



Final Service Development Plan

Coachella Valley-San Gorgonio Pass Rail
Corridor Service Program

May 2022



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Abbreviations/Acronyms

AA	Alternatives Analysis
ADA	Americans with Disabilities Act
BCA	benefit-cost analysis
CalSTA	California State Transportation Agency
Caltrans	California Department of Transportation
CDP	census-designated place
CEQA	California Environmental Quality Act
COA	proposed Coachella station
CP	control point
CSRP	California State Rail Plan
CTC	centralized traffic control
CV	Coachella Valley
EIR	environmental impact report
EIS	environmental impact statement
FRA	Federal Railroad Administration
FUL	Fullerton Station
FY	fiscal year
GPSCVB	Greater Palm Springs Convention and Visitors Bureau
I-10	Interstate 10
IDR	proposed Indio rail station
JPA	Joint Powers Authority
LAUS	Los Angeles Union Station
LAX	Los Angeles Union Station (Amtrak station code)
LML	proposed Loma Linda station
LOSSAN	Los Angeles – San Diego – San Luis Obispo Rail Corridor
MEGA	USDOT National Infrastructure Project Assistance Program
Metro	Los Angeles County Metropolitan Transportation Authority
MID	proposed Mid-Valley station
MOW	maintenance-of-way
MP	milepost
MT	Main Track
NEPA	National Environmental Policy Act
O&M	operation and maintenance

OCTA	Orange County Transportation Authority
PAS	proposed Pass Area Station
PRIIA	Passenger Rail Investment and Improvement Act of 2008
Program	Coachella Valley-San Geronimo Pass Rail Corridor Service Program
PSN	Palm Springs Amtrak Station
RCTC	Riverside County Transportation Commission
RIV	Riverside Station
ROW	right-of-way
RTC	Rail Traffic Controller
SB	Senate Bill
SBCTA	San Bernardino County Transportation Authority
SCAG	Southern California Association of Governments
SCRRA	Southern California Regional Rail Authority
SDP	Service Development Plan
SR	State Route
TNC	Transportation Network Company
TPC	train performance calculations
U.S.	United States
UP	Union Pacific Railroad
US-101	United States Highway 101
USDOT	United States Department of Transportation
VMT	vehicle miles traveled

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Executive Summary

The Riverside County Transportation Commission (RCTC), in coordination with the California Department of Transportation (Caltrans) and the Federal Railroad Administration (FRA), is working to bring passenger rail service to the Coachella Valley-San Gorgonio Pass Rail Corridor (Corridor) as an alternate mode of travel across Southern California, connecting desert communities and attractions with Los Angeles, Orange County, and the Inland Empire. The proposed Corridor extends approximately 144 miles between downtown Los Angeles and the Coachella Valley, as shown on Figure ES-1, and is divided into a Western Section, from Los Angeles to Colton, and Eastern Section, from Colton to Coachella.

ES.1 Project Background

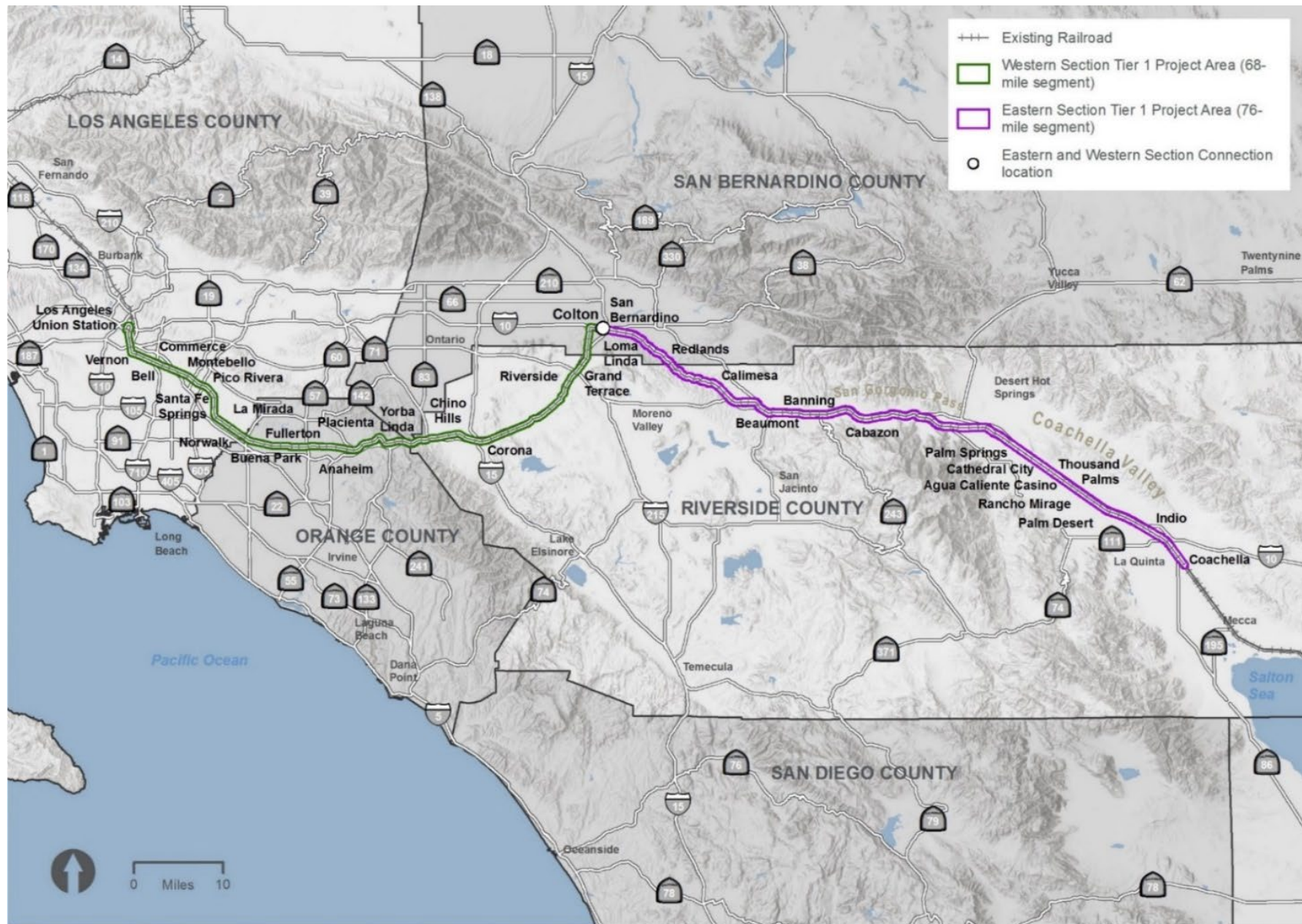
In 1991, RCTC completed the first in a series of studies evaluating the feasibility of operating one or two daily intercity passenger rail round trips between Los Angeles and Indio. From 1991 to 2013, RCTC completed additional feasibility studies on the Corridor. In July 2016, RCTC, in coordination with Caltrans and FRA, prepared and completed the 2016 Alternatives Analysis (AA) Report that evaluated a reasonable range of alternatives for implementation of daily intercity passenger rail service between Los Angeles and Indio (FRA and RCTC 2016). The purpose of the 2016 AA Report was to identify a reasonable range of preliminary alternatives that could be evaluated in a Service Development Plan (SDP) and Tier 1/Program environmental impact statement (EIS)/environmental impact report (EIR).

In October 2016, the Notice of Intent/Notice of Preparation was issued for the Coachella Valley-San Gorgonio Pass Rail Corridor Service Project's (Project) Tier 1/Program EIS/EIR. The Draft Tier 1 Program EIS/EIR was released in May 2021, with the public comment period ending July 6, 2021 (FRA and RCTC 2021). Publishing of the Final Tier 1 Program EIS/EIR and issuance of the Record of Decision and the Notice of Determination are expected in Summer 2022.

This document presents the Project's SDP. It describes the planned operation, maintenance, equipment, infrastructure, implementation plan, organization, finances, and economics of the proposed intercity passenger railroad service.

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Figure ES-1. Coachella Valley-San Geronio Pass Rail Corridor



Source: RCTC 2021

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ES.2 Purpose and Need

ES.2.1 Purpose

The Project's Purpose is to implement a safe, reliable, and convenient intercity passenger rail service in the Program Corridor with the capability to meet the future mobility needs of residents, businesses, and visitors and meet the following objectives:

1. Provide travelers between the Los Angeles Basin and the Coachella Valley with a public transportation service that offers more convenient, reliable, and competitive trip times, better station access, and more frequency than currently available public transportation services
2. Provide travelers between the Los Angeles Basin and the Coachella Valley with an alternative to driving that offers reliable travel schedules
3. Provide travelers between the Los Angeles Basin and the Coachella Valley with an affordable transportation service
4. Serve a range of trip purposes traveling between the Los Angeles Basin and the Coachella Valley, particularly including business and personal trips
5. Improve regional travel opportunities between the Los Angeles Basin and the Coachella Valley for individuals without private vehicles
6. Serve the expected population growth in the Los Angeles Basin and the Coachella Valley
7. Assist regional agencies in meeting air pollution and greenhouse gas emission reduction targets as mandated in state and federal regulations

ES.2.2 Need

The Project is needed to address the absence of effective transportation alternatives to personal automobile travel between coastal regions of Southern California and the Inland Empire and the Coachella Valley, the projected increase in travel demand in the Program Corridor resulting from population and employment growth, and the increasing unreliability of existing transportation systems within the Program Corridor.

For interregional travel between the Los Angeles Basin and the Coachella Valley, travelers are required to drive Interstate 10 (I-10) through the San Gorgonio Pass. There are limited public transportation options; therefore, people with no, or limited access to, private vehicles have limited ability to travel between the regions. Emergency closures of I-10 through San Gorgonio Pass further undermine the reliability of the Program Corridor's transportation system. Figure ES-2 illustrates the reliance of drivers on I-10, as no parallel highways exist through the pass.

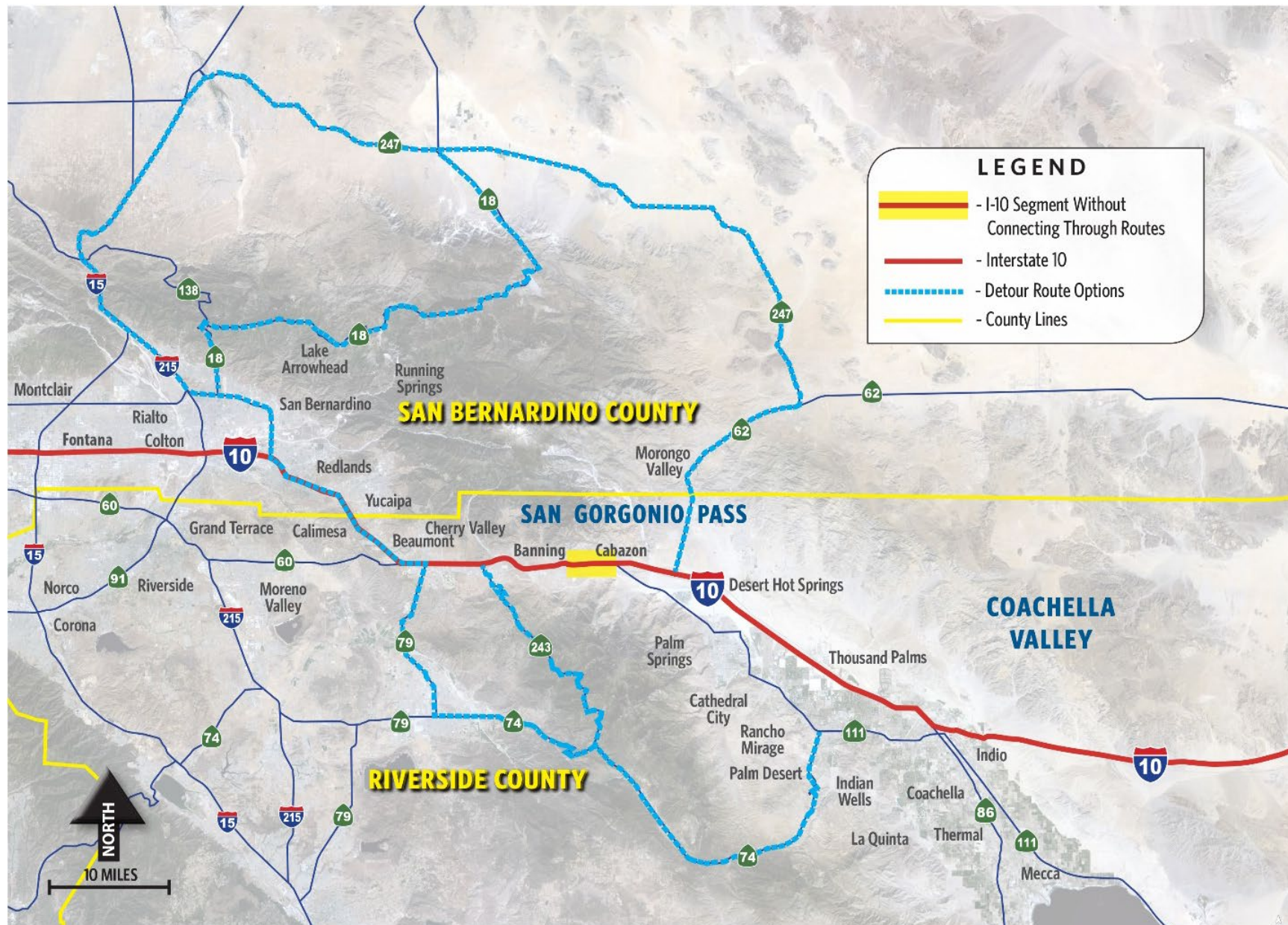
The Coachella Valley and San Gorgonio Pass area are projected to be two of the fastest-growing areas in the state by 2040 and increases in population and employment will increase demand for reliable and safe travel options for people living and working in the Corridor (Southern California Association of Governments [SCAG] 2016).

Transportation options providing an alternative to driving between the Coachella Valley and Greater Los Angeles are limited to the following:

- Amtrak's Sunset Limited long-distance passenger service, with three trips per week each way that stop in Palm Springs in the middle of the night
- Amtrak Thruway, commuter bus, and Greyhound services that traverse the San Geronimo Pass via I-10
- High-cost air passenger service between Los Angeles International Airport and Palm Springs International Airport

The Tier 1/Program EIS/EIR Study Area identifies a number of communities along the corridor classified as disadvantaged communities by the California Environmental Protection Agency per Senate Bill (SB) 535. A substantial portion of the population within these disadvantaged communities does not own personal vehicles and relies on alternative transportation services. East of Colton, the lack of available alternative transportation options leaves the I-10 corridor underserved for these populations.

Figure ES-2. Interstate 10 Corridor San Gorgonio Pass Detour Alternatives



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ES.3 Corridor Overview

The Corridor is approximately 144 miles long and extends from a western terminus at Los Angeles Union Station (LAUS) in the City of Los Angeles to an eastern terminus in the City of Coachella. The Corridor consists of two sections: the Western Section and the Eastern Section. The boundary between Western and Eastern sections is in the City of Colton, at the intersection of existing railroad lines owned by Union Pacific (UP) and BNSF Railway.

The Western Section is traversed by four rail lines that link Los Angeles to Colton:

- The San Bernardino Subdivision (owned by BNSF), which passes through Fullerton and Riverside. It is primarily a freight main line for BNSF containing segments ranging from two to four main tracks; it also hosts the Metrolink 91/Perris Valley Line, and portions of it are used by Metrolink's Riverside Line, Inland Empire/Orange County Line, and Orange County Line.
- The Los Angeles Subdivision (owned by UP), which passes through Riverside and Pomona. It is primarily a freight main line for UP, and portions of it are used by Metrolink's Riverside Line. It is primarily double track with segments of single track.
- The Alhambra Subdivision (owned by UP), which runs due west from Colton and passes through Pomona. It is primarily a freight main line for UP, and it also hosts three weekly round trips of Amtrak's Sunset Limited long-distance service. It primarily a single-track alignment.
- The San Gabriel Subdivision (owned by the San Bernardino County Transportation Authority (SBCTA) and the Los Angeles County Metropolitan Transportation Authority [Metro]), which lies north of Colton and carries the Metrolink San Bernardino Line commuter rail service between San Bernardino and Los Angeles. It contains primarily single track with some sidings and segments with two main tracks.

The Eastern Section has a single existing main line approximately 76 miles long owned and operated by UP between Colton and the City of Coachella. It is primarily a freight main line with two tracks but also hosts three weekly round trips of Amtrak's Sunset Limited long-distance service.

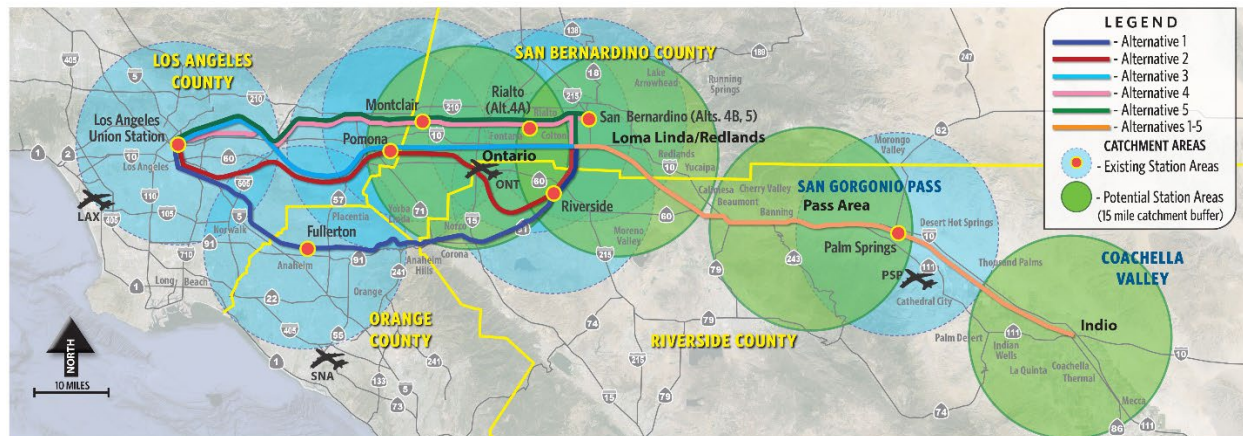
ES.4 Alternatives Considered

The 2016 AA Report identified a reasonable range of preliminary alternatives that could be carried forward for evaluation in a subsequent SDP and Tier 1/Program EIS/EIR.

ES.4.1 2016 Alternatives Analysis

The 2016 AA Report identified six potential route alternatives for the Corridor based on the Purpose and Need statement, review of previous studies, and comments from agencies and the public. In the Western Section of the Corridor, various combinations of the four existing rail lines between the cities of Los Angeles and Colton were evaluated. For the Eastern Section, all potential route alternatives utilized UP's Yuma Subdivision between Colton and Indio. The six route alternatives are shown on Figure ES-3.

Figure ES-3. Corridor Route Alternatives Considered in the Alternatives Analysis



Source: RCTC 2016

Notes: Alternative 4 has two variations between Los Angeles and San Bernardino (Route Alternative 4-A and Route Alternative 4-B), resulting in a total of six route alternatives. During preparation of the 2016 AA Report, Indio was anticipated to be the eastern terminus of the Program Corridor.

The six alternatives were evaluated using four screening criteria: achieving the Program's Purpose and Need, environmental constraints, technical feasibility, and economic feasibility. After the two-step screening process shown on Figure ES-4, Alternative 1, along the BNSF San Bernardino and UP Yuma subdivisions, was determined to be the only alternative that met the Purpose and Need and was economically feasible.

Figure ES-4. Alternatives Selection Process Flow Chart



ES.4.2 Tier 1 EIS/EIR Alternatives

The alternatives evaluated in the Tier 1 Program EIS/EIR include a No Build Alternative, which is used as a baseline for comparison purposes and describes the impacts if the Program is not implemented, and a Build Alternative with three implementation options. The No Build Alternative assumes no new intercity passenger rail service is implemented in the Program Corridor.

The Build Alternative was based on Route Alternative 1 in the 2016 AA, connecting from Los Angeles to Colton on the Western Section of the corridor serving stations in Los Angeles (LAUS), Fullerton, and Riverside. Three implementation options were considered for the Eastern Section:

- **Build Alternative Option 1 (Coachella Terminus):** This option would serve the existing station in the City of Palm Springs. Additionally, up to five new potential stations would be constructed in the following areas: Loma Linda/Redlands Area (serving the Cities of Loma

Linda and Redlands), the Pass Area (serving the communities of Beaumont, Banning, Calimesa, and Cabazon), the Mid-Valley Area (serving the communities of Cathedral City, Thousand Palms, the Agua Caliente Casino area, Rancho Mirage, and Palm Desert), the City of Indio, and the City of Coachella as the eastern terminus of the Program Corridor. A third main line track would augment the existing two main tracks along the Eastern Section of the Corridor to Coachella.

- **Build Alternative Option 2 (Indio Terminus):** Option 2 would serve the same stations as Option 1, with the exception of Coachella. Like Option 1, a third main line track would augment the existing two main tracks along the Eastern Section of the Corridor but would terminate in Indio.
- **Build Alternative Option 3 (Indio Terminus with Limited Third Track):** Option 3 would serve the same five stations as Option 2. A third main track would augment the existing two main tracks along the portion of the Eastern Section of the Corridor from Colton to the proposed Mid-Valley Station area.

ES.4.3 Preferred Alternative

Because the No Build Alternative does not include any new rail service, it would not meet the Purpose and Need of the Project.

Considering the projected ridership, agency and public input, and potential environmental impacts associated with improving passenger rail within the Program Corridor, a passenger rail system from LAUS to Coachella (Build Alternative Option 1) is considered to be more cost efficient and better performing than a passenger rail system from LAUS to Indio (Build Alternative Option 2) or with limited third track infrastructure (Build Alternative Option 3), with similar potential impacts on the environment. Therefore, FRA and Caltrans have recommended Build Alternative Option 1 as the Preferred Alternative in the Draft Tier 1/Program EIS/EIR for purposes of the National Environmental Policy Act (NEPA).

For the purposes of the California Environmental Quality Act (CEQA), the No Build Alternative would be the environmentally superior alternative, because it would not result in any new construction-related effects or require new land acquisition that may be required for rail infrastructure. However, CEQA Guidelines Section 15126.6(e)(2) also states that where the No Project (No Build) Alternative is considered the environmentally superior alternative, the EIR shall identify another environmentally superior alternative.

While Build Alternative Options 2 and 3 could have less environmental impacts (due to a shorter rail route and fewer station facilities), they are anticipated to result in fewer reductions of vehicle miles traveled (VMT) and greenhouse gas emissions than Build Alternative Option 1. For purposes of the Tier 1/Program EIS/EIR, Build Alternative Option 1 was identified as the environmentally superior alternative.

ES.5 Ridership and Revenue Projections

Ridership and revenue forecasts for the Coachella Valley Rail service were prepared using the Caltrans Mode Share Model developed to support rail planning activities throughout the State of California and used to forecast ridership for the proposed service. The model begins with existing zone-to-zone travel patterns obtained from cell phone data, adjusted for population, employment, and

income growth. A rail mode share is estimated based on relative travel time, relative price, and service frequency for each zone-to-zone pair.

ES.5.1 Ridership Forecasts

Ridership forecasts were prepared in January 2019 with a base year of 2018, and projections were also made for the initially anticipated Opening Year of 2024 and a Future Year of 2044 after 20 years of operation. Estimated annual boardings by station for the six-station scenario (Build Alternative Option 1), are presented in Table ES-1.

Table ES-1. Annual Passenger On and Offs by Station

Code	Station	2018	2024	2044
COA	Coachella	16,600	19,300	32,000
IDR	Indio (rail)*	19,400	22,600	37,400
MID	Mid Valley	25,300	29,400	48,800
PSN	Palm Springs	73,900	85,900	142,600
PAS	Pass Area	8,300	9,700	16,000
LML	Loma Linda	32,300	37,600	62,300
RIV	Riverside	32,100	37,300	61,900
FUL	Fullerton	22,600	26,300	43,600
LAX	Los Angeles	120,500	140,100	232,400
Total on and offs		351,000	408,200	677,100
Project ridership (total annual one-way trips)		175,500	204,100	338,500
Average passengers per train		120	140	232

Source: Appendix A

Notes:

* The Indio (rail) station is a proposed new station and would not be located at the existing Amtrak Thruway bus stop in Indio.

COA=proposed Coachella station; FUL=Fullerton station; IDR=proposed Indio rail station; LAX=Los Angeles Union Station (Amtrak station code); LML=proposed Loma Linda station; PAS=proposed Pass Area Station; PSN=Palm Springs Station; RIV=Riverside station

ES.5.2 Revenue, Operating, and Maintenance Costs and Subsidy

Fare revenue was estimated by multiplying station to station ridership by an estimated fare for that station pair. In addition, auxiliary revenues, such as from on-board food and beverage service, were estimated. Operation and maintenance (O&M) costs were estimated based on annual seat miles of the proposed service and the cost per seat mile of the Pacific Surfliner (which is operated by Amtrak). Based on these estimates, an estimate of the profit and loss statement for the route is provided in Figure ES-2.

Table ES-2. Estimated Profit and Loss

Performance Metric	2024	2044
Projected annual ridership (6 stops east of Colton)	204,100	338,500
Route Profit/Loss (2019 Dollars)		
Ticket revenue	\$4,760,000	\$7,900,000
Auxiliary revenue	\$610,000	\$1,010,000
Projected O&M costs	\$11,545,000	\$11,545,000
Subsidy required	(\$6,175,000)	(\$2,635,000)
Subsidy per boarding	\$30.25	\$7.78
Revenue recovery ratio	47%	77%

Notes:

O&M=operating and maintenance

ES.6 Proposed Service

ES.6.1 Conceptual Timetable Development

The passenger-train service frequency determined to best meet the Project's Purpose and Need was established as two daily round trips, with one morning departure and one afternoon departure from each end of the Corridor. This frequency was determined based on a ridership forecasting model service optimization analysis performed as part of the 2016 AA, which found that with a mid-morning and mid-afternoon departure from each originating terminal would attract the greatest number of riders per train. For the purposes of the Tier 1 EIS/EIR and SDP, Amtrak is assumed to be the operator.

Conceptual timetables were developed using an operational simulation model of the eastern section of the corridor in combination with BNSF-provided available train slot times on the western section. The conceptual timetable for Build Alternative Option 1 is presented in Table ES-3.

Table ES-3. Conceptual Passenger Train Schedule for Build Alternative Option 1

AM Westbound (read down) ▼	PM Westbound (read down) ▼	Miles	Station Stops	Miles	AM Eastbound (read up) ▲	PM Eastbound (read up) ▲
9:25 AM	3:25 PM	0	Coachella, California	144	1:38 PM	6:38 PM
9:32 AM	3:32 PM	4	Indio, California	140	1:30 PM	6:30 PM
9:45 AM	3:45 PM	17	Mid-Valley-Rancho Mirage, California	127	1:14 PM	6:14 PM
9:59 AM	3:59 PM	27	Palm Springs, California	117	1:02 PM	6:02 PM

Table ES-3. Conceptual Passenger Train Schedule for Build Alternative Option 1

AM Westbound (read down) ▼	PM Westbound (read down) ▼	Miles	Station Stops	Miles	AM Eastbound (read up) ▲	PM Eastbound (read up) ▲
10:20 AM	4:20 PM	43	Pass Area-Cabazon, California	101	12:38 PM	5:38 PM
10:59 AM	4:59 PM	73	Loma Linda/Redlands, California	71	11:59 AM	4:59 PM
<i>11:12 AM</i>	<i>5:12 PM</i>	<i>76</i>	<i>Colton, California (UP/BNSF)</i>	<i>68</i>	<i>11:47 AM</i>	<i>4:47 PM</i>
11:22 AM	5:22 PM	82	Riverside, California	62	11:39 AM	4:39 PM
12:06 PM	6:06 PM	118	Fullerton, California	26	10:55 AM	3:55 PM
12:40 PM	6:40 PM	144	Los Angeles, California	0	10:20 AM	3:20 PM
<i>3:15</i>	<i>3:15</i>		<i>Trip Time (Coachella-Los Angeles)</i>		<i>3:18</i>	<i>3:18</i>

Notes:

The conceptual passenger train schedules presented above were developed for operations modeling and planning purposes only and do not represent a service commitment from stakeholders.

Italicized times are provided for reference and do not reflect station stops.

UP=Union Pacific Railroad

Operating at a maximum speed of 79 miles per hour, scheduled travel times are approximately 3 hours and 15 minutes, which is considered competitive with the personal automobile and commercial bus, which have a lower travel reliability because of highway traffic congestion.

ES.6.2 Operations Simulation Modeling

Computer-based operations simulations were conducted using the Rail Traffic Controller (RTC) modeling software to estimate rail performance in the Corridor. Project stakeholders agreed that the passenger rail service should be designed to achieve an endpoint on-time performance of 90 percent and an all-stations on-time performance of 90 percent, in compliance with on-time performance metrics in effect at the time that were established by FRA under the Passenger Rail Investment and Improvement Act of 2008 (PRIIA), as well as the Uniform Performance Standards for intercity passenger trains established by the California State Transportation Agency (CalSTA) on July 1, 2014. The PRIIA metrics and standards published by FRA also seek to ensure that the proposed intercity passenger rail service would not unreasonably impair the freight operations of the host railroad, or materially lessen the quality of freight transportation provided to shippers.

Operational simulations used infrastructure and operating data from the host railroad, UP, and from other stakeholders as needed, including Amtrak, BNSF, and the Southern California Regional Rail Authority (SCRRA). This included characteristics of existing infrastructure, planned or funded capital improvements, and existing and planned service plans for freight, intercity passenger, and commuter rail. Simulations were performed for multiple years and infrastructure build scenarios. Under the scenario corresponding to Build Option 1, the proposed service operated above 90 percent on-time and did not degrade freight performance in either of the two horizon years, 2024 and 2044.

ES.6.3 Equipment Needs

To reliably deliver the proposed service, three trainsets are assumed to be required, two of which will be deployed in daily service, and a third to be used as a spare trainset for when the two revenue trainsets are cycled out for inspection, preventive maintenance, or repair. In addition, a fourth locomotive is assumed to be purchased and assigned to the endpoint layover facility at Coachella/Indio for protection power.

Table ES-4 summarizes the passenger rail rolling stock capital costs estimated for the Project, based on the assumptions above. The estimated unit costs were provided by Caltrans. The Siemens locomotives meets operational and regulatory needs and was assumed to establish a realistic basis for cost estimating. This assumption is not intended to suggest a preferred vendor or specific equipment models.

Table ES-4. Coachella Valley Project Rolling Stock Capital Cost Estimates (2020 Dollars)

Vehicle Type	Quantity	Estimated Unit Cost	Estimated Total Cost
SC-44 Charger diesel-electric locomotive	4	\$7.2 million	\$28.8 million
Bi-level coach car	3	\$4.0 million	\$12.0 million
Bi-level coach café car	3	\$4.8 million	\$14.4 million
Bi-level Business Class Car	3	\$4.5 million	\$13.5 million
Bi-level coach baggage cab car	3	\$4.9 million	\$14.7 million
Total equipment capital cost investment			\$83.4 million

In addition, periodic capital investment in equipment overhauls and replacement is necessary to maintain the locomotives and rolling stock in a state of good repair. During the 20-year period following implementation of the proposed service, railcar overhaul costs are estimated to total \$22.17 million in 2019 dollars.

ES.7 Proposed Infrastructure

To support the proposed service, several improvements would be constructed on the Yuma Subdivision: a light maintenance facility, six new or upgraded stations, and a third main track.

ES.7.1 Stations and Facilities

The proposed service would include stops at nine stations. No improvements are proposed at the stations on the Western Section (Riverside, Fullerton, and Los Angeles). Five new stations are proposed on the Eastern Section. In addition, the existing station in Palm Springs would be upgraded to support larger passenger volumes. Station improvements would include tracks, platforms, access roads, parking, and, with the exception of the Pass area, a station building. Depending on forecasted ridership, amenities would include an interior waiting area, shelters or platform canopies, restrooms, and a ticketing office. Stations with multiple platforms will also include a pedestrian bridge and

elevators. The terminal station, Coachella, would have a single side platform and would not need a pedestrian bridge or elevator.

An overnight train layover and light maintenance facility will be required at the eastern terminus of the proposed Corridor and is assumed to be located adjacent to the terminal station. This facility will provide tracks on which to store trains and to provide cleaning, servicing, repair, and light maintenance. In addition, the facility must include accommodations for train crews going on and off duty. A facility or contractual provisions to provide heavy maintenance for locomotives and trainsets will be required. A location has not yet been determined, but the existing Amtrak Los Angeles Maintenance Facility is the most likely location.

ES.7.2 Track improvements

The Preferred Alternative includes the addition of a third main track along the 76 miles of the Yuma Subdivision between Colton and Coachella. This provides the greatest ability to minimize disruption to existing and projected freight and passenger rail services that use the corridor. In addition, a connecting track would be required to allow trains to transition between the UP Yuma and BNSF San Bernardino Subdivisions in Colton, which intersect at a rail-to-rail grade separation.

At the Loma Linda/Redlands station, a controlled siding would also be constructed, providing a fourth track for passenger trains to pass each other without impacting freight operations. To accommodate the third main track along the corridor, additional improvements are required to include: installation of new signals; constructing, reconstructing, or removal of crossovers; reconstruction of existing tracks; and modifications to at-grade or grade-separated crossings.

ES.7.3 Capital Cost Estimates

A summary of capital costs by route segment is summarized in Table ES-5.

Table ES-5. Capital Cost Estimate (2019 U.S. Dollars)*

Segment Number	Segment Name	Estimated Cost Per Segment
1	BNSF Colton Connector	\$27,000,000
2	Colton to Loma Linda	\$243,200,000
3	San Timoteo Canyon	\$97,500,000
4	Beaumont Pass Area	\$205,500,000
5	Cabazon to West Palm Springs	\$203,000,000
6	West Palm Springs to Rancho Mirage	\$149,800,000
7	Rancho Mirage to Indio	\$313,900,000
8	Indio to Coachella	\$182,300,000
—	Maintenance Facility	\$7,200,000

Table ES-5. Capital Cost Estimate (2019 U.S. Dollars)*

Segment Number	Segment Name	Estimated Cost Per Segment
—	Rolling Stock (2020 Dollars)	\$83,400,000
	Total	\$1,511,600,000

Notes:

* Unless indicated otherwise

Costs are rounded to the nearest \$100,000.

ES.8 Benefit-Cost and Economic Analyses

To assess the economic implications of the Project, a benefit-cost analysis (BCA) and an economic impact analysis were conducted.

ES.8.1 Benefit-Cost Analysis

Table ES-6 summarizes the findings of the Project BCA over the lifecycle from 2024 to 2057. These results, along with additional sensitivity testing described in Section 11.7, indicate that the quantifiable user and non-user benefits of this Project are unlikely to exceed the costs of Project implementation and operation over a period of time and at a discount rate typically recommended for such evaluations by regulatory agencies (a period of up to 30 years and a discount rate of 7 percent recommended by the United States Department of Transportation [USDOT]).

Table ES-6. Overall Results of the Benefit-Cost Analysis (Millions of 2019 U.S. Dollars)*

Project Evaluation Metric	Undiscounted	Present Value at 7 Percent Discount Rate	Present Value at 3 Percent Discount Rate
Total benefits	\$1,086.6	\$186.5	\$475.5
Rehabilitation and major maintenance	\$51.3	\$8.4	\$22.2
O&M costs	\$346.4	\$83.4	\$178.6
Capital costs**	\$1,249.10	\$794.70	\$1,024.40
Total costs	\$1,646.70	\$886.40	\$1,225.20
Net present value	-\$560.1	-\$699.9	-\$749.7
Benefit/cost ratio	0.57	0.13	0.28
Internal rate of return (percent)	-2.25%		

Notes:

* Unless indicated otherwise

** Capital costs for the BCA exclude ROW and reserve contingency

O&M=operating and maintenance; ROW=right-of-way

The Project, as planned, incurs maximum capital expenses with minimal service levels of four trains per day. The proposed Project may also generate other socioeconomic benefits for the local and regional economies which are of a strategic nature.

ES.8.2 Economic Impact Analysis

An economic impact analysis of the Project was conducted. The impacts were estimated using economic multipliers from IMPLAN for the region comprising Los Angeles, Orange, Riverside, and San Bernardino Counties.

Overall, the Project is expected to generate more than \$2.9 billion in output and 15,067 jobs during the development phase, from 2024 to 2027. Long-term economic impacts will also be generated during the operational phase of the Project. Passenger spending (on lodging, meals, etc.) is expected to generate \$120.2 million in output and 1,011 jobs in the opening year (2028) and increase over time as ridership grows. In addition, rail O&M are expected to create 77 jobs and generate \$20.9 million in annual output.

ES.9 Project Implementation

Implementation of the Project will require selection of an institutional management structure for the service and securing funding for capital improvements and operational expenses.

ES.9.1 Governance Options

RCTC, in cooperation with Caltrans and FRA, has been responsible for planning the Coachella Valley Rail Program. However, RCTC does not have statutory authority to manage a state-supported intercity rail service. Thus, the implementation of service will ultimately be carried out based on a decision from Caltrans, in which the state has vested the authority to contract with railroad corporations, such as UP, for use of tracks and the authority to construct, acquire or lease passenger terminals on designated corridors including the Los Angeles-Riverside-San Bernardino-Calexico corridor, which would host the Coachella Valley Rail Program.

The 2018 California State Rail Plan (CSRP) presents a flexible, Corridor-level framework for developing the envisioned passenger rail system over the long-term (2040) horizon. This framework is intended to serve as the basis for state-led service implementation planning to be undertaken in coordination with regional agencies, rail operators, and stakeholders to achieve the 2040 Vision.

While the state continues to play an active leadership role in statewide service planning, it seeks to develop new service in partnership with local stakeholders, and there is an opportunity for the regional transportation agencies on emerging corridors to work with the state to forge a path toward establishing service and governance structures that best meet the needs of their constituents. Decisions, such as the governing structure for the Corridor service, should be coordinated through the state in order to meet the goals and objectives of the 2018 CSRP and to position the Project for the successful development of the required capital infrastructure and gaining access to the host railroads. Along with the state, local governments will need to concur on the key aspects of governance, funding, and management of the proposed system and services.

While the 2018 CSRP states that it seeks to provide a path toward implementation and clearly states that it would be carried out in coordination with regional and local agencies, it does not provide guidance on the means and governance structures needed for attaining new infrastructure or for providing passenger train service on new corridors. This approach leaves room for a project sponsor

or grouping of sponsors to determine the most appropriate governance structure for moving forward with its proposed Project.

The three existing state-supported rail services in California are all governed using a joint powers authority (JPA) model. JPAs are separate legal entities that allow multiple public agencies, such as county transportation commissions, to jointly exercise powers at a larger geographic level. Each state-supported rail service was previously managed by Caltrans, and the state legislature subsequently vested authority to manage the service in a regional JPA composed of agencies representing the counties in which the service operates.

If the state and corridor stakeholders choose to use the same JPA-based governance structure for the new Coachella Valley rail service, there are two potential governance options. The service could be managed by the Los Angeles – San Diego – San Luis Obispo (LOSSAN) Rail Corridor Agency, which manages the Pacific Surfliner and of which RCTC is a member agency, or a new JPA could be formed specifically for the service. Both of these options would require action from the state legislature to either expand the jurisdiction of the LOSSAN Rail Corridor Agency or confer new authority to the new JPA. Looking to the state for leadership will assist and better inform the discussion about whether to incorporate the Corridor within an existing JPA or form a new JPA.

Regardless of governance structure for management of the service, rolling stock is assumed to be owned by the state. Caltrans has indicated the desire to acquire equipment that is interoperable with the Pacific Surfliner service so that a single fleet can be shared by the two services, similar to the common equipment pool used for the two northern California services.

ES.9.2 Funding Sources

Given the early stage of the Project development that currently exists, funding has not been secured for the entire Program and Project-specific funding sources have not been identified. Potential funding sources to deliver the Coachella Valley Rail Program include:

- Federal competitive/discretionary grants and loans
- State sources of transportation funding, including SB 1, gas and diesel taxes, and state bond proceeds dedicated to transportation
- Contributions from regional transportation planning agencies in each county served by the corridor including allocations of formula federal funds for specific project elements outside of the competitive programs.
- Contributions from cities and Native American tribes along the corridors which would benefit from the improved rail service.

ES.10 Next Steps

As shown on Figure ES-5, the Tier 1/Program-level environmental document is currently under development, with the Record of Decision and Notice of Determination anticipated in Summer 2022. As noted in the Final Tier 1 Program EIS/EIR and Record of Decision for the Project, FRA's selection of Build Alternative Option 1 is made with consideration that after the approval of Tier 1/Program EIS/EIR and prior to the initiation of Tier 2/Project-Level analysis, the State and/or local agency seeking to advance the Preferred Alternative will:

- Conduct additional operations simulation analysis on the Preferred Alternative to assess whether different infrastructure or operating plans would further improve the estimated performance of freight and passenger trains.
- Determine the initial operating plan for service and infrastructure improvements for the Preferred Alternative based on good faith negotiations with the host railroads and the passenger rail service operator prior to the implementation of service.¹
- Identify the entity responsible for the management and delivery of the Preferred Alternative.

Caltrans and the Project sponsors will need to develop consensus on how best to implement the Corridor governance, and an institutional structure for managing the service must be established as well as deciding whether Amtrak or another operator will be the corridor's service provider.

After completion of the Final Tier 1/Program EIS/EIR and decisions on identifying the managing entity and service provider are made, funding must be secured for Project development to proceed to Tier 2/Project-Level environmental clearance and preliminary engineering. During this phase, specific projects will be refined, such as selection of sites for new stations, and site-specific impacts of each project would be assessed. Once approved, projects would advance to final design and then construction, as funding allows.

Figure ES-5. Project Development and Delivery Timeline



In addition to delivering proposed infrastructure improvements, rolling stock would also need to be acquired, and an institutional structure for service must be established. Negotiations would be needed with UP to secure track access rights on the Eastern Section and with BNSF and SCRRA to authorize the use of available slots in the Western Section.

¹ The operations modeling work prepared for the Program's Service Development Plan should inform these discussions.

The steps to introduce regularly scheduled intercity passenger rail service between LAUS and Coachella will be planned and carried out in ways that will not preclude future expansions of service, either through the introduction of additional frequencies, or through the extension of the corridor east toward Phoenix, Arizona.

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1 Introduction

To provide a safe, efficient, cost-effective transportation system, the FRA, Caltrans Division of Rail and Mass Transportation, and RCTC have been studying ways to serve intercity travel needs and enhance travel opportunities between Los Angeles, Orange, Riverside, and San Bernardino Counties. Statewide and regional transportation planning efforts undertaken from 1991 to 2016 have recommended implementing passenger rail service to supplement the travel capacity provided by highways. To that end, FRA, Caltrans, and RCTC are proposing to establish daily intercity passenger rail service within the 144-mile-long Corridor between LAUS in Los Angeles County, California, and the City of Coachella in Riverside County, California, in order to provide more travel choices in the Corridor.

The Corridor, which connects the Los Angeles metropolitan area with Coachella Valley through the San Gorgonio Pass, currently has no daily intercity passenger rail service. The proposed implementation of intercity passenger rail service in the Corridor, including the planning and construction of rail infrastructure improvements required to establish the service, are collectively known as the Project.²

FRA and Caltrans are the joint lead agencies for an environmental review under NEPA, and RCTC is the lead agency under CEQA. FRA, Caltrans, and RCTC have prepared a Tier 1/Program EIS/EIR in compliance with:

- NEPA (42 United States [U.S.] Code Section 4321, et seq.) and the Council on Environmental Quality regulations implementing NEPA (40 Code of Federal Regulations Parts 1500–1508);
- CEQA (California Public Resource Code, Section 21000, et seq.);
- California Code of Regulations, Title 14, Division 6, Chapter 3 Sections 15000-15387;
- FRA's Procedures for Considering Environmental Impacts (FRA 1999; 64 *Federal Register* 28545, May 26, 1999), and
- 23 U.S. Code Section 139.

In Summer 2022, FRA is expected to issue a combined Record of Decision and Final Tier 1/Program EIS/EIR (hereinafter referred to as the Final Tier 1/Program EIS/EIR), which includes the selection of a recommended Preferred Alternative for purposes of both NEPA and CEQA and the identification by FRA of a Selected Alternative in the Record of Decision. The Selected Alternative will be carried forward for future Tier 2/Project-level analysis, as required by NEPA. Based on the analysis contained in the Draft Tier 1/Program EIS/EIS service-level evaluation, Build Alternative Option 1 was chosen as the Preferred Alternative and the Selected Alternative.

This document is an SDP for the proposed Project. The SDP is a planning-level document that provides Caltrans, RCTC, and Project stakeholders, as well as FRA, the information needed to assess the utility of establishing intercity passenger rail service in the Corridor. The SDP is a detailed definition of the service improvements and transportation network proposed, as well as the operational and financial aspects of the alternative for passenger rail service that is selected through the NEPA and CEQA processes. The SDP and the Final Tier 1/Program EIS/EIR together comprise the first phase

² For California Environmental Quality Act (CEQA) purposes, this is the proposed Project.

of a Corridor Investment Plan. The intent of the Corridor Investment Plan is to provide sufficient information to support future decision making at the federal, state, and/or local level regarding investments within the Corridor. This comprehensive plan is a key step toward meeting federal funding eligibility requirements for establishing new intercity passenger rail service.

Chapter 1 provides background information on the Project. Chapters 2 and 3 describe the purpose, need, and rationale for the Project. Chapter 4 summarizes the alternatives analyzed as part of the Program Tier 1 EIS/EIR and the Project's Recommended Preferred Alternative. Chapter 5 discusses the forecasted ridership and revenue of the proposed service. Chapter 6 details the operations modeling that was conducted to assess the performance of the proposed intercity passenger trains and the adequacy of proposed infrastructure improvements to accommodate the proposed service. Chapters 7, 8, and 9 describe the proposed station locations and the infrastructure improvements and servicing facilities proposed to implement the Preferred Alternative for the service. Chapters 9 and 10 present estimated capital and operating costs and a financial plan. Chapter 11 contains a BCA that considers the broader public benefits and costs of the Project. Chapter 12 discusses the proposed economic impact of the Project and Chapter 13 summarizes considerations for financing and implementing the Project.

This SDP provides planning-level information that can be used in the development of a subsequent, more detailed Tier 2 (Project NEPA) environmental review, a prerequisite for federal construction funding. The SDP does not commit California or RCTC to implementation. RCTC anticipates that service development planning for the Project will continue to evolve as funding becomes available to advance future stages.

1.1 Project Background and Location

1.1.1 Project Background

This SDP and the Final Tier 1/Program EIS/EIR have been preceded by several years of preliminary Program development activities. In 1991, RCTC completed the first in a series of studies evaluating the feasibility of operating one or two daily intercity passenger rail round trips between Los Angeles and Indio. From 1991 to 2013, RCTC completed additional feasibility studies on the Corridor. In July 2016, RCTC, in coordination with Caltrans and FRA, prepared and completed the 2016 AA Report (summarized in Chapter 2 of the Tier 1/Program EIS/EIR) that evaluated a reasonable range of alternatives for implementation of daily intercity passenger rail service between Los Angeles and Indio. The purpose of the 2016 AA Report was to identify a reasonable range of preliminary alternative(s) that could be evaluated in the SDP and Tier 1/Program EIS/EIR.

On October 11, 2016, the Notice of Intent/Notice of Preparation was issued for the Project's SDP and Tier 1/Program EIS/EIR. The Notice of Intent indicated the Tier 1/Program EIS/EIR would include a programmatic environmental evaluation for provision of "intercity passenger rail service between the Cities of Los Angeles and Indio, California also known as the Coachella Valley-San Geronimo Pass Corridor." Subsequent to issuance of the Notice of Intent/Notice of Preparation, FRA, Caltrans, and RCTC elected to carry two eastern terminus service options into the Tier 1/Program EIS/EIR: one that retained the originally proposed eastern terminus at Indio, and one that extends the Corridor eastward approximately 3 miles further to Coachella, with station stops in both cities.

1.1.2 Project Location and Alternatives Analysis Study Area

The Coachella Valley Rail Corridor is approximately 144 miles long and extends from a western terminus at LAUS to an eastern terminus in the City of Coachella. For ease of evaluation, the Corridor is divided into two sections: a Western Section and an Eastern Section, both occurring within existing railroad rights-of-way (ROW). The boundary between the Western and Eastern Sections is in the City of Colton at the intersection of existing railroad lines owned by UP and BNSF:

- The Western Section consists of a 68-mile segment primarily comprised of the existing BNSF San Bernardino Subdivision between LAUS and the City of Colton within Los Angeles, Orange, San Bernardino, and Riverside counties.
- The Eastern Section consists of an approximately 76-mile segment along the existing UP Yuma Subdivision between the cities of Colton and Coachella within San Bernardino and Riverside counties.

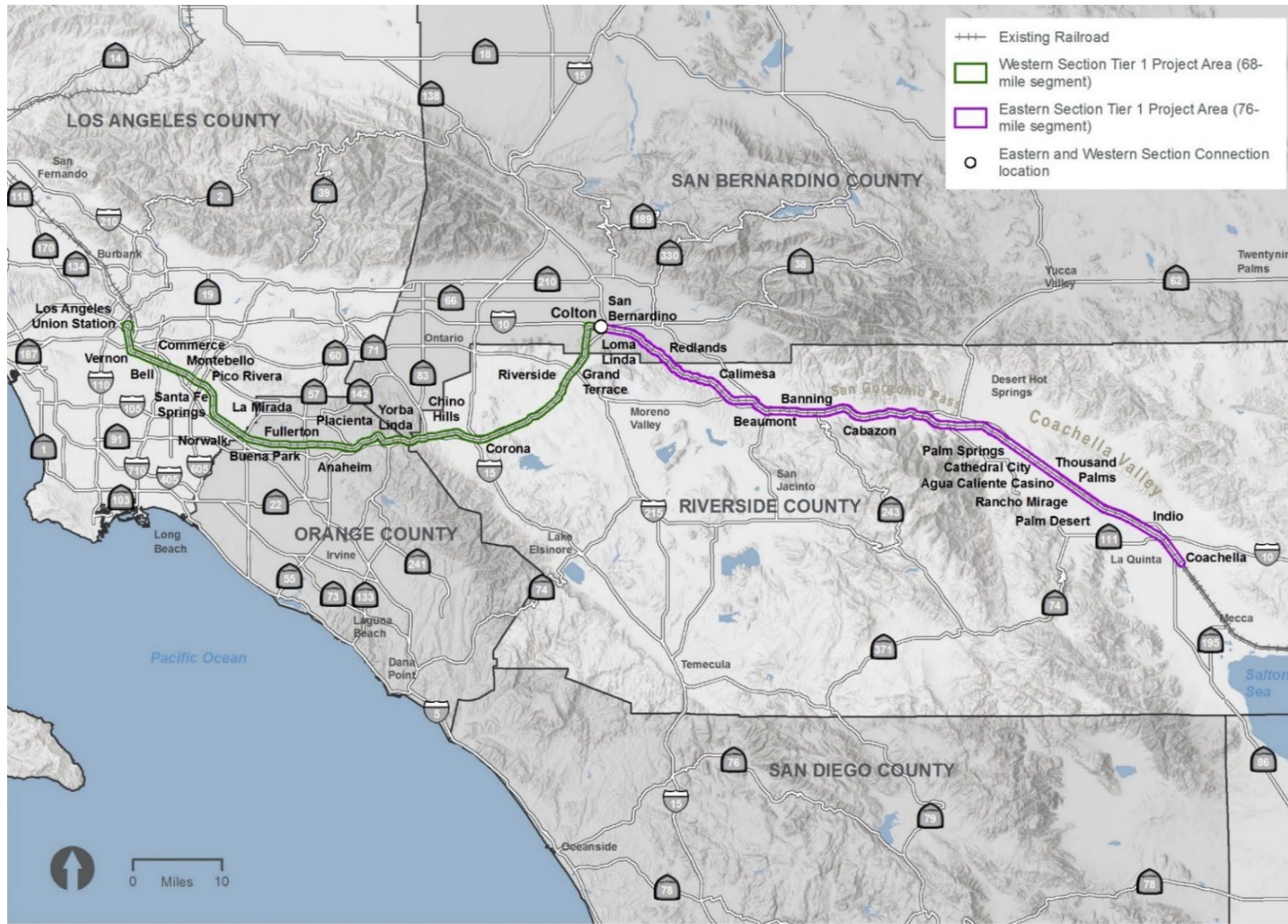
The Corridor currently has no daily intercity passenger rail service that serves the Coachella Valley. While the Corridor contains existing rail lines and rail infrastructure, these existing rail systems currently support freight rail, commuter rail, and limited long-distance Amtrak intercity passenger rail service.

From west to east, the incorporated cities traversed by the Project include Los Angeles, Vernon, Bell, Commerce, Montebello, Pico Rivera, Santa Fe Springs, Norwalk, La Mirada, Buena Park, Fullerton, Anaheim, Placentia, Yorba Linda, Chino Hills, Corona, Riverside, Grand Terrace, Colton, San Bernardino, Loma Linda, Redlands, Calimesa, Beaumont, Banning, Palm Springs, Cathedral City, Rancho Mirage, Palm Desert, Indio, and Coachella.

Figure 1-1 presents an overview of the entire Corridor and highlights the counties that comprise the study area for the purposes of the Project.

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Figure 1-1. Alternatives Analysis Study Area (Western and Eastern Sections)



Source: RCTC 2016

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1.2 Alignment With 2018 California State Rail Plan

The Project is consistent with the vision and objectives for improved intercity passenger rail service identified in the 2018 CSRP and is further supported by the FRA Southwest Multi-State Rail Planning Study. The 2018 CSRP presents the state's goals for providing and connecting services in different regions. The Coachella Valley Rail Project is identified in the 2018 CSRP as an emerging corridor, which provides opportunities to develop new intercity and regional rail connections to the statewide passenger system. Long term, the state envisions that a high-speed rail line will eventually run between Los Angeles and Phoenix, Arizona, serving the Coachella Valley.

One outcome of the FRA's Southwest Multi-State Rail Planning Study was a recommendation for a Blue Ribbon Commission to guide the Los Angeles to Phoenix high-speed rail planning (FRA 2014). The 2018 CSRP supports efforts to develop conventional state-supported intercity passenger rail service to the Coachella Valley and high-speed rail service to Arizona with two actions: identifying the clear importance of service to Coachella Valley and supporting the Blue Ribbon Commission and the opportunity for both states to invest in the corridor.

1.3 Summary of the Service Plan and Project Overview

Passenger train frequencies proposed as part of the Project would consist of two daily round-trip intercity passenger trains operating between Los Angeles and Coachella, with one morning departure and one afternoon departure from each end of the Corridor. This frequency was determined based on a ridership forecasting model service optimization analysis (described in the Project's 2016 AA Report), which found that two round trips per day, with a mid-morning and mid-afternoon departure from each originating terminal, would attract the greatest number of riders per train. The Project could result in scheduled one-way travel times between Los Angeles and Coachella of approximately 180 to 200 minutes.

The passenger rail service would be designed to achieve an endpoint on-time performance of 90 percent and an all-stations on-time performance of 90 percent, in compliance with on-time performance metrics established by FRA under PRIIA that were in effect during the timeframe when the Project was being carried out, as well as the Uniform Performance Standards for intercity passenger trains established by the CalSTA on July 1, 2014. Under these metrics, intercity passenger trains in the Program Corridor would have an endpoint on-time performance variance (late tolerance) of 10 minutes and an all-stations on-time performance variance of 15 minutes.

The proposed western terminus is LAUS, which is located in downtown Los Angeles and is the hub station for Amtrak's intercity and long-distance passenger rail services and much of Los Angeles's Metrolink commuter rail service. The station is also served by Metro's heavy rail and light rail rapid-transit system, Metro's bus system, other municipal bus operators, and a direct link to Los Angeles International Airport via the FlyAway Express Bus. LAUS is also a proposed station for the California high-speed rail system. The proposed eastern terminus is the City of Coachella, which has no existing intercity passenger rail station and would require one to be constructed for the Project.

Three equipment sets are estimated to be required to provide the proposed service frequency of two daily round trips, with two deployed in daily service and one spare trainset. Caltrans has recommended at this stage of Project, for planning purposes, that equipment could be assumed to be charger diesel locomotives (built by Siemens) and bilevel rail cars identical to the Pacific Surfliner trainsets currently providing state-supported intercity passenger service on the LOSSAN Corridor serving LAUS.

Passenger trains would operate in a push-pull configuration, with a locomotive at one end of the train and a cab car at the other, eliminating the need to turn trainsets at the end of each trip. To provide two daily round trips, three train crews would be needed each day, reporting on duty from a crew base in Los Angeles. Chapter 6 provides additional information regarding the planning assumptions developed for train crew and equipment.

1.4 Summary of the Preferred Alternative

In the Final Tier 1/Program EIS/EIR, FRA, Caltrans, and RCTC recommended Build Alternative Option 1 as the Preferred Alternative for purposes of both NEPA and CEQA. FRA also identified Build Alternative Option 1 as the Selected Alternative in the Tier 1 Record of Decision. Build Alternative Option 1 assumes the following infrastructure improvements within the Eastern Section of the Program Corridor:

- **Station construction.** Build Alternative Option 1 identifies six potential station location areas in the Eastern Section of the Program Corridor where passenger rail stations could be located. Build Alternative Option 1 would use the existing station in the City of Palm Springs. Additionally, up to five new potential stations could be constructed in the following areas: Loma Linda/Redlands area (serving the Cities of Loma Linda and Redlands), the Pass area (serving the communities of Beaumont, Banning, and Cabazon), the Mid-Valley area (serving the communities of Cathedral City, Thousand Palms, the Agua Caliente Casino area, Rancho Mirage, and Palm Desert), the City of Indio, and Coachella as the eastern terminus of the Program Corridor.
- **Third main track:** A third main line track would augment the existing two main tracks along the Eastern Section of the Program Corridor to Coachella. This alternative also includes construction of a new second Mount Vernon connector track in Colton and a new controlled siding/station track at the proposed Loma Linda/Redlands Station, where the two afternoon Coachella Valley intercity passenger trains are scheduled meet. To accommodate the third main track, additional improvements are required to include: installation of new signals; constructing, reconstructing, or removal of crossovers; reconstruction of existing tracks; and modifications to at-grade or grade-separated crossings.
- **Layover and servicing:** The Coachella Valley Rail Corridor's equipment would potentially be maintained at Amtrak's facility in Los Angeles, with contract cleaning and turnaround services provided at a new layover facility in Coachella that would be located at the far end of the station track serving the terminus station.

2 Purpose and Need

The Purpose and Need statement for the Program was developed by FRA, Caltrans, and RCTC as part of the 2016 AA for the Corridor and was informed by public input. The Purpose and Need statement provides the justification for implementing intercity passenger rail service in the Corridor and also provides the basis for the Project's planning efforts, including the identification and evaluation of service development alternatives. The Purpose and Need statement remained relatively consistent between the 2016 AA Report, the Draft Tier 1/Program EIS/EIR, and the Final Tier 1/Program EIS/EIR.

2.1 Purpose and Objectives for Transportation Improvements

The Project's Purpose is to implement a safe, reliable, and convenient intercity passenger rail service in the Corridor with the capability to meet the future mobility needs of residents, businesses, and visitors and meet the following objectives:

- Provides travelers between the Los Angeles Basin and the Coachella Valley with a public transportation service that offers more convenient, reliable, and competitive trip times, better station access, and more frequency than currently available public transportation services.
- Provides travelers between the Los Angeles Basin and the Coachella Valley with an alternative to driving that offers reliable travel schedules.
- Provides travelers between the Los Angeles Basin and the Coachella Valley with an affordable transportation service.
- Serves a range of trip purposes traveling between the Los Angeles Basin and the Coachella Valley, particularly including business and personal trips.
- Improves regional travel opportunities between the Los Angeles Basin and the Coachella Valley for individuals without private vehicles.
- Serves the expected population growth in the Los Angeles Basin and the Coachella Valley.
- Assists regional agencies in meeting air pollution and greenhouse gas emission reduction targets as mandated in state and federal regulations.

2.2 Need for Transportation Improvements

The Project is needed to address the absence of effective transportation alternatives to personal automobile travel between coastal regions of Southern California (e.g., Los Angeles and Orange Counties) and cities in the Inland Empire (e.g., City of Riverside) and the Coachella Valley (e.g., Cities of Coachella, Indio, Palm Springs), the projected increase in travel demand in the Corridor resulting from population and employment growth, and the increasing unreliability of existing transportation systems within the Program Corridor.

The Project addresses the following needs in the region:

- The Program Corridor is served by a transportation system that includes air, highway, transit, and rail modes, few of these alternatives provide regular intercity transportation within the

Program Corridor between the Coachella Valley, Inland Empire, and coastal regions of Southern California.

- The Coachella Valley is projected to be one of the fastest-growing areas in the state by 2040, with the permanent population projected to exceed 595,100 and employment growing by 94 percent to more than 253,700. The San Gorgonio Pass area population is projected to almost double to 143,000, with employment more than doubling to 38,100.
- Five of the nine incorporated cities in the Coachella Valley, containing over 40 percent of the valley's population, have poverty rates exceeding 15 percent, which is the federal average poverty rate. Two of the nine incorporated cities have poverty rates that exceed 25 percent. In addition, a substantial portion within these disadvantaged communities does not own personal vehicles and rely on alternative transportation services. East of Colton, the lack of available alternative transportation options leaves the I-10 corridor underserved for these populations.

2.2.1 Limited and Constrained Travel Options

While the Program Corridor is served by a transportation system that includes air, highway, transit, and rail modes, few of these alternatives provide regular intercity transportation within the Program Corridor between the Coachella Valley, Inland Empire, and coastal regions of Southern California. In addition, the existing transportation system is constrained due to the limited travel alternatives to driving a private vehicle. Currently, the only existing passenger rail service in the Program Corridor that provides service from Los Angeles to Coachella Valley is Amtrak's Sunset Limited, a long-distance train that operates 3 days per week in each direction, connecting Los Angeles, Tucson, San Antonio, and New Orleans. Amtrak makes intermediate stops at Pomona, Ontario, and Palm Springs; however, its arrival and departure is scheduled during the middle of the night. Air travel access is also a limited option for many residents of the Los Angeles Basin because of the distance from residences to major airports and the infrequency and high cost of flights between Los Angeles and the Coachella Valley.

As a result, virtually all of the intercity travel between these regions is by personal automobiles, primarily on I-10 through the San Gorgonio Pass. However, even travel by personal automobile is constrained by recurring highway congestion and the lack of alternative routes to I-10.

