emissions equivalent to the emissions offset by a forest that is a quarter of the size of California
- Reduce pollution-related respiratory disease, saving more than $1.6 billion annually
- Reduce passenger vehicle travel by more than 4 trillion miles, the equivalent of taking all cars off California's roads for 15 years

Construction of the California HSR System, coupled with successful implementation of the Authority's Station Area Development Policies, would reinforce cities as hubs of economy and future growth, and would save land and water, reduce energy use, improve air quality, and save money. The initial findings of the Vision California study suggest that these benefits could be substantial and would help California meet its sustainability goals.

2.8.2 Right-of-Way Acquisition for Construction, Operation, and Maintenance of High-Speed Rail

The Authority has developed a right-of-way process that is in accordance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act. Figure 2-95 shows the right-of-way process, which has four major milestones: Design/Survey, Appraisal, Acquisition, and Relocation. Table 2-34 summarizes right-of-way acquisitions required for each of the six Build Alternatives.

The Authority has developed a Permit to Enter (PTE) Process for private property owners, which would be utilized for (1) environmental phase fieldwork and (2) ongoing (post-EIR/EIS), pre-construction fieldwork. The PTE process for the environmental phase fieldwork covers environmental studies and geotechnical survey work, and the ongoing (post-EIR/EIS), pre-construction fieldwork covers ongoing environmental studies and geotechnical survey work.

For large organizations with their own PTE processes (utilities, railroads, water districts, school districts, etc.), general PTE letters would not be sent; these would be handled on a case-by-case basis.

The displacement of a small percentage of the population is often necessary in the building of a large transportation project. However, Authority policy requires that displaced persons not suffer unnecessarily as a result of the California HSR System that is designed to benefit the public as a whole. Individuals, families, businesses, farms, and nonprofit organizations displaced by the Palmdale to Burbank Project Section could be eligible for relocation advisory services and payments. More details on relocation assistance for residences, mobile homes, businesses, farms, and nonprofit organizations are provided in the Authority's Your Rights and Benefits as a Displacee Under the Uniform Relocation Assistance Program brochures (Authority 2013a; Authority 2016b; Authority 2016e).

Table 2-34 Right-of-Way Acquisitions

Acquisition Type	Build Alternatives					
	Refined SR14	SR14A	E1	E1A	E2	E2A
Temporary Construction Easements						
Acres of existing land uses subject to temporary land use effects						
Industrial	<1–2	0–<1	<1–2 / 0–<1	0–<1	0	0
Commercial	0–<1	0–<1	0–<1	0–<1	0–<1	0
Residential	22–41	17–27	28–63 / 48–63	48–63	32–63	35–64
Agricultural	8	0	8 / 3	3	8	3
Recreational	0	0	0	0	0	0
Public	1–2	0–<1	1 / 0–<1	0–<1	1	0–<1
Institutional	8	8	0	0	0	0
Railroads/Utilities	1	0–<1	1 / 59–75	59–75	1	0
Vacant Land	71–100	96–118	27–40 / 59	59	32–47	46–61
Acres of general plan–designated land uses subject to temporary land use effects						
Industrial	<1–12	0	<1–12	<1–12	0	0
Commercial	<1	11	0 / 11	11	0	11
Medium-High-Density Residential	0	0	0	0	0	0
Low-Density Residential	93–116	92–105	53	81–96	56	65
Agricultural/Open Space	2–13	0	1	1	<1	<1
Angeles National Forest	6–33	8–9	<1–27	<1–27	<1–32	<1–32
Public Facility/Institutional	11–15	11–15	11–15	9	12	6
Right-of-Way	0	0	0	0	0	0
Specific Plan	0	0	0	0	0	0
Permanent Right-of-Way Acquisition						
Acres of existing land uses subject to permanent acquisition						
Industrial	278–290	273–286	231–243	228–240	168	166
Commercial	90–93	91–94	90–93	89	83–84	82
Residential	173–183	95–103	179–188	167–173	214–219	205–206
	13	18	<1 / 5	5	<1	5
Recreational Agricultural	<1	<1	<1	<1	<1	<1
Public	168–169	168–169	150–151	142	121	113
Institutional	8	8	2	2	1–2	1–2

Acquisition Type	Build Alternatives					
	Refined SR14	SR14A	E1	E1A	E2	E2A
Railroads/Utilities	201–202 / 154	154	240–241	185	210	156
Vacant Land	1,714–1,742	1,595–1,654	1,412–1,441	1,346–1,363	1,459–1,469	1,343–1,355
Acres of general plan–designated land uses subject to permanent acquisition						
Industrial	730–745	477–484	744–759	754–761	681–696	687
Commercial	392	377	398	372	395	370
Medium-High-Density Residential	54	56	54	56	54	53
Low-Density Residential	883–884	670	690–691	564	738–739	613
Agricultural/Open Space	238	670	185	165	164	143
Angeles National Forest	216–282	216–282	38–104	38–104	64–87	92
Public Facility/Institutional	140–146	136–137	167–173	153	111–117	111–117
Right-of-Way	5	5	1	1	1	1
Specific Plan	43	43	43	43	43	43
Specific land use impacts within the Angeles National Forest (acres)						
Back Country	0–66	0–66	16–135	16–135	16–58	16–58
Back Country (Motorized Use Restricted)	<1	<1	0	0	0	0
Back Country (Non-Motorized)	0–<1	0–<1	22–23	22–23	22–37	22–37

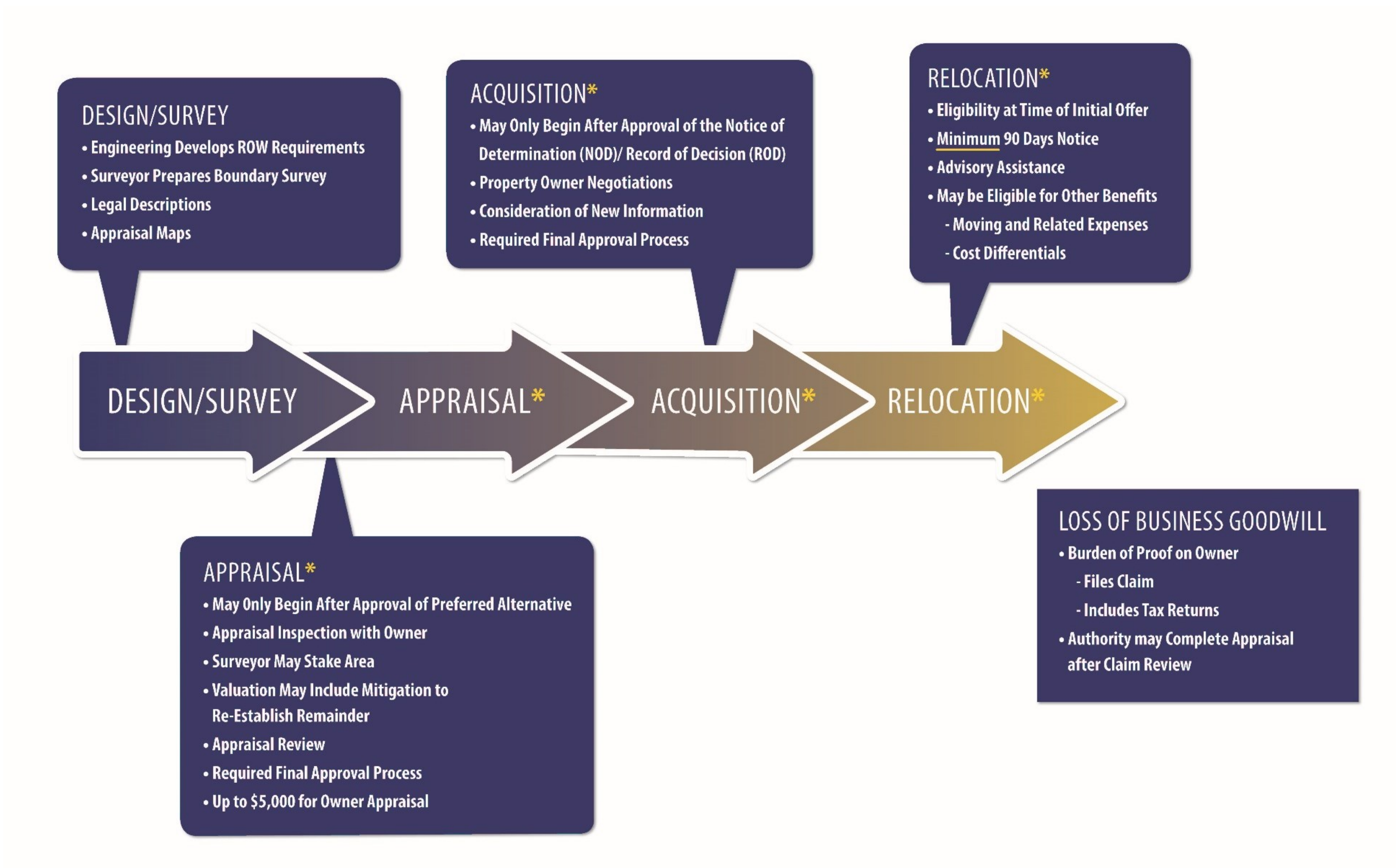


Figure 2-95 Right-of-Way Process

2.9 Construction Plan and Phased Implementation Strategy

This section summarizes the general approach to building the California HSR System, including activities associated with pre-construction and construction of major system components, and describes the Authority's phased implementation strategy. To maintain its eligibility for federal American Recovery and Reinvestment Act funding, the Authority started final design in fall 2013 and initiated project construction in 2014. First construction of the IOS (also known as the First Construction Section) will be completed by 2024. Service on the IOS is expected to start in 2025.

