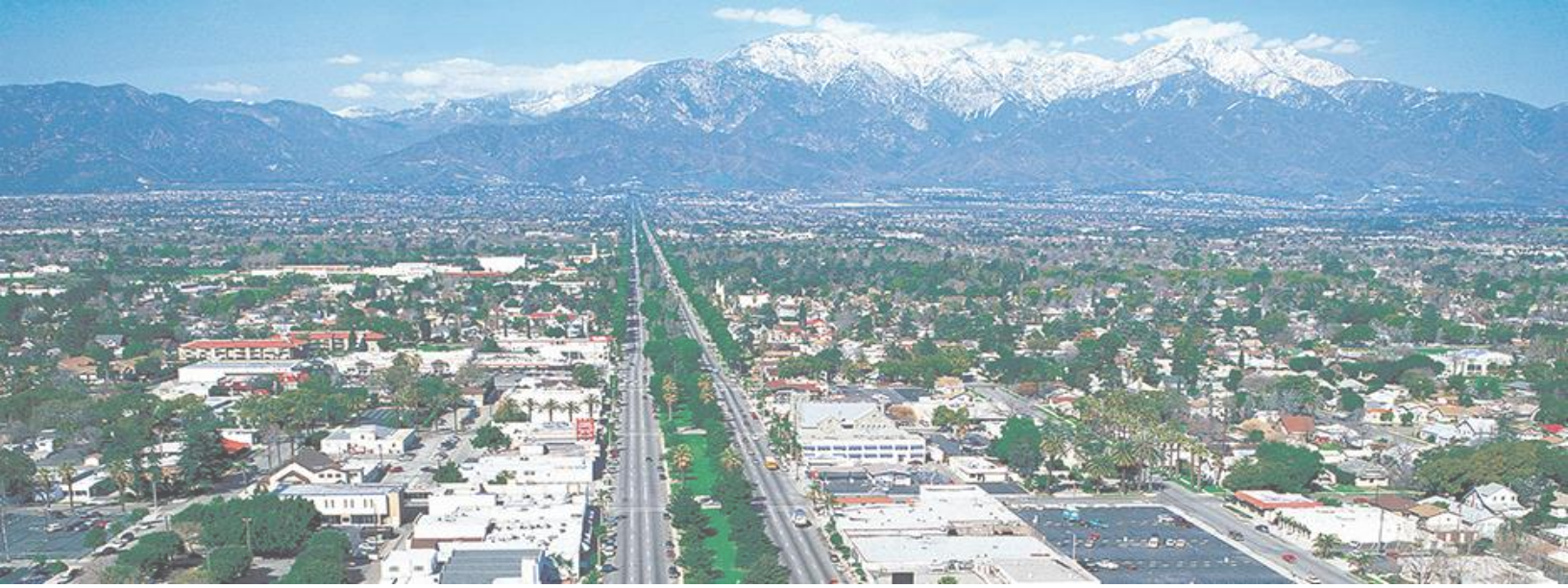
Appendix T: Alternatives Considered Report



Ontario Connector Project

San Bernardino County Transportation Authority
Contract No. 21-1002452

Alternatives Analysis Report

Prepared for:

San Bernardino County Transportation Authority
1170 W. Third St., Second Floor
San Bernardino, CA 92410-1715

Prepared by:

777 South Figueroa Street, Suite 2300
Los Angeles, CA 90017

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Abbreviations and Acronyms

Abbreviation/Acronym	Description
BRT	Bus rapid transit
Caltrans	California Department of Transportation
CEQA	California Environmental Quality Act
DMU	Diesel Multiple Unit
FAA	Federal Aviation Administration
FTA	Federal Transit Administration
I-	Interstate
LAX	Los Angeles International Airport
MAP	Million annual passengers
NEPA	National Environmental Policy Act
OMUC	Ontario Municipal Utilities Company
OIAA	Ontario International Airport Authority
ONT	Ontario International Airport
ROM	Rough-order-of-magnitude
ROW	Right-of-way
SBCFCD	San Bernardino County Flood Control District
SBCTA	San Bernardino County Transportation Authority
SCE	Southern California Edison
SCRRA	Southern California Regional Rail Authority
Section 408	33 U.S.C. 408
SNA	John Wayne Airport
TBM	Tunnel Boring Machine
TCE	Temporary construction easement
USACE	United States Army Corps of Engineering
UPRR	Union Pacific Railroad
VMT	Vehicle Miles Travelled
WVC	West Valley Connector
ZEMU	Zero-Emission Multiple Unit

1 Introduction

1.1 Project Background

The San Bernardino County Transportation Authority (SBCTA), in cooperation with Omnitrans, is proposing to provide a direct transit connection from the existing Cucamonga Metrolink Station to the Ontario International Airport (ONT), referred to in this report as the Ontario Connector Project or the proposed Project.

The proposed Project is subject to state and federal environmental review requirements because SBCTA anticipates the use of federal funds administered by the Federal Transit Administration (FTA), which will be the lead agency under the National Environmental Policy Act (NEPA). SBCTA is the lead agency under the California Environmental Quality Act (CEQA). Partner agencies include the Ontario International Airport Authority (OIAA), Omnitrans, and the cities of Ontario and Rancho Cucamonga.

1.2 Purpose of Report

The purpose of this report is to present the findings of the screening evaluation of transit connection alternatives to ONT presented in previous planning studies including the Project Background and History Report (SBCTA, 2023a). In coordination with FTA and SBCTA, four build alternatives were selected for evaluation to determine the reasonableness and feasibility of the alternatives to meet the Purpose and Need. Based on the evaluation presented in this report, the alternative that best aligns with the project's Purpose and Need is recommended to be studied during the environmental analysis phase.

1.3 Study Area

The ONT Connector Project would provide a direct connection between ONT and the Cucamonga Metrolink Station. The proposed Project is regionally located within the cities of Ontario and Rancho Cucamonga in San Bernardino County, California. The Cucamonga Metrolink Station is located at 11208 Azusa Court in Rancho Cucamonga, California and serves the Metrolink San Bernardino Line commuter rail. The Cucamonga Metrolink Station is generally bounded by the Union Pacific Railroad (UPRR) tracks to the north, Milliken Avenue to the east, Azusa Court to the south, and industrial uses to the west.

ONT is located within the City of Ontario, California, approximately 1.2 miles south of the City of Rancho Cucamonga's southern boundary and approximately two miles east of downtown Ontario. ONT is generally bounded by the UPRR Alhambra subdivision to the north and the UPRR Los Angeles subdivision to the south. The ONT property is bounded to the east and west by Haven Avenue and Grove Avenue, respectively. Primary access to ONT is from Interstate 10 (I-10) via Archibald Avenue from the north and California State Route 60 (SR-60) via Haven Avenue from the south.

1.4 Overview of Project Alternatives

Several alternatives to connect to ONT have been evaluated, screened, and refined since 2008 (SBCTA, 2023a). FTA, in coordination with SBCTA, proposed four alternatives for the Ontario Connector Project to be screened as part of this alternatives analysis evaluation. Each alternative would have a station at the Cucamonga Metrolink Station and two stations at ONT Terminals 2 and 4. The general locations of the alternatives are shown on Figure 1-1. Plan and profile sheets illustrating project design are included in Appendix A. The project alternatives include:

- Alternative 1 – Tunnel to ONT via Milliken Avenue and Airport Drive.

- Alternative 2 - Rancho Cucamonga to ONT via Hermosa/Turner Rail Alignment (formerly A-3 in the Rail Access Study (SANBAG, 2014)).
- Alternative 3 - Rancho Cucamonga to ONT via Deer Creek Rail Alignment (formerly A-4 in the Rail Access Study (SANBAG, 2014)).
- Alternative 4 - Rancho Cucamonga to ONT Bus Shuttle (formerly B-2 in the Rail Access Study (SANBAG, 2014)).

Figure 1-1: Project Alternatives Overview

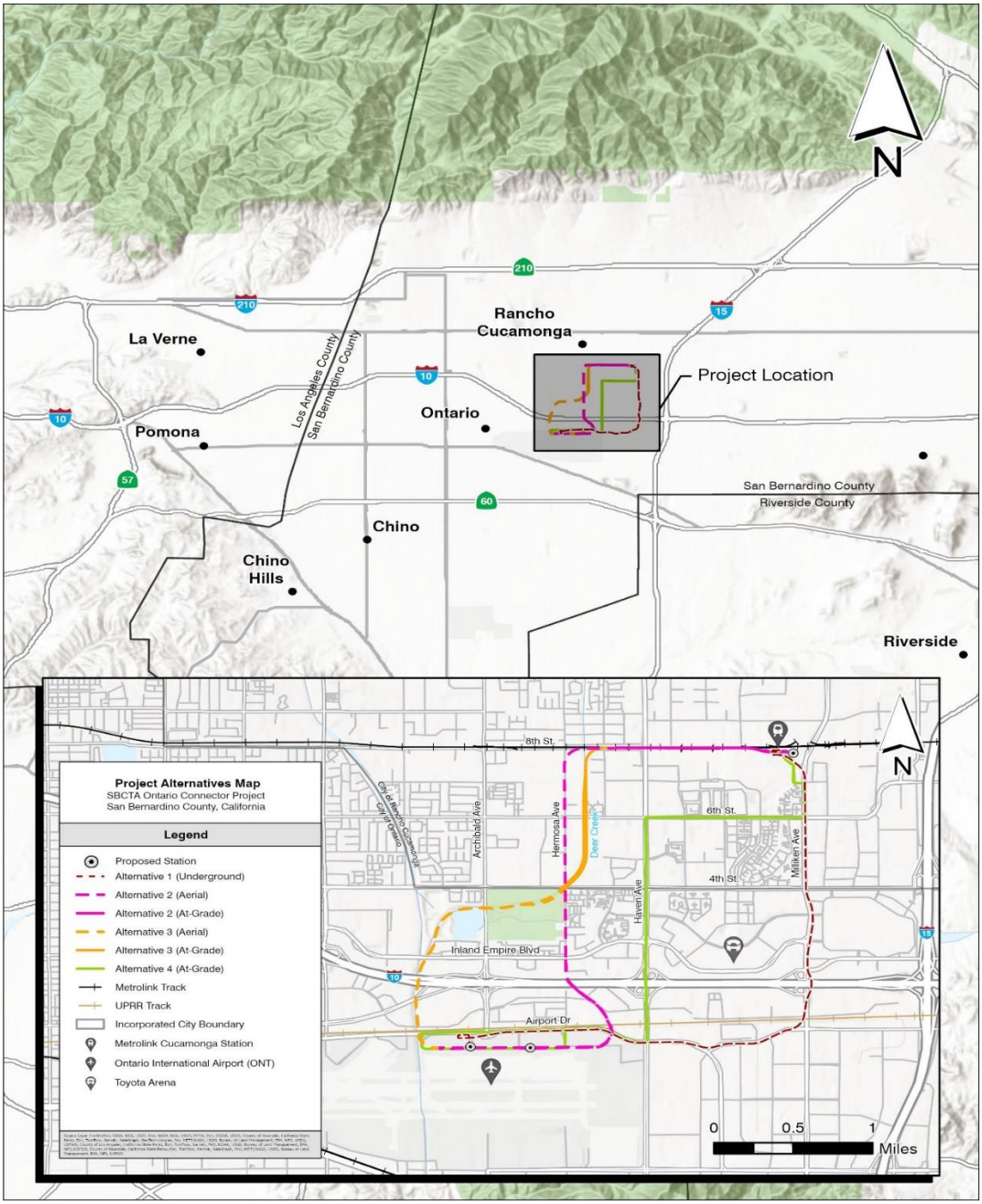


Table 1-1: Summary of Alternatives summarizes general alignment length, number of stations, and travel time for each project alternative. A more detailed description of each alternative is provided in Section 4.