Limited Alternatives to Personal Automobile Travel

Travel opportunities in the Program Corridor between regions by rail, bus, or air are limited and consist of the following services:

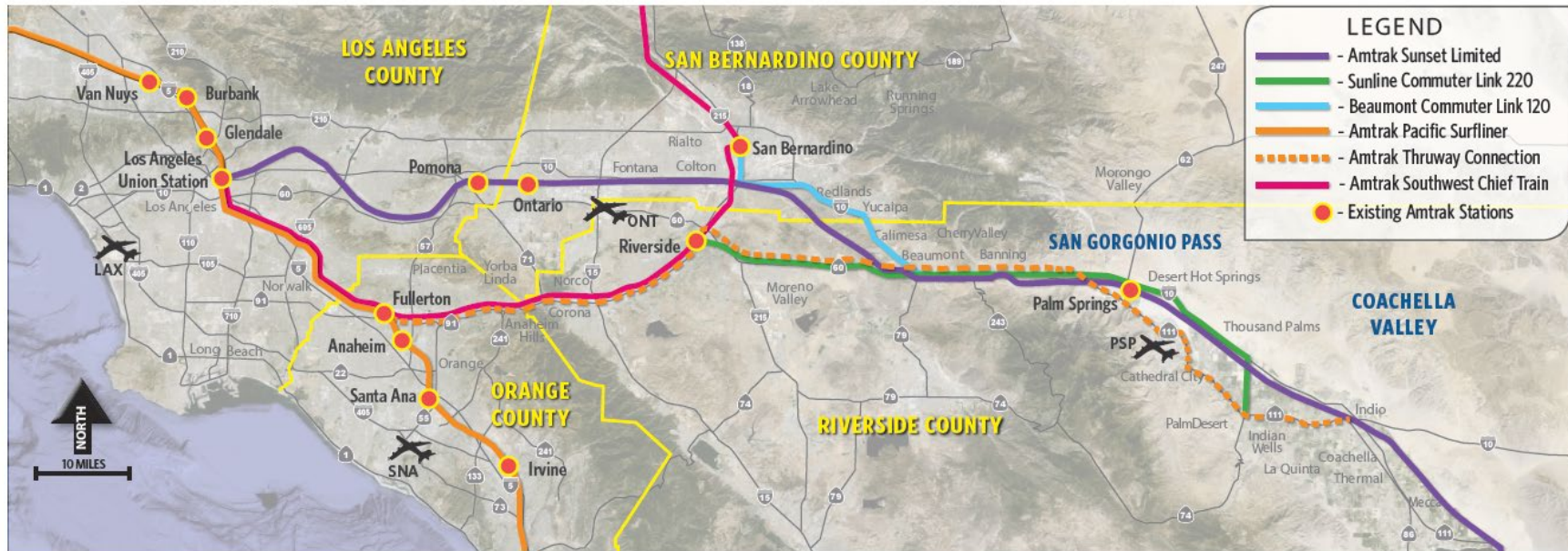
- Amtrak Sunset Limited, a long-distance passenger train that operates three days per week in each direction, connecting Los Angeles, Tucson, San Antonio, and New Orleans. Amtrak's Sunset Limited makes intermediate stops at Pomona, Ontario, and Palm Springs; however, its arrival and departure are scheduled during the middle of the night.
- Amtrak Southwest Chief, a long-distance passenger train that operates once daily in each direction between Los Angeles and Chicago, and makes intermediate stops at Fullerton, Riverside, and San Bernardino.
- The Pacific Surfliner intercity passenger service managed by the LOSSAN Rail Corridor Agency, funded by the State of California, and operated under contract by Amtrak provides service 12 times per day in each direction between Los Angeles and San Diego, with an intermediate stop at Fullerton.

- Amtrak Thruway bus service connects the Coachella Valley to Amtrak Pacific Surfliner trains at Fullerton, consisting of one daily trip each way between Fullerton and the Palm Springs Airport (making intermediate stops in Riverside, Cabazon, and downtown Palm Springs) and one daily trip each way between Fullerton and Indio (making intermediate stops at Riverside, Cabazon, downtown Palm Springs, Palm Springs Airport, Palm Desert, and La Quinta).
- Amtrak Thruway bus service connects Indio to Amtrak San Joaquin trains at Bakersfield, consisting of two daily trips each way (making intermediate stops at La Crescenta, Pasadena, Claremont, Ontario, Riverside, San Bernardino, Cabazon, downtown Palm Springs, Palm Springs Airport, Palm Desert, and La Quinta).
- SunLine Route 220 commuter bus service with two weekday peak period trips each way between Riverside and the Coachella Valley.
- Beaumont Commuter Link 120 bus service, with seven weekday round trips between the San Bernardino Metrolink Station, Loma Linda, and Beaumont.
- Greyhound provides intercity bus service, with seven daily trips between Los Angeles and the Coachella Valley.
- Metrolink commuter rail service operating:
 - One route daily from Los Angeles to Riverside via Fullerton, with nine weekday one-way trips (five eastbound, four westbound) and four weekend one-way trips (two each way).
 - One route weekdays from Los Angeles to Riverside via Pomona, with 12 weekday one-way trips (6 each way).
 - One route daily from San Bernardino and Riverside to Laguna Niguel and Oceanside, with 8 weekday one-way trips (four each way) to/from San Bernardino and 16 weekday one-way trips (8 each way) to/from Riverside, as well as 4 weekend one-way trips (2 each way) to/from San Bernardino.
- Scheduled air passenger service connecting the Los Angeles Basin with the Coachella Valley provided through daily flights (ranging from 9 to 13.5 daily flights at different times of the year) between Los Angeles International Airport and Palm Springs International Airport. Air travel access is a limited option for many residents of the Los Angeles Basin because of the distance from residences to major airports and the infrequency and high cost of flights between Los Angeles and the Coachella Valley.

Figure 2-1 and Figure 2-2 illustrate the existing intercity passenger rail and bus services connecting the Coachella Valley and Los Angeles Basin, as well as the cities connected by Greyhound service. In addition, rental cars are available in every medium and large city along the Corridor and provide riders with a means for reaching rural areas and other urban centers in the immediate area not presently served by transit, air, or intercity rail and bus lines.

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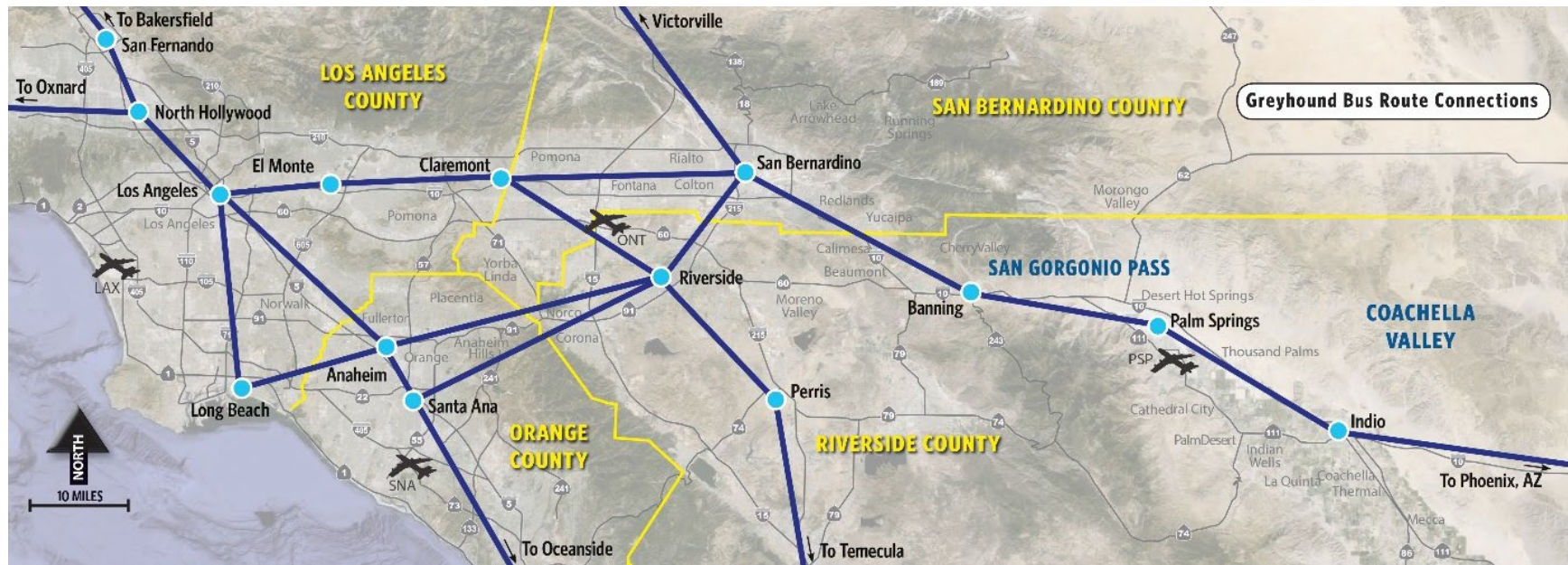
Figure 2-1. Existing Intercity Rail and Regional Bus Services Connecting the Los Angeles Basin and Coachella Valley



Source: RCTC 2016

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Figure 2-2. Existing Intercity Bus Service Connecting the Los Angeles Basin and Coachella Valley



Source: RCTC 2016

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Existing and Projected Highway Volumes

The Los Angeles Basin and Coachella Valley are separated by major mountain ranges, and virtually all travel between these geographic areas flows through the San Gorgonio Pass, the only direct route between the two areas. I-10 is the only roadway that traverses the San Gorgonio Pass to connect the Los Angeles Basin with the Coachella Valley and is a major artery for transcontinental freight and passenger transportation. I-10 is the southernmost transcontinental highway in the U.S. Interstate Highway System and stretches from Santa Monica, California on the Pacific Coast to Jacksonville, Florida near the Atlantic Coast. Connecting state highways diverge from I-10 on each side of the pass for travel westward to Los Angeles or eastward to the Coachella Valley. Other local roads through the mountains only carry a small volume of travelers. Figure 2-3 shows the key regional highways serving the Program Corridor and the lack of alternate highway options to I-10 through the San Gorgonio Pass area.

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Figure 2-3. Existing Key Program Corridor Highways Connecting the Los Angeles Basin and Coachella Valley



Source: RCTC 2016

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On a typical weekday, 130,000 people travel through the San Gorgonio Pass; over half (55 percent) of these trips have their eastern terminus in the Coachella Valley. The remaining trips have their eastern terminus in the high desert areas of Yucca Valley and Twentynine Palms (14 percent) or travel east to Blythe and Phoenix (27 percent) or south to the Imperial Valley (4 percent). The region's existing travel market is substantial, with more than 58 million daily person trips (individual travel trips that occur daily) in the four-county area (Los Angeles, San Bernardino, Riverside, and Orange counties) with projections to increase 47 percent by 2035 (SCAG 2016).³

Personal trips increase these travel flows on weekends with 45 percent more trips being made through the San Gorgonio Pass on a typical Friday than a typical midweek day. This number increases when major festivals and events are held. During the highest travel weekend of the year, which in 2014 included both Easter and the Coachella Music Festival, 125 percent more trips traveled through the San Gorgonio Pass than on a typical midweek day (SCAG 2016).

Chronic Highway Congestion

Population growth is expected to increase demand on already constrained highways resulting in increased congestion. Figure 2-4 illustrates the areas of existing weekday highway congestion (in either the eastbound or westbound directions) on I-10 and other regional freeways. Daily traffic volumes regularly exceed the design capacity of I-10 in certain locations.

³ The demographic and travel data reported in Chapters 2 and 3 reflect conditions at the time the Project's Purpose and Need was developed as part of the 2016 Alternatives Analysis (AA) for the Corridor.

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Figure 2-4. Existing Areas of Recurring Weekday Road Congestion within Program Corridor



Source: RCTC 2016

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Congestion primarily occurs in the Western Section of the Program Corridor, while the Eastern Section is relatively congestion-free unless an incident closes highway lanes. Data obtained from the Caltrans Performance Measurement System analyzing highway congestion in the Program Corridor for a period from April 20, 2014, through May 14, 2014, indicate that eastbound I-10 has congested areas between Alhambra and Pomona during typical weekday afternoons, with longer durations and slower speeds on Friday afternoons. The Eastern Section of the Program Corridor has minimal areas with reduced speeds throughout the day on typical weekdays and Fridays. Saturdays show some congested areas in the Western Section of the Program Corridor and no congestion in the Eastern Section. In the Western Section of the Program Corridor, westbound I-10 exhibits typical commute congestion between Pomona and Alhambra in the morning hours, as well as periodic slowing in several areas at different times throughout the afternoon.

Much of State Route (SR) 60 is congested from East Los Angeles to Rowland Heights, from Pomona to East Ontario, and from Rubidoux to Moreno Valley on normal weekday afternoons. On normal Fridays, the congestion through these areas intensifies. Eastbound SR 91 is congested for much of its length from North Long Beach to Anaheim and from Orange to Riverside during most of the afternoon on normal weekdays and Fridays (Caltrans 2014).

The wide variations of highway travel times and travel unreliability caused by highway congestion requires travelers to allow for extra travel time to ensure they will arrive at their destinations on time. Future growth will result in more congestion and even longer travel times, causing more highway travel unreliability; thus, driving is an increasingly unattractive and inconvenient mode of travel through the Program Corridor.

Existing travel times using rail and transit can be even longer than highway travel because the trip is indirect, involves intermediate stops, and may require mode transfers. Table 2-1 illustrates each existing service's current travel time between Los Angeles and the Coachella Valley/San Gorgonio Pass area. Trip times were calculated assuming that Metrolink service is used for the portion of the SunLine and Beaumont trips between downtown Los Angeles and the respective eastern bus route terminus.

Table 2-1. Existing Travel Times Using Rail and Transit Connecting the Los Angeles Basin and Coachella Valley

Rail/Transit Line	Western Terminus	Eastern Terminus	Travel Time (Minutes)
Sunset Limited	Los Angeles	Palm Springs	156
Amtrak Thruway	Los Angeles	Indio	240
SunLine Commuter Link 220 and Metrolink	Los Angeles	Palm Desert	234
Beaumont Commuter Link 120 and Metrolink	Los Angeles	Beaumont	145
Greyhound	Los Angeles	Indio	240

Source: RCTC 2016

Notes:

The SunLine and Metrolink and Beaumont and Metrolink travel times include transfer and waiting time.

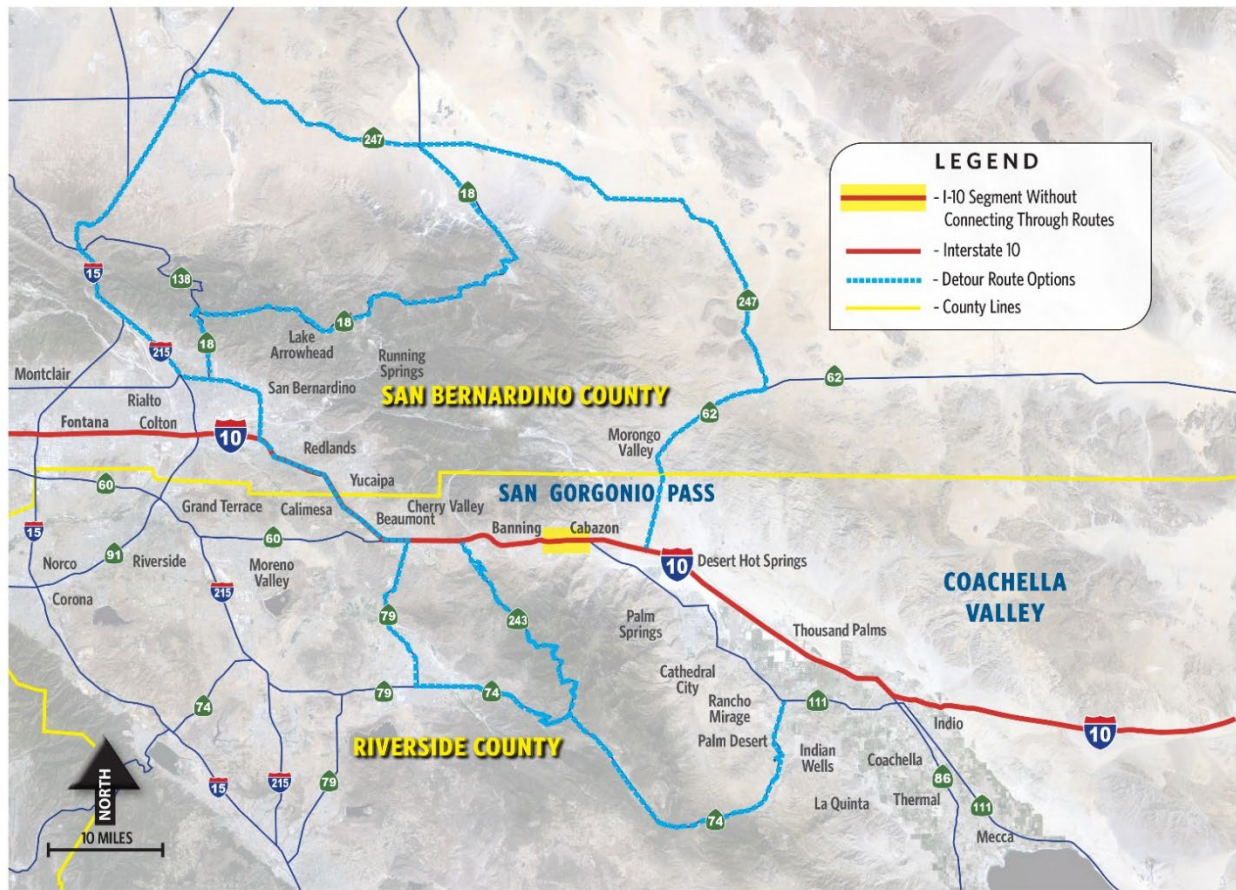
Emergency Highway Closures

Emergency closures of I-10 through San Geronio Pass further undermine the reliability of the Program Corridor's transportation system. Since I-10 is the only road through the San Geronio Pass, Program Corridor travel is susceptible to substantial disruption during an emergency closure. Five separate incidents in the San Geronio Pass have disrupted travel for several hours or more since 2005, as reported in the *Los Angeles Times* (Los Angeles Times 2014), *Banning Patch* (Banning Patch 2014), and *Desert Sun* (Desert Sun 2016):

- June 2005: A high-speed pursuit of a homicide suspect led to gunfire and a 12-hour shutdown of the freeway near Cabazon. Stranded drivers slept in their cars while others needed medical attention because of the heat (Los Angeles Times 2014).
- December 2010: A fatal collision involving a big rig and a spill of fertilizer and diesel oil near Whitewater closed I-10 for 6 hours (Los Angeles Times 2014).
- February 2012: A broken computer system led to a delay in concrete slabs needed for lanes that were ground up during repaving. Three of the four westbound lanes were closed for almost 1 full day, leading to a 25-mile backup in Banning, with traffic spilling into Palm Springs (Los Angeles Times 2014).
- September 2014: A fiery big rig crash shut down westbound I-10 east of Cabazon at 6:45 AM. The four westbound affected lanes were closed for almost 12 hours before resuming service at 6:00 PM (Banning Patch 2014).
- October 2016: A tour bus slammed into the back of a big rig, killing 13 and injuring 31 people. The crash occurred just west of Palm Springs at 5:00 AM and shut down all westbound lanes of I-10 until 4:00 PM (Desert Sun 2016).

Figure 2-5 illustrates the reliance of drivers on I-10 through the San Geronio Pass, as no parallel highways exist to I-10 through Beaumont, Banning, and Cabazon; the only alternative routes involve lengthy detours and longer travel times. For example, facing an I-10 closure between Banning and Cabazon, a driver bound for Indio could detour south to SR 74, through the mountains and reach Indio in approximately 2 hours, travelling 80 miles. The direct route via I-10 is typically 46 minutes and 50 miles.

Figure 2-5. Interstate 10 Corridor San Gorgonio Pass Detour Alternatives



2.2.2 Regional Population and Employment Growth

Population and Employment Growth

Between 1970 and 2010, the Corridor's four-county region of Los Angeles, Orange, Riverside, and San Bernardino Counties grew by more than 7.4 million people. In 2010, approximately 46 percent of the population of California resided in the region (RCTC 2016). Los Angeles County has the largest population in the four-county region, followed by Orange County. Historical growth patterns between 1970 and 2010 show that Riverside and San Bernardino Counties grew at a faster rate than Los Angeles and Orange Counties; Riverside County and San Bernardino County grew at an average annual rate of 4.0 percent and 2.8 percent, respectively, while Los Angeles County and Orange County grew annually by 0.8 percent and 1.9 percent. Population projections prepared by the California Department of Finance forecast that the population within the four-county region will continue to grow between 2018 and 2050. The annual growth rate is anticipated to slow to 0.5 percent annually for the four-county region as a whole with higher annual growth rates forecast for San Bernardino County (1.0 percent) and Riverside County (1.1 percent) compared with Los Angeles County (0.3 percent) and Orange County (0.4 percent), consistent with historical trends (RCTC 2016).

In 2016, Coachella Valley had a full-time population of approximately 376,000, which increases substantially during winter months with part-time residents from colder climates (Inland Empire Center for Economics and Public Policy 2016). The San Gorgonio Pass area, which is comprised of the Cities of Banning, Beaumont, and Calimesa, as well as the unincorporated community of Cabazon, had a

population of more than 77,600 and employment of more than 14,500 including a major resort/casino and outlet mall (SCAG 2016).

The Coachella Valley is projected to be one of the fastest-growing areas in the state by 2040, with the permanent population projected to exceed 595,100 and employment growing by 94 percent to more than 253,700 (SCAG 2016). The San Gorgonio Pass area population is projected to almost double to 143,000, with employment more than doubling to 38,100 (SCAG 2016). These projected increases in population and employment will increase demand for reliable and safe travel options for people living and working in the Corridor.

Tourism Industry

Coachella Valley is home to a large tourism industry that attracts millions of visitors annually from Southern California and around the world. In addition to providing a large base of employment in the Coachella Valley, the tourism industry also affects transportation demand in the Program Corridor. In 2017, Joshua Tree National Park received 2.8 million visitors, and the Palm Springs Aerial Tramway drew 630,000 visitors (Greater Palm Springs Convention and Visitors Bureau [GPSCVB] 2017). In addition, the regional economic benefit of the Coachella and Stagecoach Festivals alone exceeded the \$403 million projected by GPSCVB (GPSCVB 2017). In 2017, GPSCVB reported nearly 13 million visitors spent a total of \$5.5 billion in the Coachella Valley, of which overnight visitors accounted for 45 percent of volume and 62.3 percent of total visitor spending. A sample of the larger events is listed in Table 2-2.

Table 2-2. Major Events in the Coachella Valley

Event	Month	Location	Duration	2017 Attendance
Career Builder Challenge	January	La Quinta	5 days	50,000
All Nippon Airways Inspiration Ladies Professional Golf Association Tournament	March/April	Rancho Mirage	4 days	50,000
Palm Springs International Film Festival	January	Palm Desert	12 days	135,000
Palm Springs Modernism Week	February	Palm Springs	10 days	97,000
BNP Paribas Open Tennis Tournament	March	Indian Wells	14 days	439,261
El Paseo Fashion Week	March	Palm Desert	7 days	13,200
La Quinta Arts Festival	April	La Quinta	4 days	20,000
The Dinah Shore Weekend Festival	April	Palm Springs	2 days	20,000
Coachella Valley Music and Arts Festival	April	Indio	6 days (2 weekends)	250,000
Stagecoach Country Music Festival	April	Indio	2 days	75,000

Table 2-2. Major Events in the Coachella Valley

Event	Month	Location	Duration	2017 Attendance
Palm Springs International ShortFest	June	Palm Springs	7 days	22,000
Comic Con Palm Springs	August	Palm Springs	3 days	15,000

Source: GPSCVB 2017

2.2.3 Disadvantaged Communities

The Tier 1/Program EIS/EIR Study Area identifies a number of communities classified as disadvantaged communities by the California Environmental Protection Agency per SB 535. These communities are specifically targeted for investment of proceeds from the state's cap-and-trade program for the purpose of improving public health, quality of life, and economic opportunity in California's most burdened communities while reducing pollution that causes climate change. Within the Tier 1/Program EIS/EIR Study Area, disadvantaged communities are concentrated in the Los Angeles area, San Bernardino County, and parts of the Cities of Beaumont, Indio, and Coachella.

Five of the nine incorporated cities in the Coachella Valley, containing over 40 percent of the valley's population, have poverty rates exceeding 15 percent, which is the federal average poverty rate. Two of the nine incorporated cities have poverty rates that exceed 25 percent. In addition, two of the unincorporated communities of the Coachella Valley have poverty rates approaching 50 percent (Mecca and Oasis). Two of the three San Gorgonio Pass area cities (Beaumont and Banning), containing 85 percent of the San Gorgonio Pass area population, have poverty rates exceeding 15 percent; the poverty rate exceeds 21 percent in Beaumont. The unincorporated community of Cabazon also has a poverty rate that exceeds 30 percent (U.S. Census Bureau 2016).

In addition, a substantial portion within these disadvantaged communities does not own personal vehicles and rely on alternative transportation services. East of Colton, the lack of available alternative transportation options leaves the I-10 corridor underserved for these populations. In addition, existing bus service by SunLine and Greyhound operates almost entirely on the freeway system with a limited number of intermediate stops; thus, only limited connections to transit are available to these communities along the I-10 corridor.

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3 Service Rationale

The service rationale developed as part of the Project's AA and Tier 1/Program EIS/EIR is presented in this section. This includes the geography and population of the Corridor and connectivity to other transportation modes.

3.1 Geography and Demographics of the Corridor

3.1.1 Geography

The Coachella Valley Rail Corridor crosses a large geographic area within Southern California, spanning a distance of approximately 144 miles from its western terminus in Los Angeles to its eastern terminus in Coachella. The Corridor is located within an existing railroad corridor that traverses areas that have predominately been heavily modified for urban purposes, especially in the Western Section, although some areas occur in, or adjacent to, lands that are in a natural condition. Much of the Corridor from Los Angeles to Loma Linda/Redlands is urbanized. The Eastern Section of the Corridor is less urbanized, with vacant land comprising the largest land use category.

Land uses in the Western Section of the Corridor are transportation, communication, and utilities (32.5 percent); industrial (29.4 percent); and single-family residential (12.2 percent), which equals approximately 74 percent of total existing land uses. Land uses for the Eastern Section of the Corridor are vacant land (40.2 percent); transportation, communication, and utilities (27.6 percent); and commercial (8.2 percent), which equals approximately 76 percent of total existing land uses.

3.1.2 Population and Demographics

Section 2.2 describes existing and projected population and employment data for the Corridor. Between 1970 and 2010, the Program Corridor's four-county region of Los Angeles, Orange, Riverside, and San Bernardino Counties grew by more than 7.4 million people. In 2010, approximately 46 percent of the population of California resided in the region (RCTC 2016).⁴ Los Angeles County has the largest population in the four-county region, followed by Orange County. In 2016, the Coachella Valley had a full-time population of approximately 376,000, which increases substantially during winter months with part-time residents from colder climates (Inland Empire Center for Economics and Public Policy 2016). The San Gorgonio Pass area, which is comprised of the Cities of Banning, Beaumont, and Calimesa, as well as the unincorporated community of Cabazon, had a population of more than 77,600 and employment of more than 14,500, including a major resort/casino and outlet mall (SCAG 2016).

The percentage of the population that is minority or that has income levels below the poverty threshold are summarized by county in Table 3-1. The minority percentage of the population is highest in Los Angeles County (70.8 percent), followed by San Bernardino County (67.0 percent), Riverside County (60.1 percent), and Orange County (55.3 percent). The percentage of the population with income below poverty ranges from 12.5 percent in Orange County to 19.1 percent in San Bernardino County.

⁴ The demographic and travel data reported in Chapters 2 and 3 reflect conditions at the time the Project's Purpose and Need was developed as part of the 2016 AA for the Corridor.

Table 3-1. Minority Population and Population below Poverty by County

County	Total Population	Percent Minority	Percent Below Poverty
Los Angeles	10,057,155	70.8	17.8
Orange	3,132,211	55.3	12.5
Riverside	2,323,892	60.1	16.5
San Bernardino	2,106,754	67.0	19.1

Source: U.S. Census Bureau 2016

As noted in Section 2.2.3, five of the nine incorporated cities in the Coachella Valley, containing over 40 percent of the valley's population, have poverty rates exceeding 15 percent, which is the federal average poverty rate. Two of the nine incorporated cities have poverty rates that exceed 25 percent. In addition, two of the unincorporated communities of the Coachella Valley have poverty rates approaching 50 percent (Mecca and Oasis). A substantial portion within these disadvantaged communities does not own personal vehicles and relies on alternative transportation services. East of Colton, the lack of available alternative transportation options leaves the I-10 corridor underserved for these populations.

The Coachella Valley is projected to be one of the fastest growing areas in California by 2040, with the permanent population projected to exceed 595,100 and employment growing by 94 percent to more than 253,700 (SCAG 2016). The San Gorgonio Pass area population is projected to almost double to 143,000, with employment more than doubling to 38,100 (SCAG 2016). These projected increases in population and employment will increase demand for reliable and safe travel options for people living and working in the Corridor.

3.2 Connectivity to Other Modes

Travel modes available to the public in the Coachella Valley Rail Corridor include automobile, air, bus, and long-distance passenger rail service. Section 2.2 provides a detailed description of existing transportation alternatives in the Corridor. Chapter 7 provides a detailed analysis of potential connectivity with other modes for each proposed station location in the Corridor.

3.3 Project Benefits

Caltrans and RCTC are working to improve intercity passenger rail service in the Corridor to help fulfill the Project's Purpose and Need. In achieving the objectives described in Section 2.1, the Coachella Valley Rail Project is expected to provide multiple benefits to the traveling public and the State of California, including provision of more convenient public transit service between Coachella Valley and the Los Angeles Basin, improved travel for multiple trip purposes, capacity to meet rising travel demand, and reductions in greenhouse gas emissions.

Chapter 11 of this SDP presents a public benefits analysis that weighs the potential costs and risks against the anticipated benefits of the Project.

4 Identification of No Build and Build Route Alternatives

This chapter describes the alternatives selection process used to identify and evaluate the No Build Alternative and the Build Alternative Options in the Project's Tier 1/Program EIS/EIR, in accordance with NEPA (42 U.S. Code Section 4321 et seq.), Council on Environmental Quality regulations implementing NEPA (40 Code of Federal Regulations Parts 1501-1508), FRA's Procedures for Considering Environmental Impacts (64 *Federal Register* 28545, May 26, 1999), and CEQA. This chapter also describes the Preferred Alternative selected for the Tier 1/Program EIS/EIR for purposes of NEPA.

4.1 Planning Horizons

For the purpose of comparison between the Build Alternative Options and No Build Alternative, three horizon years were analyzed:

- Existing Year (2018): This scenario includes Project-related transportation impacts under existing conditions. This scenario was analyzed to fulfill CEQA requirements for establishing a baseline environmental setting.
- Opening Year (2024): This scenario includes Project-related transportation impacts, including roadways and rail (passenger and freight) systems, on the first day the Project is operational.
- Future Year (2044): This scenario includes Project-related transportation impacts, including roadways and rail (passenger and freight) systems, at the conclusion of a 20-year time horizon following the completion of the passenger project.

4.2 Summary of Route Evaluation Process

In July 2016, RCTC, in coordination with Caltrans and FRA, prepared and completed the 2016 AA Report (summarized in Chapter 2 of the Draft Tier 1/Program EIS/EIR) that evaluated a reasonable range of alternatives for implementation of daily intercity passenger rail service between Los Angeles and Indio. The purpose of the 2016 AA Report was to identify a reasonable range of preliminary alternatives that could be carried forward for evaluation in a subsequent SDP and Tier 1/Program EIS/EIR. Reasonable alternatives are those that meet the established Purpose and Need, are buildable and cost-effective, and are anticipated to have acceptable levels of impact on the built and natural environments.

The alternatives evaluated in the Tier 1 Program EIS/EIR include the No Build Alternative, which is used as a baseline for comparison purposes and describes the impacts if the Program is not implemented, and the Build Alternative with three implementation options, which are described in Section 4.5.

The Build Alternative Options have been developed to a level of detail appropriate for a Tier 1/Program service-level evaluation and this SDP. The Tier 1/Program EIS/EIR Study Area encompasses the potential area where rail infrastructure improvements and station facilities could be implemented and constructed but does not represent the precise location or footprint of the improvement or facility. If a Build Alternative Option is selected, the Tier 2/Project-level analysis will consider further refinements

to the Tier 1/Program EIS/EIR Study Area to optimize performance, reduce cost, and avoid or reduce impacts on properties and environmental resources.

4.3 2016 Alternatives Analysis and Screening

4.3.1 Route Alternatives Studied

The 2016 AA Report identified six potential route alternatives and service options for the Corridor based on the Purpose and Need statement, review of previous studies, and comments from agencies and the public. In the Western Section of the Corridor, various combinations of four existing rail lines between the cities of Los Angeles and Colton were evaluated. For the Eastern Section, all potential route alternatives utilized UP's Yuma Subdivision between Colton and Indio. The six route alternatives are shown on Figure 4-1.

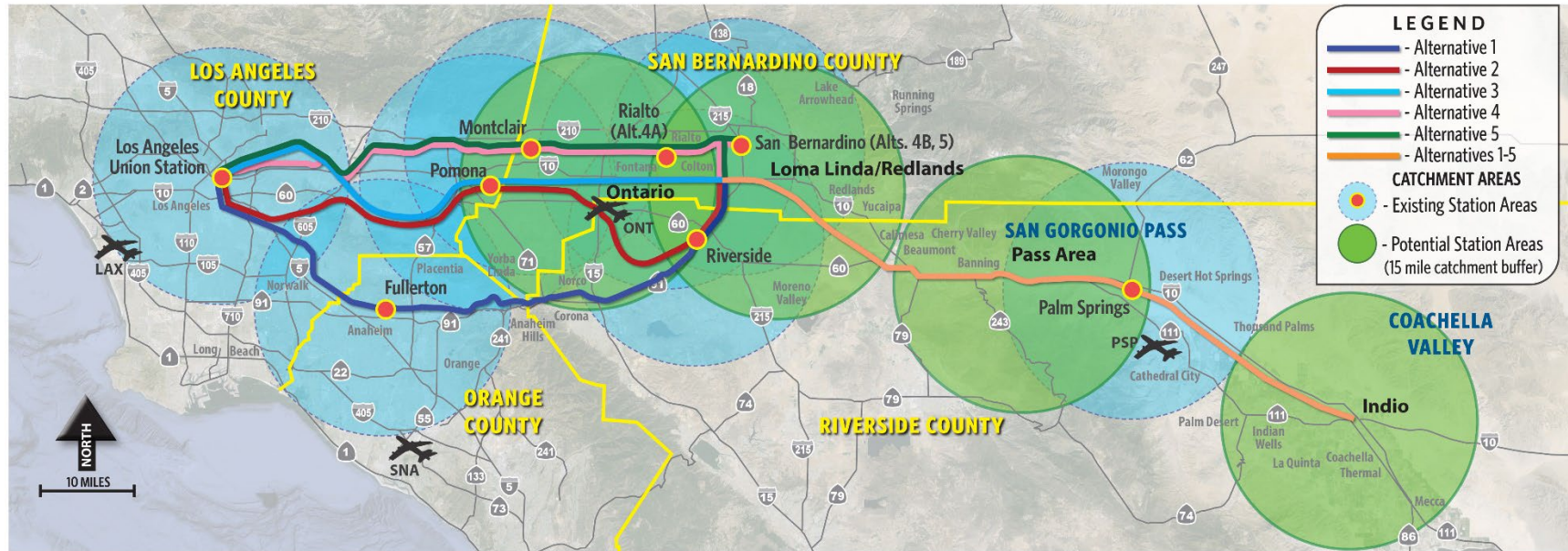
During preparation of the 2016 AA Report, the Program termini for proposed passenger rail service were Los Angeles and Indio in the west and east, respectively. As depicted on Figure 4-1, up to six station locations were planned within station catchment areas throughout the Program Corridor. Intermediate station stops were located on each route alternative at the largest intermediate cities, or as close as possible to the largest intermediate cities⁵, to attract and serve the largest possible ridership. A station stop was assumed within each of the existing and potential station areas shown on Figure 4-1. The intermediate station stops were different for each route alternative, as the route alternatives were geographically separated in the areas between LAUS and Colton and only shared a common alignment east of Colton. The number of station stops was determined with recognition that too many stops would make the overall travel time unacceptably long and less competitive with automobile travel times, thus reducing ridership.

At the outset of the AA process, a comprehensive public outreach plan was developed to serve as the blueprint for community engagement and stakeholder input. Stakeholders included cities, transportation providers, and other local agencies and entities within the Program Corridor. Feedback from stakeholder input and community engagement efforts helped to inform key decisions, including defining the Purpose and Need statement, Program termini, route alternatives, and potential station area locations.

During the preparation of the 2016 AA Report, the City of Indio was proposed to be the eastern terminus of the Corridor. Therefore, the City of Coachella was not included in the 2016 AA Report. However, the City of Coachella is located within the 15-mile Indio station catchment area studied in the 2016 AA Report. Based on comments received during the formal scoping period, FRA, Caltrans, and RCTC extended the eastern terminus of the Program Corridor beyond Indio to include the adjoining City of Coachella. The extension of the eastern terminus of the Corridor would not affect the conclusions reached in the 2016 AA Report, as only one route alternative in the Eastern Section (between Colton and Indio) was evaluated in the 2016 AA Report: the existing UP rail line.

⁵ Intermediate cities are cities with a population between 50,000 and 1,000,000 people that generally play a primary role in connecting important rural and urban areas to basic facilities and services.

Figure 4-1. Corridor Route Alternatives Considered in the Alternatives Analysis



Source: RCTC 2016

Notes: Alternative 4 has two variations between Los Angeles and San Bernardino (Route Alternative 4-A and Route Alternative 4-B), resulting in a total of six route alternatives. During preparation of the 2016 AA Report, Indio was anticipated to be the eastern terminus of the Program Corridor.

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Route Alternatives 1 through 3 proposed the use of the existing UP Yuma Subdivision between Colton and Indio and existing rail lines west of Colton, as described below:

- Route Alternative 1 proposed the use of the BNSF San Bernardino Subdivision from LAUS through Fullerton and Riverside to reach Colton.
- Route Alternative 2 proposed the use of the UP Los Angeles Subdivision from LAUS through Pomona and Riverside to reach Colton.
- Route Alternative 3 proposed the use of the UP Alhambra Subdivision from LAUS through Pomona and Ontario to reach Colton.

Route Alternative 4 proposed the use of the SCRRA San Gabriel Subdivision (owned by Metro) and the SBCTA⁶ from LAUS to San Bernardino, the SCRRA Short Way Subdivision from San Bernardino to Colton, and the UP Yuma Subdivision from Colton to Indio. Route Alternative 4 had two variations between Los Angeles and San Bernardino, as described below:

- Route Alternative 4-A proposed the use of the SCRRA San Gabriel Subdivision from LAUS, traveling eastward through Montclair and Rialto to reach a new eastward connection in San Bernardino with the Short Way Subdivision. This route alternative would not travel farther east along the San Gabriel Subdivision to serve the new San Bernardino Transit Center in downtown San Bernardino, making its length approximately 4 miles shorter than Route Alternative 4-B.
- Route Alternative 4-B also proposed the use of the SCRRA San Gabriel Subdivision from LAUS but continues east to serve the new San Bernardino Transit Center in San Bernardino. Once reaching San Bernardino, trains utilizing Route Alternative 4-B would reverse direction to reach the existing southward connection to the Short Way Subdivision. Route Alternative 4-B is approximately 4 miles longer than Route Alternative 4-A.

Route Alternative 5 also proposed the use of the UP Yuma Subdivision between Colton and Indio and a combination of rail lines west of Colton, as described below:

- Route Alternative 5 proposed the use of the UP Alhambra Subdivision between Los Angeles and El Monte, the SCRRA San Gabriel Subdivision between El Monte and San Bernardino, and the SCRRA Short Way Subdivision between San Bernardino and Colton. Similar to Route Alternative 4-B, Route Alternative 5 travels east to serve the new San Bernardino Transit Center in San Bernardino.

4.3.2 Screening Criteria and Process

The following four screening criteria were relied on during the process of evaluating and selecting reasonable and feasible route alternatives to carry forward in the SDP and Tier 1/Program EIS/EIR:

- Achieving the Program's Purpose and Need
- Environmental constraints
- Technical feasibility

⁶ The San Bernardino County Transportation Authority (SBCTA) was formerly known as the San Bernardino Associated Governments.

- Economic feasibility

These screening criteria were used to compare each route alternative during a two-step screening process: an initial coarse-level screening and, in greater detail, a subsequent fine-level screening. The initial coarse-level screening identified whether any route alternative was hindered by major challenges (and would, thus, be eliminated from subsequent fine-level screening). The fine-level screening evaluated the remaining route alternatives in greater quantitative and qualitative detail. The 2016 AA Report provides a detailed discussion of the screening criteria and how the screening criteria were applied to each route alternative. Figure 4-2 illustrates the overall route alternative screening and selection process.

Figure 4-2. Alternatives Selection Process Flow Chart



For the Western Section of the Corridor, route alternatives that did not meet the Purpose and Need, had major environmental challenges, or were not technically or economically feasible were eliminated during the coarse-level screening process. As a result of applying these criteria, the coarse-level screening concluded that Route Alternatives 2 and 3 were eliminated from further study. Both route alternatives are high-density freight lines, with substantial sections of single track that would require costly expansion projects to create the additional capacity needed to reliably operate the proposed passenger rail service and mitigate impacts on freight rail capacity and reliability.

The remaining four route alternatives for the Western Section of the Corridor were carried forward for more detailed consideration in the fine-level screening. The fine-level screening analyzed criteria such as environmental impacts, ROW availability, passenger and freight capacity, feasibility of the alignment, cost of structures, number of grade crossings, and economic feasibility in terms of capital and O&M costs. To determine ridership and revenue projections, a service plan consisting of two daily round trips between LAUS and Indio was presumed to operate for each of the four route alternatives screened, with identical arrival and departure times at LAUS for all route alternatives. The fine-level screening concluded that, of the remaining four route alternatives carried forward from the coarse-level alternative screening process, three route alternatives were not reasonable or feasible based on the technical or economic feasibility.

The fine-level screening process resulted in the recommendation that one of the four remaining route alternatives in the Western Section (Route Alternative 1) be carried forward in the SDP and the Tier 1/Program EIS/EIR. Although one route alternative is carried forward, the Tier 1/Program EIS/EIR included a reasonable range of alternatives for major Project elements (e.g., station stop pattern/service options and frequency) associated with the Build Alternative Options.

All route alternatives considered using existing freight and passenger routes rather than constructing a new rail ROW. Consequently, for the Eastern Section, the coarse-level screening was limited to the UP Yuma Subdivision. Based on the results of the coarse-level screening, the UP Yuma Subdivision

was carried forward through the fine-level screening and into the SDP and the Tier 1/Program EIS/EIR as the only reasonable and feasible route alternative for the Eastern Section of the Corridor.

4.4 No Build Alternative

The No Build Alternative would not fulfill the Program's Purpose and Need but is carried forward as a baseline alternative against which the Build Alternative Options are compared. The No Build Alternative assumes no new passenger rail service is implemented in the Program Corridor except for existing and committed transportation improvements.

4.4.1 Existing Operations

Western Section

Current Service Frequency

Under the No Build Alternative, current daily intercity passenger rail service levels in the Western Section of the Program Corridor would remain unchanged, and no new infrastructure would be constructed. The Western Section of the Corridor is comprised primarily of BNSF's San Bernardino Subdivision, a high-density freight train route that also hosts Amtrak intercity passenger and Metrolink commuter rail traffic. In addition, UP freight trains operating to and from the UP Los Angeles Subdivision at Riverside have trackage rights at BNSF's San Bernardino Subdivision between Riverside and San Bernardino. Detailed information about BNSF track speeds, gradients, terminal locations, mileages, and signaling in the Western Section of the Program Corridor is provided in the 2016 AA Report.

The Western Section of the Corridor plays a critical role in the movement of domestic and imported consumer goods carried in BNSF intermodal trains between Southern California ports and terminals throughout the U.S. Intermodal trains to and from the Ports of Los Angeles and Long Beach operate the entire length of the Western Section and use a connection at the Corridor's western end with the Alameda corridor rail line serving the ports. BNSF operates additional intermodal trains to and from its own intermodal terminals located along the Corridor at Commerce and Hobart Yards.

The BNSF San Bernardino Subdivision has multiple main line tracks for its entire length, consisting of alternating sections of double track and triple track. The current service levels (2018) in the Western Section of the Program Corridor are described below:

- Current freight train traffic between Los Angeles and Colton averages 32 to 54 trains per day for the lowest and highest density sections, respectively (Caltrans 2018).
- Two daily Amtrak long-distance passenger trains operate the entire length of the Western Section, and 24 daily Amtrak Pacific Surfliner passenger trains use the portion of the Program Corridor between Los Angeles and Fullerton, as noted in Amtrak's System Timetable (Amtrak 2018). Amtrak station stops in the Western Section are located at LAUS (all trains), Fullerton (all trains), and Riverside (long-distance trains only).
- Weekday Metrolink commuter rail traffic varies by segment. Metrolink's All Lines Timetable (Metrolink 2018) indicates that it operates 28 trains per day on weekdays between Los Angeles and Fullerton; 9 trains per day between Fullerton and Atwood; 25 trains per day between Atwood and Riverside; 20 trains per day between Riverside and Highgrove; and 8 trains per day from Highgrove to Colton. Weekend Metrolink commuter rail traffic also varies, with 12

trains per day between Los Angeles and Fullerton; 4 trains per day between Fullerton and Atwood; 8 trains per day between Atwood and Riverside; and 4 trains per day between Riverside and Colton.

Table 4-1 summarizes the Existing Year (2018) average daily train frequencies along the Western Section of the Program Corridor.⁷

Table 4-1. Western Section: Existing Year (2018) Daily Train Operations in the Program Corridor (Average One-Way Trips)

Endpoints	Existing Intercity Passenger One-Way Train Trips	Existing Commuter One-Way Train Trips	Existing Freight One-Way Train Trips	Total Existing 2018 Average Daily Volume of Trains
Western Section (SCRRA – Host Railroad; Additional Operators – Amtrak, BNSF)				
LAUS-Soto*	26	28	1	55
Western Section (BNSF – Host Railroad; Additional Operators – Amtrak, SCRRA, UP)				
Los Angeles (Soto*) Fullerton	26	28	32	86
Fullerton-Atwood	2	9	32	43
Atwood-Riverside	2	25	34	61
Riverside-Highgrove	2	20	34	76
Highgrove-Colton	2	8	54	64

Notes:

* This is the Soto interlocking (MP 144.4) in Los Angeles.

LAUS=Los Angeles Union Station; MP=milepost; SCRRA=Southern California Regional Rail Authority; UP=Union Pacific Railroad

Current Speed and Operating Conditions

Maximum authorized passenger train speed in the Western Section of the Corridor is 79 miles per hour west of Fullerton and 60 miles per hour east of Fullerton. The maximum authorized freight train speed is 50 miles per hour throughout the Western Section; however, grades of 1 percent ascending eastward from Fullerton to Colton have the potential to slow or prevent freight trains from reaching track speed. The route is equipped with wayside signaling and centralized traffic control (CTC) and positive train control. At Colton, a low-speed (20 miles per hour) connecting track is in operation that enables trains from Indio operating westbound on UP's Yuma Subdivision to directly access and operate westbound on BNSF's San Bernardino Subdivision.

⁷ Daily train counts depicted in Table 4-1 and Table 4-2 represent revenue train movements on a weekday (Monday–Friday). Freight train counts are based on Base Year (2013) daily freight train totals for the line segments shown above, as published in the California State Rail Plan (CSRP), Appendix A.4, Table 20 (Caltrans 2018). Passenger and commuter train counts are based on the following public timetables in effect in September 2018: Metrolink “All Lines” timetable effective May 14, 2018, the 2018 Los Angeles – San Diego – San Luis Obispo (LOSSAN) Southern California Passenger Rail System Map and Timetables effective April 1, 2018, the Amtrak Southwest Chief timetable effective July 31, 2018, and the Amtrak Sunset Limited timetable effective March 11, 2018.

Eastern Section

Current Service Frequency

Under the No Build Alternative, current daily intercity passenger rail service levels in the Eastern Section of the Corridor would remain unchanged, and no new infrastructure would be constructed. The Eastern Section of the Corridor (the UP Yuma Subdivision) is a high-density double-track freight train route. This subdivision carries UP's long-haul intermodal, automotive, bulk, and manifest freight traffic destined to and from major terminals in Southern California, including the Ports of Los Angeles and Long Beach. The UP Yuma Subdivision is part of UP's Sunset Route between Los Angeles and El Paso, Texas, which links Southern California with major population and manufacturing centers in the Midwest, Southwest, and Gulf Coast, as well as gateways to the Eastern U.S. and Mexico. The current service levels in the Eastern Section of the Program Corridor are summarized below:

- Current traffic averages 42 freight trains per day (Caltrans 2018). However, freight train volumes have substantial variability associated with vessel calls at the ports, customer requirements, day of week, and import-export fluctuations.
- One Amtrak long-distance passenger train, the Sunset Limited, operates the entire length of the Eastern Section of the Program Corridor 3 days per week in each direction. This train, which runs between Los Angeles and New Orleans, makes one station stop within the Program Corridor at Palm Springs.

Table 4-2 summarizes the Existing Year (2018) average daily train frequencies along the Eastern Section of the Corridor.⁸

Table 4-2. Eastern Section: Existing Year (2018) Daily Train Operations in the Program Corridor (Average One-Way Trips)

Endpoints	Existing Intercity Passenger One-Way Train Trips	Existing Commuter One-Way Train Trips	Existing Freight One-Way Train Trips	Total Existing 2018 Average Daily Volume of Trains
Eastern Section (UP – Host Railroad; Additional Operator – Amtrak)				
Colton-Coachella	1	0	42	43

Notes:

UP=Union Pacific Railroad

Current Speed and Operating Conditions

In the Eastern Section of the Corridor, passenger trains have maximum authorized speeds ranging between 30 and 70 miles per hour. The average maximum authorized speed is 59 miles per hour; however, in many sections, the operating speed that a passenger train could attain is less, which is attributable to the subdivision's grades and curves, time required for acceleration and braking as speed limits change, and time allotted for the station stop at Palm Springs. The lower operating speeds primarily result from curves of 3 to 5 degrees and lengthy gradients of up to 2 percent in each direction of travel. Reduction of curvature or gradient on much of the subdivision would be costly, owing to the

⁸ See Footnote 6 for sources of existing train operations.

adjacent canyon terrain and surrounding urban development. The subdivision's maximum authorized freight train speed is also 70 miles per hour, although most freight trains operate at much lower maximum speeds for similar reasons: the rail line's steep grades and curves that limit freight train speeds. The Eastern Section of the Program Corridor is equipped with wayside signaling with a CTC overlay and with positive train control.

Freight trains on the UP Yuma Subdivision experience operating challenges as a result of the steep grades on either side of San Gorgonio Pass, the geographic formation through which the UP Yuma Subdivision passes between the San Bernardino Mountains to the north and the San Jacinto Mountains to the south. Eastbound trains from Colton have a 1.9 percent climb for more than 20 miles to reach the summit, passing through San Timoteo Canyon. From an elevation of sea level near Indio, westbound trains face a 50-mile climb on a ruling grade that increases to 2.12 percent before cresting the summit of the pass at an elevation of 2,591 feet just east of Beaumont, California. The combination of steep grades on either side of the pass and the sustained up-grade climb for westbound trains and resulting lower operating speeds generates a substantial loss of capacity compared with a double-track main line without heavy grades.

Freight trains can also experience delays or congestion at Colton, where some trains are held to wait for permission to enter BNSF's San Bernardino Subdivision. The West Colton Yard, just west of Colton on the Alhambra Subdivision, is UP's principal classification yard for manifest trains in Southern California, as well as a crew change point for most freight trains that pass through. On days of heavy freight train traffic, one of the two main line tracks on the Yuma Subdivision is frequently occupied east of Colton by several parked freight trains waiting for an open track in West Colton Yard.

4.4.2 Riverside County Transportation Commission/BNSF Shared Use Agreement in Western Section

Use of the BNSF San Bernardino Subdivision would allow for the use of an existing shared use agreement and memorandum of understanding between RCTC and the railroad stakeholders, which provides for available passenger rail capacity along the Western Section of the Corridor. RCTC's existing shared use agreement with BNSF pairs staged infrastructure improvement projects to available passenger train slots in the Western Section of the Corridor (Atchison, Topeka, and Santa Fe Railway Company and RCTC 1992). In addition, a memorandum of understanding between SBCTA, UP, and BNSF associated with the Colton Crossing Railroad Grade Separation Project provides for the conversion of four non-revenue passenger train movements to revenue train movements in the segment of the San Bernardino Subdivision between Riverside and San Bernardino (SBCTA, UP, and BNSF 2010). Under these agreements, RCTC has the ability to commit four available train slots between LAUS and Colton for the proposed passenger rail service without constructing additional rail capacity improvement projects in the Western Section.

Under the existing agreements, passenger/commuter rail frequencies in the busiest part of the Western Section of the Corridor, between Los Angeles and Fullerton, are currently at capacity. However, specific capacity improvement projects planned or in construction along the Western Section of the Corridor would create additional passenger/train commuter train slots between Los Angeles and Fullerton by 2024 or sooner. RCTC has the ability to commit four of these additional slots to the proposed passenger rail service without the need to reduce existing passenger/commuter rail services by an equivalent number of frequencies between Los Angeles and Fullerton. However, if the proposed passenger rail service does not occur, RCTC could commit these slots to other intercity passenger or commuter rail services in the Western Section of the Corridor.

The additional passenger/commuter slots associated with the near-term capacity improvement projects planned or in construction between Los Angeles and Fullerton would also support other service increases in commuter and intercity passenger rail traffic that are anticipated to occur regardless of the proposed passenger rail service implementation. The capacity improvement projects that are planned or in construction are programmed for completion before the proposed passenger rail service would start. Therefore, infrastructure associated with the capacity improvement projects is considered part of baseline conditions in the Western Section of the Corridor between Los Angeles and Colton.

4.4.3 Programmed and Planned Infrastructure

Western Section

As discussed above, track capacity in the Western Section of the Corridor currently exists to accommodate the proposed passenger rail service. However, capacity improvement projects currently planned or in construction between Los Angeles and Fullerton will provide additional passenger/commuter train slots that could be used by the proposed Coachella Valley passenger trains without an equivalent reduction in existing services. Additionally, the increase in passenger/commuter train slots realized by these projects will allow other planned passenger/commuter service improvements to advance.

The No Build Alternative would consist of a continuation of existing and programmed passenger rail and transit services that currently connect the greater Los Angeles metropolitan area with the San Gorgonio Pass area and Coachella Valley. Table 4-3 provides a summary of capacity improvement projects that are currently in construction, programmed, or planned, and will occur regardless of the Project.

Table 4-3. Programmed and Planned Capacity Improvement Projects Within the Western Section of the Corridor

Project	Description
Rosecrans/Marquardt Grade Separation Project	In construction. This is a grade separation project located in City of Santa Fe Springs that will eliminate the existing at-grade crossing of BNSF's San Bernardino Subdivision at the Rosecrans and Marquardt Avenues. CEQA clearance (Statutory Exemption) was obtained by Metro in February 2016, and NEPA clearance (Environmental Assessment/Finding of No Significant Impact) was obtained by FRA in November 2018. The project is currently in construction with construction activities anticipated through 2023 (Metro 2020).
Third Main Line Track Project	Partially in construction. This project includes construction of 15 miles of a third main line track between Los Angeles and Fullerton within BNSF's existing railroad ROW. Completion of the project will provide 32 additional passenger/commuter slots between Los Angeles and Fullerton, with 10 of the new slots allocated for Amtrak's Pacific Surfliner trains (increasing service availability from today's 24 one-way trips to 34 trips) and 22 of the new slots allocated to Metrolink commuter or RCTC-sponsored passenger service (increasing the number of available Metrolink/RCTC frequencies from today's 28 one-way trips to 50 trips). Metro is currently working with funding partners to execute full funding agreements for ROW acquisition and construction (Metro 2017).

Table 4-3. Programmed and Planned Capacity Improvement Projects Within the Western Section of the Corridor

Project	Description
Fullerton Junction Interlocking and Third Main Track Improvements Project	Programmed. This project consists of multiple track and signal improvements, both east and west of the Fullerton train station, including constructing a 4.8-mile third main line track at the Fullerton Junction Interlocking and Third Main Track between CP Atwood and CP Esperanza on the BNSF San Bernardino Subdivision. Improvements will reduce cascading delays to Amtrak, Metrolink, and BNSF operations. Up to \$30 million in grant funds under the Consolidated Rail Infrastructure and Safety Improvements Program were awarded to this project.
Southern California Optimized Rail Expansion Program	Programmed. The Southern California Optimized Rail Expansion Program consists of a series of capacity improvement projects aimed at improving safety and service and building infrastructure that would enable regional passenger rail service frequency to at least 30 minutes systemwide with better connections to other transit providers. Improvements include capacity improvements at LAUS and on tracks between Los Angeles and Fullerton. The program also includes infrastructure planning funding for projects in El Monte, Simi Valley, Burbank, Rancho Cucamonga, Chatsworth, and other areas throughout the region. The program includes up to \$91.2 million in California Transportation Commission funding and additional funding from a Transit and Intercity Rail Capital Program grant.
Link Union Station Project	Programmed. The project entails the reconstruction of track and station infrastructure at LAUS to meet long-term rail travel needs and improve passenger comfort, safety, and ease of navigation through LAUS. The project will increase rail capacity at LAUS by replacing the current stub-end station track configuration with new run-through station tracks over US-101 and reconfiguring the station's throat (entry tracks) and rail yard (platform area). The increase in station capacity would allow for more trains to serve LAUS and open new opportunities for one-seat rides to more destinations in Southern California. CEQA clearance (EIR/notice of determination) was obtained by Metro in June 2019, and NEPA clearance (EIS) by California High-Speed Rail Authority is currently in process.
City of Santa Fe Springs Grade Separation Projects	Planned. Three additional grade separation projects on BNSF's San Bernardino Subdivision in the City of Santa Fe Springs are in the planning stages, but no funding has been committed or programmed; therefore, these projects would not be assumed as part of the No Build Alternative for the purposes of this Tier 1/Program EIS/EIR. These include the Norwalk/Los Nietos Grade Separation Project, Lakeland Road Grade Separation Project, and the Pioneer Boulevard Grade Separation Project.

Notes:

CEQA=California Environmental Quality Act; CP=Control Point; EIR=environmental impact report; EIS=environmental impact statement; FRA=Federal Railroad Administration; LAUS=Los Angeles Union Station; Metro=Los Angeles County Metropolitan Transportation Authority; NEPA=National Environmental Policy Act; RCTC=Riverside County Transportation Commission

In addition, the No Build Alternative includes forecast growth in freight traffic on BNSF's San Bernardino Subdivision. The 2018 CSRP anticipates rail intermodal traffic in California will increase at a compound annual growth rate of 2.9 percent through 2040, and rail carload traffic will increase at a compound annual growth rate of 1.7 percent through 2040, which could add approximately 40 additional freight trains to BNSF's San Bernardino Subdivision west of Riverside and approximately 60 additional freight trains between Riverside and Colton (Caltrans 2018).

Implementation of the Project would not preclude future connections to the California High Speed Rail Program. As disclosed on the California High-Speed Rail Authority's website, the two California High Speed Rail Program sections that would be relevant to the Project would be the Los Angeles to

Anaheim section (Phase 1 high-speed rail alignment), which provides a potential high-speed rail connection at the existing Fullerton Station, and the Los Angeles to San Diego section (Phase 2 high-speed rail alignment), which provides a potential high-speed rail connection at the existing LAUS. As documented in the Draft Tier 1/Program EIS/EIR, the Western Section of the Program Corridor identified the existing rail station at LAUS that would be utilized for the proposed passenger rail service. There are no California High Speed Rail Program sections currently proposed in Phase 1 or Phase 2 for the Eastern Section of the Program Corridor. However, implementation of the Coachella Valley Rail Project would connect passenger rail travelers to the statewide high-speed rail system and services.

Table 4-4 summarizes the Opening Year (2024) average daily train frequencies along the Western Section of the Program Corridor under the No Build Alternative.⁹

Table 4-4. Western Section No Build Alternative Opening Year (2024) Daily Train Operations in the Program Corridor (Average One-Way Trips)

Endpoints	Intercity Passenger One-Way Train Trips	Commuter One-Way Train Trips	Freight One-Way Train Trips	Total 2024 Average Daily Volume of Trains
<i>Western Section (SCRRA – Host Railroad; Additional Operators – Amtrak, BNSF)</i>				
LAUS-Soto*	36	50	1	87
<i>Western Section (BNSF – Host Railroad; Additional Operators – Amtrak, SCRRA, UP)</i>				
Los Angeles (Soto*)-Fullerton	36	50	38	124
Fullerton-Atwood	2	23	38	63
Atwood-Riverside	2	39	40	81
Riverside-Highgrove	2	24	63	89
Highgrove-Colton	2	12	63	77

Notes:

* This is the Soto interlocking (MP 144.4) in Los Angeles.

LAUS=Los Angeles Union Station; MP=milepost; SCRRA=Southern California Regional Rail Authority; UP=Union Pacific Railroad

⁹ Daily train counts depicted in Table 4-4 and Table 4-6 represent revenue train movements on a weekday (Monday–Friday). Freight train counts are 2.7 percent compound annual growth increases to 2024 from existing 2018 freight train average daily volumes that were based on Base Year (2013) daily freight train totals for the line segments shown above, as published in the California State Rail Plan, Appendix A.4, Table 20 (Caltrans 2018). Passenger and commuter train counts are based on train frequency increases associated with completion of the Third Main Line Track Project on BNSF between Los Angeles and Fullerton, and existing (2018) or previously programmed frequencies on other line segments.

Table 4-5 summarizes the Future Year (2044) average daily train frequencies along the Western Section of the Program Corridor under the No Build Alternative.¹⁰

Table 4-5. Western Section: No Build Alternative Future Year (2044) Daily Train Operations in the Program Corridor (Average One-Way Trips)

Endpoints	California High-Speed Rail Authority One-Way Train Trips	Intercity Passenger One-Way Train Trips	Commuter One-Way Train Trips	Freight One-Way Train Trips	Total 2044 Average Daily Volume of Trains
Western Section (SCRRA – Host Railroad; Additional Operators – Amtrak, BNSF)					
LAUS-Soto*	100	40	134	1	275
Western Section (BNSF – Host Railroad; Additional Operators – Amtrak, SCRRA, UP)					
Los Angeles (Soto*)-Fullerton	100	40	134	74	348
Fullerton-Atwood	0	2	44	74	120
Atwood-Riverside	0	2	88	81	171
Riverside-Highgrove	0	2	124	118	244
Highgrove-Colton	0	2	44	118	164

Notes:

* This is the Soto interlocking (MP 144.4) in Los Angeles.

