VTA's BART Silicon Valley
Phase II Extension Project

CEQA Addendum to the 2018 Final Subsequent Environmental Impact Report

Updated/Revised June 2024

Santa Clara Valley Transportation Authority

Solutions that move you

VTA's BART Silicon Valley Phase II Extension Project

CEQA Addendum to the
2018 Final Subsequent Environmental Impact Report

June 2024

Valley Transportation Authority

Solutions that move you

Contents

Appendix A Technical Memorandums

Hexagon. 2024. *Vehicle Miles Traveled (VMT) Estimates for the BART Silicon Valley Phase II Extension Project*. March 2024.

Terry A. Hayes Associates Inc. 2024*. Re-Evaluation of the Air Quality Technical Report for the Santa Clara Valley Transportation Authority Bay Area Rapid Transit Silicon Valley Phase II Extension Memorandum*. March 2024.

Wilson Ihrig. 2024. *Noise and Vibration Analysis of Design Changes to VTA's BART Silicon Valley Phase II Extension Project Since the 2018 Record of Decision*. March 2024.

Tables

Figures

Acronyms and Abbreviations

µg/m³	micrograms per cubic meter
AB	Assembly Bill
Addendum	CEQA Addendum
APE	Area of Potential Effect
BAAQMD	Bay Area Air Quality Management District
BART	Bay Area Rapid Transit
CAPCOA	California Air Pollution Control Officers Association
CARB	California Air Resources Board
CEQA	California Environmental Quality Act
CO	carbon monoxide
CTMP	Construction Transportation Management Plan
Draft EIS/EIR	Draft Environmental Impact Statement/Environmental Impact Report
EIR	Environmental Impact Report
EMFAC	EMission FACtor
EPA	U.S. Environmental Protection Agency
Final SEIS/SEIR	VTA's BART Silicon Valley Phase II Extension Project Final Supplemental Environmental Impact Statement/Subsequent Environmental Impact Report and Section 4(f) Evaluation
FTA	Federal Transit Administration
GHG	greenhouse gas
HRDF	highly resilient, direct-fixation
IST	Isolated Slab Track
LOS	level of service
MND	Mitigated Negative Declaration
MSAT	mobile source air toxics
$MTCO_2e$	metric tons of carbon dioxide equivalents
NEPA	National Environmental Policy Act
NO_X	nitrogen oxides
OPR	Office of Planning and Research
Phase I Project	BART Silicon Valley—Phase I Berryessa Extension Project
Phase II Project	BART Silicon Valley Phase II Extension
PM_{10}	particulate matter 10 microns in diameter or less
$PM_{2.5}$	particulate matter 2.5 microns in diameter or less
RAMP	Real Estate Acquisition Management Plan
RAP	Relocation Assistance Plan
ROD	Record of Decision
ROG	reactive organic gases
SB	Senate Bill
SVRTC	Silicon Valley Rapid Transit Corridor
TBM	Tunnel Boring Machine
TOJD	Transit-Oriented Joint Development
Uniform Act	Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970
VdB	vibration velocity decibels
VMT	vehicle miles traveled
VMT Memo	VMT Estimates for the BART Silicon Valley Phase II Extension Project
VTA	Santa Clara Valley Transportation Authority

Chapter 1
Introduction

1.1 Purpose of the Addendum

The California Environmental Quality Act (CEQA) recognizes that between the date projects are approved and the date they are constructed one or more of the following changes may occur: (1) the scope of the project may change; (2) the environmental setting in which the project is located may change; (3) certain environmental laws, regulations, or policies may change; and (4) previously unknown information may be identified. CEQA requires that lead agencies evaluate these changes to determine whether or not they are significant.

The mechanism for assessing the significance of these changes is found in CEQA Guidelines Sections 15162–15164. Under these Guidelines, a lead agency should prepare a subsequent or supplemental CEQA document if the triggering criteria set forth in CEQA Guidelines Sections 15162 and 15163 are met. These criteria include a determination as to whether any changes to the project, or the circumstances under which the project will be undertaken, involve new significant environmental effects or a substantial increase in the severity of previously identified significant effects. In addition, a subsequent or supplemental CEQA document may be prepared if "new information" meeting certain standards under CEQA Guidelines Section 15162 is presented. If the changes do not meet these criteria, or if no "new information of substantial importance" is presented, then an Addendum per CEQA Guidelines Section 15164 is prepared to document any minor corrections to the Environmental Impact Report (EIR) or Initial Study/Mitigated Negative Declaration (MND). CEQA does not require that an Addendum be circulated for public review.

As discussed in Chapter 3, *Environmental Evaluation,* of this document, the implementation of the project changes described in Chapter 2, *Proposed Project Changes,* will not result in new significant environmental effects or a substantial increase in the severity of previously identified significant effects. Therefore, the preparation of a Supplemental EIR, as defined by CEQA, is not warranted and an Addendum is the appropriate environmental document for this undertaking.

1.2 Scope of this Addendum

This CEQA Addendum (Addendum) to *VTA's BART Silicon Valley Phase II Extension Project Final Supplemental Environmental Impact Statement/Subsequent Environmental Impact Report and Section 4(f) Evaluation* (Final SEIS/SEIR)[1] for the Santa Clara Valley

[1] Santa Clara Valley Transportation. 2018. *2018 Final Supplemental Environmental Impact Statement/Subsequent Environmental Impact Report (SEIS/SEIR)*. Available:

Transportation Authority's (VTA's) BART Silicon Valley Phase II Extension (Phase II) Project evaluates the potential environmental impacts of the changes made to the Phase II Project since the VTA Board of Director's certification of the Final SEIR in April 2018.

This Addendum will determine whether the design refinements since approval of the project and certification of the Final SEIS/SEIR in 2018 would result in any substantial change to the environmental setting, impacts, and mitigation measures.

1.3 Overview of the Project

The Phase II Project consists of an approximately 6-mile extension of the Bay Area Rapid Transit (BART) system from the terminus of VTA's BART Silicon Valley Phase I Berryessa Extension (Phase I) Project in San Jose to Santa Clara. The Phase I Project began operation in 2020. The Phase II Project would descend into an approximately 5-mile-long tunnel, continue through downtown San Jose, and terminate at grade near the Santa Clara Caltrain Station. The Phase II Project includes three underground stations in the City of San Jose (28th Street/Little Portugal, Downtown San Jose, and Diridon Stations), one at-grade station in the City of Santa Clara (Santa Clara Station), and the Newhall Maintenance Facility on the border of the Cities of San Jose and Santa Clara near the Phase II Project's terminus. Figures of the Phase II Project area, tunnel alignments, and station plans are provided in Chapter 2.

1.4 Previous Environmental Studies

The Federal Transit Administration (FTA) and VTA prepared a combined Draft Environmental Impact Statement/Environmental Impact Report (Draft EIS/EIR) and Draft Section 4(f) Evaluation for the original 16-mile Silicon Valley Rapid Transit Corridor (SVRTC) Project in accordance with the requirements of the National Environmental Policy Act (NEPA) and CEQA, and released it for public comment in March 2004. Subsequent to the public review period, VTA chose to pursue federal and state environmental clearance of the project on independent paths, and in December 2004, VTA's Board of Directors certified the Final EIR. In June 2007, VTA's Board of Directors certified the Final Supplemental EIR updating the 2004 EIR to address project design refinements.

In mid-2007, VTA requested FTA approval to restart the NEPA process, and FTA concurred. FTA, in coordination with VTA, released the Draft EIS for public comment in March 2009 and published the Final EIS in March 2010. On June 24, 2010, FTA issued a Record of Decision (ROD) on the first phase of the SVRTC Project, an approximately 10-mile segment from Warm Springs to Berryessa—designated the Phase I Project.

https://www.vta.org/projects/documents?document_search=2018&document_category%5B%5D=391&project=656. Accessed: May 15, 2023.

VTA released a Draft 2nd Supplemental EIR for the 10-mile Phase I Project for public review in November 2010 to make the CEQA analysis consistent with the NEPA analysis. VTA's Board of Directors certified the Final 2nd Supplemental EIR and approved the Phase I Project in March 2011. The Phase I Project moved forward into construction and opened in 2020. The remaining approximately 6 miles of the SVRTC Project is now referred to as the Phase II Project.

FTA and VTA prepared a combined Draft SEIS/SEIR on the remaining 6-mile Phase II Project in 2016. On April 5, 2018, the VTA Board of Directors approved the Phase II Project and certified that the SEIR met the requirements of CEQA. The BART Board of Directors approved the Phase II Project on April 26, 2018. On June 4, 2018, FTA issued an ROD on the Final SEIS/SEIR for the Phase II Project.