Table 1-1: Summary of Alternatives

Alternative Characteristics	Project Alternatives			
	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Length	4.6 miles	4.6 miles	4.8 miles	5.7 miles
Number of stations	3	3	3	3
Travel time	5.5 minutes	8 minutes	off-peak hour: 8 minutes peak hour: 10 minutes	16 minutes

1.5 Existing and Planned Transportation Network

ONT is located in the Inland Empire (Riverside and San Bernardino Counties), approximately 35 miles east of Los Angeles and two miles east of downtown Ontario. The airport is considered medium-hub by Federal Aviation Administration (FAA) standards, servicing approximately 25 major cities via 10 commercial carriers (SBCTA, 2022a). It is one of five commercial airports in the Los Angeles metropolitan area, and the only one in the Inland Empire. With an air passenger volume of 5.6 million annual passengers (MAP) in 2019, ONT is the third largest airport by volume in the region behind Los Angeles International Airport (LAX) and John Wayne Airport (SNA). Despite experiencing a 19.5% drop-off in passenger volumes in 2021 to 4.5 MAP as a result of the COVID-19 pandemic (OIAA, 2022), ONT is forecasted to serve 14 MAP by 2045 (OIAA, 2019).

1.6 Existing Roadway Network

Major freeways and arterials provide significant vehicle access to ONT. Interstate 10 I-10 and State Route 60 (SR-60) provide regional east and west access via major interchanges. Interstate 15 (I-15) also provides regional north-south access at the nearby Jurupa Street interchange. A number of arterials serve local traffic to the airport, including Grove Avenue, Vineyard Avenue, Hellman Avenue, Archibald Avenue, Turner Avenue, Haven Avenue, Commerce Parkway, Milliken Avenue, Holt Boulevard, Airport Drive, Jurupa Street, and Mission Boulevard.

1.7 Existing Transit Network

A few local and regional operators offer transit service in the vicinity of ONT. Metrolink, or the Southern California Regional Rail Authority (SCRRA), operates regional commuter rail service along two routes less than five miles from ONT. The Riverside Line to the south of ONT (colored purple in Figure 1-2) provides weekday east-west service between Downtown Los Angeles and Riverside. The San Bernardino Line north of ONT (red in Figure 1-2) provides parallel east-west service between Downtown Los Angeles and San

Bernardino with more frequent headways and service on the weekends. Figure 1-2 shows the Metrolink route map east of Los Angeles near ONT.

Figure 1-2: Metrolink Service near ONT

Source: Metrolink, 2023

The Riverside Line currently operates on UPRR tracks making it challenging for Metrolink to improve the service along the corridor. However, Metrolink operates and maintains the track used by the San Bernardino Line making this corridor the preferred transit connection to ONT.

Table 1-2 compares service and ridership on the Riverside and San Bernardino Lines for 2018-2019 Q3 (SCRRA, 2019).

Table 1-2 Service and Ridership Comparison between Metrolink Riverside and San Bernardino Lines

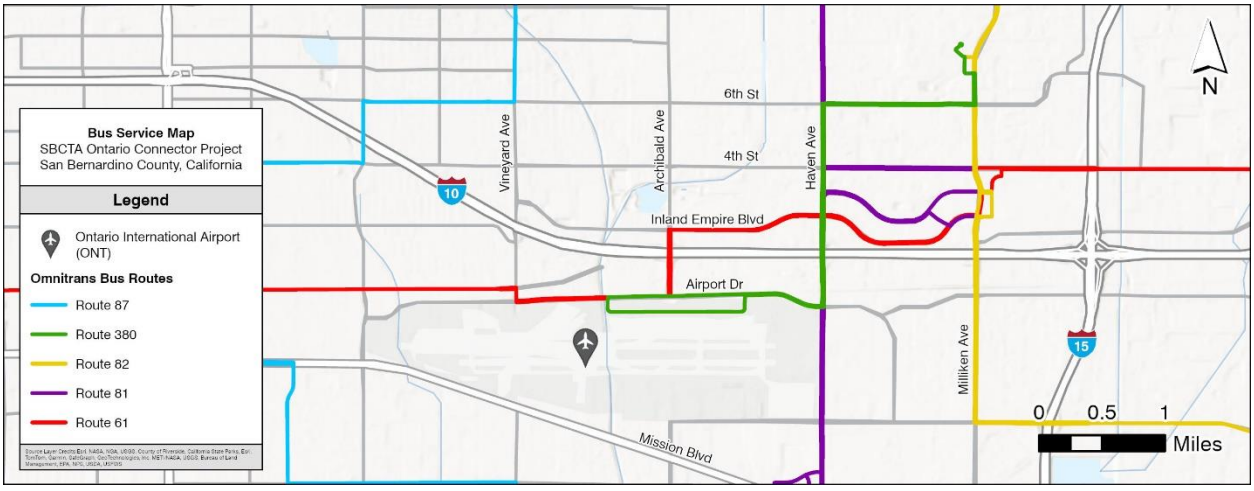
	Riverside Line	San Bernardino Line
Service Parameters		
Route Miles	59.1	58.6
Trains Operated per Weekday	11	36
Trains Operated per Weekend Day	0	16
Ridership		
Average Weekday Riders	1,201	6,162
Average Weekend Day Riders	N/A	2,676

Source: SCRRA, 2024

In addition to rail, Omnitrans is the largest transit operator in San Bernardino County and operates bus service near ONT. In 2022, Omnitrans and OIAA began to provide temporary shuttle service between Cucamonga Station and ONT terminals (Route 380) to increase awareness of the nearby transit connection, but it is not scheduled to coincide with train arrivals, which would facilitate timely service to accommodate Metrolink riders to ONT. Route 81 runs north-south along Haven Avenue adjacent to the airport and directly connects to the East Ontario Metrolink Station but its nearest stop to ONT is at Haven-

Airport—a 0.8 mile walk from the nearest ONT terminal. The route only operates once an hour on weekdays, with no service on weekends. Route 61 runs between the Fontana Metrolink Station and Pomona Transit Center, with a direct stop at the ONT terminal area via Archibald Avenue and Airport Drive. Given connections to distant Metrolink stations and headways of 30-minutes on weekdays and weekends, however, this route is inconvenient for air travelers connecting from regional rail. Figure 1-3 shows bus routes operated by Omnitrans near ONT.

Figure 1-3: Bus Service near ONT



Source: Omnitrans, 2023

1.8 Planned Transit Network

The West Valley Connector (WVC) Project is a planned bus rapid transit (BRT) service connecting the cities of Rancho Cucamonga, Ontario, Pomona, Fontana, and Montclair. Between ONT and the Cucamonga Station, the bus service would travel along Milliken Avenue, Inland Empire Boulevard, and Archibald Avenue. Without an explicit focus on airport travel, such as coinciding with Metrolink and peak flight schedules and lack of attention to air passenger luggage, this service is unlikely to be adopted by airport passengers.

The Brightline West project is a planned high-speed rail system running between Las Vegas, Nevada and Rancho Cucamonga, California. Brightline West would consist of a southern terminus station located adjacent to the existing Cucamonga Metrolink Station. Trains are expected to have 45-minute headways and the travel time is anticipated to be approximately 35 minutes. The location of the Project's Rancho Cucamonga Station near the Brightline West and Cucamonga Metrolink Stations would allow for a seamless transition between multiple multi-modal transportation options connecting to Downtown Los Angeles, the greater Southern California region, and Las Vegas, Nevada.

1.9 ONT Ground Access

1.9.1 Parking

ONT has a plentiful supply of relatively inexpensive parking located near the airport terminals. As reported on the ONT Parking website, the airport currently has five surface parking lots located near the terminals. Lots 2 and 4 across from the terminals total approximately 3,300 spaces and newly renovated Lots 5 and

6 have over 2,200 spots each. With Lot 3 (located between the two terminals), ONT has over 8,500 parking spaces for air passengers.

1.9.2 Bicycle Facilities

The Cities of Ontario and Rancho Cucamonga include a combination of off-road and on-street bicycle facilities in the proximity of ONT. Running east to west, G Street and Inland Empire Boulevard feature painted bike lanes. Further north, portions of Milliken Avenue, 6th Street, 4th Street and Haven Avenue have bicycle lanes within the City of Rancho Cucamonga. A series of public use off-road, multi-purpose trails run along Deer Creek and Cucamonga Creek from 8th Street to 4th Street.

1.9.3 Pedestrian Facilities

Pedestrian facilities include sidewalks, crosswalks, and pedestrian signals at signalized intersections. Near ONT, pedestrian facilities are well developed along most major roadways. Direct pedestrian access to the airport terminals is provided on the north side of the airport via Terminal Way. Pedestrians can access Terminal Way from the western intersection with Airport Drive. At the Airport Drive and Terminal Way intersection, a crosswalk is only provided along one approach and a sidewalk is only provided along one side of Airport Drive, which eventually continues to one side of Terminal Way. Along Terminal Way there are nine signalized pedestrian crossings, which connect the on-site parking facilities between Airport Drive and Terminal Way to the various airport terminals.