LAUS=Los Angeles Union Station; MP=milepost; SCRRA=Southern California Regional Rail Authority; UP=Union Pacific Railroad

Eastern Section

UP continues to realize capacity benefits from projects it has undertaken in Southern California over the past 2 decades, including an initiative to construct a second main line track on 760 miles of its Sunset Route between Colton, California, and El Paso, Texas. UP also continues to benefit from the 2013 completion of the Colton Crossing Railroad Grade Separation Project, which grade separated the crossing of UP's Yuma Subdivision and BNSF's San Bernardino Subdivision in Colton. During the No Build Alternative development process, UP indicated that it had no additional improvements planned or programmed for this section the Corridor within the timeframe of the study.

The No Build Alternative includes forecast growth in freight traffic on UP's Yuma Subdivision. The 2018 CSRP anticipates that rail intermodal traffic in California will increase at a compound annual growth rate of 2.9 percent through 2040 and that rail carload traffic will increase at a compound annual growth rate of 1.7 percent through 2040, which could add approximately 50 additional freight trains to UP's Yuma Subdivision (Caltrans 2018). This growth forecast is consistent with growth projections

¹⁰ Daily train counts depicted in Table 4-5 and Table 4-7 represent revenue train movements on a weekday (Monday–Friday). Freight train counts are averages between the minimum and maximum volumes of Proposed Future Year (2040) daily freight train totals for the line segments shown above, as published in the California State Rail Plan, Appendix A.4, Table 20 (Caltrans 2018). Passenger and commuter train counts are preliminary estimates interpreted from Metrolink Southern California Optimized Rail Expansion Program projections for service frequencies on various routes and services in the Western Section of the Corridor.

provided by UP for computerized rail operations modeling simulations undertaken by RCTC for the Program.

Table 4-6 summarizes the Opening Year (2024) average daily train frequencies along the Eastern Section of the Program Corridor under the No Build Alternative.¹¹

Table 4-6. Eastern Section: No Build Alternative Opening Year (2024) Daily Train Operations in the Program Corridor (Average One-Way Trips)

Endpoints	Intercity Passenger One-Way Train Trips	Commuter One-Way Train Trips	Freight One-Way Train Trips	Total Average 2024 Daily Volume of Trains
Eastern Section (UP – Host Railroad; Additional Operator – Amtrak)				
Colton-Coachella	1	0	49	50

Notes:

UP=Union Pacific Railroad

Table 4-7 summarizes the Future Year (2044) average daily train frequencies along the Eastern Section of the Program Corridor under the No Build Alternative.¹²

Table 4-7. Eastern Section: No Build Alternative Opening Year (2044) Daily Train Operations in the Program Corridor (Average One-Way Trips)

Endpoints	California High-Speed Rail Authority One-Way Train Trips	Intercity Passenger One-Way Train Trips	Commuter One-Way Train Trips	Freight One-Way Train Trips	Total 2044 Average Daily Volume of Trains
Eastern Section (UP – Host Railroad; Additional Operator – Amtrak)					
Colton-Coachella	0	1	0	88	89

Notes:

UP=Union Pacific Railroad

As described above, under the No Build Alternative, no new growth in existing passenger services or new passenger services providing regional linkages in the Eastern Section of the Corridor are programmed or funded for implementation at this time.

4.5 Build Alternatives

4.5.1 Build Alternative Options 1, 2, and 3

As summarized in Section 4.3.2, only Route Alternative 1 in the Western Section of the Corridor was considered reasonable and feasible after evaluation under the two-stage alternatives screening process. Therefore, for purposes of analysis in this SDP and the Tier 1/Program EIS/EIR, Route

¹¹ See Footnote 8 for sources of train operations data.

¹² See Footnote 9 for sources of train operations data.

Alternative 1 in the Western Section of the Program Corridor is the route alignment for all Build Alternative Options. This Western Section route alignment is summarized in Table 4-8 and shown on Figure 4-3.

For the Eastern Section of the Corridor, three Build Alternative Options were analyzed in the Tier 1/Program EIS/EIR. Build Alternative Option 1 and Build Alternative Option 2 were developed based on the findings in the 2016 AA Report. Build Alternative Option 3 was recommended for inclusion by FRA during a review of a rail operations sensitivity test conducted in summer 2019. These Eastern Section Build Alternative Options are summarized in Table 4-8 and shown on Figure 4-4 and Figure 4-5.

Table 4-8. Summary of Build Alternative Options

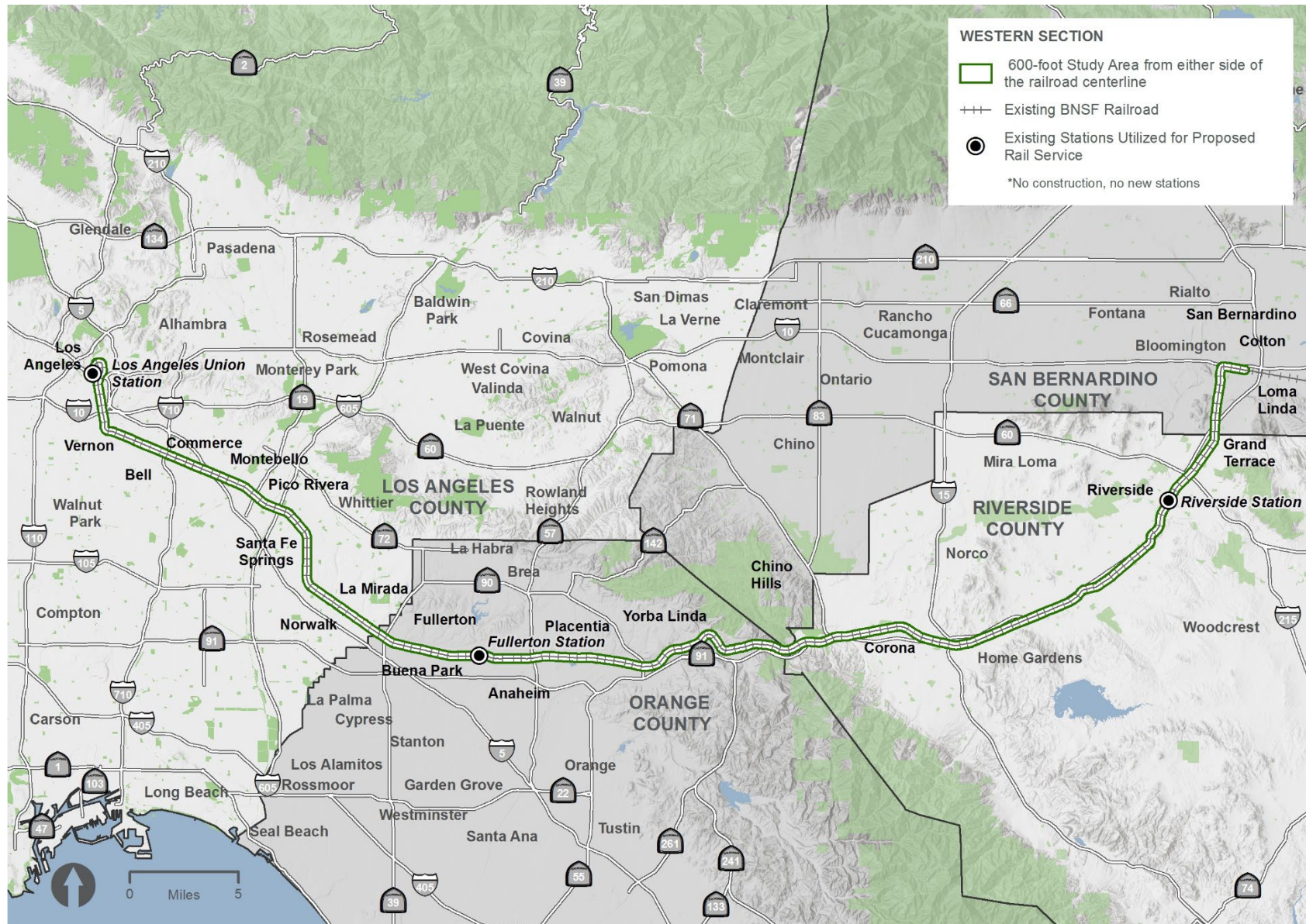
Build Alternative Option	Western Section	Eastern Section
Build Alternative Option 1 (Coachella Terminus): 144-mile Corridor	The Western Section consists of a 68-mile segment along BNSF's San Bernardino Subdivision between Colton and CP Soto (at MP 144.4; for a distance of approximately 63 miles), and Metro's River Subdivision, operated by SCRRA, between CP Soto and LAUS (for a distance of approximately 5 miles).	The Eastern Section consists of a 76-mile segment along the existing UP Yuma Subdivision corridor between the Cities of Colton and Coachella. Under Build Alternative Option 1, five new potential station areas are identified (to allow up to six stations), and a third track is proposed along the entire Eastern Section of the Program Corridor.
Build Alternative Option 2 (Indio Terminus): 140.25-mile Corridor	The Western Section consists of a 68-mile segment along BNSF's San Bernardino Subdivision between Colton and CP Soto (at MP 144.4; for a distance of approximately 63 miles), and Metro's River Subdivision, operated by SCRRA, between CP Soto and LAUS (for a distance of approximately 5 miles).	The Eastern Section consists of a 72.25-mile segment along the existing UP Yuma Subdivision corridor between the Cities of Colton and Indio. Under Build Alternative Option 2, four new potential station areas are identified (to allow up to five stations), and a third track is proposed along the entire Eastern Section of the Program Corridor.
Build Alternative Option 3 (Indio Terminus with Limited Third Track): 140.25-mile Corridor	The Western Section consists of a 68-mile segment along BNSF's San Bernardino Subdivision between Colton and CP Soto (at MP 144.4; for a distance of approximately 63 miles), and Metro's River Subdivision, operated by SCRRA, between CP Soto and LAUS (for a distance of approximately 5 miles).	The Eastern Section consists of a 72.25-mile segment along the existing UP Yuma Subdivision corridor between the Cities of Colton and Indio. Under Build Alternative Option 3, four new potential station areas are identified (to allow up to five stations), and a third track is proposed between the City of Colton and the northern boundary of the potential Mid-Valley Station area. ^a

Notes:

^a The third track under Build Alternative Option 3 would stop at the northern boundaries of the potential Mid-Valley Station area. Any improvements that may be required to transition from a third track to a second track would occur within the larger footprint of the potential Mid-Valley Station area.

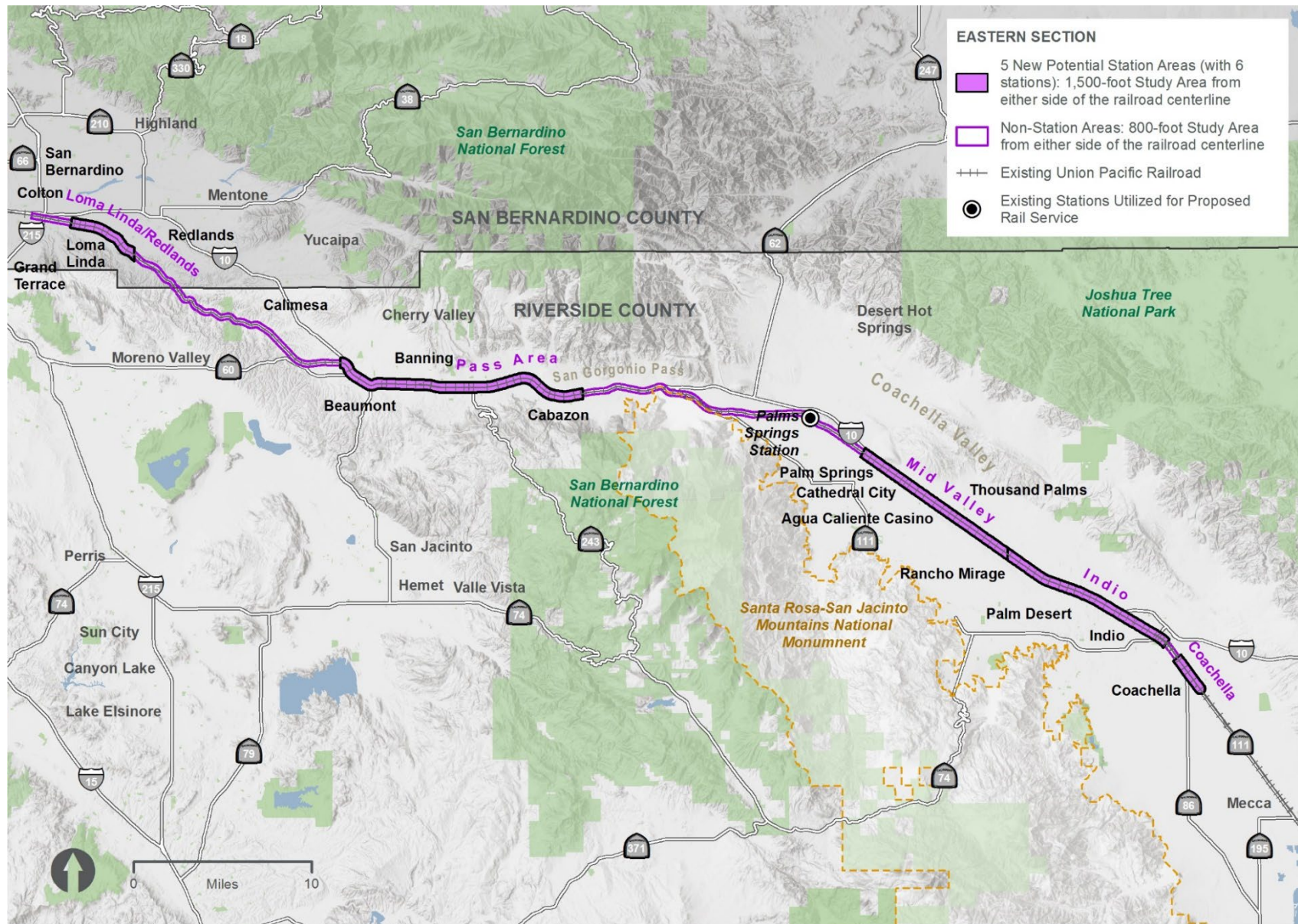
CP=Control Point; LAUS=Los Angeles Union Station; Metro=Los Angeles County Metropolitan Transportation Authority; MP=milepost; SCRRA=Southern California Regional Rail Authority; UP=Union Pacific Railroad

Figure 4-3. Western Section of the Program Corridor (Build Alternative Options 1, 2, and 3)



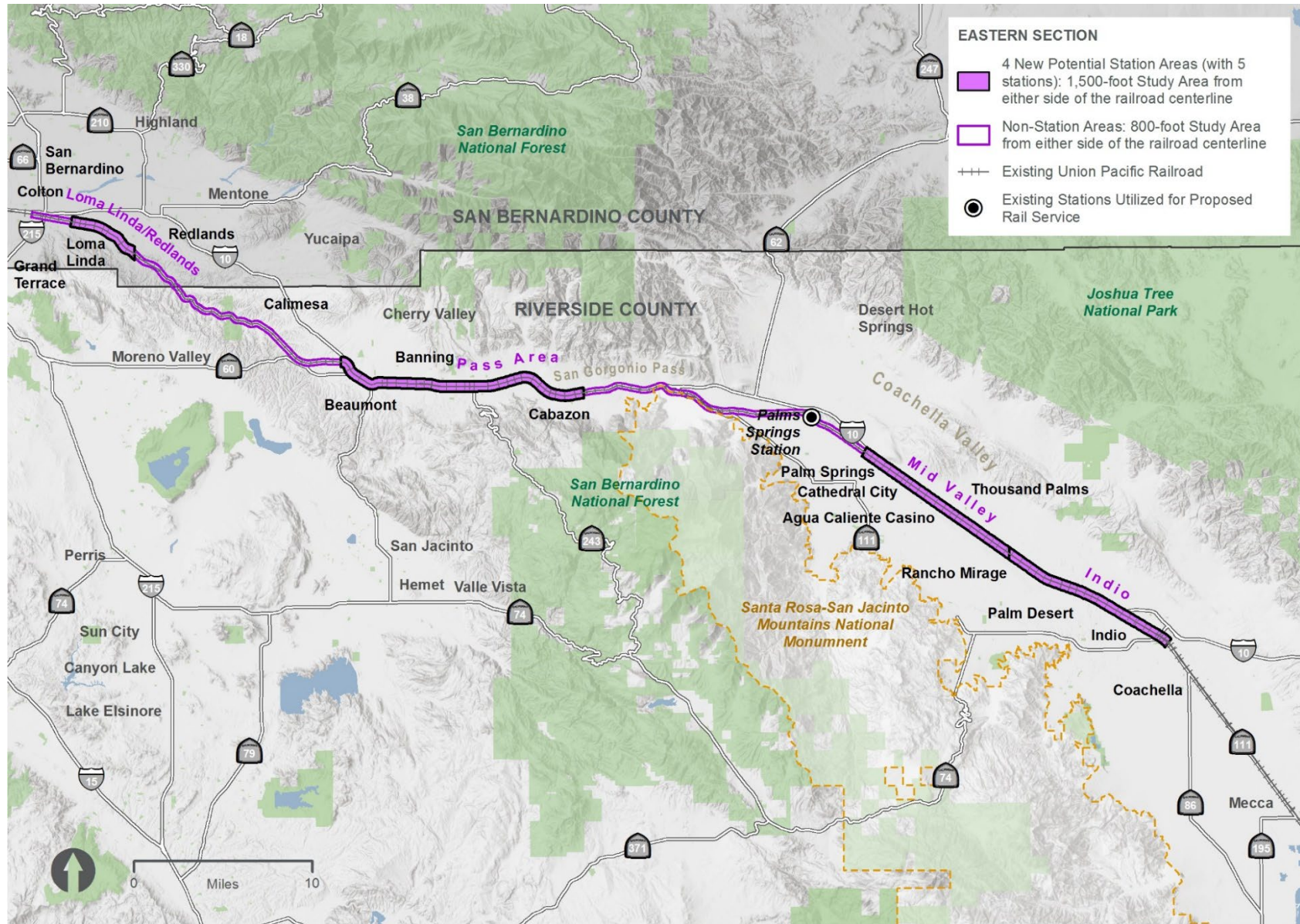
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Figure 4-4. Eastern Section of the Program Corridor (Build Alternative Option 1)



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Figure 4-5. Eastern Section of the Program Corridor (Build Alternative Options 2 and 3)



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Under all Build Alternative Options, existing rail infrastructure would be used in the Western Section of the Corridor, and no additional railroad infrastructure improvements would be required. LAUS would serve as the western terminus, while existing stations in the Cities of Fullerton and Riverside would be utilized to support the proposed service. No new stations or improvements to existing stations would be required to accommodate the proposed service within the Western Section of the Program Corridor. As shown on Figure 4-3, the Tier 1/Program EIS/EIR Study Area for the Western Section of the Program Corridor encompasses a 600-foot buffer from either side of the railroad centerline.

The three Build Alternative Options are summarized below.

- **Build Alternative Option 1:** Build Alternative Option 1 assumes up to two daily round passenger rail trips between LAUS and the City of Coachella. No additional railroad infrastructure improvements would be required within the Western Section of the Program Corridor, and existing stations in Fullerton and Riverside would be utilized. Within the Eastern Section of the Program Corridor, the existing station in Palm Springs would be utilized, and up to five new potential stations could be constructed in the Loma Linda/Redlands area, the Pass area, the Mid Valley area, the City of Indio, and the City of Coachella. A third main line track would augment the existing two main tracks along the entire Eastern Section of the Program Corridor from Colton to Coachella.
- **Build Alternative Option 2:** Build Alternative Option 2 assumes up to two daily round passenger rail trips between LAUS and the City of Indio. No additional railroad infrastructure improvements would be required within the Western Section of the Program Corridor and existing stations in Fullerton and Riverside would be utilized. Within the Eastern Section of the Program Corridor, the existing station in Palm Springs would be utilized, and up to four new potential stations could be constructed in the Loma Linda/Redlands area, the Pass area, the Mid Valley area, and the City of Indio. A third main line track would augment the existing two main tracks along the entire Eastern Section of the Program Corridor from Colton to Indio.
- **Build Alternative Option 3:** Build Alternative Option 3 assumes up to two daily round passenger rail trips between LAUS and the City of Indio. No additional railroad infrastructure improvements would be required within the Western Section of the Program Corridor, and existing stations in Fullerton and Riverside would be utilized. Within the Eastern Section of the Program Corridor, the existing station in Palm Springs would be utilized, and up to four new potential stations could be constructed in the Loma Linda/Redlands area, the Pass area, the Mid Valley area, and the City of Indio. A third main line track would augment the existing two main tracks along the Eastern Section of the Program Corridor from Colton to the proposed Mid-Valley Station area.

4.6 Identification of a Preferred Alternative

Based on the analysis contained in the Tier 1/Program EIS/EIR service-level evaluation and as summarized in Chapter 7 of the Draft EIS/EIR, Build Alternative Option 1 is identified as the recommended Preferred Alternative for purposes of NEPA. Based on the environmental analysis conducted for the Tier 1/Program EIS/EIR service-level evaluation and summarized in Chapter 7 of the Draft EIS/EIR, the No Build Alternative does not meet the Purpose and Need of the Project. Specifically, the No Build Alternative would not divert highway trips within the Corridor, reduce congestion, increase access to employment and activity centers, or provide reliable travel times and a level of safety comparable to that offered by passenger rail travel. The No Build Alternative would

not connect the urban, suburban, and rural areas between Los Angeles and Coachella with a high-capacity travel option, facilitate continued development of a multimodal transportation network, or provide mobility choices for existing and future needs.

Considering the projected ridership, agency and public input, and potential environmental impacts associated with improving passenger rail within the Program Corridor, a passenger rail system from LAUS to Coachella (Build Alternative Option 1) is considered to be more cost efficient and better performing than a passenger rail system from LAUS to Indio (Build Alternative Option 2) or with limited third track infrastructure (Build Alternative Option 3), with similar potential impacts on the environment. As described in Chapter 6, Build Alternative 1 would meet the objectives of allowing the proposed service to operate above 90 percent on-time performance and without degrading freight operations, whereas Build Alternative 2 would not provide the travel options afforded by an extension to Coachella, and Build Alternative 3 would not be sufficient to meet operational performance objectives.

Therefore, FRA and Caltrans have recommended Build Alternative Option 1 as the Preferred Alternative in the Draft Tier 1/Program EIS/EIR for purposes of NEPA.

4.6.1 Characteristics of the Recommended Alternative for Service Development Plan Analysis

The Preferred Alternative has a total Corridor distance of approximately 144 miles and consists of a Western Section, terminating at LAUS, and an Eastern Section, terminating in the City of Coachella, the details of which are as follows.

Western Section. Existing rail infrastructure would be used in the Western Section of the Corridor, and no additional railroad infrastructure improvements would be required. LAUS would serve as the western terminus, while existing stations in the Cities of Fullerton and Riverside would be utilized to support the proposed passenger rail service. No new stations or improvements to existing stations would be required to accommodate the proposed service within the Western Section of the Corridor.

Eastern Section. Potential new infrastructure improvements on the Eastern Section of the Corridor could include sidings, additional main line track, wayside signals, drainage, grade-separation structures, and station facilities to accommodate the proposed passenger rail service. Conceptual engineering and operational service plans were developed that reflect a Preferred Alternative with the following features:

- A third main line track of approximately 76 miles to augment the existing two-track main line along the Eastern Section of the Corridor from Colton to Coachella
- Various crossovers connecting the existing main line tracks to the new third main line track
- A new, second Mount Vernon connector track in Colton
- A new siding at Loma Linda to allow passenger trains to meet, reducing delay
- A new railroad bridge across the Santa Ana River
- Additional infrastructure components throughout the Program Corridor including, but not limited to, wayside signals, drainage structures, and grade-separation structures.

The proposed passenger rail services within the Eastern Section of the Corridor would use the existing station in the City of Palm Springs, with the addition of an island platform between Main Tracks 1 and 2 and a side platform serving Main Track 3. Additionally, up to five new potential stations could be

constructed in the following areas: Loma Linda/Redlands area (serving the Cities of Loma Linda and Redlands), the Pass area (serving the communities of Beaumont, Banning, Calimesa, and Cabazon), the Mid-Valley area (serving the communities of Cathedral City, Rancho Mirage, Palm Desert, Thousand Palms, and the Agua Caliente Casino area), the City of Indio, and the City of Coachella as the eastern terminus of the Corridor.

The Tier 1/Program EIS/EIR service-level evaluation does not clear these potential future station facilities or rail infrastructure improvements for construction. Completion of Tier 2/Project-level environmental review would be required prior to implementation of site-specific infrastructure improvements, including station locations.

4.7 Environmental Impact Statement Summary of Effects

The potential effects of the No Build Alternative and the Preferred Alternative, based on the detailed analysis of the social, economic, and environmental resources, are documented in Chapter 3 of the Draft Tier 1/Program EIS/EIR. The No Build Alternative does not meet the service Purpose and Need but was retained for detailed analysis to allow equal comparison to the Preferred Alternative. Resource areas evaluated in the Draft EIS/EIR included: land use and planning; transportation; visual and aesthetic resources; air quality and greenhouse gases; noise and vibration; jurisdictional waters and wetland resources/biological resources; floodplains, hydrology, and water quality; geology, soils, seismicity, and paleontological resources; hazards and hazardous materials; public utilities and energy; cultural resources; parklands and community services; safety and security; and socioeconomics and communities affected. In a Tier 1/Program EIS/EIR, potential impacts are identified using high-level data and analysis. As a result, the available information is not detailed enough to formulate specific mitigation measures. Therefore, each resource evaluation in the Draft Tier 1/Program EIS/EIR includes a list of mitigation strategies that would be considered and further developed in the future as part of the Tier 2/Project-level environmental analysis. Project-specific mitigation strategies for Tier 2/Project-related impacts would be considered and implemented as necessary during subsequent Tier 2/Project-level environmental studies¹³.

The key differentiating factors between the Build Alternative Options are related to a decrease in regional VMT, resulting in an associated decrease in the emissions of air pollutants and reduced regional transportation energy consumption. Some of the key environmental effects are summarized below.

- **Air quality/Greenhouse gas:** The Preferred Alternative would result in regional reductions of air quality and greenhouse gases emissions. These reductions would be achieved through implementation of passenger rail service and its related potential to attract passengers from other travel modes such as personal automobile and bus. The passenger rail service provided under the Preferred Alternative is anticipated to result in a reduction of approximately 10.5 million VMT per year during opening year and 17.4 million VMT per year during future year scenarios.
- **Energy:** The proposed passenger rail service has potential to attract passengers from other travel modes. Accordingly, it is expected that a portion of these passengers would be using

¹³ The Tier 2 process may not automatically follow the Tier 1 process, rather project(s) would be defined based on the Tier 1/Program EIS/EIR broad project scope and funded at that time. The Tier 2 process would be a separate environmental analysis and could be funded and led by an agency other than the FRA, Caltrans, or RCTC depending upon the source of funding.

the rail service in place of vehicle, bus, or air travel, thus reducing transportation-related energy consumption. Additionally, travel by rail is the most energy efficient mode of long-distance, intercity transportation. However, an empty train would not reduce energy consumption. Overall, the displacement of automobile VMT to increased ridership on the railway would result in reduced transportation-related energy consumption.

- **Construction Impacts:** Implementation of the Preferred Alternative would result in construction-related effects, such as noise, vibration, the localized emission of air pollutants, one-time energy consumption effects, and potential temporary disruptions to both rail and automobile traffic. Certain components requiring the acquisition of land outside the railroad right of way would, if constructed, result in the conversion of agricultural lands as well as other lands known to include sensitive biological habitats. Construction activities could also expose soils and/or groundwater that are contaminated with hazardous materials. Construction could also potentially affect the eligibility of known and unknown archaeological sites and other cultural resources.
- **Operational Impacts:** Operational impacts would include increased localized noise and vibration from additional daily trains, as well as increased levels of roadway traffic in the vicinity of existing and proposed station areas.
- **Daily Passenger Rail Service:** The Preferred Alternative would establish daily passenger rail service in the Corridor and help to create an interconnected, multimodal solution allowing for better mobility throughout the Southern California region. With the implementation of the passenger rail service, rail ridership would be anticipated to increase, and would also allow flexibility for people who may prefer or require alternatives to automobile transportation. This increase in service would provide additional transportation system capacity that could relieve some of the projected near- and long-term demand on the highway system, potentially slowing the need to further expand highways and roadways within the Corridor, or reduce the scale of those expansions, including their associated cost and impacts on communities and the environment.
- **Economic Development:** The Preferred Alternative would allow for the development of additional passenger stations within the Eastern Section of the Corridor, which would support local planning and revitalization plans as well as introduce new employments and growth opportunities through the provision of passenger rail service and complementary station area development.
- **Traffic and Travel:** The Preferred Alternative proposes up to five new passenger rail stations in the Eastern Section of the Corridor. Buildout of the station areas (which includes the opening of the stations themselves, increased passenger rail activity, and buildout of surrounding planned land uses) would result in increased traffic on local streets.
- **Land Use and Planning, Communities and Neighborhoods, Property and Environmental Justice:** Rail infrastructure improvements (e.g., siding extensions, bridge structures) and station facilities associated with the Preferred Alternative that require land conversion/acquisition outside of the railroad ROW have the potential to commit the land uses and natural resources for an expanded and realigned railway in some areas. Future implementation of components outside the existing ROW and in populated areas would have the largest impact on existing land uses and communities. The components associated with the Preferred Alternative are conceptual at this time and if carried forward in the future, could be refined to avoid some or all potential impacts on existing land uses and communities.

- **Agricultural Resources:** Rail infrastructure improvements and station facilities associated with the Preferred Alternative that require land conversion/acquisition outside of the railroad ROW have the potential to convert prime farmland and other protected types of farmland to nonagricultural uses. Design refinements may result in reduced potential impacts to agricultural resources.
- **Biological and Wetland Resources:** Rail infrastructure improvements and station facilities associated with the Preferred Alternative that require land conversion/acquisition outside of the railroad ROW have the potential to be located in critical habitat areas for several protected species, habitat of special-status species, sensitive vegetation communities, and wetlands. Design refinements may be able to avoid some or all of the aforementioned potential effects.
- **Hydrology and Water Quality:** Rail infrastructure improvements and station facilities associated with the Preferred Alternative have the potential to intersect surface waters, potentially resulting in hydrological and/or water quality effects. Design refinements of the conceptual plan components could potentially avoid some of all of these hydrology and/or water quality impacts.

Representative mitigation strategies include conceptual avoidance and minimization measures for the next phase of design, suggestions for interagency agreement documents, best management practices, regulatory agency and tribal coordination, and further technical study requirements. Table 2-1 in the Final Tier 1/Program EIS/EIR summarizes potential future Project-level mitigation strategies for specific resources areas.

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5 Ridership and Revenue Forecasts

This chapter describes the methods, assumptions, and outputs of the travel demand forecasting process for the Corridor service study. Results include projections of ridership and revenue for 2018, 2024, and 2044.

5.1 Methodology

Ridership and revenue forecasts for the Corridor service study were prepared by using the Caltrans Mode Share Model, which was developed in April 2018 to support rail planning activities throughout the State of California.

This model starts with an estimate of current total person travel by automobile and rail (including connecting Amtrak Thruway bus service) estimated from cell phone trace data obtained from AirSage. As an intercity rail service, the proposed service is assumed not to compete with local transit. Automobile travel would be the primary mode that competes with rail travel; however, Metrolink commuter rail was included for trips between Los Angeles and Riverside or San Bernardino. AirSage cell phone data is converted into a person-trip table representing travel between each pair of origin and destination locations in the State of California. A mode choice model separates these trips into travel made by automobile and travel made by rail. Model parameters for the mode choice model are based on prior rail modeling experience in California and confirmed with a series of validation and sensitivity tests.

Future travel demand is estimated by factoring the current person trip tables using growth factors based on projections of population, employment, and income growth obtained from Moody's.

This model was used to test four different Coachella Valley rail service options defined by the number of station stops that will be served east of Colton: three, four, five, or six station stops. The model was applied for three different horizon years (2018, 2024, and 2044). Revenue was estimated by multiplying station-to-station rail trips by a projection of the average fare for each journey.

5.2 Ridership Forecast

This subsection describes the data, area system, mode share model, and the resulting forecasts of ridership for each Coachella Valley service option.

5.2.1 Data Sources

Data to support the development and application of the Caltrans Mode Share Model was obtained from four principal sources:

- Estimates of current-year zone-to-zone person-travel demand for ground transportation (auto and rail) are based on cell phone trace data obtained from AirSage for the period between January 2015 and July 2015 and calibrated against annual average daily traffic data from Caltrans and data from the California Statewide Travel Demand Model. These traces were converted to total (auto and rail) person-trip tables and adjusted by comparing trip table results to Caltrans highway screen line crossings at 10 locations throughout the state. One of these screen line locations represents Coachella Valley to Los Angeles/San Diego travel.

- Future population, employment, and income were obtained from Moody's and used to project future travel demand by applying an iterative proportional fitting factoring process. An overview of demographic assumptions is presented in Table 5-1, Table 5-2, and Table 5-3 for population, employment, and individual income, respectively. The impact on the resulting county-to-county flow of travelers is presented in Table 5-4. As this table shows, trip-making in the modeling region is expected to grow by 1.37 percent per year between 2018 and 2044. Growth in travel is highest for trips occurring entirely within the Inland Empire (San Bernardino and Riverside Counties, about 2 percent per year) where growth in population and employment is highest. Travel growth is lowest within the more built out portions of the region, such as Los Angeles and Orange Counties (under 1.5 percent per year) where population and employment are growing more slowly. Travel between the Inland Empire and Los Angeles or Orange Counties reflect an intermediate level of growth, which is in keeping a market connecting high and more modest growth areas.

Table 5-1. Population by County and Year

County	2018	2024	Percent Compound Annual Growth 2018 to 2024	2044	Percent Compound Annual Growth 2018 to 2044
Riverside	2,508,863	2,804,783	1.88%	3,935,658	1.75%
San Bernardino	2,242,305	2,452,123	1.50%	3,197,008	1.37%
Orange	3,278,788	3,489,657	1.04%	4,156,465	0.92%
Los Angeles	10,356,682	10,728,279	0.59%	11,675,392	0.46%
Total	18,386,638	19,474,842	0.96%	22,964,523	0.86%

Source: Appendix A

Notes:

Quantities expressed by number of residents

Table 5-2. Employment by County and Year

County	2018	2024	Percent Compound Annual Growth 2018 to 2024	2044	Percent Compound Annual Growth 2018 to 2044
Riverside	1,041,806	1,200,233	2.39%	1,808,222	2.14%
San Bernardino	1,006,099	1,130,592	1.96%	1,564,874	1.71%
Orange	2,228,575	2,461,416	1.67%	3,216,852	1.42%
Los Angeles	6,436,817	6,941,332	1.27%	8,502,437	1.08%
Total	10,713,297	11,733,573	1.53%	15,092,385	1.33%

Source: Appendix A

Notes:

Quantities expressed by number of employees

Table 5-3. Average Annual Individual Income by County and Year (Year of Expenditure Dollars)

County	2018	2024	Percent Compound Annual Growth 2018 to 2024	2044	Percent Compound Annual Growth 2018 to 2044
Riverside	\$32,923	\$36,141	1.57%	\$44,906	1.20%
San Bernardino	\$32,082	\$35,045	1.48%	\$42,773	1.11%
Orange	\$53,918	\$58,965	1.50%	\$74,558	1.25%
Los Angeles	\$48,325	\$53,090	1.58%	\$67,907	1.32%
Total	\$45,240	\$49,430	1.49%	\$61,670	1.20%

Source: Appendix A

Table 5-4. Weekday One-Way Person Trips by County-to-County Pair and Year

County	2018	2024	Percent Compound Annual Growth 2018 to 2024	2044	Percent Compound Annual Growth 2018 to 2044
Riverside-Riverside	1,236,575	1,447,673	2.66%	2,254,313	2.34%
Riverside-San Bernardino	347,996	402,049	2.44%	599,185	2.11%
Riverside-Orange	146,216	166,803	2.22%	239,519	1.92%
Riverside-Los Angeles	137,249	154,246	1.96%	211,562	1.68%
San Bernardino-Riverside	347,996	402,049	2.44%	599,185	2.11%
San Bernardino-San Bernardino	1,167,874	1,329,923	2.19%	1,889,895	1.87%
San Bernardino-Orange	106,871	120,220	1.98%	164,789	1.68%
San Bernardino-Los Angeles	423,512	469,161	1.72%	613,576	1.44%
Orange-Riverside	146,216	166,803	2.22%	239,519	1.92%
Orange-San Bernardino	106,871	120,220	1.98%	164,789	1.68%
Orange-Orange	2,749,387	3,053,033	1.76%	4,029,054	1.48%
Orange-Los Angeles	656,842	718,730	1.51%	906,705	1.25%
Los Angeles-Riverside	137,249	154,246	1.96%	211,562	1.68%
Los Angeles-San Bernardino	423,512	469,161	1.72%	613,576	1.44%
Los Angeles-Orange	656,842	718,730	1.51%	906,705	1.25%
Los Angeles-Los Angeles	9,346,280	10,087,694	1.28%	12,205,560	1.03%
Total	18,137,490	19,980,741	1.63%	25,849,496	1.37%

Source: Appendix A

- Zone-to-Zone estimates of automobile travel time were obtained from the California State Travel Demand Model. Congested highway times are estimated by multiplying base times by a congestion factor for peak, midday, and nighttime periods equal to 1.5 in the AM and PM peak periods, 1.2 in the midday period, and 1.0 in the nighttime period. These congestion factors are assumed to grow at the rate of 2 percent per year, based on analysis of historical data from the 2015 Urban Mobility Scorecard (Schrank et. al. 2015). A summary of the resulting estimates of travel time for selected city pairs is presented in Table 5-5. The time to make an automobile trip from Los Angeles to Palm Springs is expected to increase from 2.55 hours in 2017 to 3.15 hours in 2044. Automobile operating costs are based on values obtained from the American Automobile Association, and parking costs were estimated by the

degree of urbanization of each zone, as discussed in Appendix A (American Automobile Association 2017).

Table 5-5. Weekday Highway Travel Times for Selected City Pairs by Year

City Pair	Time of Day	2017 (hours)	2018 (hours)	2024 (hours)	2044 (hours)
Los Angeles-Palm Springs	AM	2.55	2.57	2.68	3.15
	mid-day	2.04	2.05	2.09	2.28
	PM	2.55	2.57	2.68	3.15
	nighttime	1.70	1.70	1.70	1.70
Palm Springs-Indio	AM	0.54	0.54	0.57	0.67
	mid-day	0.43	0.43	0.44	0.48
	PM	0.54	0.54	0.57	0.67
	nighttime	0.36	0.36	0.36	0.36
Los Angeles-Riverside	AM	1.34	1.34	1.40	1.65
	mid-day	1.07	1.07	1.09	1.19
	PM	1.34	1.34	1.40	1.65
	nighttime	0.89	0.89	0.89	0.89

Source: Appendix A

- Rail levels-of-service for the current year are based on Fiscal Year (FY) 17 Amtrak schedules. Schedules for the Project were added to the FY17 schedules to represent possible future services. The development and operational modeling of these schedules is described in Chapter 6. The current and future schedules were used to develop estimates of zone-to-zone travel times and frequencies. Average rail fare revenue per passenger for each station-to-station combination are based on actual FY16 Amtrak ridership and revenue converted to a simple fare model that includes a fixed boarding fee plus an additional mileage charge. Station access times and distances are obtained from the California Statewide Travel Demand Model.

5.2.2 Travel Model

The core of the forecasting process is the California Mode Share Model. The model is structured as a nested logit choice model with parameters based on experience with rail forecasting models in California. The model was calibrated to match observed ridership for the three Amtrak-California routes currently in operation. The results of this calibration are presented in Table 5-6.

Table 5-6. Comparison of Route-Level Actual and Modeled Ridership

Route	FY17 Actual	FY17 Model	Difference	%Difference
Pacific Surfliner	2,502,864	2,493,660	-9,204	-0.4%
Capitol Corridor	1,591,174	1,641,461	50,287	3.2%
San Joaquin	1,100,602	1,157,777	57,175	5.2%
Total	5,194,640	5,292,899	98,259	1.9%

Source: Appendix A
FY=fiscal year

The model's sensitivity was evaluated by running a series of scenarios that adjusted rail in-vehicle times, frequencies, and fares by ± 10 percent, ± 20 percent, and ± 30 percent and then recording the resulting changes in ridership. Table 5-7 presents the effects that each change had on ridership. Fare elasticities range from between -0.82 to -1.06, in-vehicle time elasticities range from -1.11 to -1.34, and frequency elasticities range from 0.49 to 0.62. These results are at the high end of the range of published estimates of the sensitivity of rail ridership to these service attributes. This past experience suggests that time and fare elasticities typically range from -0.3 to -1.2 and frequency elasticities range from 0.1 to 0.6. The Caltrans Mode Share model sensitivity test results suggests that it is likely to respond to changes in service in an optimistic, but still reasonable manner.

Table 5-7. Ridership Elasticities with Respect to Level-of-Service

Percent Change in Level-of-Service Characteristic	Ridership Elasticity to		
	Fare	In-Vehicle Time	Frequency
-30%	-0.82	-1.11	0.62
-20%	-0.87	-1.16	0.59
-10%	-0.91	-1.21	0.56
+10%	-0.99	-1.28	0.52
+20%	-1.03	-1.31	0.50
+30%	-1.06	-1.34	0.49

Source: Appendix A

5.2.3 Modal Forecasts

Ridership Projections for four Coachella Valley Rail service options were prepared for 2018, 2024 and 2044. These options were defined as follows:

- **Option A – Three Stops East of Colton.** This option has two daily round trips between LAUS and Indio with East-of-Colton station stops at Pass Area, Palm Springs, and Indio.

- **Option B – Four Stops East of Colton.** This option has two daily round trips between LAUS and Coachella with East-of-Colton station stops at Pass Area, Palm Springs, Indio, and Coachella.
- **Option C – Five Stops East of Colton.** This option has two daily round trips between LAUS and Indio with East-of-Colton station stops at Loma Linda, Pass Area, Palm Springs, Mid-Valley, and Indio.
- **Option D – Six Stops East of Colton.** This option has two daily round trips between LAUS and Coachella with East-of-Colton station stops at Loma Linda, Pass Area, Palm Springs, Mid-Valley, Indio, and Coachella.

Options A and B were developed to represent alternative scenarios for the eastern terminus in Indio and Coachella in an early phase of Project implementation with two new intermediate stations, while Options C and D represent alternative scenarios for the eastern terminus with the full complement of intermediate stations. Forecasts are presented below for Option D, which corresponds to the stations included in the Preferred Alternative. The schedule for this option is presented in Table 5-8. Schedules and forecasts for the other options are included in Appendix A.

Metrolink service was included in the model to provide a high-frequency option for travel between San Bernardino and Los Angeles and for travel between the City of Riverside and Fullerton or Los Angeles. Weekday Metrolink service assumptions are shown in Table 5-9. Due to the high level of existing Metrolink and Pacific Surfliner service between Los Angeles and Fullerton, this origin-destination pair was not modeled for the Coachella Valley service.

Table 5-8. Option D Schedule (Six Stops East of Colton)

Eastbound: Read Down		Miles	Station	Miles	Westbound: Read Up	
750	752		Train No.		751	753
10:20 a.m.	3:20 p.m.	0	Los Angeles	144	12:40 p.m.	6:40 p.m.
10:55 a.m.	3:55 p.m.	26	Fullerton	118	12:06 p.m.	6:06 p.m.
11:39 a.m.	4:39 p.m.	62	Riverside	82	11:22 a.m.	5:22 p.m.
11:59 a.m.	5:04 p.m.	72	Loma Linda*	72	10:58 a.m.	4:58 p.m.
12:39 p.m.	5:44 p.m.	103	Pass Area*	41	10:18 a.m.	4:18 p.m.
1:01 p.m.	6:06 p.m.	118	Palm Springs	26	9:58 a.m.	3:58 p.m.
1:13 p.m.-L	6:18 p.m.-L	128	Mid Valley*	16	9:44 a.m.	3:44 p.m.
1:29 p.m.-L	6:34 p.m.-L	141	Indio*	3	9:31 a.m.	3:31 p.m.
1:35 p.m.	6:40 p.m.	144	Coachella*	0	9:26 a.m.	3:26 p.m.
3:15	3:20		Travel Time		3:14	3:14

Notes:

* Proposed New Stations

L=Train may leave in advance of time shown

Table 5-9. Metrolink Service Assumptions, Trains per Weekday

Metrolink Line	Route	Eastbound Trains	Westbound Trains
San Bernardino	Los Angeles to San Bernardino	19	19
Riverside	Los Angeles to Riverside via Industry	6	6
91/Perris Valley	Los Angeles to Riverside via Fullerton	5	4

Annual ridership forecasts for Option D are presented for year 2018, 2024, and 2044 in Table 5-10. This table shows total annual forecasted station activity (passenger boardings plus alightings) at each station. Total boardings plus alightings for all stations are divided by two to estimate total annual Project ridership (i.e., one-way trips). One-way trips are the best overall measure of how the Project serves the traveling public. Average ridership per train is estimated by dividing annual ridership by 365 days per year and by 4 trains per day. This number is helpful for determining consist length and load factors.

Year 2018 forecasted results represent expected ridership if the Coachella Valley service were in operation today (in 2018). These estimates are unaffected by projected growth in population or employment or to changes in competing forms of transportation, such as increased highway congestion. As such, year 2018 forecasts are most helpful in reviewing the ability of the Project to serve existing markets and are least affected by circumstances beyond the control of the rail system operators.

Years 2024 and 2044 forecasts consider the effect of expected demographic growth in the Coachella Valley and elsewhere in California and changes to highway congestion levels that could increase congestion-related delays by over two-thirds between now and 2044. Effects of proposed service increases on other rail services in the service area were not considered, and existing schedules for connecting or competing rail services were assumed to remain in place.

Table 5-10. Year 2018 Forecasted Ridership by Year

Code	Station	2018	2024	2044
COA	Coachella	16,600	19,300	32,000
IDR	Indio (rail)*	19,400	22,600	37,400
MID	Mid Valley	25,300	29,400	48,800
PSN	Palm Springs	73,900	85,900	142,600
PAS	Pass Area	8,300	9,700	16,000
LML	Loma Linda	32,300	37,600	62,300
RIV	Riverside	32,100	37,300	61,900
FUL	Fullerton	22,600	26,300	43,600
LAX	Los Angeles	120,500	140,100	232,400

Table 5-10. Year 2018 Forecasted Ridership by Year

Code	Station	2018	2024	2044
Total ons and offs		351,000	408,200	677,100
Project ridership (total annual one-way trips)		175,500	204,100	338,500
Average passengers per train		120	140	232

Source: Appendix A

Notes:

Average Passengers Per Train is rounded

* The Indio (rail) station is a proposed new station and would not be located at the existing Amtrak Thruway bus stop in Indio.

COA=proposed Coachella station; FUL=Fullerton station; IDR=proposed Indio rail station; LAX=Los Angeles Union Station (Amtrak station code); LML=proposed Loma Linda station; PSN=Palm Springs Station; RIV=Riverside station

As described in Section 6.2.3, train consists consist of four bilevel cars and are assumed to seat 323 passengers. Therefore, the proposed train consist is enough to serve the demand projected for 2018 if it is evenly distributed among all four trains. By 2044, passengers per train could exceed 230, but would still adequately serve demand with the proposed four-car bilevel consists.

Between 2018 and 2024, rail ridership is expected to grow by about 16 percent, approximately the same as the growth in total travel demand occurring within the Inland Empire and slightly higher than the growth in demand between the Inland Empire and Orange or Los Angeles Counties of 12 percent.

Between 2018 and 2044, rail ridership is expected to grow by approximately 93 percent. Some of this increase is related to growth in travel inside the Inland Empire (78 percent growth) and growth from the Inland Empire to Orange and Los Angeles Counties (51 percent). The difference between rail ridership growth and overall travel growth is caused by automobile times between Los Angeles and Palm Springs that are expected to grow by about 35 minutes in the AM peak between 2018 and 2044.

Station-to-station forecasted ridership for each year and option are presented in Table 5-11 through Table 5-13. Key findings from the station-to-station analyses include:

- The largest Project market is for travel between the Project area (stations east of Colton) and Los Angeles. This market accounts for approximately 70 percent of all Project usage for all options. This is a sensible outcome both because Los Angeles is a large destination and because LAUS is a regional transfer point for connecting Amtrak services as well as other transit services.
- Fullerton and Riverside and Loma Linda (for selected options) are smaller destinations that, together, serve most of the remaining trips.
- Trips that are internal to the corridor (east of Colton) account for relatively few trips in the three-station option (200 annual trips in 2018) growing to 2,400 annual trips in the six-station option. This outcome is a result of the fact that additional stations begin to provide more internal travel options than are available with only three stations.

Table 5-11. Year 2018 Station-to-Station Forecasted Ridership

Station	COA	IDR	MID	PSN	PAS	LML	RIV	FUL	LAX	Total
COA	—	—	—	1,400	200	2,800	3,500	600	8,100	16,600
IDR	—	—	—	—	100	3,500	4,300	7,300	4,200	19,400
MID	—	—	—	—	700	3,900	4,500	1,400	14,800	25,300
PSN	—	—	—	—	—	2,500	3,100	4,700	62,200	72,500
PAS	—	—	—	—	—	900	1,000	2,000	3,400	7,300
LML	—	—	—	—	—	—	—	600	18,100	18,700
RIV	—	—	—	—	—	—	—	6,000	9,700	15,700
FUL	—	—	—	—	—	—	—	—	—	—
LAX	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	1,400	1,000	13,600	16,400	22,600	120,500	175,500

Source: Appendix A

Notes:

COA=proposed Coachella station; FUL=Fullerton station; IDR=proposed Indio station; LAX=Los Angeles Union Station (Amtrak station code); LML=proposed Loma Linda Station; MID=proposed Mid-Valley station; PAS=proposed Pass Area Station; PSN=Palm Springs Station; RIV=Riverside station

Table 5-12. Year 2024 Station-to-Station Forecasted Ridership

Station	COA	IDR	MID	PSN	PAS	LML	RIV	FUL	LAX	Total
COA	—	—	—	1,600	200	3,300	4,100	700	9,400	19,300
IDR	—	—	—	—	100	4,100	5,000	8,500	4,900	22,600
MID	—	—	—	—	800	4,500	5,200	1,600	17,200	29,400
PSN	—	—	—	—	—	2,900	3,600	5,500	72,300	84,300
PAS	—	—	—	—	—	1,000	1,200	2,300	4,000	8,500
LML	—	—	—	—	—	—	—	700	21,100	21,700
RIV	—	—	—	—	—	—	—	7,000	11,300	18,300
FUL	—	—	—	—	—	—	—	—	—	—

Table 5-12. Year 2024 Station-to-Station Forecasted Ridership

Station	COA	IDR	MID	PSN	PAS	LML	RIV	FUL	LAX	Total
LAX	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	1,600	1,200	15,800	19,100	26,300	140,100	204,100

Source: Appendix A

Notes:

COA=proposed Coachella station; FUL=Fullerton station; IDR=proposed Indio station; LAX=Los Angeles Union Station (Amtrak station code); LML=proposed Loma Linda Station; MID=proposed Mid-Valley station; PAS=proposed Pass Area Station; PSN=Palm Springs Station; RIV=Riverside station

Table 5-13. Year 2044 Station-to-Station Forecasted Ridership

Station	COA	IDR	MID	PSN	PAS	LML	RIV	FUL	LAX	Total
COA	—	—	—	2,700	400	5,400	6,800	1,200	15,600	32,000
IDR	—	—	—	—	200	6,800	8,300	14,100	8,100	37,400
MID	—	—	—	—	1,400	7,500	8,700	2,700	28,500	48,800
PSN	—	—	—	—	—	4,800	6,000	9,100	120,000	139,900
PAS	—	—	—	—	—	1,700	1,900	3,900	6,600	14,100
LML	—	—	—	—	—	—	—	1,200	34,900	36,100
RIV	—	—	—	—	—	—	—	11,600	18,700	30,300
FUL	—	—	—	—	—	—	—	—	—	—
LAX	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	2,700	1,900	26,200	31,600	43,600	232,400	338,500

Source: Appendix A

Notes:

COA=proposed Coachella station; FUL=Fullerton station; IDR=proposed Indio station; LAX=Los Angeles Union Station (Amtrak station code); LML=proposed Loma Linda Station; MID=proposed Mid-Valley station; PAS=proposed Pass Area Station; PSN=Palm Springs Station; RIV=Riverside station

5.2.4 Ridership Sensitivity to Service Frequency

During the AA phase of the Coachella Valley rail service planning, preliminary ridership forecasts were developed to test the sensitivity of ridership to the frequency of service in the corridor. Ridership forecasts were prepared for each of four service frequencies, with the service level varying from one to four round trips per day. The results, shown in Table 5-14, indicate that ridership in the Corridor would be expected to increase with increasing daily service frequency, but the average number of passengers per train would be expected to decrease. For purposes of the Tier I Final EIS/EIR and SDP, two round trips per day was selected as the service level for the Preferred Alternative. Two round

trips per day would provide the best performance in terms of riders per train while providing an opportunity for passengers to make a limited round trip in one day.

Table 5-14. Ridership Sensitivity to Service Frequency

Route	Number Daily Trains		Annual Ridership	Year	Actual / Projected	Avg. Passenger s per Train	Route Miles
	Weekdays	Weekends					
CV Rail Service – Forecasts for SDP and Tier 1 EIS/EIR (six stations east of Colton)							
Los Angeles - Coachella	4	4	175,500	2018	Projected	120	144
Los Angeles - Coachella	4	4	204,100	2024	Projected	140	144
CV Rail Service – Preliminary forecasts for 2016 AA to test ridership sensitivity to train frequency							
Los Angeles - Indio	2	2	103,200	2020	Projected	141	140
Los Angeles - Indio	4	4	163,200	2020	Projected	112	140
Los Angeles - Indio	6	6	204,200	2020	Projected	93	140
Los Angeles - Indio	8	8	242,000	2020	Projected	83	140

Notes:

The trip optimization ridership estimates prepared 2016 AA assumed 5 stations east of Colton: Loma Linda, Cabazon, Palm Springs, Rancho Mirage, and Indio.

AA=alternatives analysis; CV=Coachella Valley; EIR=environmental impact report; EIS=environmental impact statement; SDP=service development plan

5.3 Revenue Forecast

Coachella Valley rail revenue includes ticket revenue obtained from passenger fares and auxiliary revenue associated with other activities, most notably on-board food and beverage service.

5.3.1 Ticket Revenue Forecasts

Ticket revenue forecasts are the product of ridership forecasts and average fare paid for each trip. This computation is performed for each station-to-station pair using the fares shown in Table 5-15. Table 5-16 presents the resulting estimates of annual fare revenue for each option and each year. Please note that all estimates of fare revenue are provided in Year 2018 dollars and no adjustment is made to account for future inflation.

Table 5-15. Coachella Valley Average Station-to-Station Fare (2018 Dollars)

Station	COA	IDR	MID	PSN	PAS	LML	RIV	FUL	LAX
COA	—	\$10.51	\$12.81	\$14.06	\$16.77	\$23.12	\$24.52	\$30.50	\$34.41
IDR	—	—	\$12.28	\$13.58	\$16.28	\$22.55	\$23.95	\$30.05	\$33.85
MID	—	—	—	\$11.92	\$14.11	\$19.87	\$21.27	\$27.75	\$32.14
PSN	—	—	—	—	\$12.45	\$17.59	\$18.98	\$25.54	\$30.36
PAS	—	—	—	—	—	\$15.02	\$16.40	\$22.63	\$27.50
LML	—	—	—	—	—	—	\$11.39	\$16.52	\$21.35
RIV	—	—	—	—	—	—	—	\$14.69	\$19.59

Source: Appendix A

Notes:

Fullerton to Los Angeles fare is not presented as this station pair was not modeled due to the high frequency of existing Metrolink and Pacific Surfliner service.

COA=proposed Coachella station; FUL=Fullerton station; IDR=proposed Indio rail station; LAX=Los Angeles Union Station (Amtrak station code); LML=proposed Loma Linda station; PAS=proposed Pass Area Station; PSN=Palm Springs Station; RIV=Riverside station

Table 5-16. Passenger Revenue (Millions of 2018 Dollars)

Year	Fare Revenue
2018	\$4.67
2024	\$5.43
2044	\$9.00

Source: Appendix A

5.3.2 Auxiliary Revenue Forecasts

Auxiliary revenue comes from other (non-fare) sales that can be generated by a passenger rail service and are typically represented as a percentage of ticket revenue. These revenues are primarily derived from food and beverages sold on trains. For the Corridor service study, auxiliary revenue is estimated as being equal to 11 percent of ticket revenue, based on the non-fare revenue to fare revenue ratio generated by LOSSAN's Pacific Surfliner passenger rail service in FY 2016-17 and FY 2017-18. Table 5-17 presents auxiliary revenue forecast for each option for each horizon year.

Table 5-17. Auxiliary Revenue (Millions of 2018 Dollars)

Year	Auxiliary Revenue
2018	\$0.51
2024	\$0.60
2044	\$0.99

Source: Appendix A

6 Operations Analysis

This chapter provides an overview of the service planning and operations simulation work undertaken to support the Project. This chapter includes the preliminary timetables that were developed for the SDP. Preliminary equipment cost estimates, preliminary conceptual consist deployment estimates, and servicing facility estimates are also discussed.

6.1 Service Requirements

6.1.1 Corridor Overview

The Corridor is approximately 144 miles long and extends from a western terminus at LAUS in the City of Los Angeles to an eastern terminus in the City of Coachella. The Corridor consists of two sections: the Western Section and the Eastern Section. The boundary between Western and Eastern sections is in the City of Colton, at the intersection of existing railroad lines owned by UP and BNSF.

- The Western Section uses an existing main line, approximately 68 miles long, 63 miles of which are owned and operated by BNSF between Colton and Control Point (CP) Soto in Los Angeles, and the remaining 5 miles of which are owned by Metro and operated by SCRRA (also referred to as Metrolink) between CP Soto and LAUS.
- The Eastern Section uses an existing main line approximately 76 miles long owned and operated by UP between Colton and Coachella.

Table 6-1 summarizes the host (operator) and tenant railroads on each portion of the Corridor.

Table 6-1. Host and Tenant Railroads in the Coachella Valley Rail Corridor

Operator	Subdivision	Endpoints	Tenants
SCRRA	River	LAUS-Soto	Amtrak (LAUS-Soto) BNSF (LAUS-Soto)
BNSF Railway	San Bernardino	Soto-Colton	Amtrak (Soto-Colton) Metrolink (Soto-Colton) UP (Riverside-Colton)
UP	Yuma	Coachella-Colton	Amtrak (Colton-Coachella)

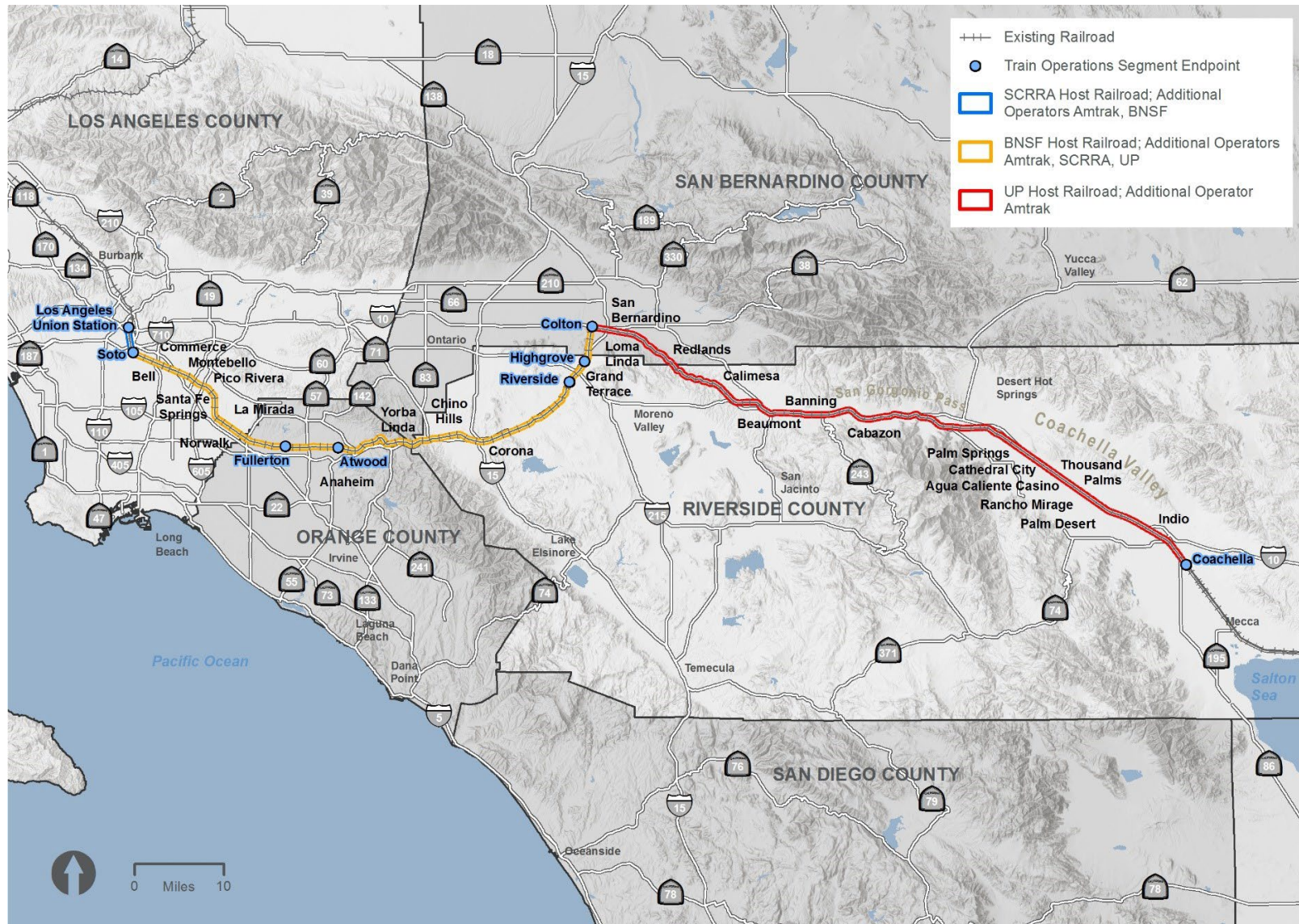
Notes:

LAUS=Los Angeles Union Station; SCRRA=Southern California Regional Rail Authority; UP=Union Pacific Railroad

Figure 6-1 shows the passenger rail corridor, delineated by host railroad and tenant operators.