Since 2018, two CEQA addenda to the SEIR were prepared and approved by the VTA Board of Directors. The first was in December 2022 to evaluate project refinements, including the increase in the tunnel's inner and outer diameters from approximately 41 to 48 feet and approximately 45 to 52 feet, respectively, with a corresponding increase in the size of the Tunnel Boring Machine (TBM) from 45 to approximately 54 feet in diameter. The second was in April 2023 to evaluate the selection of the location of the replacement parking during construction at Diridon Station to a facility located at 501 Cinnabar Street.

In March 2024, FTA approved a NEPA Re-evaluation that analyzed and evaluated design refinements described in this Addendum. The NEPA Re-evaluation concluded that the proposed design refinements would not result in new substantial or severe impacts, and the 2018 ROD was still valid.

1.5 Contents of this Addendum

This Addendum is organized as follows:

Chapter 1: *Introduction*	Provides the purpose of the Addendum, summarizes the overall Phase II Project, and describes previous environmental studies.
Chapter 2: *Proposed Project Changes*	Identifies the location of the Phase II Project and describes the design refinements in detail.
Chapter 3: *Environmental Evaluation*	Evaluates the environmental impacts of the Phase II Project design refinements.
Chapter 4: *Environmental Determination*	Provides summary conclusions of the Addendum.
Appendices	Comprises technical memoranda that support this Addendum to the Phase II Project.

Chapter 2
Proposed Project Changes

2.1 Phase II Project

The Phase II Project consists of an approximately 6-mile extension of the BART system beginning at the Berryessa/North San Jose Station, continuing through downtown San Jose in an approximately 5-mile-long, single-bore tunnel, and terminating in Santa Clara near the Santa Clara Caltrain Station as shown in Figure 1. The Phase II Project includes three underground stations in the City of San Jose (28th Street Station/Little Portugal, Downtown San Jose, and Diridon Stations), one at-grade station in the City of Santa Clara (Santa Clara Station), and the Newhall Maintenance Facility on the border of the Cities of San Jose and Santa Clara near the Phase II Project's terminus. In 2018, the VTA Board of Directors approved the project that also included Transit-Oriented Joint Development (TOJD) consisting of retail, office, and residential uses. No changes to the TOJD are proposed; therefore, TOJD is not included in this Addendum.

2.2 Project Changes

Since the VTA Board of Director's certification of the Final SEIR in April 2018 and the FTA ROD in June 2018, design has progressed, resulting in refinements to the Phase II Project; these are referred to as the "Phase II Project with design refinements" in this Addendum. Some refinements are project-wide and some are site-specific. The design refinements are summarized below and are ordered with project-wide refinements first, followed by individual refinements listed from east to west along the alignment. All design refinements are located within the original project footprint and Area of Potential Effect (APE).

Figure 1: Phase II Alignment Map

VTA's BART Silicon Valley Phase II Extension Project

March 2024

2.2.1 Project-Wide Refinements

The following refinements apply project wide for the Phase II Project with design refinements.

- **Opening Year.** The Final SEIS/SEIR stated an opening year of 2025/2026; however, based on current projections, construction is expected to commence in 2024 with operations commencing (opening year) in 2039 and target revenue service in 2037.
- **Tunnel Configuration and Alignment.** Two tunnel configuration options (twin-bore and single-bore) were evaluated in the Final SEIS/SEIR, with the Single-Bore Option selected and approved by the VTA Board of Directors in April 2018. The single-bore design included both a stacked and a side-by-side configuration, with a stacked configuration at the three underground stations and transition zones in between.

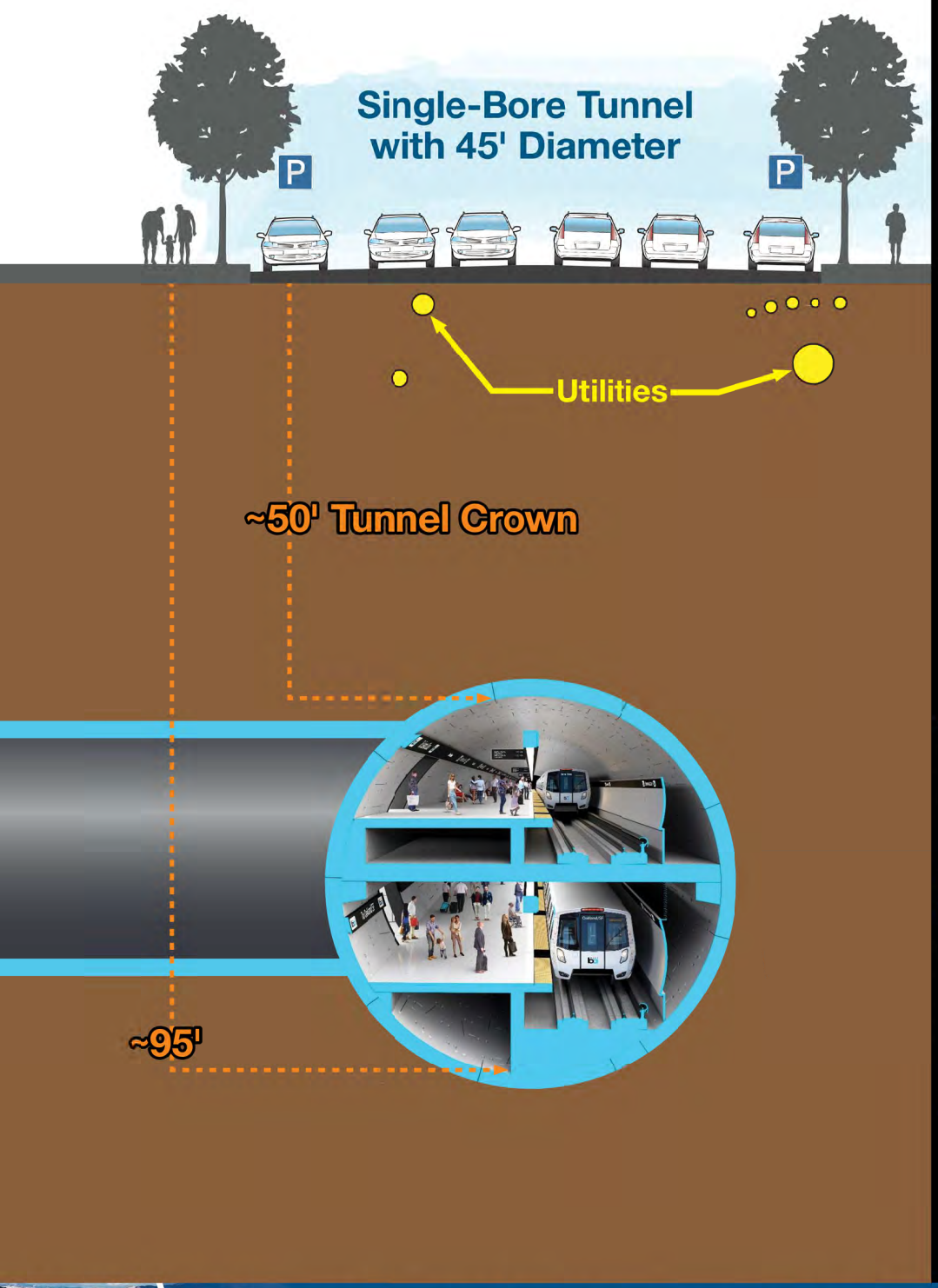
  Since the project was approved in 2018, the design of the single-bore tunnel configuration has been further refined. To maintain minimum platform widths at the three underground stations and a consistent side-by-side track configuration throughout the entire alignment, as disclosed in the 2022 Addendum, the tunnel's inner and outer diameters would be increased from approximately 41 feet to 48 feet and 45 feet to 52 feet, respectively (see Figure 2). Also, there would be vertical alignment shifts (up to approximately 13 feet shallower and up to approximately 33 feet deeper) and horizontal alignment shifts of up to 125 feet at the widest diversion point (just west of Diridon Station) of the tunnel. These shifts are within the same project footprint evaluated in the Final SEIS/SEIR.

2.2.2 Project Element Refinements

The design refinements for site-specific project elements are presented below from east to west for the Phase II Project with design refinements.

- **28th Street/Little Portugal Station.** This station includes the same project elements in generally the same locations as described in the Final SEIS/SEIR with the following minor modifications. In the Final SEIS/SEIR, this station included two separate entrance/exit portals located near each end of the station platform. With the updated design, the entrances would be consolidated into a single central station building, called a headhouse, that would have multiple street-level entrance/exit points. In addition, the parking garage shifted slightly from the northwest end near East St. James Street to the northeastern side near North 30th Street. Figures 3 and 4 show the previous and updated designs for this station. All design refinements are within the original station footprint.
- **East Mid-Tunnel Facility at Santa Clara and 13th Streets.** The design refinements for the ventilation system would result in the elimination of the Mid-Tunnel Facilities (see Figure 1).