2 Purpose and Need

2.1 Purpose of Project

The purpose of the Project is to expand access options to ONT by providing a direct transportation connection from the Cucamonga Metrolink Station to ONT (SBCTA, 2023b). This new connection would increase mobility and connectivity for transit patrons, improve access to existing transportation services, provide a connection to future Brightline West service to/from ONT, and support the use of clean, emerging technology for transit opportunities between the Cucamonga Metrolink Station and ONT. More specifically, the Project's purpose is as follows:

- Expand access options to ONT by providing a convenient and direct connection between ONT and the Metrolink network, and other transportation services at the Cucamonga Station.
- To reduce roadway congestion by encouraging a mode shift to transit from single-occupancy vehicles and provide reliable trips to and from ONT.
- Support autonomous electric vehicle technology usage for transit projects.

2.2 Need of Project

The proposed Project need includes:

- Lack of direct transit connection coinciding with Metrolink trains and peak airport arrival and departure schedules. The lack of a direct transit connection between the Cucamonga Station and ONT creates mobility challenges for air passengers accessing ONT. In many cases, the lack of a last-mile connection between the Metrolink system and ONT forces airport passengers to use rideshare services or private single-occupancy vehicles, adding congestion to the local roads between the Cucamonga Station and ONT. This congestion results in delays for the public to reach their destination, community services, and facilities.
- Roadway congestion affecting trip reliability and causing traffic delays. ONT travelers using rideshare services or private single-occupancy vehicles adds traffic volumes and increasing congestion on the local roads between the Cucamonga Station and ONT. Increases in future traffic volumes and roadway congestion affects trip reliability for travelers and commuters to and from ONT.
- Increasing Vehicle Miles Travelled (VMT) resulting from ONT travelers and lack of a direct transit connection.
- Increased greenhouse gas emissions within communities surrounding ONT from single-occupancy vehicle travel to-and-from ONT.

2.3 Project Objectives

The following performance objectives have been identified based on the purpose and need established for the project:

- Mobility improvements – the project's travel time shall be competitive with auto travel times and shall provide an alternative to congested freeways and arterials.
- Service reliability – the project shall provide transit service that coincides with airline operating schedules and provides consistent travel time and frequency.

- Maximize mobility capacity – the project shall consist of system capacity that accommodates peak passenger throughput of 300 passengers per hour.
- Minimize environmental impacts – the project shall minimize environmental impacts and right-of-way (ROW) acquisition impacts.
- Project cost – the project shall minimize cost and reduce risk of cost increase.

3 Screening Methodology

The evaluation of each alternative is based on the performance of each alternative against the Project's objectives. The evaluation criteria were developed on the high-level data currently available for the project. More precise data will be generated as the project advances in the environmental process. Table 3-1 presents the evaluation criteria used to screen the project alternatives.

Table 3-1 Evaluation Criteria

Project Objective	Evaluation Criteria
Objective 1: Mobility improvements	Transit travel time (minutes) to/from ONT Effects to transit systems within the study area
Objective 2: Service reliability	Operating schedule and headway
Objective 3: Maximize mobility capacity	# of passengers per hour
Objective 4: Minimize environmental impacts	Minimize environmental impacts and ROW acquisition impacts
Objective 5: Project Cost	Rough-order-of-magnitude (ROM) capital costs Risk of cost increase

The performance of each alternative was assigned a rating of "high", "medium", or "low" based on the alternative's capacity to meet the Project's objectives (see Section 2.3). Table 3-2 presents the rating methodology for each criterion.

Table 3-2 Screening Rating Descriptions

Rating		Description
High	●	A high rating indicates the alternative highly supports and satisfies the criterion or has a low potential for negative impacts.
Medium	◑	A medium rating indicates the alternative moderately supports the criterion or has a moderate potential for negative impacts.
Low	○	A low rating indicates that an alternative does not support or conflicts with the criterion or has a high potential for negative impacts.

No weighting was applied to the results of the screening evaluation as each objective was given equal consideration. The resulting evaluation demonstrates how each project alternative compares to the project objectives with an overall high, medium, or low rating. Results of the screening process are included in Section 5.

4 Project Alternatives

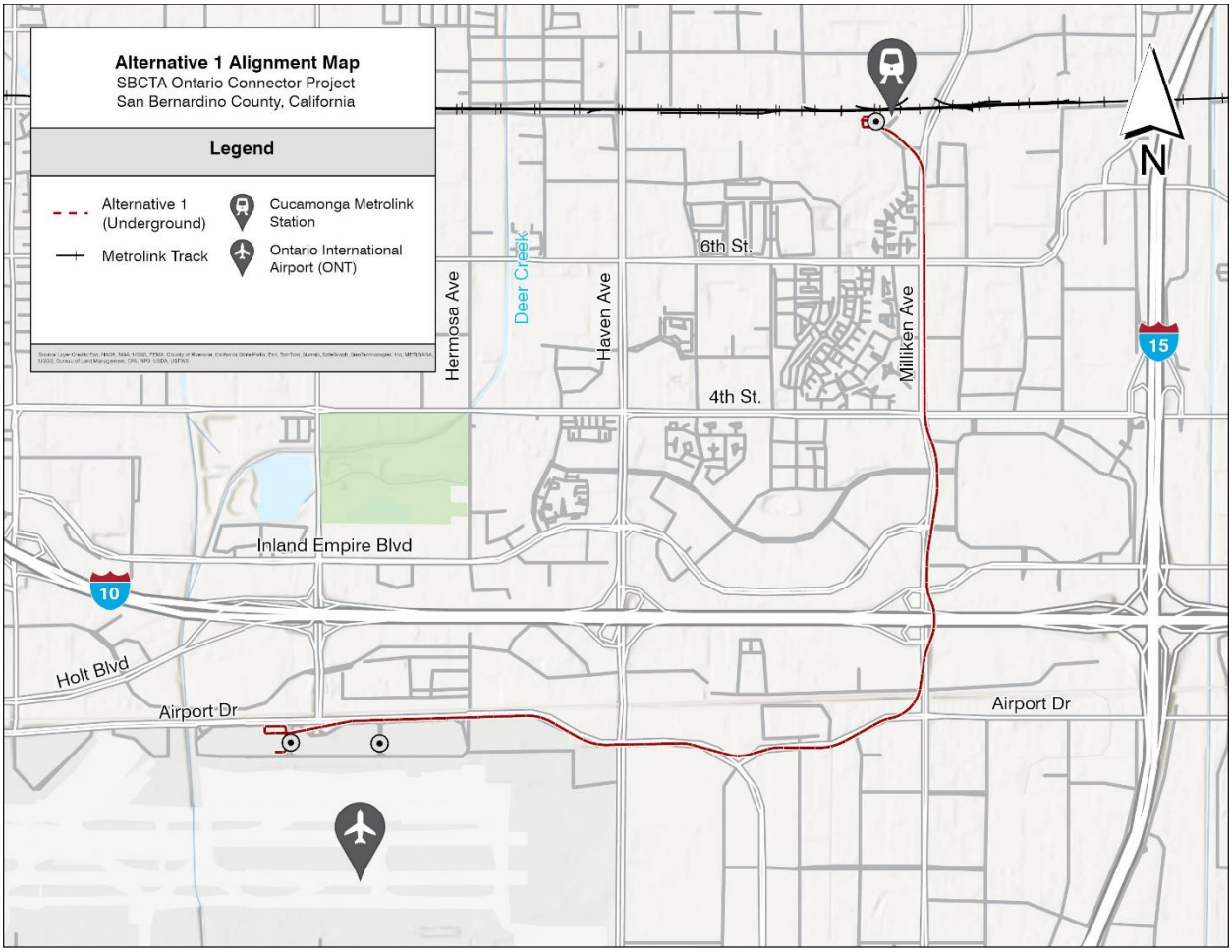
This section provides a description of each of the four project alternatives.

4.1 Alternative 1 - Tunnel

This alternative consists of a tunnel system for autonomous transit network vehicles from the Cucamonga Station to the ONT via Milliken Avenue and Airport Drive (see Figure 4-1). The tunnel alignment includes a 24-foot inner diameter single bore, bi-directional tunnel that begins at the Cucamonga Metrolink Station and travels south along Milliken Avenue and crosses beneath 6th Street and 4th Street, I-10, and the UPRR, before traveling west beneath East Airport Drive to connect Terminals 2 and 4 at ONT. The depth to the crown of the tunnel is estimated to be approximately 53 feet below the ground surface. Tunnel walls would be lined with precast concrete with an asphalt pavement driving surface. The tunnel will include an emergency access and ventilation shaft along the alignment. Utilities within the tunnel would include drainage, electrical, and fire/life safety, including a fire-rated internal separation wall for emergency egress. Electrical power would be sourced through a local substation. Alternative 1 would operate within the cities of Rancho Cucamonga and Ontario.

The proposed tunnel alignment begins at the Cucamonga Metrolink Station adjacent to Milliken Avenue in the City of Rancho Cucamonga. Autonomous electric vehicles would enter the main artery tunnel via a ramp from the Cucamonga Metrolink Station located within the existing Metrolink station parking lot. The tunnel alignment would continue south generally under Milliken Avenue. At Ontario Mills Parkway, the tunnel would bow east, missing the I-10 overcrossing structure, and then bow back under Milliken Avenue, running southwest to clear the Ontario Municipal Utilities Company (OMUC) water tanks in the southeast quadrant of the I-10 interchange. The tunnel would begin curving west at Guasti Road to clear the UPRR overcrossing bridge, connecting to Airport Drive east of Milliken Avenue. The proposed tunnel would then generally run under the eastbound lanes of Airport Drive before terminating at ONT. At the airport, vehicles would emerge via ramps and drive to drop-off points near either Terminal 2 or Terminal 4.

Figure 4-1: Alternative 1 Alignment



4.1.1 Operations

Electric vehicles would be grouped and queued at their origin station and depart toward the destination station once boarded with passengers. After the group of vehicles arrives at the destination station and passengers deboard, new passengers would board, and the group of vehicles would return to its origin station. If no new passengers are present, empty vehicles would be returned to the origin station to pick up new passengers. The proposed Project would provide a peak one-way passenger throughput of up to approximately 300 passengers per hour.

4.1.2 Stations

Three passenger stations are proposed. One station would serve the Cucamonga Metrolink Station, and two stations would serve ONT within the existing parking lots located across from Terminals 2 and 4.

The three proposed stations would include the following elements:

- Stations would be sized to accommodate the projected ridership, headways, and selected vehicles.
- Stations would be naturally ventilated and covered with canopies.