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Figure 6-1. Host Railroads and Additional Operators Within the Coachella Valley-San Geronio Pass Rail Corridor



Source: RCTC 2020

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The current maximum authorized speed and method of operation (movement authority) of each subdivision in the Corridor is detailed in Table 6-2. At present, the maximum authorized passenger train speed in the Corridor is 79 miles per hour, according to railroad operating rules currently in effect. 49 Code of Federal Regulations Part 236.0 limits maximum passenger train speeds to 59 miles per hour on lines not equipped with signals and 79 miles per hour on lines equipped with signals but not equipped with automatic cab signaling, automatic train stop, or an automatic train control system to stop a train in the event of a signal override. The method of operation on all sections of the Corridor is CTC. As of January 1, 2020, positive train control had been implemented on all sections of the Corridor.

Table 6-2. General Operating Characteristics of the Coachella Valley Rail Corridor

Railroad	Subdivision	Endpoints	Approximate Miles	Method of Operation	Main Tracks	Main Line Maximum Authorized Speed (mph)
UP	Yuma	Coachella-Colton	76	CTC	2	79 (Passenger) 70 (Freight)
BNSF	San Bernardino	Colton-Soto	63	CTC	2-3	60 (Passenger) (Colton-Fullerton) 79 (Passenger) (Fullerton-Soto) 50 (Freight)
SCRRA	River	Soto-LAUS	5	CTC	2	79 (Passenger) 40 (Freight)

Notes:

CTC=centralized traffic control; LAUS=Los Angeles Union Station; SCRRA=Southern California Regional Rail Authority; UP=Union Pacific Railroad

Certain sections of the Corridor have operating speeds reduced from these maximums owing to track geometry constraints or operating characteristics. For example, the Mount Vernon connection track between the UP and BNSF main lines at Colton, California, has a maximum authorized track speed of 20 miles per hour because of geometric constraints such as curvature, the track's constrained geography, and complex freight activity.

The Corridor's western terminus is LAUS, which is located in downtown Los Angeles and is the hub station for Amtrak's intercity and long-distance passenger rail services and Metrolink's commuter rail service. The station is also served by Metro's heavy rail and light rail rapid-transit system, Metro's bus system, Amtrak Thruway buses, other municipal bus operators, and a direct link to Los Angeles International Airport via the FlyAway Express Bus. LAUS is also a proposed station for the California high-speed rail system.

A new train station would be required at the Corridor's eastern terminus in the City of Coachella, as there is no existing train station there to accommodate the proposed service.

6.1.2 Agreements Governing Western Section Train Frequency Increases

Infrastructure estimates and rail operations impact assessments are not required for the Western Section of the Corridor between Soto interlocking (Milepost [MP] 144.4) in Los Angeles (Soto) and Colton. Under an existing Shared Use Agreement between RCTC and BNSF, the train slot capacity for the Project is already in place between Los Angeles and Colton. Similarly, impacts on rail operations and improvements to accommodate the Project between Soto and LAUS are not analyzed because they are being accommodated within the capacity improvements currently planned in the Link Union Station Project. As a result of these agreements, operational simulations were not required by the Project for the Western Section of the Corridor between LAUS and Colton.

6.1.3 Characteristics of the Eastern Section of the Corridor

The operations simulation analyses conducted for the Project and described in this chapter were performed on the Eastern Section between Colton and Coachella. This section describes the characteristics of the Eastern Section of the Corridor. The modeled territory developed for the Project's operations simulation work consisted of the Eastern Section as well contiguous sections of UP trackage used by intercity passenger, commuter, and freight trains (see Section 6.2.2 for a definition of the modeled territory's limits).

Operations

The Eastern Section of the Corridor (the UP Yuma Subdivision) is a high-density, double-track freight train route. This subdivision carries UP's long-haul intermodal, automotive, bulk, and manifest freight traffic destined to and from major terminals in Southern California, including the Ports of Los Angeles and Long Beach. The UP Yuma Subdivision is part of UP's Sunset Route between Los Angeles and El Paso, Texas, which links Southern California with major population and manufacturing centers in the Midwest, Southwest, and Gulf Coast, as well as gateways to the Eastern U.S. and Mexico.

The current service levels in the Eastern Section are summarized below:

- Current traffic averages 42 freight trains per day (Caltrans 2018). However, freight train volumes have substantial variability associated with vessel calls at the ports, customer requirements, day of week, and import-export fluctuations.
- One Amtrak long-distance passenger train, the Sunset Limited, operates the entire length of the Eastern Section 3 days per week in each direction. This train, which runs between Los Angeles and New Orleans, makes one station stop within the Corridor at Palm Springs.

Existing Intercity Passenger Rail Stations

The Eastern Section of the Corridor has one existing intercity passenger rail station with a platform and facilities that are anticipated to be used for the proposed passenger rail service. The station facility consists of a low-level platform approximately 850 long, a station track approximately 1.1 mile long running south of, and adjacent to, the two main tracks with a powered turnout at each end connecting to Main Track 2, an open-air shelter with a roof, a mini-high platform to facilitate level boarding, a 40-space parking lot, 10 bus bays, and 6 drop off/pick up spaces.¹⁴

¹⁴ Based off Google aerial imagery of Palm Springs station (Google Maps 2015).

Operating Conditions

The Eastern Section has several localized operating conditions that governed the infrastructure solutions proposed to implement passenger service on the Corridor.

Union Pacific/BNSF Colton Connector

UP's Yuma Subdivision and BNSF's San Bernardino Subdivision cross each other in Colton, California, in San Bernardino County, approximately 7 miles north of the Riverside passenger station. The intersection was originally built as an at-grade crossing in 1883, when the Santa Fe Railway built across the Southern Pacific's main line and constructed a tower to regulate traffic through the crossing. After more than a century of economic growth and associated increases in freight volumes, train traffic across the diamond grew to an average of 125 trains per day, creating what the USDOT labeled as the oldest bottleneck in U.S. history (American Society of Civil Engineers 2014). In 2013, a new grade-separated crossing was completed that carried UP's Yuma Subdivision on an elevated, 8,150-foot-long flyover structure 35 feet above BNSF's San Bernardino Subdivision. The structure eliminated the delays to the through main line freight, passenger, and commuter movements for both railroads.

However, Colton is also used an entry/exit location for UP trains operating between Los Angeles and the U.S. interior on a routing that uses UP's Los Angeles Subdivision from Los Angeles to Riverside, BNSF's San Bernardino Subdivision from Riverside to Colton (over which UP has trackage rights), and UP's Yuma Subdivision from Colton east. Trains moving between BNSF's San Bernardino Subdivision and UP's Yuma Subdivision use an existing single-track connector in the southeast quadrant of the Colton Crossing, known as the Mount Vernon connection track.

The maximum authorized speed on the Mount Vernon connection track is 20 miles per hour. Freight trains can also experience delays or congestion at Colton, where trains may be held on or near the Mount Vernon connection track to wait for authority to enter BNSF's San Bernardino Subdivision. The West Colton Yard, just west of the Colton Crossing on UP's Alhambra Subdivision, is UP's principal classification yard for manifest trains in Southern California, as well as a crew change point for most freight trains that pass by. On days of heavy freight train traffic, one of the two main tracks on the Yuma Subdivision may be occupied east of Colton by freight trains waiting for an open track in West Colton Yard.

San Gorgonio Pass (Beaumont Hill)

Like all other railroad lines linking Southern California with the U.S. interior, UP's Yuma Subdivision must cross the range of mountains that rings the Los Angeles Basin. The Yuma Subdivision's mountain crossing is through San Gorgonio Pass, wedged between the San Bernardino Mountains to the north and the San Jacinto Mountains to the south. Railroaders refer to the mountain crossing as Beaumont Hill. Eastbound trains from Colton ascend the pass following San Timoteo Creek through the narrow San Timoteo Canyon, where grades are as steep as 2 percent and the rail line twists and turns through a succession of S-curves. Westbound trains ascend the pass in a desert-like landscape, where curves are gentler, but the grades are just as steep.

There is no part of the Corridor's Eastern Section that is not on a grade. Eastbound trains from Colton have a 1.9 percent climb for more than 20 miles to reach the summit, passing through San Timoteo Canyon. Westbound trains face a climb 50 miles long, beginning from an elevation below sea level at Indio and Coachella, on a grade that increases to 2.12 percent before cresting the summit of the pass at an elevation of 2,591 feet just east of Beaumont, California. The combination of steep grades on

either side of the pass and the sustained upgrade climb for westbound trains and resulting lower operating speeds generates a substantial loss of capacity compared with a double track main line without heavy grades.

A reduction of curvature or gradient on much of the Yuma Subdivision would be costly, owing to the adjacent canyon terrain and surrounding urban development. However, in 1956 and 1957, portions of second main line track were built on each side of the San Geronio Pass, adding capacity. By 1978, the west slope from Colton to Beaumont was fully double tracked. The longer east slope from Coachella to Beaumont was not completely double-tracked until 2009, as part of a UP initiative begun in the early 2000s to fully double-track 760 miles of the Sunset Route between West Colton and El Paso to handle projected increases in freight volumes, particularly intermodal traffic. Less than one quarter of the line between West Colton and El Paso had a second main line track when UP acquired the Sunset Route in 1996 with its purchase of the Southern Pacific Railroad; by the end of 2015, approximately 80 percent of the route had two main line tracks.

The sustained heavy mountain grades in each direction require both passenger and freight trains to operate at slower authorized speeds than the maximum allowable on the subdivision and also create significant differentials in operating speed between passenger and freight trains. Table 6-3 summarizes the maximum authorized passenger and freight train speeds by MP in the Corridor's Eastern Section.¹⁵ Passenger trains have a maximum authorized speed ranging between 40 and 79 miles per hour; however, in many sections, the operating speed that a passenger train could actually attain is less, owing to the subdivision's grades and curves, time required for acceleration and braking as speed limits change, and time allotted for the station stop at Palm Springs. Freight trains have maximum authorized speeds ranging between 35 and 70 miles per hour, although most freight trains operate at much lower maximum speeds on account of the line's steep grades and curves.

Table 6-3. Eastern Section Maximum Speeds by Milepost

MP Limits	Approximate Miles	Maximum Passenger Speed (mph)	Maximum Freight Speed (mph)	Passenger/Freight Speed Differential
539.9 (Mount Vernon) – 544.3	4.4	60	40	20
544.3 – 545.3	1.0	55	40	15
545.3 – 548.2 (Ordway)	2.9	50	40	10
548.2 – 554.8	6.6	40 – Track 2 45 – Track 1	35 – Track 2 40 – Track 1	5
554.8 – 560.2	5.4	60	40	20
560.2 – 562.9 (approximate summit of pass)	2.7	40 – Track 2 50 – Track 1	35 – Track 2 40 – Track 1	5 10

¹⁵ Information about all Union Pacific Railroad (UP) track speeds, gradients, terminal locations, mileages, and signaling in the Eastern Section of the Corridor have come from the UP Yuma Subdivision employee timetable, dated October 28, 2013 (UP 2013).

Table 6-3. Eastern Section Maximum Speeds by Milepost

MP Limits	Approximate Miles	Maximum Passenger Speed (mph)	Maximum Freight Speed (mph)	Passenger/Freight Speed Differential
562.9 – 576.6	13.7	60	40	20
576.6 – 589.5 (Garnet)	12.9	50	40	10
589.5 – 615.0 (Coachella)	25.5	79	70	9

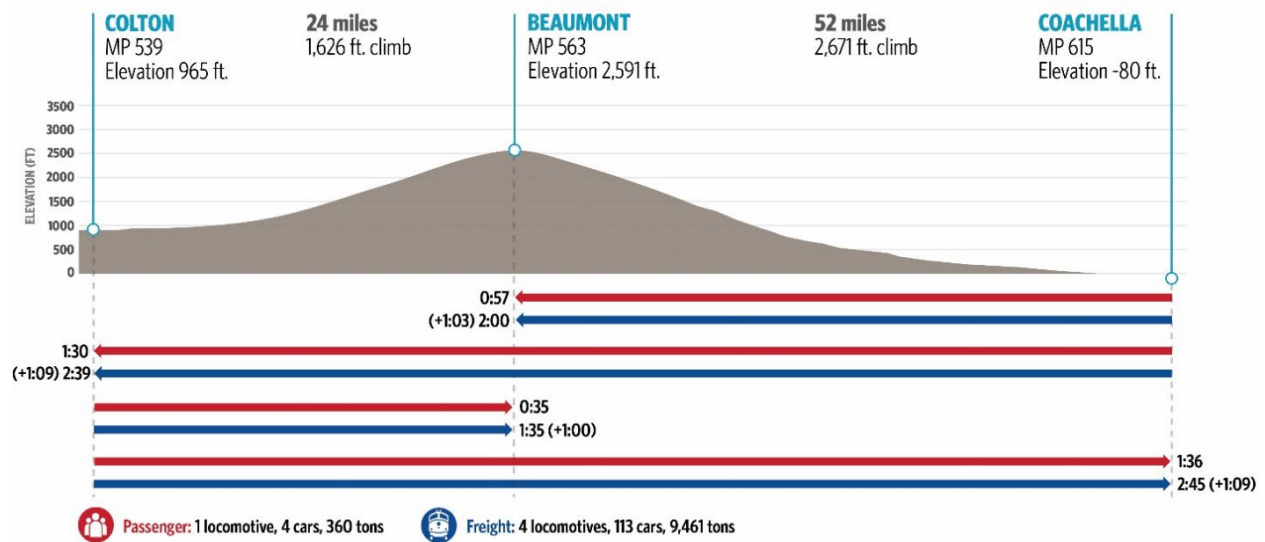
Notes:

MP=milepost

Table 6-3 shows the widest differential (20 miles per hour) between maximum authorized passenger train and freight train speeds in the Eastern Section of the Corridor is in effect on segments totaling approximately 23.5 miles, or nearly one-third of the entire Eastern Section.

However, as a result of the mountain grades in each direction leading to the summit at Beaumont, actual train speeds are typically much lower than the maximum authorized limit, and the differential is much wider. Figure 6-2 depicts the running time results of trips made in the RTC model by a prototype UP freight train and a proposed Coachella Valley passenger train consist, operating in each direction between Colton and Coachella. The prototype freight train has 4 locomotives and 113 cars, with a total weight of 9,461 tons. In these modeled simulations, both the Coachella Valley passenger train and the freight train made a trip in each direction between Colton and Coachella without any enroute stops or delays to compare run times between the train types.

Figure 6-2. Rail Traffic Controller Running Times of Passenger and Freight Trains in the Eastern Section



As seen on Figure 6-2, the freight train has a running time in each direction between Colton and Coachella that is 1 hour and 9 minutes longer than the passenger train, owing to the slower speed of the freight trains on the heavy grades approaching Beaumont. Across the full 76-mile Eastern Section between Colton and Coachella:

- The average speed of the westbound passenger train was 50.7 miles per hour, and the average speed of the westbound freight train was 28.7 miles per hour, which results in a speed differential of 22.0 miles per hour between the two types.
- The average speed of the eastbound passenger train was 47.5 miles per hour, and the average speed of the eastbound freight train was 27.6 miles per hour, which results in a speed differential of 19.9 miles per hour between the two types.

The climb for westbound trains begins east of Coachella in the Salton Sink, a geographic depression in the Colorado Desert where UP's Yuma Subdivision, at more than 200 feet below sea level, reaches the lowest surface point of any railroad in North America. Both Coachella and Indio are below sea level. Westbound passenger trains originating at either terminus would begin their revenue trip on the Corridor on the ascending grade. The portion of the line between Coachella and Garnet interlocking, the east end of the Palm Springs station track, has a sustained westbound climb with grades ranging between 0.1 and 1.1 percent. In the 26 miles between Coachella and Garnet, westbound trains climb approximately 705 feet. Westward from Garnet, the grade becomes nearly twice as steep or more at most locations, reaching a maximum of 2.12 percent near Robertson (MP 571.8). In the 26 miles between Garnet and Coachella, westbound trains climb 1,966 feet to reach the summit of the pass at Beaumont.

Across the 52-mile westbound ascent from Coachella to Beaumont:

- The westbound passenger train had a running time that was 1 hour, 3 minutes longer than the passenger train.
- The average speed of the westbound passenger train was 60.0 miles per hour, and the average speed of the westbound freight train was 26.0 miles per hour, which results in a speed differential of 34.0 miles per hour between the two train types.

The eastbound ascent from Colton to Beaumont is shorter in miles but has no transition from gentle to severe grades, similar to the westbound climb. At Bryn Mawr, 3 miles from the Yuma Subdivision western entry point, the eastbound ruling grade of 1.9 percent begins and increases to 1.97 percent from Hinda to the summit at Beaumont. In the 24 miles from Colton to Beaumont, eastbound trains climb 1,626 feet.

Across the 24-mile eastbound ascent from Coachella to Beaumont:

- The eastbound passenger train had a running time that was 60 minutes longer than the passenger train.
- The average speed of the eastbound passenger train was 41.2 miles per hour, and the average speed of the eastbound freight train was 15.2 miles per hour, which results in a speed differential of 26.0 miles per hour between the two train types.
- The steep grades on each side of the pass and resulting lower operating speeds generates a substantial loss of capacity compared with a double track main line without heavy grades.

6.2 Operating Plan and Timetables

This section presents the conceptual intercity passenger train frequencies, station stops, standard train consist, and timetables developed for the proposed implementation of scheduled passenger rail service over the approximately 144-mile Corridor.

6.2.1 Service Frequency and Rationale

The proposed Coachella Valley intercity passenger rail service is intended to serve a range of trip purposes for travel between the Los Angeles Basin and the Coachella Valley, including business, social, medical, leisure, and recreational trips.

The passenger-train service frequency determined to best meet the Project's Purpose and Need was established as two daily round trips, with one morning departure and one afternoon departure from each end of the Corridor. This frequency was determined based on a ridership forecasting model service optimization analysis (described in Section 7.3.2 of the 2016 AA Report), which found that two round trips with morning and afternoon departures would attract the greatest number of riders per train.

6.2.2 Performance Objectives

Providing convenient, reliable, and competitive travel times are Project objectives. The passenger trains are proposed to operate at 79 miles per hour as track geometric conditions allow, which is the maximum allowable speed for passenger trains in the Corridor. Operations at this speed could result in scheduled one-way travel times between downtown Los Angeles and Coachella of approximately 180 to 200 minutes. Section 6.2.4 presents a conceptual timetable for the proposed service.

For the purposes of the Tier 1 EIS/EIR and SDP, Amtrak is assumed to be the operator of the Coachella Valley service. Amtrak is unique among passenger rail operators in that Amtrak has statutory rights (under 49 USC 24308) to operate over host railroads to include:

- Access to any rail line in the US.
- Use of host railroad facilities.
- Payments based on host's incremental cost.
- Amtrak preference over freight transportation.
- Additional trains.
- Accelerated speeds.

The analytical assumptions and decisions in both Tier 1 EIS/EIR and SDP were developed with the assumption that Amtrak would serve as the Project's service operator, but this assumption does not commit Caltrans and RCTC to select Amtrak as the service operator. If Caltrans and RCTC decide to utilize a different operator, the assumptions and decisions made in both the Tier 1 EIS/EIR and SDP will need to be reevaluated. Prior to implementation of service, Caltrans and the Project sponsors will need to evaluate and determine the best service provider arrangement. This issue is discussed further in Chapter 14.

Performance objectives were developed for the Project, targeting an endpoint on-time performance of 90 percent and an all-stations on-time performance of 90 percent for the proposed passenger trains, in compliance with federal and state on-time performance metrics in effect at the time the goals were

established, per FRA's "Metrics and Standards for Intercity Passenger Rail Service" developed under Section 207 of PRIIA and published in the *Federal Register* on May 12, 2010 (FRA 2010), and the Uniform Performance Standards for intercity passenger trains established by the CalSTA on July 1, 2014. Under the definition of on time established based on federal and state metrics, intercity passenger trains in the Corridor would have an endpoint on-time performance variance (late tolerance) of 10 minutes and an all-stations on-time performance variance of 15 minutes. For freight trains the performance objective was considered achieved if the modeling indicated no increase in freight train delay compared to the equivalent year's no build case.

Since the conclusion of the operations modeling work, FRA issued a final rule in November 2020 that established revised metrics and service standards for measuring the on-time performance of intercity passenger trains. Under the FRA's final rule, on-time performance will be measured using a customer on-time performance metric, which will measure the percentage of intercity rail passengers who arrive at their detraining point, including intermediate stations, no later than 15 minutes after the published scheduled arrival time. The final rule sets an on-time minimum performance standard of 80 percent for any two consecutive calendar quarters and requires Amtrak and its host railroads to certify Amtrak intercity passenger train schedules. Performance measuring under the final standards will take effect on the first full calendar quarter after May 17, 2021.

6.2.3 Equipment Consist Assumptions

For planning purposes, a proposed future train consist for the Coachella Valley intercity passenger rail service was developed. Specific car types or models have not yet been determined, but the equipment assumptions presented in Table 6-4 were applied for the Project's service development planning and operations modeling simulations. An on-board passenger estimate for each trainset was assumed for the duration of each scheduled run, based on ridership projections developed for the Project's 2016 AA Report.

The proposed Coachella Valley consist uses bilevel equipment and locomotives identical to the Pacific Surfliner trains currently providing state-supported intercity passenger service on regional routes serving LAUS. Passenger trains would operate in a push-pull configuration, with a locomotive at one end of the train and a cab car at the other, eliminating the need to turn trainsets at the end of each trip. The end car of each trainset is a cab car equipped with an operating cab for the engineer to operate the train when the locomotive is running in the push mode.

The proposed four-car bilevel consist, interoperable with existing locomotive-hauled Pacific Surfliner trainsets, is presumed to provide sufficient ability to deliver the passenger rail service proposed by the Project and accommodate the forecasted ridership volumes.

Table 6-4. Proposed Coachella Valley Intercity Passenger Train Consist

Equipment Type	Equipment Length (feet)	Units per Trainset
Siemens SC-44 "Charger" diesel locomotive	71.5	1
Pacific Surfliner Business Class (77 revenue seats)	85	1
Pacific Surfliner Coach Café (72 revenue seats)	85	1
Pacific Surfliner Coach (90 revenue seats)	85	1

Table 6-4. Proposed Coachella Valley Intercity Passenger Train Consist

Equipment Type	Equipment Length (feet)	Units per Trainset
Pacific Surfliner Cab Coach Baggage Car (84 revenue seats)	85	1
Total	411.5	1 locomotive, 4 cars
Consist characteristics	Dimensions	
Revenue seating capacity of trainset	323	
Estimated patrons/crew on board	200*	
Train weight	360 tons (approx.)	

Notes:

* Patrons/crew on board projection based on 2044 ridership forecast presented in the Project's 2016 AA Report.
AA=Alternatives Analysis

Beginning in 2018, new SC-44 model Charger diesel locomotives were placed into service as the motive power for the Pacific Surfliner trains. The Chargers were built by Siemens in Sacramento, California, part of a state order for 14 new environmentally friendly Tier IV emissions certified passenger locomotives, replacing the Amtrak-owned F59PHI model locomotives built in 1998 (LOSSAN 2018). However, for the Coachella Valley operations simulation modeling, the P42 model passenger locomotive built by General Electric was selected as the motive power for the Project's prototype intercity passenger train, owing to a lack of sufficient real-world performance data for the Siemens Charger locomotive, which precluded the development of performance characteristics for a Charger locomotive in the RTC operations simulation software. Based on some preliminary performance for the Charger locomotive provided by FRA and work with RTC software developer Berkeley Simulation Software, LLC, it was determined that the existing intercity passenger locomotive RTC model that contained acceleration and braking characteristics most similar to the Charger, based on the preliminary data provided, was the General Electric P42 locomotive.

6.2.4 Conceptual Timetable Development for Passenger Trains in the Model

For planning and operations modeling purposes, conceptual train schedules were developed for each intercity passenger train proposed to operate in the Coachella Valley Corridor between LAUS and Coachella. Train schedule development for the proposed Project occurred in two steps. In the first step, train performance calculations (TPC) were generated to develop a pure running time (a pure running time is an unimpeded running time). These TPCs were used in the second step to develop conceptual passenger train schedules for each frequency.

Train Performance Calculation Estimates

Once the train consist was specified, running time estimates were made using the TPC feature of RTC operations simulation model. TPC estimates were developed for the entire Corridor between Coachella and LAUS. A TPC estimates a pure running time unaffected by variables that are typically applied to a passenger train schedule, such as station dwells of variable duration and recovery time

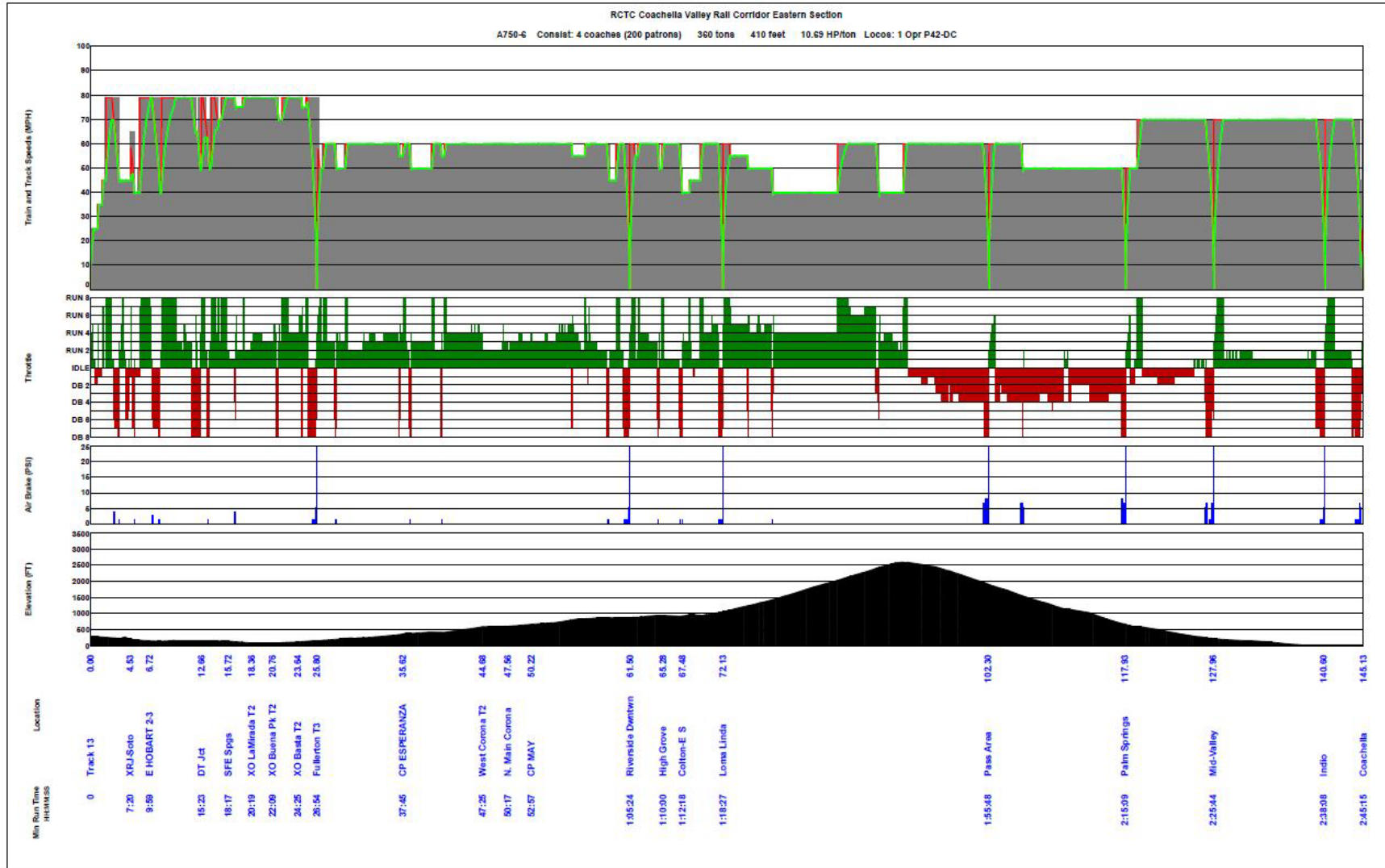
of variable percentage at specified locations in a train's trip. The TPCs also are unimpeded running times; no allowance is made within them for train meets or delays caused by other trains or less-than-ideal track conditions; however, passenger train braking and acceleration for station stops were recorded.

The TPC estimates were based on rail alignments, curves, distances, and maximum speeds provided by the Project's engineering team to account for infrastructure improvements proposed for the Build Alternative options. Eastbound and westbound runs were recorded. A 1-second dwell time was used for modeling all station stops (actual dwells were incorporated in the schedule development phase), for the purposes of generating the TPC running time estimate

Build Alternative Option 1/Preferred Alternative Speed Profiles

Using RTC's TPC function, speed profiles were developed to calculate the running times of trains between Los Angeles and Coachella under the service plan and infrastructure configuration evaluated in the Tier 1/Program EIS/EIR as Build Alternative Option 1/Preferred Alternative. Speed profiles were developed with the assumption of a standard, four-car bilevel trainset with one P42 locomotive operating eastbound and westbound. Figure 6-3 and Figure 6-4 show the speed profiles of trains between Los Angeles and Coachella in the Preferred Alternative's service and infrastructure configuration, with six stations east of Colton and an eastern Corridor terminus at Coachella.

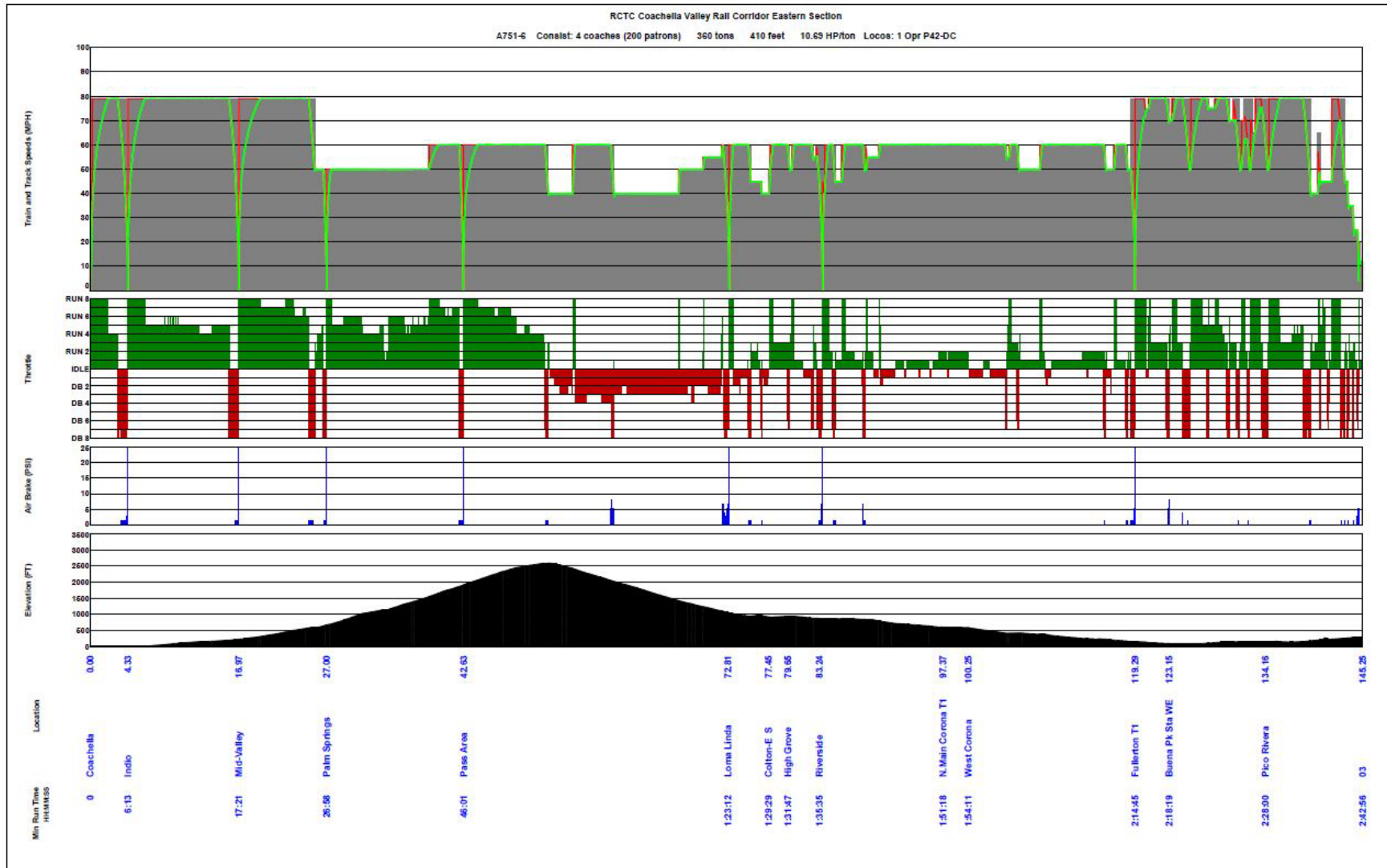
Figure 6-3. Speed Profile Eastbound: Six Stations East of Colton with an Eastern Terminus at Coachella – Tier 1/Program EIS/EIR Preferred Alternative



Case: BUILD_3TRACK_INFRA RTC run: 23 May 2019 10:42:13 User: Kevin Johns of HDR Engineering, Inc.

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Figure 6-4. Speed Profile Westbound: Six Stations East of Colton with an Eastern Terminus at Coachella – Tier 1/Program EIS/EIR Preferred Alternative



Case: BUILD_3TRACK_INFRA RTC run: 23 May 2019 10:43:42 User: Kevin Johns of HDR Engineering, Inc.

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Eastbound trains between LAUS and Coachella making six station stops east of Colton with a standard, four-car bilevel trainset with one P42 locomotive recorded a pure running time of 2 hours, 45 minutes, and 15 seconds in the RTC software's TPC function, and westbound trains recorded a pure running time of 2 hours, 42 minutes, 56 seconds.

Conceptual Timetable Development

Once the TPC estimates were completed, conceptual schedules were developed for each intercity passenger train. The train schedules combined a TPC-based timetable building approach for trip times in the Eastern Section from Indio or Coachella to Riverside, with the predetermined station arrival times provided by BNSF under a previously conducted corridor study (the pulsed schedule study) for trip times in the Western Section from Riverside to Los Angeles. Under the proposed service plan, intercity passenger trains would operate daily, making two round trips, with morning and afternoon departures from each end of the Corridor. This frequency was determined based on a ridership forecasting model and service optimization analysis, which found that two round trips per day, with a mid-morning and mid-afternoon departure from each originating terminal, would attract the greatest number of riders per train. Using the BNSF-provided arrival times at Riverside for all proposed eastbound and westbound intercity passenger trains, train schedules were extended eastward to Indio or Coachella. No crew changes or enroute locomotive refueling is assumed, so no additional dwell time was included in the train schedules for these activities.

Eastern Section Timetable Development

Using the TPC estimates, recovery time was added to the overall trip time calculations. For each train, 8 percent of the estimated running time between Riverside and Coachella or Indio was added as recovery time for each train in each direction. Recovery time was distributed throughout each train's proposed trip to better enable trains to achieve their all-stations on-time performance target of 90 percent.

Station dwell times were also determined for each train's schedule and incorporated into the development of the conceptual train schedules. Dwell times of 1 minute were added at all intermediate station stops between Riverside and Coachella or Indio, except for Palm Springs, where a dwell time of 2 minutes was added, to account for the higher passenger loadings estimated there.

Western Section Timetable Development

Slot times in the Western Section of the Corridor between Colton and LAUS were provided by BNSF to develop conceptual schedules for the proposed Coachella Valley intercity passenger trains. These slot times were also provided to the Link Union Station Project team for comment. The slot times provided by BNSF for the proposed Coachella Valley intercity passenger trains were developed as part of the pulsed schedule study that BNSF and SMA Rail Consulting developed for the BNSF San Bernardino Subdivision and the LOSSAN south corridor, to optimize the use of rail capacity in the corridor by multiple train operators and services. Travel times between Los Angeles and Colton provided by BNSF for the Coachella Valley passenger trains are those used in the pulsed schedule study and assume that infrastructure improvements have been implemented to accommodate the introduction of California High-Speed Rail Authority passenger service, as well as planned increases to Amtrak Pacific Surfliner intercity passenger service and Metrolink commuter service in the Western Section of the Corridor. Specific slots on the San Bernardino Subdivision were then selected for the two round-trip Coachella Valley passenger trains that included arrival and departure times at LAUS within the optimal morning and afternoon windows identified by the ridership analysis.

Conceptual Train Schedules

Table 6-5 presents the proposed conceptual passenger train schedules for the Preferred Alternative service option (evaluated as Build Alternative Option 1 in the Tier 1/Program EIS/EIR), with six station stops east of Colton and an eastern Corridor terminus at Coachella.

Table 6-5. Conceptual Passenger Train Schedule for the Project's Preferred Alternative

AM Westbound (read down) ▼	PM Westbound (read down) ▼	Miles	Station Stops	Miles	AM Eastbound (read up) ▲	PM Eastbound (read up) ▲
9:25 AM	3:25 PM	0	Coachella, California	144	1:38 PM	6:38 PM
9:32 AM	3:32 PM	4	Indio, California	140	1:30 PM	6:30 PM
9:45 AM	3:45 PM	17	Mid-Valley-Rancho Mirage, California	127	1:14 PM	6:14 PM
9:59 AM	3:59 PM	27	Palm Springs, California	117	1:02 PM	6:02 PM
10:20 AM	4:20 PM	43	Pass Area-Cabazon, California	101	12:38 PM	5:38 PM
10:59 AM	4:59 PM	73	Loma Linda/Redlands, California	71	11:59 AM	4:59 PM
11:12 AM	5:12 PM	76	Colton, California (UP/BNSF)	68	11:47 AM	4:47 PM
11:22 AM	5:22 PM	82	Riverside, California	62	11:39 AM	4:39 PM
12:06 PM	6:06 PM	118	Fullerton, California	26	10:55 AM	3:55 PM
12:40 PM	6:40 PM	144	Los Angeles, California	0	10:20 AM	3:20 PM
3:15	3:15		Trip Time (Coachella-Los Angeles)		3:18	3:18

Notes:

UP=Union Pacific Railroad

Note that the conceptual passenger train schedules presented above were developed for operations modeling and planning purposes only and do not represent a service commitment from stakeholders. Scheduling assumptions have been made to show potential train frequencies and trip times, but those assumptions may be modified in the future to optimize fleet size and Project cost, incorporate updates to the planned pulsed schedule operations in the Western Section of the Corridor, or conduct additional service planning and evaluation using more detailed and complete information based on the 2018 CSRP.

Under the conceptual train schedules prepared, the proposed passenger trains had one-way travel times between Los Angeles and Indio or Coachella of approximately 195 to 200 minutes, which were considered competitive with the personal automobile, commercial bus, and airline service, all of which have a lower travel reliability because of inclement weather and highway traffic congestion.

6.3 Operations Simulation Modeling

Computer-based operations simulations (also known as operations modeling) were conducted to estimate rail performance in the Corridor. Results from the simulations were used to estimate if alternatives analyzed in the Tier 1/Program EIS/EIR would provide the adequate infrastructure capacity and service performance necessary to meet the Purpose and Need of the Project and to inform the SDP's conceptual engineering and service development planning. The simulations were developed in 2017 and performed in 2018 and 2019. The operations simulation modeling software used for the Project was the RTC software developed and licensed by Berkeley Simulation Software, LLC. The operations simulations were developed in coordination with host railroads UP, BNSF, and Metro, and the regional intercity passenger rail JPA LOSSAN Rail Corridor Agency. Appendix B of the SDP (Operations Modeling Analysis for Passenger Rail Service Implementation) contains detailed information about the modeling methodology, service and infrastructure options, assumptions, and performance results associated with the simulations carried out for the Project. This section summarizes results from simulations evaluating the Preferred Alternative identified in the Tier 1/Program EIS/EIR.

6.3.1 Geographic Limits of the Simulations

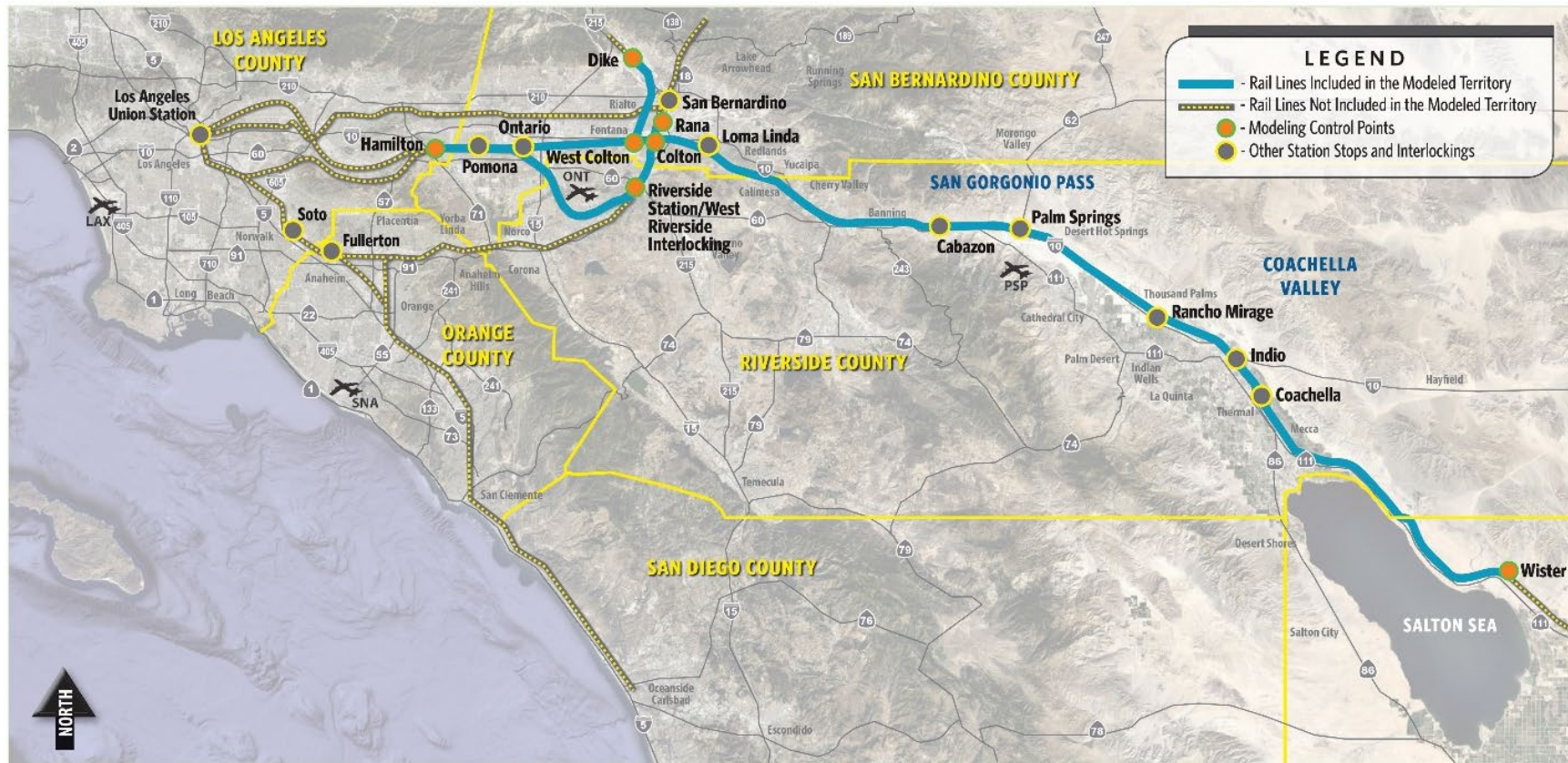
The geographic limits of the modeled rail network assessed with the simulations were established to capture potential effects on capacity and velocity of existing and future freight and passenger operations associated with changes to infrastructure and service, both within and immediately outside of the proposed Corridor. The limits were established in discussion with UP and BNSF to estimate the effects of the proposed passenger service in the Eastern Section of the Corridor on the UP network, where additional infrastructure would be required to deliver the proposed service. The modeled territory incorporated the following track segments (Figure 6-5):

- The UP Yuma Subdivision, from the Wister Crossovers interlocking at MP 658.0 (CP SP658) in the unincorporated community of Wister in Imperial County west to the Rancho interlocking at MP 538.2 (CP SP538) in Colton an approximate distance of 119.8 miles.
- The UP Alhambra Subdivision, from the Rancho interlocking at MP 538.2 (CP SP538) in Colton to the Hamilton interlocking at MP 513.7 (CP AL514) in Pomona, an approximate distance of 23.6 miles.
- The UP Los Angeles Subdivision, from the Riverside interlocking at MP 56.6 (CP C057) in Riverside, to the Hamilton interlocking at MP 31.2 (CP AL514) in Pomona, an approximate distance of 25.4 miles.
- The UP Mojave Subdivision, from the north switch of Dike siding at MP 480.2 (CP SP480) near Keenbrook, to the Pepper interlocking at 492.1 (CP SP535) in Colton and the Rancho interlocking at MP 492.7 (CP SP538) in Colton, an approximate distance of 12.5 miles.
- The BNSF San Bernardino Subdivision, from the Rana interlocking at MP 2.2 in Colton, to the West Riverside interlocking at MP 10.6 in Riverside, an approximate distance of 8.4 miles. This segment of track was modeled only with trains entering and exiting the UP Yuma Subdivision at Colton. Other operations on the BNSF San Bernardino Subdivision were not modeled because they are being accommodated within the capacity improvements currently planned between Los Angeles and Colton under the existing Shared Use Agreement between RCTC and BNSF.

- Major yards within the limits of the RTC modeled territory are:
 - UP West Colton Yard, located on the UP Alhambra Subdivision
 - UP Old Colton Yard, located on the UP Yuma Subdivision

Figure 6-5 illustrates the geographic extent of the modeled territory, as well as the section of the Corridor not modeled and other passenger and commuter lines in Southern California. This figure also shows representative station locations developed for study purposes only in each potential station area of the proposed Corridor.

Figure 6-5. Geographic Extent of Modeled Territory



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The portion of BNSF's San Bernardino Subdivision within the modeled territory, between Riverside and Colton, was only modeled for proposed Corridor passenger movements and existing and projected UP freight train movements between the BNSF San Bernardino Sub and the Yuma Subdivision at Colton or the Los Angeles Subdivision at Riverside. No freight data was received from BNSF for this line segment.

Rail Lines Not Included in the Modeled Territory

Operations simulation modeling was not performed for the Project in the Western Section of the Corridor between Colton and Soto. This work has already been performed by BNSF and Metrolink, and the capacity, timetable slots, and guaranteed service performance of the Coachella Valley intercity passenger service is already in place for the proposed service. This section of the Corridor has a Shared Use Agreement between RCTC and BNSF governing planned infrastructure improvements to accommodate passenger service increases, including those proposed for the Corridor service, and as such, was considered part of the No Build Alternative in the Tier 1/Program EIS/EIR and for the purposes of the operations modeling work and the SDP. Rights to operate the projected service are contractually obligated by BNSF to RCTC, and infrastructure sufficient to support the Project has been planned for or constructed to allow for implementation of the service. RCTC has the ability to commit four available train slots between LAUS and Colton to the proposed passenger rail service without constructing additional rail capacity improvement projects in the Western Section; however, if the proposed passenger rail service does not occur, RCTC also has the ability to commit these slots to other intercity passenger or commuter rail services in the Western Section. Capacity improvement projects currently planned or in construction between Los Angeles and Fullerton will provide additional passenger/commuter train slots that could be used by the proposed Coachella Valley passenger trains without an equivalent reduction in existing services. Additionally, the increase in passenger/commuter train slots realized by these projects will allow other planned passenger/commuter service improvements to advance.

Operations between Soto and LAUS were not incorporated into the simulations. LAUS is currently being evaluated by the Link Union Station Project. That project will identify infrastructure improvements required to support planned regional rail growth, including the proposed Coachella Valley intercity passenger rail service, as well as future accommodation of California high-speed rail services at LAUS, and as such was considered part of the No Build Alternative in the Tier 1/Program EIS/EIR and for the purposes of the operations modeling and SDP.

6.3.2 Implementation and Horizon Years of Project

FRA-funded passenger projects generally require that operations analysis (and specifically operations simulation) demonstrate that the proposed project incorporates sufficient infrastructure capacity to deliver the proposed passenger service for its intended schedule and intended schedule adherence, while reasonably mitigating effects of the proposed passenger service on other passenger rail services and freight services that also use the Corridor. The measurement of reasonable mitigation is typically made at the 20th year after the implementation of the proposed passenger service.

For the operations simulation modeling work performed for the Project, 3 years were selected and analyzed:

- **Base Case (Existing Operations) Year (2017):** For the purposes of calibrating the operations simulation model, the Base Case year of 2017 was selected to simulate existing operations, as operating data from UP had been compiled and was available for that year.

- **Implementation Year (2024):** A Project implementation year of 2024 was established, representing the first year that the Project would be operational.
- **Horizon Year (2044):** This year represents the conclusion of the 20-year planning horizon following the completion of the Project, established for the purposes of long-term evaluation of the proposed infrastructure improvements and service development.

2024 was set as the Project implementation year for the purposes of assessing impacts and evaluating service performance. The actual full build of infrastructure improvements and implementation of the proposed Coachella Valley intercity passenger rail service is dependent on availability of Project funding and construction staging considerations and may occur beyond 2024.

6.3.3 Train Performance Metrics

The train performance estimates of intercity passenger, freight, and commuter trains in the cases modeled were measured against the performance objectives described Section 6.2. For all cases modeled, the simulated train operations included a randomization function to represent the variable probability that some trains may not enter the Corridor on time (see Appendix B for descriptions of the randomization attributes applied). Results for each case were the calculated average from all successful seed runs per case captured from the 7-day steady-state period of operation.

Passenger Train Metrics

Intercity passenger train and commuter train performance in the simulations was measured with the following metrics:

- End-to-end (endpoint) on-time performance
- Station by station (all-stations) on-time performance
- Average trip time variance

Performance was measured for three different passenger train types:

- **Coachella Valley intercity passenger trains.** This type represents the future intercity passenger train proposed to provide state-supported intercity passenger rail service in the Corridor between LAUS and Coachella.
- **Long Distance intercity passenger trains.** This type represents the existing Long-Distance train (the Sunset Limited) currently operated by Amtrak.
- **Commuter trains.** This type represents all existing and proposed commuter trains operated by Metrolink on the Riverside Line. Metrolink 91/Perris Valley Line and Inland Empire-Orange County Line commuter trains on the BNSF San Bernardino Subdivision were not modeled because they are being accommodated within the capacity improvements currently planned between Los Angeles and Colton under the existing Shared Use Agreement between RCTC and BNSF.

Endpoint on-time performance was measured as the percentage of instances a train arrived at its endpoint terminal or endpoint measurement location at its scheduled arrival time or up to:

- 10 minutes after its scheduled arrival time for a Coachella Valley intercity passenger train
- 15 minutes after its scheduled arrival time for a long-distance intercity passenger train

- 5 minutes, 59 seconds after its scheduled arrival time for a commuter train

All-stations on-time performance for all passenger train types was measured as adherence to schedule incorporating a late tolerance of 15 minutes.

Passenger train average trip time variance measures the average minutes of passenger train trip time variance (delay) between the scheduled trip time and the actual trip time. The variance was measured for each passenger train type.

On-time performance objectives were not established for the existing Amtrak long-distance trains or Metrolink commuter trains in the operations simulations. Performance metrics were included for Amtrak long distance and Metrolink commuter trains to compare performance between No Build and Build Alternatives to estimate whether the Project will accommodate the future growth of existing and projected intercity and commuter rail services in the Corridor.

Freight Train Metrics

Freight train performance in the simulations was measured with the following metric:

- Freight train delay minutes per 100 Train-Miles by Train Type

This metric compares the simulated time a freight train took to cover its route inclusive of interactions with other trains, passenger, and freight, compared with the time the freight train would have taken to cover its route had it encountered no delays enroute. Delays enroute include events such as waits to meet or pass other trains; waits for clear track ahead; waits for signal clearances; and speed reductions caused by taking crossovers or sidings or clearing in sidings or yard tracks for other trains. Delays enroute do not include terminal and yard dwells or work events that are built into each freight train's trip plan.

Freight trains in the model were divided into the following freight train types for measurement:

- All freight trains (cumulative): The all-freight trains category is a weighted average of all freight train types in the model
- Intermodal freight train: Intermodal trains typically carry time-sensitive cargo, often on expedited schedules, and as such are often given the highest dispatching priority. Automotive trains exclusively carrying finished vehicles are also included in the Intermodal category
- Manifest freight train: Manifest trains carry a diverse array of commodities in individual carloads or small groups of cars that are batched together for movement in one train from an originating yard to common terminating locations where the cars are classified (sorted) for further movement. Manifest trains may perform pickups and setouts at intermediate yards, interchange points, or customers enroute, as required.
- Bulk freight train: Bulk trains, often called unit trains, carry one single commodity and generally originate, operate, and terminate as intact trainsets between one shipper and one receiver.

6.3.4 Train Frequency Increases in No Build Alternative

Freight train growth rates on UP for simulations in the years 2024 and 2044 were calculated from existing (2017) train volumes using a compound annual growth rate of 2.71 percent, which is the same growth rate that was applied to projected freight train increases calculated for the Colton Crossing Rail

Grade Separation Project overseen by Caltrans. This freight growth formula generated projected future freight train counts that correspond to anticipated 2040 train traffic levels depicted in Exhibit 1.14 of the 2018 CSRP. Per UP guidance, existing train lengths remained the same size in the future. Freight growth was accommodated in new, additional trains. Freight trains added into the model to account for freight growth are treated as part of the No Build Alternative as they reflect freight railroad forecast estimates that are presumed to occur regardless of whether or not the Project is implemented.

Figure 6-6 details the changes in total train frequencies on all line segments within the modeled territory. Existing train frequency is shown for the year 2017 and forecasted train frequencies for years 2024 and 2044. The volume increases shown in the illustration are fully attributable to freight train growth, as no changes to existing Amtrak Long Distance or Metrolink Commuter train frequencies were made in future year cases. As Figure 6-6 shows, freight train volumes in the 2044 simulations are essentially double of what they are in the 2017 simulations.

Figure 6-6. Trains per Day in Modeled Territory: 2017, 2024, and 2044

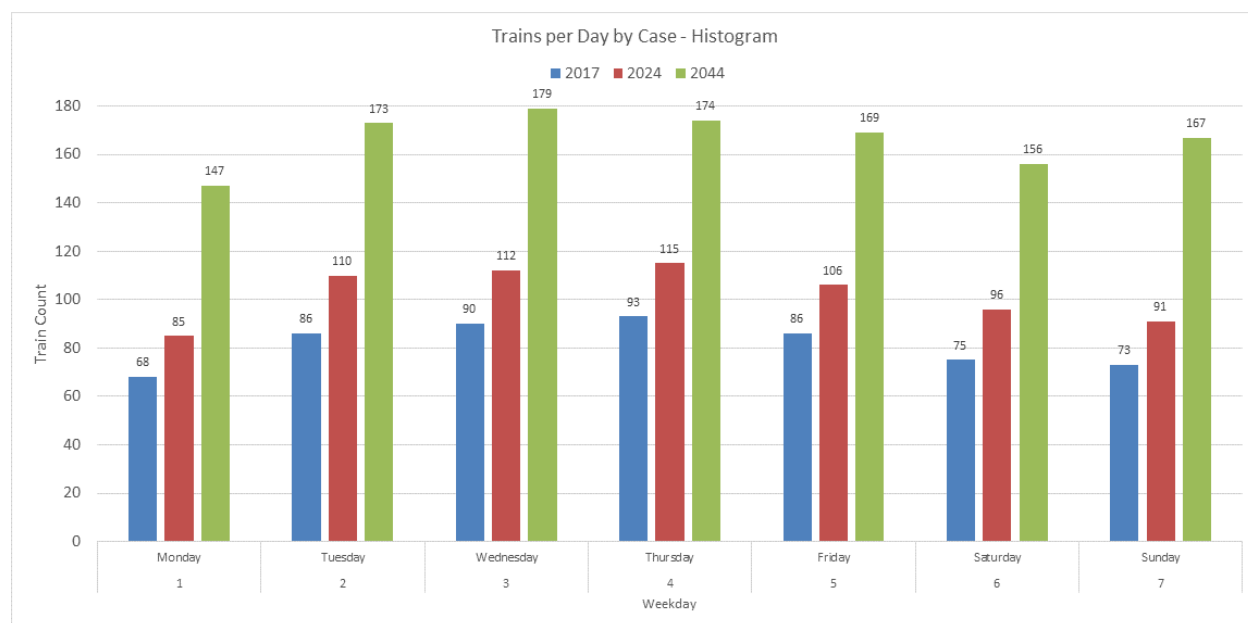


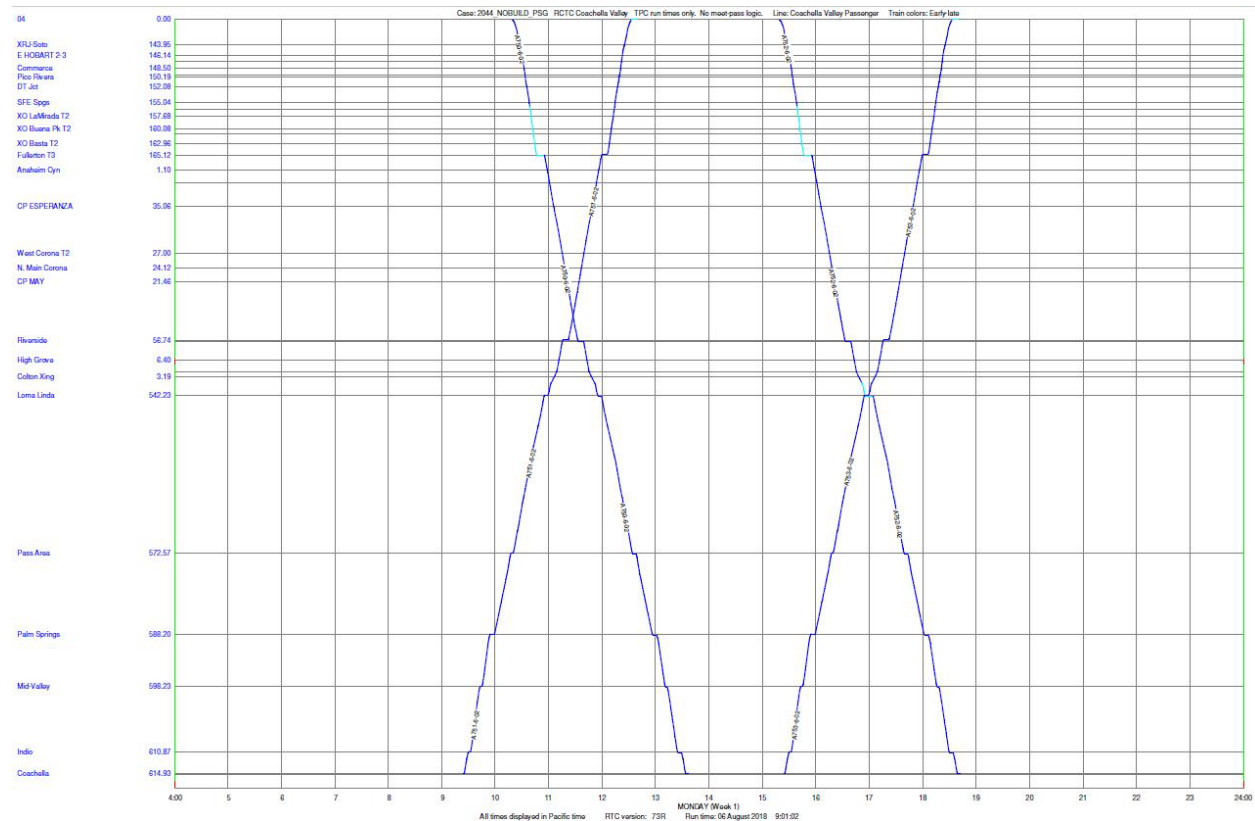
Figure 6-6 also shows how widely traffic volumes fluctuate by day over the course of a week as a result of varying customer commitments, arrivals and loading schedules of ships at the ports of Long Beach and Los Angeles, and unplanned delays that can be anticipated to occur over the course of a train's multi-day journey between Southern California and other locations. In 2017, the difference in volume between the lightest day, which is Monday, and the heaviest day, which is Thursday, is 25 trains—an increase that could be measured as an extra train each hour, on average. By 2044, the difference in volume between the lightest and heaviest day grows to 32 additional trains. Lulls in freight traffic may be experienced on certain lighter-volume days of the week, but the lull likely will not be there 1 or 2 days later or may not occur at the same time.

6.3.5 Operational Considerations for Proposed Service on Build Alternative Infrastructure

As shown in the conceptual train schedules, the morning and afternoon Coachella Valley passenger trains traveling in each direction are scheduled to pass each other near the middle of their journeys.

In the morning, the meet between passenger trains occurs on BNSF's San Bernardino Subdivision, west of the Riverside station. In the afternoon, the meet between passenger trains occurs on UP's Yuma Subdivision, at the Loma Linda/Redlands station. The scheduled meets between morning and afternoon passenger trains are graphically depicted in the stringline diagram presented on Figure 6-7.