- **Downtown San Jose Station.** This station includes the same project elements in generally the same locations as described in the 2018 Final SEIS/SEIR with the following minor modifications. In the Final SEIS/SEIR, the Downtown San Jose Station included two separate entrance/exit portals located near each end of the station platform. With the updated design, the entrances would be consolidated into a central station building, called a headhouse, that would have multiple street-level entrance/exit points. In addition, the updated design of this station includes an option to eliminate the secondary entrance between 1st and 2nd Streets on the north side of Santa Clara Street. Also, the 0.7-acre construction staging area at the northwest corner of Santa Clara and 4th Streets would be eliminated. Figures 5 and 6 show the previous and updated designs for this station. All design refinements are within the original station footprint.
- **Diridon Station.** This station includes the same project elements in generally the same locations as described in the 2018 Final SEIS/SEIR with the following minor modifications. In the Final SEIS/SEIR, the Diridon Station included two separate entrance/exit portals located near each end of the station platform. With the updated design, the entrances would be consolidated into a single central station building that will have multiple street-level entrance/exit points. In addition, the overall footprint of the station would be reduced to 1.5 acres (from 8 acres), and the construction staging areas would be reduced to approximately 5 acres (from 8 acres). The footprint of the station in the Final SEIS/SEIR included the station, system facilities, transit facility, and VTA's TOJD. The footprint of the station in this Addendum shows only the station and system facilities. The updated design of this station also includes an option to eliminate the East Egress Facility at the corner of Santa Clara and Barack Obama Boulevard. Figures 7 and 8 show the previous and updated designs for this station.
- **West Mid-Tunnel Facility at Stockton Avenue and Taylor Street.** The design refinements of the ventilation system would result in the elimination of the Mid-Tunnel Facilities (see Figure 1).
- **Santa Clara Station.** The design refinements for this station would result in a smaller station footprint compared to the design in the Final SEIS/SEIR, as an approximately 12-acre private property north of Brokaw Road in the City of Santa Clara is no longer needed for the Santa Clara Station. All station facilities formerly located north of Brokaw Road would be shifted south of Brokaw Road and within a VTA-owned property that includes the Newhall Maintenance Facility. Figures 9 and 10 show the previous and updated designs.



