Ontario International Airport Connector Project

ONTCONNECTOR



APPENDIX F
CONSTRUCTION METHODS TECHNICAL REPORT

October 2024

Prepared by:

sbeta

San Bernardino County Transportation Authority
1170 West Third Street, Second Floor
San Bernardino, CA 92410-1715

THIS PAGE INTENTIONALLY LEFT BLANK

TABLE OF CONTENTS

1 INTRODUCTION 1-1

2 PROJECT DESCRIPTION 2-1

2.1 Project Purpose and Objectives 2-1

2.2 Project Need 2-1

2.3 Alternatives Evaluated 2-2

2.3.1 No Project Alternative 2-2

2.3.2 Proposed Project 2-2

3 METHODOLOGY 3-1

3.1 Industry Standards 3-1

3.1.1 Federal 3-1

3.1.2 State 3-1

3.1.3 Regional and Local 3-2

3.1.4 Construction Mitigation Measures and Construction Industry Standard Practices 3-2

4 CONSTRUCTION SCENARIO 4-1

4.1 Proposed Project 4-1

4.1.1 Construction Sequencing 4-1

4.1.2 Underground Guideway Construction 4-3

4.1.2.1 Cut-and-Cover Construction 4-3

4.1.2.2 Tunnel 4-3

4.1.3 Ventilation Shafts 4-6

4.1.4 Other Facilities and Construction Activities 4-7

4.1.4.1 Utility Relocation and Installation 4-7

4.1.4.2 Stations 4-7

4.1.4.3 Transition Structures 4-8

4.1.4.4 Construction Staging Areas 4-9

4.1.4.5 Maintenance and Storage Facility 4-9

4.1.4.6 Roadway Reconstruction 4-9

5 REFERENCES 5-1

TABLES

Table 2-1: Stations, Maintenance and Storage Facility Construction Details 2-15
Table 2-2: Typical Sequencing of Transit Construction Activities 2-16
Table 4-1: Haul Routes for Mass Excavation and Tunneling 4-2

FIGURES

Figure 2-1: Regional Location Map 2-4
Figure 2-2: Proposed Project Site 2-5
Figure 2-3: Typical Transit Tunnel Section View 2-7
Figure 2-4: Cucamonga Station 2-9
Figure 2-5: Ontario International Airport - Terminal 2 Station and Terminal 4 Station 2-10
Figure 2-6: Vent Shaft Design Option 2 and Vent Shaft Design Option 4 2-12
Figure 4-1: Example of Construction via Cut-and-Cover 4-4
Figure 4-2: Tunnel Boring Machine 4-5
Figure 4-3: Example of Bored Tunnel Constructed 4-5

ACRONYMS AND ABBREVIATIONS

ADA	Americans with Disabilities Act
a.m.	Ante meridiem
BMPs	Best Management Practices
Cal/OSHA	California Division of Occupational Safety and Health
Caltrans	California Department of Transportation
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
EIR	Environmental Impact Report
EPB	Earth Pressure Balance
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
I-10	Interstate 10
I-15	Interstate 15
MEP	mechanical, electrical, and plumbing
MSF	Maintenance and Storage Facility
MWD	Metropolitan Water District of Southern California
NEPA	National Environmental Policy Act
NFPA	National Fire Protection Association
NHPA	National Historic Preservation Act
OIAA	Ontario International Airport Authority
ONT	Ontario International Airport
Cal/OSHA	California Division of Occupational Safety and Health
p.m.	Post meridiem
Project	Ontario International Airport (ONT) Connector Project
ROW	right-of-way
SANBAG	San Bernardino Associated Governments
SBCTA	San Bernardino County Transportation Authority
SCE	Southern California Edison
SCRRA	Southern California Regional Rail Authority
SCAQMD	South Coast Air Quality Management District
TBM	tunnel boring machine
UPRR	Union Pacific Railroad
USEPA	United States Environmental Protection Agency
Vent shaft	Ventilation shaft
VMT	vehicle miles traveled

THIS PAGE INTENTIONALLY LEFT BLANK

1 INTRODUCTION

San Bernardino County Transportation Authority (SBCTA), in cooperation with the Federal Transit Administration (FTA), proposes to construct a 4.2-mile-long transit service tunnel directly connecting the Southern California Regional Rail Authority (SCRRA) Cucamonga Metrolink Station to the Ontario International Airport (ONT). The proposed ONT Connector Project (Project) is to expand access options to ONT by providing a direct transportation connection from Cucamonga Metrolink Station to ONT. The proposed Project is subject to federal and state environmental review requirements pursuant to National Environmental Policy Act (NEPA) and California Environmental Quality Act (CEQA). FTA is the lead agency for NEPA, while SBCTA is the lead agency under CEQA. Partner agencies include the Ontario International Airport Authority (OIAA), Omnitrans, the City of Ontario and the City of Rancho Cucamonga.

ONT is located approximately two miles east of downtown Ontario in San Bernardino County. The airport services more than 25 major cities via 10 commercial carriers. ONT is owned and operated under a joint powers agreement between the City of Ontario and the County of San Bernardino. OIAA provides overall direction, management, operations, and marketing for ONT. In 2014, the San Bernardino Associated Governments (SANBAG), now SBCTA, prepared the Ontario Airport Rail Access Study (SANBAG 2014), which identified the need for a direct rail-to-airport connection to ONT to support its projected growth. ONT is one of the fastest growing commercial airports, forecasted to serve 14 million annual passengers by 2045 (OIAA 2019).

The purpose of this technical report is to describe the construction methods for the proposed Project. This technical report describes applicable regulatory settings and the means and methods for the construction activities for the proposed Project. This technical report describes the existing setting, applicable regulatory settings, methodology, and a description of the methods and process associated with construction of the proposed Project. The information contained in this technical report will be used to prepare the required environmental documents under CEQA.

2 PROJECT DESCRIPTION

2.1 PROJECT PURPOSE AND OBJECTIVES

The purpose of the proposed Project is to expand access options to ONT by providing a direct transportation connection from Cucamonga Metrolink Station to ONT. 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 Cucamonga Metrolink Station and ONT. More specifically, the proposed Project's objectives are 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.
- 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 PROJECT NEED

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 Cucamonga Metrolink 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 Metrolink 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 Cucamonga Metrolink 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 Traveled (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 ALTERNATIVES EVALUATED

2.3.1 No Project Alternative

CEQA requires that existing conditions and the proposed Project be evaluated against a No Project Alternative in an Environmental Impact Report (EIR). The No Project Alternative represents the Project area if the proposed Project is not constructed, and additional municipal projects would still be developed in the area. The No Project Alternative is used for comparison purposes to assess the relative benefits and impacts of constructing a new transit project versus only constructing projects which are already funded and planned for in local and regional plans.

The No Project Alternative would result in no new direct electrically powered, on-demand fixed transit guideway connection from the Cucamonga Metrolink Station to ONT. Omnitrans currently operates a limited-service bus route to ONT, known as ONT Connect or Route 380, which would remain operational under the No Project Alternative. ONT Connect currently operates Monday through Sunday, with bi-directional (northbound and southbound) service frequencies ranging from 35-60 minutes. However, ONT Connect travels with general/mixed traffic on existing roadways. The No Project Alternative assumes that the existing roadway system near ONT (such as the Interstate 10 [I-10] and Interstate 15 [I-15]) will implement some planned expansion and improvement projects and undergo routine maintenance activities. SBCTA and California Department of Transportation (Caltrans) propose to construct Express Lanes, including tolled facilities, in both directions of I-15. In addition, Caltrans is proposing to improve I-10 by constructing freeway lane(s) and other improvements through all or a portion of the 33-mile-long segment of I-10 from the Los Angeles/San Bernardino County line to Ford Street in San Bernardino County.

A detailed list of the planned projects included in the No Project Alternative is found in the Cumulative Impacts Technical Report (SBCTA 2024a).

2.3.2 Proposed Project

The proposed Project includes a 4.2-mile tunnel alignment, three passenger stations, a maintenance and storage facility (MSF), and an access and ventilation (vent) shaft in the cities of Rancho Cucamonga and Ontario within the County of San Bernardino (see Figure 2-1). The proposed Project would include autonomous electric vehicles that would be grouped and queued at their origin station and depart toward the destination station once boarded with passengers. The following sections provide additional details on the proposed Project location and land uses, and on the proposed design, construction, and operation, as applicable, for these project elements.

2.3.2.1 Project Location

The proposed Project is located in the City of Rancho Cucamonga and in the City of Ontario within the. Figure 2-1 illustrates the proposed Project site's regional location and vicinity. The proposed Project alignment is a reversed L-shaped alignment consisting of the Cucamonga Metrolink Station, Milliken

Avenue, East Airport Drive, and ONT. Figure 2-2 illustrates the proposed Project area. Cucamonga Metrolink Station is located at 11208 Azusa Court in the City of Rancho Cucamonga and serves the Metrolink San Bernardino Line commuter rail. ONT is located at 1923 East Aviation in the City of Ontario and provides international airport service with over 10 different airline partners. Information related to the proposed Project Design is found in Section 2.3.2.3.