Figure 6-7. Stringline Diagram of Proposed Coachella Valley Passenger Trains



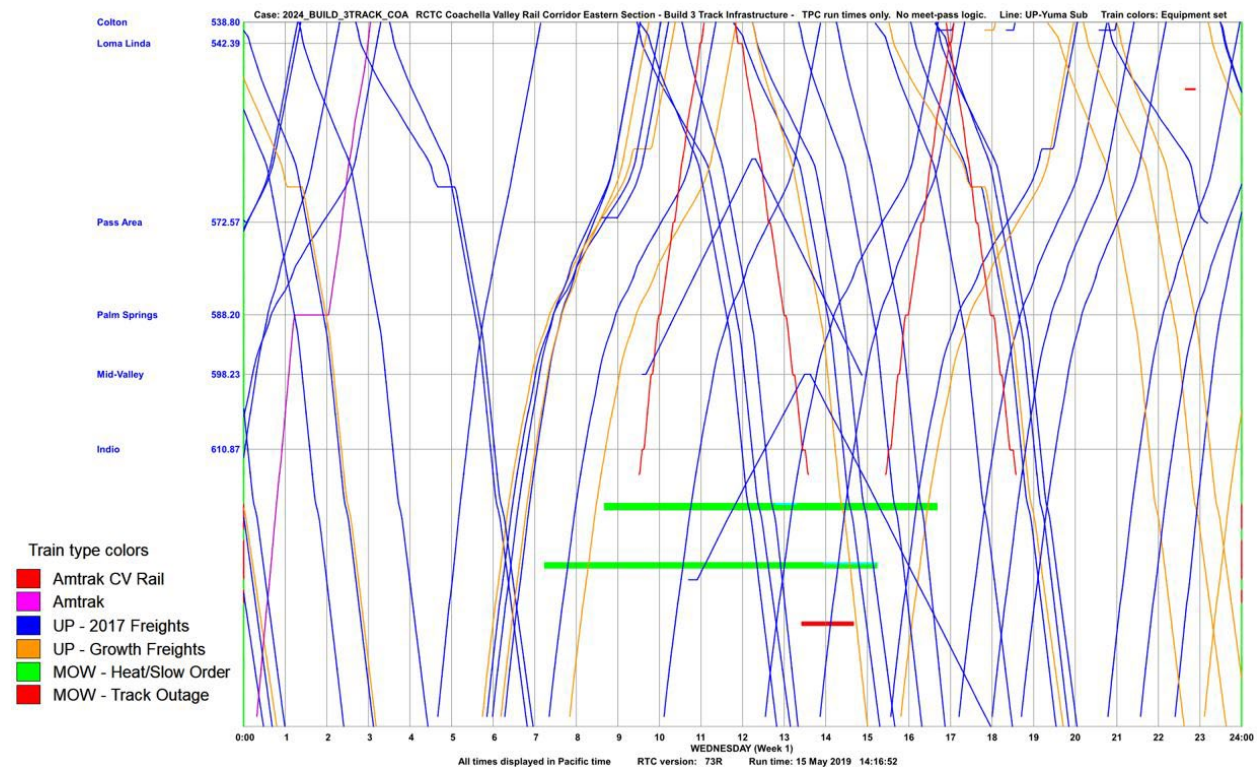
Examination of the graphic also reveals the occupancy requirements of the proposed passenger service on the UP Yuma Subdivision. With the timed morning and afternoon meets occurring so close to the UP Yuma Subdivision entry/exit point at Colton, an intercity passenger train is using some portion of the 76 miles it travels on the Yuma Subdivision almost continuously for 9 hours of the day, from when the morning westbound train departs Coachella at 9:25 AM to when the afternoon eastbound train arrives in Coachella at 6:38 PM. There are only a limited number of gaps in the middle of the day when the Yuma Subdivision is not occupied by passenger trains.

Stringline diagrams from simulations of freight operations on the Yuma Subdivision in 2024 and 2044 were generated to analyze the forecasted increases in freight train frequency and identify any potential traffic lulls that might be considered regularly recurring. A stringline diagram capturing train operations and maintenance-of-way (MOW) activities from 1 day of a 7-day simulation for the 2024 No Build Alternative is presented on Figure 6-8. Yellow lines represent additional trains added to the 2017 volumes. The scheduled trips of the passenger trains were layered atop the freight train movements.

When the scheduled trips of the passenger trains are layered atop the 2024 No Build Alternative stringline diagram, the need for additional track capacity to reliably deliver the passenger service becomes apparent. The passenger trains, depicted as red lines in the diagram, have angles much steeper than the freight trains, reflecting the higher passenger train speeds in the Corridor. On the

particular simulation day of this stringline diagram, all four Coachella Valley trains passed freight trains moving in the opposite direction at multiple points during their journey, and three of the four Coachella Valley trains also had to overtake slower freight trains moving in the same direction. Freight train running times between Colton and Coachella were approximately 1 hour longer than passenger train running times in the RTC model. In all three overtake situations, the passenger train is overtaking one freight train in close proximity to a meet with an opposing freight train, a condition that would require three tracks, one for each train, to avoid delaying either the proposed passenger service or the existing freight traffic.

Figure 6-8. Passenger Trains Layered Atop 2024 No Build Stringline Diagram

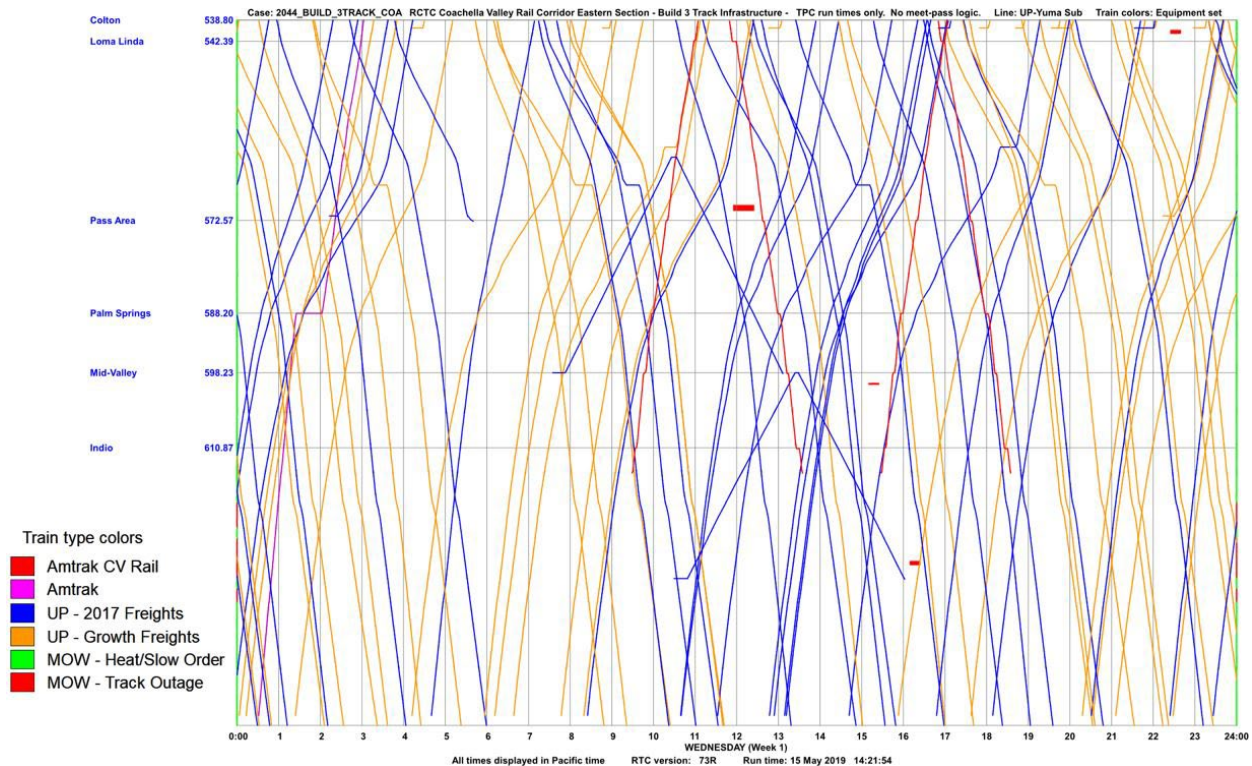


Shifting the schedules of the proposed passenger trains to minimize meets and overtakes is complicated by the variability of freight traffic on the line, as well as by the schedules of the passenger trains operating in the Corridor's Western Section. If a schedule shift were made to the Coachella Valley passenger trains, it likely would have to be made in increments of 1 hour, to enable the Coachella Valley trains to operate through the Western Section at the same minutes past the hour as their current schedules to minimize conflicts with other passenger rail traffic, including passenger trains operated under recurring hourly patterns of service. A schedule shift of more than 2 hours could impact ridership; the preliminary ridership and service optimization forecasts in the 2016 AA Report showed that earlier morning departures from Indio and later afternoon departures from Los Angeles would attract fewer riders.

When the scheduled trips of the passenger trains are layered atop a 2044 No Build Alternative stringline diagram, as shown on Figure 6-9, a higher number of anticipated overtakes and meet/pass events can be seen, as a result of forecasted freight growth. By 2044, train volumes are approximately double of what they were in 2017. The yellow lines represent additional trains added to the Base Case volumes. Approximately one to two freight trains per hour in each direction can be seen on the Yuma

Subdivision, limiting the opportunities for passenger trains to meet or overtake freight trains on the existing two-track infrastructure without causing delays or congestion.

Figure 6-9. Passenger Trains Layered Atop 2044 No Build Stringline Diagram



The scheduling considerations discussed above were identified by the Project's operations and engineering teams as factors to be taken into consideration when developing the Build Alternative infrastructure and conceptual timetables tested in the operations modeling simulations.

6.3.6 Operations Simulation Cases Modeled

Seven different modeling simulation cases were developed during 2017–2019. The cases consisted of combinations of the following elements:

- RTC cases that simulated train operations at specific years under specific service options and infrastructure scenarios
- Service options that established the various station stopping patterns of the proposed Coachella Valley passenger trains in the build case simulations
- Infrastructure scenarios that contained additional track infrastructure to add in the build case simulations to support the proposed Coachella Valley passenger service

Appendix B contains descriptions of all simulation cases developed for the Project, including simulations of alternatives not carried forward for evaluation in the Tier 1/Program EIS/EIR. This chapter summarizes the simulation cases of existing conditions (the Base Case), the No Build Alternative, and Build Alternative Option 1 evaluated in the Tier 1 Program EIS/EIR, which was selected as the Preferred Alternative. These cases are defined as follows:

- **2017 Base Case with MOW:** This case estimates train performance in the modeled territory with the existing (2017) track infrastructure and train operations. This case also includes routine MOW events developed for the simulations (see Appendix B for descriptions of the MOW events simulated). The purpose of a Base Case is to calibrate and determine the ability of the operations simulation to realistically estimate operations and train performance.
- **2024 No Build Alternative with MOW:** This case estimates train performance in the modeled territory with the No Build Alternative infrastructure and No Build Alternative train operations anticipated at the year of the Project's proposed implementation (2024) without the addition of the proposed Coachella Valley intercity passenger trains. This case includes routine MOW events and incorporates freight traffic levels forecasted for the year 2024, as well as programmed and budgeted additional intercity passenger and commuter train frequencies in that year.
- **2024 Build Alternative Option 1/Preferred Alternative with MOW:** This case estimates train performance in the modeled territory in the Project's implementation year of 2024, with an infrastructure scenario consisting of a third main line track supplementing the existing two main track infrastructure between Colton and Coachella, and platform edges at all main tracks. This Build Case adds the proposed Coachella Valley-San Geronimo Pass intercity passenger train frequencies (two daily round trips, with six station stops east of Colton) to the No Build Alternative train operations with freight traffic levels forecasted for the year 2024. This case also incorporates routine MOW events. The infrastructure and service plan tested in this case were evaluated in the Tier 1/Program EIS/EIR as Build Alternative Option 1 and selected as the Preferred Alternative.
- **2044 No Build Alternative with MOW:** This case estimates train performance in the modeled territory with the No Build Alternative infrastructure and No Build Alternative train operations anticipated at the conclusion of the Project's 20-year planning horizon without the addition of the proposed Coachella Valley intercity passenger trains. This case includes routine MOW events and incorporates freight traffic levels forecasted for the year 2044, as well as programmed and budgeted additional intercity passenger and commuter train frequencies in that year.
- **2044 Build Alternative Option 1/Preferred Alternative with MOW:** This case estimates train performance in the modeled territory in the Project's horizon year of 2044 with an infrastructure scenario consisting of a third main line track supplementing the existing two main track infrastructure between Colton and Coachella, and platform edges at all main tracks. This Build Case adds the proposed Coachella Valley-San Geronimo Pass intercity passenger train frequencies (two daily round trips, with six station stops east of Colton) to the No Build Alternative train operations with freight traffic levels forecasted for the year 2024. This case also incorporates routine MOW events. The infrastructure and service plan tested in this case were evaluated in the Tier 1/Program EIS/EIR as Build Alternative Option 1 and selected as the Preferred Alternative.

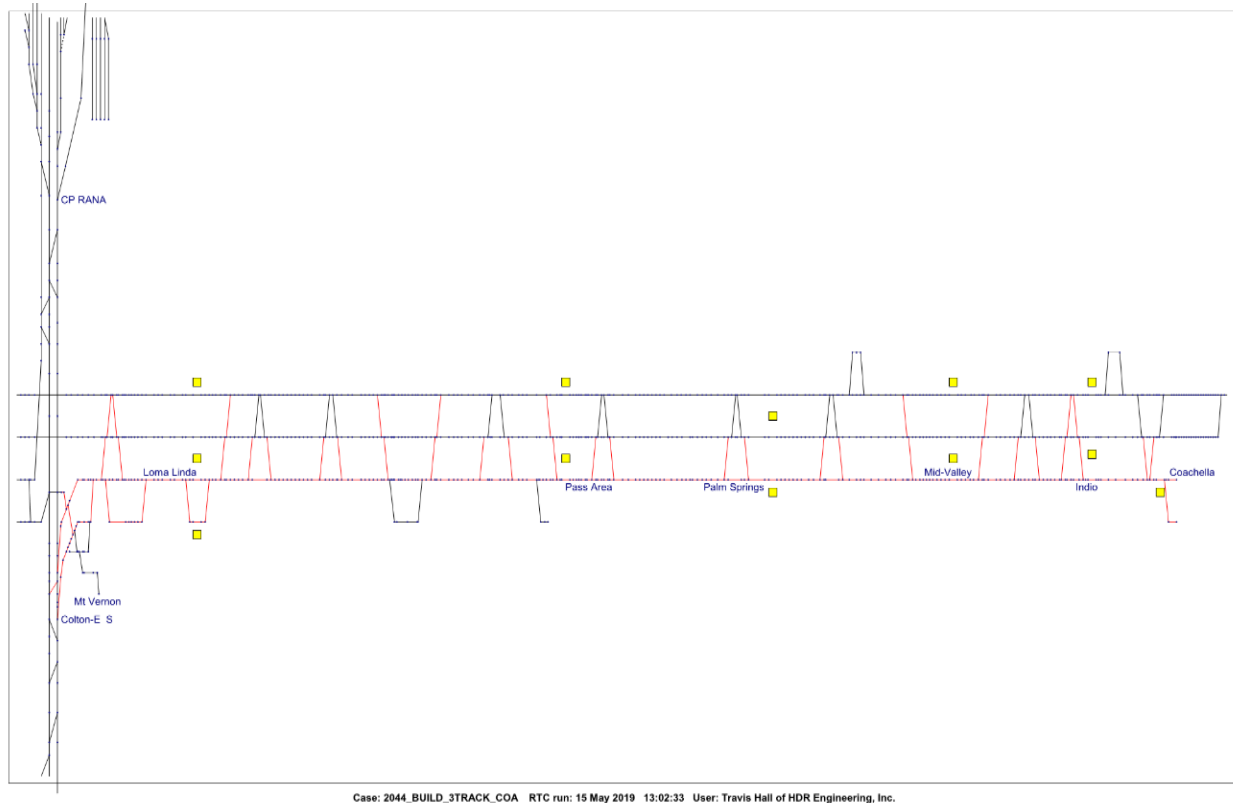
Development of the Build Alternative Option 1/Preferred Alternative infrastructure scenario included an assessment of potential freight traffic hulls in the Eastern Section, where proposed passenger train times could be modified to minimize the Project's capital investment (see Section 6.3.5). General design characteristics of this infrastructure alternative include:

- Platform edge on every main track

- No new at-grade crossings; in-station egress between platforms is provided with a pedestrian grade-separation
- Second Mount Vernon connection track
- Station Track at Loma Linda/Redlands Station where the two afternoon Coachella Valley intercity passenger trains are scheduled meet

Figure 6-9 provides a schematic view of the proposed infrastructure and representative station locations in the Build Alternative Option 1/Preferred Alternative scenario.

Figure 6-10. Build Alternative Option 1/Preferred Alternative Infrastructure



6.3.7 Operations Modeling Results

This section presents the passenger train and freight train performance estimates generated from the operations modeling simulations undertaken for this SDP. Results from the Build Alternative Option 1/Preferred Alternative case can be summarized as follows:

- The Coachella Valley intercity passenger train type exceeded the 90 percent on-time performance goal in the year 2024 and 2044 simulations, when calculated both as endpoint on-time performance and all-stations on-time performance. Trip time variance of the Coachella Valley intercity passenger trains was well below the threshold of 15 minutes in the year 2024 and 2044 simulations.
- Freight train operations achieved their performance goal of no degradation from no build levels, in both the year 2024 and 2044 simulations.

Table 6-6 presents the endpoint on-time performance estimates for intercity passenger trains and commuter trains in the Base Case, No Build Case, and Build Alternative Option 1/Preferred Alternative Case simulations.

Table 6-6. Passenger Train Endpoint On-Time Performance

Case	Coachella Valley Intercity Passenger Train	Long Distance Train (Sunset Limited)	Commuter Train (Riverside Line)
<i>Performance Goal</i>	90%	<i>None established*</i>	<i>None established</i>
2017 Base Case with MOW	—	85.0%	85.8%
2024 No Build Case with MOW	—	81.7%	83.0%
2024 Build Alternative Option 1/ Preferred Alternative Case with MOW	98.6%	71.7%	86.7%
2044 No Build Case with MOW	—	56.7%	84.7%
2044 Build Alternative Option 1/ Preferred Alternative Case with MOW	95.4%	66.7%	82.0%

Notes:

MOW=maintenance-of-way

* As noted in Section 6.2.2, the operations modeling was completed prior to the issuance of the Metrics and Minimum Standards for Intercity Passenger Rail Service Final Rule.

Table 6-7 presents the all-stations on-time performance estimates for intercity passenger trains and commuter trains in the simulations.

Table 6-7. Passenger Train All-Stations On-Time Performance

Case	Coachella Valley Intercity Passenger Train	Long Distance Train (Sunset Limited)	Commuter Train (Riverside Line)
<i>Performance Goal</i>	90%	<i>None established*</i>	<i>None established</i>
2017 Base Case with MOW	—	86.1%	86.5%
2024 No Build Case with MOW	—	79.5%	84.4%
2024 Build Alternative Option 1/Preferred Alternative Case with MOW	98.0%	70.5%	87.5%

Table 6-7. Passenger Train All-Stations On-Time Performance

Case	Coachella Valley Intercity Passenger Train	Long Distance Train (Sunset Limited)	Commuter Train (Riverside Line)
2044 No Build Case with MOW	—	60.5%	84.9%
2044 Build Alternative Option 1/ Preferred Alternative Case with MOW	96.5%	70.7%	82.7%

Notes:

MOW=maintenance-of-way

* As noted in Section 6.2.2, the operations modeling was completed prior to the issuance of the Metrics and Minimum Standards for Intercity Passenger Rail Service Final Rule.

Table 6-8 presents the average minutes of delay (trip variance) between actual trip time and scheduled trip time of the intercity passenger trains and commuter trains in the modeled territory.

Table 6-8. Passenger Train Average Trip Time Variance

Variance measured in minutes

Case	Coachella Valley Intercity Passenger Train	Long Distance Train (Sunset Limited)	Commuter Train (Riverside Line)
<i>Performance Goal</i>	<i>Variance should not exceed 15 minutes</i>	<i>None established*</i>	<i>None established</i>
2017 Base Case with MOW	n/a	2.1	0.4
2024 No Build Case with MOW	n/a	2.2	0.7
2024 Build Alternative Option 1/Preferred Alternative Case with MOW	1.7	2.6	0.8
2044 No Build Case with MOW	n/a	15.9	1.6
2044 Build Alternative Option 1/ Preferred Alternative Case with MOW	3.6	10.5	1.8

Notes:

MOW=maintenance-of-way

* As noted in Section 6.2.2, the operations modeling was completed prior to the issuance of the Metrics and Minimum Standards for Intercity Passenger Rail Service Final Rule.

Table 6-9 summarizes the average minutes of freight train delay per 100 train-miles performance estimates for freight trains in the simulations.

Table 6-9. Freight Train Minutes of Delay per 100 Train-Miles

Case	Average Freight Train	Intermodal Freight Train	Manifest Freight Train	Bulk Freight Train
<i>Performance Goal: Freight trains in the Build Case should exhibit no degradation of performance from results in the equivalent year's No Build Case</i>				
2017 Base Case with MOW	22.4	14.5	48.7	32.5
2024 No Build Case with MOW	30.7	20.5	49.7	59.0
2024 Build Alternative Option 1/ Preferred Alternative case with MOW	28.5	18.9	45.9	47.4
2044 No Build Case with MOW	70.0	45.6	132.7	112.1
2044 Build Alternative Option 1/ Preferred Alternative Case with MOW	60.7	38.4	121.4	92.9

Notes:

MOW=maintenance-of-way

In summary, the Build Alternative Option 1/Preferred Alternative with MOW case is estimated to enable the proposed Coachella Valley passenger rail service to achieve a high level of reliability over the full 20-year horizon of the Project. Passenger train on-time performance results were above 90 percent in both the year 2024 and 2044, when measured at the endpoint arrival time and when measuring station-by-station arrivals. In addition, the Build Alternative Option 1/Preferred Alternative with MOW case did not cause the performance of freight trains to degrade from their no build levels in the year 2024 or 2044, when the proposed passenger service was introduced into the Corridor. The Build Alternative Option 1/Preferred Alternative infrastructure mitigates for the introduction of passenger train operations and the irregularities of existing and projected future freight operations, and also enables the passenger rail service to meet the Purpose and Need of the Project.

6.3.8 Consistency with Proposed Future Service Expansions

In addition to meeting the Purpose and Need of the Project, the infrastructure proposed for the Preferred Alternative also meets a stated Project goal of not precluding, by choice of alignment or technology, a possible future corridor expansion between the Coachella Valley and Phoenix, Arizona. Further, the Preferred Alternative would not preclude possible future investments in the Corridor to increase the frequency of trains operating between the Coachella Valley and Riverside, San Bernardino, or the Los Angeles Basin above the two round trips proposed by the Project.

The 2018 CSRP's long-term vision for the Inland Empire includes hourly train service to the Coachella Valley from San Bernardino and Riverside. The state foresees this increase of service as an opportunity to provide the groundwork for anticipated passenger rail service to Arizona. The state views the investment being proposed in this Corridor Investment Plan as the state's contribution to

establishing regular passenger rail service between Southern California and the Phoenix metropolitan area and accessing that potentially significant travel market.

6.4 Operating Equipment

6.4.1 Equipment Requirements

Two equipment sets are estimated to be required to provide the proposed service frequency of two daily round trips. Section 6.2.3 describes the proposed future train consist for the Coachella Valley intercity passenger rail service was developed for planning purposes. Section 6.2.4 presents conceptual train schedules that identify specific times of day that the revenue train trips may operate. The Corridor's equipment would potentially be maintained at a servicing and maintenance facility in Los Angeles used by Amtrak, with contract cleaning and turnaround services provided at a new layover facility in Coachella or Indio that would be located at the far end of the station track serving the terminus station.

Proposed Equipment

Caltrans has recommended the use of state-owned locomotives and rolling stock for the proposed Coachella Valley service. The use of state-owned equipment would eliminate the need to pay Amtrak equipment capital use charges but would require an upfront investment of public funds for the initial purchase of equipment, as well as additional investments to perform regular overhauls of the locomotives and rolling stock.

Caltrans has recommended at this stage of the Project that the motive power for the Coachella Valley trainsets should be assumed to be the SC-44 model Charger diesel locomotive. A fleet of 14 Charger locomotives was purchased by the State of California for use on the state-supported Pacific Surfliner intercity passenger rail corridor, the first of which was placed into service in 2018. RCTC and Caltrans assume that additional SC-44 Charger diesel locomotives will be purchased by the State of California for use on the proposed Corridor service.

Caltrans has recommended at this stage of planning that the rolling stock proposed for the Corridor service should be assumed to be a bilevel passenger rail car design similar in construction and configuration to the existing bilevel cars used on the Pacific Surfliner intercity passenger trains. FRA requires that new equipment purchases made with federal assistance conform to the PRIIA Section 305 equipment specifications, which includes specifying designs for a bilevel passenger rail car that would be interoperable with existing bilevel cars. Potential Equipment Pooling with the Los Angeles – San Diego – San Luis Corridor

The state-supported Pacific Surfliner intercity passenger rail service on the LOSSAN Corridor is operated under contract by Amtrak with Amtrak crews, using rolling stock (cars and locomotives) that is primarily owned by the State of California and supplemented with additional rolling stock owned by Amtrak to meet operational requirements.

Standardization of the proposed Coachella Valley train consists with existing Pacific Surfliner trainsets would enable the pooling of equipment among intercity passenger routes serving Southern California. Having combined interoperable fleets and maintenance facilities to support intercity passenger rail is a goal in the 2018 CSRP. Caltrans has indicated its support for acquiring equipment for the Corridor service that could be used interchangeably with LOSSAN equipment. Both LOSSAN and the Coachella Valley rail service provider would realize cost efficiencies from a pooled fleet and eliminate potential constraints associated with the use of dedicated equipment for each service.

Benefits would include flexibility when planning rolling stock assignments, efficient equipment substitutions during maintenance or overhaul outages, reduced potential for terminal track congestion and equipment preparation delays and maximized utility of track and storage capacity at shared terminals. Caltrans has recommended that RCTC and LOSSAN conduct a joint fleet planning effort that can help determine future equipment needs for both services under a pooled arrangement.

6.4.2 Equipment Cost Estimates

For planning purposes, a rolling stock capital cost estimate was developed for the proposed Coachella Valley two daily round trip trains to be operated based on the conceptual train schedules presented in Section 6.2.4.

To reliably deliver the proposed service, three trainsets are assumed to be required, two of which will be deployed in daily service, and a third to be used as a spare trainset for when the two revenue trainsets are cycled out for inspection, preventive maintenance, or repair. Equipment inspections occur at 30-day, 90-day, 6-month, and 12-month intervals, and each interval inspection requirement is progressively more rigorous. It is anticipated that in practice, the trainsets would cycle in and out of service every few days for preventive maintenance or required maintenance. In addition, a fourth locomotive is assumed to be purchased and assigned to the endpoint layover facility at Coachella/Indio for protection power.

The cost estimates assume the use of Siemens-built intercity passenger rail equipment, but this assumption is not intended to suggest a preferred vendor or specific equipment models and is only used to establish a realistic basis for cost estimating.

Table 6-10 summarizes the passenger rail rolling stock capital costs estimated for the Project, based on the assumptions above. The estimated unit costs presented in Table 6-10 were provided by Caltrans.

Table 6-10. Coachella Valley Project Rolling Stock Capital Cost Estimates (2020 Dollars)

Vehicle Type	Quantity	Estimated Unit Cost	Estimated Total Cost
SC-44 charger diesel-electric locomotive	4	\$7.2 million	\$28.8 million
Bi-level coach car	3	\$4.0 million	\$12.0 million
Bi-level coach café car	3	\$4.8 million	\$14.4 million
Bi-level business class car	3	\$4.5 million	\$13.5 million
Bi-level coach baggage cab car	3	\$4.9 million	\$14.7 million
Total equipment capital cost investment			\$83.4 million

Close coordination with Caltrans and LOSSAN Rail Corridor Agency, and additional analysis of potential equipment requirements, will be needed in future operational planning and capital planning stages of the Project once funding for implementation of the Project has been secured.

6.5 Equipment and Train Crew Scheduling

This section describes assumptions for the deployment of trainsets and train crews to support the proposed Coachella Valley intercity passenger rail service. These assumptions were developed for planning purposes and will be refined in consultation with other stakeholders once funding for implementation of the Project has been secured.

6.5.1 Potential Trainset Deployment Estimate

For planning purposes, and after consultation with Caltrans and the LOSSAN Rail Corridor Agency, a desktop analysis was conducted using current LOSSAN Corridor operating practices as a guide to estimate the number of trainsets that could potentially be deployed to provide intercity passenger rail service in the Corridor under the Preferred Alternative conceptual service plan and train schedules presented in Section 6.2.4. Table 6-11 presents a summary of potential trainset rotations estimated to deliver the Project's two daily round trip service plan.

Table 6-11. Estimated Potential Equipment Rotations to Provide the Proposed Coachella Valley Intercity Passenger Service

Trainset Number	Daily Trips	Origin (Departure)	Destination (Arrival)	Assignment	Notes
CV-1	2	Los Angeles (10:20 AM) Coachella (3:25 PM)	Coachella (1:38 PM) Los Angeles (6:40 PM)	AM Eastbound PM Westbound	Midday layover at Coachella Overnight layover at Los Angeles
CV-2	2	Coachella (9:25 AM) Los Angeles (3:20 PM)	Los Angeles (12:40 PM) Coachella (6:38 PM)	AM Westbound PM Eastbound	Midday layover at Los Angeles Overnight layover at Coachella

During the midday layover of trainset CV-2, after discharging passengers at LAUS, the trainset is presumed to operate to the Los Angeles equipment base where Coachella Valley trainsets will be stored in order to fuel the locomotive, restock provisions in the café car, and change operating crews. In consultation with Amtrak, it was determined that the conceptual midday layover time allotted would be sufficient for these activities to occur if carried out at Amtrak's 8th Street Yard Service and Inspection Facility in downtown Los Angeles. Trainset CV-1 will be refueled and restocked during its overnight at layover in Los Angeles.

6.5.2 Train Crew Utilization Assumptions

Current staffing of state-supported Pacific Surfliner trains typically includes operating employees (locomotive engineers, conductors, and assistant conductors) who are responsible for the safe operation of the train, and on-board service employees (café car and business class car attendants) whose staffing levels vary depending on the types of services provided on board the train. Operating employees oversee the movement of a train between designated crew change locations, and a train may be operated by several train crews in succession over the entire duration of its trip. Operating crews have shift lengths determined by the location of crew bases and federal hours of service requirements (such as a maximum of 12 on-duty work hours per day), whereas on-board service employees typically remain with a train for the entire length of its trip regardless of total trip time. Los

Angeles-based Amtrak train crews operating trains in the LOSSAN Corridor sign on duty and off duty at the Redondo Locomotive Maintenance Facility in downtown Los Angeles. Although operational arrangements for the proposed Coachella Valley intercity passenger rail service are still in early planning stages, it is anticipated that a similar contractual arrangement would be signed with one or more service providers for train operations and equipment servicing and maintenance.

Based on consultations with Caltrans, the LOSSAN Rail Corridor Agency, and Amtrak, the following assumptions concerning Coachella Valley intercity passenger rail train crews were developed for planning purposes:

- Train crews will sign on duty in Los Angeles at the maintenance facility where Coachella Valley trainsets will be stored.
- Four crew members will be on board each train: one locomotive engineer, one conductor, one assistant conductor, and one lead service attendant.
- As required under federal law, the maximum length of a workday for one train crew cannot exceed 11 hours and 59 minutes.
- Train crews are presumed to report on duty 30 minutes before the initial departure from layover/servicing facilities in Los Angeles and Coachella/Indio.
- A morning train crew will sign on duty and operate the AM Eastbound train from Los Angeles to Coachella/Indio and operate the PM Westbound train from Coachella/Indio back to Los Angeles. This operation, including trainset positioning between LAUS and a Los Angeles-area maintenance facility, is presumed to occur within one 12-hour shift.
- An afternoon train crew will sign on duty and operate the PM Eastbound train from Los Angeles to Coachella/Indio. This train crew will rest overnight at a hotel in Coachella/Indio and then operate the next day's AM Westbound train from Coachella/Indio to Los Angeles.
- A typical operating day will require three train crews:
 - One morning crew operating a round trip from Los Angeles to Coachella/Indio and return
 - One morning crew ending its split shift by operating the AM Westbound train from Coachella/Indio to Los Angeles
 - One afternoon crew beginning its split shift by operating the PM Eastbound train from Los Angeles to Coachella/Indio.

Table 6-12 presents a summary of potential train crew deployments estimated to deliver the Project's Preferred Alternative service plan of two daily round trips.

Table 6-12. Estimated Potential Train Crew Assignments to Provide the Proposed Coachella Valley Intercity Passenger Service

Train Crew Number	Daily Trips	Origin (Departure)	Destination (Arrival)	Assignment	Notes
CV Crew 1	2	Los Angeles (10:20 AM) Coachella (3:25 PM)	Coachella (1:38 PM) Los Angeles (6:40 PM)	AM Eastbound PM Westbound	Same-day on/off duty at Los Angeles
CV Crew 2	1	Los Angeles (3:20 PM)	Coachella (6:38 PM)	PM Eastbound	On duty at Los Angeles. Overnight layover at Coachella. Turns as next morning's Crew 3.
CV Crew 3	1	Coachella (9:25 AM)	Los Angeles (12:40 PM)	AM Westbound	On duty at Coachella. Off duty at Los Angeles. Turns from previous evening's Crew 2.

Additional details regarding train crew assignments and crew rotations to deliver the passenger service proposed by the Project will be determined by Amtrak (assuming that Amtrak is the selected service provider), RCTC, and Caltrans at a later stage of the Project, in consultation as needed with other funding and service management partners, service providers, and host railroads. Final crew staffing levels and assignments ultimately will be determined by a future service management entity (discussed further in Section 13.2), along with Amtrak.

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7 Station and Access Analysis

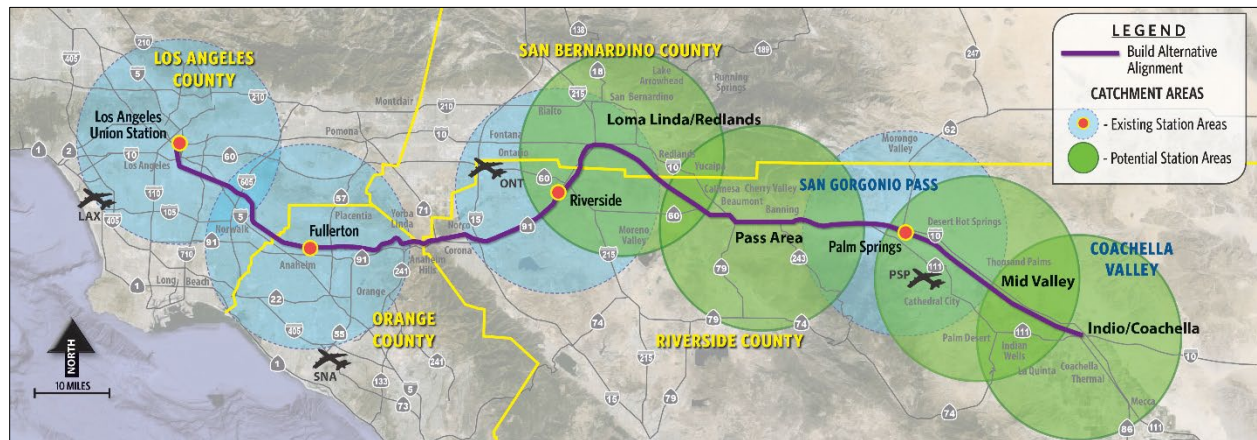
The purpose of this chapter is to identify general station locations, potential modal connectivity at stations, and station access needs for the proposed service. The first section identifies the general station locations and the estimated number of annual passenger boardings and alightings at each proposed station. The second section identifies station facility needs based on the forecasted ridership. The third section evaluates the intermodal system connectivity that will be available at these stations for rail passengers who wish to travel beyond the station catchment areas, estimates the passengers' station access needs and modes they will use to access the stations, and then uses the access analysis to estimate needs for parking spaces for each station. The final section provides cost estimates for each station based on the needed facilities; these costs will be included in the overall financial plan for implementing the corridor service.

7.1 Station Location Analysis

As defined in the Tier 1 Final EIS/EIR, the Corridor is divided into a Western Section (between Los Angeles and Colton) and an Eastern Section (between Colton and Indio). Stations in the western section include LAUS, Fullerton Station, and Riverside Station, all of which are existing stations with developed infrastructure and multimodal service options. These stations are being planned to accommodate future rail service expansions (through other project efforts), and the associated infrastructure improvements will be adequate to support the proposed new intercity service in the Corridor as well as expansions of Metrolink, California High Speed Rail, and Pacific Surfliner services. Hence, no additional improvements will be needed at these three stations to serve the access needs of Coachella Valley rail passengers. General descriptions of the stations along the western section of the corridor are provided in Section 7.1.1.

In the Eastern Section, only one rail station exists: the Palm Springs Amtrak Station. In addition to Palm Springs Station, up to five new stations are being considered to serve the communities in the Eastern Section. Locations proposed for new intercity passenger stations include the Loma Linda/Redlands area, the Pass area, the Mid Valley area, Indio, and Coachella. Specific station sites have not been identified as part of the SDP and Tier 1 EIS/EIR. Potential rider catchment areas have been developed to indicate the communities and areas that would be served by the existing and potential new stations (Figure 7-1). General descriptions of the existing and potential station areas along the eastern section of the corridor are provided in Section 7.1.2.

Figure 7-1. Potential Catchment Areas for Each Station



7.1.1 Western Section Stations

Los Angeles Union Station

Located in downtown Los Angeles, LAUS is the western terminus of the proposed Corridor. The station is located at 800 North Alameda Street in the City of Los Angeles. The station is surrounded by a variety of commercial, industrial, institutional, and residential land uses and can be accessed via the area freeways (I-5, US-101, and I-110) as well as multiple other modes of transportation including buses (local, express, and intercity bus services) and rail (light, heavy, commuter, and Amtrak state-supported and long-distance services). LAUS serves as a hub for Amtrak services.

Fullerton Station

Fullerton Station is located at 120 East Santa Fe Avenue in the City of Fullerton. The station is surrounded by retail and commercial land uses to the north and residential and industrial uses to the south. The station can be accessed via the area freeways (I-5, SR 57, and SR 91), as well as other modes of transportation including buses and rail (commuter, intercity, and long distance).

Riverside Station

Riverside Station is a transportation hub in western Riverside County and is located at 4066 Vine Street in the City of Riverside. The station is surrounded by a combination of commercial, light industrial, and residential uses and can be accessed via SR 91 and SR 60/I-215, as well as other modes of transportation including buses and rail (commuter and long distance).

7.1.2 Eastern Section Stations

Potential Loma Linda/Redlands Station

The potential Loma Linda/Redlands Station is the westernmost station on the eastern section of the Corridor. The station is anticipated to be located along the UP corridor in eastern Loma Linda or southern Redlands. The station is anticipated to serve cities in the San Bernardino Valley including Rialto, Colton, San Bernardino, Yucaipa, Loma Linda, and Redlands.

Potential Pass Area Station

The potential Pass Area Station is anticipated to be located along the UP corridor between the communities of Beaumont and Cabazon. The station is anticipated to serve the communities of Calimesa, Cherry Valley, Beaumont, Banning and Cabazon.

Upgraded Palm Springs Station

The existing Amtrak Palm Springs Station is located at the intersection of North Indian Canyon Drive and Palm Springs Station Road, which is at the north end of the City of Palm Springs just south of the I-10 freeway. The Palm Springs Station catchment area includes the City of Palm Springs, Desert Hot Springs, and Cathedral City.

The station is surrounded by undeveloped land in an area that the Palm Springs General Plan designates as open space–water with a wind energy overlay. Highway-oriented services are located slightly less than a mile north at the I-10 interchange with Indian Canyon Drive.

Potential Mid Valley Station

The potential Mid Valley Station is anticipated to be located along the UP corridor between the communities of Cathedral City and Rancho Mirage. The station is anticipated to serve the communities of Desert Hot Springs, Thousand Palms, Cathedral City, Palm Desert, Rancho Mirage, and Indian Wells.

Potential Indio Station

The potential Indio Station is anticipated to be located along the UP corridor between the communities of Palm Desert and Indio. The station is anticipated to serve the communities of La Quinta, Indian Wells, Coachella, Indio, Thermal, Mecca and parts of Palm Desert.

Potential Coachella Station

The potential Coachella Station would be located approximately 5 miles southeast of the potential Indio station and would provide more convenient access for the communities of Coachella, Thermal, Mecca, and parts of La Quinta.

7.1.3 Forecast Passenger Activity by Station

To determine needed station facilities and access services, the long-term (2044) ridership forecasts were utilized to detail the typical number of passenger boardings and alightings per train at each of the stations. Station-level estimates of 2044 passenger activity per train (boardings and alightings) are summarized in Table 7-1. The projected station-level ridership is used to estimate station facility requirements in Section 7.3.

Table 7-1. Boardings and Alightings by Station (Year 2044)

Station	Annual Boardings/ Alightings	Typical Day* Boardings/ Alightings	Trains per Day	Typical Boardings/ Alightings per Train
LAUS	232,445	775	4	194
Fullerton	43,595	145	4	36
Riverside	61,921	206	4	52
Loma Linda/ Redlands	62,307	208	4	52
Pass Area	16,011	53	4	13
Palm Springs	142,553	475	4	119
Mid Valley	48,804	163	4	41
Indio	37,423	125	4	31
Coachella	32,021	107	4	27
Total	677,080	2,257	4	565

Notes:

* Typical day=1/300 of annual total. Numbers may not multiply exactly due to rounding.

LAUS=Los Angeles Union Station

7.2 Station Facilities

This section describes the assumptions for typical station elements (such as platforms and parking areas) which are required to serve the station access needs for passengers at each of the proposed station area locations. The infrastructure and improvement needs at each of the proposed station areas follow the *Amtrak Station Program and Planning Guidelines* (Amtrak 2013).

7.2.1 Station Category

The Amtrak Guidelines categorize railroad stations into four categories (Category 1: Large; Category 2: Medium; Category 3: Caretaker; and Category 4: Shelter) to help plan and program station size and amenities. The categories are determined based on annual ridership thresholds. While these are the basic categories, stations can have combined characteristics based on specific locations, presence of other transportation operators, retail, and community services.

Table 7-2 shows the categorization of the western stations based on the combination of existing ridership and new ridership for the proposed service. The Western Section stations are established hubs with existing intercity and commuter rail services. Therefore, existing amenities, combined with improvements planned as part of the California High-Speed Rail Los Angeles to Anaheim segment and Metrolink Southern California Optimized Rail Expansion Program, are anticipated to be sufficient to support the proposed service.

Table 7-2. Western Station Categories and Characteristics

Station / Station Areas	Boardings and Alightings			Annual Ridership Threshold	Category	Amenities
	Existing 2019	Project 2044	Total 2044			
LAUS	1,413,006	232,445	1,645,451	>400,000	1: Large	These stations are staffed to provide ticketing and checked baggage services and typically include a crew base, commissary, and facilities for rolling stock servicing.
Fullerton	256,594	43,595	300,189	100,000-400,000	2: Medium	Staffed by Amtrak and typically include a waiting area, ticket office, restrooms, and often a community space for other tenants providing services during business hours.
Riverside*	10,973	61,921	72,894	20,000 – 100,000	3: Caretaker	Not staffed by Amtrak agents but includes an interior waiting facility, with restrooms, that is opened, closed, and maintained by an Amtrak caretaker or staffed by another entity.

Sources: Appendix A, Amtrak 2013, Amtrak 2020a

Notes:

* Currently Riverside is a Category 4 station.

LAUS=Los Angeles Union Station

To identify long-term station facility needs for the eastern section stations, the forecast 2044 station-level ridership (boardings and alightings) was referenced to determine the appropriate station categories for the Palm Springs Station and the five potential new stations. Based on the ridership forecasts, most stations on the eastern section of the Corridor will be fall under Category 3: Caretaker, with the Pass Area station falling in Category 4: Shelter, and the existing Palm Springs station rising to Category 2: Medium. While the existing Palm Springs station (as a Category 4 station) is adequately equipped for the existing level of rail activity, it will need to be upgraded to accommodate the additional ridership that will be generated by the Coachella Valley Rail.

Table 7-3 presents the category and characteristics for each station on the eastern section of the Corridor, while Appendix C provides details of services that each station category supports, based on Amtrak station categories. Annual ridership for the six-station scenario is assumed in categorization.

Table 7-3. Eastern Station Categories and Characteristics

Station/ Station Areas	Year 2044 Annual Boardings and Alightings	Annual Ridership Threshold	Category	Amenities
Loma Linda/ Redlands	62,307	20,000 – 100,000	3: Caretaker	Not staffed by Amtrak agents but includes an interior waiting facility, with restrooms, that is opened, closed, and maintained by an Amtrak caretaker or staffed by another entity.
Pass Area	16,011	<20,000	4: Shelter	Not staffed and includes only a shelter and/or platform canopy to protect passengers from the weather.
Palm Springs*	142,553	20,000 – 100,000	2: Medium	Staffed by Amtrak and typically include a waiting area, ticket office, restrooms, and often a community space for other tenants providing services during business hours.
Mid Valley	48,804	20,000 – 100,000	3: Caretaker	Not staffed by Amtrak agents, but includes an interior waiting facility, with restrooms, that is opened, closed, and maintained by an Amtrak caretaker or staffed by another entity.
Indio	37,423	20,000 – 100,000	3: Caretaker	Not staffed and includes only a shelter and/or platform canopy to protect passengers from the weather.
Coachella	32,021	20,000 – 100,000	3: Caretaker	Not staffed and includes only a shelter and/or platform canopy to protect passengers from the weather.

Sources: Appendix A, Amtrak 2013

Notes:

* Existing station. Currently Palm Springs is a Category 4 station.

7.2.2 Parking

A preliminary parking demand analysis was conducted in order to determine the projected number of parking spaces for each of the station areas along the eastern section of the Corridor. This analysis determined the space requirements of parking cars, accessible spaces, and short-term parking for kiss-and-ride, taxis, and transportation network companies (TNC).

The initial parking demand analysis was conducted using a recent Amtrak onboard survey of its state-supported Pacific Surfliner corridor service in Southern California. Factors used in the determination of parking needs included an estimate of passenger access mode split at each station, the average number of nights that cars remain parked at stations, and the number of people traveling together on each trip. In addition, in accordance with regulations under the Americans with Disabilities Act (ADA) from 2010, ADA parking needs were calculated and included within the total number of parking space demand for each station.

For a reasonability check, the estimated parking and curb space needs for kiss-and-rides and TNCs were compared with the current supply at existing stations with comparable ridership levels along Amtrak's Pacific Surfliner and San Joaquin corridors. The calculations are shown in Appendix D and the resulting parking needs estimates for each station area are presented later in this chapter.

7.3 Station Access

This section describes the intermodal system connectivity available at each of the proposed stations along the Western and Eastern Sections of the Corridor, estimates the rail passengers' station access needs and modes they will use to access the stations, and then uses the access analysis to estimate needs for parking spaces for each station. Modal station access is estimated based on survey results for passengers riding the Amtrak Pacific Surfliner service. Parking space needs are estimated for passengers who park at the station during their trip, and short-term parking needs are estimated for taxis, TNCs, buses, and private vehicles that pick up/drop off passengers.

For each station, major community attractions are identified to help determine if existing transit service provides sufficient public transit access for passengers visiting the community or if adjustments to existing transit service will be needed so passengers will have an effective transit access option available. Regional modal connections include long-distance bus and rail services, which would serve passengers using the proposed Coachella Valley Rail service who wish to make connections to locations beyond the station catchment areas. The landscape for regional bus services could also continue to evolve as new operators such as FlixBus, Megabus, BoltBus, and LuxBus are entering into new markets. Existing transit services that serve each station (or could potentially serve a new station, depending on its eventual location) are identified and evaluated to determine if they provide an effective access option for passengers visiting the community. For potential new stations, existing transit services that might serve the future station (depending on its eventual location) are identified, and the existing service levels and service area are considered to determine whether transit service adjustments should be planned to provide station access via public transit.

7.3.1 Forecast Station Boardings/Alightings by Mode

Total projected boardings and alightings by station were presented in Table 7-1. This section presents an estimate of station access trips by mode. The mode choice for station access trips was estimated based on a recent Amtrak onboard survey of its state-supported Pacific Surfliner corridor service in Southern California (San Francisco State University 2017). The mode choice results from the survey are summarized in Table 7-4.

Table 7-4. Amtrak On-Board Survey Mode Choice Results

Access/Egress Mode	Pacific Surfliner		
	Mode to Boarding Station	Mode from Alighting Station	Average
Drive alone and park	19.6%	5.7%	12.7%
Carpool and park	7.3%	3.2%	5.2%
Dropped off/picked up	39.1%	38.6%	38.9%
Walk	5.9%	11.5%	8.7%
Bicycle	0.9%	0.7%	0.8%
Bus/rail transit	7.7%	12.1%	9.9%
Connecting rail	1.6%	2.8%	2.2%

Table 7-4. Amtrak On-Board Survey Mode Choice Results

Access/Egress Mode	Pacific Surfliner		
	Mode to Boarding Station	Mode from Alighting Station	Average
Taxi/TNC/shuttle	13.1%	18.9%	16.0%
Other	4.8%	6.5%	5.6%
Total	100%	100%	100%

Notes:

TNC=transportation network company

The access mode percentages from the Pacific Surfliner survey results were used as the basis to estimate passenger access mode to the proposed Coachella Valley rail stations. The average mode choice percentages from the Pacific Surfliner survey were adjusted as follows to better reflect the access and surrounding land use characteristics of each station:

- For LAUS, because of the very high level of transit accessibility combined with the relative difficulty of accessing LAUS by auto and lack of passenger-generating land uses within walkable distance, the percentage of passengers accessing the service by bus and rail transit was increased while the percentages accessing by car, pick up/drop off, and walking were reduced.
- For the Riverside station, because of the lack of passenger-generating land uses within walkable distance combined with the station's accessibility by auto, the percentage of passengers accessing the service by pick up/drop off was increased while the percentage accessing by walking was reduced.
- For the Pass Area, Palm Springs, and Mid-Valley stations, because of the generally low levels of transit accessibility and lack of passenger-generating land uses within walkable distance of the rail line combined with those areas' accessibility by auto, the percentages of passengers accessing the service by pick up/drop off and by taxi/TNC/shuttle were increased while the percentages accessing by walking and transit were reduced.
- For the Indio and Coachella stations, because of the lack of passenger-generating land uses within walkable distance of the rail line combined with the areas' accessibility by auto, the percentage of passengers accessing the service by pick up/drop off was increased while the percentage accessing by walking was reduced.

To account for these factors, adjustments to the passenger access mode percentages were made in increments of 5 percent (in the case of the Palm Springs station walking was reduced by the full 8.7 percent because there are no nearby passenger-generating land uses existing or planned). The resulting mode split percentages and estimates of passenger access mode for each station are summarized in Table 7-5 and Table 7-6.

Table 7-5. Estimated Rail Passenger Access Mode by Station – Percentage of Passengers, Year 2044

Percentage of Train passengers	LAUS	Fullerton	Riverside	Loma Linda/ Redlands	Pass Area	Palm Springs	Mid-Valley	Indio	Coachella
In cars being parked	7.9%	17.9%	17.9%	17.9%	17.9%	17.9%	17.9%	17.9%	17.9%
Dropped off/picked up	23.9%	38.9%	43.9%	38.9%	43.9%	47.6%	43.9%	43.9%	43.9%
Walk	3.7%	8.7%	3.7%	8.7%	3.7%	0.0%	3.7%	3.7%	3.7%
Bicycle	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%
Bus/rail transit	42.1%	12.1%	12.1%	12.1%	7.1%	7.1%	7.1%	12.1%	12.1%
Taxi/TNC/Shuttle	21.6%	21.6%	21.6%	21.6%	26.6%	26.6%	26.6%	21.6%	21.6%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Notes:

LAUS=Los Angeles Union Station; TNC=transportation network company

Table 7-6. Estimated Rail Passenger Access Mode by Station – Number of Passengers per Train, Year 2044

Typical Number of Passengers Boarding and Alighting per Train	LAUS	Fullerton	Riverside	Loma Linda/ Redlands	Pass Area	Palm Springs	Mid-Valley	Indio	Coachella
In cars being parked	15	7	9	9	2	21	7	6	5
Dropped off/picked up	46	14	23	20	6	57	18	13	12
Walk	7	3	2	5	1	0	2	1	1
Bicycle	2	0	1	1	0	1	0	0	0
Bus/rail transit	82	4	6	6	1	8	3	4	3
Taxi/TNC/Shuttle	42	8	11	11	3	32	11	7	6
Total Passengers	194	36	52	52	13	119	41	31	27

Notes:

LAUS=Los Angeles Union Station; TNC=transportation network company

7.3.2 Western Section Stations

Los Angeles Union Station

Major Community Attractions

In addition to the offices and businesses located in downtown Los Angeles, several major community attractions are located within the catchment area: Hollywood, Universal Studios, Los Angeles International Airport, Hollywood Burbank Airport, a number of sports complexes, and several colleges and major universities, including the University of Southern California, California State University in Los Angeles, and the University of California, Los Angeles. Many of these attractions are readily accessible from LAUS by public transportation, or other shared modes, as well as by automobile.

Intermodal Connectivity

LAUS serves as a major transportation hub providing an array of intercity and commuter rail and bus connections throughout the region. Amtrak provides intercity passenger rail service to San Diego, Santa Barbara, and San Luis Obispo via the Pacific Surfliner; and long-distance services to the Seattle/Portland areas via the Coast Starlight; to the Chicago area via the Southwest Chief; and to the New Orleans and San Antonio areas via the Sunset Limited. Commuter rail access is provided by the SCRRA/Metrolink. All Metrolink lines except the Inland Empire-Orange County Line serve LAUS. These include the Ventura County Line, the Antelope Valley Line, the San Bernardino Line, the Riverside Line, the 91/Perris Valley Line, and the Orange County Line.

Intercity bus connections that serve LAUS include Amtrak Thruway bus, Greyhound, and Megabus.

Transit Service

LAUS accommodates several local access options, including urban rail, bus, taxi/TNCs, and active transportation. The Metro Red, Purple, and Gold Lines stop at LAUS and provide rail connections to various cities throughout Los Angeles County.

Currently there are 14 bus routes provided by four regional bus operators that serve LAUS. These include the Antelope Valley Transit Authority, Foothill Transit, City of Los Angeles Department of Transportation, and Metro. LAX FlyAway, which is a shuttle bus operated by the Los Angeles World Airports, also serves LAUS.

Taxi service is available at the west entrance area of LAUS, while a designated kiss and ride area is located at the east entrance area of the station. TNCs such as Lyft, Uber, and FlexLA provide services to and from LAUS. In addition to the traditional car rental service provided by companies such as Budget and Hertz, car share programs through Zipcar and Maven are available at LAUS.

Active transportation options are provided at LAUS through a bike share program and bike parking facilities. Metro operates the Metro Bike Share program with bike share stations throughout the city, including one at LAUS. Metro also operates a Bike Hub which provides secured parking for 192 bikes at the station.

Transit service serving LAUS is sufficiently robust to serve the access needs of the Coachella Valley Rail passengers that would use transit to access the service through LAUS.

Parking

Approximately 3,000 parking spaces are currently available at LAUS. The cost of parking a vehicle at LAUS varies depending on the duration and location. Parking at the Patsaouras Plaza/Metro parking structures is \$8.00 a day and \$110.00 a month. Parking in the western area of the station is \$14.00 per day.

The parking supply at LAUS is sufficient to serve the needs of the Coachella Valley Rail passengers that would park a car at LAUS to access the service.

Fullerton Station

Major Community Attractions

A number of major attractions are located within the station catchment area. These include theme parks such as the Disneyland Resort and Knott's Berry Farm, as well as entertainment venues including the Anaheim Convention Center, Honda Center, and Angel Stadium of Anaheim. The California State University at Fullerton is also located within the station's catchment area.

Intermodal Connectivity

Rail connections available at this station include Amtrak's Pacific Surfliner intercity rail service, which connects to the San Diego, Santa Barbara, and San Luis Obispo areas, as well as long-distance rail service to the Chicago area via Amtrak's Southwest Chief. From Fullerton commuter rail service connects to Los Angeles, Orange, and Riverside Counties via Metrolink's Orange County and 91/Perris Valley Lines.

Amtrak Thruway provides an intercity bus service connecting passengers from the Coachella Valley and Inland Empire with the Pacific Surfliner at Fullerton Station.

Transit Service

The Orange County Transportation Authority (OCTA) is the primary provider of fixed-route bus and demand response service at the Fullerton Station. Fullerton Station is served by OCTA Local Routes 26, 43, and 47, Community Route 143, and Express Routes 213 and 543 which provide linkages to various cities within Orange County.

The station's location in the downtown area provides pedestrians and cyclists with access to the station. Bicycle lockers are available at this station.

Transit service serving Fullerton is sufficiently robust to serve the access needs of the Coachella Valley Rail passengers that would use transit to access the service through Fullerton.

Parking

Currently 1,321 parking spaces and 9 handicapped spaces are available at Fullerton Station, as well as 814 additional parking spaces in a parking structure to the west of the station. Surface-lot parking is free at this station and there is a maximum 72-hour restriction in the parking structure. Other marked parking stalls have a 3-hour limit.

The parking supply at the Fullerton Station is sufficient to serve the needs of the Coachella Valley Rail passengers that would park a car at the station to access the service.

Riverside Station

Major Community Attractions

Major community attractions within this station catchment area include the Mission Inn in Downtown Riverside, the Riverside Convention Center, and the offices and businesses located in downtown Riverside. The University of California, Riverside is also located in this catchment area, as are several smaller colleges and institutions.

Intermodal Connectivity

Rail connections available at this station include long-distance rail service to the Chicago area via Amtrak's Southwest Chief, and commuter rail service to Los Angeles, Orange, Riverside, San Bernardino, and San Diego Counties via Metrolink's 91/Perris Valley Line, Riverside Line, and Inland Empire-Orange County Line. Intercity bus service at this station is provided by Amtrak Thruway and Megabus.

Transit Service

The Riverside Transit Agency provides both local and commuter fixed-route bus service at this station location. Other transit operators include the SunLine Transit Agency and Omnitrans. Riverside Station is served by Riverside Transit Agency Local Routes 1, 15, 29, 49, and 54, Riverside Transit Agency RapidLink Gold Line, Riverside Transit Agency CommuterLink Routes 200, 208, and 210, and Omnitrans Route 215, which provide linkages to various cities in Riverside, San Bernardino, and Orange Counties. A downtown Riverside Metrolink shuttle provides free rides to the Downtown area.

Transit service serving the Riverside station is sufficiently robust to serve the access needs of the Coachella Valley Rail passengers that would use transit to access the service through Riverside.

Parking

Currently 1,115 parking spaces and 25 handicapped spaces are available at the Riverside Station, as well as 325 additional spaces in the Eastside Parking Lot located east of the Riverside Station. Parking is free and overnight parking is allowed, with the exception of the Eastside Parking lot, where overnight parking is prohibited.

The parking supply at the Riverside station is sufficient to serve the needs of the Coachella Valley Rail passengers that would park a car at the station to access the service.

7.3.3 Eastern Section Stations

Proposed Loma Linda/Redlands Station

Major Community Attractions

The proposed Loma Linda/Redlands Station could potentially serve a number of community attractions located in the San Bernardino Valley, which may include major hospitals, colleges/universities, and other major recreational destinations. Several universities are within the catchment area including the Loma Linda University, California State University, San Bernardino and the University of Redlands. Major retail and recreational destinations in the area include Downtown Redlands, the San Manuel Casino, and the San Manuel Stadium. Many of the winter and summer resorts in the San Bernardino Mountains are accessible by road from the San Bernardino and Redlands area.

Intermodal Connectivity

There are no existing or anticipated rail or intercity bus services that provide intermodal connections at a future Loma Linda/Redlands station.

Transit Service

Omnitrans is the primary public transportation service provider in the San Bernardino Valley. A number of Omnitrans fixed-route services and a bus rapid-transit route travel through the catchment area of the station. These routes provide service throughout the eastern portion of the San Bernardino Valley. Potential buses that could serve a station in the Loma Linda/Redlands area include Omnitrans Routes 2, 8, 19, and Green Line. Both the Green Line (bus rapid-transit service) and Omnitrans Route 2 provide service to the San Bernardino Transit Center. A number of regional buses and Metrolink commuter rail lines serve San Bernardino Transit Center, thus giving passengers access to many destinations throughout the Inland Empire.

This transit service in the Loma Linda/Redlands area, including service connections to the San Bernardino Transit Center, is sufficient to meet the access needs of Coachella Valley Rail passengers, if the station is located where these routes can serve it.

Parking

As described in Section 7.3.2, parking needs were estimated based on the Year 2044 forecast boardings and alightings at each station. Survey data of mode split for passenger access were obtained from existing Amtrak service in Southern California (Pacific Surfliner) and were used to estimate needs for long-term parking spaces (including ADA), short-term parking spaces, and bus bays at each station (see Appendix D for calculations). The estimated parking space needs are summarized in Table 7-7.

Table 7-7. Parking Needs for the Proposed Loma Linda/Redlands Station

Station	Long-Term Parking Spaces (Including ADA)	Short-Term Parking Spaces (Kiss and Ride, Taxis, and TNCs)	Bus Bays
Loma Linda/ Redlands	43	13	1 to 3

Notes:

ADA=Americans with Disabilities Act; TNC=transportation network company

Proposed Pass Area Station

Major Community Attractions

Major community attractions within the station catchment area include a number of entertainment and retail destinations, including the Morongo Casino Resort and Spa and the Desert Hills Premium Outlets. Other recreational attractions within the catchment area include outdoor activities on Mount San Jacinto State Park.

Intermodal Connectivity

Within the Pass Area station catchment area, Amtrak currently provides thruway bus service to the Morongo Casino, Resort, and Spa, connecting passengers to the Amtrak San Joaquin train in Bakersfield. This Amtrak Thruway service could potentially be connected at a new station.

Transit Service

Several fixed-route transit providers operate within the station catchment area and close to the Corridor. Existing transit services within the station catchment area include Pass Transit's Banning Route 1 and Beaumont Route 2 (both provide 60-minute weekday and 120-minute weekend service) and SunLine Commuter Link 10 (four roundtrips per weekday).

This transit service in the Pass Area is sufficient to meet the access needs of Coachella Valley Rail passengers if the station is located where these routes can serve it.

Parking

Year 2044 parking needs for the proposed Pass Area station are summarized in Table 7-8.

Table 7-8. Parking Needs for the Proposed Pass Area Station

Station	Long-Term Parking Spaces (Including ADA)	Short-Term Parking Spaces (Kiss and Ride, Taxis, and TNCs)	Bus Bays
Pass Area	13	4	1 to 3

Notes:

ADA=Americans with Disabilities Act; TNC=transportation network company

Palm Springs Station

Major Community Attractions

Due to its location on the northern end of the Coachella Valley, the catchment area includes several access points to some of the state and national parks in the area, which include the Mount San Jacinto State Park and Big Morongo Canyon Preserve. The Mount San Jacinto State Park can be accessed via the Palm Springs Aerial Tramway, which is located 8 miles from the station.

Other attractions include downtown Palm Springs, with numerous hotels, and the Palm Springs Convention Center. In addition, Palm Springs International Airport is located approximately 2 miles east of the Downtown area. Several golf resorts and clubs are located in the northern end of the Coachella Valley within the Palm Springs Station catchment area.

Intermodal Connectivity

Rail connections available at this station include long-distance rail service westbound towards Los Angeles and eastbound towards New Orleans via Amtrak's Sunset Limited (which operates 3 days per week in each direction).

Amtrak Thruway Bus connections currently travel to downtown Palm Springs and Palm Springs International Airport and could serve the upgraded station based on demand.