- Passengers would access each station via existing sidewalks or plazas. Stations would be entered via a ticketing area. Ticketing would likely occur via a self-service kiosk.
- Wayfinding and dynamic signage would be provided to facilitate passenger flow through each station and inform passengers of arrival/departure times. A public address system would assist visually impaired passengers.
- Mechanical, electrical, plumbing, fire protection, communications, and security systems would be integrated into the station's architecture to minimize visual clutter.
- Minimum clearances would be provided to allow vehicles to maneuver within each station and enter docking bays. Vehicle charging would occur within the bays.
- Sufficient space would be provided for passenger boarding and alighting. This would include accommodations for passenger luggage and boarding assistance.
- Each station would include ancillary rooms for electrical equipment, communications equipment, and janitorial services. No passenger restrooms are anticipated.
- Stations would include landscaping to prevent unauthorized access to restricted areas, screen station elements, buffer guideways, and fill unprogrammed exterior space. Plantings would be low-maintenance and reflective of the local climate. Lighting and security cameras would be provided at each station.
- Public and non-public space would be differentiated within the station facilities with all non-public spaces access controlled and clearly identified as such.

The proposed stations would be connected to the bored tunnel via a cut-and-cover structure and an at-grade guideway. The guideway would be enclosed by fencing and walls that would be buffered with landscaping. A walkway would be provided abutting the outside of the guideway travel lanes. Crossings for pedestrians and non-system vehicles would be avoided.

Rancho Cucamonga Station

This proposed Rancho Cucamonga Station would be approximately 18,000 square feet in size and located in the northwest corner of the existing Cucamonga Metrolink Station parking lot. The parking lot is owned and maintained by the City of Rancho Cucamonga. An at-grade station plaza would be constructed and would be integrated with an adjacent maintenance facility. Approximately 180 parking spaces would be permanently removed from the Metrolink parking lot to accommodate the proposed Project's station. A conceptual plan of the layout of the proposed station is provided as Figure 4-2 below.

The proposed Rancho Cucamonga Station would include a maintenance facility to store and maintain vehicles. This facility would be approximately 10,000 square feet. The following maintenance activities would occur at this facility: vehicle washing, spare vehicle storage, and vehicle heavy and light maintenance and repairs. In addition, the maintenance facility would accommodate the Operations Control Center to manage the system and include employee amenities (lockers, restrooms, and breakroom). Employee parking for the maintenance facility would be provided at the existing parking lot in the southeast quadrant of the Milliken Avenue/Azusa Court intersection owned by SBCTA.

Ontario International Airport Stations

As discussed above, two stations are proposed at ONT within the existing parking lots located across from Terminals 2 and 4. Both stations would be located at-grade and would connect to their associated tunnel

portals along Terminal Way via an at-grade connection. The proposed stations would be approximately 10,000 square feet and entirely located within ONT right-of-way. Approximately 80 parking spaces would be permanently removed to accommodate the Terminal 2 Station, with approximately 115 spaces permanently removed to accommodate the Terminal 4 Station. A conceptual plan of the layout of the proposed stations is provided as Figure 4-3.

Figure 4-2: Rancho Cucamonga Station Proposed Conceptual Station Plan

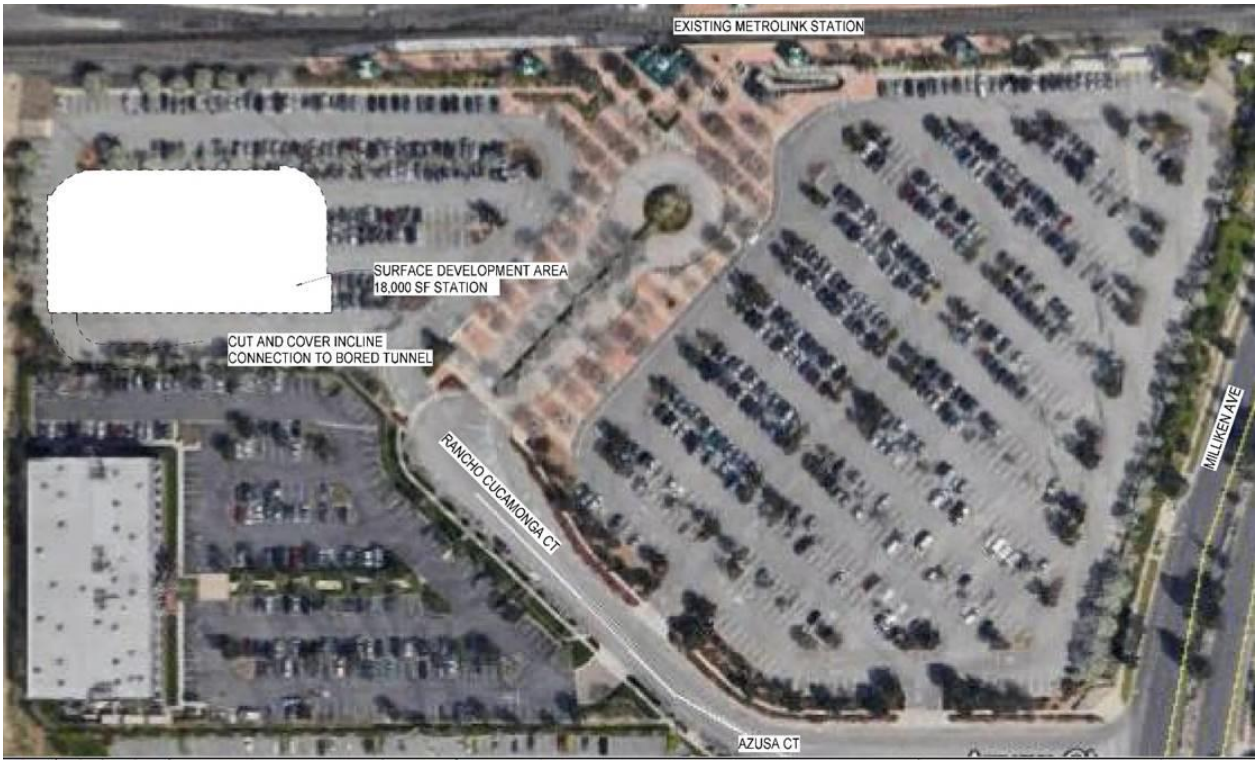


Figure 4-3: ONT Airport Stations Proposed Conceptual Station Plan

4.1.3 Ventilation Shaft

A mid-tunnel ventilation shaft would be located near the OMUC water tanks in the southeast quadrant of the I-10/Milliken Avenue interchange. Work at this location would encroach on both California

Department of Transportation (Caltrans) and city of Ontario right-of-way. Parking stalls for emergency services would be provided at this location. Access to the mid-tunnel ventilation shaft would be through the existing parking lot of a shopping center and the City of Ontario's property located north of Guasti Road. Existing landscaping would be removed.

4.1.4 Design Options

Two design options are being considered at the Milliken Avenue to Airport Drive segment to avoid existing constraints and easements, including structures for UPRR located north of Airport Drive and west of the I-15 (see Figure 4-4). Design Option A would shift the alignment west across Milliken Avenue and travel south to Guasti Road and below the UPRR ROW to connect to Airport Drive. Design Option B would shift the alignment further east of Milliken Avenue near the I-10 interchange and continue travelling south below the UPRR ROW to connect to Airport Drive. Both design options would require permanent or temporary easements for the properties located east and west of Milliken Avenue and along Guasti Road and Airport Drive.

Figure 4-4: Alternative 1 Design Options

4.1.5 Construction

Construction of the tunnel alternative would last approximately 30 months. Construction would not interrupt Metrolink service as construction activities and staging would occur within the existing parking lot. Additional construction details are described below.

4.1.5.1 Stations

A construction staging area would be required at each of the three proposed stations. Staging at the proposed Cucamonga Station and maintenance facility would require approximately 3.2 acres. Approximately 170 parking spaces would be temporarily unavailable for public use at the existing Cucamonga Metrolink Station parking lot. Equipment needs would include the following: a vertical conveyor system, a gantry crane, a crawler crane, excavators, concrete trucks, muck trucks, a wheel loader, Foamplant, cooling towers, a tunnel fan grout plant, segment cars, and flatcars. The staging area would be needed for up to 21 months. Haul trucks would exit the staging area, travel north along Milliken Avenue, and turn right on Foothill Boulevard to access I-15. No road closures are anticipated for staging at the Rancho Cucamonga Station.

Staging at the proposed ONT Terminal 2 Station would require approximately 3.4 acres. Approximately 300 parking spaces would be temporarily unavailable for public use at the ONT parking lot. Equipment needs would include the following: a piling rig, a gantry crane, a crawler crane, excavators, concrete trucks, muck trucks, a wheel loader, Foamplant, cooling towers, a tunnel fan, a grout plant, segment cares, and flatcars. The staging area would be needed for up to 27 months. Haul trucks would exit the staging area, travel east along Terminal Way, and turn left on Haven Avenue to access I-10. No road closures are anticipated for staging at the Terminal 2 Station.

Staging at the proposed ONT Terminal 4 Station would require approximately 3.2 acres. Approximately 300 parking spaces would be temporarily unavailable for public use at the ONT parking lot. Equipment needs would include the following: a piling rig, a crawler crane, concrete trucks, muck trucks, a compressor, a generator, a water treatment plant, a wheel wash, a wheel loader, and excavators. The staging area would be needed for up to 15 months. Haul trucks would exit the staging area, travel east along Terminal Way, and turn left on Haven Avenue to access I-10. No road closures are anticipated for staging at the Terminal 4 Station.

4.1.5.2 Tunnel

A tunnel boring machine (TBM) would be launched from either the existing ONT parking lot near Terminal 2 or the Cucamonga Metrolink Station to construct the tunnel. It would operate six days a week, with maintenance occurring each Sunday. A large crane would be used to deploy and recover the TBM. OIAA height limits at ONT and Rancho Cucamonga, 135 feet and 160 feet, respectively, would restrict crane heights. Construction of the entire tunnel would take approximately 14 months. Both ends of the tunnel would need to be constructed via direct excavation (cut-and-cover) to launch or retrieve the TBM. The limits of excavation needed for the TBM and cut-and-cover construction is approximately 1.84 acres near the Cucamonga Metrolink Station, approximately 1.15 acres near Terminal 4, and approximately 0.51 acres near Terminal 2 at ONT, which total 3.5 acres for all cut-and-cover construction. Vehicle ramps connecting to the tunnel would be constructed via direct excavation, as well. Emergency access shafts will be constructed along the tunnel alignment for access to the tunnel in the event of an emergency.

Equipment at the TBM launch site would include trucks, a crane, excavators, a grout plant, a compressor plant, a tunnel fan, and cooling towers. The launch area would also store tunnel construction materials (rail, pipe, ducts, etc.) and stockpile excavated material. Haul trucks would remove excavated material from the potential launch site at ONT by traveling along Terminal Way to Archibald Avenue, which connects to I-10. Haul trucks would remove excavated material from the potential launch site at ONT by traveling north or south on Milliken Avenue to access I-10 or I-15.