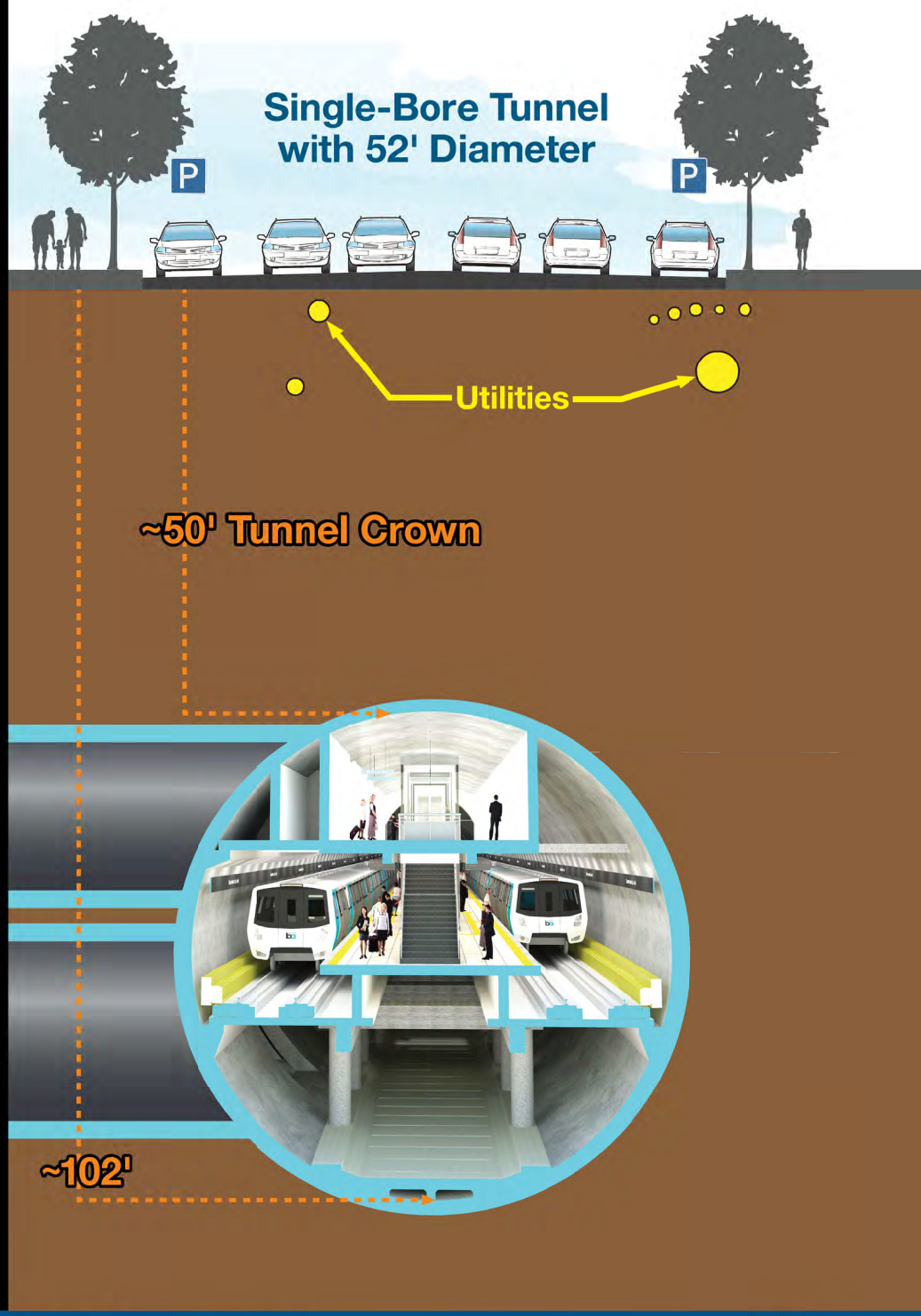


Figure 2: Single-Bore Tunnel Station Configurations

VTA's BART Silicon Valley Phase II Extension Project

March 2024

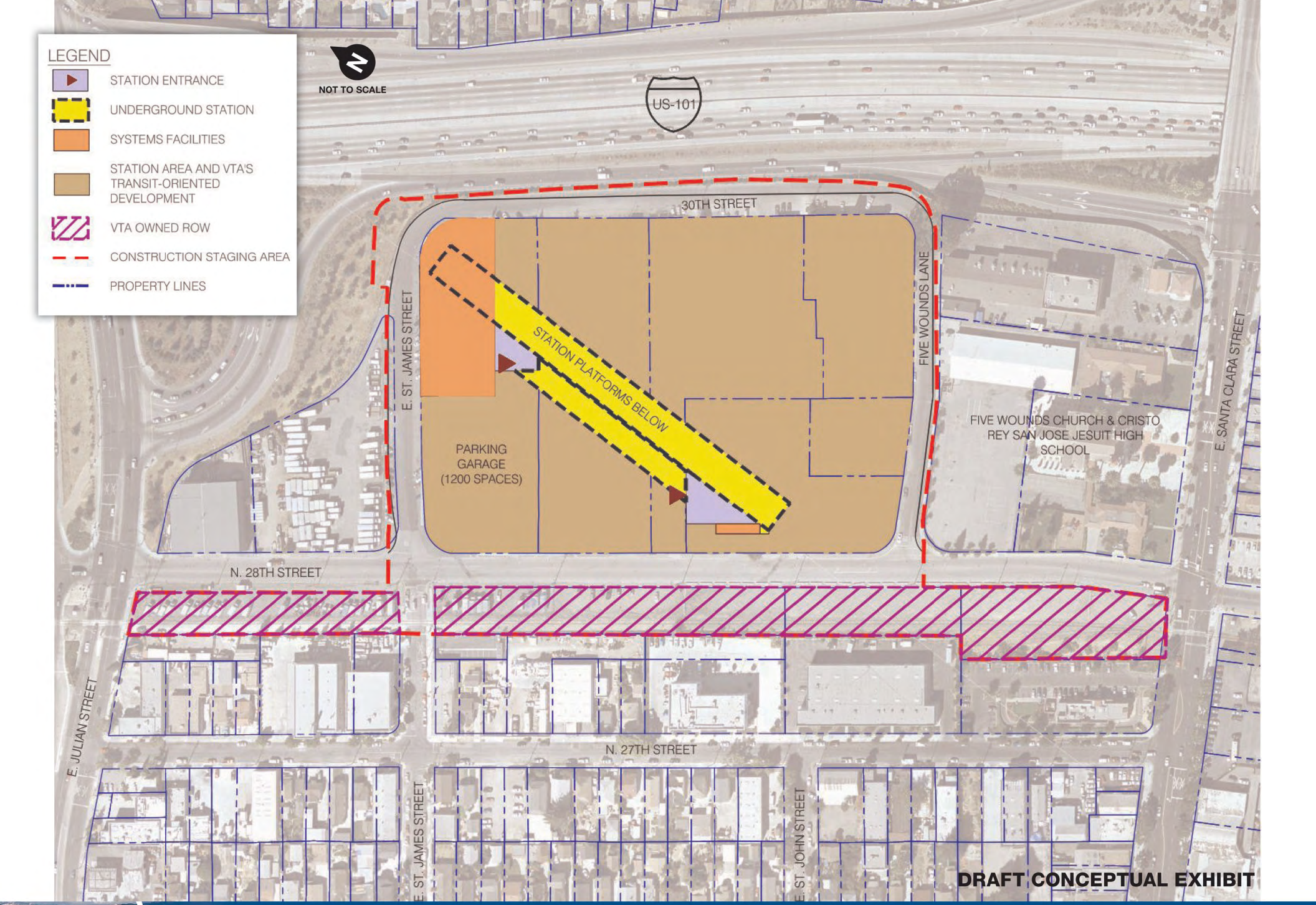


Figure 3: 2018 28th St/Little Portugal Station Conceptual Site Plan

VTA's BART Silicon Valley Phase II Extension Project

March 2024

Figure 4: 2024 28th St/Little Portugal Station Conceptual Site Plan

VTA's BART Silicon Valley Phase II Extension Project

March 2024

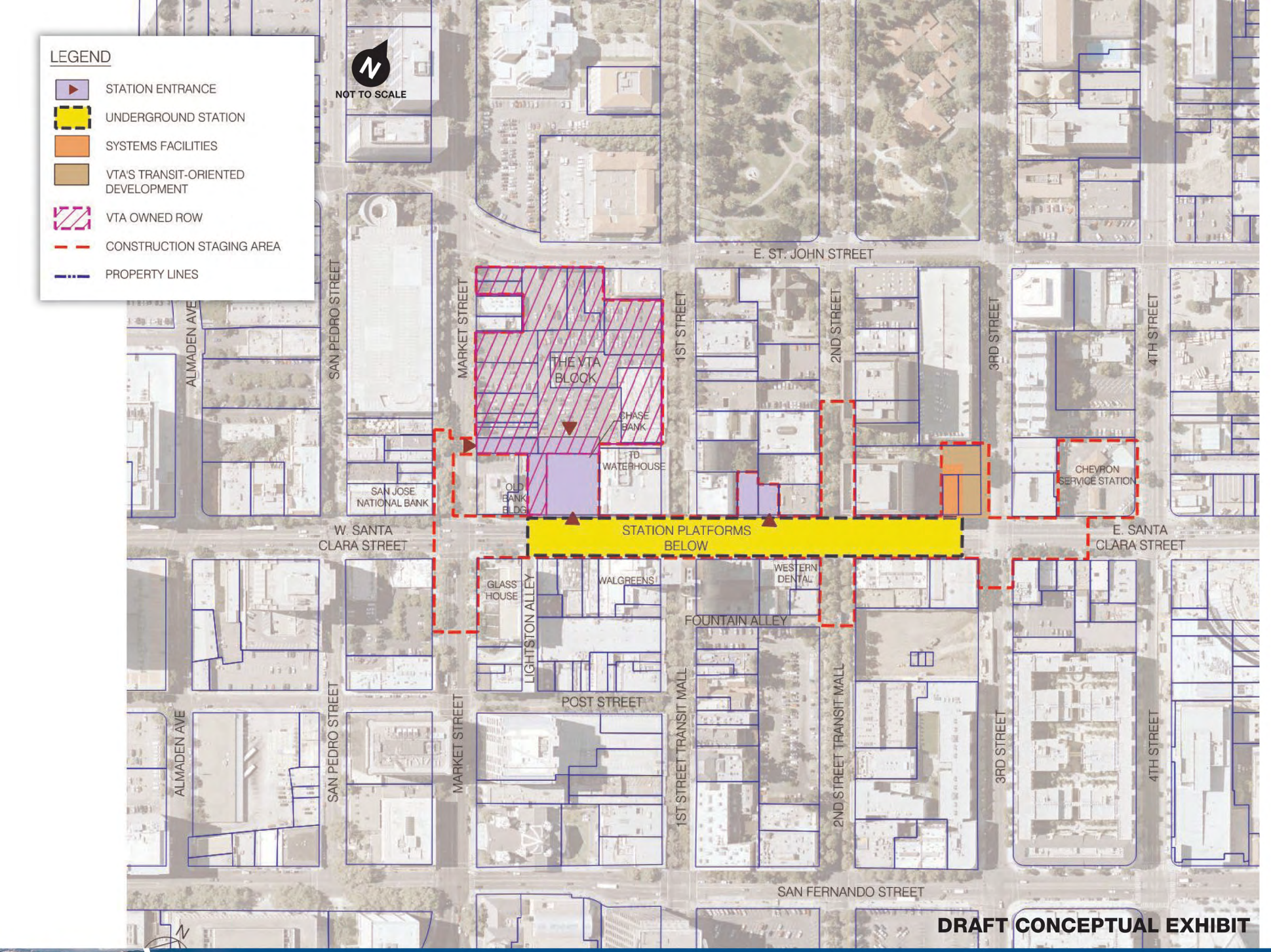


Figure 5: 2018 Downtown San José Station Conceptual Site Plan

VTA's BART Silicon Valley Phase II Extension Project

March 2024

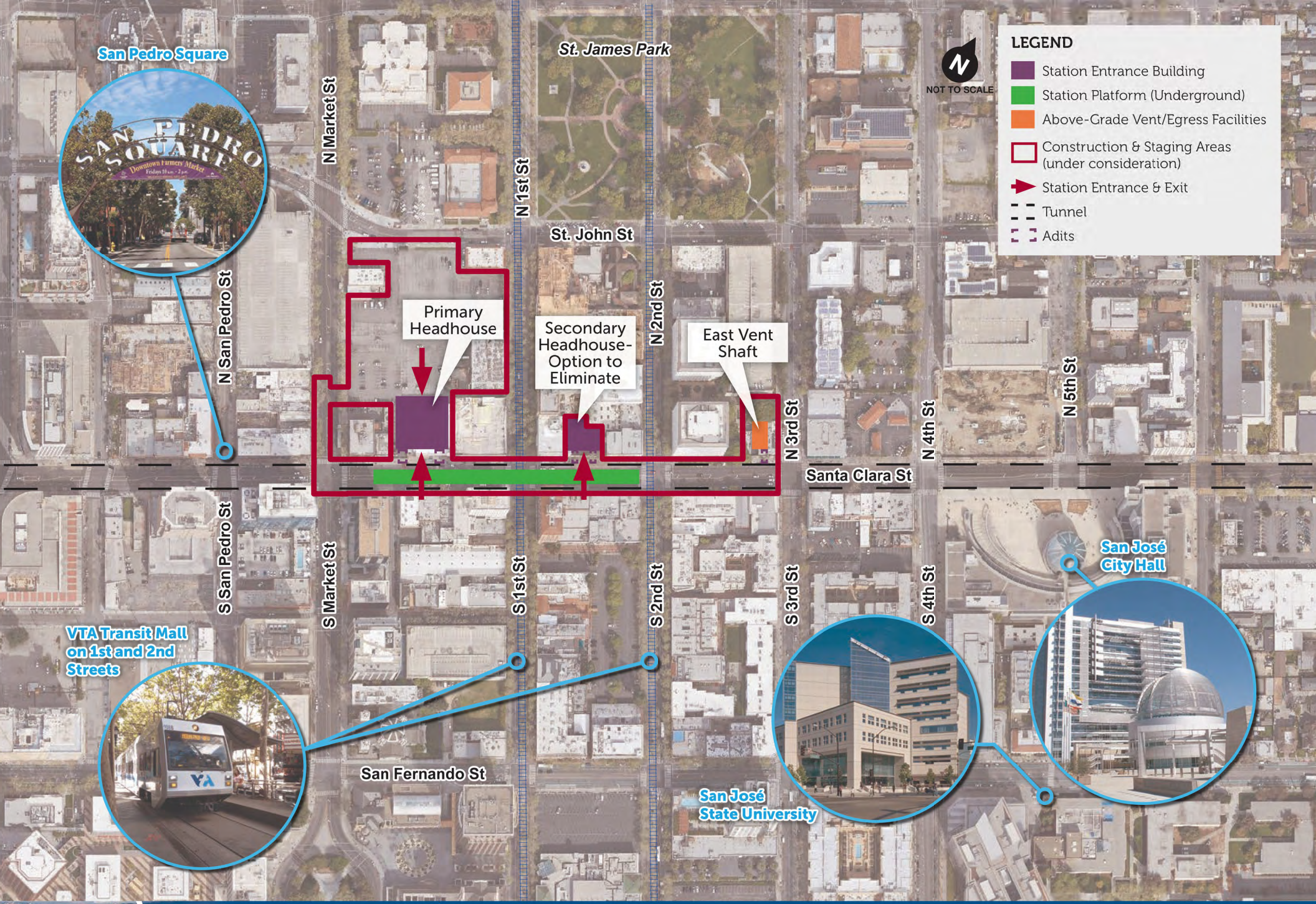


Figure 6: 2024 Downtown San José Station Conceptual Site Plan

VTA's BART Silicon Valley Phase II Extension Project

March 2024

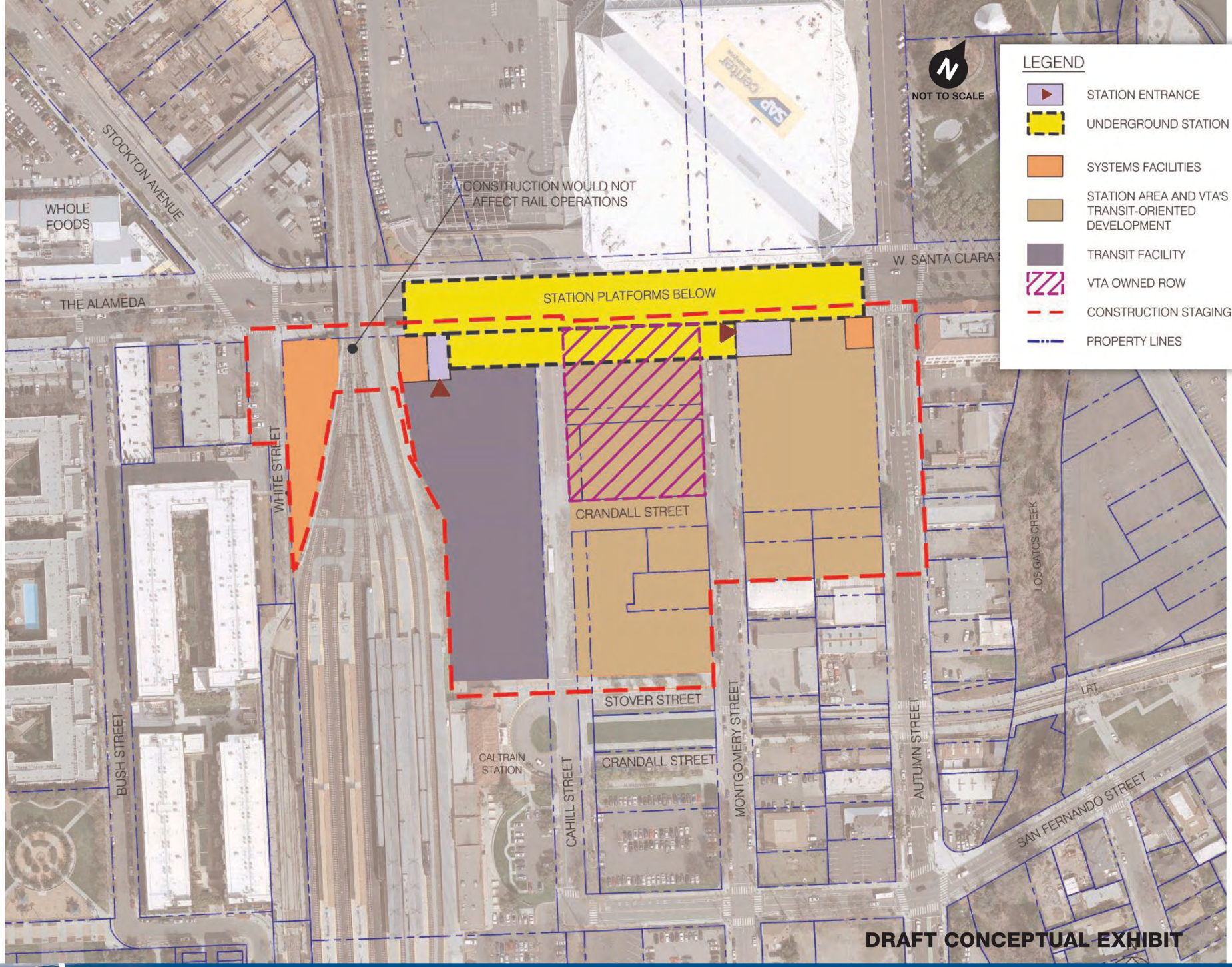


Figure 7: 2018 Diridon Station Conceptual Site Plan

VTA's BART Silicon Valley Phase II Extension Project

March 2024