2.9.1 Design-Build Project Delivery

The Palmdale to Burbank Project Section is expected to be constructed using a design-build approach. This method of project delivery involves a single contract between a design-build firm and the project owner to provide design and construction services. This differs from the design-bid-build approach, in which design and construction services are managed under separate contracts, and the design is completed before the project is put out for construction bids. The design-build approach offers flexibility to adapt the project to changing conditions. The contract with the design-build contractor would require compliance with standard engineering design and environmental practices and regulations as well as implementation of Palmdale to Burbank Project Section design features and applicable mitigation measures included in this Draft EIR/EIS.

2.9.2 Phased Implementation Strategy

The Authority has prioritized a portion of the Merced to Fresno and Fresno to Bakersfield Project Sections as the first sections of the California HSR System to be built, for a number of reasons including meeting the American Recovery and Reinvestment Act funding requirements, which had a funding deadline of September 30, 2017. In addition, the FRA grant agreement includes the requirement that the federal investment demonstrate "independent utility" as that term is defined in the High-Speed Intercity Passenger Rail Notice of Funding Availability and Interim Program Guidance (74 *Federal Register* 29900, 29905). Full implementation of HSR service on the IOS would satisfy this "independent utility" requirement, but so would earlier phases of rail service on the Initial Construction Segment. For example, the Initial Construction Segment presents an opportunity for improved, faster service on the San Joaquin intercity line prior to initiation of HSR service on the IOS in 2025, thus providing for independent utility consistent with the FRA grant agreement.

As described in Chapter 1, Purpose and Need, the Authority has developed a phased implementation strategy to deliver the California HSR System, with a priority on completing Phase 1 of the California HSR System between San Francisco and Anaheim while also continuing planning for Phase 2 project sections.

As reinforced in the Authority's business plans, the first passenger service would operate between the Central Valley and the Silicon Valley, then extend to completion of Phase 1.

2.9.3 General Approach

Upon receiving the required environmental approvals and securing needed funding, the Authority would begin implementing its construction plan. Given the size and complexity of the California HSR System, the design and construction work could be divided into a number of procurement packages. In general, the procurement would address the following:

- Civil/structural infrastructure, including design and construction of passenger stations, maintenance facilities, and right-of-way facilities
- Trackwork, including design and construction of direct fixation track and sub-ballast, ballast, ties and rail installation, switches, and special trackwork
- Core systems, such as traction power, train controls, communications, the operations center, and the procurement of rolling stock

One or more design-build packages would be developed, and the Authority would then issue construction requests for proposals, start right-of-way acquisition, and procure construction management services to oversee physical construction of the project. Although the contractor would set the actual schedule, the approximate total timeline for construction is provided in Table 2-35. Table 2-36 shows estimated durations of construction activities. During peak construction periods, work is envisioned to be under way at several locations along the route, with overlapping construction of various elements of the Build Alternatives. Working hours and workers present at a given time would vary depending on the activities being performed. Where construction fencing is required, it would be restricted to areas designated for construction staging and areas where public safety is an issue.

Table 2-35 Construction Timeline Estimates

Build Alternative	Total Estimated Duration of Work for Tunnel Construction (assuming use of adit)	Total Estimated Duration of Work for Entire Build Alternative
Refined SR14/SR14A	7.08 years / 7.25 years	8.33 years / 8.33 years
E1/E1A	7.5 years / 7.5 years	8.5 years / 8.5 years
E2/E2A	8.25 years / 8.25 years	9.25 years / 9.25 years

Table 2-36 General Construction Durations

Activity	Tasks	Duration
Mobilization	Safety device and special construction equipment mobilization	12 months
Site Preparation	Utilities relocation; clearing/grubbing right-of-way; establishment of detours and haul routes; preparation of construction equipment yards, stockpiles of materials, and precast concrete segment casting yard	12 to 48 months
Earthmoving	Excavation and earth support structures	62 months
Tunneling	Tunnel excavation and support, first stage concrete and walkway (tracklaying and systems not included)	85 to 99 months (depending on Build Alternative; with use of adit to shorten construction time)
Fire Life Safety and Ventilation Facilities	Fire and life safety facilities, tunnel ventilation facilities	12 months
Construction of Road Crossings	Surface street modifications, grade separations	54 to 60 months
Construction of Elevated Structures	Aerial structure and bridge foundations, substructure, and superstructure	3 to 43 months (depending on particular feature)
Track Laying	Includes backfilling operations and drainage facilities	12 months
Systems	Train control systems, overhead contact system, communication system, signaling equipment	12 months
Demobilization	Includes site cleanup	6 months
Maintenance Facility	Construction of the Maintenance Facility along the alignment	24 months

Activity	Tasks	Duration
HSR Stations	Demolition, site preparation, foundations, structural frame, electrical and mechanical systems, finishes	36 to 72 months

Source: Authority, 2017
HSR = high-speed rail

Consistent with the *Memorandum of Understanding for Achieving an Environmentally Sustainable High-Speed Train System in California* (Authority et al. 2011), the Authority intends to build the California HSR System using sustainable methods that:

- Minimize use of nonrenewable resources
- Minimize impacts on the natural environment
- Protect environmental diversity
- Protect, maintain, conserve, and restore wildlife corridors and habitat
- Emphasize using renewable resources in a sustainable manner—for example, the use of material recycling for construction of the Build Alternatives (asphalt, concrete or Portland Cement Concrete, excavated soil)

Fill material would be excavated from local borrow sites and travel by truck from 10 to 40 miles to the HSR construction area. Railroad ballast would be drawn from existing, permitted quarries located from the Bay Area to Southern California. Ballast would be delivered by a combination of rail and trucks. All materials would be suitable for construction purposes and free from toxic pollutants in toxic amounts in accordance with Section 307 of the Clean Water Act.

Applicable design standards, including compliance with laws, regulations, and industry standard practices, are included in Appendix 2-D and are considered a part of the Palmdale to Burbank Project Section.

2.9.4 Pre-Construction Activities

2.9.4.1 Operational Right-of-Way

During final design, the Authority and its contractor would conduct several pre-construction activities to determine how construction of the Palmdale to Burbank Project Section should be staged and managed. These activities include the following:

- Geotechnical investigations would be conducted along the selected Build Alternative, focusing on defining precise geology, groundwater, and seismic conditions. The results would inform the final design and construction methods for foundations, underground structures, tunnels, stations, grade separations, aerial structures, systems, and substations.

- Geotechnical investigations would be conducted in-situ within boreholes, drilled to the approximate depth below ground surface of the Preferred Alternative alignment tunnels, and would be located at approximately 50 to 100 sites along the selected Build Alternative. In general, each site would require drive-up access and/or helicopter support. Detailed access plans for each site would be determined by locations of the selected candidate sites and means and methods that best protect the surrounding environment and facilitate the geotechnical investigations and borehole drilling. Sites would require water to drill boreholes, which would generally be provided by water trucks. Water bladders would be located near the borehole sites in staging areas for water storage, as necessary. Geotechnical investigations could result in some vegetation removal and construction noise, but these effects would be temporary because borehole drilling and investigations generally last only 4 to 8 weeks.