4.1.5.3 Ventilation Shaft

One ventilation shaft measuring 8-feet by 14-feet would be constructed along the tunnel alignment. The shaft could be constructed before or after the construction of the tunnel. Construction of the ventilation shaft would last approximately 6 months. A drill rig would install up to 5 piles deep per day, each 60 feet deep. Piles would be drilled (i.e., no impact driving). The access shaft would then be excavated. The excavation would be supported by an internal bracing system.

The ventilation shaft would require a staging area. Anticipated equipment at the location would include haul trucks, a drill rig, a crane, an excavator, a wheel loader, a compressor, and a ventilation fan. The staging area would include material storage, stockpiles of excavated material, water treatment, a workshop, a construction office, and an employee parking. The staging area would be approximately 27,000 square feet.

As mentioned above, the shaft would be located south of the I-10 freeway near the OMUC water tanks on the east side of Milliken Avenue. No lane closures along Milliken Avenue are anticipated, although work would encroach into Caltrans right-of-way. Tree and vegetation clearing would be required. Haul trucks would access I-10 by traveling south along the access road to Guasti Road, then turning right (north) on Milliken Avenue to access the interstate. The OIAA height limit (121 feet) would restrict crane heights at the access shaft.

Any traffic detours would be covered under a traffic management plan, as identified during the detailed design stage. Bike lanes along Milliken Avenue would be temporarily closed during the construction. Sidewalks would also be temporarily closed. Temporary detours would be provided for these closures.

4.1.5.4 Utilities

Utility relocations are not anticipated for the construction of the proposed tunnel. However, at the proposed maintenance facility at the proposed Rancho Cucamonga Station, overhead Southern California Edison (SCE) lines would need to be relocated underground and horizontally. The remainder of the utility relocations would be associated with the emergency access shaft. A preliminary list of utility relocations anticipated with the proposed Project is provided below.

Multiple utilities would be relocated to allow for the construction of the access shaft including:

- 16-inch cement mortar water line owned and operated by the City of Ontario
- Potential electric underground distribution cables owned and operated by Southern California Edison (SCE)
- Landscape irrigation line owned and operated by the City of Ontario
- Caltrans fiber optic duct bank

4.1.5.5 Right-of-Way and Property Acquisition

The tunnel alignment would require right-of-way acquisition from 27 properties. This includes the need for 26 permanent subsurface easements and one permanent utility easement. There would be five partial fee acquisitions for all three stations totaling approximately 2 acres. In particular, subsurface easements would be required where the tunnel begins curving east at Guasti Road east of the UPRR bridge. It is assumed that emergency access shaft and the mid-tunnel vent shaft would require acquisition and easements from both private and city-owned parcels. This does not include potential right-of-entries, encroachment permits, or other right-of-way interests needed for construction. No relocations of businesses and residences would be required to construct the tunnel.

4.1.6 Capital Cost

The estimated capital cost to construct Alternative 1 is $557 million. This estimate includes the estimated cost of vehicles, tunneling, underground track, three stations with platforms, train control and communications systems, and general construction sitework.

The cost estimates produced during this phase are intended to inform initial decision-making and the alternatives screening process. As design progresses and decisions on project features are refined, the capital cost for this alternative may increase. Cost risks associated with this alternative include:

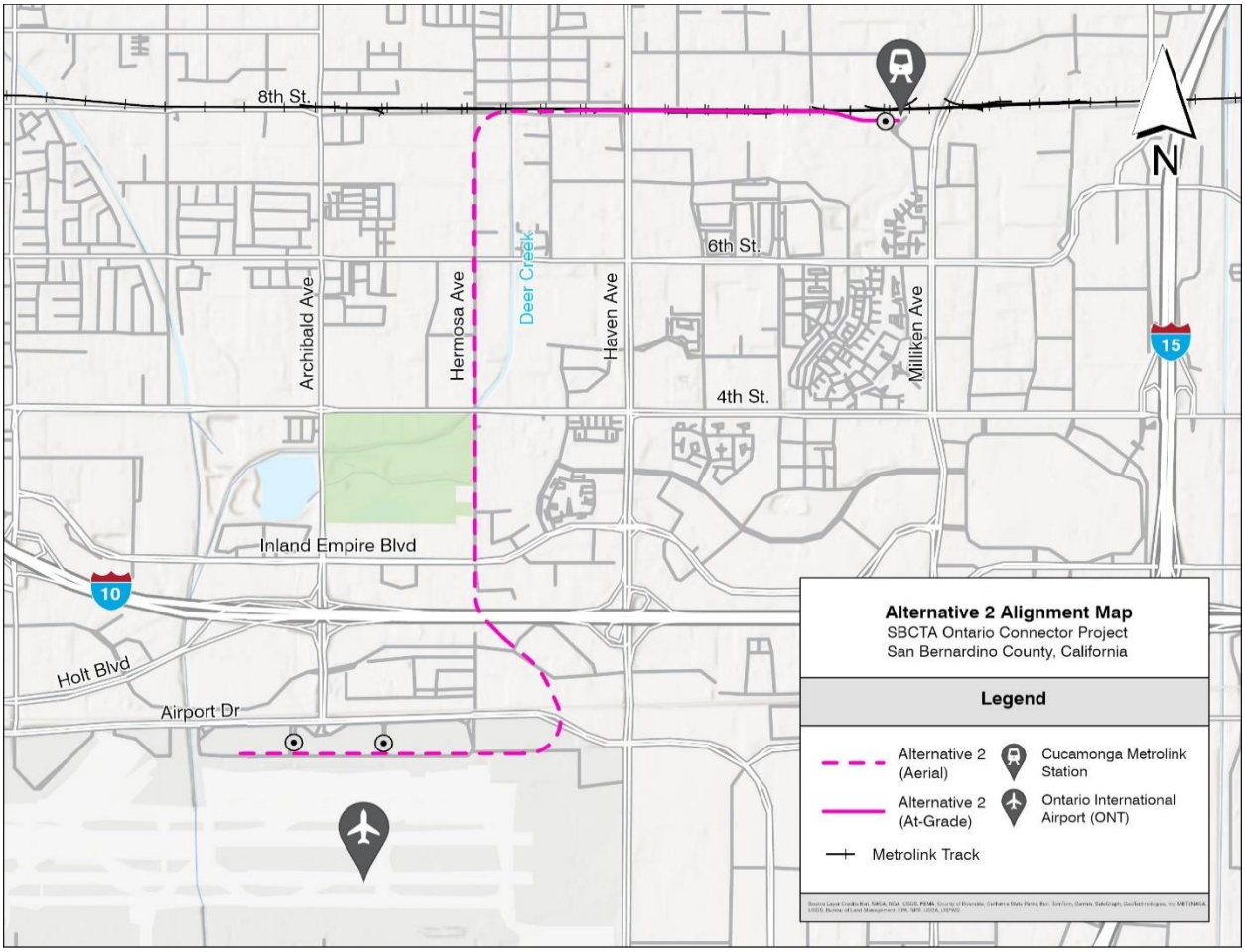
- Construction impacts from Brightline West.
- Coordinating airport access during construction.
- Further design and coordination associated with construction of ventilation shafts.

4.2 Alternative 2- Rancho Cucamonga to ONT via Hermosa/Turner Rail Alignment

This alternative consists of a stand-alone Diesel Multiple Unit (DMU) or Zero-Emission Multiple Unit (ZEMU) vehicle traversing a 4.6-mile rail alignment from the Cucamonga Metrolink Station to ONT via Hermosa Avenue / Turner Avenue. The rail alignment would begin at the Cucamonga Metrolink Station and travel west along the south side of the existing San Gabriel Subdivision (San Bernardino Metrolink Line) before turning south onto Hermosa Avenue/Turner Avenue. Continuing along Hermosa Avenue/Turner Avenue, the alignment would cross over a parking lot for the American Career College and I-10 before turning east to traverse a Best Western hotel parking lot and cross over Guasti Road. The alignment would then turn south through the Airport Corporate Center parking lot, crossing over the UPRR Alhambra subdivision tracks and Airport Drive, and turning west on John Bangs Drive to the ONT terminals along Terminal Way.

The Alternative 2 alignment would operate within the cities of Rancho Cucamonga and Ontario, railroad ROWs controlled by Metrolink and UPRR, and the San Bernardino County Flood Control District (SBCFCD). The alternative alignment is shown in Figure 4-5.

Figure 4-5: Alternative 2 Alignment



4.2.1 Operations

Transit rail DMU or ZEMU vehicles would operate on a fixed schedule between the Cucamonga Metrolink Station and existing terminals at ONT. Service would be provided everyday with hours of operation on weekdays from 4:00 AM to 11:00 PM and 7:00 AM to 11:00 PM on weekends. The trains would operate on 15-minute headways and would provide a peak one-way passenger throughput of up to 368 passengers per hour.

4.2.2 Stations

Like Alternative 1, Alternative 2 would include three passenger stations, including one station at the Cucamonga Metrolink Station, and two stations which would serve ONT (see Figure 4-5). The Cucamonga Station would be constructed within the existing parking area just south of the existing Metrolink Station. Passengers would have access to the at-grade station via the station parking lot. The Cucamonga Station would include side loading platforms. The ONT Stations would be constructed within an existing parking lot adjacent to Terminals 2 and 4. The two stations at ONT would be elevated along Terminal Way across from Terminals 2 and 4 and would include center platforms with tracks on each side of the platform for passenger loading. Passengers would have access to the aerial stations via stairs, escalators, or elevators along Terminal Way and from within the airport terminals.

The proposed stations would include the following elements:

- Stations would be sized to accommodate the projected ridership, headways, and selected vehicles.
- Stations would be naturally ventilated and covered with canopies.
- Passengers would access the stations from existing sidewalks or plazas in front. Stations would be entered via a ticketing area. Ticketing would likely occur via a self-service kiosk.
- Wayfinding and dynamic signage would be provided to facilitate passenger flow through each station and inform passengers of arrival/departure times. A public address system would assist visually impaired passengers.
- Mechanical, electrical, plumbing, fire protection, communications, and security systems would be integrated into the station's architecture to minimize visual clutter.
- Sufficient space would be provided for passenger boarding and alighting. This would include accommodations for passenger luggage and boarding assistance.
- Each station would include ancillary rooms for electrical equipment, communications equipment, and janitorial services. No passenger restrooms are anticipated.
- Stations would include landscaping to prevent unauthorized access to restricted areas, screen station elements, buffer guideways, and fill unprogrammed exterior space. Plantings would be low-maintenance and reflective of the local climate. Lighting and security cameras would be provided at each station.
- Public and non-public space would be differentiated within the station facilities with all non-public spaces access controlled and clearly identified as such.