2.3.2.2 Existing Land Uses

The northwestern portion of the proposed Project alignment includes the Cucamonga Metrolink Station. There are 980 standard parking stalls and 24 Americans with Disabilities Act (ADA) compliant stalls at the Cucamonga Metrolink Station (Metrolink 2022).

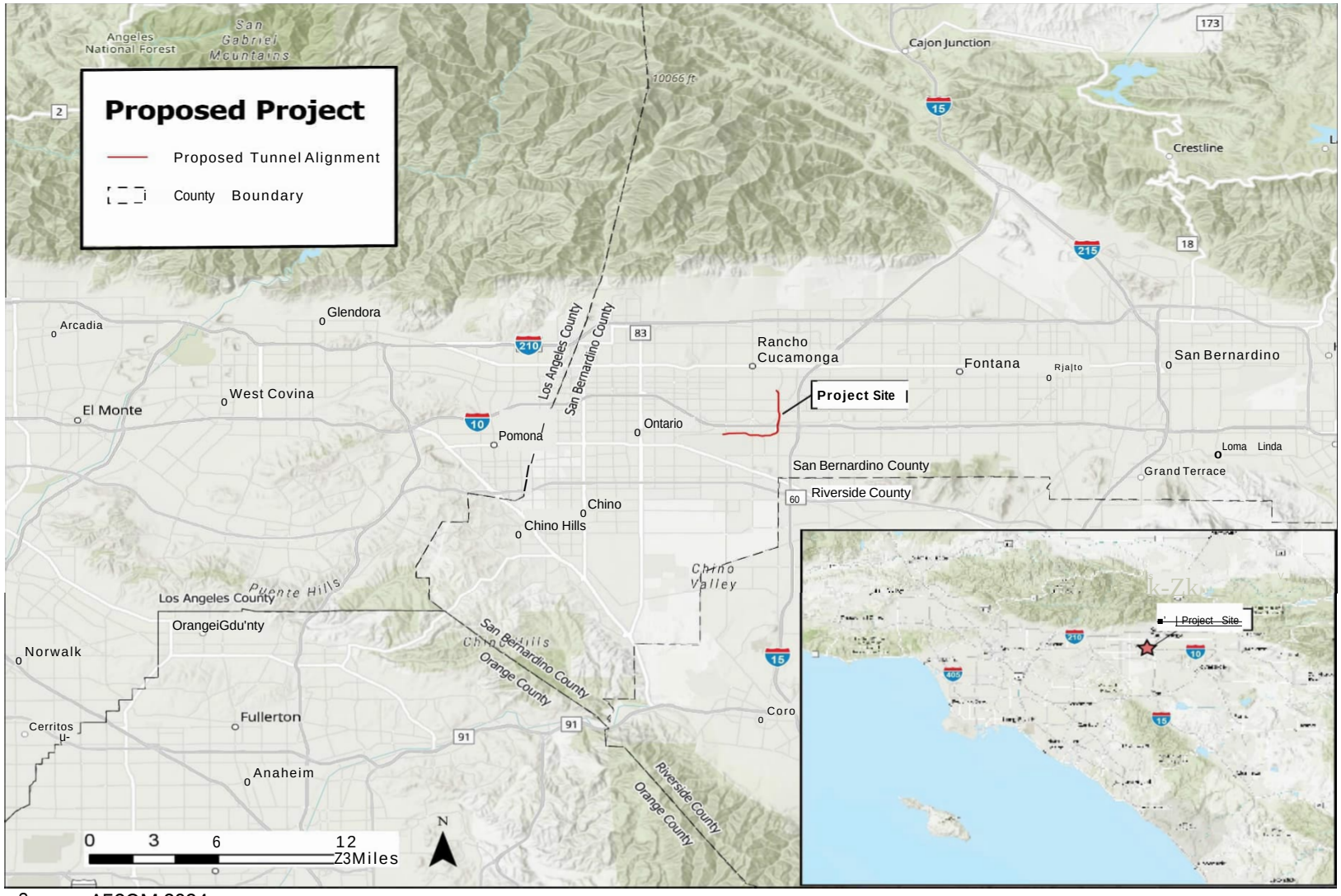
From the northwestern portion of the proposed Project site, the tunnel alignment travels under Milliken Avenue, which is a major north-south arterial roadway. Milliken Avenue consists of three travel lanes north of Inland Empire Boulevard and four travel lanes south of Inland Empire Boulevard. From Milliken Avenue, the alignment travels south crossing under the existing I-10. I-10 is an east-west cross-country highway and has six lanes in each direction at the proposed Project site. The alignment eventually connects to East Airport Drive, which is an east-west arterial roadway with three travel lanes in each direction.

The southwestern portion of the proposed Project tunnel alignment terminates at ONT. Parking Lots 2 through 5 are located on the northern side of ONT. Parking Lots 2, 3, and 4 are surface lots that provide general parking and are a short walk away from the terminals at ONT. Parking Lot 5 is a surface economy lot at which a shuttle service is available.

2.3.2.2.1 Surrounding Land Uses

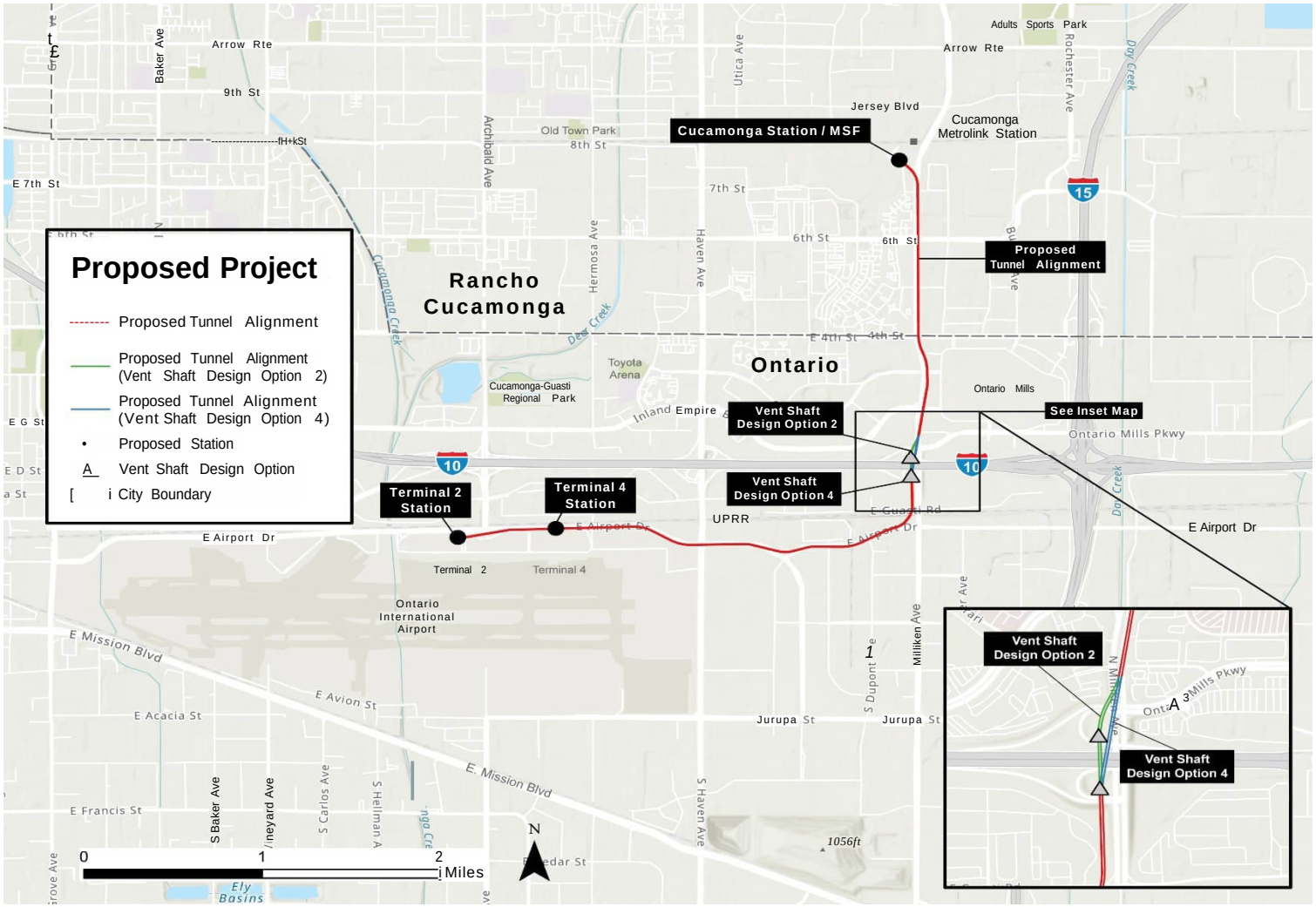
Development in the immediate vicinity of the proposed Project site includes a mix of industrial, commercial, manufacturing, transportation, office, multi-family residential, hotel, and airport related land uses. The proposed Project site's surrounding land uses are located within the City of Rancho Cucamonga and City of Ontario. Immediately adjacent uses include the following:

Figure 2-1: Regional Location Map



Source: AECOM 2024

Figure 2-2: Proposed Project Site



Source: AECOM 2024

- North: Railroad tracks, industrial and manufacturing uses, trucking facilities, surface parking lots, Rancho Cucamonga Fire Station Number 174, and All Risk Training Center for the Rancho Cucamonga Fire Protection District.
- South: Industrial and manufacturing uses, along with trucking facilities, rental car facilities, parking lots, hotel uses, and other airport related uses. ONT includes two passenger terminals, general aviation facilities, air freight buildings, parking lots, and numerous airport and aircraft maintenance and support services.
- East: The eastern side of Milliken Avenue from 5th Street south to 4th Street consists primarily of hotel uses. Concentrated areas of commercial uses and restaurants are located along Milliken Avenue from 4th Street south to I-10, including Ontario Mills, which is a regional shopping mall complex. Hotel uses are also located adjacent to the Ontario Mills shopping mall.
- West: The western side of Milliken Avenue from approximately 7th Street south to 4th Street consists primarily of multi-family residential uses. Concentrated areas of large retail, commercial uses, restaurants, hotels, and the Toyota Arena are located along Milliken Avenue from 4th Street south to I-10.