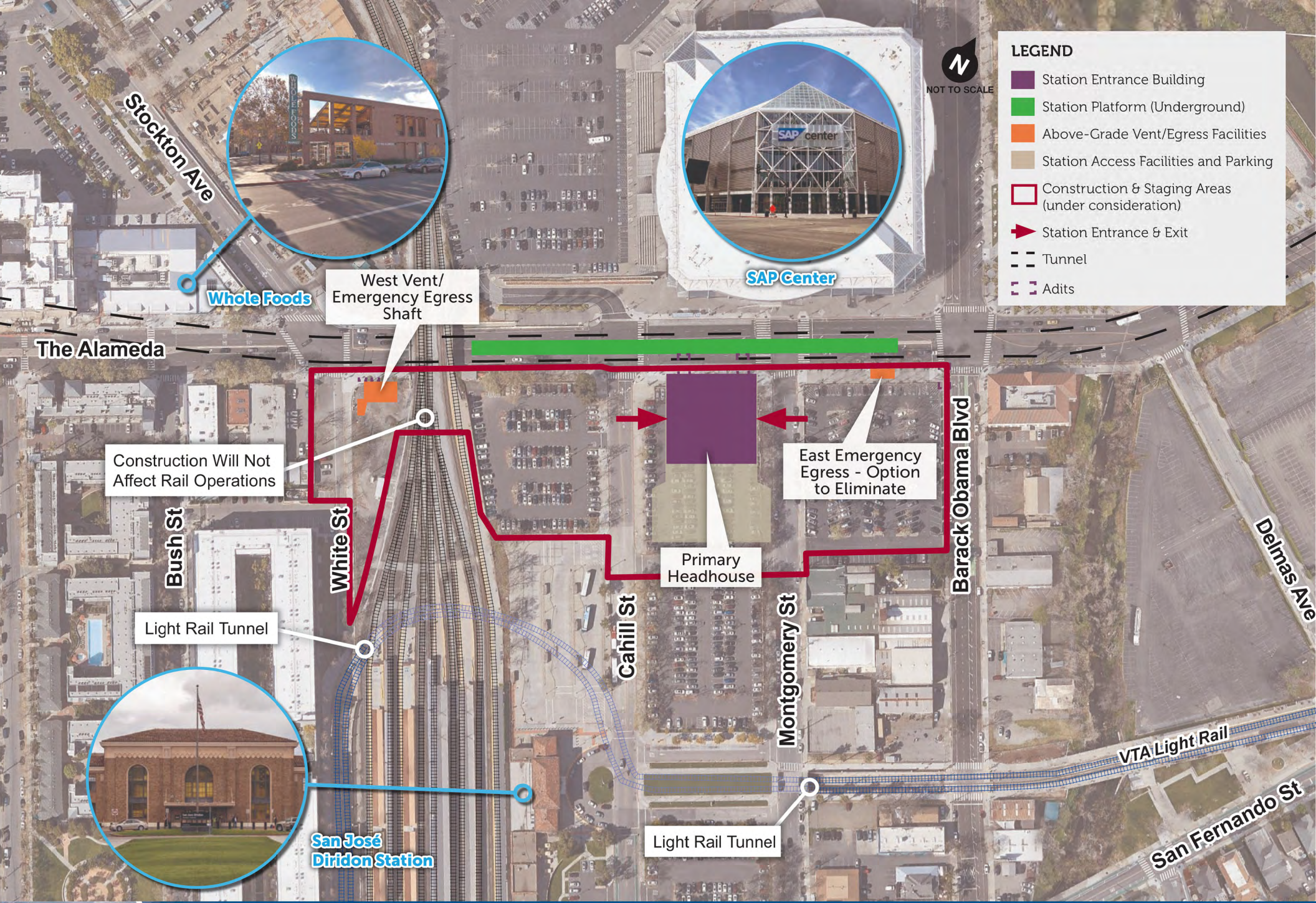


Figure 8: 2024 Diridon Station Conceptual Site Plan

VTA's BART Silicon Valley Phase II Extension Project

March 2024

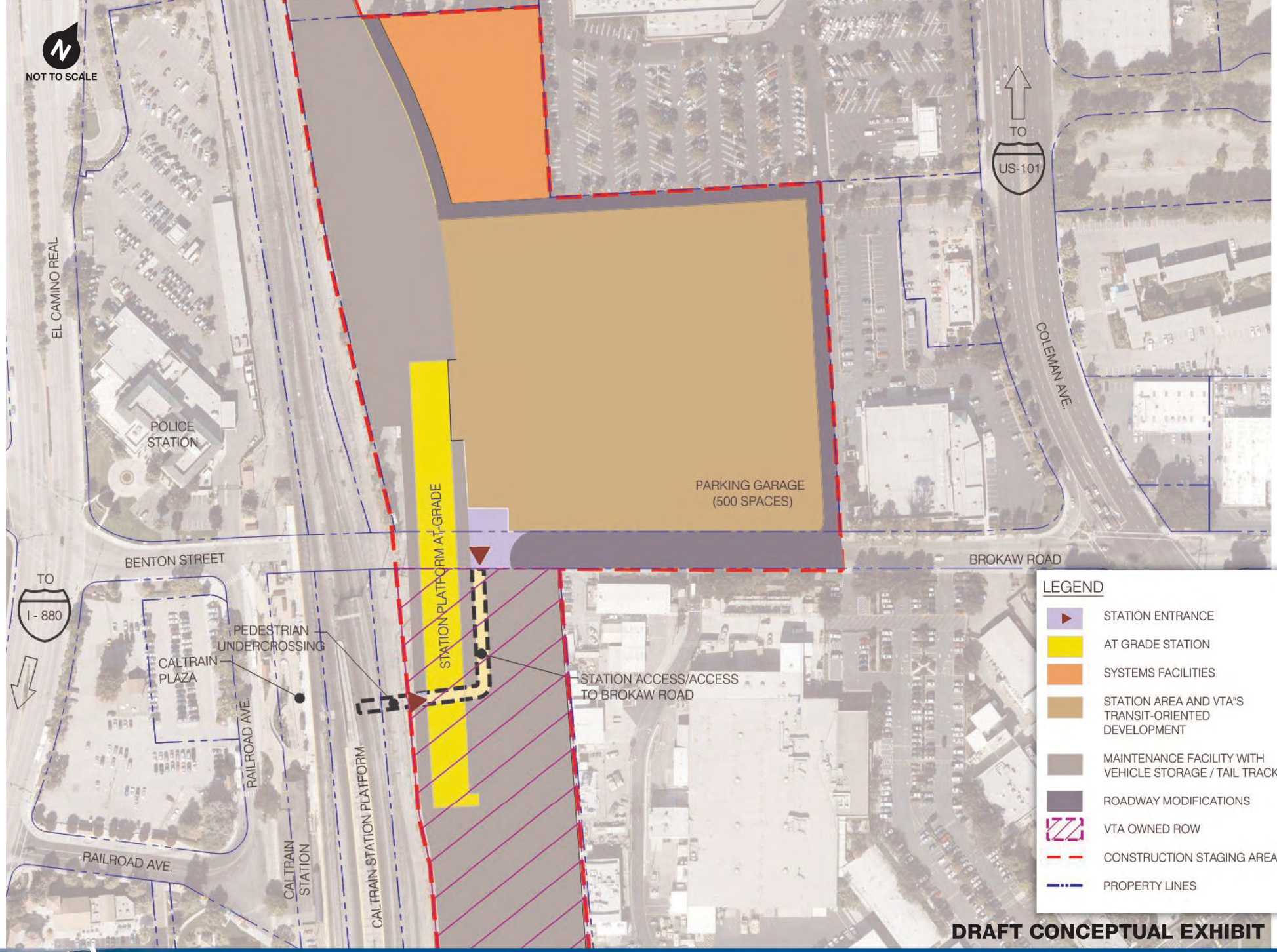


Figure 9: 2018 Santa Clara Station Conceptual Site Plan

VTA's BART Silicon Valley Phase II Extension Project

March 2024

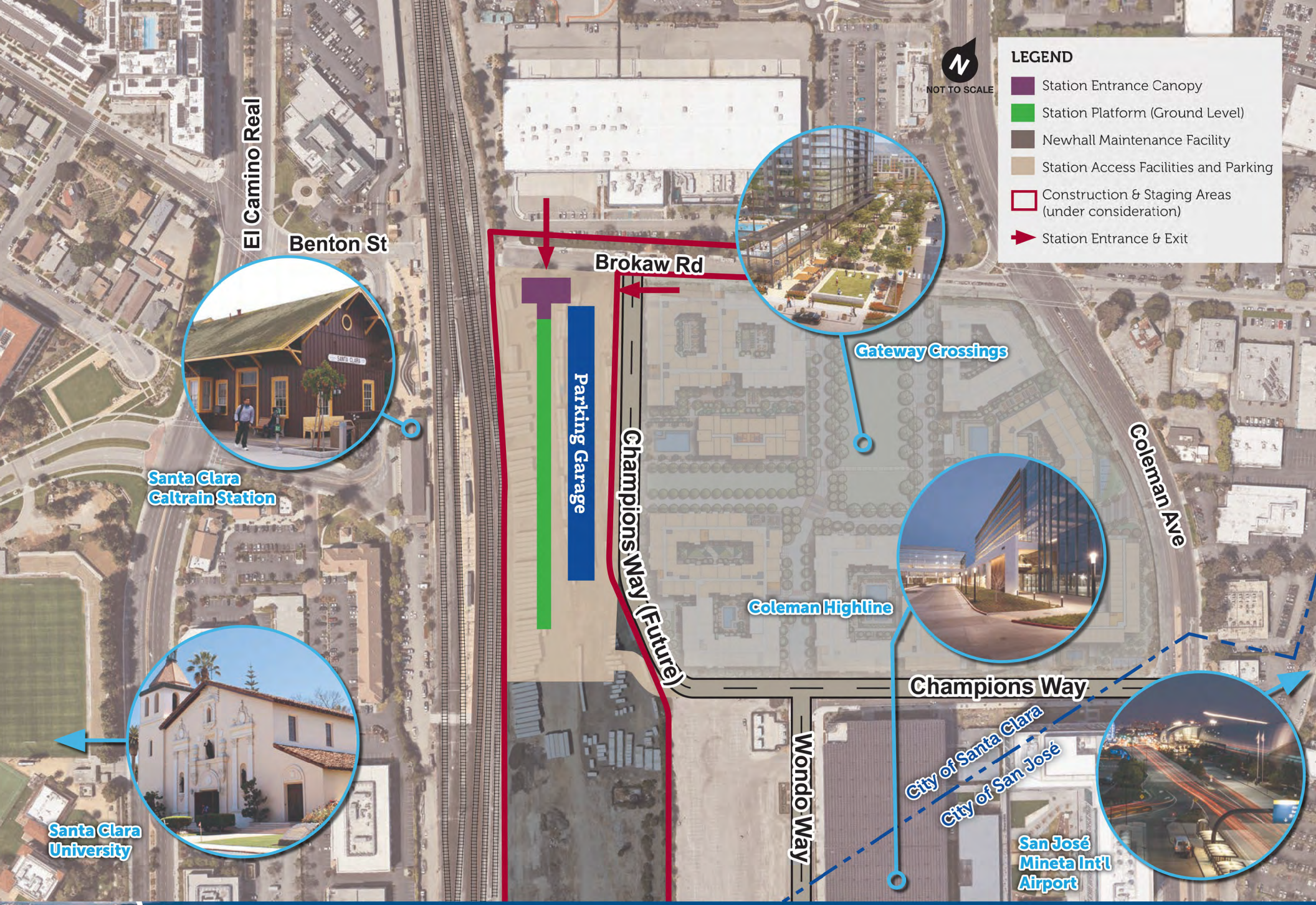


Figure 10: 2024 Santa Clara Station Conceptual Site Plan

VTA's BART Silicon Valley Phase II Extension Project

March 2024

Chapter 3
Environmental Evaluation

This chapter evaluates the potential environmental impacts on the physical environment from the Phase II Project with design refinements. It also determines whether any new significant environmental impacts, or a substantial increase in the severity of significant impacts previously identified in the Final SEIS/SEIR, would occur as a result of the updated design.

Environmental evaluation of the design refinements to the Phase II Project since approval of the Final SEIR and subsequent Addendums is provided in the sections below. This evaluation focuses on the following environmental subject areas: transportation; air quality; greenhouse gas (GHG) emissions; land use; noise and vibration; and water resources, water quality, and floodplains. Technical memorandums in support of this evaluation are included in Appendix A.

Several environmental subject areas are not evaluated in this Addendum because associated impacts and mitigation measures, if applicable, have not changed since the Final SEIS/SEIR. These are biological resources and wetlands; community facilities and public services; cultural resources; energy; geology, soils, and seismicity; hazards and hazardous materials; utilities and service systems; visual quality and aesthetics; and growth-inducing impacts.

Please note that only relevant aspects of the environmental analysis affected by the design refinements are described below. All other environmental analyses remain unchanged from the Final SEIS/SEIR.