4.2.3 Construction

Construction of Alternative 2 would last approximately 48 - 60 months and include the stations and both at-grade track and elevated track sections as described below.

Construction activities would likely require closures on numerous streets along the alignment. Depending on the nature of the work and location, select lane closures may be necessary with full closure necessary in some instances. Temporary detours may be necessary to route traffic around closures. Additional coordination with Caltrans and UPRR would be required for work within their rights-of-way. In addition, project construction will require temporary disruption of Metrolink service.

Typical equipment used during construction would include, but not be limited to excavators, loaders, trucks, cranes, pile-rigs, speed swing or loader, grapple trucks, on-track e-clip applicator, rail heater, welding truck, tamper, ballast regulator, and ballast cars.

4.2.3.1 Temporary Construction Staging and Haul Routes

Construction staging areas will be provided at each of the three proposed stations and along the alignment. Construction materials will be hauled away from these staging area and the construction site via designated haul routes. Potential haul routes were considered by reviewing each major east-west and north-south corridor within the vicinity of the alternatives. These corridors were accessed based on their ability to provide direct access to the I-10 and I-15. Additionally, routes were prioritized that do not direct heavy haul traffic within past schools or parks. Proposed haul routes during the construction period

include the following north-south routes: Hermosa Avenue, Haven Avenue and Milliken Avenue between Foothill Boulevard and I-10, and Hermosa Avenue between 8th Street and I-10. The main east-west haul routes include Foothill Boulevard between Vineyard Ave and I-15, and 4th Street between Vineyard Avenue and I-15. A route to the I-10 or I-15 from ONT will be provided via Airport Drive.

4.2.3.2 At-grade Tracks

The at-grade portion of the alignment would extend from the proposed Cucamonga Metrolink Station along the south side of the San Gabriel Subdivision (San Bernardino Metrolink Line) tracks to approximately 1,360 feet west of Haven Avenue. The proposed Cucamonga Station would be located within the existing parking area south of the Metrolink station with new tracks running adjacent the south side of the Metrolink tracks. The tracks would continue west adjacent the Metrolink tracks, requiring bridge widening over Haven Avenue. East of the Deer Creek channel the alignment would begin to elevate and turn south over 8th Street towards Hermosa Avenue. No grade crossing would be required.

4.2.3.3 Elevated Tracks

Beginning in the Metrolink right-of-way the alignment would elevate to cross over 8th Street and turn south to follow Hermosa Avenue. The elevated single track would follow the median of Hermosa Avenue/Turner Avenue across Inland Empire Boulevard at which point it would switch to a double track. The elevated alignment would continue over the American Career College parking lot, turning slightly east, and cross I-10, Guasti Road, UPRR tracks, East Airport Drive, and John Bangs Drive, before turning west on Terminal Way to connect with two elevated stations at ONT.

The elevated structure will vary in height with a low of approximately 26 feet above the ground surface near Terminal Way to a high of approximately 38 feet near John Bangs Drive.

4.2.4 Utilities

Potential utility conflicts for the construction of the Alternative 2 include the following:

- SCE lines along 8th Street and 4th Street
- City of Ontario overhead traffic signals
- Underground water and sewer
- Underground electrical and telecommunications

4.2.5 Right-of-Way and Property Acquisition

Alternative 2 would require right-of-way acquisition from 36 properties. This includes the need for five temporary construction easements (TCE). The project would require the full acquisition of six properties totaling 1.3 acres and the partial acquisition of 24 partial acquisitions totaling 11.4 acres. This does not include potential right-of-entries, encroachment permits, or other right-of-way interests needed for construction. Construction of the project would require the relocation of two residences and one partial business relocation.

4.2.6 Capital Cost

The estimated capital cost to construct Alternative 2 would range between $976 million and $1.2 billion. This estimate includes the estimated cost of six vehicles, the at-grade track and subgrade, the aerial guideway, three stations with platforms, land acquisitions, train control and communications systems, and general construction sitework. The cost estimates produced during this phase are intended to inform

initial decision-making and the alternatives screening process. As design progresses and decisions on project features are refined, the capital cost for this alternative may increase. Cost risks associated with this alternative include:

- Coordination with Metrolink and impacts to service operations.
- Impacts to SCE transmission corridor at Cucamonga Station. Transmission line would need to be placed underground.
- Impacts to Cucamonga Station requiring additional parking to be provided.
- Impacts to residential development adjacent to Cucamonga station requiring mitigation.
- Impacts to industry service track and businesses for a period of 12 months.
- Construction impacts from Brightline West.
- Close proximity to SCE substation requiring costly improvements to move poles and protection during construction.
- Bridge widening over Deer Creek.
- Impacts to Haven Avenue Bridge where Haven Avenue would require lane improvements.
- Separate power feeds.
- Requires approximately 4,000-foot noise barrier along Haven Avenue in vicinity of housing.
- Approximately 300-foot span length of over the I-10 requiring special construction sequencing.
- Coordinating airport access during construction.
- Crossing over UPRR special approvals and agreements.
- Access to staging areas are constrained due to temporary traffic diversions and road closures.
- No maintenance facility next to corridor could require special provisions at the stations for light maintenance requiring costly infrastructure for maintenance.

4.3 Alternative 3 - Rancho Cucamonga to ONT via Deer Creek Rail Alignment

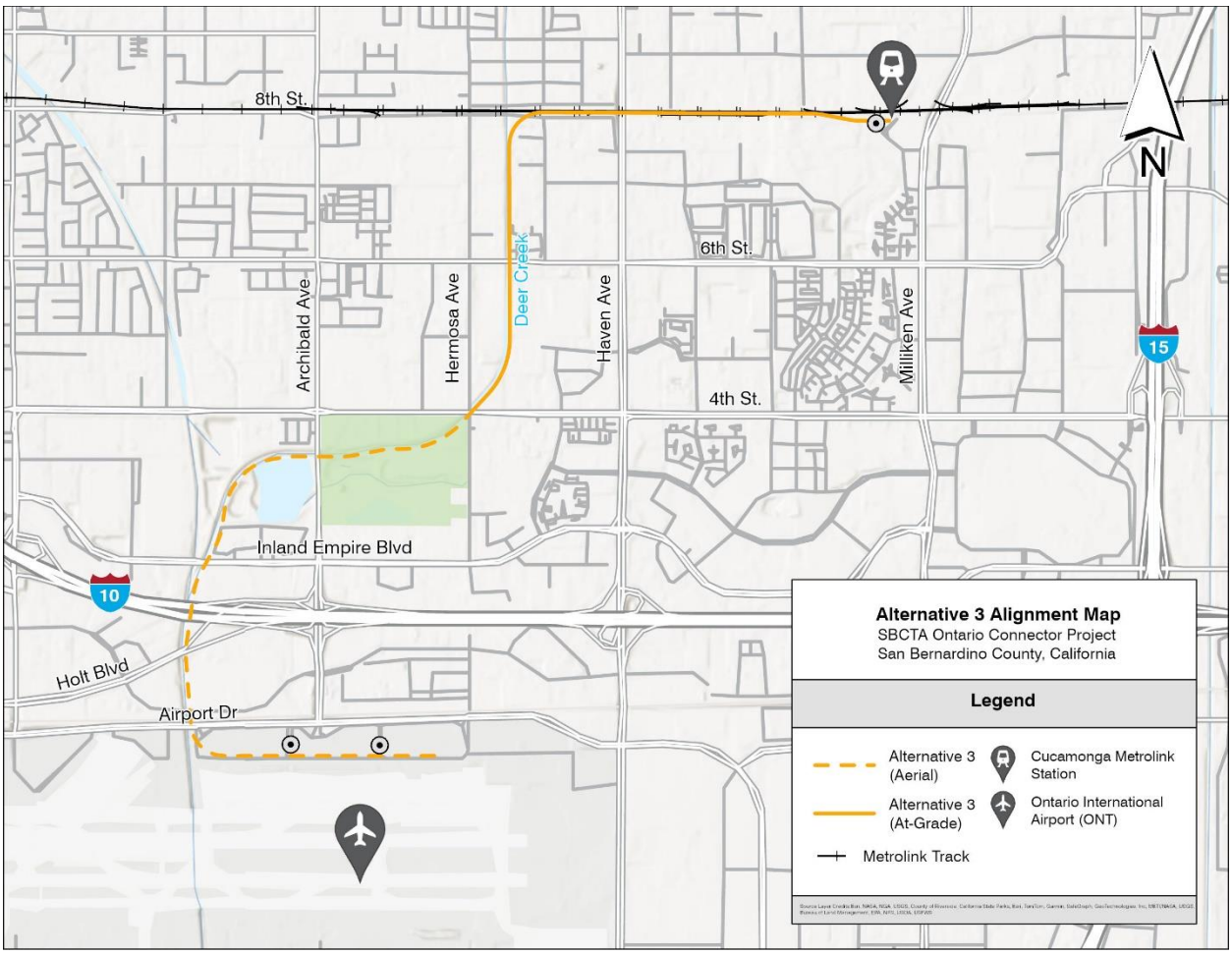
This alternative consists of a stand-alone DMU or ZEMU service from the Cucamonga Metrolink Station to ONT via Deer Creek and Cucamonga Creek. The alternative follows a 4.8-mile rail alignment that begins at the Cucamonga Metrolink Station and travels west along the south side of the San Gabriel Subdivision (San Bernardino Metrolink Line), turning south to run along the SBCFCD Deer Creek channel. After reaching the Deer Creek corridor, the two tracks would separate from a double track configuration immediately south of the Metrolink corridor to allow each track to run in a single track configuration on opposite sides of Deer Creek. One track would run along the east side of Deer Creek and the other track would cross to the west side of Deer Creek via a proposed bridge. The tracks would continue running along opposite sides of Deer Creek until approximately 1,000 feet east of Archibald Avenue at which point the two tracks would meet to operate side-by-side. The alignment would continue along the southeast side to the channel crossing over Archibald Avenue, Inland Empire Boulevard, I-10, Holt Boulevard, Gausti Road, the UPRR tracks, and Airport Drive before turning east to serve the airport terminals along Terminal Way.

The alignment would include grade separations over the following facilities: 4th Street/Hermosa Avenue intersection, Archibald Avenue, Inland Empire Boulevard, I-10, Holt Boulevard, Guasti Road, UPRR tracks, East Airport Drive, and Terminal Way. At-grade crossings would be at 8th Street and 6th Street.

The existing bike path located along the westside of the Deer Creek channel between 8th Street and 6th Street and eastside of the channel between 6th Street and 4th Street would be removed to accommodate the new at-grade rail along both sides of the channel.