Transit Service

SunLine Transit is the primary public transit service provider in the Palm Springs area and nearby routes include SunLine Commuter Link 10 (four roundtrips per weekday) and Palm Springs Buzz services (free downtown shuttle service from Thursdays to Sundays). The Morongo Basin Transit Authority also provides service to Palm Springs via Morongo Basin Transit Authority Route 12 (three

roundtrips per weekday) and Route 15 (two roundtrips on Saturdays and Sundays) from the Morongo Basin located to the north in the high desert, including to the 29 Palms Marine Corp Base and Joshua Tree National Park.

This transit service in the Palm Springs area could be sufficient to meet the access needs of the Coachella Valley Rail passengers, if the routes and schedules can be modified to provide stops at the station coordinated with the rail service or if additional trips could be added to serve the rail service passengers.

Parking

Currently, there are 39 parking spaces, including 4 handicapped spaces at the existing Palm Springs Station. Parking is free and overnight parking is allowed. The existing parking supply is insufficient to serve the needs of the Coachella Valley Rail passengers that would park a car at the station to access the service. Year 2044 parking needs for the upgraded Palm Springs station are summarized in Table 7-9. A total of 93 additional parking spaces would be required to meet the needs of forecasted passengers. The station currently has three bus bays and up to two additional bus bays may be required.

Table 7-9. Parking Needs for the Upgraded Palm Springs Station

Station	Long-Term Parking Spaces (Including ADA)	Short-Term Parking Spaces (Kiss and Ride, Taxis, and TNCs)	Bus Bays
Palm Springs	95	37	3 to 5

Notes:

ADA=Americans with Disabilities Act; TNC=transportation network company

Proposed Mid-Valley Station

Major Community Attractions

Many of the major community attractions in the catchment area cater to leisure and sporting activities south of the Corridor, including several major resorts, spa, and golf courses, and the Indian Wells Tennis Garden, home of the BNP Paribas Open tennis tournament.

Other major community attractions within this catchment area include the Children’s Discovery Museum, College of the Desert, University of California, Riverside-Palm Desert campus, California State University, San Bernardino Palm Desert Campus, and the Coachella Valley Preserve–Thousand Palms Oasis Preserve.

Intermodal Connectivity

Within the Mid-Valley Station catchment area, Greyhound intercity bus service is available at the SunLine Transit Hub located at 72420 Varner Road in the community of Thousand Palms.

Transit Service

The primary public transit service provider in the Mid-Valley catchment area is the SunLine Transit Agency. Within the station catchment area, SunLine Route 4 (50-minute weekday and 60-minute

weekend service) serves the SunLine Transit Hub, and SunLine Commuter Link 10 (four roundtrips per weekday) serves the California State University, San Bernardino Palm Desert Campus.

This transit service in the Mid-Valley area is sufficient to meet the access needs of Coachella Valley Rail passengers if the station is located where these routes can serve it.

Parking

Year 2044 parking needs for the proposed Mid-Valley Station are summarized in Table 7-10.

Table 7-10. Parking Needs for the Proposed Mid Valley Station

Station	Long-Term Parking Spaces (Including ADA)	Short-Term Parking Spaces (Kiss and Ride, Taxis, and TNCs)	Bus Bays
Mid Valley	32	12	1 to 3

Notes:

ADA=Americans with Disabilities Act; TNC=transportation network company

Proposed Indio Station

Major Community Attractions

Major community attractions include many of the resorts and golf clubs located within the catchment area. The Jack Nicklaus Private Course, home of the Desert Classic professional golf tournament on the PGA Tour, is located within the catchment area.

The Empire Polo Club, also located in the catchment area, hosts a number of sporting and entertainment events and activities throughout the year, including the Coachella Music and Arts Festival and Stagecoach Music Festival, both of which are heavily attended on an annual basis during the month of April.

Several educational institutions, including Brandman University and the Indio campus of College of the Desert, are located within the catchment area.

Intermodal Connectivity

The Indio Transportation Center at 83100 Indio Boulevard is an existing Greyhound stop for intercity bus service traveling between Los Angeles and the cities of Phoenix or Calexico. In addition, an international bus line from Mexico called Tufesa operates from this station. Amtrak thruway bus connections travel to Indio with a stop at Monroe Street and Highway 111 and could serve the proposed station based on demand.

Transit Service

SunLine provides local fixed-route services as well as complimentary paratransit services within the Indio station catchment area. SunLine operates several routes near the rail line through Indio, including SunLine Route 1 (20-minute service), 6 (60-minute service), and Commuter Link 10 (four round trips per weekday).

This transit service in the Indio area is sufficient to meet the access needs of Coachella Valley Rail passengers if the station is located where these routes can serve it.

Parking

Year 2044 parking needs for the proposed Indio station are summarized in Table 7-11.

Table 7-11. Parking Needs for the Proposed Indio Station

Station	Long-Term Parking Spaces (Including ADA)	Short-Term Parking Spaces (Kiss and Ride, Taxis, and TNCs)	Bus Bays
Indio	26	9	1 to 3

Notes:

ADA=Americans with Disabilities Act; TNC=transportation network company

Proposed Coachella Station

Major Community Attractions

Major community attractions within the station's catchment include the Indian Palms Country Club and Resort, the La Quinta Resort and Club, and the Jack Nicklaus Private Course. The Empire Polo Club, located within the catchment area, is host to the Coachella Music and Arts Festival, Stagecoach Music Festival, and several sporting events throughout the year.

The communities of Thermal and Mecca are located south of Coachella within the catchment area.

Intermodal Connectivity

There are no existing or anticipated rail or intercity bus services in the City of Coachella.

Transit Service

SunLine provides local fixed-route and ADA paratransit service within the station's catchment area, which includes Route 1, Route 6, and Route 8.

This transit service in the Coachella area is sufficient to meet the access needs of Coachella Valley Rail passengers if the station is located where these routes can serve it.

Parking

Year 2044 parking needs for the proposed Coachella station are summarized in Table 7-12.

Table 7-12. Parking Needs for the Proposed Coachella Station

Station	Long-Term Parking Spaces (Including ADA)	Short-Term Parking Spaces (Kiss and Ride, Taxis, and TNCs)	Bus Bays
Coachella	22	8	1 to 3

Notes:

ADA=Americans with Disabilities Act; TNC=transportation network company

7.4 Conceptual Cost Estimates

Conceptual cost estimates were prepared for each of the proposed stations along the eastern section of the Corridor, based upon typical unit costs obtained from recent similar station plans and designs in Southern California, including the Redlands Passenger Rail Project in San Bernardino County. Since specific station locations have not been identified at this time, the conceptual cost estimates were developed for a theoretically feasible station site within each station catchment area. More detailed engineering and analysis of alternative station locations will be required in a subsequent Tier 2 environmental document in order to refine the required station improvements and provide a refined cost estimate for the proposed stations.

The estimated costs for each station were broken down into the following four categories and are summarized in Table 7-13:

- **Station elements:** includes costs for pedestrian overpasses, elevators, building-only station mechanical, electrical, plumbing, station electrical, station building, station water, station sewer, station drainage, station civil work, station fencing, and signage
- **Platform elements:** includes costs for the platforms, canopies, platform furnishings, platform lighting, and platform drainage
- **Systems:** includes costs for the public address system and video surveillance software
- **Accessways:** includes costs for parking and access roads
- **ROW:** includes cost to acquire property on which to locate the station

While specific station locations are not being identified at this time, the track and platform configuration was considered while developing the conceptual cost estimates. To provide maximum operational flexibility, platform edge was provided on every main track at the five intermediate Eastern Section stations, thereby requiring a typical platform configuration to include an island platform and one side platform with a grade-separated pedestrian crossing connecting the platforms. However, at the eastern terminus in Coachella, only one side platform was included, and an additional side platform was included at the Loma Linda/Redlands station, where an additional station track is included for scheduled train meets.¹⁶ The detailed cost estimate assumptions and calculations are provided in Appendix E.

As shown in Table 7-13, the estimated cost is lowest for Palm Springs, which requires facility upgrades to accommodate new riders as a Category 2 station but not new property acquisition. The estimates cost for Loma Linda/Redlands is highest due to the inclusion of a third platform. The estimated station element cost for the proposed Coachella station is significantly lower than the others because it is the only station that does not require a pedestrian bridge and multiple elevators and platforms.

¹⁶ A configuration of one island platform and two side platforms was selected to avoid substantial modifications to the existing mainline tracks and nearby Anderson Street overpass structures that would be required to accommodate a second 30-foot island platform.

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Table 7-13. Conceptual Cost Estimates for Stations (2019 Dollars)

Cost Category	Loma Linda/Redlands	Pass Area	Palm Springs*	Mid Valley	Indio	Coachella
Station Elements	\$4,087,249	\$3,560,000	\$3,982,642	\$3,785,996	\$3,772,296	\$565,794
Platform Elements	\$2,987,240	\$2,006,720	\$2,022,720	\$2,022,720	\$2,532,240	\$964,520
Systems	\$906,000	\$604,000	\$604,000	\$604,000	\$604,000	\$302,000
Accessways	\$689,000	\$527,600	\$1,574,540	\$755,300	\$712,880	\$620,420
ROW	\$20,000,000	\$20,000,000	\$0	\$20,000,000	\$20,000,000	\$20,000,000
Total	\$28,669,500	\$26,698,300	\$8,183,900	\$27,168,000	\$27,621,400	\$22,452,700

Notes:

* Cost shown reflects construction of a new station at the existing site, and savings may be possible if existing facilities can be incorporated into the design.

** Estimated total cost is rounded to nearest hundred.

ROW=right-of-way

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8 Maintenance and Layover Facility

The purpose of this chapter is to document the maintenance and layover facility requirements for the proposed Coachella Valley rail service.

An existing Amtrak maintenance facility exists at the Corridor's western terminus, near LAUS. Amtrak's Los Angeles Maintenance Facility at Redondo Junction serves both Pacific Surfliner and Amtrak long-distance trains. Services provided at the Los Angeles Maintenance Facility include the following:

- Locomotive and passenger car maintenance and inspection
- Locomotive and passenger car washing
- Locomotive sanding
- Equipment inspection and storage
- Fueling
- Provisioning (for cafe, lounge, and dining cars)
- Railway turntable for turning locomotives and equipment
- Private railcar storage

The proposed daily passenger rail service between Los Angeles and the Coachella Valley will require a facility at each end of the corridor for the overnight storage, cleaning, and light maintenance of the trains described in this chapter. A facility location at the western end of the corridor in Los Angeles has not yet been determined, although the Amtrak Los Angeles Maintenance Facility would be the most likely location to carry out those services. A new maintenance facility also will be required at the eastern end of the corridor.

8.1 Equipment Operations Plan

8.1.1 Maintenance Facility Requirements

The proposed daily rail service between Los Angeles and the Coachella Valley will require a servicing and layover facility at each end of the Corridor for the overnight storage, cleaning, inspecting, and light maintenance of the trains. Each facility will provide tracks on which to store trains, as well as structures and supporting infrastructure to provide cleaning, servicing, overnight inspection, ground power, repair, light maintenance, and facilities for train crews going on and off duty. In addition, the Los Angeles facility will require infrastructure to support the restocking of food, beverages, and other provisions for the café car.

The facility location at the western end of the Corridor in Los Angeles is anticipated to be Amtrak's 8th Street Yard Service and Inspection facility in downtown Los Angeles. A new maintenance facility will be required at the eastern end of the Corridor to provide the servicing, cleaning, storage, and inspection. Space also will be needed at the eastern facility to stage a spare locomotive in order to support reliable operation of the service. The equipment deployment plan does not anticipate the need for train refueling to occur regularly at Coachella. Although, if any fueling of trains at Coachella is necessary, it would be done from trucks, so permanent storage tanks and fueling facilities will not be

required at this location. The proposed trainsets will use bidirectional push-pull equipment with a locomotive at one end and a cab car on the other and three cars in between, with an approximate trainset length of 411.5 feet. Refer to Section 6.2.3 for a more detailed description of the proposed passenger train consist characteristics. The minimal requirements for these facilities are as follows:

- Track (with access pad and collect/drip pans) to accommodate the trainsets required for each service phase
- Small building (approximately 2,000 square feet) for train crews to go on/off duty (see Figure 8-1 for example)
- Employee parking and access to the public road network
- Potable water and general utility services
- 480-volt electrical service for standby power
- Perimeter security fencing
- Site lighting

Figure 8-1. Example Maintenance Facility (Existing Goleta Layover)



If a pooled equipment arrangement with LOSSAN were implemented as part of the proposed Coachella Valley service, the layover facility in Coachella may require additional space or equipment, in order to accommodate modifications to fleet servicing practices currently being contemplated by LOSSAN. These include upgrading or expanding the servicing and maintenance capabilities of the facilities at endpoint locations to perform additional routine light servicing functions and/or train washing functions currently only performed in Los Angeles. As implementation planning for the Project continues, and funding is secured, RCTC will work with Caltrans and LOSSAN to determine what additional capabilities of the Coachella layover facility may be needed to support a pooled equipment fleet.

In addition to the light maintenance services provided at Coachella, a facility to provide heavy maintenance for locomotives and trainsets will be required. Currently, the primary maintenance facility for the LOSSAN Rail Corridor's Pacific Surfliner rolling stock is the Redondo Locomotive Maintenance Facility in Los Angeles. This facility, operated in tandem with an Amtrak Service and Inspection Facility located near 8th Street, contains a locomotive and car repair shop that performs safety inspections,

servicing, and maintenance of all Amtrak locomotive and rolling stock, including the rolling stock for long-distance trains, such as the Sunset Limited. Amtrak's Redondo Locomotive and Car Shop is one of the railroad's 15 systemwide major maintenance facilities that can perform all rolling stock maintenance activities except for the rebuilding and heavy overhaul of cars and locomotives (LOSSAN 2013). Additional functions carried out at the 8th Street Yard location include trainset corridor, café car restocking, and facilities for train crews going on and off duty. In consultation with Amtrak, it was determined that the Amtrak Redondo Locomotive Maintenance Facility and 8th Street Yard Service and Inspection Facility in downtown Los Angeles have the infrastructure and capacity to provide the needed maintenance, storage, inspection, crewing, servicing, and restocking functions for the proposed Corridor service.

As part of its annual operating contract with the LOSSAN Rail Corridor Agency, Amtrak is responsible for all maintenance activities for the Pacific Surfliner service. The LOSSAN Agency provides administration and maintenance supervision of the Pacific Surfliner equipment, most of which is owned by the State of California. Caltrans is responsible for managing overhaul, wreck repair, warranty work, and major and minor modifications made to state-owned rolling stock, in close coordination with LOSSAN and other JPAs who manage intercity passenger rail corridors. Caltrans also develops statewide fleet plans, uniform statewide equipment standards, and equipment deployment plans for all state-supported intercity passenger rail corridors in consultation with staff from each passenger JPA.

In the future, Caltrans and LOSSAN may contemplate establishing an independent maintenance facility in Los Angeles for state-owned and leased corridor passenger rail equipment. If such a facility were to be constructed, Caltrans and LOSSAN would work with the future Coachella Valley service entity and Amtrak on the development and use of a joint equipment maintenance, servicing, and inspection facility.

Specific details regarding terminal, yard, and support operations to deliver the passenger service improvements proposed by the Project will be determined Caltrans at a later stage of the Project.

8.1.2 Maintenance Facility Design Parameters

Host Railroad Requirements

In discussions with representatives from host freight railroad UP, which owns and operates the Eastern Section of the corridor, the following site requirements were provided:

- Minimum track centers from adjacent main track: UP will require 50 feet of separation
- Additional track: UP requested that in addition to the passenger train service track, the facility should include a set-out track for any railcars that require repairs

Design Criteria

The design criteria/parameters that were followed in preparing the conceptual site plans for maintenance facility are summarized in Table 8-1.

Table 8-1. Maintenance Facility Design Criteria

Design Parameter	Design Considerations
Overnight Train Storage	- One train will be stored overnight at the Coachella Valley Maintenance Facility - A second train will be stored overnight in Los Angeles.
Train wash	- A train wash will not be required at the Eastern terminus yard - Train washing will occur at the facility location at the western end of the corridor in Los Angeles.
Train Cars, Locomotive	Train will consist of one locomotive and a maximum of five coaches (will include a food service car); maximum train length: 600 feet
Tracks	- The Service Track will be a continuation of the track adjacent to the station platform, and will be 700 feet in length - A total of two stub-ended tracks will be provided: - Track access roads/pad adjacent to storage track to support service vehicles. At a minimum this pad should be long enough to provide access to the locomotive and all passenger cars. - Track collector/drip pans at either end of the Service Track (will include drainage to an oil/water separator to prevent overflowing during rain events).
Turnouts	- A turnout off the main track to the service track providing access to the maintenance facility and a turnout off the service track to the setout track; minimum turnout size for the main line turnout is No. 20 - Turnout size for turnouts that are on non-controlled tracks is No. 11
Crew House	- Small building (possibly trailer or other temporary structure) for crew change and maintenance base - Includes room to store basic cleaning supplies and minor replacement items (such as light bulbs, consumables, etc.)
Parking	Parking for up to ten employee vehicles
Wayside Power	480-volt electrical service for standby power
Water and General Utilities	- Toilet dumps adjacent to each of the coaches - Sewer connections to the toilet dump - Potable water for drinking onboard the train - Ground forced air connections
Trash Receptacle	A trash enclosure for a minimum of two trash containers

Table 8-1. Maintenance Facility Design Criteria

Design Parameter	Design Considerations
Safety and Security Features	- Perimeter security fencing - Site lighting
ROW	Minimize the need for property outside existing UP ROW; no additional property would be required

Notes:

ROW=right-of-way; UP=Union Pacific Railroad

8.1.3 Maintenance Facility Location

The maintenance and layover facility would be located adjacent to the terminus station at the Coachella site. The Coachella site, shown on Figure 8-2, utilizes a portion of UP ROW and will be located east of the proposed station. Ingress and egress into the facility will be access from Indio Boulevard (California Highway 111). There may be underground utilities that will require to be encased or relocated.

8.1.4 Maintenance Facility Conceptual Cost Estimate

A conceptual cost estimate for a maintenance facility is provided in Table 8-2. These costs do not include the cost to lease or acquire ROW for the property.

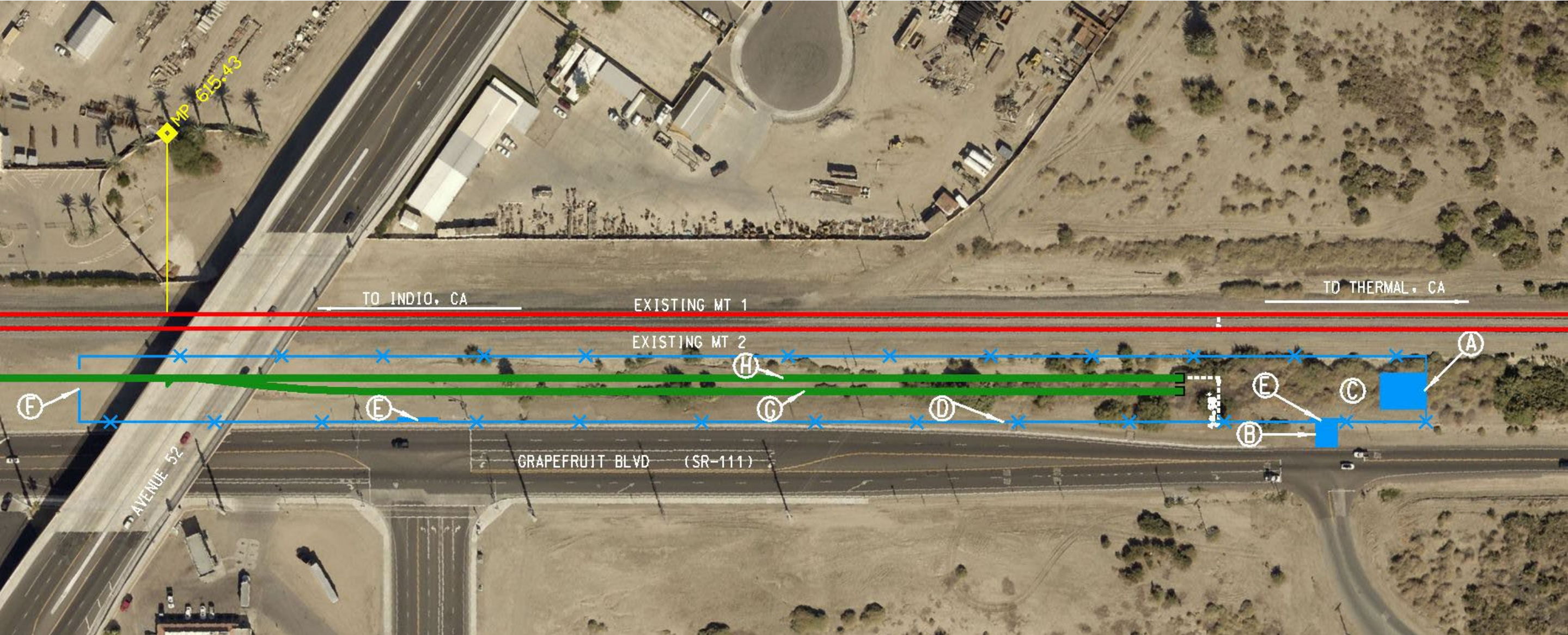
Table 8-2. Maintenance and Layover Facility Summary Capital Cost Estimate

No.	Cost Element	Notes	2019 Cost (in USD)
1	Site preparation (grading, utilities, etc.)	0.5 acres (approximate)	\$65,000
2	Track work and other track material	Approximately 1,000-foot layover and setout tracks	\$945,100
3	Turnout	No. 9 Turnout	\$260,000
4	Perimeter fencing	—	\$75,000
5	Lighting	—	\$50,000
6	Parking lot	—	\$35,000
7	Crew house	—	\$2,300,000
Total Construction Cost (USD)			\$3,730,100

The costs stated in Table 8-2 do not include additive costs, such as railroad flagging, engineering design, ROW, agency permits, or contingencies and escalation factors. See Chapter 9 for a programmatic-level cost that includes additive percentages.

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Figure 8-2. Coachella Maintenance Facility Concept



LEGEND

A	Crew House (40' x 50')	E	Sliding Gate (24')
B	Access Road	F	Track Gate (12')
C	Employee Parking	G	Layover Track
D	Fence	H	Setout Track



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9 Conceptual Engineering and Capital Programming

This chapter describes the projected infrastructure requirements to support the Project. Infrastructure elements include track, signal, station, and ROW. Rolling-stock/vehicle criteria, service assumptions and projections, and operating criteria, which were used to develop service plans and operating simulations, are addressed in Chapter 6.

Each of the infrastructure alternatives presented in this chapter were developed by RCTC to an approximately 10 percent level of design (conceptual design) using readily available data from existing sources as well as data provided by host railroad UP. Publicly available data included local, county, and municipal data on land ownership and parcel boundaries, which were used to determine the limits of existing UP ROW, as well as exact track locations. The conceptual designs were sufficient to determine the infrastructure levels that would meet operational needs in computer-based operations simulations, as well as to perform comparative impact analyses for NEPA assessments and to support the decision-making for the Preferred Alternative presented in the Tier 1 Program EIS/EIR. Guidelines for the conceptual design were developed and presented in the Coachella Valley Rail Basis of Design, which is included in Appendix F. Detailed technical criteria for the Project are included in Appendix G.

As previously mentioned, the Western Section of the Corridor between the cities of Los Angeles and Colton, California already has existing infrastructure and passenger rail facilities and agreements in place to support proposed Coachella Valley rail service. At present, capacity exists, or has been agreed upon to construct, on both the BNSF San Bernardino Subdivision and the western route terminus trackage at LAUS, to accommodate the proposed Coachella Valley rail service without the need for additional capital projects. Therefore, the scope of the infrastructure and capital planning effort presented in this chapter is limited to the Eastern Section of the Corridor, which is along the UP Yuma Subdivision between the cities of Colton and Coachella, California.

9.1 Corridor Infrastructure

The Preferred Alternative identified in the Tier Final EIS/EIR for the Project identified a new third main track for the approximate 76-mile segment parallel to the existing double-track UP Yuma Subdivision. The Preferred Alternative includes up to six potential station locations in the Eastern Section of the Corridor, at Loma Linda/Redlands, the Pass area, the City of Palm Springs, the Mid-Valley area, the City of Indio, and Coachella as the eastern terminus of the Corridor. This alternative provides a station track only at the proposed Loma Linda Station; the other intermediate station stops will be made on the proposed third main track. This alternative also provides the greatest ability to minimize disruption to existing and projected freight and passenger rail services that use the corridor. The second infrastructure scenario, the low build scenario, represents the potential minimum infrastructure that might be needed and does not correspond directly to an alternative in the Tier 1/Program EIS/EIR. More details of the low build scenario are described in Appendix H, and schematics are included in Appendix I.

Due to the length of the approximately 76-mile third main track, segmentation is required based on route characteristics. Eight route segments for the Preferred Alternative are listed in Table 9-1. These eight segments will be addressed within this section of the study and within the capital planning section. Appendix J includes schematics for the Preferred Alternative showing 5 track-miles per sheet

and includes existing and proposed railroad MPs, stations, main tracks, controlled sidings, yard entrances and exits, grade crossings and grade separations, bridges, culverts, horizontal alignment, and freight and passenger track speeds.

Table 9-1. Build Alternative Option 1 Scenario Route Segments

Segment No.	From MP	To MP	Segment Name	Segment Length
1	538.50	540.00	BNSF Colton Connector	1.50
2	540.00	546.00	Colton to Loma Linda	6.00
3	546.00	560.00	San Timoteo Canyon	14.00
4	560.00	571.00	Beaumont Pass Area	11.00
5	571.00	587.00	Cabazon to West Palm Springs	16.00
6	587.00	598.00	West Palm Springs to Rancho Mirage	11.00
7	598.00	612.00	Rancho Mirage to Indio	14.00
8	612.00	616.00	Indio to Coachella	4.00

Notes:

MP=Milepost

9.1.1 Third Main Track Design Characteristics

The following general design characteristics of the Preferred Alternative were developed in conjunction with the RTC Modeling Team and UP Network Planning staff:

- *Platform edge on every main track:* UP staff made this a requirement to ensure interoperability among all tracks and maintain a high level of passenger service reliability by enabling passenger trains to serve a station platform from any main track during periods when track maintenance or service disruptions may be occurring on an adjacent track.
- *No new at-grade crossings:* In-station egress between platforms must be made via a grade-separation. For the purpose of this study, a pedestrian overpass will be considered as the standard grade separation.
- *CP spacing of approximately 15,000 feet:* UP provided this criterion to allow freight-train staging between adjacent CPs in order to minimize passenger-freight train conflicts and maintain a high level of passenger service reliability. Train consists routinely exceed 12,000 feet on today's railroads; the 15,000-foot CP spacing will allow greater operational flexibility by permitting a passenger train to maneuver around a staged freight train, regardless of which track the freight train occupies.

The remaining portion of this section will review infrastructure features of each of the eight route segments. A key goal among stakeholders during the Project implementation phase is to avoid disruptions to existing intercity passenger, commuter, and freight rail service. Therefore, RCTC is recommending an incremental construction approach to building the infrastructure improvements. Under the incremental construction approach, the Project would be constructed in logical segments of

approximately 8 to 10 miles. Some segments may vary in length depending on available funding, complexity of construction, identification of logical endpoints for the infrastructure improvements, and rail operations. More details on Project phasing can be found in Section 13.

9.1.2 BNSF Colton Connector (Milepost 538.50 to 540.00)

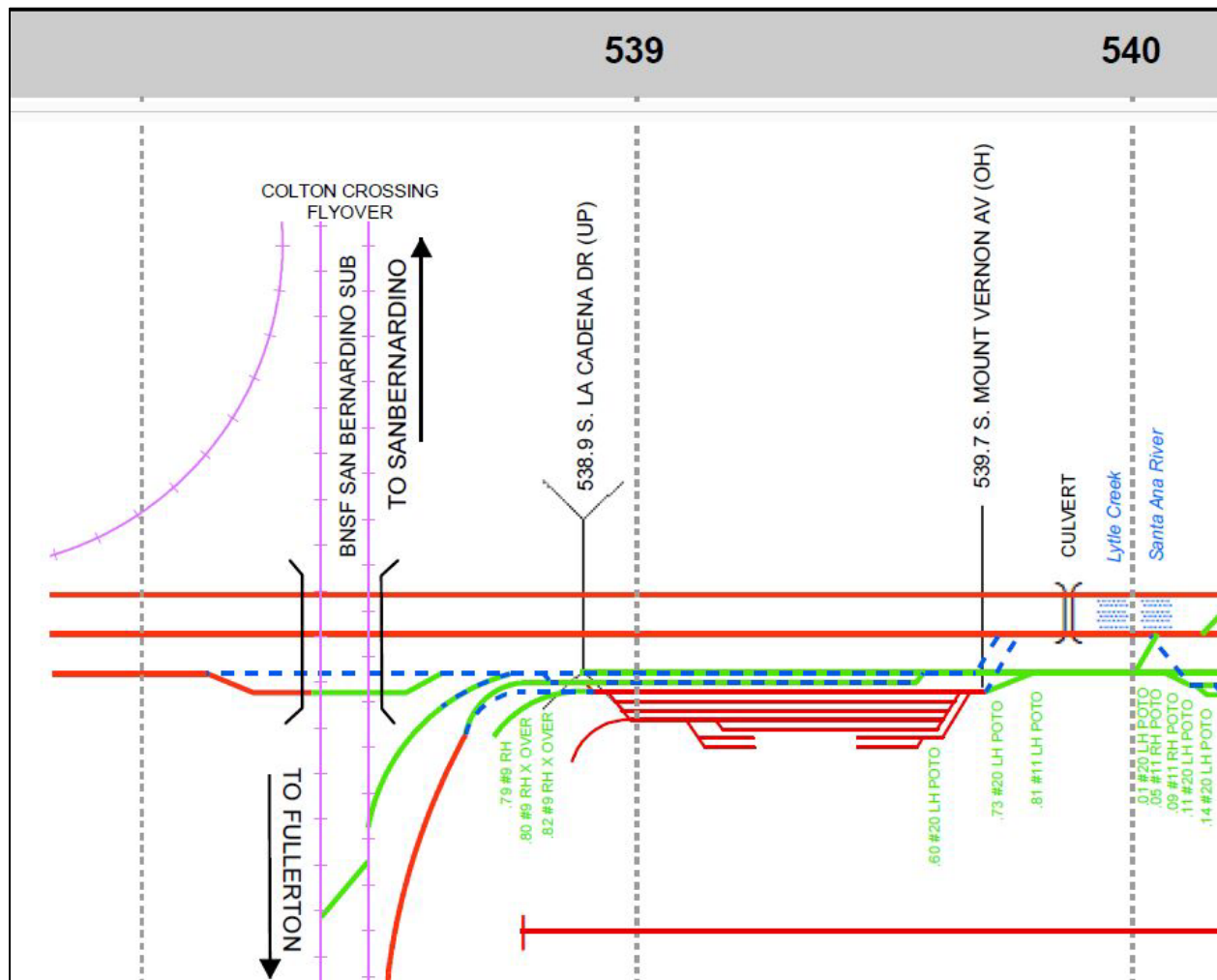
The junction with the BNSF Railway's San Bernardino Subdivision in Colton currently consists of a rail-to-rail grade-separation known as the Colton Crossing where the main tracks of the UP Yuma Subdivision are elevated above the BNSF San Bernardino Subdivision main line tracks, as shown on Figure 9-1. This intersection is located in Colton, California, in San Bernardino County, approximately 7 miles north of the Riverside passenger station. An existing single-track connector track in the southeast quadrant of the crossing, known as the Mount Vernon connector, allows train egress between the two railroads. At-grade crossings of two-yard lead, or drill tracks, cross the BNSF main tracks, as shown on Figure 9-1.

Figure 9-1. Colton Crossing (Mount Vernon Connector at Lower Left)



The geographic extent of the Route Segment 1, BNSF's Colton Connector, includes all proposed infrastructure features west of the Santa Ana River, as shown on Figure 9-2.

Figure 9-2. BNSF Colton Connector, Build Alternative Option 1 Segment



Major infrastructure improvements with the BNSF Colton Connector route segment include:

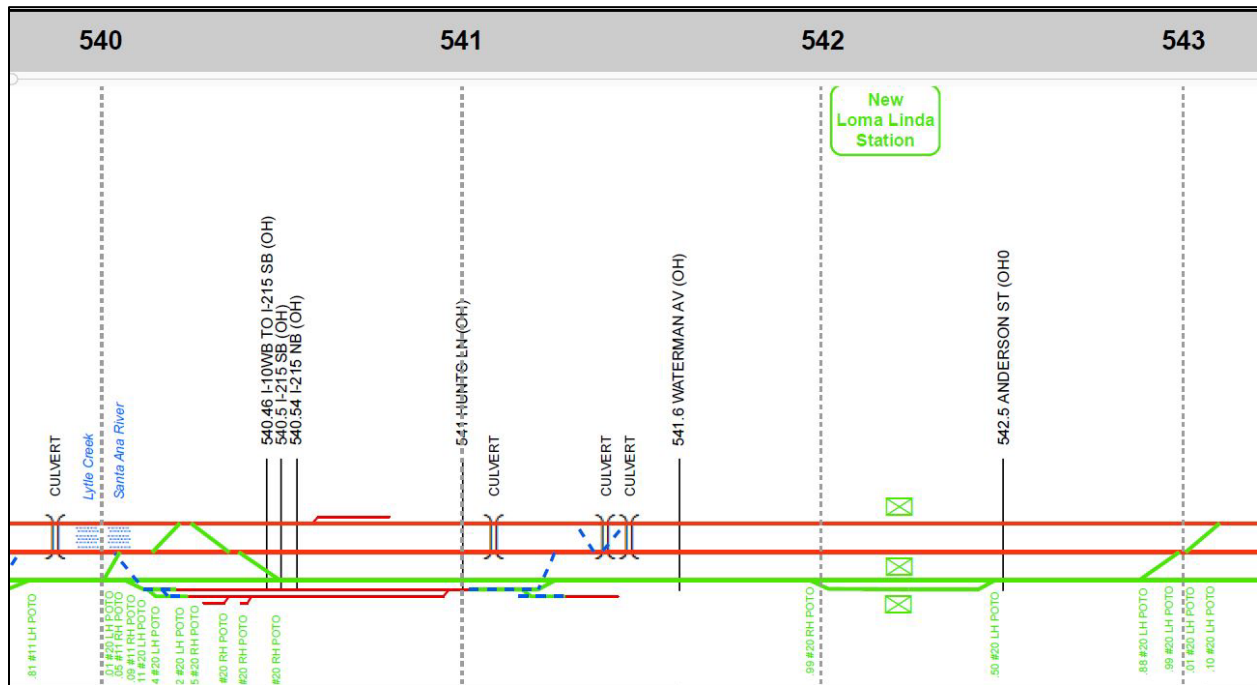
- A second Mount Vernon connector track, which will enable passenger trains to bypass freight trains stopped on the existing Mt. Vernon connector awaiting permission to proceed onto the adjacent railroad's territory;
- New crossover on the BNSF San Bernardino Subdivision to access the second Mount Vernon connector from either main track;
- Relocated flange-bearing diamond crossings (at-grade crossing);
- A new ladder-track connection for the west end of the Old Colton Yard;
- Relocated tail-track at the west end of the Old Colton Yard; and,
- Rebuilt east-end connector of the Old Colton Yard.

9.1.3 Colton to Loma Linda (Milepost 540.00 to 546.00)

The next route segment is an approximately 6-mile portion of the Corridor that begins at the Santa Ana River and extends through the City of Loma Linda to approximately MP 546. This route segment is located in San Bernardino County.

Figure 9-3 presents, in schematic form, a portion of the track schematics showing the infrastructure elements included in this segment. Only the westerly portion of the Colton to Loma Linda segment is shown on Figure 9-3.

Figure 9-3. Colton to Loma Linda, Westerly Portion



The proposed Loma Linda/Redlands station is depicted on Figure 9-3. This station location features platforms serving all three main tracks and includes a controlled siding (5,755 feet) that accesses an additional platform. The controlled siding will allow for a scheduled afternoon meet of passenger trains in each direction that occurs at this location under the conceptual timetables developed. The additional controlled siding will permit the passenger trains moving in each direction to pass and make simultaneous station stops without delaying one another or impacting freight operations on the adjacent main tracks. This location, where freight trains are routed and staged for entry/exit to BNSF's San Bernardino Subdivision at Colton (as well as entry/exit to UP West Colton terminal facility), does not have sufficient track capacity to accommodate a planned meet of passenger trains making station stops on two of the line's proposed three main line tracks. Holding with the design parameter of having a platform-edge on every track, three platforms will be required at the Loma Linda/Redlands Station, which would maintain passenger train reliability without impacting existing and projected freight operations.

In addition to the Loma Linda/Redlands Station and Station Track, infrastructure features of the Colton to Loma Linda route segment include:

- A railroad bridge across the Santa Ana River, approximately 950 feet in length;

- New universal crossovers at the east end of the Santa Ana River, including removal of crossovers shown as dashed blue lines on Figure 9-3;
- A new crossover on the east side of the Loma Linda Station (present location of the Bryn Mawr hold signal);
- Reconnected industry tracks on the easterly side of the Santa Ana River;
- Roadway overpasses (Mount Vernon Avenue, I-215, Hunts Lane, Waterman Avenue, Anderson Street, Mountain View, and Barton Road) may require modifications in the form of pier protection walls or perhaps reconstruction of some or all of the overhead structures; and,
- Quiet zone crossings in Loma Linda: Whittier Avenue and Bryn Mawr Avenue are designated by the City of Loma Linda as quiet zone crossings whereby supplemental safety measures were installed as risk-reduction features in lieu of the routine sounding of locomotive horns. Raised-medians comprise the existing supplemental safety measures at each crossing. The addition of a third main track at these crossings will necessitate revisiting the quiet zone calculations for the crossing. The Project would provide either extensions of the raised medians or new exit gates. The selection of these design features will be determined in conjunction with the California Public Utilities Commission, FRA, City of Loma Linda, and UP.

9.1.4 San Timoteo Canyon (Milepost 546.00 to 560.00)

The route segment in San Timoteo Canyon is characterized by its topography. Progressing easterly from Loma Linda, the surrounding area becomes more rural. The UP Yuma Subdivision begins to follow San Timoteo Creek and a parallel roadway: San Timoteo Canyon Road. This road parallels the railroad from the City of Redlands in San Bernardino County to the City of Beaumont in Riverside County.

Although this 14-mile segment does not include any station locations, there are significant engineering challenges, most notably the track horizontal alignment. The existing horizontal alignment for Main Track 1 and Main Track 2 includes an extensive number of curves. Many compound curves are located in this segment. This is also the steepest portion of the corridor. The average track grade between Ordway and Beaumont is 1.55 percent, with an elevation gain of 1,131 feet, the route climbs continually eastward for 13.8 miles.

Some of the significant infrastructure features for this route segment include:

- New universal crossovers at Ordway, including removal of the existing Ordway crossovers;
- Additional crossovers at Hinda between Main Track 2 and Main Track 3;
- At-grade crossing modifications within this segment to address significant design challenges associated with expansion of the main line to three tracks. Most notably, a skewed crossing of San Timoteo Canyon Road in Redlands and the Live Oak Canyon Road crossing in unincorporated Riverside County, will be difficult;
- The City of Redlands is in the process of establishing a quiet zone at Alessandro Road. The Project will need to consider how to implement supplemental safety measures to continue the city's quiet zone; and,
- Solutions to address the segment's drainage challenges, resulting from the corridor's close proximity to the San Timoteo Creek watershed. Engineering solutions to address known flooding issues will be required and developed at a more detailed level of design.

9.1.5 Beaumont Pass Area (Milepost 560.00 to Milepost 571.00)

The Beaumont Pass Area segment comprises an 11-mile route segment from MP 560 to MP 571. As the tracks emerge from San Timoteo Canyon, the route characteristics change from a rural setting to a more developed area. Compared with areas to the west, curves are broader and track speeds increase. The apex of the route is achieved near MP 563 at an elevation of 2,591 feet proceeding easterly from the summit, grades descend at a rate comparable to grades on the westerly slope of Beaumont Hill, but the topography is not as confined as San Timoteo Canyon. The most prominent feature of this segment is that it closely parallels I-10. No passenger stations are proposed within this segment; however, it includes the following major infrastructure components:

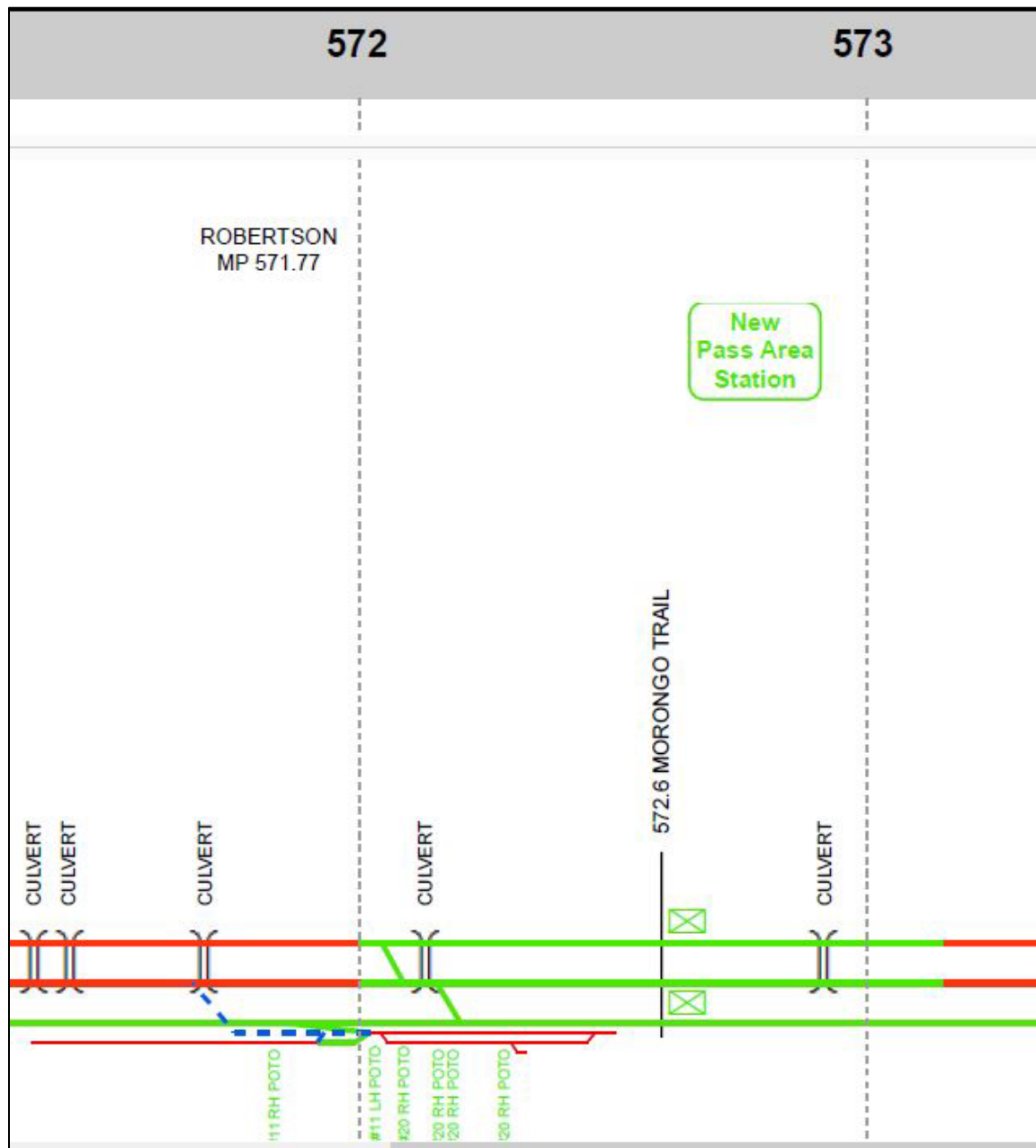
- New universal crossovers at Beaumont, and removal of the existing Beaumont crossovers
- Reconnection of industry tracks at Beaumont and an industry lead track
- Roadway/highway overpass structures may require retrofitting with pier protection walls or, in some cases, complete rebuilding of structures. Some newer overhead highway bridges, clear-span the UP ROW; however, there are likely close-clearance issues with major structures such as at SR 60 and SR 79
- Roadway underpasses will require new railroad bridges. These include Highland Springs Avenue (MP 564.2), Sunset Avenue (MP 566.8), and South Eighth Street (MP 567.7)
- At-grade crossing modifications

9.1.6 Cabazon to West Palm Springs (Milepost 571.00 to Milepost 587.00)

East of the City of Banning, the terrain becomes more desert-like. The transition from upland chaparral vegetation to the Sonoran Desert occurs within this segment.

The Pass Area Station would be located in this segment, as shown on Figure 9-4. In addition to the new third main track, portions of existing Main Track 1 and Main Track 2 will require reconstruction to accommodate the station platforms as the platforms must be located on tangent track.

Figure 9-4. Pass Area Station



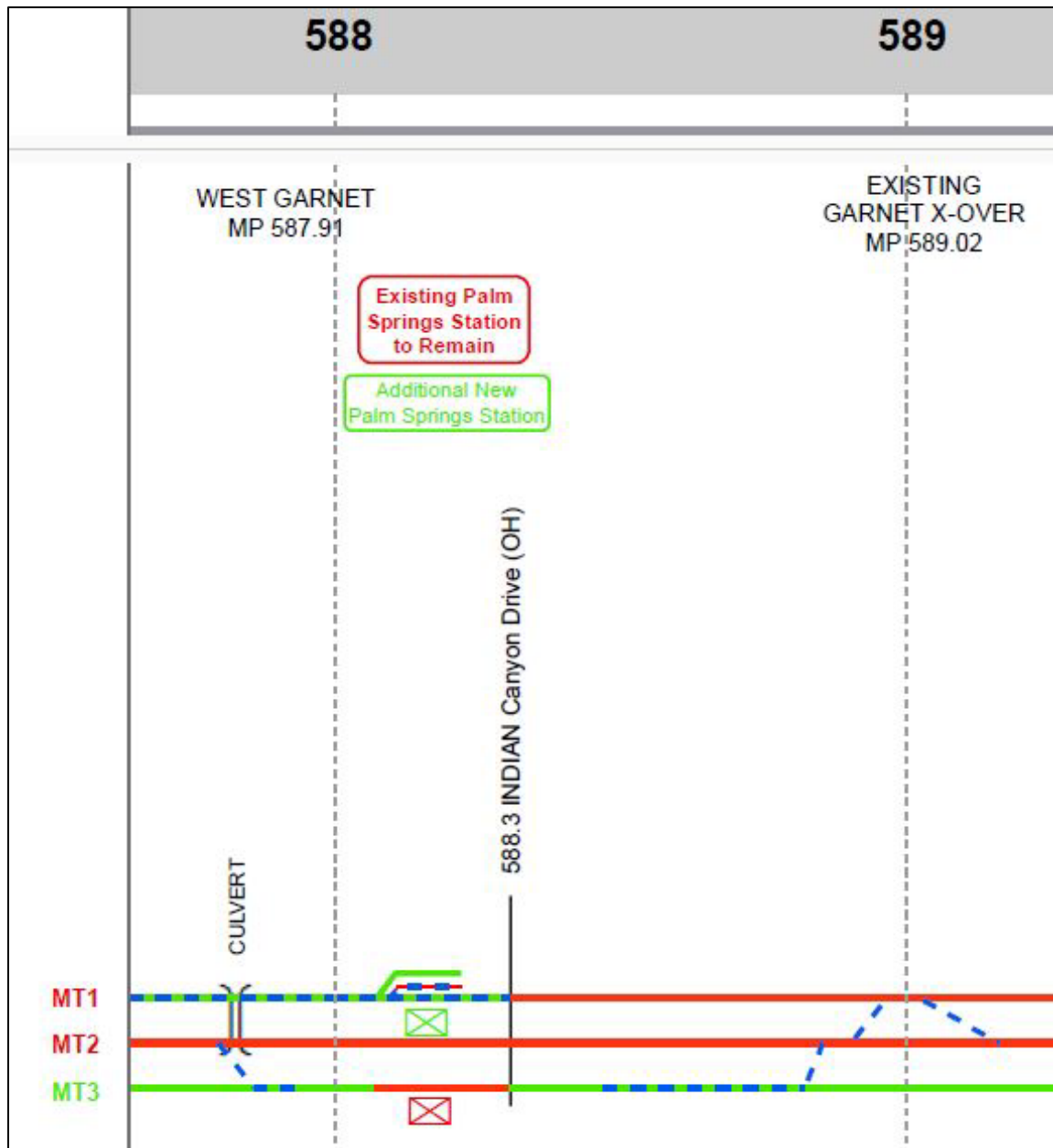
Additional notable infrastructure in this segment includes:

- New connections to the Robertson mining industry tracks;
- New crossovers on each approach to the new station;
- Relocated universal crossovers at Cabazon and a new West Palm Springs universal at MP 586;
- The SR 111 roadway overhead will require survey data before determining whether a retrofit strategy is necessary; and,
- At-grade modification to Morongo Trail.

9.1.7 West Palm Springs to Rancho Mirage (Milepost 587.00 to Milepost 598.00)

This segment includes the existing Palm Springs Station. As shown on Figure 9-5, a horizontal track alignment solution was developed to retain the existing side platform while providing a center-platform between Main Track 1 and Main Track 2.

Figure 9-5. Palm Springs Station



Other major infrastructure items for this route segment include:

- Reconstruction of the Indian Canyon Drive roadway overhead;
- Removal of the Garnet crossovers;

- Reconstruction of the West Garnet setout track on Main Track 1; and,
- Removal and reconstruction of the Rimlon crossovers.

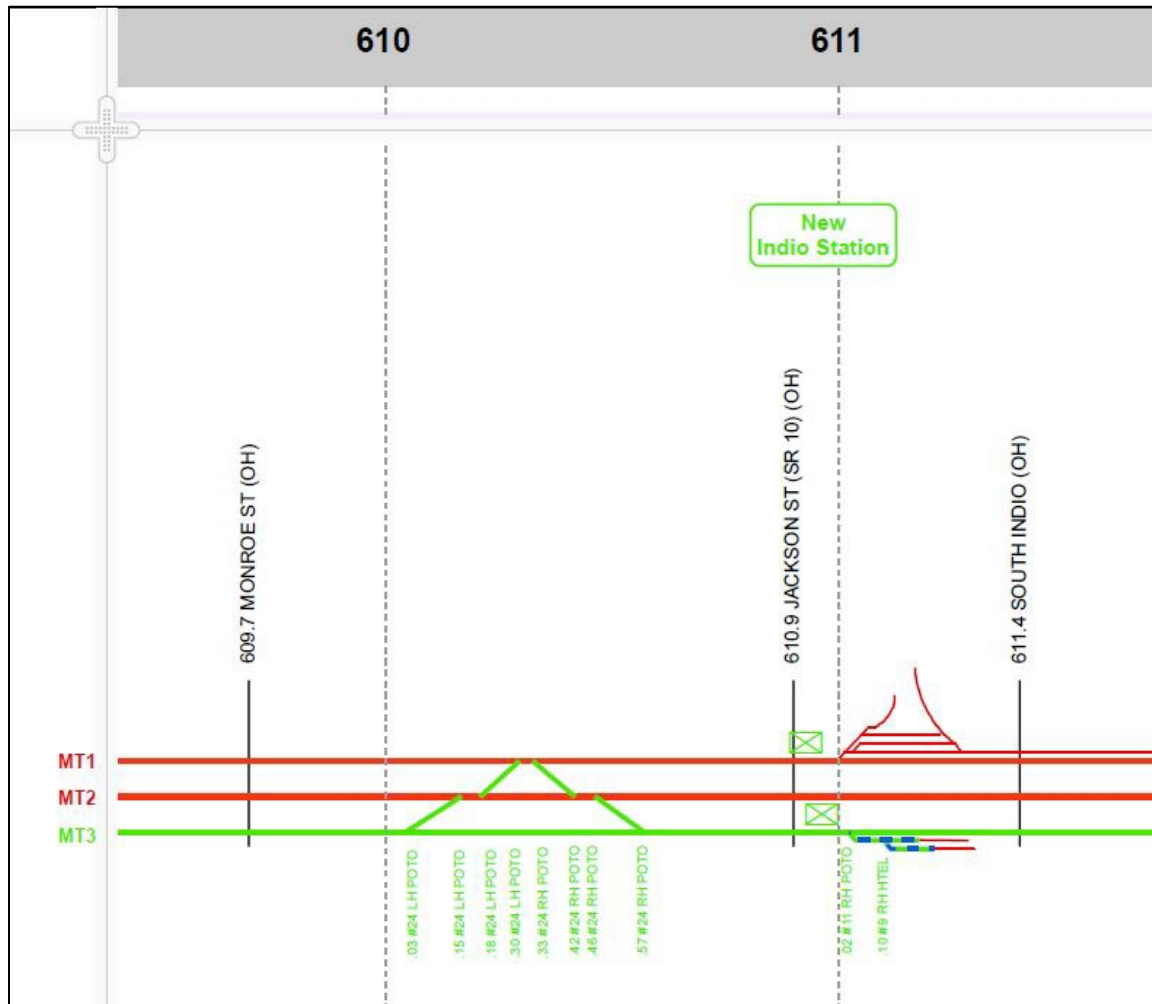
9.1.8 Rancho Mirage to Indio (Milepost 598.00 to Milepost 612.00)

The Mid-Valley Station and Indio Station would be included in this segment. The Mid-Valley Station location, to be located on the northern jurisdictional limit of the City of Rancho Mirage, poses several geometric constraints. As shown on Figure 9-6, two adjacent overhead roadway structures west of the proposed Mid-Valley Station location, Ramon Road and Bob Hope Drive, likely do not have sufficient capacity to accommodate a third track based on the study team's interpretation of existing air photos and would likely require major reconstruction. See Figure 9-6 for a schematic view of the proposed Mid-Valley Station location. Figure 9-7 shows the Indio Station.

Figure 9-6. Mid-Valley Station, Potential Location



Figure 9-7. Indio Station, Intermediate Stop Configuration



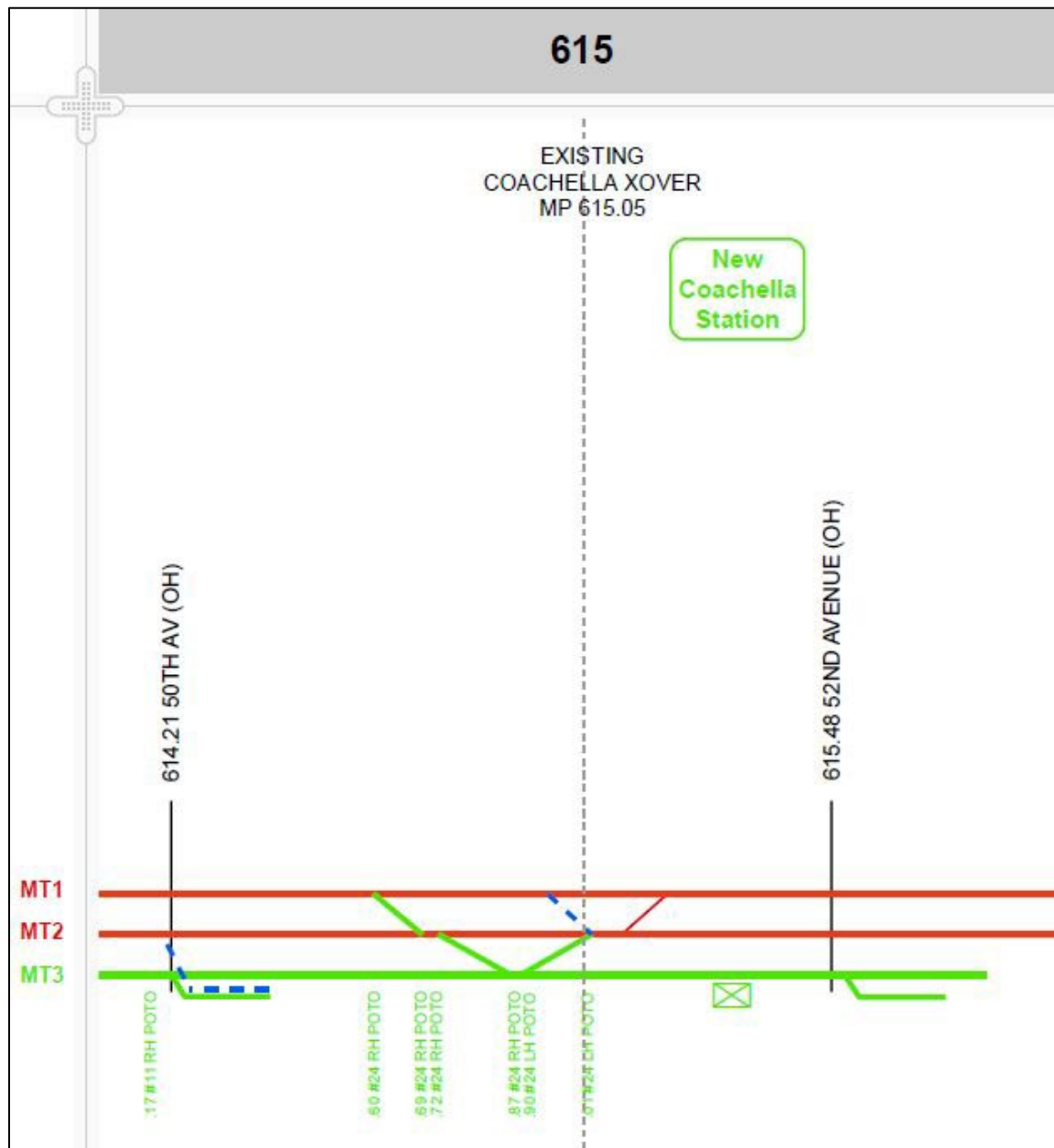
In addition to the stations that are included in the Rancho Mirage to Indio route segment, several major infrastructure items are included:

- Overhead highway bridges: all of the public roadway crossings on this segment are grade separated. Additional analyses need to be conducted to determine whether modifications to the existing structures are required for the third main track. Ramon Road and Bob Hope Drive would likely require major reconstruction
- Reconstruction of the existing team tracks just east of the Indio Station
- New cross-overs on MT 1, MT 2, and MT 3 west of the Indio Station

9.1.9 Indio to Coachella (Milepost 612.00 to Milepost 616.00)

This segment includes the last 4 miles of the route from Indio to Coachella and the proposed Coachella station. This segment closely parallels old SR 111, also known as Indio Boulevard or Grapefruit Boulevard depending on the location. Figure 9-8 shows a schematic view of the proposed Coachella station. There is extremely limited ROW between the roadway and adjacent tracks. UP specifically requires a 50-foot offset between existing MT 2 and the Coachella Station track (3,685 feet) for the future expansion.

Figure 9-8. Coachella Station, Build Alternative Option 1 Configuration



Other major infrastructure items beyond the Coachella Station for this route segment include:

- New cross-overs on MT 1, MT 2, and MT 3 west of the Coachella Station;
- Remove west leg of the existing cross-over and leave east leg in place;
- A new light maintenance facility consisting of layover tracks and supporting infrastructure to provide cleaning, servicing, inspection, and light maintenance; and,
- Reconnect existing setout track on MT 3.

9.2 Capital Cost Estimating Methodology

Capital cost estimation was based on a rough order of magnitude unit costs applied to cost categories that were identified during the conceptual engineering evaluation of the Corridor. Unit costs were derived from recent similar construction bids for public agencies in the Southern California region. Unit cost categories are listed below, and non-construction cost categories, expressed as a percentage of construction costs, are provided in Table 9-2. This methodology deviates from the FRA Standard Cost Category Sheet by providing greater detail in generating the cost estimate.

- Culverts and drainage – includes the costs of drainage structures to protect the rail facilities from storm water damage
- Earthwork – includes the costs of clearing, demolition, and fine-grading
- Grade crossings – includes the costs of constructing grade crossing and associated infrastructure
- Maintenance facility
- Signals and communications
- Stations
- Structures - highway bridges
- Structures - railroad bridges
- Track
- Special trackwork
- Removal of track and turnouts
- Turnouts

Table 9-2. Additive Cost Percentages, As Percentage of Construction Costs

Additive Costs Item	Description	Percentage
Construction contingency	Contingency to allow for fluctuations in materials costs or labor market prevailing conditions.	15
Civil design	Preliminary and final design of track and civil design elements.	9
Engineering support during construction	Support during construction for track and roadway modifications.	3
Signal and communications design	Railroad signal engineering support. This function may be performed by UP or its designated consulting firm.	3
Signal and communications support during construction	Signal and communication cutover activities.	2
Project management	Lead agency staff costs to lead the Project through design into construction.	4

Table 9-2. Additive Cost Percentages, As Percentage of Construction Costs

Additive Costs Item	Description	Percentage
Construction management	On-site supervision on behalf of the lead agency during construction.	8
Flagging	Railroad personnel provide on-site safety supervision during construction and pre-construction activities	6
Agency costs	Interagency costs, such as for Caltrans to review and oversee highway bridge reconstruction or retrofitting.	10
Project reserve	In addition to the foregoing percentages, a 20 percent Project reserve is included in the capital cost estimate due to current level of investigation.	20

Notes:

Caltrans=California Department of Transportation; UP=Union Pacific Railroad

Contingencies

There are still uncertainties at the current 10 percent design level. For the Project, these uncertainties include limited hard surface topography information, limited geotechnical data, utility details, drainage details, and stormwater and erosion control requirements. Contingencies are a way of including an allowance for uncertain Project costs as a percentage of construction costs. Design details are inversely related to contingencies. As the percentage of design detail increases, the percentage of contingency is anticipated to decrease. RCTC applied a 15 percent contingency, in addition to a 20 percent Project reserve at the 10 percent (concept) level developed for this SDP.

9.3 Capital Cost Estimate

A summary of capital costs per route segment is summarized in Table 9-3. Detailed cost descriptions are included with Appendix K.

Table 9-3. Capital Cost Estimate (2019 Dollars)*

Segment No.	Segment Name	Estimated Cost Per Segment (USD)
1	BNSF Colton Connector	\$27,000,000
2	Colton to Loma Linda	\$243,200,000
3	San Timoteo Canyon	\$97,500,000
4	Beaumont Pass Area	\$205,500,000
5	Cabazon to West Palm Springs	\$203,200,000
6	West Palm Springs to Rancho Mirage	\$149,800,000

Table 9-3. Capital Cost Estimate (2019 Dollars)*

Segment No.	Segment Name	Estimated Cost Per Segment (USD)
7	Rancho Mirage to Indio	\$312,900,000
8	Indio to Coachella	\$182,300,000
—	Maintenance Facility	\$7,200,000
—	Rolling Stock (2020 Dollars)	\$83,400,000
Total		\$1,511,600,000

Notes:

* Unless indicated otherwise

Costs are rounded to the nearest \$100,000.