3.1 Transportation

3.1.1 Construction

3.1.1.1 Newhall Maintenance Facility/West Tunnel Portal

As stated in the Final SEIS/SEIR, construction of the Phase II Project with the Single-Bore Option would result in significant and unavoidable impacts on vehicular traffic, bicyclists, and pedestrians during construction at the Newhall Maintenance Facility, West Tunnel Portal, and Santa Clara Station even with implementation of Mitigation Measures TRA-CNST-A through TRA-CNST-C.

As stated in the 2022 Addendum, the project refinements would result in an increase in the diameter of the TBM and the inner and outer diameters of the tunnel. This may result in a slightly slower progression rate, and the amount of muck produced will increase, as will the amount of material required to build the tunnel. The 2022 Addendum concluded that construction of the tunnel would still result in a significant impact on vehicular traffic, bicyclists, and pedestrians at the Newhall Maintenance Facility, West Tunnel Portal, and

Santa Clara Station even with implementation of Mitigation Measures TRA-CNST-A through TRA-CNST-C.

Estimates for truck hauling volumes per hour provided in the 2018 Final SEIS/SEIR and 2022 Addendum were based on the best information available at the time. There are many variables that determine the estimated truck volumes per hour, and these estimates are dependent on a variety of many factors that influence the number of trucks at any given time during construction. These variable factors include: the size of the trucks, volume/weight of the haul material, the hours per day of the hauling operation, the numbers of days/week hauling operations are performed, the months/duration of tunneling, and the rate of the TBM as it bores through different subsurface materials (such as rock, clay, silt, sand, gravel). Therefore, the volume of trucks may be highly variable during construction. VTA will work with key stakeholders, including the Cities of San Jose and Santa Clara, during the development of the Construction Transportation Management Plans (CTMPs).

As stated in Section 3.2 of the Final SEIS/SEIR, on September 27, 2013, Governor Jerry Brown signed Senate Bill (SB) 743 to further the State's commitment to its climate change goals. Environmental review of transportation impacts previously focused on the delay that vehicles experience at intersections and on roadway segments (known as "level of service" or LOS). Under SB 743, the focus of transportation impact analysis has shifted from driver delay to reduction of GHG emissions, creation of multimodal networks, and promotion of a mix of land uses. SB 743 required the Governor's Office of Planning and Research (OPR) to amend the CEQA Guidelines (Title 14 of the California Code of Regulations, Division 6, Chapter 3, Sections 15000-15387) to provide an alternative to LOS for evaluating transportation impacts.

In 2020, after the Final SEIS/SEIR was released and the Phase II Project approved in 2018, the CEQA Guidelines were officially amended (Section 15064.3), and vehicle miles traveled (VMT) replaced LOS as the metric by which projects must be evaluated. As stated in the March 5, 2024, *VMT Estimates for the BART Silicon Valley Phase II Extension Project* (VMT Memo), as of July 1, 2020, consistent with the revisions in State law to implement SB 743, public agencies in California are mandated to use VMT as the metric for CEQA transportation analyses. The CEQA Guidelines identify VMT as the most appropriate metric for evaluating a project's transportation impacts. With the California Natural Resources Agency's certification and adoption of the changes to the CEQA Guidelines, automobile delay and congestion, as measured by LOS and other similar metrics, no longer constitutes a significant environmental effect under CEQA.

The *Technical Advisory on Evaluating Transportation Impacts In CEQA*, published by the OPR in December 2018, contains recommendations regarding the assessment of VMT, thresholds of significance, and mitigation measures. The document states that: "Transit and active transportation projects generally reduce VMT and therefore are presumed to cause a less-than-significant impact on transportation." This presumption may apply to all passenger rail projects, bus and bus rapid transit projects, and bicycle and pedestrian

infrastructure projects. Streamlining transit and active transportation projects aligns with each of the three statutory goals contained in SB 743 by reducing GHG emissions, increasing multimodal transportation networks, and facilitating mixed-use development. Because the Phase II Project is a passenger rail project, it is projected to reduce VMT and would therefore cause a less-than-significant impact on transportation.

As demonstrated in the VMT Memo, the analysis shows that the Phase II Project would reduce the daily (the sum of personal vehicles and trucks) VMT by 67,027 in 2019, 177,810 in 2039, and 187,903 in 2040. According to the *Technical Advisory on Evaluating Transportation Impacts In CEQA*, passenger rail projects, such as the Phase II Project, are presumed to cause a less-than-significant impact on transportation because they generally reduce VMT. The VMT Memo concludes and confirms that the Phase II Project would reduce VMT. Furthermore, even though, as the Final SEIS/SEIR stated, the Phase II Project would result in traffic congestion and automobile delay temporarily during construction, this is no longer considered a significant impact under CEQA, and all other topical areas have been analyzed and evaluated under CEQA.

As required by Mitigation Measures TRA-CNST-A and TRA-CNST-B, VTA is working closely with the Cities of San Jose and Santa Clara to develop CTMPs to minimize and reduce construction-related transportation impacts to the extent feasible and to inform the public and other stakeholders of the construction schedule and associated activities.

Therefore, this would not result in any new additional significant impacts, nor would it substantially increase the severity of previously anticipated significant impacts, and construction of the tunnel and excavation of soils from the West Tunnel Portal would still result in a significant unavoidable/adverse effect on vehicular traffic. All mitigation measures included as part of the Final SEIS/SEIR, including Mitigation Measures TRA-CNST-A and TRA-CNST-B, would continue to be implemented. Thus, a new or substantially greater significant impact would not result from the proposed modifications, and no additional environmental analysis pursuant to Section 15162 of the CEQA Guidelines is necessary.

3.1.1.2 Diridon Station

As stated in Chapters 5 and 6 of the Final SEIS/SEIR, construction of Diridon Station would require full and partial street closures, including bike lanes and sidewalks, of Autumn (now Barack Obama Boulevard), Montgomery, Cahill, and White Streets, with no closures anticipated on Santa Clara Street. Full closure of the streets and sidewalks south of Santa Clara Street near the station would occur for several months each. Partial closure of these streets and sidewalks near the station would last for months at a time throughout the 7–8 years of construction. Partial and full street and sidewalk closures would cause significant impacts on vehicular traffic, bicyclists, and pedestrians within the station area during construction. Although VTA will implement Mitigation Measures TRA-CNST-A, TRA-CNST-B, and TRA-CNST-C, construction of the Diridon Station would result in

a significant and unavoidable impact on pedestrians, bicyclists, and vehicular traffic during construction.

As the design of the Phase II Project continues to progress and the construction methodology is further refined, the layout and plans for lane closures to accommodate sequencing and staging phases of construction may need to be revised. Intermittent, partial lane closures on the south side of West Santa Clara Street may be necessary during construction at Diridon Station between Bush Street and Barack Obama Boulevard. These intermittent and partial lane closures would not result in new or substantially more severe impacts on transportation than previously analyzed in the Final SEIS/SEIR under Impact BART Extension AQ-1: Conflict with an air quality plan; Impact BART Extension AQ-2: Violate an air quality standard or contribute to an air quality violation; Impact BART Extension AQ-3: Cause a cumulatively considerable net increase in a criteria pollutant; Impact BART Extension AQ-4: Expose sensitive receptors to substantial pollutant concentrations; Impact BART Extension CNST-TRA-6: Conflict with transit, bicycle, or pedestrian policies, plans, or programs; and Impact BART Extension CNST-TRA-7: Interfere with activities at event centers. Also, these intermittent and partial lane closures would not result in a new or substantially more severe impacts on air quality during construction.

VTA will continue to implement Mitigation Measures TRA-CNST-A, TRA-CNST-B, and TRA-CNST-C to work with key stakeholders, including the City of San Jose and local fire and police departments, during the development of the CTMP for Diridon Station with the goal of maximizing traffic capacity and minimizing duration of closures.

As stated in Section 3.2 of the Final SEIS/SEIR, on September 27, 2013, Governor Jerry Brown signed SB 743 to further the State's commitment to its climate change goals. Environmental review of transportation impacts previously focused on LOS. Under SB 743, the focus of transportation impact analysis has shifted from driver delay to reduction of GHG emissions, creation of multimodal networks, and promotion of a mix of land uses. SB 743 required the OPR to amend the CEQA Guidelines (Title 14 of the California Code of Regulations, Division 6, Chapter 3, Sections 15000-15387) to provide an alternative to LOS for evaluating transportation impacts.

In 2020, after the Final SEIS/SEIR was released and the Phase II Project approved in 2018, the CEQA Guidelines were officially amended (Section 15064.3), and VMT replaced LOS as the metric by which projects must be evaluated. As stated in the March 5, 2024, VMT Memo, as of July 1, 2020, consistent with the revisions in State law to implement SB 743, public agencies in California are mandated to use VMT as the metric for CEQA transportation analyses. The CEQA Guidelines identify VMT as the most appropriate metric for evaluating a project's transportation impacts. With the California Natural Resources Agency's certification and adoption of the changes to the CEQA Guidelines, automobile delay and congestion, as measured by LOS and other similar metrics, no longer constitutes a significant environmental effect under CEQA.