- Geotechnical investigation sites would be located within the temporary and permanent footprint of the selected Build Alternative, as analyzed in this Draft EIR/EIS, and the environmental impacts associated with geotechnical investigations would resemble construction effects evaluated herein. Geotechnical investigations for tunnels would occur in areas outside the resource study area. The need, location, and timing of such geotechnical investigations would be determined once a Preferred Alternative is selected. As such, the precise location of these investigations is not known at this time and would be developed as part of finalizing design for the selected Build Alternative. These geotechnical investigations may result in additional environmental effects such as emissions and fugitive dust from construction equipment, noise, temporary road closures or traffic delays, mobilization of extant hazardous materials or wastes, and impacts on biological and cultural resources. These types of impacts are common to geotechnical investigations and are typically reduced to a less than significant level by adhering to applicable regulations, obtaining regulatory permits, incorporating best management practices, and applying standard mitigation measures. In addition, the Authority has committed to integrate programmatic geotechnical investigation-specific IAMFs to minimize the risk of affecting sensitive environmental resources, such as habitat or aquatic resources, to the extent feasible. Accordingly, the Authority will implement the following IAMFs:

- The Authority, to the extent feasible, will select geotechnical investigation sites that would avoid placing access roads or staging areas in or in proximity (within 50 feet) to streams.
- The Authority, to the extent feasible, will select geotechnical investigation sites that would avoid placing access roads or staging areas in sensitive habitat areas. Additionally, to the extent feasible, the Authority will avoid vegetation removal in sensitive habitat areas.
- For geotechnical investigation sites that would be in the ANF, including the SGMNM, and outside the footprint evaluated in this Draft EIR/EIS, the Authority would coordinate with the USFS to obtain modified or additional permits or approvals.[15]
- Identifying construction laydown and staging areas used for mobilizing personnel, stockpiling materials and storing equipment for building HSR or related improvements—In some cases, these areas would also be used to assemble or pre-fabricate components of guideway or wayside facilities before transport to installation locations. Precasting yards would also be identified, which would serve as locations for casting, storage, and preparation of precast concrete segments; temporary storage of spoils; and temporary storage of delivered construction materials. Workshops, field offices, and temporary jobsite trailers would also be located at the staging areas. Construction laydown areas are part of the Build Alternative footprint that is evaluated for environmental impacts, yet actual use of the area is left to the discretion of the design-build contractor. After conclusion of construction, the staging, laydown and precasting areas would be restored to pre-construction condition. Table 2-37 lists the CSAs for each Build Alternative that are assumed in this analysis.
- Procuring TBM, bridge gantries, and all other heavy engineering equipment that have long lead time for procurement
- Securing insurance for all construction works
- Initiating site preparation and demolition, such as clearing, grubbing, and grading, followed by the mobilization of equipment and materials—Demolition would require strict controls to ensure that adjacent buildings and infrastructure are not damaged or otherwise affected by the demolition efforts.
- Relocating utilities—Prior to construction, the contractor would work with utility companies to relocate, or protect in place, high risk utilities such as overhead tension wires, pressurized transmission mains, oil lines, fiber optics, and communications.

[15] In coordination with the USFS, geotechnical investigations are currently being conducted within the ANF to obtain subsurface field data to help evaluate the tunnel portion of alignments for potential environmental impacts (on groundwater, hydrogeology, and surface water resources), design constraints, and construction constraints.

Table 2-37 Construction Staging Areas by Build Alternative

Size (acres)	Jurisdiction	Location	Build Alternative					
			Refined SR14	SR14A	E1	E1A	E2	E2A
18.0	Acton	West of Sierra Highway, south of the Sierra Highway/Pearblossom Highway Interchange	N/A	X	N/A	N/A	N/A	N/A
25.6	Acton	Immediately west of Angeles Forest Highway, intersecting Vincent View Road	N/A	N/A	X	N/A	X	N/A
18.0	Acton	South of the existing SR 14, east of Crown Valley Road	N/A	X	N/A	N/A	N/A	N/A
23.8	Acton	North of the existing SR 14 freeway, east of Red Rover Mine Road	X	N/A	N/A	N/A	N/A	N/A
17.4	Acton	South of the existing SR 14 freeway, east of Escondido Canyon Road	X	N/A	N/A	N/A	N/A	N/A
12.0	Acton	South of the existing SR 14 freeway, west of Escondido Canyon Road	X	N/A	N/A	N/A	N/A	N/A
27.3	Acton	South of the existing SR 14 freeway, west of Big Springs Road	X	N/A	N/A	N/A	N/A	N/A
20.7	Agua Dulce	Southeast of the existing SR 14 freeway, southeast of Vasquez Rocks	X	N/A	N/A	N/A	N/A	N/A
9.5	Agua Dulce	South of the existing SR 14 freeway, southwest of Vasquez Rocks, east of Agua Dulce Canyon Road	X	N/A	N/A	N/A	N/A	N/A
12.6	Agua Dulce	North of Briggs Edison Road, East of Burk Road	N/A	X	N/A	N/A	N/A	N/A
26.8	Agua Dulce	South of the existing SR 14 freeway, west of Agua Dulce Canyon Road	X	N/A	N/A	N/A	N/A	N/A
25.7	Agua Dulce	South of the existing SR 14 freeway, west of Agua Dulce Canyon Road	N/A	X	N/A	N/A	N/A	N/A
27.9	Agua Dulce	Southeast of the existing SR 14 freeway, north of Soledad Canyon Road	X	N/A	N/A	N/A	N/A	N/A
26.6	Agua Dulce	Southeast of the existing SR 14 freeway, north of Soledad Canyon Road	N/A	X	N/A	N/A	N/A	N/A
36.5	Canyon Country	South of the existing SR 14 freeway, at Vulcan Mine	X	X	N/A	N/A	N/A	N/A
24.1	Canyon Country	South of the existing SR 14 freeway, at Vulcan Mine	X	X	N/A	N/A	N/A	N/A
32.8	ANF	Along Little Tujunga Canyon Road	X	X	X	X	N/A	N/A
10.6	Sylmar	South of Pacoima Reservoir, adjacent to Wallabi Avenue	X	X	N/A	N/A	N/A	N/A
16.2	Sylmar	South of Pacoima Reservoir, adjacent to Pacoima Canyon Road	X	X	N/A	N/A	N/A	N/A
20.7	Sylmar	South of Pacoima Reservoir, adjacent to Gavina Avenue	X	X	N/A	N/A	N/A	N/A

Size (acres)	Jurisdiction	Location	Build Alternative					
			Refined SR14	SR14A	E1	E1A	E2	E2A
4.6	Sylmar	North quadrant of the I-210/SR 118 interchange, north of Paxton Street	X	X	X	X	N/A	N/A
6.7	Sylmar	North quadrant of the I-210/SR 118 interchange, north of Paxton Street	X	X	X	X	N/A	N/A
2.9	Sylmar	West quadrant of the I-210/SR 118 interchange, north of Paxton Street	X	X	X	X	N/A	N/A
1.9	Sylmar	Southeast of Paxton Street, northeast of Foothill Boulevard, north of I-210 eastbound on-ramp	X	X	X	X	N/A	N/A
1.6	Sylmar	Southeast of Paxton Street, northeast of Foothill Boulevard, south of I-210 eastbound on-ramp	X	X	X	X	N/A	N/A
2.0	Sylmar	South quadrant of the I-210/SR 118 interchange, Southwest of Foothill Boulevard	X	X	X	X	N/A	N/A
13.9	Acton	West of Sierra Highway, south of the Sierra Highway/Pearblossom Highway Interchange	N/A	N/A	N/A-X	N/A-X	N/A-X	N/A-X
9.9	Acton	Southwest of the existing SR 14 freeway, south of Foreston Drive	N/A	N/A	X	X	X	X
38.4	Acton	East of Aliso Canyon Road, south of Blum Ranch Road	N/A	N/A	X	X	X	X
6.4	Acton	East of Aliso Canyon Road, south of Blum Ranch Road	N/A	N/A	X	X	X	X
1.9	Acton	West of Aliso Canyon Road, south of W Avenue Y 8	N/A	N/A	X	X	X	X
13.5	Acton	West of Aliso Canyon Road, south of Blum Ranch Road	N/A	N/A	X	X	X	X
32.2	Acton	North of Arrastre Canyon Road, south of Edison Road	N/A	N/A	X	X	X	X
28.0	ANF	Along Little Tujunga Canyon Road	N/A	N/A	X	X	N/A	N/A
35.9	ANF	Along Little Tujunga Canyon Road, west of Ahmanson Road	N/A	N/A	N/A	N/A	X	X
232	ANF	Along Little Tujunga Canyon Road, east of Ahmanson Road	N/A	N/A	N/A	N/A	X	X
29.0	Lake View Terrace	North of the existing I-210 freeway, west of Wheatland Avenue	N/A	N/A	N/A	N/A	X	X
17.0	Shadow Hills	South of Wentworth Street, west of Wheatland Avenue	N/A	N/A	N/A	N/A	X	X
30.0	Sun Valley	Southeast of Stonehurst Recreation Center, north of Peoria Street	N/A	N/A	N/A	N/A	X	X

Note: The above values for the Refined SR14, E1, and E2 Build Alternatives are identical to the SR14A, E1A, and E2A Build Alternatives, respectively, unless otherwise indicated.
ANF = Angeles National Forest; I- = Interstate; N/A = not applicable; SR = State Route

- Implementing temporary, long-term, and permanent road closures to reroute or detour traffic away from construction activities—Handrails, fences and walkways would be provided for pedestrians and bicyclist safety.
- Locating temporary batch plants—These would be required to produce Portland Cement Concrete or asphaltic concrete needed for roads, bridges, aerial structures, retaining walls, and other large structures. The facilities generally consist of silos containing fly ash, lime, and cement; heated tanks of liquid asphalt; sand and gravel material storage areas; mixing equipment; aboveground storage tanks; and designated areas for sand and gravel truck unloading, concrete truck loading, and concrete truck washout. The contractor would be responsible for implementing procedures for reducing air emissions, mitigating noise impacts and reducing the discharge of potential pollutants, from equipment, materials, and waste products, into storage drains or watercourses.
- Conducting other studies and investigations, as needed, such as local business surveys to identify business usage, delivery, shipping patterns, and critical times of the day or year for business activities—This information would help develop construction requirements and worksite traffic control plans and would identify potential alternative routes for cultural resource investigations and historic property surveys.