Station costs are included in their respective segment.

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10 Financial Plan and Performance

This chapter presents operating and financial projections for the Project. The methods, assumptions, and outputs for operating expenses for the train services are addressed. Documentation of key assumptions is included, along with a description of how unit costs and quantities are derived.

An estimate of the profit and loss statement for the service is also presented, as well as details of capital replacement and overhaul costs.

10.1 Costing Methodologies and Assumptions

The O&M cost estimates for the Project were derived from recent operating cost estimates for Amtrak Pacific Surfliner service. The Pacific Surfliner was identified as a relevant basis for Project cost estimation due to its regional proximity and its presence as a connecting service. Total O&M expenses, as well as total seat miles for the Pacific Surfliner, were available from Amtrak Performance Reports. The January 2020 Performance Report, which represented the most recent data available at the time of analysis, referenced costs for FY to date (starting October 2019). This data was used to derive a cost per seat mile in 2019 dollars.

Total O&M expenses included in the Amtrak Performance Report reflect:

- Salaries, wages, and benefits
- Train operations
- Fuel, power, and utilities
- Materials
- Facility, communication, and office
- Advertising and sales
- Casualty and other claims
- Professional fees and data processing
- All other expenses

Cost per seat mile, rather than cost per train mile, was used to derive O&M cost estimates for the Project as the train length for the Surfliner differs from the proposed Project. The Surfliner operates six cars with a seated capacity of 420, while the proposed Project is assumed to operate four cars with a seating capacity of 323. Table 10-1 shows the calculation of cost per seat mile for the Pacific Surfliner. Using cost per seat mile to derive operating cost is supported by a review of O&M costs for other California intercity rail services from the January 2020 Performance Report (Amtrak 2020b).

Table 10-1. Pacific Surfliner Operation and Maintenance Cost Estimates, January 2020 Performance Report

Cost element	Cost
Total O&M expenses, FY to date	\$45.3m
Total seat miles, FY to date	\$273m
Cost per seat mile, 2019 Dollars	\$0.17

Notes:

FY=fiscal year; O&M=operating and maintenance

10.1.1 Summary of Operating Costs

The total operating costs were developed for the forecast years in 2019 dollars, based on a unit cost per seat mile of \$0.17. Daily round trips in the forecast years are the same for both weekdays and weekend days. With four one-way trips daily, a route length of 144 miles and a planned seating capacity of 323, total annual O&M cost is estimated at approximately \$11,545,000, as shown in Table 10-2. No change to the operating patterns is assumed throughout the forecast years.

Table 10-2. Operating Data and Costs through Forecast Years (2019 Dollars)

Operating Metric	2024	2044
Daily one-way trains	4	4
One-way route miles	144	144
Seated capacity	323	323
Cost/seat mile	\$0.17	\$0.17
Annual train miles	210,240	210,240
Annual seat miles	67,907,520	67,907,520
Annual O&M cost (rounded)	\$11,545,000	\$11,545,000

Notes:

O&M=operating and maintenance

10.2 Route Profit and Loss Statement

An estimate of the profit and loss statement for the route is provided in Table 10-3 based on operating cost forecasts as well as the ridership and revenue estimates presented in Chapter 5.

Table 10-3. Estimated Profit and Loss (2019 Dollars)

Performance Metric	2024	2044
Projected annual ridership (six stops east of Colton)	204,100	338,500
Route Profit/Loss		
Ticket revenue	\$4,760,000	\$7,900,000
Auxiliary revenue	\$610,000	\$1,010,000
Projected O&M costs	\$11,545,000	\$11,545,000
Subsidy required	(\$6,175,000)	(\$2,635,000)
Subsidy per boarding	\$30.25	\$7.78
Revenue recovery ratio	47%	77%

Notes:

O&M=operating and maintenance

10.3 Railcar Overhaul and Replacement

Periodic capital investments in equipment overhauls and replacement are necessary to maintain the locomotive and rolling stock in a state of good repair. In discussion with Caltrans, RCTC has assumed a projected service life of 20 to 25 years for the diesel locomotives and a projected service life of 30 years for the passenger cars. Overhauls of passenger rail equipment are often scheduled based on federally mandated clean, oil, test, and stencil inspection and air brake servicing requirements.

During the 20-year period following implementation of the proposed service, RCTC anticipates that each Charger locomotive will require life cycle preventive maintenance capital outlays consisting of one overhaul per unit every 4 years. During the 20-year period following implementation of the proposed service, RCTC anticipates that each bilevel passenger car will also require regular 4-year overhauls. Table 10-4 summarizes the passenger rail rolling stock overhaul capital costs estimated for the Coachella Valley Project, in 2019 dollars. The estimated unit costs presented in Table 10-4 were developed are based on Amtrak equipment overhaul estimates.

The rail equipment used on this corridor is assumed to be state-owned, consistent with other California intercity rail services. Future operating and equipment replacement cost estimates for the Project will include additional inputs and discussions with Amtrak.

Table 10-4. Railcar Overhaul Cost over 20-year Operational Period (2019 Dollars)

Vehicle Type	Total Overhauls Estimated	Estimated Unit Overhaul Cost (\$2019)	Estimated Total Cost (\$2019)
SC-44 Charger diesel locomotive (four units)	16	\$337,000	\$5.39 million
Bilevel coach car (three cars)	12	\$322,000	\$3.86 million
Bilevel coach café car (three cars)	12	\$389,000	\$4.69 million

Table 10-4. Railcar Overhaul Cost over 20-year Operational Period (2019 Dollars)

Vehicle Type	Total Overhauls Estimated	Estimated Unit Overhaul Cost (\$2019)	Estimated Total Cost (\$2019)
Bilevel business class car (three cars)	12	\$330,000	\$3.96 million
Bilevel coach baggage cab car (three cars)	12	\$358,000	\$4.30 million
Total equipment capital cost investment			\$22.17 million

10.4 Funding and Financing Considerations

Given the estimated capital requirements for full-service implementation, a project of this size might be delivered through the use of investment targets for the completion of a number of individual projects that collectively will deliver the full buildout and service. These targets should be individual projects or a series of inter-operable projects that can be funded through completion of construction and are of independent utility in that they prioritize capacity expansion on the subdivision. These targets can provide a pathway to the delivery of the initial increment of passenger rail service and could be memorialized in the development of an agreement with the host railroad. This approach also considers the competitiveness of funding programs and the limited potential for receiving grants funds to construct the full build in one increment.

Need for the Funding and Financing Strategy

Due to the complexity of the Project in terms of size of capital required, the multitude of potential public and private partners (i.e., the state, regional transportation planning agencies from each county, local governments, host railroads, and [potentially for station development] Native American tribes and private developers), and the time it takes to secure funding and financing sources, any funding and financing strategy for the Corridor should be developed to parallel the sequence of improvements that emerges as a series of targeted capital projects with independent utility.

Corridor investments will need to compete with other transportation projects for finite transportation funding resources at federal, state, and local levels. This underscores the importance of a funding and financing strategy to be considered early on in Project implementation so that Coachella Valley Rail investments can be integrated with state programs (such as the CSRP), the SCAG Regional Transportation Plan, the Riverside County and San Bernardino County Transportation Improvement Programs, potential sales tax measures, and other improvement and funding plans for the governmental agencies involved with this Project.

As the Project's capital requirements are unlikely to be provided for by only one funding source, there is the need to identify a mix of funding and financing sources.

The funding and financing strategy could also consider an alignment of interests between freight, interstate passenger, and intercity passenger rail needs. Under an incremental approach, the completion of targeted capital projects may potentially provide a benefit to existing corridor users prior to any implementation of intercity passenger rail service. If such a benefit is identified and mutually recognized by the host railroad and the project sponsor, it should be defined and memorialized in any shared use agreements developed for the Project. In the Corridor's Eastern Section, this could also provide the beginning of a pathway toward the CSRP's long-term objective of connecting to the

Phoenix (Arizona) metropolitan region. Early investments along the Eastern Section should be identified as a state contribution in any discussion between the two states and the federal government.

The funding and financing strategy would further address the questions relative to the difficulty of securing the funding required, and the degree to which specific Project elements would qualify (and compete well) for funding. BCA will be needed for some grant programs and emissions quantification will be required for state programs relying on SB 1 dollars. Again, there will need to be cooperation with the host freight railroad in order to properly quantify these elements, agree on them, and then utilize them in grant applications.

10.4.1 Capital Plan Strategy

While the Project has assumed a full build, full-service scenario for planning purposes, an incremental/independent utility approach is a possible pathway to be explored. A capital plan tied to a funding and financing strategy brings together a summary of the estimates of the capital costs for the full-service investment options and should also describe the potential funding and financing options of an incremental approach to meet the infrastructure needs of the Eastern Section. A breakdown of estimated construction costs by Project segment and by type of capital improvement is provided in Table 10-5 to indicate the approximate magnitude of capital improvement costs that will need to be addressed in this strategy.

Table 10-5. Summary of Estimated Capital Costs

Segment No.	Segment Name	Estimated Cost Per Segment (USD)
1	BNSF Colton Connector	\$27,000,000
2	Colton to Loma Linda	\$243,200,000
3	San Timoteo Canyon	\$97,500,000
4	Beaumont Pass Area	\$205,500,000
5	Cabazon to West Palm Springs	\$203,200,000
6	West Palm Springs to Rancho Mirage	\$149,800,000
7	Rancho Mirage to Indio	\$312,900,000
8	Indio to Coachella	\$182,300,000
—	Maintenance facility	\$7,200,000
—	Rolling stock	\$83,400,000
Total		\$1,511,600,000

Notes:

Costs are rounded to the nearest \$100,000.

Station costs are included in their respective segment.

The following section describes a range of potential sources of the capital funds to build the Project and begins to associate the incremental approach of using targeted investment projects to begin the final design and construction of Eastern Section infrastructure projects.

Capital funding and/or financing for implementation of each of the investment options should also be derived from a mix of sources that may be secured by the participating entities in order to preserve flexibility in the determination of the Project implementation decisions and to ensure maximum availability of funds to support the Project. The sources may include a combination of:

- Federal competitive/discretionary grants and loans;
- State sources of transportation funding, including SB 1, gas and diesel taxes, and state bond proceeds dedicated to transportation;
- Contributions from regional transportation planning agencies in each county served by the corridor including allocations of federal formula funds (for certain eligible project components) outside of the competitive programs as well as locally derived state formula funds and locally derived tax return monies; and
- Contributions from cities and Native American tribes along the corridor which would benefit from the improved rail service.

10.4.2 Funding Sources

This section discusses the landscape of potential capital funding and financing sources that can be considered for the Corridor. This section also addresses the potential sources of revenue to operate the proposed services.

Given the early stage of the Project development that currently exists, this description of possible funding sources for the Project discusses only the program-level capital funding required. Some funding sources, such as federal discretionary grants for passenger rail implementation, may be awarded at an amount sufficient to implement the entire Project, whereas other funding sources are more typically utilized when large capital programs are implemented in phases. The capital and operating costs are preliminary and are subject to further refinement as the program moves further through the planning process. Discussion will be required with the potential funding partners and cooperating agencies regarding the preferred funding and financing strategy.

The following federal funding sources could be considered by Project sponsors as part of the Coachella Valley Rail Corridor Funding and Financing Strategy.

Federal Sources

Federal Railroad Administration

FRA is mainly in charge of creating and enforcing safety regulations for the national railroad network and administering federal rail funding. It offers the following programs to fund rail projects:

- **Consolidated Rail Infrastructure and Safety Improvements Program** – To improve the safety, efficiency, and reliability of passenger and freight rail systems.
- **Federal-State Partnership for State of Good Repair Program** – To fund capital projects that reduce the state of good repair backlog, improve performance, or expand or establish new intercity passenger rail service, including privately operated intercity passenger rail service if an eligible applicant is involved.
- **Restoration and Enhancements Program** – For operating assistance to initiate, restore, or enhance intercity passenger rail transportation.

- **Railroad Safety Technology Grant Program** – Grant funding for deployment of positive train control and complementary advanced technologies.
- **Railroad Crossing Elimination** – Provides funding to promote highway rail or pathway-rail grade crossing improvement projects that focus on improving the safety and mobility of people and goods. The program has \$3 billion appropriated over five years.

Federal Highway Administration

The Federal Highway Administration is mainly in charge of the construction, maintenance, and preservation of the nation's highways, bridges, and tunnels. It offers the following programs that intersect with rail projects.

- **Railway-Highway (Section 130) Crossing Program** – This program provides annual funding of about \$220 million to fund the elimination of hazards at railway-highway crossings to reduce the number of fatalities, injuries, and crashes. Funding is distributed to the states based on a formula that accounts for the number of public railway-highway crossings in the state. A state's apportionment of Section 130 funds may be used to improve safety at-grade crossings along the corridors.
- **Transportation Enhancements Program** – This program supports nontraditional transportation-related improvements. For rail, program funds can be used to support the rehabilitation and operation of historic transportation buildings and other structures, as well as the acquisition of abandoned railroad corridors.

Combined/Multimodal Programs:

- **USDOT Multimodal Discretionary Program, Rebuilding American Infrastructure with Sustainability and Equity** – Rebuilding American Infrastructure with Sustainability and Equity (formerly known as [BUILD] Better Utilizing Investments to Leverage Development and [TIGER] Transportation Investment Generating Economic Recovery) is a discretionary multimodal program administered by USDOT that provides competitive grants to fund investments in road, rail, transit, and port projects that promise to have a significant impact on the nation, a region, or a metropolitan area. Rebuilding American Infrastructure with Sustainability and Equity could help fund selected elements if the corridor investments were prioritized by the states and local governments in their choice of Rebuilding American Infrastructure with Sustainability and Equity projects.
- **USDOT National Infrastructure Project Assistance (MEGA) Program** – The MEGA Program was created in the Bipartisan Infrastructure Law of 2021 to fund major projects that are too large and complex for traditional funding programs. It provides competitive grants for highway, bridge, freight, passenger rail, and public transit projects of national and regional significance. The Coachella Valley-San Geronimo Pass Rail Corridor Service Program would be eligible as an intercity rail project to establish a new rail service connecting urban and rural areas in the Southern California region.

Federal Loan Programs

Limited discretionary federal funding for major transportation projects has led to increased reliance on federal loans, notably through the following and programs:

- **FRA Railroad Rehabilitation and Improvement Financing Loans** – Railroad Rehabilitation and Improvement Financing was created in 1998 to help railroad operators finance improvements to infrastructure and equipment. Eligible borrowers include railroad operators, state and local governments, government-sponsored authorities, and joint ventures that include at least one railroad. The program was designed to operate at no cost to the government, and therefore, it charges the credit risk premium to the borrower based on the borrower's financial health.
- **Federal Highway Administration Transportation Infrastructure Finance and Innovation Act program** – Created in 1998, the Transportation Infrastructure Finance and Innovation Act provides loans and loan guarantees for highway, transit, railroad, intermodal freight, and port access projects. According to the program guide, rail projects “involving the design and construction of intercity passenger rail facilities or the procurement of intercity passenger rail vehicles” are eligible for Transportation Infrastructure Finance and Innovation Act assistance.

State Sources

State of California

The 2018 CSRP offers an investment strategy that allows the state to focus on corridor-level rail investments to achieve service goals that will help in closing capacity gaps, improving corridor safety, and increasing the frequency and reliability of intercity passenger rail. This plan identifies short-, medium-, and long-term investments and costs, including the Corridor. Potential sources derived from state programs include the following:

- The Transit and Intercity Rail Capital Program was created by SB 862 (Chapter 36, Statutes of 2014) and modified by SB 9 (Chapter 710, Statutes of 2015), to provide grants from the Greenhouse Gas Reduction Fund to fund transformative capital improvements that will modernize California's intercity, commuter, and urban rail systems, and bus and ferry transit systems to significantly reduce emissions of greenhouse gases, VMTs, and congestion.
- State Rail Assistance SB 1, the Road Repair and Accountability Act of 2017, created the State Rail Assistance Program by directing a portion of new revenue specifically to commuter rail and intercity rail, estimated at almost \$240 million over the next 5 years. The majority of program funding is directed by a statutory formula to rail operators, divided equally between commuter rail and intercity operators; however, CalSTA awards 25 percent of the intercity State Rail Assistance portion via discretionary grants.
- Low Carbon Transportation Operations Program was created to provide operating and capital assistance for transit agencies to reduce greenhouse gas emission and improve mobility, with a priority on serving disadvantaged communities. Approved projects in the Low Carbon Transportation Operations Program will support new or expanded bus or rail services, expand intermodal transit facilities, and may include equipment acquisition, fueling, maintenance, and other costs to operate those services or facilities, with each project reducing greenhouse gas emissions. For agencies whose service area includes disadvantaged communities, at least

50 percent of the total moneys received will be expended on projects that will benefit disadvantaged communities.

- The Road Repair and Accountability Act of 2017, SB 1 (Chapter 5, Statutes of 2017), includes a program that will provide additional revenues for transit infrastructure repair and service improvements. This investment in public transit is referred to as the State of Good Repair Program. This program receives funding of approximately \$105 million annually. State of Good Repair funds are to be made available for eligible transit maintenance, rehabilitation, and capital projects. Also included are State Rail Assistance funds for expanded service, outreach, increased customer amenities, and discounted tickets with a purpose of increasing ridership. This category can also be utilized for capital investments, such as new and cleaner emissions rolling stock (to increase capacity and reduce emissions), as well as track and station investments (which will reduce travel times and delays, improve accessibility, and enhance the customer experience).
- SB 1 Local Partnership Program: This program is intended to provide local and regional transportation agencies that have passed sales tax measures, developer fees, or other imposed transportation fees with a continuous appropriation of \$200 million annually from the Road Maintenance and Rehabilitation Account to fund road maintenance and rehabilitation, sound walls, and other transportation improvement projects. This program is meant to balance the need to direct increased revenue to the state's highest transportation needs while fairly distributing the economic impact of increased funding.
- SB 1 Solutions for Congested Corridors Program: This statewide, competitive program makes \$250 million available annually for projects that implement specific transportation performance improvements and are part of a comprehensive corridor plan by providing more transportation choices while preserving the character of local communities and creating opportunities for neighborhood enhancement.
- Section 130/190 Grade Crossing Funds
- Other SB 1 related fund sources for housing and disadvantaged communities may also be potentially leveraged for the construction of stations and station level improvements.

Local Program Sources

Local funding may include place-specific funding for station improvements from localities that own or regulate the land around Coachella Valley Rail stations. The potential funding sources include:

- County and city general funds
- Riverside County and incorporated city portions of their Measure A shares that could be directed toward supporting station infrastructure development and/or station operations. Measure A is the county's local option sales tax dedicated to funding transportation. Funds are returned to the county's subregions. In Western Riverside, 12 percent of funds are set aside for public transit, and in the Coachella Valley 15 percent of funds are dedicated to transit.
- Private developer contributions and joint development, where there is a joint interest in land redevelopment around the stations
- Station-specific tax increment financing, special assessment districts, and/or joint development have been successfully applied to partially fund transit projects nationwide. Additional analysis will require careful consideration of the projected daily ridership at

individual stations, real estate market, land use productivity and enabling zoning, and whether such projections would warrant consideration of value capture mechanisms.

RCTC may also consider the use of its local tax increment financing mechanisms including existing Measure A, a renewed or secondary measure as well the potential re-direction of some developer fee (such as the transportation uniform mitigation fee) funds towards either capital or operating costs.

11 Benefit-Cost Analysis

This section provides detailed technical information on the economic analyses conducted to develop a BCA for the Project.

This section is organized as follows:

- Section 11.1, Methodological Framework and General Assumptions, introduces the conceptual framework used in the BCA and outlines the assumptions used in the estimation of Project costs and benefits.
- Section 11.2, Project Overview, includes a brief description of existing conditions and the proposed alternative, a summary of cost estimates and schedule, and a description of the types of effects that the Project is expected to generate.
- Section 11.3, Demand Projections, shows the estimates of travel demand and traffic growth.
- Section 11.4, Benefits Measurement, Data, and Assumptions, presents specific data elements and assumptions pertaining to projected long-term outcomes, along with associated benefit estimates.
- Section 11.5, Summary of Findings and BCA Outcomes, introduces estimates of the Project's Net Present Value, its Benefit/Cost Ratio and other Project evaluation metrics.
- Section 11.6, BCA Sensitivity Analysis, provides the results of the sensitivity analysis.
- Section 11.7, Concluding Remarks, provides overall comments regarding the interpretation of results of this analysis and outlines other possible benefits of the Project that are difficult to quantify and include in the BCA.

11.1 Methodological Framework and General Assumptions

The BCA conducted for this Project is based on the monetized benefits and costs of the proposed Project measured using USDOT guidance for BCA, as well as the quantitative and qualitative merits of the Project. A BCA provides estimates of the benefits that are expected to accrue from a project over a specified period and compares them to the anticipated costs of the Project. Costs include both the resources required to develop the Project and the costs of maintaining the new or improved asset over time. Estimated benefits are based on the projected impacts of the Project on both users and non-users of the facility, valued in monetary terms (USDOT 2021).

While a BCA is just one of many tools that can be used in making decisions about infrastructure investments, it provides a useful benchmark from which to evaluate and compare potential transportation investments.

The specific methodology features the following:

- Establishing existing and future conditions under the build and no build scenarios
- Measuring benefits in dollar terms, whenever possible, and expressing benefits and costs in a common unit of measurement
- Using USDOT guidance for the valuation of travel time savings and safety benefits, while relying on industry best practices for the valuation of other effects

- Discounting future benefits and costs with the real discount rate recommended by USDOT (7 percent and 3 percent for sensitivity)
- Conducting a sensitivity analysis to assess the impacts of changes in key input assumptions

A BCA measures benefits against costs of a project throughout a period of analysis beginning at the start of construction and including operations over a period sufficient for full realization of benefits. The methodology makes several important assumptions and seeks to avoid overestimation of benefits and underestimation of costs.

- Input prices are expressed in 2019 dollars to align with BCA valuation parameters recommended by USDOT at the time of this analysis (USDOT 2021)
- The period of analysis begins in 2024 and ends in 2057 and includes construction years (2024–2028) and 30 years of operations (2028–2057)
- A constant 7 percent real discount rate is assumed throughout the period of analysis¹⁷ and 3 percent discount rate for sensitivity analysis
- Opening-year demand and benefits are inputs to the BCA and assumed to be fully realized after construction is finished and Project starts operations in 2028 (no ramp up)
- Unless specified otherwise, the results shown in this report correspond to the effects of the Preferred Alternative, as described in Section 11.3

11.2 Project Overview

11.2.1 Project Description, Current Conditions, and Challenges

The Project area for the Preferred Alternative extends approximately 144 miles from the eastern terminus in Coachella to LAUS in the west.

Currently, passenger rail transportation services between Los Angeles and destinations in the Coachella Valley are limited. Auto travel, with trips on I-10 or SR 91, is the predominant mode of transportation. Travel in the I-10 corridor is becoming increasingly congested as Coachella Valley experiences an increase in population, employment, and tourism. During non-congested periods, a trip between Los Angeles and Indio along I-10 takes approximately 2 hours, and during peak congested travel periods such as Friday evening, it may take up to 3.5 hours.

An effective intercity rail service between Los Angeles and the Coachella Valley would provide a new travel option that will help meet future mobility needs for residents, business, and visitors. The proposed Project entails operating two daily round trip intercity passenger trains between Los Angeles and Coachella Valley, with morning and evening departures from each endpoint. The passenger service is being planned with an approximate trip time of 3 hours and 15 minutes, providing a comparable trip time to auto travel time on I-10 and SR 91 at peak periods. The Project would provide travelers between the Coachella Valley and Los Angeles with a public transportation service that offers more convenient and competitive trip times, better station access, and more frequency than currently available public transportation services.

¹⁷ Except for the quantification of impacts on carbon dioxide emissions which are discounted using a 3 percent discount rate as per USDOT guidance.

11.2.2 Base Case and Alternative

The Base Case for the Project is defined as the No Build Alternative. The No Build Alternative reflects the continuation of current conditions with no major investments to address the identified deficiencies. The Alternative Case is defined as the Preferred Alternative, or Build Alternative Option 1, that includes all Project components outlined above.

11.2.3 Types of Impacts

The proposed Project is expected to have the following impacts:

- Reduction in travel times to travelers. Currently, passenger rail services between Los Angeles and destinations in the Coachella Valley are limited and inconvenient for most origin-destination city pairs. The Project would provide travelers a transportation choice with shorter travel time and service at more convenient times of day.
- Reduction in the number of accidents and corresponding social cost of accidents. The Project would result in auto trip diversion to train, which would lead to a reduction in highway VMT. This will reduce exposure to accident risks and can be expected to reduce the number of highway accidents and the social costs of these accidents.
- Environmental protection. Reduction in highway VMT due to diversion of auto trips to rail will also result in reduced motor vehicle emissions.
- Productivity Benefits. Passengers traveling on business diverting from auto to the new rail service will be able to engage in some productive work on the train such as reading, writing, reviewing documents.
- Agency Benefits. Under the Preferred Alternative, the Amtrak Thruway Bus from Fullerton to Indio would be discontinued. This will generate operating cost savings. In addition, the Project will generate revenues to the agency operating the service, including fare revenues as well revenues from auxiliary services.
- Improvement in state of good repair. Reduction in highway VMT due to diversion of auto trips to rail will result in reduced highway pavement wear and tear and a reduction in pavement maintenance costs to the responsible agency.
- Residual value. At the end of the analysis period, Project capital will still have some value remaining and offer the potential to generate benefits for future years (until the end of its useful life).

11.2.4 Project Cost and Schedule

Total Project capital construction costs (including track, structures, stations, engineering, signals) are estimated at \$1,190.2 million in 2020 dollars.¹⁸ In addition, the cost of rolling stock (locomotives and coach cars) are estimated at \$83.4 million. For BCA purposes, all costs were adjusted to 2019 dollars using a gross domestic product deflator and inflation factors.¹⁹ The adjusted Project capital cost

¹⁸ Capital costs used in the BCA do not include project reserve contingency.

¹⁹ The adjustment of construction costs amounted to dividing 2020 costs by the deflator index of 1.03952 based on the gross domestic product deflators for the years 2019 - 2020 (Office of Management and Budget of the White House n.d.).

(including construction and rolling stock) amounts then to \$1,249.1 million in 2019 undiscounted dollars and \$794.3 million discounted at 7 percent.

O&M costs are estimated at \$11.5 million in 2019 constant dollars per year. O&M costs are assumed to be constant through the analysis period. In addition to the initial capital outlay for equipment, it is anticipated that periodic capital investments in equipment overhauls will be needed to maintain the locomotive and rolling stock in a state of good repair. After 25 years of operations, the Project will require replacement of locomotives.

Total O&M costs for 30 years of operations are estimated at \$346.4 million in 2019 constant dollars and \$83.4 million discounted at 7 percent. Total rehabilitation and major maintenance costs are estimated at \$51.3 million undiscounted and \$8.4 million discounted at 7 percent. The Project costs as outlined above are summarized in Table 11-1.

Table 11-1. Summary of Costs over Project Life Cycle (2024–2057, millions of 2019 Dollars)

Cost Element	In Constant Dollars	Discounted at 7 Percent	Discounted at 3 Percent
Construction and Development Costs	\$1,249.1	\$794.3	\$1,024.4
Rehabilitation and Major Maintenance	\$51.3	\$8.4	\$22.2
O&M	\$346.4	\$83.4	\$178.6
Total	\$1,646.7	\$886.4	\$1,225.2

Notes:

O&M=Operations and Maintenance

Construction is anticipated to start in 2024 and be completed in early 2028. For the purposes of this BCA, January 2028 is assumed as the first year of full operations.

11.3 Demand Projections

When quantifying the benefits of transportation infrastructure improvements, current and future travel demand in the study area needs to be analyzed and quantified.

Ridership and revenue forecasts for the Project were prepared using the Caltrans Mode Share Model (in April 2018) to support rail planning activities throughout the State of California. Chapter 5 provides more details about the ridership and revenue forecasting.

As shown in Table 11-2, estimated ridership in 2018 is 175,500 annual one-way trips. Ridership for 2024 is anticipated to be 204,100 annual one-way trips, a 16 percent increase over 2018. Ridership for 2044 is anticipated to be 338,500 annual trips, a 93 percent increase over 2018.

Table 11-2. Coachella Valley – San Geronio Pass Rail Ridership Annual Estimates, by Year

Number of Station Stop East of Colton	2018	2024	2044
6 Stops	175,500	204,100	338,500

Source: Appendix A

Ridership for years between those shown in Table 11-2 was interpolated while ridership beyond 2044 was extrapolated assuming the same rate of growth as in the earlier years.

11.4 Benefits Measurement, Data, and Assumptions

11.4.1 General Overview

Passengers traveling between Los Angeles and Coachella Valley destinations will derive benefits from the public transportation service improvements in the Preferred Alternative. The magnitude of these benefits can be quantified using the concept of consumer surplus. Consumer surplus is a concept of a benefit that captures the difference between the price that a consumer would be willing to pay (or the willingness to pay) and the price that they actually pay.

The demand for travel is measured as the total number of trips while the generalized cost of travel represents the value of travel time and any out-of-pocket expenses, such as fares. Riders on an improved passenger rail service may experience travel time savings compared to their previous travel arrangements, improvements in reliability, and a reduction in their out-of-pocket costs. In addition, the availability of transportation at a lower cost (including time and fare) will encourage users to travel more or attract entirely new users, increasing the total number of trips.

The increased ridership includes the existing users, as well as new riders who diverted from auto or who were not making the trip at all. Benefits to existing users can be estimated as savings in the generalized travel cost (essentially travel time savings, assuming fares remain unchanged under Build Alternative Option 1) multiplied by the number of such travelers. The latter can be estimated as savings in the generalized travel cost multiplied by the number of new travelers and divided in half (“rule of half”).

The availability of rail service can result in social cost savings as well, which represent benefits in addition to direct travel trip savings. These include benefits stemming from reduced auto travel leading to a reduction in tailpipe emissions, highway accidents, as well as highway maintenance costs. This section describes the measurement approach used for each quantifiable benefit or impact category identified in Section 11.3 and provides an overview of the associated methodology, assumptions, and estimates of benefits and impacts.

11.4.2 Consumer Surplus/Travel Time Savings Benefits

Travel time savings are one of the key benefits of transportation project improvements and the key driver of changes in consumer surplus. To assess travel time savings benefits, we compared the scheduled travel times on the Project with those on currently available services.

Currently, passenger rail services between Los Angeles and destinations in the Coachella Valley are limited and inconvenient for most origin-destination city pairs. They include the following:

- Amtrak Pacific Surfliner service between Los Angeles and Fullerton and Amtrak Thruway Bus between Fullerton and Indio (also serving Riverside, Palm Springs, Palm Desert, and La Quinta). Passengers traveling eastbound from Los Angeles to Indio have a total travel time of 4 hours and 52 minutes. Passengers traveling westbound from Indio to Los Angeles have a total travel time of 4 hours and 16 minutes.²⁰
- Amtrak Sunset Limited service between Los Angeles and Palm Springs, which operates 3 days per week. Passengers traveling eastbound from Los Angeles to Palm Springs have a total travel time of 2 hours and 26 minutes. Passengers traveling westbound from Palm Springs to Los Angeles have a total travel time of 3 hours and 33 minutes.²¹
- Metrolink commuter trains between Los Angeles and Riverside and Riverside and Fullerton. Travel times from Riverside to Los Angeles on the Riverside Line is 1 hour and 27 minutes, while travel time from Riverside Downtown to Fullerton on the 91/Perris Valley Line is 49 minutes.²²

For the city pairs between Riverside and Indio/Coachella, no rail services currently exist during daylight hours, and travelers wishing to use public transport must rely on a combination of local transit services or intercity bus services, such as Greyhound.²³

The above suggests that for the purpose of comparing the new service with the existing services and estimating travel time savings, total ridership can be divided into three markets: trips between Los Angeles/Fullerton and Riverside, trips to/from Los Angeles (excluding Riverside), and other trips in the corridor.

Table 11-3 shows the estimated ridership by market and average trip length in each of the markets. The table shows that trips between Los Angeles and various destinations in the Coachella Valley are forecast to account for about 63 percent of total ridership. Destinations to/from Riverside account for about 9 percent of total ridership and remaining trips in the corridor for 28 percent.

²⁰ Based on Amtrak Pacific Surfliner schedule effective June 1, 2020 and accessed in February 2021.

²¹ Based on Amtrak Southwest Chief schedule effective October 1, 2020 and accessed in February 2021.

²² Based on Metrolink commuter train schedules accessed in February 2021.

²³ Amtrak Thruway bus can be used only in conjunction with Amtrak train but not on its own.

Table 11-3. Ridership and Average Trip Distance, by Market

Market	Average Trip Length (Miles)	Ridership, Projected Annual Trips		
		2018	2024	2044
Riverside - Los Angeles/Fullerton	52.1	15,700	18,300	30,300
Other Trips to/from Los Angeles	121.3	110,800	128,900	213,700
Other Trips in Corridor	83.2	49,000	56,900	94,800
Preferred Alternative	—	175,500	204,100	338,500

Average travel times for each market were calculated based on the average trip length in each market and average speed of the train service.

Base Case travel times for each of the markets were calculated as follows:

- **Riverside market.** Base Case travel time was calculated as the weighted average travel time on Metrolink commuter trains between Riverside and Los Angeles and between Riverside and Fullerton.
- **Trips to/from Los Angeles excluding Riverside.** Base Case travel time was calculated as Amtrak train travel time from Los Angeles to Fullerton, plus waiting time for Amtrak thruway bus in Fullerton (average of eastbound and westbound direction) and in-vehicle travel time on Amtrak thruway bus (travel time for the entire route times average distance travelled divided by entire bus route length).
- **Other trips in corridor.** This market presents challenges in estimating Base Case travel times and calculating travel time savings benefits as currently there is no existing comparable public transportation service. A pragmatic approach was developed by the United Kingdom Department for Transport for their computerized project evaluation tool, the Transport User Benefits Appraisal tool and documented in the respective guidance document (USDOT 2019).
- **All travel time/consumer surplus benefits were assumed constant over the analysis period.** For each market, the difference in travel time between the Base and Alternative cases was multiplied by ridership (existing, new) to obtain the person-hours saved under Build Alternative Option 1. The person-hours saved were multiplied by the value of time to obtain the monetary value of travel time savings. Existing passengers were assigned the entire value of travel time savings while new users of rail service, users diverting from auto and entirely new users, obtained half of that value (consistently with the “rule of half”).

Estimation of the value of travel time savings on the new service also requires assumptions as to the source of the ridership, i.e., percentage of the estimated train ridership that would be diverted from existing public transportation services, percentage diverted from auto, and entirely new users. This information was not directly available with ridership forecasts. Assumptions as to the source of the ridership were made for each market based on its characteristics and potential attractiveness of the new train service to various groups of prospective passengers, as discussed below.

- **Other trips to/from LA.** The proposed new service would be very attractive to the current users of Amtrak services (train with Thruway Bus) as it would offer substantial travel time savings

and a seamless trip. Based on the AA report, in 2013 ridership on the Thruway Bus between Fullerton and Coachella Valley amounted to 17,648 (FRA and RCTC 2016). This ridership amounts to about 17 percent of total ridership in this market at 2018 levels. New demand is expected to account for a relatively low level of 5 percent of total ridership. The remainder of the trips, 78 percent of total, was assumed to be trips diverted from auto.

- Other trips in corridor. As discussed earlier, currently there is no comparable public transportation service in the corridor and travelers wishing to use public transport must rely on a patchwork of service providers which varies by city pair. Private auto is expected to be the “default” transportation mode and the key source of trip diversion to the new service. By its nature, the “existing” ridership would be very low. Transport User Benefits Appraisal guidance recommends an assumption of 2 percent of ridership as the “existing” demand. Similarly, as for trips to/from LA, new demand was assumed at 5 percent. The remainder of ridership, 93 percent of total, are then trips diverted from auto.
- Riverside – LA/Fullerton. This market is already well served by existing Metrolink commuter trains; however, they are mostly scheduled in the early morning in the direction to Los Angeles and early evening in the direction to Riverside. For the remaining times of the day, private auto can be expected to be the default transportation mode and provide the key source of trip diversion to the new service. Therefore, for the purpose of this BCA it was assumed that 25 percent of ridership would be trips diverted from existing demand, 5 percent of ridership would be new demand, and the remaining 70 percent of ridership would be trips diverting from auto.

The results of the above discussion are summarized in Table 11-4. Other assumptions and parameters used to quantify and monetize travel time savings are shown in Table 11-5.

Table 11-4. Source of Coachella Valley Train Ridership, by Market

Ridership Source	Riverside - Los Angeles / Fullerton	Other Trips to/from Los Angeles	Other Trips in Corridor
Diverted from Other Rail / Public Transport	25%	17%	2%
Diverted from Auto	70%	78%	93%
New	5%	5%	5%

Table 11-5. Assumptions Used in the Estimation of Travel Time Savings

Data Item	Unit	Value	Source
Average speed of Coachella train	miles per hour	44.3	Calculated from schedule forecasts
Average Build travel times on Coachella rail service	hours	—	Calculated from average trip length and forecasted train speed. Assumed constant over analysis period
Riverside (including Los Angeles)	—	1.17	—

Table 11-5. Assumptions Used in the Estimation of Travel Time Savings

Data Item	Unit	Value	Source
Trips to/from Los Angeles (excluding Riverside)	—	2.74	—
Other Trips in Corridor	—	1.88	—
Average travel times on existing services	hours	—	Calculated from average trip length and current schedules. Assumed constant over analysis period
Riverside (including Los Angeles)	—	1.22	Based on Metrolink commuter train travel time
Trips to/from Los Angeles (excluding Riverside)	—	4.02	Based on Amtrak service travel time
Other Trips in Corridor	—	5.63	Calculated as 3 times the travel time on the proposed service based on UK Transport User Benefits Appraisal Guidance
Wait time component included in trips to Los Angeles	hours	0.85	Amtrak schedule as of January 2021
Average auto occupancy (trips diverting to train)	Persons per Vehicle	1.40	Southern California Association of Governments regional travel forecasting model
Value of time, by type of travel	\$/h	—	USDOT, BCA Guidance for Discretionary Grants Program, February 2021. All figures in 2019 dollars
Personal - autos and transit, intercity (greater than 50 miles)	—	\$23.10	—
Business - autos and transit, intercity (greater than 50 miles)	—	\$39.06	—
Percent of riders traveling on business	Percent	30%	Coachella Valley Planning Study 2013, Table 2-5
Average Train Fare for "Other" Trips	\$	\$23.36	Calculated from ridership forecasting assumptions on average fare and ridership by origin-destination pairs. 2018 value inflated to 2019 dollars

Notes:

BCA=benefit-cost analysis; USDOT=United States Department of Transportation

11.4.3 Accident Costs Savings

Diversion of some auto trips to rail service will lead to a reduction in highway VMT. In addition, as mentioned in Section 11.3, the Amtrak thruway bus from Fullerton to Indio would be discontinued under the Preferred Alternative, contributing further to a reduction in highway VMT in the corridor. This will reduce exposure to accident risks and will reduce the social costs associated with road accidents.

To estimate the social safety benefits, first VMTs diverted from highway to rail service were estimated as the number of trips diverted and average trip length. Bus VMTs displaced were calculated as the number of daily trips multiplied by the distance between Fullerton and Indio. Highway VMTs reduced were then multiplied by the accident rates (number of accidents per 1 million VMT, by type) derived from historical statistics to obtain the number of accidents avoided. The accidents avoided were then multiplied by unit social cost of accidents (by type) to derive the monetary value of accidents avoided.

The benefit of avoided highway accidents is offset by incremental accidents related to incremental train miles. To estimate the number of such accidents, annual Project train miles were multiplied by train accident rates derived from historical statistics. These were then multiplied by unit social cost of accidents (by type) to derive the monetary value of accidents avoided.

Table 11-6 shows the assumptions and data sources used in the estimation of safety benefits.

Table 11-6. Assumptions Used in the Accident Costs Savings

Data Item	Unit	Value	Source
Highway accident rates – 3-Year Average 2015-2017	Number per Million VMT	—	Calculated from accident statistics data, 2015-2017, Caltrans. Includes Los Angeles County, San Bernardino County, and Riverside County; Freeway Travel
Total accidents	—	1.06	
Property damage only accidents	—	0.74	
Injury accidents	—	0.32	
Fatal accidents	—	0.005	
Fatalities per fatal accident	—	1.14	
Injured per injury accident	—	1.47	
Train Accidents - per train mile	Number per Million VMT	—	—
Injury accidents	—	0.31	—
Fatal accidents	—	0.07	—
Accident costs	—	—	USDOT, BCA Guidance for Discretionary Grants Program, February 2021. All figures in 2019 dollars
Fatal	\$/Victim	\$10,900,000	—
Injury crash	\$/Accident	\$284,100	Adjusted for the number of victims (based on USDOT Guidance)
Fatal crash	\$/Accident	\$12,071,000	Adjusted for the number of victims (based on USDOT Guidance)
No injury/property damage only	\$/Vehicle	\$4,500	—
No injury/property damage only	\$/Accident	\$8,820	Adjusted for the number of vehicles involved (as below)

Table 11-6. Assumptions Used in the Accident Costs Savings

Data Item	Unit	Value	Source
Average number of vehicles involved in property damage only accidents	Number	1.96	California Life-Cycle Benefit/Cost Analysis Model. Original source is Caltrans accident statistics

Notes:

BCA=benefit-cost analysis; Caltrans=California Department of Transportation; USDOT=United States Department of Transportation; VMT=vehicle miles traveled

11.4.4 Emissions Cost Savings

Reduction in highway VMT due to diversion of auto travelers to rail service will also result in reduced motor vehicle emissions. Highway VMTs avoided were estimated using the methodology described in Section 5.3 in the context of accident cost savings. The amount of emissions avoided were then estimated using emission factors (grams of emissions per VMT, by pollutant type) adopted from Cal-B/C Sketch BCA tool version 7.2 (Caltrans n.d.) and monetized using unit costs of emissions recommended by USDOT BCA Guidance. The recommended values vary by year, and specific values are available for years until 2050. For years after 2050, the unit values were assumed at the same constant level as for 2050. Table 11-7 shows values for 2028, the first year of Project operations, with comments how the value changes over time.

Emissions generated by the incremental train miles were estimated based on Tier 4 level locomotive emissions factor standards (grams of emissions per gallon of fuel) developed by the U.S. Environmental Protection Agency (U.S. Environmental Protection Agency 2009). These were converted to grams per locomotive mile assuming a fuel efficiency factor of 4.5 miles per gallon. Total emissions by pollutant were then monetized according to USDOT BCA guidance using emissions unit costs shown in Table 11-7.

Table 11-7. Unit Emission Cost Savings, 2028

Pollutant	Unit	Value	Notes
Oxides of nitrogen	\$/metric ton	\$17,500	Value increases to \$18,000 in 2030.
Particulate matter	\$/metric ton	\$829,800	Value increases to \$852,700 in 2030.
Oxides of sulfur	\$/metric ton	\$46,900	Value increases to \$48,200 in 2030.

Table 11-7. Unit Emission Cost Savings, 2028

Pollutant	Unit	Value	Notes
Volatile organic compounds	\$/metric ton	\$0	Volatile organic compounds no longer monetized.
Carbon dioxide	\$/metric ton	\$59	Value varies by year, from \$50/metric tonne for 2020 to \$84/metric tonne for 2050

Source: USDOT, Benefit-Cost Analysis Guidance for Discretionary Grants Program, February 2021 value in 2019 dollars

Notes:

BCA=Benefit-Cost Analysis; USDOT=United States Department of Transportation

11.4.5 Productivity Benefits

Casual observations suggest that many rail passengers work while traveling on the train. This includes reading, writing, or reviewing documents. These activities are not possible while driving. Passengers diverting from auto to the new service will experience a benefit from being able to engage in such activities.

These productivity benefits are particularly valuable for business passengers. In the context of business travel, the value of this benefit can be estimated as the train trip time multiplied by the value of time for business travelers and multiplied by the number of passengers traveling on business. It is assumed that 75 percent of business travelers work on the train and only half of the trip time would be spent on productive work. Key assumptions used in the estimation of productivity benefits are shown in Table 11-8.

Table 11-8. Assumptions Used in the Productivity Benefits

Data Item	Unit	Value	Source
Ridership traveling on business	Percent	30%	Coachella Valley Planning Study 2013, Table 2-5
Business travelers working on train	Percent	75%	Amtrak California rider surveys
Percent of time business travelers working on train engage in work	Percent	50%	Amtrak California rider surveys
Value of time, business – autos and transit, intercity trips (greater than 50 miles)	\$/h per Person	\$39.06	USDOT, BCA Guidance for Discretionary Grants Program, February 2021

Notes:

BCA=benefit-cost analysis; USDOT=United States Department of Transportation

11.4.6 Agency Benefits

As indicated earlier in this report, under the Preferred Alternative, current Amtrak thruway bus service between Fullerton and Indio would be discontinued. The O&M cost of this service would then constitute a saving that can be counted toward the benefits of the Project. The O&M costs of this service were

calculated on the basis of estimated revenue hours discontinued plus a layover assumption (a total of 12 hours a day) and an hourly O&M cost based on SunLine, a transit agency operating in the Coachella Valley (\$119.71 in 2019 [National Transit Database n.d.]). This provided an annual estimate of \$524,330 assumed to be constant over the analysis period.

The Project will generate fare revenues for the agency operating the service, which will partially offset the operating costs. For the portion of ridership that consists of trips diverted from auto and entirely new trips, these revenues are incremental. For BCA purposes, they were counted as agency benefits.²⁴ These revenues were estimated for each market based on ridership (new and diverted from auto) and average fare in that market. The average fare was calculated from origin-destination pair ticket prices assumed in the ridership forecast and adjusted to 2019 dollars (Table 11-9). Fares were assumed constant over the analysis period.

Table 11-9. Average Fares by Market (2019 Dollars)

Market	Average Fare
Riverside – Los Angeles/Fullerton	\$18.03
Other trips to/from Los Angeles	\$29.99
Other trips in corridor	\$23.36

Source: Calculated by HDR based on ridership forecasting fare assumptions, Table 5-15, and adjusted to 2019 dollars

In addition, the Preferred Alternative is expected to generate some auxiliary non-fare revenue associated with various on-train services, most notably on-board food and beverage service. Caltrans provided revenue estimates for years 2018, 2024, and 2044.

Revenues for years between those shown in Table 11-10 were interpolated while revenues beyond 2044 were extrapolated assuming the same rate of growth as in the earlier years.

²⁴ Calculation of consumer surplus benefits intrinsically specifies fare as a cost to riders. As a balance, fares are then included as a benefit to the operating agency. For the existing demand, the net effect between No Build and Build scenarios is zero. This is because the operating agency receives the same fare revenues under both scenarios (assuming that fares remain constant). For the new demand, the net effect are fare revenues corresponding to that portion of demand.

Table 11-10. Agency Revenues Forecasts (Millions of 2019 Dollars)

Category of Agency Benefits	2018	2024	2044
Fare revenues	\$4.09	\$4.76	\$7.90
Thruway bus O&M costs savings	\$0.52	\$0.52	\$0.52
Auxiliary revenues	\$0.52	\$0.61	\$1.01
Total	\$5.14	\$5.89	\$9.43

Notes:

Fare Revenues: calculated from ridership (new and diverted from auto) in each market and average ticket prices for each market.

Auxiliary fare revenues: Revenue forecasts provided by Caltrans were inflated to 2019 dollars using the inflation factor of 1.0179. Amtrak Thruway Bus operating cost savings estimated by HDR based on cost of similar operations incurred by other transit agencies in the region.

O&M=operating and maintenance

11.4.7 Highway Pavement Maintenance Savings

Reduction in highway VMT due to diversion of auto travelers to rail will result in reduced highway pavement wear and tear and a reduction in pavement maintenance costs to the responsible agency. These costs were estimated on the basis of auto VMT diversion to rail service and unit pavement damage cost for autos derived from the Addendum to the 1997 Federal Highway Cost Allocation Study, as shown in Table 11-11.

Table 11-11. Assumptions Used in the Highway Pavement Maintenance Savings

Data Item	Unit	Value	Source
Pavement damage cost, urban interstate	—	—	Addendum to the 1997 Federal Highway Cost Allocation Study Final Report, inflated to 2019 using Gross Domestic Product deflator
Autos	\$/million VMT	\$1,442	
Bus (using 4-axle truck)	\$/million VMT	\$44,696	—

Notes:

VMT=vehicle miles traveled

11.4.8 Residual Value of Capital

At the end of the analysis period, Project capital will still have some value remaining and offer the potential to generate benefits for future years. To account for this benefit, the residual value of the Project capital at the end of the analysis period was included as a benefit.

The residual value was calculated only for track and structures, as well as locomotives that would be replaced after 25 years of operations. The original costs were depreciated in a linear manner over 60 years for track and structures and 25 years for locomotives, as shown in Table 11-12.

Table 11-12. Assumptions Used in the Residual Value of Capital

Data Item	Unit	Value	Source
Capital cost, track and structures	\$M	\$517.9	Cost estimation
Service life (Project capital)	Years	60	Association of American Railroads
Major equipment (locomotives)	\$M	\$28.2	Caltrans
Service life (locomotives)	Years	25	Equipment specifications

Notes:

Caltrans=California Department of Transportation

11.4.9 Aggregation of Benefit Estimates

Table 11-13 provides the monetary estimates of the quantified and monetized benefits of this Project. Benefits include the residual value of structures constructed under this Project.

Table 11-13 shows that total Project benefits amount to \$186.5 million in 2019 dollars discounted at 7 percent. Travel time savings account for the largest share of benefits at \$73.8 million (or nearly 40 percent of total) followed by agency benefits estimated at \$59.8 million (32 percent of total), residual value of capital at \$25.7 million (14 percent of total), and productivity benefits at \$17.9 million (about 10 percent of total).

Table 11-13. Summary of Project Benefits (Millions of 2019 Dollars)

Benefit Categories	Over Project Operations (2028-2057)		
	Undiscounted	Present Value at 7 Percent Discount Rate	Present Value at 3 Percent Discount Rate
Travel time savings/consumer surplus benefits	\$346.9	\$73.8	\$169.2
Accident cost savings	\$36.7	\$7.7	\$17.8
Emissions cost savings	\$3.1	\$1.6	\$1.4
Productivity benefits	\$84.0	\$17.9	\$41.0
Agency benefits	\$279.1	\$59.8	\$136.6
Highway pavement maintenance costs savings	\$0.5	\$0.1	\$0.2
Residual value of capital	\$336.3	\$25.7	\$109.4
Total benefits	\$1,086.6	\$186.5	\$475.5

11.5 Summary of Findings and Benefit-Cost Analysis Outcomes

Table 11-14 summarizes the BCA findings. Annual costs and benefits are estimated over the lifecycle of the Project (years from 2024 to 2057). As stated earlier, construction is expected to be completed by early 2028. Benefits accrue during the operation of the Project (over the years 2028–2057).

Table 11-14. Overall Results of the Benefit-Cost Analysis (Millions of 2019 Dollars*)

Project Evaluation Metric	Undiscounted	Present Value at 7 Percent Discount Rate	Present Value at 3 Percent Discount Rate
Total benefits	\$1,086.6	\$186.5	\$475.5
Rehabilitation and major maintenance	\$51.3	\$8.4	\$22.2
O&M costs	\$346.4	\$83.4	\$178.6
Capital costs	\$1,249.1	\$794.7	\$1,024.4
Total costs	\$1,646.7	\$886.4	\$1,225.2
Net present value	-\$560.1	-\$699.9	-\$749.7
Benefit/cost ratio (ratio)	0.57	0.13	0.28
Internal rate of return (%)	-2.25%		

Notes:

* Unless indicated otherwise

O&M=operating and maintenance

Considering all monetized benefits and costs, the estimated internal rate of return of the Project is -2.25 percent. With a 7 percent real discount rate, the \$794.4 million investment would result in \$186.5 million in total benefits, net present value of -\$699.6 million, and a benefit-cost ratio of approximately 0.13. With a 3 percent real discount rate, the net present value of the Project -\$749.3 million, for a benefit-cost ratio of 0.28.

11.6 Benefit-Cost Analysis Sensitivity Analysis

The BCA outcomes presented in the previous sections rely on several assumptions and long-term projections, both of which are subject to considerable uncertainty. The primary purpose of the sensitivity analysis is to help identify the variables and model parameters whose variations have the greatest impact on the BCA outcomes: the critical variables.

The sensitivity analysis can also be used to:

- Evaluate the impact of changes in individual critical variables: how much the BCA outcomes would vary with reasonable departures from the preferred or most likely value for the variable; and

- Assess the robustness of the BCA and evaluate whether the conclusions reached under the preferred set of input values are significantly altered by reasonable departures from those values.

The sensitivity analysis was conducted primarily with respect to a longer study period or period of operations. The length of analysis was extended to 60 years of operations. Although USDOT does not recommend analysis periods extending beyond 30 years of full operations, some agencies do consider longer evaluation periods. Rail projects can be considered to have a long-term life cycle with a potential to impact mode shares and thus it may be of interest to evaluate them over such long period of time as a sensitivity test.

Table 11-15 provides the monetary estimates of the quantified and monetized benefits of this Project over 60 years of operations. The table shows that total Project benefits amount to \$207 million in 2019 dollars discounted at 7 percent. Travel time savings account for the largest share of benefits at \$94.5 million (or 5.6 percent of total) followed by agency benefits at \$76.1 million (36.7 percent of total) and productivity benefits of \$22.9 million (11.1 percent of total).

Table 11-15. Summary of Project Benefits Over 60 Years of Operations (Millions of 2019 Dollars)

Benefit Categories	Over Project Lifecycle		
	Undiscounted	Present Value at 7 Percent Discount Rate	Present Value at 3 Percent Discount Rate
Travel time savings	\$1,089	\$94.5	\$318.3
Accident cost savings	\$121	\$10.0	\$34.6
Emissions cost savings	\$12.1	\$3.5	\$3.2
Productivity benefits	\$263.6	\$22.9	\$77.1
Agency benefits	\$857.2	\$76.1	\$253.0
Highway pavement maintenance	\$1.4	\$0.1	\$0.4
Residual value of capital	\$0.0	\$0.0	\$0.0
Total benefits	\$2,343.5	\$207.0	\$686.5

Table 11-16 summarizes the BCA findings under this sensitivity analysis. Annual costs and benefits were estimated over the 60 years of operations. Considering all monetized benefits and costs, the estimated internal rate of return of the Project is 0.54 percent. With a 7 percent real discount rate, the \$794.4 million capital investment would result in \$207 million in total benefits, net present value of -\$691.5 million, and a benefit-cost ratio of approximately 0.14. With a 3 percent real discount rate, the net present value of the Project is -\$620.4 million, for a benefit/cost ratio of 0.41. In undiscounted dollars terms, the capital costs of \$1,249.1 million would generate benefits of \$2.3 billion, net present value of \$315.4 million for a benefit-cost ratio of 1.24.

**Table 11-16. Overall Results of the Benefits Cost Analysis over 60 Years Operations
(Millions of 2019 Dollars)**

Project Evaluation Metric	Undiscounted	Present Value at 7 Percent Discount Rate	Present Value at 3 Percent Discount Rate
Total benefits	\$2,343.5	\$207.0	\$686.5
Rehabilitation and major maintenance	\$82.6	\$9.6	\$29.4
O&M costs	\$692.7	\$94.3	\$252.2
Capital costs	\$1,249.1	\$794.7	\$1,024.4
Total costs	\$2,028.5	\$898.8	\$1,307.3
Net present value	\$315.0	-\$691.8	-\$620.8
Benefit/cost ratio	1.24	0.14	0.41
Internal rate of return (%)	0.54%		

Notes:

O&M=operating and maintenance

The results with a longer evaluation period show that considering a longer period of operations does not improve the evaluation outcomes in a substantial way. This is because, for the longer period of time, additional benefits do accumulate but in smaller and smaller amounts (due to discount rate becoming greater over time). At the same time, Project residual value becomes equal to \$0. However, it is noted that the internal rate of return is above 0 at 0.54 percent. In undiscounted dollar terms, the Project has a positive net present value and a benefit-cost ratio greater than one.

The sensitivity analysis also reviewed the impact of a 20 percent decrease and increase in ridership growth rate during the first 30 years of operations. The outcomes of the sensitivity analysis using a 7 percent discount rate are summarized in Table 11-17. The table provides the effect on the benefit/cost metrics indicated in the column headers associated with changes in variables or parameters corresponding to each row. As Table 11-17 shows, increase in ridership or extension in the years of the analysis period increase the net present value, but the metric remains at the level of below \$0.

Table 11-17. Quantitative Assessment of Sensitivity, Summary

Parameters	Change in Parameter Value	New Net Present Value (7 Percent Discount Rate)	Percent Change in Net Present Value	New Benefit/Cost Ratio (7 Percent Discount Rate)
Length of analysis period	Extension from 30 years to 60 years	-\$691.5	1.16%	0.14
Ridership growth	20 Percent decrease	-\$706.3	-0.96%	0.12
	20 percent increase	-\$692.5	1.02%	0.14

11.7 Concluding Observations

The results of the BCA presented in Section 11.6 indicate that the quantifiable user and non-user benefits of this Project are unlikely to exceed the costs of Project implementation and operation over a period of time and at a discount rate typically recommended for such evaluations by funding agencies (a period of up to 30 years and a discount rate of 7 percent recommended by USDOT).

Including most common benefits and using common industry assumptions in this BCA produces a negative net present value and a benefit-cost ratio smaller than 1. Only considering 60 years of operations and a discount rate of 0.54 percent or less, the Project breaks even or produces a positive net present value and a benefit-cost ratio equal to or greater than 1.

A BCA focuses on direct user benefits and externalities to the environment which are based on project operating characteristics such as ridership, schedules, operating cost, and operating specifications of the equipment. The Project, as planned, incurs maximum capital expenses with minimal service levels of four trains per day. The proposed Project may also generate other socioeconomic benefits for the local and regional economies which are of strategic nature. Such benefits are frequently more difficult to quantify and monetize for inclusion in the standard BCA due to insufficient data, conceptual challenges in their quantification and monetization, or significant additional effort that would be needed to determine them (for example, regional transportation modeling for scenarios with and without the Project). A brief description of these benefits relevant for this Project is provided below.

11.7.1 Improvements in System Reliability

- The Project will provide an alternative travel mode through the San Geronimo Pass where currently I-10 is the only existing transportation facility.
- By diverting private auto trips to rail, the Project may alleviate traffic congestion in the I-10 corridor. Reductions in traffic congestion typically improve average travel times and the reliability of travel times. Reliability will also improve due to reduction in the number of accidents or incidents and corresponding delays when lanes are blocked with the involved vehicles.
- The Project can be expected to provide a reliable service and travel times that are competitive with auto travel.

11.7.2 Improvements in Mobility and Quality of Life

- The Project would provide a new travel option that will help meet future mobility needs for residents, business, and visitors without expanding highway capacity. This may reduce or at least delay future capital and land requirements.
- The Project will reduce reliance on personal autos within the travel corridor and provide a high quality and affordable alternative. This will be particularly valuable to persons who do not own a vehicle or do not drive for various reasons, including the elderly, persons with disabilities, low-income individuals, or students, which in turn will help improve transportation equity.
- The Project will provide service of increased frequency compared to existing comparable Amtrak services (two daily return trips compared to one daily offered currently).

- The Project will provide a service which may be more enjoyable than the alternative of driving a car. Instead of driving in congested conditions, rail passengers can spend the travel time engaged in conversation with friends and family, reading, or simply resting.
- The Project will help advance the objectives of increasing the mode share of public transportation and reducing greenhouse gas emissions from transportation.

A BCA provides a structured and systematic comparison of costs and benefits of a proposed project. This will present a useful benchmark and perspective for the evaluation and comparison of investment projects to inform decisions regarding these projects. However, as outlined above, a BCA may not capture a range of other benefits and impacts stemming from a project which are difficult to quantify and monetize. Potential additional service in the future beyond the baseline of four trains per day may also alter the balance of costs and benefits if the service can attract more ridership while only minimally increasing operating costs. In future phases of project development, the BCA may change in terms of consistency with USDOT guidance, adjusting for Amtrak-related costs, and other costs which may change during subsequent planning and engineering.

12 Economic Impact Analysis

This section provides detailed technical information on the economic impact analysis conducted for the Project. The following economic impacts were considered:

- Short-term (or temporary) economic impacts associated with capital expenses (preliminary design, construction, etc.) during the development phase
- Long-term (or annually recurring) economic impacts associated with (additional) O&M expenses during the operational phase
- Long-term (or annually recurring) economic impacts associated with rail passenger spending

The economic impacts of the Project were quantified on a four-county region: Los Angeles, Orange, Riverside, and San Bernardino counties, all of which intersect the proposed Corridor.

The analysis relies primarily on ridership estimates, capital and O&M cost estimates, and tourism data. Socioeconomic data were also obtained from various state and national sources, including the U.S. Census Bureau and Caltrans. The IMPLAN economic assessment system was used to estimate the Project's direct, indirect, and induced economic impacts on the study area.

12.1 Methodology

This section details the methodology for the economic impact analysis with attention to the process behind the estimation of passenger spending for the proposed Project.

12.1.1 Economic Impact Analysis

The main purpose of an economic impact analysis is to determine the effect of a change in the demand for goods and services on the level of economic activity in a given area. The demand change can arise as a result of decisions made by governments (e.g., construction of the Project), firms, or households (e.g., passenger spending on lodging). IMPLAN, an input-output based regional economic assessment modeling system, was used to conduct the economic impact analysis of the Project. Specifically, multipliers were derived from the most recent 2019 IMPLAN data files for the study area, which consists of Los Angeles, Riverside, Orange, and San Bernardino counties.

Types of Effect

Economic impact analysis involves the estimation of three different types of effects: direct effect, indirect effect, and induced effect:

- Direct effect: Refers to the economic activity that arises as a result of the direct spending by businesses or agencies in the study area (e.g., expenses related to station construction activities).
- Indirect effect: Refers to the economic activity that results from purchases by local firms who are suppliers to the directly affected businesses or agencies (e.g., spending by the suppliers of the contractors responsible for the station construction).
- Induced effect: Represents the increase in economic activity, over and above the direct and indirect effects, associated with the increased labor income that workers (e.g., of the contractor

and all suppliers) accrue and is in turn spent on household goods and services purchased from businesses within the study area.

The indirect and induced effects are often referred to as multiplier effects since they can make the total economic impact significantly larger than the direct effect alone.