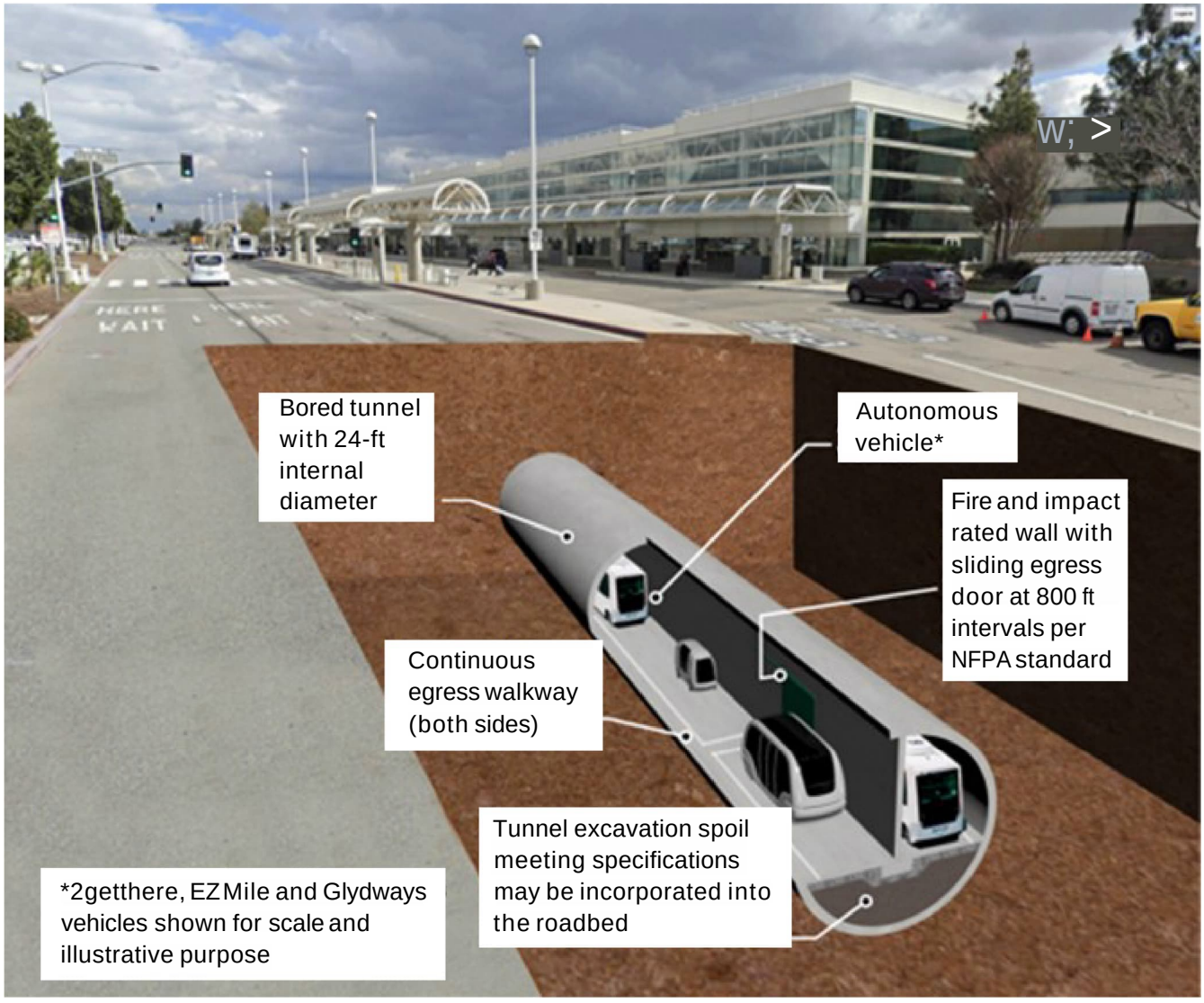
2.3.2.3 Proposed Project Design

The proposed Project includes construction of transit facilities, including three at-grade passenger stations, one MSF, and one emergency access and vent shaft. The proposed alignment would run primarily within a 4.2-mile single underground tunnel (24-foot inner diameter bi-directional tunnel) alignment 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 Union Pacific Railroad (UPRR), before traveling west beneath East Airport Drive to connect to Terminals 2 and 4 at ONT. A tunnel configuration has been identified as the proposed Project based on technical analysis, evaluation, and stakeholder input. Figure 2-3 below depicts a typical transit tunnel section. Please see the Alternatives Considered Report for additional background on the development and refinement of the proposed Project design.

The three proposed at-grade stations would be constructed to serve Cucamonga Metrolink Station, ONT Terminal 2, and ONT Terminal 4. The MSF would be located adjacent to Cucamonga Metrolink Station and would support operations for the proposed Project by storing, maintaining, and cleaning autonomous electric transit vehicles, and it would also include employee amenities and parking. The access and vent shaft would be constructed to provide a means of emergency passenger egress and first responder access.

The proposed Project would include autonomous electric vehicles that would transport passengers on demand between Cucamonga Metrolink Station and ONT. The autonomous electric vehicles would run on rubber tires, and the vehicles are proposed to travel on a dedicated asphalt guideway within the proposed tunnel. The tunnel will include access ramps for the transit vehicles to surface to grade and provide access to the three proposed at-grade stations for passenger boarding and alighting.

Figure 2-3: Typical Transit Tunnel Section View



Source: HNTB 2024

2.3.2.3.1 Stations

The proposed Project includes three passenger stations. One station would be located in the northwestern corner of the existing Cucamonga Metrolink Station parking lot, which is owned and maintained by the City of Rancho Cucamonga. The other two proposed stations would be located within two of the existing parking lots at ONT, specifically Parking Lot 2 and Parking Lot 4, which are located across from Terminals 2 and 4. These proposed stations would be located at-grade and would connect to their associated tunnel portals along Terminal Way at ONT. Stations are proposed to be one to two stories and up to approximately 40 feet in height. All three 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 the walls would be buffered with landscaping. A pedestrian walkway would be provided bordering the outside of the guideway. Figure 2-4 and Figure 2-5 illustrate the overview of the proposed station footprint.

The proposed at-grade station Cucamonga Station would be approximately 8,000 square-feet and would be located at the northwest corner of the existing Cucamonga Metrolink Station parking lot. The existing Cucamonga Metrolink Station parking lot is owned and maintained by the City of Rancho Cucamonga. Approximately 180 parking stalls would be permanently removed from the existing Cucamonga Metrolink Station parking lot to accommodate the proposed Cucamonga Station. Two other stations, each approximately 10,000 square-feet, would be located at-grade within two of the existing parking lots at ONT Terminal 2 and Terminal 4. The Cucamonga Station also includes the proposed Project's MSF.

The two airport-serving stations would connect to their associated tunnel portals along Terminal Way via an at-grade connection. The proposed stations would be entirely located within the ONT right-of-way (ROW). Approximately 80 parking stalls would be permanently removed to accommodate the ONT Terminal 2 station, and approximately 115 spaces would be permanently removed to accommodate the ONT Terminal 4 station.

2.3.2.3.1 Maintenance and Storage Facility

The proposed Cucamonga Station would include an adjacent maintenance and storage facility with enclosed bays to store, clean, and maintain vehicles. The MSF would be approximately 11,000 square feet, with an additional 5,000 square feet second story and would contain an operations control center with lockers, breakrooms, and restrooms. Employee parking for the facility would be provided at the existing parking lot owned by SBCTA, in the southeastern quadrant of the Milliken Avenue/Azusa Court intersection.

Figure 2-4: Cucamonga Station



Source: HNTB 2024

Figure 2-5: Ontario International Airport - Terminal 2 Station and Terminal 4 Station



Source: HNTB 2024

2.3.2.3.2 Description of Vent Shaft Design Options

A vent shaft would be constructed to provide a means of emergency passenger egress and first responder access to and from the tunnel. Two locations are being considered west of Milliken Avenue on the north and south sides of I-10, as shown in Figure 2-6. A final decision about the location of the vent shaft would be made after the completion of the CEQA and NEPA environmental processes, and consideration of operational needs, environmental impacts, and stakeholder coordination.