2.9.4.2 Non-Operational Right-of-Way

In certain negotiated right-of-way purchase situations, the Authority may enter into agreements to acquire properties or portions of properties that are not directly needed for the construction of the California HSR System and are not intended to be part of the operational right-of-way. These are known as excess properties and are distinct from severed remnant parcels (which are evaluated as part of the Build Alternative footprint). While eventually these properties would likely be sold as excess state property, these excess properties are not part of the Build Alternative footprint and in the interim the Authority would need to conduct various management and maintenance activities on them (Authority 2018).

The process for acquisition and disposal of excess property is detailed in Chapter 16 of the *California High Speed Rail Authority Right of Way Manual (ROW Manual)* (January 2019). Chapter 11 of the ROW Manual identifies the following management and maintenance activities that may occur on any given excess property. The activities required on a given parcel will be dependent on-site conditions including the presence of buildings or other structures, existing land uses, and habitat conditions.

Structure Demolition

Various structures may be present on excess property including single and multi-family residences, mobile homes, mobile offices, warehouses and other light industrial structures, sheds, fences, concrete driveways, signs, other nondescript buildings, and related appurtenances and utilities (in-ground pools, septic systems, water wells, gas lines, etc.) as well as orchards and ornamental shrubs and trees.

If the Authority determines that any existing uses of a particular structure are not going to continue, it may, following additional environmental review if/as necessary (for example, to confirm the structure is not considered historic), decide to demolish and remove the structure. Demolition of a structure may also be appropriate if the structure is in a state of disrepair, or a potential safety and security concern exists from trespassers.

The properties may include utilities such as water wells, septic systems, gas, and electric lines that would require removal in accordance with local and state regulations. Local construction permits for demolition and removal would be secured from the local agency with jurisdiction (e.g., well demo permit, septic removal, etc.).

Vegetation Management

Excess properties may have a variety of vegetation present including ornamental landscaping, various crops including orchards or vineyards, and natural habitats such as annual grassland.

Vegetation management may occur as part of initial site clearing efforts or as part of ongoing management.

Initial site clearing is likely to occur in conjunction with structure demolition. Ornamental landscaping may be removed to reduce ongoing maintenance needs. Vegetation removal or disturbance may be necessary for equipment access during structure demolition. If certain agricultural crops are present on site, particularly orchards or vineyards, they may be removed if the Authority determines that it is appropriate based on the condition of the plants.

Ongoing vegetation management activities may include mowing, discing, or similar mechanical control, the clearing of firebreaks on larger properties, and, if noxious weeds are present, they may be treated with the use of approved herbicides. Mowing or other mechanical control may be used to maintain vegetation at a certain height or density based on site-specific concerns of security, visual appearance or fire prevention. The mechanical control of weed species may also be appropriate depending on the relevant species and site conditions. Firebreaks may be mowed or disced in an approximately 12-foot band around the exterior of a site. Internal fire breaks may be appropriate for larger sites. All herbicide application will be conducted in a manner consistent with product labeling and applicable laws including application by a licensed Pest Control Advisor if appropriate.

Pest Management

Pest management may include the mechanical control of insects, rodents and other animals. Mechanical removal (trapping) of rodents and other animals may be appropriate in or around structures that exist on excess properties. Mechanical removal of animals will be conducted by a licensed Pest Control Advisor and after obtaining any appropriate local approvals. Rodenticide will not be used for the control of animals.

Chemical control of insects may occur in or around buildings on excess property or in agricultural areas to control pest species. Any pesticide application will be conducted in a manner consistent with product labeling and applicable laws including application by a licensed Pest Control Advisor if appropriate and after obtaining any appropriate local approvals.

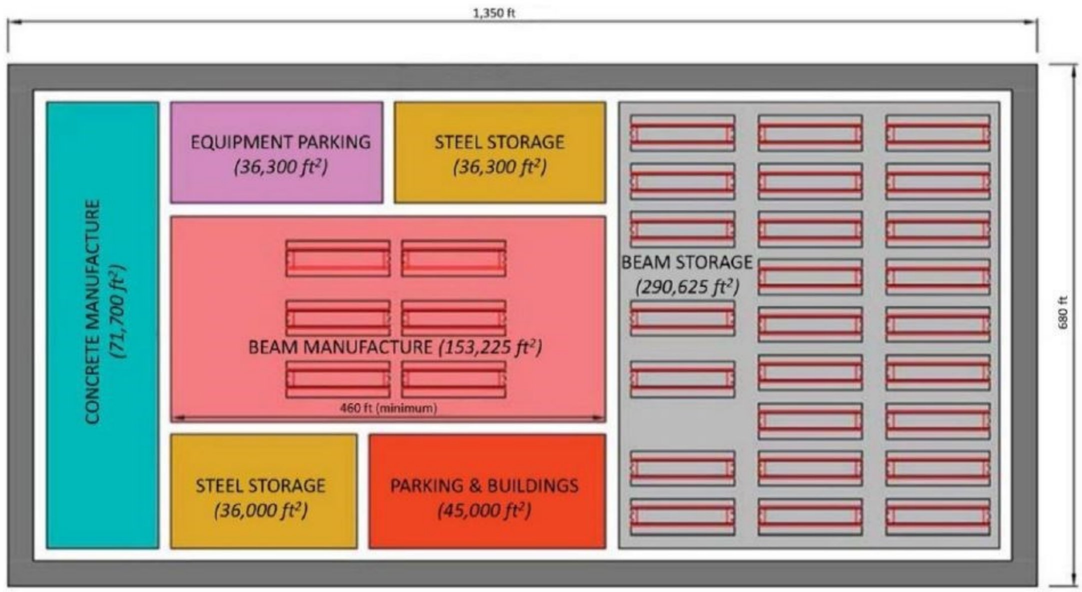
Site Security

Site security will primarily consist of the installation of fencing around properties. The installation of fencing may be appropriate on properties where structures will remain or where there is a safety and security concern or particular risk of trespass. Fencing will consist of 6–12-foot-high chain-link fencing and may include barb wire or similar features at the top. Fence posts may be either metal or wood and require an excavation up to 4 inches in diameter and 3 feet deep. Other security devices such as security lighting, an alarm system, or cameras may be implemented if specific conditions require it. If buildings or other structures are present on the site, windows and doors may be boarded up to prevent trespassing. “No Trespassing” or similar signs may be posted as appropriate.

Site security will also involve the periodic inspection of excess properties for signs of trespass and the removal of any accumulated trash or dumping.

Structure Maintenance

If buildings or other structures remain on site, they will be maintained in a clean and orderly condition so as not to detract from the general appearance of the neighborhood. If the property is rented or leased, maintenance activities will be undertaken as needed to ensure the health and safety of occupants. Maintenance and repair activities may include exterior and interior painting, yard maintenance, repair or replacement of plumbing, electrical facilities, roofs, windows, heaters, and built-in appliances and other similar activities. Figure 2-96 shows a typical pre-casting yard layout, including estimated size requirements for each element.



Source: Authority 2017b

Figure 2-96 Typical Pre-Casting Yard Layout

2.9.5 Major Construction Activities

Major types of construction activities for the Palmdale to Burbank Project Section include earthwork; bridge, aerial structure, and roadway crossings; railroad systems; and station construction, as briefly described in the following subsections.