The Alternative 3 alignment would operate within the cities of Rancho Cucamonga and Ontario, railroad ROWs controlled by Metrolink and UPRR, and the SBCFCD facility. The alternative alignment is shown in Figure 4-6.

Figure 4-6: Alternative 3 Alignment



4.3.1 Operations

Transit rail DMU or ZEMU vehicles would operate on a fixed schedule between the Cucamonga Metrolink Station and existing terminals at ONT. Service would be provided everyday with hours of operation on weekdays from 4:00 AM to 11:00 PM and 7:00 AM to 11:00 PM on weekends. The trains would operate on 15-minute headways and would provide a peak one-way passenger throughput of up to approximately 368 passengers per hour.

4.3.2 Stations

Alternative 3 would include the same three passenger stations as described with Alternative 2.

4.3.3 Construction

Construction of Alternative 3 would last approximately 48 – 60 months and include the stations and both at-grade track and elevated track sections as described below.

Construction activities would likely require closures on numerous streets along the alignment. Depending on the nature of the work and location, select lane closures may be necessary with full closure necessary in some instances. Temporary detours may be necessary to route traffic around closures. Additional coordination with Caltrans and UPRR would be required for work within their rights-of-way. In addition, project construction will require temporary disruption of Metrolink service.

Typical equipment used during construction would include, but not be limited to excavators, loaders, trucks, cranes, pile-rigs, speed swing or loader, grapple trucks, on-track e-clip applicator, rail heater, welding truck, tamper, ballast regulator, and ballast cars.

4.3.3.1 Temporary Construction Staging and Haul Routes

Construction staging areas will be provided at each of the three proposed stations and at designation locations along the alignment between stations. Construction materials will be hauled off-site from these construction sites via designated haul routes. Potential haul routes were considered by reviewing each major east-west and north-south corridor within the vicinity of the alternatives. These corridors were accessed based on their ability to provide direct access to the I-10 and I-15. Additionally, routes were prioritized that do not direct heavy haul traffic within past schools or parks. Proposed haul routes during the construction period include the following north-south routes: Hermosa Avenue, Haven Avenue and Milliken Avenue between Foothill Boulevard and I-10, and Hermosa Avenue between 8th Street and I-10. The main east-west haul routes include Foothill Boulevard between Vineyard Ave and I-15, and 4th Street between Vineyard Avenue and I-15. A route to the I-10 or I-15 from ONT will be provided via Airport Drive.

4.3.3.2 At-grade Tracks

The northern half of the alignment would be constructed at-grade. From the Cucamonga Metrolink Station the new track would be constructed along the south side of the San Gabriel Subdivision (San Bernardino Metrolink Line) from the new Cucamonga station before turning south onto the SBCFCD maintenance road along the east side of the Deer Creek channel for approximately 400 feet before splitting with one set of tracks crossing the channel to operate along the west side with another set continuing along the east side of the channel. New rail track would be installed at-grade along the Deer Creek channel until it transitions to an elevated structure approximately 950 feet east of 4th Street.

At-grade rail crossings would be required at 8th and 6th Streets and include the installation of necessary crossing signal equipment, including lights, signals, gates, and signage.

4.3.3.3 Elevated Tracks

Crossing over 4th Street, the alignment would be elevated and continue along the maintenance road adjacent Deer Creek channel to the merge with the Cucamonga Creek channel. The alignment would continue south along the channel maintenance road crossing over Inland Empire Boulevard, I-10, Guasti Road, UPRR tracks, East Airport Drive, and turning east along Terminal Way to connect with the two ONT stations.

4.3.4 Utilities

Potential utility conflicts for the construction of the Alternative 3 include the following:

- SCE lines along 8th Street and 4th Street
- City of Ontario overhead traffic signals
- Underground water and sewer
- Underground electrical and telecommunications

4.3.5 Right-of-Way and Property Acquisition

Alternative 3 would require right-of-way acquisition from 67 properties. This includes the need for 12 temporary construction easements. The project would require the full acquisition of 11 properties totaling 10.8 acres and the partial acquisition of 45 partial acquisitions totaling 20.4 acres. This does not include potential right-of-entries, encroachment permits, or other right-of-way interests needed for construction. Construction of the project would require the relocation of four businesses but would not the result in the relocation of any single-family residences.

4.3.6 Regulatory Requirements

In general, the double track portion of the alignment would straddle Deer Creek starting immediately south of the Metrolink corridor and ending at ONT. Additionally, bridge crossings would be constructed to convey the track on both sides of the channel. The Deer Creek corridor was constructed as a flood control channel and maintained by SBCFCD. Construction of flood control channel received funding from the United States Army Corps of Engineering (USACE) under the USACE Civil Works Program. Thus, the Project's impacts are subject to USACE review and approval as defined by 33 U.S.C. 408 (Section 408). In addition, a series of public use off-road, multi-purpose trails run along Deer Creek 8th Street to 4th Street within the SBCFCD right-of-way. Alternative 3 would require the full acquisition of 7.6 acres and the partial acquisition of 11.5 acres of SBCFCD property along Deer Creek. This alternative would require approval through the USACE Section 408 Program prior to construction.

4.3.7 Capital Cost

The estimated capital cost to construct Alternative 3 would range between $989 million and $1.2 billion. This estimate includes the estimated cost of six vehicles, the at-grade track and subgrade, the aerial guideway, three stations with platforms, land acquisitions, train control and communications systems, and general construction sitework.

The cost estimates produced during this phase are intended to inform initial decision-making and the alternatives screening process. As design progresses and decisions on project features are refined, the capital cost for this alternative may increase. Cost risks associated with this alternative include:

- Coordination with Metrolink and impacts to service operations.
- Impacts to SCE transmission corridor at Cucamonga Station. Transmission line would need to be placed underground.
- Impacts to Cucamonga Station requiring additional parking to be provided.
- Impacts to residential development adjacent to Cucamonga Station requiring mitigation.
- Impacts to industry service track and businesses for a period of 12 months.

- Construction impacts from Brightline West.
- Close proximity to SCE substation requiring costly improvements to move poles and protection during construction.
- Alignment goes over Deer Creek for considerable length. Coordination with SBCFCD and USACE
- Impacts to Deer Creek detention ponds required costly improvements to hydrology.
- Approximately 300-foot span length of over the I-10 requiring special construction sequencing.
- Coordinating airport access during construction
- Crossing over UPRR special approvals and agreements
- Access to staging areas are constrained due to temporary traffic diversions and road closures.
- No maintenance facility next to corridor could require special provisions at the stations for light maintenance requiring costly infrastructure for maintenance.

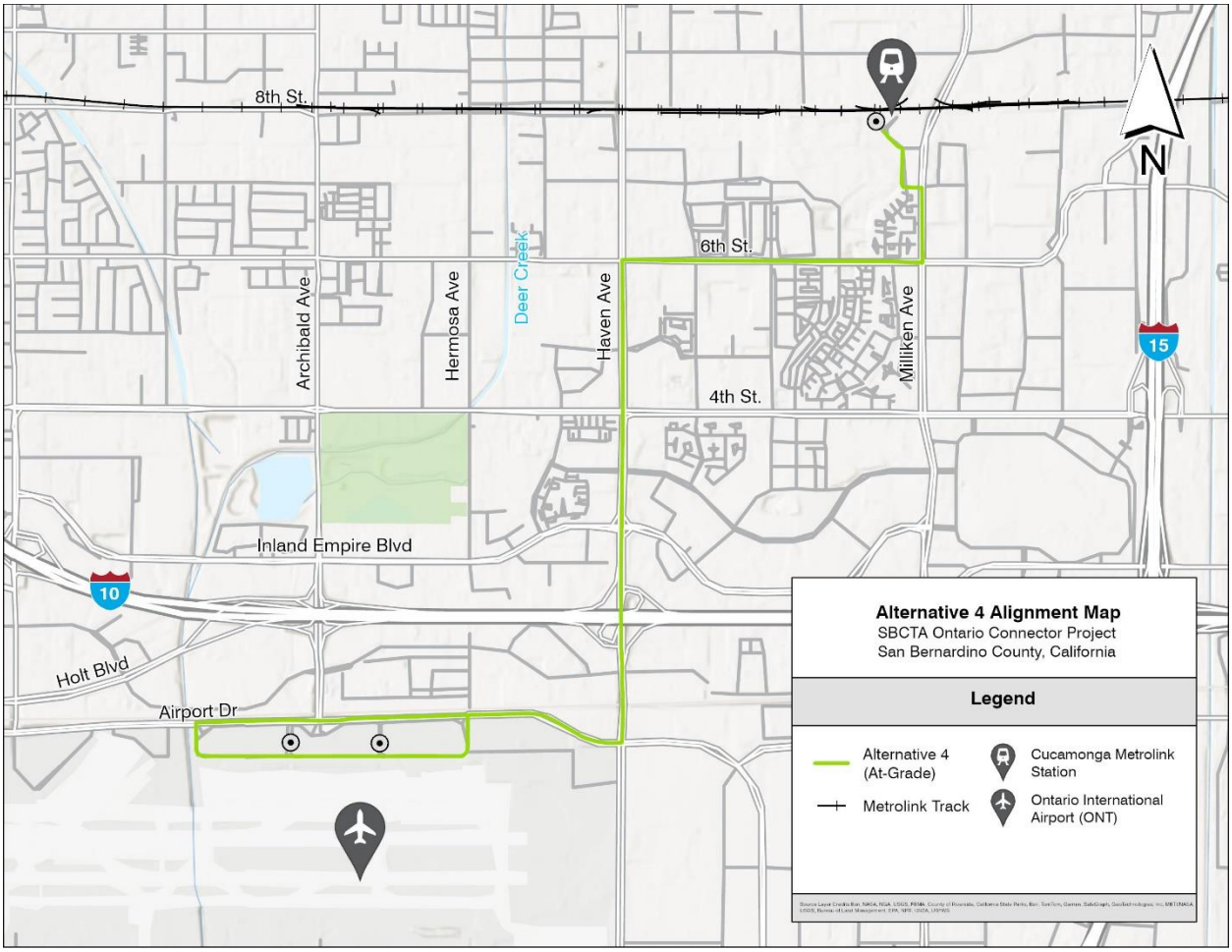
4.4 Alternative 4 - Rancho Cucamonga to ONT Bus Shuttle

Alternative 4 consists of a bus shuttle using 40-foot electric buses which would run from the Cucamonga Metrolink Station to ONT via 6th Street and Haven Avenue for approximately 5.7 miles. The bus route would begin at the Cucamonga Metrolink Station and would travel south along Milliken Avenue, west on 6th Street, and south on Haven Avenue to Airport Drive. The bus would continue past Archibald Avenue and loop around Terminal Way to serve the ONT terminals before returning to the Cucamonga Metrolink Station. The alignment would operate within the Cities of Rancho Cucamonga and Ontario, and ONT ROW as shown in Figure 4-7.