Impact Metrics

Typically, economic impacts are measured in terms of industry output, value added, employment, and tax revenue (both at the federal and state/local level):

- Output is the broadest measure of economic activity and refers to the total volume of sales.
- Value added comprises the value that a company adds to a product or service. It is the difference between what a company spends to acquire the product or service and its value at the time it is sold to other users, i.e., the output net of intermediate inputs. Therefore, value added can be thought of as a measure of the contribution to the gross domestic product made by an establishment or industry.
- Employment corresponds with two impact metrics: labor income and jobs.
 - Labor income refers to both employee compensation and proprietor income. Employee compensation, in turn, consists of wage and salary payments, as well as benefits (health, retirement, etc.) and employer-paid payroll taxes (employer side of social security, unemployment taxes, etc.). Proprietor income consists of payments received by self-employed individuals (e.g., doctors and lawyers) and unincorporated business owners.
 - Jobs created should not be interpreted as full-time equivalents as they reflect a mix of full- and part-time jobs for each industry. The jobs should not be interpreted as permanent jobs either, but rather as job-years. A job-year can be defined as one person employed for 1 year, whether part-time or full-time.
- Tax Revenue is the revenue generated from sales tax, property tax, and corporate income tax at the county, state, and federal levels.

IMPLAN Multipliers

The IMPLAN system consists of a software package and data files that are updated every year. The IMPLAN data files include transaction information (intra-regional and import/export) on 546 distinct industrial sectors and data on more than 20 different economic variables, including employment, output, and value added. For this study, the IMPLAN system is populated with the most recent data available for the study area, which reflect the year 2019 (IMPLAN 2021).

The following adjustments are made to help ensure that all impact estimates are truly incremental and specific to the study area:

- Since the original IMPLAN data is for 2019, the impact analysis results need to be adjusted for inflation to be expressed in 2021 dollars.²⁵

²⁵ Deflators derived from the most current Bureau of Labor Statistics (BLS) Employment Growth Model are used in IMPLAN to account for relative price changes over time. These deflators are available through 2060. Output deflators are Industry specific and are used to adjust Industry Output. Gross

- Type social accounting matrix multipliers,²⁶ used for estimating the indirect and induced effects, are modified with regional purchase coefficients²⁷ derived from the IMPLAN National Trade Flows Model to ensure that any spending leaking out of the study area is not included (e.g., machinery equipment purchased by construction contractors is most likely manufactured outside of the four-county region).
- Households are the only institution selected when building the model through multipliers in IMPLAN (government and capital are typically not internalized); as a result, the induced effects are based only on the income of households living in the study area.

12.1.2 Passenger Spending

In order to assess the passenger spending associated with the Project, the number of trips for each station of origin was tabulated using ridership tables for the Preferred Alternative. Since opening year (2028) ridership forecasts were not available, the 2028 station-level ridership projections were derived from the projections provided by Caltrans for 2024 and 2044.

Table 12-1 presents the projected number of leisure trips, business trips, and total trips originating from each station. After splitting the trips by point of origin, the 2016 AA results were used to derive the potential number of business trips and leisure trips. From this study, approximately 70 percent of passengers are leisure travelers and approximately 30 percent of passengers travel for business (including commuters). For the purpose of the economic impact analysis, it is imperative to delineate between leisure and business travelers, as their respective spending profiles differ substantially.

Table 12-1. Year 2028 Passengers by Origin Station

Origin	Number of Leisure Trips	Number of Business Trips	Total Trips
LAX	54,273	23,260	77,533
FUL	10,179	4,362	14,541
RIV	14,458	6,196	20,654
LML	14,548	6,235	20,783
PAS	3,738	1,602	5,340
PSN	33,285	14,265	47,549

Domestic Product deflators are not Industry specific and are used to adjust Final Demand and Value Added.

²⁶ Type social accounting matrix multipliers are the direct, indirect, and induced effects where the induced effect is based on information in the social accounting matrix. Type social accounting matrix multipliers capture interinstitutional transfers (such as transfers between households and the federal government) in addition to all commodity flows (purchases of goods). It is commonly accepted that only households should be internalized when building type social accounting matrix multipliers. Internalizing households relies on the assumption that workers will re-spend a portion of their labor income.

²⁷ Regional purchase coefficients represent the portion of the total regional demand that is met by regional production and attempt to account for cross-hauling, the importation and exportation of commodities from the same sector. All remaining demand is satisfied by imports, which provide no economic benefit to the region. In other words, regional purchase coefficients filter-out economic leakages from the region.

Table 12-1. Year 2028 Passengers by Origin Station

Origin	Number of Leisure Trips	Number of Business Trips	Total Trips
MID	11,395	4,884	16,279
IDR	8,738	3,745	12,483
COA	7,477	3,204	10,681
Total	158,090	67,753	225,843

Source: Amtrak 2011

Notes:

COA=proposed Coachella station; FUL=Fullerton station; IDR=proposed Indio station; LAX=Los Angeles Union Station (Amtrak station code); LML=proposed Loma Linda Station; MID=proposed Mid-Valley station; PAS=proposed Pass Area Station; PSN=Palm Springs Station; RIV=Riverside station

Based on the ridership tables and the 2019 Visitor Profile data from the San Diego Tourism Authority, which provides a detailed categorical breakdown of trip spending for both leisure and business travelers (\$200 and \$630 respectively), annual passenger spending was calculated (San Diego Tourism Authority 2019)²⁸. The level of spending is assumed to differ from station to station based on the socioeconomic characteristics of the station of origin. Essentially, wealthier households would likely spend more than others, and so the need for an adjustment factor arose.

For stations along the Corridor, a selection of cities and census-designated places (CDP) that intersect the station areas were utilized. Median 2019 household income data for each city/CDP were obtained from the U.S. Census Bureau. Using the number of households, the weighted average of the median household income for each station was then calculated. To calibrate the passenger spending estimates, each station's percent difference from the overall Corridor weighted average of the median household income (estimated at \$71,449) was applied as an adjustment factor.

Table 12-2 shows the weighted average of the median household income for each station. The catchment area for each station was determined utilizing ArcGIS based on the CDPs that intersect each station area. As a result, some cities/communities may be included in the calculation of median household income for more than one station catchment area.

Table 12-2. Household Income by Station Area

Station	Jurisdiction	Median Household Income (Weighted Average of Cities near Each Station)	Percent Difference from Corridor Weighted Average
Los Angeles	Los Angeles County	\$72,797	1.9%
Fullerton	Fullerton City	\$93,983	31.5%

²⁸ Data from the San Diego Tourism Authority was used because it included breakdowns by mode (road, rail, and air) and spending profiles (business, leisure) that were not available from the Greater Palm Springs Convention and Visitors Bureau (GPSCVB). Available tourism data from the Greater Palm Springs GPSCVB closely aligns with spending category breakdowns from the San Diego Tourism Authority.

Table 12-2. Household Income by Station Area

Station	Jurisdiction	Median Household Income (Weighted Average of Cities near Each Station)	Percent Difference from Corridor Weighted Average
Riverside	Riverside City	\$69,045	-3.4%
Loma Linda	Loma Linda City; Redlands City; San Bernardino City	\$56,855	-20.4%
Pass Area	Banning City; Beaumont City; Cabazon CDP	\$64,995	-9.0%
Palm Springs	Palm Springs City	\$53,441	-25.2%
Mid Valley	Thousand Palms CDP; Rancho Mirage City; Palm Desert; Cathedral City; Palm Springs City	\$56,745	-20.6%
Indio	Indio City; Desert Palms; Bermuda Dunes; Palm Desert; Thousand Palms CDP	\$56,608	-20.8%
Coachella	Coachella City; Indio City	\$47,399	-33.7%

Notes:

CDP=census-designated place

Finally, after calibrating the spending for each station's leisure and business passengers based on the median household income at the point of origin, total spending for the entire Corridor was assigned to spending categories based on the 2019 Visitor Profile from the San Diego Tourism Authority. Table 12-3 highlights the differences in category spending between leisure travelers and business travelers. For both types of travelers, lodging and meals make up the largest share of spending. Lodging alone represents 52 percent of total spending by business travelers, whereas lodging and meals collectively represent 52 percent of total spending by leisure travelers.

Table 12-3. Leisure versus Business Travelers Spending

Spending Category	Leisure Travelers (Percent of Total)	Business Travelers (Percent of Total)
Lodging	27%	52%
Meals	25%	19%
Beverages	6%	4%
Non-food shopping	16%	9%
Amusement/attractions	13%	7%

Table 12-3. Leisure versus Business Travelers Spending

Spending Category	Leisure Travelers (Percent of Total)	Business Travelers (Percent of Total)
Transportation (local ground)	7%	7%
Groceries	7%	2%

Source: San Diego Tourism Authority 2019

To account for the year of expenditure, passenger spending was inflated to 2028 dollars using long-term inflation projections (Caltrans 2020). Table 12-4 presents the final passenger spending estimates in millions of 2028 dollars.

Table 12-4. 2028 Passenger Spending Estimates (Millions of 2028 Dollars)

Category	Leisure Travelers	Business Travelers	Total Spending
Lodging	\$9.3	\$24.4	\$33.7
Meals	\$8.7	\$9.0	\$17.7
Beverages	\$2.1	\$2.1	\$4.2
Non-food shopping	\$5.6	\$4.2	\$9.8
Amusement/Attractions	\$4.4	\$3.2	\$7.6
Transportation	\$2.4	\$3.2	\$5.6
Groceries	\$2.3	\$0.9	\$3.3
Total	\$34.8	\$47.1	\$81.9

12.2 Model Inputs

This section details the source of the cost estimates, socioeconomic data needed to estimate the passenger spending arising as a result of the Project, IMPLAN sector assignment for all incurred costs (both short and long term), and various other data sources utilized in this analysis.

12.2.1 Capital Costs

The capital costs incurred by the Project are derived from estimates prepared by HDR. Capital costs are incurred once and constitute the bulk of the spending during the development phase of the Project. Furthermore, these capital costs can be broken down into five categories, which are presented in Table 12-5: construction-related costs, equipment costs (e.g., track signals), rolling stock expenses,²⁹ professional services (e.g., engineering), and agency costs (e.g., inspection fees).

²⁹ For the purpose of the economic impact analysis, it is assumed that all railway vehicles would be manufactured in the study area,

Table 12-5. Cost Categories for Capital Costs^a (Millions of 2019 Dollars)

Cost Category	Amount
Construction	\$866.0
Equipment	\$133.8
Rolling stock ^b	\$105.8
Professional services	\$82.8
Agency costs	\$69.0

Notes:

^a Capital costs used in the economic impact analysis do not include ROW.

^b Rolling stock costs include initial purchase costs and overhauls for 20 years following implementation.

Construction costs include the expenses incurred with the construction of new track, stations, bridges, and other structures in the Eastern Section of the corridor. Equipment costs refer to the purchase of signals and other communication equipment, as well as the design and support necessary during the development phase of the Project. Rolling stock costs include both the purchase of new rolling stock and the overhaul of existing rolling stock. Professional services refer to the costs incurred for the civil design and engineering support during construction. Agency costs are the costs incurred by the managing agency; for the purposes of our analysis, this was assigned to Sector 532: local government passenger transit.

Construction costs were assumed to take place according to the following schedule: 25 percent of spending taking place in FY2024–2025, an additional 25 percent in FY2025–2026, 40 percent in FY2026–2027, and finally 10 percent in FY2027–2028. Furthermore, the remaining capital costs detailed above were assumed to be split evenly across the 4 years of spending, 2024–2027, meaning 25 percent of spending taking place each year.

Using the detailed cost estimates, North American Industry Classification System codes were found for each cost category and then matched to their respective IMPLAN sectors so that multipliers could be derived for each year of spending and cost category.

All cost estimates used for the purpose of the economic impact analysis include both/either contingency and/or reserve amounts estimated by HDR. For example, station construction cost estimates include a 30 percent contingency. The model results can be easily adjusted to include both contingency and reserve amounts, only contingency, or neither contingency nor reserve amounts.

IMPLAN Sector Assignment

Table 12-6 provides an enumeration of each IMPLAN sector utilized for the purposes of our analysis. Multipliers were found for each of the 4 years of the development phase (2024–2027) to estimate six different economic impact metrics: output, value added, labor income, employment, federal tax revenue, and state and local tax revenue. More detail can be found in the Section 12.1.1.

Table 12-6. IMPLAN Sectors for Capital Costs

Sector Code	Sector Description
54	Construction of new highways and streets
56	Construction of other new nonresidential structures
303	Other communications equipment manufacturing
359	Railroad rolling stock manufacturing
455	Legal services
532	Local government passenger transit

12.2.2 Operations and Maintenance Costs

The analysis assumes rail service starts in 2028, following the development phase. Even though these costs would be recurring annually, the impact analysis was only assessed for the first year of operations. The annual O&M expenses are estimated at \$11.5 million based on a cost of \$0.17 per seat mile, in 2019 dollars.

For the IMPLAN analysis, this annual cost was assigned to Sector 415: Rail Transportation.

12.2.3 Passenger Spending

After allocating passenger spending according to the percentage breakdown from the 2019 San Diego Tourism Authority Visitor Profile, IMPLAN sectors were assigned to each. Table 12-7 details the different IMPLAN sectors utilized in the analysis of passenger spending on the study area. Multipliers were compiled for each sector for 2028, congruent with the ridership estimates prepared previously, and economic impacts were assessed in accordance with the methodology described in Section 12.1.

Table 12-7. IMPLAN Sectors for Passenger Spending

Sector Code	Sector Description
406	Retail - Food and beverage stores
408	Retail - Gasoline stores
418	Transit and ground passenger transportation
509	Full-service restaurants
511	All other food and drinking places
HOTEL_AGG	Aggregate of 507-508: Hotels and motels, including casino hotels; Other accommodations
SHOP_AGG	Aggregate of retail sectors: 404-405, 407, & 409-412
AMU_AGG	Aggregate of amusement sectors: 496-506

12.3 Analysis Results

Based on the methodology and the model inputs detailed previously, the economic impacts of the Project were estimated in IMPLAN using economic multipliers for the four-county study area. To facilitate comparison all results in this section are presented in the same dollar year, 2021, the year in which the analysis was conducted. Additional detailed results are included in Appendix L.

12.3.1 Capital Cost Impacts

As shown in Table 12-8, when accounting for the multiplier effects, the total contribution of capital expenditures to employment across all construction years is estimated at 15,067 job-years in the four-county region. Employees at these jobs would earn \$1.2 billion in labor income and would generate over \$2.9 billion in output, or \$1.1 billion in value added. Federal, state, and local tax revenues that would be generated by the Project over the construction period total \$401 million.

Table 12-8. 2024-2027 Capital Cost Impacts by Type of Effect and by Metric (Millions of 2021 Dollars)

Impact Metric	Direct	Indirect	Induced	Total
Output	\$1,161.2	\$972.1	\$778.7	\$2,912.1
Value added	\$151.1	\$459.5	\$481.2	\$1,091.7
Labor income	\$675.9	\$221.0	\$276.9	\$1,173.7
Employment	7,957	2,746	4,364	15,067
Taxes	—	—	—	\$401.0
Federal taxes	—	—	—	\$225.4
State/Local taxes	—	—	—	\$175.6

Table 12-9 provides a breakdown of the output impact by type of effect and by sector. Construction sectors 54 and 56 would generate more than half of the total output impact.

Table 12-9. 2024-2027 Breakdown of Output Impact by Type of Effect and by Sector (Millions of 2021 Dollars)

Sector	Sector Description	Direct	Indirect	Induced	Total
54	Construction of new highways and streets	\$423.0	\$155.3	\$199.5	\$777.8
56	Construction of other new nonresidential structures	\$372.4	\$174.0	\$188.2	\$734.7
303	Other communications equipment manufacturing	\$130.2	\$82.1	\$47.8	\$260.2
359	Railroad rolling stock manufacturing	\$94.6	\$52.9	\$29.5	\$177.1

532	Local government passenger transit	\$65.5	\$475.3	\$266.9	\$807.8
457	Architectural, engineering, and related services	\$75.5	\$32.4	\$46.7	\$154.6
Total		\$1,161.2	\$972.1	\$778.7	\$2,912.1

Table 12-10 presents the top ten industries (in descending order) in terms of indirect and induced employment that would be generated by capital expenditures. Employment services, which include labor contractors and staffing agencies, comes first with 270 job-years during the development phase of the Project. Full- and limited-service restaurants complete the top three most impacted industries, with a combined total of 515 job-years. Additionally, the top ten industries account for nearly 45 percent of the total number of indirect and induced job-years that would be created by capital spending.

Table 12-10. 2024-2027 Top Ten Industries by Indirect and Induced Employment Impacts

Rank	Sector Number	IMPLAN Sector	Employment
1	472	Employment services	270
2	509	Full-service restaurants	266
3	510	Limited-service restaurants	249
4	418	Transit and ground passenger transportation	238
5	447	Other real estate	228
6	417	Truck transportation	200
7	457	Architectural, engineering, and related services	184
8	469	Management of companies and enterprises	178
9	490	Hospitals	168
10	493	Individual and family services	164

Construction Cost Impacts

Table 12-11 shows the economic impacts resulting from construction costs only. Construction costs alone would generate more than \$1.5 billion in output, \$854.7 million in value added, and 8,017 job-years from 2024 to 2027. Employees at these jobs would earn \$576.7 million in labor income. Further, construction spending would generate tax revenues totaling \$119.2 million in federal taxes and \$70.0 million in state and local taxes, or \$189.2 million collectively.

Table 12-11. 2024-2027 Construction Impacts by Type of Effect and by Metric (Millions of 2021 Dollars)

Impact Metric	Direct	Indirect	Induced	Total
Output	\$795.4	\$329.4	\$387.8	\$1,512.5
Value added	\$440.4	\$174.7	\$239.6	\$854.7
Labor income	\$346.3	\$101.9	\$128.5	\$576.7
Employment	4,541	1,301	2,174	8,017
Taxes	—	—	—	\$189.2
Federal taxes	—	—	—	\$119.2
State/Local taxes	—	—	—	\$70.0

12.3.2 Operations and Maintenance Cost Impacts

O&M costs are expected to average \$11.5 million (2019 dollars) annually from 2028 onward. Table 12-12 presents a summary of the impacts associated with O&M expenditures broken down by impact metric (output, value added, labor income, employment, and taxes) and by type of effect (direct, indirect, induced, and total). When accounting for the multiplier effects, O&M costs would generate \$20.9 million in economic output and \$2.3 million in taxes annually. Furthermore, the total contribution of O&M spending to employment would amount to an estimated 77 jobs³⁰, or \$6.9 million in labor income.

Table 12-12. 2028 Operations and Maintenance Cost Impacts by Type of Effect and by Metric (Millions of 2021 Dollars)

Impact Metric	Direct	Indirect	Induced	Total
Output	\$10.0	\$6.3	\$4.6	\$20.9
Value added	\$4.2	\$3.5	\$2.9	\$10.6
Labor income	\$3.4	\$2.0	\$1.5	\$6.9
Employment	25	26	26	77
Taxes	—	—	—	\$2.3
Federal taxes	—	—	—	\$1.4
State/Local taxes	—	—	—	\$0.9

³⁰ Job impact includes both full- and part-time jobs, and therefore, not full-time equivalents.

12.3.3 Passenger Spending Impacts

Passenger spending associated with the projected 225,843 trips in 2028 would generate \$120.2 million in output, or \$77.0 million in value added, in the study area (\$2021). Further, the total contribution to employment would amount to 1,011 jobs. These employees would earn \$48.2 million in labor income in 2028.

As shown in Table 12-13, the indirect and induced effects are smaller for passenger spending than for capital costs because the bulk of passenger spending is assigned to retail sectors, which add little value to the goods they sell.

The economic impact of annually recurring passenger spending would vastly outweigh the economic impact of annual O&M expenditures, especially when considering projected ridership growth through 2044.

**Table 12-13. 2028 Passenger Spending Impacts by Type of Effect and by Metric
(Millions of 2021 Dollars)**

Impact Metric	Direct	Indirect	Induced	Total
Output	\$64.2	\$23.4	\$32.6	\$120.2
Value added	\$43.3	\$13.5	\$20.1	\$77.0
Labor income	\$28.8	\$8.6	\$10.8	\$48.2
Employment	707	122	182	1,011
Taxes	—	—	—	\$18.7
Federal taxes	—	—	—	\$10.5
State/Local taxes	—	—	—	\$8.3

As Table 12-14 shows, the accommodation aggregate sector generates the largest output impact. Full-service restaurants rank second, followed by the amusement aggregate sector.

**Table 12-14. 2028 Breakdown of Output Impact by Type of Effect and by Sector
(Millions of 2021 Dollars)**

Sector	Sector Description	Direct	Indirect	Induced	Total
HOTEL_AGG	Aggregate of 507-508	\$30.7	\$10.6	\$15.6	\$57.0
509	Full-service restaurants	\$15.3	\$5.7	\$7.4	\$28.5
AMU_AGG	Aggregate of amusement sectors: 496-506	\$6.9	\$2.6	\$3.5	\$13.0
SHOP_AGG	Aggregate of retail sectors: 404-405, 407, and 409-412	\$3.5	\$1.6	\$1.8	\$6.9
511	All other food and drinking places	\$3.7	\$1.3	\$2.0	\$6.9
418	Transit and ground passenger transportation	\$2.4	\$1.1	\$1.3	\$4.8
406	Retail - Food and beverage stores	\$1.0	\$0.4	\$0.6	\$2.0
408	Retail - Gasoline stores	\$0.6	\$0.2	\$0.3	\$1.1
Total		\$64.2	\$23.4	\$32.6	\$120.2

12.4 Conclusion

Overall, the Project is expected to generate more than \$2.9 billion in output and 15,067 jobs during the development phase, from 2024 to 2027. A majority of these jobs will be created in industries directly impacted by construction and other capital expenditures.

Long-term economic impacts will also be generated during the operational phase of the Project. In particular, passenger spending (on lodging, meals, etc.) is expected to generate \$120.2 million in output and 1,011 jobs in the opening year alone (2028). These impacts will increase over time as ridership grows. In addition, rail O&M is expected to create 77 jobs and generate \$20.9 million in annual output.

In turn, the economic activity generated by passenger spending and O&M expenditures will likely attract businesses to the Corridor that will further increase the economic impacts on the regional economy.

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13 Corridor Service Implementation Plan

This chapter describes the potential implementation and phasing plan options of the Project. This plan includes a description of the service (the proposed full buildout of infrastructure and frequencies); a discussion of the institutional and management structures potentially available to implement and manage the service; and the funding, financing, and service strategies that might be implemented in order to construct and operate the service. This plan also identifies where negotiation and agreements may be necessary to advance the service.

13.1 Proposed Service

The proposed service would provide two round trips per day between LAUS and the City of Coachella. The service requirements and operating plan are described in Sections 6.1 and 6.2.

13.2 Institutional Management Structure

RCTC is the regional transportation planning agency for Riverside County where a portion of the Western Section of the Corridor and most of the Eastern Section are located. The primary responsibilities of RCTC are to plan, design, fund, and construct transportation improvements for Riverside County. RCTC manages local return to source sales tax dollars (Measure A), which are specifically designated for transportation improvements in Riverside County, as well as various state and federal formula funding streams dedicated for transportation improvements.

While RCTC is responsible for advancing the planning of the Project in partnership with, and on behalf of, Caltrans Division of Rail and Mass Transportation, RCTC does not possess the legislative authority necessary to operate the service.

For this reason and for the purpose of sponsoring the Project's environmental reviews and SDP, the Caltrans Division of Rail and Mass Transportation is the responsible agency for this work. The Corridor's service planning and Tier 1 environmental analysis will ultimately be carried out based on a decision from Caltrans, in partnership with other regional entities, on which agency is the most appropriate authority to further advance the Project and undertake the construction, implementation, and operation of the service.

13.2.1 Overview of Intercity Rail Service Institutional Organization in California

The National Railroad Passenger Corporation (Amtrak) assumed operation of almost all intercity passenger trains in the U.S. in 1971. Under current federal and state laws, Amtrak cannot be the entity that manages the proposed Coachella Valley Rail Corridor service. Amtrak can be the designated service provider and the supplier of rolling stock that could be leased for corridor service, two functions it carries out in California as well as in other states. Amtrak can also be responsible for implementing capital improvements, although it currently has not carried out that function in California.

In 1976, the State of California began providing financial assistance to Amtrak to make the service on regional passenger corridors within California more reliable and more frequent. At the same time, the Caltrans Division of Rail and Mass Transportation was formed to oversee these state-supported passenger rail corridor operations.

In 1990, California voters passed Propositions 108 and 116, which provided more than \$3 billion in funding for transportation projects, with a large portion going to passenger rail service. This funding resulted in the purchase of new locomotives and passenger cars by the state for use on its state-supported Amtrak routes. The state-supported corridors were expanded as well.

California Government Code Section 14035 gives Caltrans broad authority to contract directly with Amtrak for the provision of passenger rail services and designated specific corridors on which Caltrans may construct, acquire, lease, and operate rail passenger terminals for passenger service, including the Los Angeles–Riverside–San Bernardino–Calexico corridor on which the proposed Coachella Valley rail service will operate. California’s three state-supported intercity rail services were originally funded and managed directly by Caltrans under this authority, but legislation was then passed for each corridor enabling state funding to be passed to a regional JPA, which would manage the service with oversight from Caltrans.

In 1998, while still funded by the state, the management of the Capitol Corridor was transferred to the Capitol Corridor JPA, which was formed by local jurisdictions served by the line. In 2015, the management of the San Joaquin and the Pacific Surfliner were similarly transferred to the San Joaquin JPA and the LOSSAN Rail Corridor Agency, respectively. Table 13-1 summarizes the management structure of each state-supported rail service.

Table 13-1. State-supported Intercity Rail Services

Service	Termini	Funding Entity	Operating Entity	Managing Entity	Contracted Service Provider
Pacific Surfliner	San Diego, San Luis Obispo	CalSTA	LOSSAN Rail Corridor Agency	OCTA	Amtrak
Capitol Corridor	San Jose, Auburn	CalSTA	Capitol Corridor JPA	Bay Area Rapid Transit District	Amtrak
San Joaquins	Bakersfield, Oakland/Sacramento	CalSTA	San Joaquin JPA	San Joaquin Regional Rail Commission	Amtrak

Notes:

CalSTA=California State Transportation Agency; JPA=Joint Powers Authority; LOSSAN=Los Angeles – San Diego – San Luis Obispo; OCTA=Orange County Transportation Authority

While it is possible for the state to manage the proposed Coachella Valley Rail Corridor service, this alternative is not specifically examined due to the strength and current prevalence of the JPA model as well as the precedents set by the state’s actions in recent years to transfer management and operations responsibilities of state-supported intercity passenger services to the corridor agencies.

As previously mentioned, RCTC does not currently possess the legislative authority necessary to operate the service. Gaining such authority would represent a major change in the footprint of the agency with a dramatic increase in agency responsibilities, as well as cause RCTC to operate outside of its defined jurisdictional boundary of Riverside County. While it is possible for RCTC to exercise this option, the SDP assumes that RCTC will not seek to gain the legislative authority necessary to operate the service.

These assumptions combined have the effect of focusing the institutional options on a JPA model as the most viable alternative available for service implementation. The 2018 CSRP does not provide guidance for emerging corridors regarding the specific mechanisms through which new corridors should be managed and funded. The sections that follow are based on the assumption that a corridor-level governance mechanism will be needed at some point to carry out future steps in the Project.

13.2.2 Joint Powers Authority as a Governance Model

JPAs have been implemented in California for over 85 years. These authorities are legally created entities that allow two or more public agencies to jointly exercise common powers. Forming such entities can provide a creative approach to the provision of public services and to fund large infrastructure projects, thereby providing public agencies with the means to deliver these services more efficiently and in a cost-effective manner.

The Joint Exercise of Powers Act, as codified in California Government Code Section 6500, governs JPAs. Under the act, JPAs are restricted to use by public agencies only. However, the term public agency is defined very broadly. Agencies that can exercise joint powers include federal agencies, state agencies, and individual departments, counties, cities, special districts, school districts, redevelopment agencies, and Native American tribes. A California agency can even share joint powers with an agency in another state.

The act authorizes two kinds of JPA arrangements. The first allows two or more public agencies to contract to jointly exercise common powers. The second allows two or more public agencies to form a separate legal entity. This new entity would then have independent legal rights, including the ability to enter into contracts, hold property, and sue or be sued. Forming a separate entity can be beneficial because the debts, liabilities, and obligations of the JPA belong to that entity, not the contracting parties.

SB 742, which passed in October 2019 and came into effect in January 2020, allows new flexibility in the governance of intercity passenger rail service. Previous law authorized Caltrans to contract with Amtrak for intercity bus service, but the new law allows both the state to enter into agreements for intercity connecting bus service or for Caltrans to pass funding to rail JPAs, which can then directly contract with Amtrak or other operators.

Before establishing intercity bus service under this authorization, both the state and JPAs are required to consult with local, regional, and private operators to avoid conflicts and duplicative service. JPAs, Amtrak, and public and private operators are also encouraged to collaborate on ticket selling agreements. This coordination is fundamental to achieving the state's vision for an integrated statewide network and is important for maintaining fiscal sustainability, particularly on corridors with low population density that may not support multiple frequent services. This requirement also provides a path forward for corridors such as Coachella Valley Rail to discuss the most appropriate mode of governance.

A JPA does not require new state legislation but instead has powers defined by the agreement between its member agencies. While taxation is a power that can be shared, JPAs often rely on funding streams generated by their constituent members, either in the form of locally generated taxes via the member agencies, federal and state formula funds gathered by the member agencies, or discretionary grants derived from either federal or state sources. With each participating entity required to secure its own funding sources for its contribution to the service, funding stability is an issue that needs to be

addressed during negotiations and analyzed for its impact on the JPA governance model once the entity is created.

Given the above, the following describes two potential JPA governance model options for rail service in the Corridor.

Option 1 – Integration of the Service into an Existing Joint Powers Authority

RCTC currently belongs to an existing JPA (LOSSAN), which manages the O&M of the state-supported Pacific Surfliner intercity passenger rail service linking San Diego, Los Angeles, Santa Barbara, and San Luis Obispo.

While LOSSAN and other JPAs responsible for state-supported passenger rail corridors oversee the day-to-day aspects of managing their respective rail corridors, the state funds the services and provides oversight, including overall planning, coordinating, and budgeting, to ensure that the state-supported rail service and its associated thruway bus system are integrated internally and with the rest of the regional and local public transit networks across the state. The goal as stated in the CSRP is to “provide and ensure a statewide integrated and seamless system.”

The Pacific Surfliner service managed by the LOSSAN Rail Agency uses a combination of state- and Amtrak-owned equipment on the route. Amtrak owns the locomotives and 40 bilevel cars and provides additional equipment used on the route. The state owns 10 cars. Amtrak maintains all the equipment and charges the JPA an annual lease fee for the use of the Amtrak-owned rolling stock.

LOSSAN has been successful in securing federal and state funding, primarily through state programs such as the Transit and Intercity Rail Capital Program, totaling \$271 million in awarded program funds to date. However, LOSSAN's \$4.9 billion capital improvement program is largely unfunded, and member agencies or the host railroad are generally responsible for funding and implementation of their respective capital improvement projects, such as track infrastructure and new stations. While the Pacific Surfliner operations are currently funded through farebox revenues and the state's Public Transportation Account, there is no long-term source of operating funds identified.

LOSSAN was originally formed in 1989 to manage and expand services on the 350-mile coastal rail line between San Diego and San Luis Obispo, including the Pacific Surfliner intercity passenger trains. It is governed by an 11-member Board of Directors composed of elected officials representing rail owners, operators, and planning agencies along the rail corridor. The LOSSAN Agency is currently managed and staffed by OCTA. However, since this service was operated under a previous JPA as well as Amtrak, it can be considered an inherited service rather than a newly-created service, such as the proposed Corridor.

An extension of the LOSSAN JPA's authority to manage the construction, implementation, and operation of the Corridor service could be a plausible approach, as LOSSAN is the only intercity service provider in the vicinity of the Corridor. Additionally, LOSSAN funds the existing Amtrak Thruway bus service that connects Coachella Valley residents to Pacific Surfliner trains in Fullerton. LOSSAN is currently a project partner with representation on the Coachella Valley Rail Technical Advisory Committee and has previously partnered with RCTC to explore the potential to operate a special event train to serve the spring music festivals in the Coachella Valley (Coachella and Stagecoach). Utilizing the LOSSAN JPA is also plausible as it already operates intercity service in the Western Section of the Corridor (Pacific Surfliner service between LAUS and Fullerton).

With RCTC as a voting member of LOSSAN, the commission's member agencies in Riverside County along the Eastern Section of the proposed Corridor are already represented, and therefore, currently have a voice in LOSSAN governance.

As previously stated, the transportation commissions of two of the other three Corridor counties (Los Angeles [Metro], and Orange [OCTA]) are also members of the LOSSAN Board. As a result, many constituent cities along the Corridor outside of Riverside County have a voice in LOSSAN governance, and therefore, would have representation in decisions about the Corridor service if LOSSAN were to manage it.

While it is technically feasible for LOSSAN to assume a role in deploying service on the Corridor, the agency's ability to integrate responsibilities for a new service with that of the existing Pacific Surfliner service will need to be more thoroughly investigated with respect both to LOSSAN's legal rights and obligations under the current JPA as well as the LOSSAN board's interest in taking on a new obligation with a new service.

While Caltrans has the authority to fund capital improvements and directly negotiate operating agreements with Amtrak on the proposed corridor, the statutory authority permitting the existing agreement that transferred administrative responsibility from Caltrans to LOSSAN is limited to the San Diego–Los Angeles–San Luis Obispo corridor. The portion of the Western Section of the proposed service from Los Angeles to Fullerton is part of that corridor, but the remainder of the proposed Coachella Valley rail service is outside LOSSAN's statutory jurisdiction.

As such and given the size and nature of the expansion, for this option to move forward, the LOSSAN enabling legislation will need to be revisited, and at a minimum, address the following:

- The statutory changes needed to expand the LOSSAN service area
- The need for a potential amendment of Joint Use of Powers Agreement

As of 2021, two different California agencies sponsoring two different emerging passenger rail corridors are currently considering the existing LOSSAN JPA as an appropriate vehicle for the delivery of the planned service: RCTC is studying the Coachella Valley Rail Corridor and the Transportation Agency for Monterey County and San Luis Obispo Council of Governments are each studying parts of a corridor between San Jose and San Luis Obispo.

If the LOSSAN JPA were to expand to manage both emerging corridors, the resulting LOSSAN service area would stretch across both northern and southern California counties as well as many different customer constituencies. Such a development would greatly expand the responsibilities of an operating agency, and therefore, prompts a wider discussion on the appropriateness of using one particular JPA as the governance vehicle to manage many different corridors throughout the state.

In consideration of the two examples above, decisions such as the governing structure for the Corridor service should be coordinated through the state in order to meet the goals and objectives of the CSRP and to position the Project for the successful development of the required capital infrastructure and gaining access to the host railroads. These conversations should include consideration of customer bases to be served by a single JPA and appropriate representation of communities on the governing body board. Within this wider discussion, the state will need to work together with all of the potential emerging corridors to define the future service and expansion under mutually agreeable terms.

Option 2 – Integration of the Service into a New Joint Powers Authority

The second option would be to form a new JPA with the specific purpose of managing the Corridor service envisioned in the CSRP. This approach has its own challenges and obstacles to service implementation, especially in terms of determining the appropriate composition of the JPA membership, developing, and maintaining the political support for the Project so a new JPA can be a viable entity, and ensuring that a new JPA will be able to effectively draw upon the necessary resources and assistance available from the state.

While the CSRP states that it seeks to provide a path toward implementation and clearly states that it would be carried out in coordination with regional and local agencies, it does not provide guidance on the means and governance structures needed for attaining new infrastructure or for providing passenger train service on new corridors. This approach leaves room for a project sponsor or grouping of sponsors to determine the most appropriate governance structure for moving forward with its proposed project.

Looking to the state for leadership will assist and better inform the discussion about whether to incorporate the Corridor within an existing JPA or form a new JPA. This avenue provides the most appropriate path to take with respect to achieving the state's objectives for integration with existing corridor services and with respect to implementing the approach best suited to tapping the funding resources and other assistance provided by the state.

The decision to form a new JPA could come out of deliberations undertaken by the transportation agencies representing the four counties that the Corridor traverses, Riverside, Orange, Los Angeles, and San Bernardino (represented by RCTC, OCTA, Metro, and SBCTA), which are, with the exception of SBCTA, members of both LOSSAN and SCRRA, the region's commuter rail JPA (SBCTA is a member of SCRRA but not LOSSAN). Given the working-level consensus exhibited by the JPA members and other local partners on existing train operations, a decision could potentially be reached for the development of a new JPA for the Corridor service. Again, this outcome would require negotiation, buy-in from the local agencies, as well as buy-in and a funding commitment from the state.

13.2.3 Managing and Operating Entity Considerations and Next Steps

Given the cross-county nature of the host railroad's freight corridor as well as the need for integration of the passenger rail service with existing rail service and transit networks in the Corridor, initiating service on the Corridor will require careful planning by several agencies and coordination with key stakeholders. This section outlines the next steps that relevant public agencies would need to take to proceed with service implementation.

For the Corridor, the implementation, management, and operation of the service should be examined not only in the context of developing an institutional structure to manage the service (such as a JPA) but also in identifying roles and responsibilities and securing needed commitments for future service planning and implementation activities from Caltrans, RCTC, and the three other county transportation commissions. The implementation, management, and operation of the service should involve the following elements, with the understanding of each having a different effect on the stakeholder agencies:

- The ability to enter into agreements with host railroads and a passenger rail service provider for the implementation and operation of intercity passenger rail service in the corridor.
- The ability to purchase (in accordance with both federal and state guidelines) real property.

- The ability to apply for and take possession of various forms of grant funds including federal, state, and local.
- The ability to enter into contracts for the construction of track, signaling, and station infrastructure as well as for fleet purposes.
- The ability to hire and manage staff both for construction as well as for train operations, maintenance, and customer service.
- The ability to establish a working framework with other public transit providers along the corridor in order to advance meaningful connections and service integration policies.

Planning and implementing service on the Corridor (including the construction of a third main track in the Eastern Section) will require close coordination between local, state, and federal agencies, in particular the four county transportation commissions and the host railroads (UP and BNSF). Negotiation with the state will also be necessary in order to institute the funding model (or similar) currently in place for the existing corridor agencies. The Bipartisan Infrastructure Law (BIL) passed in November 2021 increases the level of federal funding available for the planning, development, and implementation of passenger rail corridors. The law also authorizes FRA to establish a Corridor Identification and Development Program, which will create a framework to facilitate the development of new, enhanced, or restored intercity passenger rail corridors, including the creation of a pipeline of intercity passenger rail corridor projects. The BIL also provides additional provisions regarding Amtrak and their role in the establishment and development of intercity passenger rail corridors, which may provide for other additional opportunities related to establishing service along the Corridor.

As to the utilization of an existing JPA such as LOSSAN or the creation of a new corridor entity, that decision will require current stakeholders to examine their own specific needs and manage those in context with the constituents along the length of the entire Corridor.

13.2.4 Host Railroad Considerations

BNSF on the Western Section

Impacts on rail operations and improvements to accommodate Coachella service in Los Angeles on Metrolink trackage between the Soto interlocking and LAUS were not analyzed because they are being accommodated within the capacity improvements currently planned in the Link Union Station Project.

The Western Section of the Corridor has a Shared Use Agreement between RCTC and BNSF in place governing planned infrastructure improvements to accommodate passenger service increases between Colton and Los Angeles, including those proposed for the Corridor service.

This section of the corridor has been the subject of significant ongoing regional rail service planning efforts including LOSSAN, Metrolink, California High-Speed Rail Authority, and host railroad BNSF. Even though potential slots already exist, for daily Coachella Valley Rail service to occur, it will likely be necessary for the Corridor's managing agency and service operator to reach an agreement with the host railroad BNSF. However, Caltrans may contract with railroad corporations for the use of tracks and other facilities and the provision of passenger services on terms and conditions as the parties may agree.

Union Pacific Railroad on the Eastern Section

Although Amtrak provides triweekly, long-distance passenger train service on the Eastern Section of the Coachella Valley Rail Corridor, no agreements are currently in place with the host railroad (UP) with respect to operating daily state-supported passenger rail service in this Section.

Agreements with host railroads must be in place before any permitting, construction, or implementing of service can begin on either section of the Corridor. While an agreement exists between RCTC and BNSF that governs passenger rail service in the Western Section of the corridor between Los Angeles and Colton, coordination with BNSF for the movement of Coachella trains between BNSF's San Bernardino Subdivision and UP's Yuma Subdivision at Colton in San Bernardino County will be required.

Any agreements developed would be expected to consider how the proposed services would affect freight service, and how the lead agencies plan to mitigate any impacts that might occur to host railroad operations.

A possible approach for achieving Corridor passenger rail service on the Eastern Section could be for the state, potentially in partnership with the local entities, the future CV Rail agency, and/or Amtrak, to initiate negotiation with UP through an agreement or series of agreements/memoranda of understanding ultimately leading to a joint and ongoing Corridor management plan and shared use agreement. This agreement would be negotiated to provide a coherent and consistent approach to the planning, design, and construction of required infrastructure and service implementation that would allow for ultimate delivery of the full-service scenario.

For the Corridor, an agreement would help prioritize capital needs and coordinate ROW actions, all leading to the intrinsic development of operational decisions. While required to advance the full buildout of the Project and associated service frequencies, an agreement structured to account for specific capital improvements may also help to advance a phased service implementation scenario.

An approach of this nature including the planning, design, and prioritization of projects would help to ensure that elements for the Eastern Section of the Coachella Valley Rail Corridor are in a ready to go stance for the development of grant applications to support the targeted capital improvements.

Lastly, documenting a corridor management strategy through periodic updates to an agreement could identify the benefits and relationships of incremental investments and thereby build stakeholder support for more service on the Corridor.

13.3 Service and Implementation Phasing

From a project development perspective, a clear dividing line exists on the Corridor with respect to both service delivery and infrastructure. As described above, the Western Section is robust and well developed in terms of capital improvements to support passenger rail service, shared use agreements to support existing and expanded service, and existing passenger rail services with an established rider base, stations, and associated amenities. Conversely, the Eastern Section will need to have agreements for passenger service access as well as a significant capital investment that protects existing freight operations and supports on-time performance of daily passenger rail service.

Chapters 5 through 9 detail the proposed service frequencies, trip times, and infrastructure requirements to deliver the Project's service plan, which has been developed to optimize ridership and costs based on market projections and meet the Project's Purpose and Need. Infrastructure needed to support the Project's proposed two round trips per day includes the construction of a third main

track in the Corridor's Eastern Section. Other needed infrastructure elements in the Eastern Section include a new (second) connector track between the UP and BNSF lines in Colton, a new bridge over the Santa Ana River, various crossing improvements, and five new passenger stations.

The required infrastructure will be expensive to build; conceptual design cost estimates indicate an infrastructure and rolling stock investment exceeding \$1.5 billion (year of expenditure dollars). Construction and equipment costs to implement the full-service scenario will demand from the Project sponsors a robust funding and financing plan. Given the competition for both federal, state, and local funds, this undertaking will occur over a period of several years. This may have the potential to push the start date of service well beyond the 2024 service implementation date assumed for planning purposes in the Tier 1 Program EIS/EIR. Therefore, corridor implementation may need to be phased to allow for an earlier inauguration of daily service at a reduced level while the buildout of the full Corridor advances. The consideration of a phased implementation strategy, featuring an earlier limited-service startup and culminating in a full buildout, may allow for alternative approaches to financing and funding the Project. Ultimately, the implementation approach will need to be worked out in access agreements with the host railroads.

13.3.1 Key Phasing Considerations

Should the Project sponsors choose to adopt a phased approach to implementing service, a number of key considerations would still have to be discussed, advanced, and agreed upon before any service is initiated including the determination of an operating entity, an access agreement with the host railroad, and a funding plan.

Several infrastructure and operational factors will merit consideration if a phased implementation of the Project is worked out with the host railroads. These factors, based on evaluation and analytical work performed for the Tier 1 Program EIS/EIR and SDP, are discussed below. Following the discussion of the ten infrastructure and operational factors, a potential phasing approach is suggested to illustrate how construction of the Project might be implemented in a manner consistent with the ten factors. The actual approach to Project implementation in the Corridor will need to be determined through access agreements negotiated with the host railroads.

1. The initial phase of service should connect from Los Angeles and Riverside to the Coachella Valley (at least to Palm Springs with its existing station) since the Purpose and Need of the Project is to connect the Coachella Valley with the Los Angeles area, and ridership forecasts indicate that relatively lower numbers of travelers would use the train if service extended only as far east as Loma Linda or the Pass Area.
2. Initiation of any regular passenger service in the Corridor should be preceded by construction of the Colton Connector to reduce the potential for congestion due to train movements connecting in both directions between the BNSF and UP tracks and to help maintain on-time passenger train performance.
3. Initiation of any regular passenger service in the corridor should be preceded by construction of a third main track through the heavy grade mountain territory between Loma Linda and Palm Springs, where the speed differential between passenger and freight trains is highest and passenger train overtakes of slow-moving freight trains can be anticipated. This track capacity is needed in order to enable the passenger trains to operate reliably and on a schedule that allows for a competitive trip time between Los Angeles and the Coachella Valley, in accordance with the Project's Purpose and Need.

4. Initiation of a single daily roundtrip in the corridor will require an eastern terminus station with a station track or a turnback where a passenger train can be staged to lay over between eastbound and westbound trips without delaying or conflicting with mainline train operations.
5. The infrastructure improvements needed to initiate service with one daily round trip are expected to be less than a full third main track between Colton and the eastern terminus. Discussions between Caltrans, the corridor's three host railroads, the service provider, and other stakeholders may identify alternate or additional improvements in place of or in addition to the general considerations outlined above to facilitate the initiation of one daily round trip. Ridership forecasts indicate that there would be significant passenger demand with a single round trip per day, whether the eastern terminus is in Palm Springs, Indio, or Coachella.
6. To operate two daily round trips, a maintenance facility will be necessary to serve trains overnighing at the eastern terminus of the service, so the Coachella maintenance facility will need to be in place prior to implementing the Project's proposed service plan of two round trips per day, with morning and afternoon departures from each end of the corridor. The Coachella station would logically be built at the same time as the maintenance facility, though the station is not an essential prerequisite to service, and the maintenance facility could be constructed prior to the station (if the Indio station has been built it could serve as the easternmost station until the Coachella station is built if the maintenance facility is in place).
7. To operate two daily round trips, a station track in Loma Linda will be necessary (or a passing track if the station has not been built yet), where the two passenger trains are scheduled to meet as they travel in opposite directions.
8. To operate two daily round trips, the third main track will need to be in place from Colton to the eastern terminus of the service, including a new bridge over the Santa Ana River in Colton, so the passenger service can operate with a high degree of reliability on the proposed service plan, which calls for morning and afternoon departures from each end of the corridor. Since the servicing and storage facility in Coachella will be required to implement the service plan's two daily round trips, the third track would logically be extended all the way to Coachella. If the Coachella station has not been built by this time, Indio could serve as the easternmost station, with trains proceeding to and from the Coachella servicing facility as nonrevenue movements, until the Coachella station is built.
9. The timing of new station construction will largely be driven by when funding is available for each station. Service could be initiated with one daily round trip using just the existing stations at Los Angeles, Fullerton, Riverside, and Palm Springs. One daily round trip could be extended easterly to Indio and/or Coachella when either or both of those stations are constructed. Other new stations could come online any time after service is initiated to their part of the Corridor. For two round trips per day, there should also be a new station at the eastern end of the corridor in Coachella or Indio.
10. The Palm Springs station and parking will need to be rebuilt and significantly expanded to accommodate future projected demand. The ridership forecasts indicate that the Palm Springs station would serve over 40,000 annual boardings upon initiation of two daily round trips, and even a single round trip would be expected to attract more riders than existing infrequent overnight service, so a substantial station upgrade will be an essential prerequisite to initiating service in the Corridor.

13.3.2 Potential Phased Implementation Approach

Based on the considerations described above, Table 13-2 illustrates the improvements needed to operate one daily round trip and two daily round trips in the corridor.

Table 13-2. Potential Service Phasing Concept

Infrastructure Improvements by Phase
Estimated improvements for operation of one round trip per day from Los Angeles to Palm Springs and back: • Construct Colton Connector • Construct third main track approximately between Loma Linda and Palm Springs • Upgrade Palm Springs Station
Any or all of the following new stations could be developed after one round trip per day initiated: • Construct new station (with station track) in Coachella (would serve as eastern terminus of service when constructed) • Construct new station (with station track) in Indio (could serve as eastern terminus of service if built prior to the Coachella station) • Construct new station in Mid Valley (after service extends to at least Indio) • Construct new station in Pass Area • Construct new station in Loma Linda/Redlands
Additional improvements for operation of two round trips per day: • Construct third main track between Colton and Loma Linda, including bridge over Santa Ana River • Construct third main track between Palm Springs and Coachella* • Construct maintenance facility in Coachella • Construct station track in Loma Linda/Redlands (or passing track if station not yet constructed)

Based on the example phasing concept discussed above, a potential approach to Tier 2 activities was developed to illustrate how projects might advance individually into Tier 2 environmental and preliminary engineering work under this illustrative phasing concept. The projects identified for Tier 2 environmental and preliminary engineering work in Table 13-3 would have independent utility to enable initiation of partial service. The Colton Connector could serve as an initial collaboration effort in implementing the Corridor's capital improvements. If subsequent negotiations with stakeholders include agreements to develop a phased implementation approach to the Coachella Valley service, the types of improvements required and the ordering of project to initiate one daily round trip and two daily round trips will change.

Table 13-3. Illustrative Tier 2 Project Development Activities List (based on illustrative infrastructure phasing concept)

Potential Tier 2 Environmental and Preliminary Engineering (PE) Activities and Associated Service Levels
Illustrative List of Potential Tier 2 Environmental and PE Activities to Facilitate Operation of One Daily Round Trip to Palm Springs: • Colton Connector • Third main track approximately between Loma Linda and Palm Springs • Palm Springs Station
Illustrative List of Potential Tier 2 Environmental and PE Activities to Facilitate Operation of One Daily Round Trip to Coachella: • Coachella station and maintenance facility • Indio station • Remainder of the stations (as separate projects) ○ Mid Valley station ○ Pass Area station ○ Loma Linda/Redlands station (and station track) • Third main track between Palm Springs and Coachella
Illustrative List of Potential Tier 2 Environmental and PE Activities to Facilitate Operation of Two Daily Round Trips to Coachella: • Third main track between Colton and Loma Linda, including bridge over Santa Ana River

13.3.3 Equipment and Crew Requirements

Equipment and crew requirements for two round trips per day are presented in Sections 6.5 and 6.6.

For one round trip per day, the service parameters, equipment requirements, and crew requirements are as follows:

- One daily round trip originating from Los Angeles in the morning and returning to Los Angeles in the evening, with the eastern terminus in the Coachella Valley to be determined based on the availability of a sufficient platform and station facility.
- This service would require one trainset (and one spare set) and one crew.³¹
 - Under this type of service plan, the service would not need an overnight layover/servicing facility at the eastern end terminal.

13.3.4 Management

As stated above, the use of either an existing JPA or the creation of a new JPA will need to be determined. Caltrans (as the oversight agency of the funding and management of state-supported passenger rail services) and the Project sponsors will need to develop consensus on how best to

³¹ If the full round trip plus nonrevenue ferry moves between Los Angeles Union Station (LAUS) and the Los Angeles servicing yard at the beginning and end of the day could be accomplished within one train crew's maximum federal 12 hours of service

implement the Corridor governance. The state or potential JPA entity will need to determine a sound financial plan for funding the Project's capital costs, including track capacity on the Corridor's Eastern Section, as well as stations and equipment, and develop a plan for funding the ongoing O&M of the service once it is in place. These decisions will have to be made whether the Project is constructed and delivered in one phase or under a phased implementation scenario.

The JPA (should this be the determined management path) will need to enter into an agreement with a passenger service operator (potentially Amtrak) prior to implementation of service. The selected service operator should have sufficient knowledge of intercity rail operations and should be able to meet terms agreed upon between the states and host freight railroads. Once an operator is procured, the O&M costs would require updating to account for the service operator's standards and any changes to standard intercity passenger rail operations and requirements of state enabling legislation in California.

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14 Conclusion

14.1 Key Findings

The analysis supporting this SDP and the Tier 1/Program EIS/EIR demonstrates that the Preferred Alternative will achieve the Program's Purpose and Need, providing a competitive and reliable alternative to travel along I-10. The service is projected to attract comparable ridership to existing state-supported rail services and, by the 2044 Horizon Year, recover the majority of its operating costs from fares. While the service is expected to have cost effectiveness similar to California's existing state-supported rail services on an operating basis, the BCA suggests that the public benefits of operating only two daily round trips would not exceed the high cost of proposed infrastructure improvements.

14.1.1 Operations and Infrastructure

The proposed service would provide a morning and an afternoon departure from each end of the corridor and would provide a competitive travel time of approximately 3 hours and 15 minutes between Coachella and LAUS. Operational simulations indicate that the proposed service in the Preferred Alternative would operate above 90 percent on-time and would not degrade freight performance in either of the two horizon years, 2024 and 2044.

Proposed infrastructure improvements included in the Preferred Alternative consist of building a third main track along the 76-miles of the UP Yuma Subdivision that constitutes the Corridor's Eastern Section, construction of five new stations, expansion of the existing Palm Springs station, improvements to existing crossings, a new second Mount Vernon connector track in Colton, and construction of a siding at the proposed Loma Linda/Redlands Station. These improvements are estimated to cost approximately \$1.4 billion (year of expenditure dollars).

The service would be operated with diesel-electric locomotive-hauled coaches similar to those used on the existing Pacific Surfliner service. Daily service requires two trainsets, and one full trainset and one additional locomotive are recommended as spare equipment. This rolling stock is estimated to cost approximately \$83.4 million, with an additional \$22.17 million in overhaul costs over the 20 years following implementation.

14.1.2 Ridership, Revenue, and Subsidy

Table 14-1 summarizes the projected performance of the service in the Opening Year (2024) and Horizon Year (2044). Ridership was also estimated for Year 2018 conditions with projected boardings of 175,500, which would rank the proposed service 20th when compared with actual 2018 ridership levels of the 29 existing state-supported Amtrak services.

Table 14-1. Estimated Profit and Loss (2019 Dollars)

Performance Metric	2024	2044
Projected annual ridership (6 stops east of Colton)	204,100	338,500
Route Profit/Loss		
Ticket revenue	\$4,760,000	\$7,900,000
Auxiliary revenue	\$610,000	\$1,010,000
Projected O&M costs	\$11,545,000	\$11,545,000
Subsidy required	(\$6,175,000)	(\$2,635,000)
Subsidy per boarding	\$30.25	\$7.78
Revenue recovery ratio	47%	77%

Notes:

O&M=operating and maintenance

14.1.3 Public Benefits

Table 14-2 summarizes the findings of the Program BCA over the lifecycle from 2024 to 2057, including 30 years of operation between 2028 and 2057. These results indicate that the quantifiable user and non-user benefits of this Project are unlikely to exceed the costs of Project implementation and operation. This is a result of the low service level proposed in comparison to the high cost of infrastructure on the Eastern Section. Establishing daily passenger rail service on one of the state's emerging corridors may also generate other socioeconomic benefits for the local and regional economies that are of strategic nature.

Table 14-2. Overall Results of the Benefit-Cost Analysis (Millions of 2019 Dollars)

Project Evaluation Metric	Undiscounted	Present Value at 7 Percent Discount Rate	Present Value at 3 Percent Discount Rate
Total benefits	\$1,086.60	\$186.50	\$475.50
Total costs	\$1,646.70	\$886.40	\$1,225.20
Net present value	-\$560.10	-\$699.90	-\$749.70
Benefit/cost ratio (Ratio)	0.57	0.13	0.28
Internal rate of return (%)	-2.25%		

Project implementation would generate economic activity, including more than \$2.9 billion in output and more than 15,000 jobs during the development phase, along with continued economic benefits during operation. In the opening year (2028), spending from passengers and direct rail operational expenditures are expected to generate a total of \$141 million in output and support over 1,000 jobs.

14.2 Next Steps

The SDP and Tier 1/Program EIR/EIS have assessed the Coachella Valley Rail service and its required infrastructure at a programmatic level. The next steps in implementation of the Program are to refine specific projects, such as identifying station sites, prepare preliminary design for infrastructure, obtain Tier 2/Project-Level environmental clearance for those projects, and secure funding to prepare final design and ultimately construct the improvements, as outlined in Figure 14-1. Additionally, a governance structure must be established for the service.

As noted in the Final Tier 1 Program EIS/EIR and Record of Decision for the Project, FRA's selection of Build Alternative Option 1 is made with consideration that after the approval of Tier 1/Program EIS/EIR and prior to the initiation of Tier 2/Project-Level analysis, the State and/or local agency seeking to advance the Preferred Alternative will:

- Conduct additional operations simulation analysis on the Preferred Alternative to assess whether different infrastructure or operating plans would further improve the estimated performance of freight and passenger trains.
- Determine the initial operating plan for service and infrastructure improvements for the Preferred Alternative based on good faith negotiations with the host railroads and the passenger rail service operator prior to the implementation of service.³²
- Identify the entity responsible for the management and delivery of the Preferred Alternative.

Figure 14-1. Project Development and Delivery Timeline



³² The operations modeling work prepared for the Program's Service Development Plan should inform these discussions.

14.2.1 Program Considerations

Establishing a Coachella Valley Rail Management Structure

Caltrans and the Project sponsors will need to decide on a Corridor governance structure. Until the preferred Corridor governance structure is determined, Caltrans will be the managing entity responsible for implementing the Project from project development through construction and operations. California Government Code Section 14035 gives Caltrans broad authority to construct, acquire, or lease, and improve and operate, rail passenger terminals and related facilities that provide intermodal passenger services along this corridor. Caltrans may also enter into contracts with Amtrak to provide commuter and intercity passenger rail services as well as with railroad corporations for the use of tracks and other facilities and the provision of passenger services on terms and conditions as the parties may agree.

Prior to implementation of service, Caltrans and the Project sponsors will evaluate and determine the most feasible institutional structure for managing the service. As mentioned in Section 13.2, this could involve creation of a new agency or incorporation into an existing agency and may require action by the state legislature. Establishing this institutional structure is necessary to advance the Project as the managing entity will be responsible for implementing the Project from project development through construction and operations. Responsibilities for the managing agency include negotiations with UP to secure track access rights on the Eastern Section and with BNSF and SCRRA to authorize the use of available slots in the Western Section. The managing entity would also have an active role in other key project phases such as preliminary engineering and final design. The managing entity will need to enter into an agreement with a passenger service operator prior to implementation of service and coordinate on an ongoing basis with other operators on the Program Corridor.

Decision on Corridor Service Provider

Caltrans and the Project sponsors will need to decide on a passenger service operator. As discussed under Section 6.2.2, Amtrak is assumed to be the operator of the Coachella Valley service for the purposes of the Tier 1 EIS/EIR and SDP. Although this assumption does not commit Caltrans and RCTC to select Amtrak as the service operator, using any operator other than Amtrak could leave the Coachella Valley service with no statutory preference over freight transportation. Prior to implementation of service, Caltrans and the Project sponsors will need to evaluate and determine the best service provider arrangement.

14.2.2 Tier 2 Environmental and Preliminary Engineering

After completion of the Tier 1/Program EIS/EIR and the resolution of the program considerations under Section 14.2.1, FRA will reengage with Caltrans and the Project sponsors. The Tier 2 process may not automatically follow the Tier 1 process, rather project(s) would be defined based on the Tier 1/Program EIS/EIR broad project scope and funded at that time. The Tier 2 process would be a separate environmental analysis and could be funded and led by an agency other than the FRA, Caltrans, or RCTC depending upon the source of funding. The anticipated work in the next phase will consist of the following:

- Tier 2/Project-level environmental clearance
 - Analysis of, and selection of, preferred alternatives for environmental clearance
 - Develop environmental constraints report for selected alternatives

- Preparation of environmental document
- Determination of the least environmentally damaging practicable alternatives
- Obtain Tier 2 Project-level environmental clearance
- Preliminary engineering to 30 percent of design for the 76-mile Eastern Section, five new stations, and replacement of the existing station at Palm Springs
 - Perform geotechnical desktop review of the proposed alignment alternatives
 - Preliminary ROW assessment
 - Preparation of 30 percent design documents for track, stations, and signaling
 - Develop refined cost estimates
 - Risk assessment

14.2.3 Final Design and Construction

Once preliminary design and environmental clearance is complete, specific projects would advance to final design and then construction, as funding allows. Design and subsequent construction of Program components could be phased to allow earlier initiation of a reduced level of service. Targeted capital projects with independent utility could be advanced prior to more complex and expensive projects.

14.2.4 Operation

Construction of the proposed improvements will provide the capacity to operate service along the Program Corridor. Prior to initiating service, rolling stock would also need to be acquired, and the managing entity would need to secure personnel to operate and maintain the trains, either directly or through contract with other entities, such as Amtrak.

The steps outlined above to introduce regularly scheduled intercity passenger rail service between LAUS and Coachella will be planned and carried out in ways that will not preclude future expansions of service, either through the introduction of additional frequencies, or through development of a higher speed rail corridor eastward to Phoenix, Arizona. The introduction of service in the Corridor, and potential future expansion, present a significant opportunity to accommodate growing regional travel demand with a reliable and cost-effective passenger train alternative. The Corridor is also a key component of California's long-term vision to meet state transportation needs and goals by establishing a statewide passenger rail network, offering travel times competitive with automobile and air travel, and seamless transfers with other modes at mobility hubs.

14.3 Potential Risks

Potential risks of implementing the proposed intercity passenger rail service include the large capital outlay required for the investment and the length of that investment. The 144-mile Preferred Alternative could be developed and constructed in segments, and a delay in the development or construction of any one segment could delay the start of full Coachella Valley Rail service described in this SDP.

The service assumptions that underpin this SDP could change over the 20-year planning horizon of the Coachella Valley Rail service or during the period that the Project is being constructed and implemented. For instance, slot assignments or potential operating windows for Coachella Valley

passenger trains in the Western Segment of the Corridor might change. Construction work at LAUS for the Link Union Station Project could affect the scheduling and performance of the commuter and intercity passenger rail service in and out of the station. Significant changes to the service assumptions, such as frequency, station location, or operating characteristics in this SDP may change the outputs of this analysis and require additional study. For example, implementing a frequency higher than two round trips could alter both the costs (by increasing train miles and potentially equipment or infrastructure needs) and benefits (by attracting more riders) of the Project, and therefore, could also change the ratio of costs and benefits.

The ridership assumptions presented in the SDP also could change over time. Population growth or other demographic changes in the Coachella Valley, or beyond the Project's study area in the Los Angeles Basin, could impact rail ridership. Changes in the relative costs of travel by automobile and train, such as gasoline prices, could also shift the ridership balance, as could the introduction of new transportation technologies.

Therefore, this SDP should be treated as a planning document that provides an analysis of operating and ridership assumptions, existing conditions, and trends at a specific point in time, rather than as a commitment of service or benefits. This document presents Caltrans and RCTC's current vision for implementing intercity passenger service in the Corridor and will need to be revisited and adjusted as necessary over time.

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