2.9.5.1 Earthwork

Earthwork is a general term applied to the movement or removal of soils by mechanical equipment (excavation) and the placement and compaction of soils by mechanical equipment (embankment). Earth support is an important factor in constructing the deep excavations that would be required on several alignment sections. The three general excavation support categories and excavation support systems planned to be used along the route are described below:

- **Open-Cut Slope**—Open-cut slope is used in areas where sufficient room is available to open-cut the area and slope the sides back to meet the adjacent existing ground. The slopes are designed like cut slopes, accounting for the natural repose angle of adjacent ground material and global stability.
- **Temporary**—Temporary excavation support structures are designed and installed to support vertical or near-vertical faces of the excavation in areas where there is not sufficient room to open-cut slopes. This structure does not contribute to the final load-carrying capacity of the tunnel or trench structure and is either abandoned in place or dismantled as the excavation is being backfilled. Generally, temporary excavation support consists of soldier piles and lagging, sheet pile walls, slurry walls, secant piles (overlapping reinforced concrete columns), or tangent piles.
- **Permanent**—Permanent structures are designed and installed to support vertical or near-vertical faces of the excavation in areas where room to open-cut does not exist. This structure forms part of the permanent final structure. Generally, the support consists of slurry walls, secant piles, or tangent pile walls combined with struts and tie-backs.

Open-cut earthwork would create spoils that could require off-hauling to re-use or disposal sites. A detailed discussion of spoils and off-hauling is included below.

Embankment would be built along the alignments. The type of equipment used to haul ballast materials used for embankment would depend on the hauling distance, with trucks or wagons used for longer distances. Figure 2-97 shows the general haul distances for common equipment types.

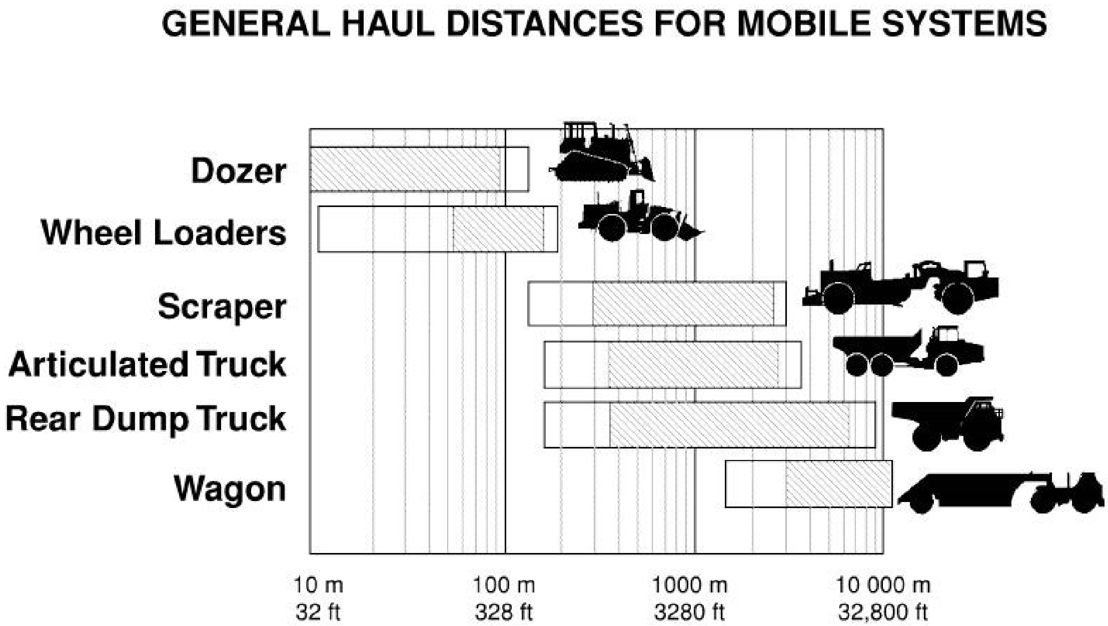


Figure 2-97 Expected Haul Distances by Equipment Type

2.9.5.2 Bridge, Aerial Structure, and Roadway Crossing Construction

Similar to existing HSR systems around the world, the elevated guideways would be designed and built as single-box segmental-girder construction. Where needed, other structural types would be considered and used, including arch, steel girder, and steel truss bridges.

- **Foundations**—A typical aerial structure foundation pile cap would be supported by an average of four bored piles with diameters ranging from 5 to 10 feet (1.5 to 3 meters). Depth of piles would depend on geotechnical site conditions. Piles can be constructed with rotary drilling rigs, and either bentonite slurry or temporary casings may be used to stabilize pile shaft excavation. The estimated production rate is four days per pile installation. Additional installation methods available to the contractor include bored piles, rotary drilling cast-in-place piles, driven piles, and a combination of pile jetting and driving.
- **Pile Caps**—After piles are completed, pile caps would be constructed using conventional methods. For pile caps constructed near existing structures such as railway, bridges, and underground drainage culverts, temporary sheet piling (i.e., temporary walls) would be used to minimize disturbances to adjacent structures. Sheet piling installation and extraction would be achieved using hydraulic sheet-piling machines.
- **Substructure**—Aerial structures with pier heights ranging from 20 to 90 feet could be constructed using conventional jump-form and scaffolding methods. A self-climbing formwork system may be used to construct piers and portal beams greater than 90 feet high. The self-climbing formwork system is equipped with a winched lifting device, which is raised up the column by hydraulic means; a structural frame is mounted on top of the previous pour. In

general, a 3-day cycle for each 12-foot pour height can be achieved. The final size and spacing of the piers depend on the types of superstructures and spans the piers are supporting.

- **Superstructure**—The loadings, stresses, and deflections encountered during the various intermediate construction stages would be considered, including changes in static scheme, sequence of tendon installation, maturity of concrete at loading, and load effects from erection equipment. As a result, the final design would depend on the contractor's means and methods of construction and would include several different methods:
- **Full-span precast construction**—Box girders would be precast and prestressed in advance as full spans and stored in a precasting yard. The 110-foot precast segments, weighing around 900 tons, would be transported along the previously constructed aerial guideway using a special gantry system (Figure 2-98).
- **Span-by-span precast segmental construction—**Shorter box girder segments would be precast and prestressed and stored in a precasting yard. These segments, limited to 12-foot segments weighing less than 70 tons, would likely be individually transported to the construction site by ground transportation. Once the gantry system is in place, construction would involve hoisting the segments from the ground and installing and tensioning the prestressing tendons to create the box girder (
- Figure 2-99).
- **Balanced cantilever segmental construction—**In locations where construction would occur over existing facilities that prevent equipment and temporary supports on the ground, balanced cantilever segmental construction may be used. Under this construction method, box girder segments (12-foot segments weighing less than 70 tons) that are either precast or cast in place would be placed in a symmetrical fashion around a bent column. The segments would be anchored at the ends by cantilever tendons located in the deck slab, with midspan tendons balancing the weight between two cantilevers (Figure 2-100). Precast segments would be precast off site, transported to the construction site, and installed incrementally onto a portion of the existing cantilever using ground cranes, hoisting devices, or a self-launching gantry. Segments can also be cast in place and installed two at a time, one at each end of the balanced cantilever. Segments generated by cast in place are generally longer than those in precast construction since they do not need to be transported to the construction site.
- **Cast-in-place construction on falsework—**The method involves creating a suspended formwork with either a launching girder or gantry system. Once the formwork is in position and reinforcements and prestressing are placed, concrete is poured and the prestressed. The formwork is then removed and moved to the next segment (Figure 2-101).

Figure 2-98 Full Span Precast Construction

Figure 2-99 Span-by-Span Precast Segmental Construction

Figure 2-100 Balanced Cantilever Segmental Construction

Figure 2-101 Cast-in-Place Construction on Falsework

Construction of superstructures would also vary between river crossings, viaducts, and road crossings:

- **River Crossings**—At river crossings, sub-structure would be constructed during the dry season. Concurrently, the bridge decks could be assembled adjacent to the crossings. These would then be installed in the following dry season.
- **Viaducts**—In mountainous regions, viaducts would be constructed using methods well-fitted to local constraints.
- **Road Crossings**—Road crossings of existing railroads, roads, and the HSR would be constructed on the line of the existing road or offline at some locations. Where crossings are constructed online, the existing road would be closed or temporarily diverted. Where crossings are constructed offline, the existing road would be maintained in use until the new crossing was completed.

Construction of foundations and substructure would be similar to that for aerial structures but reduced in size. The superstructure would likely be constructed using precast, prestressed concrete girders and cast-in-place deck. Approaches to the over bridges would be earthwork embankments, mechanically stabilized earth walls, or other retaining structures.