The location option on the north side of I-10 would be in the ROW for the westbound off-ramp and would provide surface ground access from the Milliken Avenue/I-10 westbound off ramp intersection or from the westbound off ramp right lane near the ramp termini or directly from Milliken Avenue. The location option on the south side of I-10 would be in the ROW for the eastbound on-ramp and would provide surface ground access from Milliken Avenue near the eastbound on-ramp.

The vent shaft would consist of both underground and above ground structures. The underground shaft would extend to the tunnel level and the surface structures would consist of a one-(1) story structure above ground.

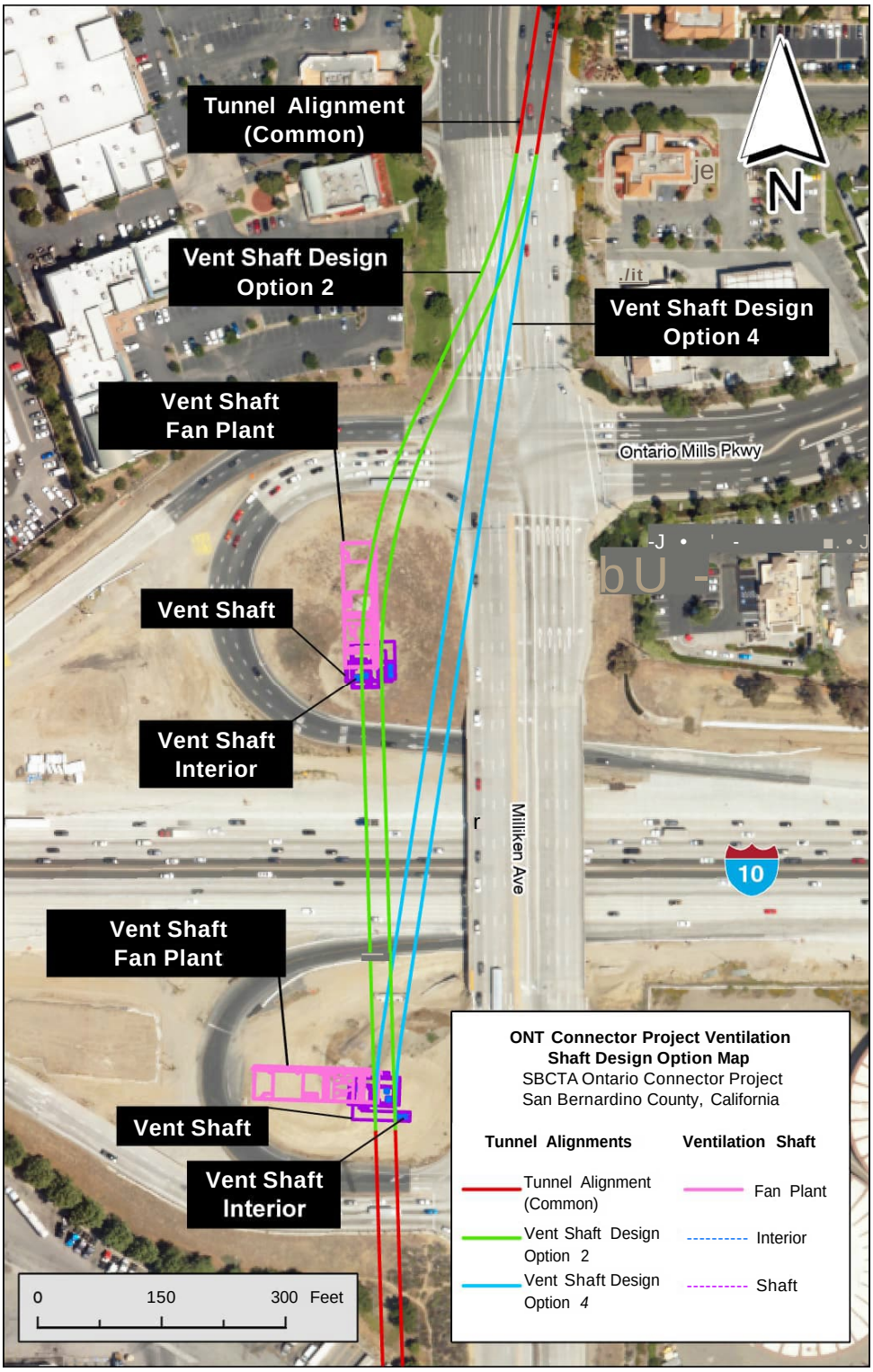
Access points would include underground, surface, and road access for emergencies to and from the tunnel. The proposed vent shaft would include associated electrical and ventilation equipment, and access would be controlled via a lock and key.

2.3.2.4 Proposed Operations

The proposed Project includes operation of autonomous electric vehicles to transport passengers to and from the proposed stations. The autonomous electric vehicles would be grouped and queued at their origin station and would 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 approximately a minimum of 100 per hour. Operations would be managed by Omnitrans, with on-demand service provided daily from 4:00 a.m. to 11:30 p.m., including weekends and holidays.

Fleet size and capacity of the vehicles will be up to the Operating System Provider and Design-Builder to determine to provide an initial operating system capable of transporting a minimum of 100 passengers per hour per direction and scalable to meet ridership demand. Based on the initial operating requirements and preliminary vehicle capacities, SBCTA is anticipating initial fleet sizes of between 7 and 60 vehicles to be required. Vehicles are rubber-tired electric autonomous vehicles.

Figure 2-6: Vent Shaft Design Option 2 and Vent Shaft Design Option 4



Source: HNTB 2024

2.3.2.5 Proposed Construction

This section describes the construction approach for the proposed Project. Overall construction of the proposed Project would last approximately 56 months, with project elements varying in their specific construction duration, as discussed below. Construction is projected to start in 2025 and is anticipated to be completed in 2031. The Construction Methods Technical Report provides additional details regarding the construction approach and process for the key project elements (stations, MSF, tunnel construction, and vent shaft) associated with the proposed Project (SBCTA 2024b).

2.3.2.5.1 Stations and Maintenance and Storage Facility Construction

A construction staging area would be required at each of the three proposed Project stations, which includes the MSF at Cucamonga Station, and at the vent shaft location. Construction staging areas would be used to store building materials and construction equipment, assemble the tunnel boring machine (TBM), temporarily store excavated materials, and serve as temporary field offices for the contractor. Heavy-duty, steel, track-out grates (i.e., rumble plates) would be staged at the entrance of the construction staging areas to capture dirt and soil debris from the wheels of trucks and construction equipment. Best management practices (BMPs) would minimize a public nuisance that can result from soil and mud tracks on the public roadway. For security purposes, construction staging areas would be equipped with fences, lighting, security cameras, and guards to prevent vandalism and theft.

Cut-and-cover sites would occur at each proposed station location. Cut-and-cover activities involve the excavation of a shallow underground guideway from the existing street surface. During the construction phase, the cut-and-cover sites at Cucamonga Metrolink Station and Terminal 2 at ONT would be used as the TBM launching and receiving pits. Ultimately, the station cut-and-cover sites would serve as the vehicle ramps for the proposed Project's operations where the underground guideway would transition to at-grade.

Following the mass excavation and grading, the stations would require the installation of the waterproof membrane around the station box. The construction sequence for the station structures would typically commence with construction of the foundation base slab, followed by installation of exterior walls any interior column elements, and pouring of the station roof. Once station structure work is complete, the station excavation would be backfilled, and the permanent roadway would be constructed. Decking removal and surface restoration would then occur. Stations are proposed to be 1 to 2 stories, up to approximately 40 feet in height.

Generally, stations would be built simultaneously with or following guideway construction. However, construction of the Cucamonga Station may need to occur after the completion of all excavation and in-tunnel work. Truck haul routes, described in Table 2-1 below, would be designated for each staging site to transport excavated material from the staging sites. Additional construction details for the proposed stations and MSF are described below, in Table 2-1, and in the Construction Methods Technical Report. Table 2-2 provides an overview of the typical sequencing for transit construction activities (SBCTA 2024b).

2.3.2.5.1.1 Construction Details for Cucamonga Station and Maintenance and Storage Facility

Construction at the proposed Cucamonga Station would require a mass excavation and the TBM would be launched from the invert of the Cucamonga Station and retrieved from the ONT Terminal 2 Station construction site. Construction at the proposed Cucamonga Station would require approximately 3.2 acres. Approximately 170 parking stalls would be temporarily unavailable at the Cucamonga Metrolink Station parking lot. Construction at the Cucamonga Station would occur for up to 37 months. No road closures are anticipated for staging at the Cucamonga Station. Equipment needs would include the following: excavators, backhoes, a vertical conveyor system, a gantry crane, a crawler crane, concrete trucks, haul trucks, a wheel loader, Foamplant, cooling towers, a tunnel fan grout plant, segment cars, and flatcars.

Additionally, construction would not interrupt Metrolink service at the Cucamonga Metrolink Station, as construction activities and staging would occur within the existing Cucamonga Station parking lot. SBCTA will coordinate construction at Cucamonga Station with SCRRA, prior to the start of construction and throughout the construction period, to maintain station access and to coordinate station parking, as needed.