The shuttle would operate on 15-minute headways in each direction to coincide with arriving trains at Rancho Cucamonga. There are no stations for this alternative, instead there are dedicated pick-up and drop-off areas for passengers to access the buses. Pick-up and drop-off locations would include the Cucamonga Metrolink Station and bus stop locations for the existing ONT Connect Shuttle (Omnitrans 380) near each of the ONT terminals. This alternative would provide a peak one-way passenger throughput of up to approximately 168 passengers per hour.

The buses would operate along existing roads and there would be no construction and no temporary or permanent easements would be required. When not in service, buses would be stored at the Omnitrans West Valley Facility.

Figure 4-7: Alternative 4 Alignment



4.4.1 Operations

Under Alternative 4, the shuttle would operate on a fixed schedule between the Cucamonga Metrolink Station and existing terminals at ONT. Buses would operate on a fixed schedule between the Cucamonga Metrolink Station and existing terminals at ONT. Service would be provided everyday with hours of operation on weekdays from 4:00 AM to 11:00 PM and 7:00 AM to 11:00 PM on weekends. Buses would operate on 15-minute headways and would provide a peak one-way passenger throughput of up to approximately 168 passengers per hour.

4.4.2 Capital Cost

The estimated capital cost to construct Alternative 4 is $6.1 million. This estimate includes the estimated costs of five electric buses, five depot chargers to be installed at the maintenance facility, and two on-route chargers at each end of the route.

The cost estimates produced during this phase are intended to inform initial decision-making and the alternatives screening process. As design progresses and decisions on project features are refined, the capital cost for this alternative may increase. Cost risks associated with this alternative include coordination with Omnitrans for competing or duplicate service.

5 Performance of Alternatives

This section presents the performance evaluation for the project alternatives. The evaluation followed the methodology described in Section 3.

5.1 Objective 1 – Mobility Improvements Performance

The evaluation and rating of the alternatives is presented in Table 5-1. The mobility improvement goal was assessed using the following criteria:

- Transit travel time – travel times around ONT have become longer and unreliable, especially during peak hour. Truck traffic is prevalent due to the warehouses in the study area. For these reasons, the at-grade segments of Alternative 3 would be impacted by roadway congestion, especially during peak hours. Alternative 4 would be the most affected by roadway congestion, hence impacting the travel time reliability.
- Effects to transit systems within the study area – the project may result in interruption of transit service during the alignment and/or station construction. Alternatives 2 and 3 will require interruption of Metrolink service during construction.

Table 5-1: Objective 1 - Mobility Improvements Rating

Project Objective	Evaluation Criteria	Project Alternatives			
		Alternative 1	Alternative 2	Alternative 3	Alternative 4
Objective 1: Mobility improvements	Transit travel time (minutes) to/from ONT	5.5 minutes	8 minutes	off-peak hour: 8 minutes peak hour: 10 minutes	16 minutes
	Effects to transit systems within the study area	-	Will require interruption of Metrolink service during construction	Will require interruption of Metrolink service during construction	-
Rating		● HIGH	◑ MEDIUM	◑ MEDIUM	○ LOW

5.2 Objective 2 – Service Reliability Performance

The evaluation and rating of the alternatives is presented in Table 5-2. The service reliability goal was assessed using the operating schedule and headway criteria. As described in Section 4, Alternative 1 will have 10 to 12-minute headway during ONT service times. All other alternatives will have a 15-minute headway and run from 4:00 AM, or 7:00 AM on weekends, until 11:00 PM on weekends. As mentioned in Section 5.1, there is potential for roadway congestion to impact travel times for Alternative 3 and 4.

Table 5-2: Objective 2 – Service Reliability Rating

Project Objective	Evaluation Criteria	Project Alternatives			
		Alternative 1	Alternative 2	Alternative 3	Alternative 4
Objective 2: Service Reliability	Headway	10 to 12 min headways	15-min headways		
	Operating schedule	ONT operating hours: 4:00 AM to 11:00 PM on weekdays 7:00 AM to 11:00 PM on weekends			
Rating		● HIGH	● HIGH	◑ MEDIUM	○ LOW

5.3 Objective 3 – Maximize Mobility Capacity Performance

The evaluation and rating of the alternatives is presented in Table 5-3. The goal to maximize mobility capacity was assessed by using the number of passengers per hour.

Table 5-3: Objective 3 – Maximize Capacity Rating

Project Objective	Evaluation Criteria	Project Alternatives			
		Alternative 1	Alternative 2	Alternative 3	Alternative 4
Objective 3: Maximize mobility capacity	# of passengers per hour	300	368	368	168
Rating		◑ MEDIUM	● HIGH	● HIGH	○ LOW

5.4 Objective 4 – Minimize Environmental Impacts Performance

The potential environmental impacts were assessed for each of the proposed alternatives. The assessment of is based on the preliminary design plans prepared for each alternative and identifies the potential impacts associated with implementation of each alternative. Table 5-4 provides a summary of the potential environmental impacts for each alternative.

Table 5-4: Environmental and Community Resource Impact Summary

Resource	Project Alternatives			
	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Land Use	Will require conversion of both private and city owned land to transportation use	Will require conversion of both private and city owned land to transportation use	Will require conversion of both private and city owned land to transportation use	No impact
Acquisitions and Displacements	No commercial or residential acquisitions or displacements	Will require commercial and residential acquisitions and displacements	Will require commercial acquisitions and displacements	No commercial or residential acquisitions or displacements
Growth	No impact	No impact	No impact	No impact
Farmland	No impact	No impact	No impact	No impact
Community Impacts	No impact	New transportation facility placed within an established community	New transportation facility placed within an established community and impacts to existing recreational bicycle/pedestrian path along Deer Creek channel	No impact
Traffic/Transportation	No impact	Placement of bridge columns within the center of Hermosa Avenue/Turner Avenue may alter traffic operations on these streets. Impacts to local streets, I-10 and Metrolink service during construction	Impacts to local streets, I-10 and Metrolink service during construction	No impact
Visual	New stations introduced to the visual environment	New at-grade and elevated rail features and stations introduced to visual environment	New at-grade and elevated rail features and stations introduced to visual environment	No impact
Cultural	Potential discovery of unknown cultural resources during ground disturbance	Potential discovery of unknown cultural resources during ground disturbance	Potential discovery of unknown cultural resources during ground disturbance	No impact

Hydrology and Floodplain	No impact	No impact	New rail facility would be located within the 100-year flood zone	No impact
Water Quality and Storm Water Runoff	Increase in impervious surface associated with stations and maintenance facility	Increase in impervious surface associated with stations	Increase in impervious surface and track adjacent the channel	No impact
Geology, Soils. Seismic	New structures susceptible to seismic activity	New structures susceptible to seismic activity	New structures susceptible to seismic activity	No impact
Paleontology	Potential discovery of paleontological resources during excavation	Potential discovery of paleontological resources during excavation	Potential discovery of paleontological resources during excavation	No impact
Hazardous Materials	No impact	No impact	No impact	No impact
Air Quality	No impact	Increased emissions associated with DMU vehicles but not with ZEMU	Increased emissions associated with DMU vehicles but not with ZEMU	No impact
Noise and Vibration	No impact	Increase noise and vibration associated with new rail facility located adjacent residential units	Increase noise and vibration associated with new rail facility located adjacent residential units	No impact
Energy and Climate Change	No impact	No impact	No impact	No impact
Section 4(f)	No impact	No impact	Impact to bicycle path adjacent the Deer Creek channel	No impact
Biological Resources	N/A	Potential impact to special status species	Potential impact to special status species	No impact
Permits	No impact	Section 401, 404, 1602	Section 401, 404, 1602, 408	No impact

Each alternative was evaluated against objective 4, which seeks to minimize environmental impacts and ROW acquisition impacts in the surrounding communities. This evaluation is presented in Table 5-5.

Table 5-5: Objective 4 – Minimize Environmental Impacts Rating

Project Objective	Evaluation Criteria	Project Alternatives			
		Alternative 1	Alternative 2	Alternative 3	Alternative 4
Objective 4: Minimize environment-tal impacts	Minimize environmental impacts and ROW acquisition impacts	See Table 5-4 for a Summary of Environmental and Community Impacts			
Rating		◑ MEDIUM	○ LOW	○ LOW	● HIGH

5.5 Objective 5 – Project Cost Performance

The evaluation and rating of the alternatives is presented in Table 5-6. The cost effectiveness goal was assessed using the following criteria:

- ROM capital costs
- Risk of cost increase.

Table 5-6: Objective 5 – Cost Effectiveness Rating

Project Objective	Evaluation Criteria	Project Alternatives			
		Alternative 1	Alternative 2	Alternative 3	Alternative 4
Objective 5: Project Cost	ROM capital costs	$557 million	$976 million to $1.2 billion	$989 million to $1.2 billion	$6.1 million
	Risk of cost increase	Moderate risk	High risk	High risk	Low risk
Rating		◑ MEDIUM	○ LOW	○ LOW	● HIGH

6 Screening Results

The screening process evaluated the project alternatives based on their capacity to achieve the project objectives. The evaluation is based on the performance of each alternative against the Project's objectives. No weighting was applied to the results of the screening evaluation as each objective was given equal consideration. The resulting evaluation, summarized in Table 6-1, demonstrates how each project alternative compares to the project objectives with an overall high, medium, or low rating, as defined in Section 3.

Table 6-1: Screening Results

Objective	Project Alternatives			
	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Objective 1: Mobility improvements	● HIGH	◑ MEDIUM	◑ MEDIUM	○ LOW
Objective 2: Service reliability	● HIGH	● HIGH	◑ MEDIUM	○ LOW
Objective 3: Maximize capacity	◑ MEDIUM	● HIGH	● HIGH	○ LOW
Objective 4: Minimize environmental impacts	◑ MEDIUM	○ LOW	○ LOW	● HIGH
Objective 5: Project Costs	◑ MEDIUM	○ LOW	○ LOW	● HIGH
Overall Rating	● HIGH	◑ MEDIUM	◑ MEDIUM	○ LOW

Based on the findings of the performance of alternatives presented in Section 5, Alternative 1 consisting of a tunnel system best aligns with the project's purpose, needs, and goals as it would provide the highest benefits. It is recommended for Alternative 1 to be studied as part of the environmental analysis phase.

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