2.9.5.3 Tunnels

All six of the Build Alternatives would require construction of multiple tunnels spanning distances ranging from 0.5 miles to 21.7 miles. As described in Section 2.3.4, Infrastructure Components, the Palmdale to Burbank Project Section would require shallow cut-and-cover tunnels to be constructed utilizing open-cut/trenching techniques and deep tunnels to be constructed using various methods described below. Regardless of the technique utilized to construct tunnels, spoils would be generated during tunnel construction. The term *spoils* refers to earth, rock, and other materials excavated during tunneling or other major earthwork activity. The spoils analysis contained in this Draft EIR/EIS is explained below.

Grouting for Ground Improvement

During tunnel construction, grouting may be required. Grouting is a ground-improving practice conducted prior to, during, and after tunnel excavation. Grouting entails injection of flowing materials into cavities to consolidate or waterproof the ground. The cavities can be cracks and joints in solid rock or pores in loose ground. Other possible reasons for grouting are to tunnel through fault zones or reduce water inflow through special preparation of the ground.

There are a variety of grouting materials such as chemical grouting and cement suspensions. The choice of material is determined by the hydrological and geological conditions on site and by environmental concerns. Cement suspensions are often used for grouting where there are environmental concerns. Please reference HYD-IAMF#7 in Section 3.8 of this Draft EIR/EIS, Hydrology and Water Resources, for further information regarding grouting.

Tunnel Techniques

The HSR Build Alternatives propose tunnels of varying depths and lengths. For shallow depths, cut-and-cover tunnels would be constructed. Cut-and-cover tunnels are typically anticipated to be used in cases where the tunnel depth varies between approximately 30 feet and 90 feet. Most cut-and-cover tunnels are anticipated to a use top-down construction method in which the tunnel walls are constructed first, using a variation of permanent excavation support methods depending on the required excavation depth and the geotechnical properties of the site. It is anticipated that cut-and-cover tunnel construction would generally take place in a linear sequence, beginning at one end and continuing toward the other with sequential excavation and excavation support, tunnel lining placement, backfill, and excavation support removal. Each of the six Build Alternative alignments would employ cut-and-cover tunneling at their approach to the Burbank Airport Station and would entail surface disruption during the construction process on airport property.

Different types of construction methods could be utilized to create deep tunnels, including TBM (Figure 2-102 and Figure 2-103) and conventional tunneling methods (mining).

Use of TBM allows rapid advance rates, significantly faster than the rates achieved by conventional (mined) tunneling under similar ground conditions. The TBM excavation procedure is generally appropriate in the following cases:

- Long tunnels (more than 3 miles long)
- Tunnels with constant cross section
- Tunnels with good accessibility to CSAs close to tunnel portals or temporary adits or shafts

Using these criteria, TBM is considered the most suitable excavation procedure for the long-bored tunnels under ANF, near Acton, in the foothills of the San Gabriel Mountains and in the Burbank area. In contrast, conventional tunneling is the most suitable procedure to construct short tunnels (less than 3 miles long).

The selection of TBM type would depend, in part, on further analysis at later stages of planning for the Palmdale to Burbank Project Section and mainly depends on the following factors:

- Geotechnical conditions—rock and soil characteristics, groundwater inflow and pressure, need of face support, ground homogeneity
- Type of tunnel, temporary support, and permanent lining

- Presence of buildings or other elements on the surface that could be affected by the tunnel drive

Please refer to HYD-IAMF#5, #6, and #7, in Section 3.8 of this Draft EIR/EIS, Hydrology and Water Resources, which provide specific information as to TBM tunneling methods and tunnel lining types that would be employed during project construction.

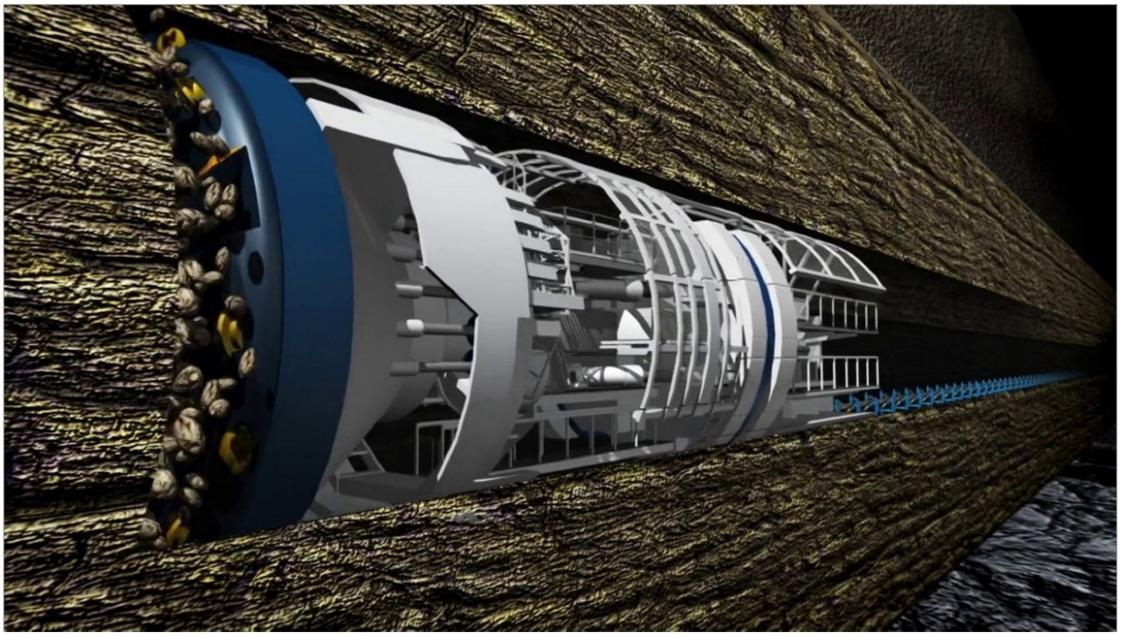


Figure 2-102 Tunnel Boring Machine

Figure 2-103 Tunnel Boring Machines at a Double Portal Entrance

In addition to tunneling with TBM, conventional methods may be used for certain elements when constructing long tunnels. Depending on the construction strategy, conventional tunneling (blasting or mechanical excavation) may be used for the following elements:

- Cross passages
- TBM assembly caverns
- TBM disassembly chambers
- Assembly/rescue tunnels
- Construction adits or shafts
- Ventilation chambers or shafts

Conventional methods would also be used to construct tunnels less than 3 miles long and that present suitable conditions. Conventional mining is suitable for the construction of short tunnels where the substrate is rock, and it offers an economical and expeditious approach. Conventional mining methods include road headers and drill-and-blast or mechanical excavators depending on the strength of the ground being excavated and the size of the excavation.

Tunnels would require the construction of portals (entry and exit structures) at each end. Portals would be constructed prior to tunnel excavation, providing an access point for TBM and mining equipment to launch into the tunnel shafts. Excavation of the tunnel portals would create spoils that could require off-hauling to re-use or disposal sites.

Adits and intermediate windows are proposed in various locations to provide additional access points to assemble, launch, and disassemble TBM equipment. Adits are also locations where fault chambers could be built to protect HSR tunnel infrastructure within fault zones. Adits and intermediate windows could also be used as locations for spoils to be removed from tunnels during construction.

Adits as inclined (descending) galleries could be mined using conventional methods such as road headers and drill-and-blast or mechanical excavators, depending on the strength of the ground being excavated and the size of the excavation. In the event that an adit is placed within the ANF, it would be designed to cross the San Gabriel Fault Zone, with the adit surface access in the fault zone. However, the connecting passageway would be located outside the fault zone. Pre-excavation grouting would be performed to control foreseeable disturbances in the hydrogeological environment and avoid and minimize groundwater inflow into the gallery.

Intermediate windows would consist of twin shafts. The upper zone of the shafts (excavated through soils) would be built with drilled concrete secant piles, which consist of reinforced concrete columns overlapped to ensure water-tightness in case groundwater is present. Concrete secant piles would also be embedded in the rock. The lower excavation of the shaft (through rock) could be supported with a combination of shotcrete, welded-wire mesh, rock bolts, and weeps. Shotcrete consists of concrete applied via a hose, while rock bolts consist of long metal rods drilled into the sides of a tunnel or shaft to stabilize existing rock formations. Weeps are small holes drilled to allow water flow to ease hydrostatic pressure. The shaft would be wide enough to accommodate the twin tunnels (approximately three tunnel diameters) and have a depth equal to the tunnels' invert depth. Excavation of the adits and intermediate windows would result in spoils that would require off-hauling to re-use or deposition sites.