The proposed Cucamonga Station includes an MSF to store, clean, and maintain vehicles. The MSF would be approximately 11,000 square feet, with an additional 5,000 square feet second story and would contain an operations control center with lockers, breakrooms, and restrooms. The MSF would be constructed adjacent to the Cucamonga Station and would include enclosed bays.

2.3.2.5.1.2 Construction Details for ONT Terminal 2 Station

Construction staging at the proposed ONT Terminal 2 station would require approximately 3.4 acres within the existing ONT Terminal 2 parking lot. Approximately 300 parking stalls would be temporarily unavailable at the ONT Terminal 2 parking lot. Construction at the ONT Terminal 2 Station would occur for up to 27 months. No road closures are anticipated for staging at the ONT Terminal 2 Station. 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.

Table 2-1: Stations, Maintenance and Storage Facility Construction Details

Proposed	Construction Area	Duration	Haul Route
Cucamonga Station and MSF	Would require approximately 3.2 acres within the existing Cucamonga Metrolink Station parking lot. Approximately 170 parking stalls would be temporarily unavailable from the existing Metrolink parking lot.	Construction at the Cucamonga Station would occur for up to 37 months.	Haul trucks are needed to support removal and transport of materials from the mass excavation for each construction site (for the stations and vent shaft) and from tunnel boring activities. Haul trucks would collect excavated material from the construction sites and transport it away from the sites, utilizing designated haul routes. 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 Cucamonga Station.
ONT Terminal 2 Station	Would require approximately 3.4 acres within the existing ONT Terminal 2 parking lot. Approximately 300 parking stalls would be temporarily unavailable from the ONT parking lot.	Construction at ONT Terminal 2 would occur for up to 27 months.	Haul trucks are needed to support removal and transport of materials from the mass excavation for each construction site (for the stations and vent shaft) and from tunnel boring activities. Haul trucks would collect excavated material from the construction sites and transport it away from the sites, utilizing designated haul routes. 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.
ONT Terminal 4 Station	Would require approximately 3.2 acres within the existing ONT Terminal 4 parking lot. Approximately 300 parking stalls would be temporarily unavailable from the ONT parking lot.	Construction at ONT Terminal 4 would occur for up to 15 months.	Haul trucks are needed to support removal and transport of materials from the mass excavation for each construction site (for the stations and vent shaft) and from tunnel boring activities. Haul trucks would collect excavated material from the construction sites and transport it away from the sites, utilizing designated haul routes. 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.

Table 2-2: Typical Sequencing of Transit Construction Activities

At Grade or Underground	Activity	Typical Duration (Total Months)	Description
At Grade Construction Activities	Utility Relocation	7-14	Relocate utilities from temporary and permanent elements related to the construction and/or operation of the Project.
At Grade Construction Activities	Construction Staging Laydown Yard	3-6	Prepare existing lots to store construction equipment and materials, including the TBM, office space.
At Grade Construction Activities	Roadway	6-18	Reconfigure roadway, demolition of existing roadway installation of curb and gutter and other public ROW improvements.
At Grade Construction Activities	At-grade Guideway	6-18	Install asphalt and striping for guideway.
At Grade Construction Activities	Station Construction (overall)	24-48	Install mechanical, electrical, and plumbing (MEP), canopies, faregates, ticketing, finishes, stairs, and walkways.
At Grade Construction Activities	Parking	3-6	Restoring existing parking stalls temporarily unavailable due to construction, as applicable.
At Grade Construction Activities	MSF	8-12	Install MEP, fencing, enclosed bays, specialized washing equipment, and rebar installation, and concrete pours.
Underground Construction Activities	Utility Relocation	7-14	Relocate and hang underground utilities from temporary and permanent elements related to the construction and operation of the Project.
Underground Construction Activities	Open Cut and Cut and Cover Construction	18-24	Supports the construction of the TBM launching and receiving pit, and of the access ramps connecting the tunnel with the at-grade stations. Install soldier piles for beam and lag support of excavation and excavation. Cover excavation with temporary decking.
Underground Construction Activities	Bored Tunnel	16-24	Underground guideway construction.
Underground Construction Activities	Ventilation and Emergency Access Shaft	6-8	Install ventilation and emergency access shaft.
Underground Construction Activities	Underground Guideway	12-18	Install asphalt and striping for guideway.

2.3.2.5.1.3 Construction Details for ONT Terminal 4 Station

Construction Staging at the proposed ONT Terminal 4 station would require approximately 3.2 acres within the existing ONT Terminal 4 parking lot. Approximately 300 parking stalls would be temporarily unavailable at the ONT Terminal 4 parking lot. Construction at the ONT Terminal 4 Station would occur for up to 15 months. No road closures are anticipated for staging at the ONT Terminal 4 Station. 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, backhoes, and excavators.

2.3.2.5.2 Tunnel Construction

The proposed Project will travel in a below grade tunnel configuration for most of its proposed alignment. A TBM will be utilized in the construction of the tunnel. TBM's are typically used in the construction of infrastructure projects to build deep underground tunnels by boring, or excavating, through soil, rocks, and/or other subsurface materials. The TBM would be launched from the Cucamonga Metrolink Station to construct the tunnel. Additional details regarding the underground construction process for the proposed Project are included in the Construction Methods Technical Report (SBCTA 2024b).

The TBM would be launched from the invert of the Cucamonga Station and retrieved from the ONT Terminal 2 Station construction site. A large crane would be used to assemble and disassemble the TBM from the excavation and receiving pits. OIAA height limits at ONT and Rancho Cucamonga, 135 feet and 160 feet, respectively, would restrict crane heights. The TBM would operate six days a week, with maintenance occurring each Sunday. Construction of the entire tunnel would take approximately 22 months. Both ends of the tunnel would need to be constructed via direct excavation (cut and cover) to launch or retrieve the TBM. After mining is completed and TBM logistics are demobilized, both ends of the tunnel would be utilized to build the invert roadway, walkways, center wall and MEP systems, etc.

Vehicle ramps connecting to the tunnel would be constructed via direct excavation, as well. 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.

Truck haul routes at the proposed launch site at Cucamonga Station and the proposed retrieval site at ONT Terminal 2 Station are described in Table 2-1 above. The Construction Methods Technical Report includes additional details on the overall construction approach for the proposed tunnel (SBCTA 2024b).

2.3.2.5.3 Vent Shaft Construction

Two vent shaft design options with different access points are being considered for the proposed Project. Vent shaft design option 2 would be located west of Milliken Avenue on the westbound off-ramp of the I-10. Vent shaft design option 4 would be located west of Milliken Avenue on the eastbound on-ramp of the I-10. The vent shaft will consist of both underground and above ground structures. The underground

shaft will extend to the tunnel level and the surface structure will consist of a one-(1) story structure above ground. One vent shaft would be constructed along the tunnel alignment.

The vent shaft could be constructed before or after the construction of the tunnel and would be installed using a similar construction methodology to that of the tunnel and take approximately 6 months to complete. A drill rig would install up to 5 piles deep per day, each 70 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 vent shaft would require a construction staging area approximately 0.62-acres (27,000 square feet). 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. Additional details regarding the construction process for the vent shaft are included in the Construction Methods Technical Report (SBCTA 2024b).

2.3.2.5.4 Utilities

Utility relocations are anticipated at the launch and retrieval locations at the Cucamonga Metrolink Station site, ONT, and ventilation/emergency access shaft. Multiple utilities would be relocated to allow for the construction of the access shaft, including: potential electric underground distribution cables owned and operated by Southern California Edison; landscape irrigation line owned and operated by the City of Ontario; and Caltrans fiber optic duct bank. In a future project phase, coordination with the existing utility service providers prior to utility relocation would be conducted to reduce potential impacts to utility service and minimize disruptions. Relocations of existing utilities would be coordinated with utility service providers and would be in previously disturbed areas or established ROW close to their existing locations and would stay within the evaluated Project footprint.

2.3.2.6 Proposed Project Easements

The proposed Project would require easements from 19 properties. This includes the need for 12 permanent subsurface easements, two permanent surface easements, and five parcel acquisitions for both subsurface and surface easements. Seven of the easements would be for the three stations and would total approximately 2 acres. SBCTA would require these easements for construction and/or operation of the proposed Project. There are two locations that are options for the location of the Vent Shaft, both belonging to Caltrans. This document evaluates the impacts for both options without selection of a preferred site. The decision of the preferred site will depend in part on the CEQA and NEPA processes, including any potential input from the public. The final decision as to which option is preferred may occur after the completion of the CEQA/NEPA process. Land uses for the parcels where these easements would be required include industrial, transportation facilities, utilities, and commercial. The owners of these parcels include SBCTA and City of Rancho Cucamonga (Cucamonga Metrolink Station west and east parking lots), OIAA, a utility service provider, and some private owners. No relocations of businesses and residences would be required to construct the proposed Project.

3 METHODOLOGY

3.1 INDUSTRY STANDARDS

Construction of the proposed Project would include a tunneling component, vent shaft design option 2 or vent shaft design option 4, MSF, and may require surface street roadway modifications (discussed in Section 4.1.1.8). In addition to adhering to regulatory requirements, development of the proposed Project would employ conventional construction methods, techniques, and equipment. All work for development of the system would conform to accepted industry specifications and standards, including BMPs. The proposed Project engineering and construction would, at minimum, be completed in conformance with the regulations, guidelines, and criteria listed below.