Water used in tunnel excavation, including all water filtered into the tunnels and water used in cleaning and industrial processes, must undergo treatment before being discharged to natural watercourses. The removal and treatment of such water begins with sedimentation, which could occur through the use of settlement basins or compact treatment plants. Settlement basins allow sediment particles to settle in the pond by their own weight; solid particles fall to the bottom as mud. The remaining mud (spoils) produced from sediments must then be dried prior to being hauled to a disposal site. The required degree of dryness would be achieved by moving the mud to a new basin where the water would be filtered out. Compact treatment plants entail use of a thickener that collects the mud from the bottoms of the sedimentation tanks and pumps it through a press filter to reduce the water content. Following sedimentation, acidity would be corrected, and lubricants and greases removed, as needed, to return the water to its natural state. All water treatment and sedimentation would take place within the Build Alternative footprint.

Spoils

Spoils are earth and rock materials excavated during construction. Each of the Build Alternatives would generate substantial volumes of spoils from major earthwork activities, including open cuts, cut-and-cover tunnels, bored/mined tunnels, adits/intermediate windows, tunnel portals, trenches, and other features. This Draft EIR/EIS estimates the volume of spoils that would be generated by each Build Alternative and evaluates a reasonable approach to spoils disposal.

Spoils resulting from excavation, if they are not classified as hazardous, may be re-used in construction of the Build Alternatives, deposited within the permanent Build Alternative footprint, or permanently disposed of at a designated site, as appropriate.[16] The extent of potential re-use and the need for imported fill from borrow sites would depend on construction sequencing and the suitability of excavated materials for re-use. This Draft EIR/EIS conservatively assumes that all of the spoils created during excavations would require off-hauling to disposal or re-use sites.

Further estimation of spoil types and their suitability for re-use would occur during the design phase of the Preferred Alternative when more detailed, site-specific information on hazardous materials becomes available.

Other projects planned in the vicinity of the Palmdale to Burbank Project Section may be able to accept spoils generated from the California HSR System for re-use on their respective project sites. Certain spoils may not be suitable for re-use by nearby projects.

Spoils that cannot be re-used as part of HSR construction or nearby projects would need to be hauled to a disposal site within or outside the Build Alternative footprint. There are several identified potential disposal sites within 25 miles of the Palmdale to Burbank Project Section, as shown on Figure 2-104.

As noted in Appendix 2-I, Potential Disposal Plan for Spoils Generated during Construction Activities, three existing mine sites have been identified as initial deposition locations for the Palmdale to Burbank Project Section and have been incorporated into the footprint:

- The Vulcan Mine site located south of Lang Station Road within the ANF, would serve as a deposition site for some of the spoils generated by the Refined SR14 and SR14A Build Alternatives. Portions of the Vulcan Mine site located within the ANF, including areas within the SGMNM, would also be used for the deposition all spoils extracted from beneath the SGMNM (which would only occur in the Refined SR14 Build Alternative).
- Excess dirt from tunnel portal 1A and portal 1 would be off-hauled by truck, using existing roadways, to potential disposal sites southeast of Palmdale.
- The Boulevard Mine, located southwest of San Fernando Road in Burbank, would serve as a disposal site for some of the spoils generated by both the Refined SR14 Build Alternative, SR14A Build Alternative, E1 Build Alternative, and the E1A Build Alternative.
- The CalMat Mine, located northwest of Peoria Street in the Sun Valley neighborhood of Los Angeles, would serve as a disposal site for some of the spoils generated by the E2 Build Alternative and the E2A Build Alternative.

Spoils would be disposed of in these mine sites using a combination of conveyor belts and trucks. Potential haul routes were identified based on where spoils would originate and by anticipating the most likely path from the origination point of the spoils to the nearest freeway access point or major roadway. It is assumed that, once trucks reach the freeway, they would travel no more than 25 miles (one way) to reach a disposal site.

[16] Spoils originating within SGMNM will be deposited within the ANF.

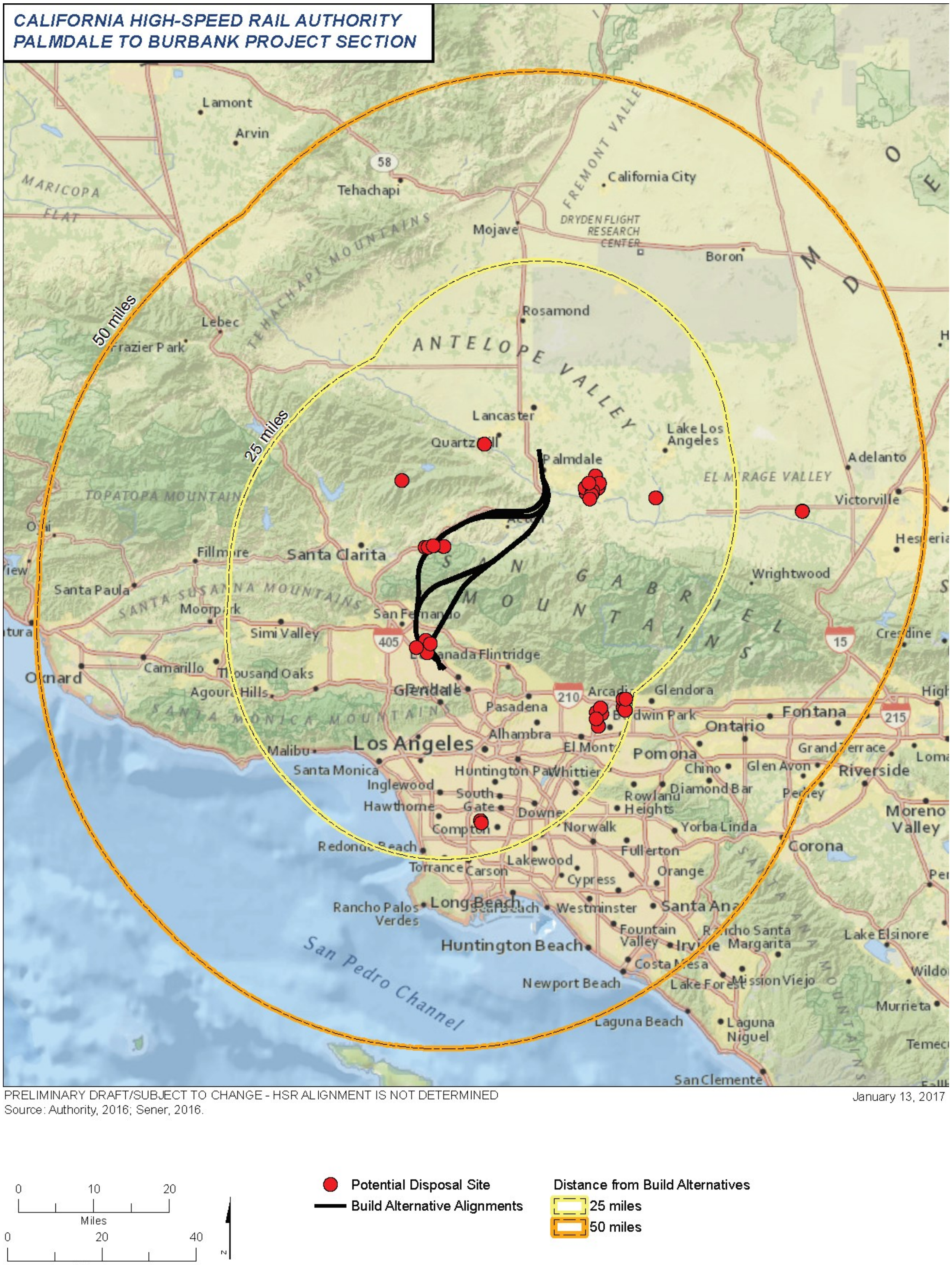


Figure 2-104 Potential Disposal Sites

As soil and rock material are excavated, it is assumed that the materials would expand to a larger volume than they would occupy in situ. Therefore, a bulking factor was applied to estimate the volume of spoils that must be transported. “Bank-to-bulking” factors are generally 1.6 to 1.8 for rock excavation, and 1.2 to 1.3 for soil excavation. In other words, 1 cubic yard of rock material in the ground would be expected to produce 1.6 to 1.8 cubic yards of rock spoil material to be transported. Estimated bank volumes, for all tunnels and open excavations in each Build Alternative, are 24-33 million cubic yards, which would result in an estimated bulk volume of 39-47 million cubic yards of spoils.

Using the estimated quantities of spoils generated by construction of the Palmdale to Burbank Project Section, apportioned to each site of spoil removal, the number of trucks required to haul the estimated spoils away from each site was calculated for each Build Alternative. Appendix 2-I, Potential Disposal Plan for Spoils Generated during Construction Activities, notes the likely number of trucks per hour and the estimated duration of each construction activity for each of the Build Alternatives.

For purposes of this spoils analysis, it is assumed that spoils-hauling trucks would have an 18-cubic-yard capacity. It is assumed that TBM machines would run 24 hours a day for 7 days a week because the machines can jam if halted. Therefore, spoils from bored tunnel construction would be generated continuously. Other types of excavation, like cut-and-cover tunnels, could take place during 8-hour workdays.