3.1.1 Federal

- United States Department of Labor, Occupational Safety and Health Administration, 29 Code of Federal Regulations (CFR) 1926 Safety and Health Regulation for Construction;
- National Pollutant Discharge Elimination System (United States Environmental Protection Agency [USEPA] 2021);
- National Fire Protection Association (NFPA) Code 130 Means of Egress;
- NFPA 502, Standard for Road Tunnels, Bridges and Other Limited Access Highways;
- National Electrical Code (NFPA Code 70);
- Federal Aviation Administration 7460 Obstruction Analysis/Air Space Analysis form;
- FTA Transit Noise and Vibration Impact Assessment Manual (FTA 2018); and
- Federal Highway Administration (FHWA) NHI-09-010, Technical Manual for Design and Construction of Roads Tunnels-Civil Element (FHWA 2009).
- National Historic Preservation Act (NHPA), as amended (54 United States Code Section 300101 et seq.), and its implementing regulations (36 Code of Federal Regulations [CFR] Part 800) is the principal federal law addressing historic properties and potential discoveries.

3.1.2 State

- California Division of Occupational Safety and Health (Cal/OSHA), Title 8, Division 1. Department of Industrial Relations, Chapter 4. Division of Industrial Safety (Section 01 35 23, Worksite Safety);
- California Building Code (California Building Standards Commission 2021);
- California Fire Code (California Building Standards Commission 2019);
- Caltrans Highway Design Manual;
- Caltrans Standard Plans (Caltrans 2018a); and
- Caltrans Standard Specifications (Caltrans 2018b).

3.1.3 Regional and Local

- Metrolink (SCRRA Design) Criteria Manual 2024 (SCRRA 2024);
- ONT Ground Transportation Rules and Regulations (ONT 2018);
- San Bernardino County Department of Public Works, General Permit Conditions and Trench Specifications (San Bernardino County Department of Public Works 2019);
- San Bernardino County Department of Public Works, Standard Plans (San Bernardino County Department of Public Works 2022);
- San Bernardino County Department of Public Works Technical Guidance Document for Water Quality Management Plans (San Bernardino County Department of Public Works 2013);
- UPRR Plan Submittal Guidelines (UPRR 2019); and
- Metropolitan Water District of Southern California (MWD), Guidelines for Improvements and Construction Projects Proposed in the Area of Metropolitan's Facilities and Rights-of-Way (MWD 2018).

3.1.4 Construction Mitigation Measures and Construction Industry Standard Practices

Project related construction impacts are described in each of the environmental topics analyzed in Chapter 3 of the Draft EIR and detailed in the Technical Reports. If significant construction impacts for the proposed Project would occur, mitigation measures are identified to reduce the impact. Mitigation measures are identified for each corresponding environmental topic in Chapter 3 of the Draft EIR and within the Technical Reports.

In addition to adhering to regulatory requirements, development of the proposed Project would employ conventional construction methods, techniques, and equipment. All work for development of the system would conform to accepted industry specifications and standards, including BMPs. Construction housekeeping practices are methods that encourage the tidiness of construction sites and reduce construction related nuisances from affecting the general public. Construction Industry Standard Practices are methods considered as components of the Project based on the individual choices of the contractor. Typical Construction Industry Standard Practices may include but are not limited to the following:

- Air Quality and Dust Control
    - Dust Control - Control fugitive dust as required by South Coast Air Quality Management District (SCAQMD). District Rule 403 (SCAQMD 2005).
    - Watering of construction staging sites.
    - Heavy-duty, steel, track-out grates (i.e., rumble plates) would be staged at the entrance of the construction staging areas to capture dirt and soil debris from the wheels of trucks and construction equipment.

- Water Quality
    - Stormwater Pollution Prevention Plan is a site-specific, written document developed to identify potential sources of stormwater pollution at a construction site.
    - A BMP is a method used to prevent or control stormwater runoff and the discharge of pollutants, including sediment, into local waterbodies. Typical Water Quality BMPs include the use of:
        - Covering of stockpiles of earth and other construction related materials to prevent wind or water from transporting site material offsite.
        - Use of swaddles and drain inlet covers to prevent sediments and pollutants from conveying into storm drain systems.
- Traffic Control
    - Notifications of traffic control.
    - Coordination of closures with agencies having jurisdiction.
- Noise
    - Noise blankets to lessen noise between sensitive receptors and construction activities above noise thresholds specified by municipal codes or ordinances.

4 CONSTRUCTION SCENARIO

The proposed Project would be delivered through a Progressive Design-Build contract in which a contractor is engaged early in the process to develop precise construction means and methods which are coordinated with the final design efforts. In a Progressive Design-Build contract, the contract for design and construction is separated into two distinct phases. The selection of the design-build firm is based primarily on their qualifications and design proposal. Because the design and budget has yet to be determined, construction cost and schedule is not part of the bidding or procurement process. As such, precise details of construction means/methods, and sequencing are not yet fully developed at the Project's current environmental phase. This section describes typical methods and sequencing which are representative of what would be developed in detail by the Design-Builder.

4.1 PROPOSED PROJECT

4.1.1 Construction Sequencing

Construction of the proposed Project is projected to start in 2025 and end in 2031, for approximately 56 months. The preconstruction work contract would include geotechnical and hazardous material field surveys to identify potential hazards and constraints related to the design and construction of the proposed Project. Construction would commence with site preparation for the construction staging areas and the TBM launching and receiving pits. After demolition and site clearing, conflicting utilities would be relocated or protected-in-place. Construction would then proceed with temporary roadway reconfiguration or restriping for mass excavation activities related to the proposed cut-and-cover Project elements.

The TBM would be launched from the Cucamonga Metrolink Station to construct the tunnel. Cut-and-cover of excavation, including temporary shoring, and mass excavation would be applied to construct the TBM launching and receiving pits. Generally, stations would be built simultaneously with or following guideway construction. However, construction of the Cucamonga Station may need to occur after the completion of all excavation and in-tunnel work. The sequence of construction activities will be confirmed in a future design phase prior to construction. Mechanical, electrical, plumbing, fire protection, communications, and security systems would be installed after tunnel construction. Ancillary facilities, final roadway reconstruction, and landscaping would typically follow guideway construction.

Most construction activities would occur during daytime hours between 7:00 a.m. and 5:00 p.m. For some specialized construction tasks, including during the TBM excavation, it would be necessary to work continually for 24 hours per day. Depending on the choices of the individual contractor, the following sites are anticipated to be constructed simultaneously: Terminal 2 station, Terminal 4 station, Cucamonga Station and the MSF, and the vent shaft. Up to 200 employees composed of construction and engineering staff are anticipated on the proposed Project site during the construction phase.

Mass excavation for cut-and-cover construction at each station and the vent shaft would involve up to 100 haul trucks per day. TBM excavation would involve up to 250 trucks per day to haul spoils (i.e., excavated materials from tunneling). Up to 10 concrete trucks per day are anticipated to construct the permanent access ramps between the tunnel and the at-grade stations. Additionally, the proposed Project would anticipate up to one truck every 2 hours for ancillary delivery work. Haul routes on the proposed Project would potentially include I-10, North Archibald Avenue, Milliken Avenue, East Airport Drive, Terminal Way, and Guasti Road. The haul route supporting construction at Cucamonga Station would include Milliken Avenue, Azusa Court, and Foothill Boulevard to access I-15. The haul routes supporting the mass excavation and construction of the proposed stations and tunnel are described in further detail in Table 4-1.

Table 4-1: Haul Routes for Mass Excavation and Tunneling

Excavation Staging Area	ROW Owner	Location	Haul Route
Terminal 2 Station	OIAA ROW	South of East Airport Drive and west of North Archibald Avenue	I-10, southbound on North Archibald Avenue, westbound on Terminal Way, northbound on East Terminal Way, eastbound on Airport Drive, northbound on Archibald Avenue, and I-10
Terminal 4 Station	OIAA ROW	South of East Airport Drive and east of North Archibald Avenue	I-10, southbound on Archibald Avenue, eastbound on East Airport Drive, southbound on East Terminal Way, eastbound on Terminal Way, northbound on Archibald Avenue, and I-10
Cucamonga Station	Metrolink ROW	East of Milliken Avenue and north of Azusa Court.	I-15, westbound on Foothill Boulevard, southbound on Milliken Avenue, westbound on Azusa Court, eastbound on Azusa Court, northbound on Milliken Avenue, eastbound on Foothill Boulevard, and I-15 Alternative Route: I-10, Northbound Milliken Avenue, Westbound 7th Street, Northbound Anaheim Place, Northbound Azusa Court, Southbound Azusa Court, Southbound Anaheim Place, Eastbound 7th Street, Southbound Milliken Avenue, I-10.
Vent Shaft Design Option 2	Caltrans ROW	West of Milliken Avenue on westbound off-ramp	I-10, southbound on Milliken Avenue, eastbound on Guasti Road, Caltrans ROW, westbound on Guasti Road, and I-10
Vent Shaft Design Option 4	Caltrans ROW	West of Milliken Avenue on eastbound on-ramp	I-10, southbound on Milliken Avenue, eastbound on Guasti Road, Caltrans ROW, westbound on Guasti Road, and I-10

Source: AECOM 2022

4.1.2 Underground Guideway Construction

4.1.2.1 Cut-and-Cover Construction

Cut-and-cover activities involve the excavation of a shallow underground guideway from the existing street surface (reference Figure 4-1). Four cut-and-cover sites would occur on the proposed Project at each proposed station and at the vent shaft site. During the construction phase, the cut-and-cover sites at Cucamonga Metrolink Station and Terminal 2 at ONT would be used as the TBM launching and receiving pits. Ultimately, the station cut-and-cover sites would serve as the vehicle ramps for the proposed Project's operations where the underground guideway would transition to at-grade. Cut-and-cover activities would include the following:

- Utility relocation or protection in-place and hanging where cut-and-cover method would be used;
- Soldier pile installation involving shoring on both sides of the excavation footprint to support the excavation and roadways;
- Initial excavation from the surface using large excavators. Installation of temporary support of excavation composed of struts and lagging;
- Stockpiling of excavated material that is deemed suitable for reuse as backfill material;
- Excavation of launching and receiving pits;
- Construction of the permanent structures;
- Backfilling of and restoring the surface once the facilities are completed; and
- Install imported fill supported by soldier pile and lagging with permanent retaining walls constructed where the guideway transitions from at-grade to underground.

The limits of excavation at Cucamonga Metrolink Station are approximately 400 feet within the existing Cucamonga Metrolink Station parking lot. The excavation limits for Terminal 2 at ONT would occur west of Southwest Way, in a U-shape configuration for over 500-feet. Excavation limits at Terminal 4 at ONT would occur parallel to Southeast Way for approximately 450-feet.

4.1.2.2 Tunnel

TBMs are large-diameter horizontal drills that continuously excavate circular tunnel sections (Figure 4-2 and Figure 4-3). Two types of pressurized-face TBMs—Earth Pressure Balance (EPB) and slurry TBM—are commonly used in the Los Angeles region depending on geologic conditions. Both EPB and slurry TBMs apply a balancing pressure to the excavation face to stabilize the ground and balance the groundwater At the TBM launching site, the staging area would also be used for storage of precast concrete segments, temporary spoil storage, ventilation lines, shaft support (air, water, electricity, spoil hoisting). Tunneling with a slurry TBM would require workshops, mixing and processing slurry for excavation support or tunnel excavation, and post-excavation slurry treatment (separation), which would include filters, centrifuges,

Figure 4-1: Example of Construction via Cut-and-Cover

Source: AECOM, 2022

Figure 4-2: Tunnel Boring Machine



Source: AECOM 2022

Figure 4-3: Example of Bored Tunnel Constructed



Source: AECOM 2022

and vibrator equipment. During tunneling with an EPB machine, excavated material (spoils) is moved to the rear of the TBM by a screw conveyor and deposited on a conveyor belt. The conveyor belt then transfers the spoils to the launching area or drops the spoils on rail-mounted muck cars hauled by a locomotive operating on temporary rail tracks in the tunnel. At the shaft, the muck cars are lifted out by a crane or hoist, and the material is loaded into trucks or temporarily stockpiled for off-site reuse or disposal. Temporary easements, typically a portion of the sidewalk, traffic lanes, and parking areas, may be required at various locations for staging.

Equipment at the TBM launch site would include trucks, a crane(s), excavators, a grout plant, a compressor plant, a tunnel fan, and cooling towers. The launch area would also store tunnel construction materials (e.g., lining segments, steel, rail, pipe, ducts) and stockpile excavated material. Flat-bed delivery trucks would enter the construction staging sites to deliver construction materials (e.g. lining segments, lumber for formwork or temporary engineering, rebar, etc.). Haul trucks would remove excavated material from the launch site at ONT. Main activities for the bored tunnel construction would consist of the following:

- The design-builder would perform a mass excavation as described in Section 4.1.2.1 to excavate the launching site for the TBM.
- For each tunnel lining installed, the TBM would be advanced a small distance (4 to 5 feet) using hydraulic jacks, which pushes against the previously installed tunnel lining ring while excavating the material ahead of the TBM; the jacks would be retracted, and another tunnel lining ring would be erected.
- The TBM would be advanced, and the process would be repeated until the entire length of the tunnel has been excavated.
- Excavated material (i.e., spoils or muck) would be removed from the launching pit.
- The TBM would be extracted at the end of the tunnel segment at an extraction pit.
- Transition from at-grade to underground would require temporary support of excavation to build the permanent reinforced concrete retaining wall and structures.
- After a permanent structural facility is built, mechanical, electrical, plumbing, fire protection, communications, and security systems would be installed.

4.1.3 Ventilation Shafts

The vent shaft would consist of both underground and at-grade components. The vent shaft measuring approximately 2,000-square feet in size and up to approximately 70-feet in depth would be constructed to provide a means of emergency passenger egress and first responder access. Two vent shaft locations are being considered for the proposed Project, as shown in Figure 2-5. Vent shaft design option 2 is located west of Milliken Avenue on the westbound off-ramp, and vent shaft design option 4 is located west of Milliken Avenue on eastbound on-ramp. Only one of the two proposed vent shafts would be constructed. The final location of the access and vent shaft would be selected after the public review period.

The underground vent shaft would extend to the tunnel level and the surface structures would consist of a one (1) story structure above ground. The vent shaft would be installed using a similar construction methodology to that of the tunnel and take approximately 6 months to complete. A drill rig would install up to five piles per day, each 70-feet deep. Piles would be drilled (i.e., no impact driving) as an excavation pre-support. The access shaft would then be excavated and temporarily supported with an internal bracing system that includes the installed piles.

The access 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 employee parking. The staging area would be approximately 27,000-square feet and would be within existing Caltrans ROW.

4.1.4 Other Facilities and Construction Activities

4.1.4.1 Utility Relocation and Installation

Utility relocation work would be required for the proposed Project. Impacted utilities may include storm drains, sanitary sewers, waterlines, overhead power lines, electrical duct banks, lighting, irrigation conduits, fiber optic lines, telephone, and other communication lines. To the extent possible, the guideway has been located to avoid conflicts with the space occupied by major utilities. Nevertheless, in certain instances, the positioning of the guideway, stations, and other facilities would require that conflicting utilities be relocated, modified, or protected-in-place.

Ongoing third-party utility coordination would occur with MWD regarding their 158-inch, reinforced-concrete pipe water line during construction of the tunnel with the TBM. Preliminary utility relocations have been identified at this stage of design and are associated with the vent shaft. A preliminary list includes: Southern California Edison (SCE) power duct bank; Caltrans fiber optic duct bank; and City of Ontario landscape irrigation conduits.

4.1.4.2 Stations

A construction staging area would be required at each of the three proposed Project stations. Station concrete construction and architectural finish work would occur after tunnel construction is completed. The time of construction would vary depending on the length and design configuration for each structure. Following the mass excavation and grading, the stations would require the installation of the waterproof membrane around the station box. The construction sequence for the station structures would typically commence with construction of the foundation base slab, followed by installation of exterior walls any interior column elements, and pouring of the station roof. Once station structure work is complete, the station excavation would be backfilled, and the permanent roadway would be constructed. Decking removal and surface restoration would then occur. Stations are proposed to be 1 to 2 stories, up to approximately 40-feet in height.

4.1.4.2.1 Cucamonga Station

Cucamonga Station consists of at-grade passenger boarding/alighting facilities as well as an operations and MSF. The structures would be two-stories tall with all passenger boarding/alighting facilities located at surface level. Construction at the proposed Cucamonga Station would require a mass excavation and the TBM would be launched from the invert of the Cucamonga Station and retrieved from the Ontario International Airport construction site. Once the TBM has been retrieved and the tunnel fit-out has been completed, the installation of guideway and systems for the tunnel structures would occur.

Equipment needs would include the following: excavators, backhoes, a vertical conveyor system, a gantry crane, a crawler crane, concrete trucks, haul 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 37 months. Haul trucks are described in Section 4.1.1 and Table 4-1 above. No road closures are anticipated for staging at the Cucamonga Station.

4.1.4.2.2 ONT Terminal 2 Station

As described respectively in Section 4.1.3.1 construction of the ONT Terminal 2 station would require a mass excavation. Staging at the proposed ONT Terminal 2 station would require approximately 3.4 acres. Approximately 300 parking stalls would be temporarily lost from 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 37 months. Haul trucks are described in Section 4.1.1 and Table 4-1 above. No road closures are anticipated for staging at the ONT Terminal 2 Station.

4.1.4.2.3 ONT Terminal 4 Station

Staging at the proposed ONT Terminal 4 station would require approximately 3.2 acres. Approximately 300 parking stalls would be temporarily lost from 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, backhoes, and excavators. The staging area would be needed for up to 15 months. Haul trucks are described in Section 4.1.1 and Table 4-1 above. No road closures are anticipated for staging at the ONT Terminal 4 Station.