2.9.5.4 Railroad Systems Construction

The railroad systems would include trackwork, traction electrification, signaling, and communications. After completion of earthwork and structures, trackwork would be the first rail system element to be built; trackwork must be in place to start traction electrification and railroad signaling installation.

Trackwork construction generally requires the welding of transportable lengths of steel running onto longer lengths (approximately 0.25 mile), which are placed in position on crossties or track slabs and are field-welded into continuous lengths.

Tie and ballast track construction typically requires that crossties and ballasts be distributed along the trackbed by a truck or tractor. In sensitive areas, such as where the HSR is parallel or near to streams, rivers, or wetlands, and in areas of limited accessibility, this operation could be accomplished by using the established right-of-way with materials delivered using the constructed rail line.

An alternative to ballasted track construction is using a slab track system. Slab track construction techniques include using slipped-form paving machines, top-down construction, grouted precast panels set on a poured slab, or conventional paving machines. Slab track may be built directly on tunnel inverts, at grade over prepared subgrade, or on aerial structures. Table 2-38 notes the quantities of aggregate (sub-ballast, ballast, and concrete) that would be used in construction for each of the Build Alternatives.

Table 2-38 Quantities of Aggregate for Construction (cubic yards)

Material	Refined SR14	SR14A	E1	E1A	E2	E2A
Sub-ballast	107,271	118,960	149,406	144,597	124,864	120,233
Ballast	419,995	451,623	492,101	495,241	534,668	537,807
Concrete	134,351	131,737	103,798	103,798	72,293	72,293
Total	**661,617**	**702,320**	**745,305**	**743,636**	**731,825**	**730,334**

Traction electrification equipment to be installed includes TPSSs and the overhead contact system. TPSSs are typically fabricated and tested in a factory and then delivered by tractor-trailer to a prepared site adjacent to the alignment. TPSSs would be located about every 30 miles along the alignment. The overhead contact system would be assembled in place over each track and would include poles, brackets, insulators, conductors, and other hardware.

Signaling equipment to be installed would include wayside cabinets and bungalows, wayside signals (at interlocking), switch machines, insulated joints, impedance bonds, and connecting cables. The equipment would support automatic train protection, ATC, PTC to control train separation, and routing at interlocking and speed.

2.9.5.5 Station Construction

The Burbank Airport Station would be constructed adjacent to the Hollywood Burbank Airport. The typical station construction sequence includes:

- **Demolition and Site Preparation**—The contractor would be required to perform street improvement work, site clearing, earthwork, drainage work, and utility relocations. Additionally, substations and maintenance facilities are assumed to be newly constructed structures. For platform improvements or additional platform construction, the contractor may be required to realign existing track.
- **Structural Shell and Mechanical/Electrical Rough-Ins**—The contractor would construct foundations and erect the structural frame for the new station, enclose the new building, and/or construct new platforms and connect the structure to site utilities. Additionally, the contractor would rough in electrical and mechanical systems and install specialty items such as elevators, escalators, and ticketing equipment.
- **Finishes and Tenant Improvements**—The contractor would install electrical and mechanical equipment, communications and security equipment, finishes, and signage. The contractor may also install other tenant improvements if requested.

2.10 Regulatory Review, Authorizations, Approvals, and Processes

The Authority has prepared or is in the process of preparing agreements with environmental resource agencies to facilitate the environmental regulatory processes required for construction and operation of the California HSR System. These agreements—a Memorandum of Understanding and a Memorandum of Agreement or Programmatic Agreement—would clearly identify the Authority's responsibilities in meeting the regulatory requirements of federal and state agencies. A Memorandum of Agreement was executed in 2010 (Authority et al. 2010b) regarding the integration of NEPA, Clean Water Act Section 404, and Rivers and Harbors Act Section 14 processes. The Authority coordinated with the U.S. Coast Guard, and the U.S. Coast Guard indicated that this Palmdale to Burbank Project Section is not within its jurisdiction (Sulouff 2011).

Table 2-39 lists the major environmental regulatory authorizations required for the HSR-related projects. The table identifies each agency's status as a NEPA cooperating agency or CEQA responsible agency. As a State agency, the Authority is exempt from local permit requirements; however, to coordinate construction activities with local jurisdictions, the Authority would seek local permits as part of construction processes consistent with local ordinances. The agencies identified in the table are anticipated to rely on the Draft EIR/EIS documents to support their permitting and approval processes.

Table 2-39 Potential Major Environmental Regulatory Review, Authorizations, Approvals, and Processes

Agency	Permit, Consultation, or Other Role
Federal	
U.S. Army Corps of Engineers (NEPA Cooperating Agency)	▪ Section 404 Permit ▪ Rivers and Harbors Act Section 14 (408) permission
U.S. Department of the Interior	Section 4(f) of the U.S. Transportation Act of 1966
Surface Transportation Board (NEPA Cooperating Agency)	Authority to construct and operate a new rail line pursuant to 49 U.S.C. 10901 or 49 U.S.C. 10502, as applicable.
U.S. Forest Service (NEPA Cooperating Agency)	Special Use Authorization
Bureau of Land Management (NEPA Cooperating Agency)	If needed, grant of right-of-way through BLM properties
Federal Aviation Administration (NEPA Cooperating Agency)	Approval of use of tall construction equipment (e.g., cranes and drill rigs) affecting National Airspace System will require flagging and lighting in accordance with FAA regulations. Notice of proposed construction or alteration (FAA form 7460-1) will need to be filed with the FAA prior to tunnel construction under the Hollywood Burbank Airport runway. A No Hazard Determination will need to be made by the FAA. Coordination with the FAA is ongoing.
U.S. Department of the Interior/National Park Service	Section 6(f) of the Land and Water Conservation Fund Act of 1965 (if needed, approval of replacement parkland)
U.S. Advisory Council on Historic Preservation, though the California State Historic Preservation Office	Section 106 Consultation (National Historic Preservation Act of 1966)
FRA and U.S. Environmental Protection Agency	General Conformity Determination (coordination with USEPA)
U.S. Fish and Wildlife Service	Section 7 Consultation - Biological Opinion/incidental take statement
State	
California Office of Historic Preservation, State Historic Preservation Officer	Section 106 Consultation (National Historic Preservation Act of 1966) Sections 5024 and 5024.5 of the California Public Resources Code
California Department of Fish and Wildlife (CEQA responsible agency)	▪ California Endangered Species Act incidental take permit ▪ California Department of Fish and Game Section 1602 Lake and Streambed Alteration Agreement ▪ Use of Title 14 Lands – Allensworth Ecological Reserve
Caltrans (CEQA responsible agency)	▪ Caltrans Encroachment Permits ▪ Caltrans Statewide Stormwater Permit (Order No. 2012-0011-DWQ, NPDES No. CAS00003)

Agency	Permit, Consultation, or Other Role
California Public Utilities Commission (CEQA responsible agency)	Approval for construction and operation of railroad crossing of public road and for construction of new transmission lines and substations
California State Lands Commission (CEQA responsible agency)	Lease for crossing state sovereign lands
State Water Resources Control Board & Lahontan and Los Angeles Regional Water Quality Control Boards (CEQA responsible agency)	▪ Section 401 Water Quality Certification under the Clean Water Act of 1972 ▪ Construction General Permit (Adopted Order No. 2009-0009-DWQ, as amended by 2010-0014-DWQ and 2012-0006-DWQ)) ▪ Industrial General Permit (Order No. 2014-0057-DWQ) ▪ Phase II MS4 Permit (Order No. 2013-0001-DWQ) ▪ Discharges with Low Threat to Water Quality (Order No. R3-2017-0042) ▪ Dewatering and Other Low Threat Discharges (Order No. R5-2013-0074) ▪ Spill Prevention, Control and Countermeasure Plan (part of Section 402 process)
Regional	
South Coast Air Quality Management District	▪ Rule 201 General Permit Requirements ▪ Rule 403 Fugitive Dust ▪ Rule 442 Architectural Coatings ▪ Rule 7050 Asbestos
Los Angeles County Flood Control Board (CEQA responsible agency)	Municipal Separate Storm Sewer System Permit (Order No. R4-2012-0175 and Order No. R8-2009-0030)

BLM = Bureau of Land Management
Caltrans = California Department of Transportation
CEQA = California Environmental Quality Act
DWQ = Division of Water Quality
FAA = Federal Aviation Administration
FRA = Federal Railroad Administration
MS4 = municipal separate storm sewer system
NEPA = National Environmental Policy Act
NPDES= National Pollutant Discharge Elimination System
NWP = Nationwide Permit
U.S.C = United States Code
USEPA = U.S. Environmental Protection Agency

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