4.1.4.3 Transition Structures

Vehicles arriving or departing the stations would traverse along a transition structure that allows the descent from the surface level to the underground guideway within the bored tunnel. These transition structures consist of U-shaped cast in-place reinforced concrete retaining walls to create a ramp for the guideway to the tunnel level. These trenches would be excavated by a cut-and-cover methodology as described in Section 4.1.3.1. The design-builder would form the retaining walls cast in structures, install steel reinforcing bars, pour concrete, and strip the forms.

4.1.4.4 Construction Staging Areas

Construction staging areas would be used to store building materials and construction equipment, assemble the TBM, temporarily store excavated materials, and serve as temporary field offices for the contractor. Heavy-duty, steel, track-out grates (i.e., rumble plates) would be staged at the entrance of the construction staging areas to capture dirt and soil debris from the wheels of trucks and construction equipment. BMPs would minimize a public nuisance that can result from soil and mud tracks on the public roadway. For security purposes, construction staging areas would be equipped with fences, lighting, security cameras, and guards to prevent vandalism and theft. Each of the three proposed Project stations and the access shaft would require a construction staging area as described below.

- Staging at the proposed Cucamonga Station and MSF would require approximately 3.2 acres.
- Staging at the proposed ONT Terminal 2 station would require approximately 3.4 acres.
- Staging at the proposed ONT Terminal 4 station would require approximately 3.2 acres.
- Staging at the access shaft would require approximately 0.62 acres. Work would encroach into the Caltrans ROW.

Staging areas supporting the underground segment would require additional space to accommodate activities including, but not limited to, tunneling, assembling, launching, and extraction of the TBM. Anticipated equipment at each location would include haul trucks, a drill rig, a crane, an excavator, a wheel loader, a compressor, and a ventilation fan. Each staging area would include material storage, stockpiles of excavated material, water treatment, a workshop, a construction office, and employee parking.

4.1.4.5 Maintenance and Storage Facility

The proposed Cucamonga Station includes an MSF to store and maintain vehicles. The MSF would be approximately 11,000 square feet, with an additional 5,000 square feet second story and would contain an operations control center with lockers, breakrooms, and restrooms, while also storing and maintaining autonomous electric vehicles. The MSF would be constructed adjacent to the Cucamonga Station and would include enclosed bays. 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 MSF would accommodate the Operations Control Center to manage the system and include employee amenities (lockers, restrooms, and breakroom). Employee parking for the MSF would be provided at the existing parking lot owned by SBCTA, in the southeastern quadrant of the Milliken Avenue/Azusa Court intersection.

4.1.4.6 Roadway Reconstruction

Street reconstruction work may require modification of existing curbs, gutters, and sidewalks.

Where applicable, existing curbs, gutters, sidewalks, landscaping, and structures would need to be demolished, and utilities would need to be relocated. Equipment typically involved in demolition includes

crawler cranes, crawler dozers/loaders, pavement breakers, rubber-tired loader/bob cats, trucks, excavator, backhoes, generator/compressors, and water trucks for dust control.

Additionally, as applicable, construction of new curb and gutter, sidewalks, roadway re-pavement would then proceed followed by the installation of lighting, signage, striping, and landscaping as necessary. Equipment used for construction would include excavators, small bulldozers, compactors, graders, transit mix concrete trucks, concrete pumping equipment, pavers, and rollers.

5 REFERENCES

California Building Standards Commission. 2021. 2019 California Building Code, Title 24. Available at: https://codes.iccsafe.org/content/CABCV12019JUL21S/cover. Accessed June 15, 2022.

California Building Standards Commission. 2019. California Fire Code. Available at: https://up.codes/viewer/california/ca-fire-code-2019. Accessed June 15, 2022.

California Department of Transportation (Caltrans). 2018a. Standard Plans. Available at: https://dot.ca.gov/-/media/dot-media/programs/design/documents/2018-std-plns-for-web-a11y.pdf. Accessed June 15, 2022.

_____. 2018b. Standard Specifications. Available at: https://dot.ca.gov/-/media/dot-media/programs/design/documents/f00203402018stdspecs-a11y.pdf. Accessed October 10, 2022.

Federal Aviation Administration. 2021. 7460 Obstruction Analysis/Air Space Analysis Form. Available at: https://oeaaa.faa.gov/oeaaa/external/portal.jsp. Accessed June 15, 2022.

Federal Highway Administration (FHWA). 2009. FHWA NHI-09-010, Technical Manual for Design and Construction of Roads Tunnels-Civil Element. Available at: https://www.fhwa.dot.gov/bridge/tunnel/pubs/nhi09010/tunnel_manual.pdf. Accessed October 10, 2022.

Federal Transit Administration (FTA). 2018. Transit Noise and Vibration Impact Assessment Manual. Available at: https://www.transit.dot.gov/sites/fta.dot.gov/files/docs/research-innovation/118131/transit-noise-and-vibration-impact-assessment-manual-fta-report-no-0123_0.pdf. Accessed on: June 15, 2022.

Metrolink. 2022. *Rancho Cucamonga Metrolink Station*. Available at: https://metrolinktrains.com/rider-info/general-info/stations/rancho-cucamonga/. (Accessed June 8, 2022)

Metropolitan Water District of Southern California (MWD). (2018). Guidelines for Improvements and Construction Projects Proposed in the Area of Metropolitan's Facilities and Rights-of-Way. Available at: https://www.mwdh2o.com/media/17779/471_guidelines_development.pdf. Accessed on: June 15, 2022.

National Fire Protection Association (NFPA). 2024. List of Codes and Standards. Available at: https://www.nfpa.org/For-Professionals/Codes-and-Standards/List-of-Codes-and-Standards#aq=%40culture%3D%22en%22&cq=%40tagtype%3D%3D(%22Standards%20Development%20Process%22)%20%20&numberOfResults=12&sortCriteria=%40computedproductid%20ascending%2C%40productid%20ascending. Accessed June 26, 2024

National Pollutant Discharge Elimination System (NPDES). 2021. PART 125 - Criteria and Standards for the NPDES. Available at: https://www.govinfo.gov/content/pkg/CFR-2021-title40-vol24/pdf/CFR-2021-title40-vol24-part125.pdfs. Accessed June 15, 2022.

Ontario International Airport (ONT). 2018. Ontario International Airport (ONT) Ground Transportation Rules and Regulations. Available at: https://www.flyontario.com/sites/default/files/airport_ground_transportation_rules_and_regulations_november_2018_revision_0.pdf. Accessed June 15, 2022.

Ontario International Airport Authority (OIAA). 2019. Strategic Assessment Ontario International Airport Final Report.

_____. 2022. Ontario International Airport Calendar May YTD. Available at: https://www.flyontario.com/sites/default/files/ont_airport_statistics_-_may_2022.pdf. Accessed June 15, 2022.

San Bernardino County Department of Public Works. 2013. Technical Guidance Document for Water Quality Management Plans. Available at: http://cms.sbcounty.gov/Portals/50/Land/SantaAnaRiver-WQMP-Final-June2013.pdf?ver=2019-06-11-140312-780. Accessed June 15, 2022.

_____. 2019. General Permit Conditions and Trench Specifications. Available at: https://cms.sbcounty.gov/Portals/50/transportation/General%20Permit%20Conditions%20and%20Trench%20Specifications%20September%201%202019.pdf?ver=2019-08-28-155809-113. Accessed June 15, 2022.

_____. 2022. County Standard Plans. Available at: https://cms.sbcounty.gov/lus/LandDevelopment/CountyStandards.aspx. Accessed June 15, 2022.

San Bernardino Associated Governments (SANBAG). 2014. Ontario Airport Rail Access Study. Southern California Regional Rail Authority (SCRRA or Metrolink) (2021). SCRRA Design) Criteria Manual. Available at: https://metrolinktrains.com/globalassets/about/engineering/scrra_design_criteria_manual.pdf. January. Accessed June 15, 2022.

San Bernardino County Transportation Authority (SBCTA). 2024a. *SBCTA Ontario International Airport Connector Project. Cumulative Impacts Technical Report.*

_____. 2024b. *SBCTA Ontario International Airport Connector Project. Construction Methods Technical Report.*

South Coast Air Quality Management District (SCAQMD). 2005. Rule 403 Fugitive Dust. Available at: https://www.aqmd.gov/docs/default-source/rule-book/rule-iv/rule-403.pdf?sfvrsn=4. Accessed on May 2, 2024.

Southern California Regional Rail Authority (SCRRA). 2024. *Metrolink (SCRRA Design) Criteria Manual 2024.* Available at https://metrolinktrains.com/globalassets/about/engineering/scrra_design_criteria_manual.pdf Accessed October 3, 2024. Union Pacific Railroad (UPRR). 2019. UPRR Plan Submittal Guidelines. Available at: https://www.up.com/cs/groups/public/@uprr/@customers/@industrialdevelopment/@operationsspecs/@specifications/documents/up_pdf_nativedocs/pdf_up_pub_guidelines.pdf. Accessed June 15, 2022.

United States Environmental Protection Agency. 2021. National Pollutant Discharge Elimination System (NPDES). Available at: https://www.epa.gov/npdes. Accessed June 15, 2022.

THIS PAGE INTENTIONALLY LEFT BLANK