The *Technical Advisory on Evaluating Transportation Impacts In CEQA*, published by the OPR in December 2018, contains recommendations regarding the assessment of VMT, thresholds of significance, and mitigation measures. The document states that: "Transit and active transportation projects generally reduce VMT and therefore are presumed to cause a less-than-significant impact on transportation." This presumption may apply to all passenger rail projects, bus and bus rapid transit projects, and bicycle and pedestrian infrastructure projects. Streamlining transit and active transportation projects aligns with each of the three statutory goals contained in SB 743 by reducing GHG emissions, increasing multimodal transportation networks, and facilitating mixed-use development. Because the Phase II Project is a passenger rail project, it is projected to reduce VMT and would therefore cause a less-than-significant impact on transportation.

As demonstrated in the VMT Memo, the analysis shows that the Phase II Project would reduce the daily (the sum of personal vehicles and trucks) VMT by 67,027 in 2019, 177,810 in 2039, and 187,903 in 2040. According to the *Technical Advisory on Evaluating Transportation Impacts In CEQA*, passenger rail projects, such as the Phase II Project, are presumed to cause a less-than-significant impact on transportation because they generally reduce VMT. The VMT Memo concludes and confirms that the Phase II Project would reduce VMT. Furthermore, even though, as the Final SEIS/SEIR stated, the Phase II Project would result in traffic congestion and automobile delay temporarily during construction, this is no longer considered a significant impact under CEQA, and all other topical areas have been analyzed and evaluated under CEQA.

As required by Mitigation Measures TRA-CNST-A and TRA-CNST-B, VTA is working closely with the Cities of San Jose and Santa Clara to develop CTMPs for the Phase II Project to minimize and reduce construction-related transportation impacts to the extent feasible and to inform the public and other stakeholders of the construction schedule and associated activities. Also, as required by Mitigation Measure TRA-CNST-C, VTA will prepare and implement an Emergency Services Coordination Plan to minimize the potential for construction activities to affect local emergency services routes and response times.

Therefore, this modification in construction methodology would not result in any new or additional significant impacts, nor would it substantially increase the severity of previously anticipated significant transportation impacts, and construction of Diridon Station would still result in a significant unavoidable/adverse effect on vehicular traffic. All mitigation measures included as part of the Final SEIS/SEIR, including Mitigation Measures TRA-CNST-A. TRA-CNST-B, and TRA-CNST-C would continue to be implemented. Thus, a new or substantially greater significant impact would not result from the proposed modifications, and no additional environmental analysis pursuant to Section 15162 of the CEQA Guidelines is necessary.

3.1.2 Operation

When the Final SEIS/SEIR was prepared, transportation impacts on the environment were measured using intersection LOS as the metric of significance. As of July 1, 2020, consistent with the revisions in State law to implement SB 743, public agencies in California are mandated to use VMT as the metric for CEQA transportation analyses. The CEQA Guidelines identify VMT as the most appropriate metric for evaluating a project's transportation impacts. With the California Natural Resources Agency's certification and adoption of the changes to the CEQA Guidelines, automobile delay and congestion, as measured by LOS and other similar metrics, no longer constitutes a significant environmental impact under CEQA.

The *Technical Advisory on Evaluating Transportation Impacts In CEQA*, December 2018, contains recommendations regarding the assessment of VMT, thresholds of significance, and mitigation measures. The document states that: "Transit and active transportation projects generally reduce VMT and therefore are presumed to cause a less-than-significant impact on transportation." This presumption may apply to all passenger rail projects, bus and bus rapid transit projects, and bicycle and pedestrian infrastructure projects. Streamlining transit and active transportation projects aligns with each of the three statutory goals contained in SB 743 by reducing GHG emissions, increasing multimodal transportation networks, and facilitating mixed-use development. Because the Phase II Project is a passenger rail project, it is projected to reduce VMT and would therefore cause a less-than-significant impact on transportation.

Therefore, operation of the Phase II Project with design refinements would not result in any new significant environmental impacts or a substantial increase in the severity of significant impacts on transportation than previously identified in the Final SEIS/SEIR.

3.2 Air Quality

3.2.1 Construction

Exhaust emissions were estimated using a spreadsheet methodology and using emission factors and emission rates obtained from the California Air Resources Board (CARB) EMission FACtor (EMFAC) mobile source emissions inventory model for on-road vehicles and Appendix A – the Data Tables used by CalEEMod (Version 2022.1.1) for off-road construction equipment.

Table 3-1 presents updated equipment exhaust (on site) and truck exhaust (off site) emissions for the Phase II Project with design refinements. Similar to the analysis and results disclosed in the Final SEIS/SEIR, maximum daily unmitigated emissions accounting for worst-case overlap of construction phases would exceed the Bay Area Air Quality Management District (BAAQMD) significance threshold for nitrogen oxides (NO_X).

When compared to the emissions analysis presented in the Final SEIS/SEIR, construction associated with the Phase II Project with design refinements would produce less emissions of reactive organic gases (ROG), NO_X, particulate matter 10 microns in diameter or less (PM_{10}), and particulate matter 2.5 microns in diameter or less ($PM_{2.5}$) on a daily basis.

Daily carbon monoxide (CO) emissions would be higher than the emissions presented in the Final SEIS/SEIR, but there is no applicable project-level threshold of significance for regional CO emissions.

The Phase II Project with design refinements would result in a similar short-term exceedance related to NO_X emissions, although that impact would be of lesser magnitude than the air quality impact previously disclosed in the Final SEIS/SEIR.

Table 3-1. Estimated Daily Construction Emissions

Criteria Air Pollutant or Ozone Precursor	Maximum Daily Emissions (pounds/day)				
	ROG	**NO_X**	**CO**	**PM_{10}**	**$PM_{2.5}$**
Onsite Emissions (Equipment Exhaust)					
Unmitigated	16	138	151	7	6
Mitigated (Tier 4 Exhaust Standards)	3	4	168	<1	<1
Offsite Emissions (Haul Truck Exhaust)					
28th Street/Little Portugal Station (*)	<1	7	5	<1	<1
Downtown San José Station (*)	<1	6	5	<1	<1
Diridon Station (*)	<1	6	4	<1	<1
13th Street Ventilation Structure (*)	<1	5	3	<1	<1
Stockton Avenue Ventilation Structure (*)	<1	5	4	<1	<1
West Portal (Import) (*)	<1	16	12	<1	<1
West Portal (Export) (*)	<1	19	14	<1	<1
East Portal	<1	17	12	<1	<1
Tunnel (muck) – West Portal to East Portal (*)	<1	50	36	<1	<1
Offsite Emissions (Concrete Truck Exhaust)					
Various Locations	1	16	3	<1	<1
Offsite Emissions (Crew Vehicles Exhaust)					
Various Locations	<1	2	26	<1	<1
Total					
Maximum Daily Emissions – Unmitigated	17	258	261	8	7
Maximum Daily Emissions – Mitigated	5	124	278	3	2
BAAQMD Construction Significance Thresholds	54	54	--	82	54
Exceed Threshold?	No	Yes	--	No	No
Comparison to Final SEIS/SEIR					
Phase II Project with Design Refinements – Unmitigated	17	258	261	8	7
Final SEIS/SEIR – Unmitigated	23	308	154	12	9
Exceed Threshold?	*No*	*Yes*	*No*	*No*	*No*

Criteria Air Pollutant or Ozone Precursor	Maximum Daily Emissions (pounds/day)				
	ROG	**NO_X**	**CO**	**PM_{10}**	**$PM_{2.5}$**
Phase II Project with Design Refinements – Mitigated	5	124	278	3	2
Final SEIS/SEIR – Mitigated	7	130	153	3	2
Exceed Threshold?	*No*	*Yes*	*No*	*No*	*No*

Sources: CARB 2022 (EMFAC2021, 2022); CAPCOA 2023 (CalEEMod Version 2022.1.0, 2023); Terry A. Hayes Associates Inc. 2024.

Note: Locations marked with (*) are included in the maximum daily emissions analysis based on schedule overlap. Construction activities at the East Portal are not anticipated to begin until 2026, and maximum daily emissions would occur sometime during the 2023–2025 scenario years.

Despite the number of hauling truckloads increasing for construction of the Phase II Project with design refinements compared to the Final SEIS/SEIR analysis, the daily NO_X emissions would be of similar magnitude due to mandatory compliance with the CARB Truck and Bus Regulation that went into effect in 2023, requiring all heavy-duty trucks to be outfitted with engines of model year 2010 or newer. Construction starting in 2024 for the Phase II Project with design refinements substantially reduces aggregate average haul truck emissions on a per-mile basis relative to the Final SEIS/SEIR analysis because of updated heavy-duty truck emissions standards. Therefore, no new or worsened significant impacts would occur; and no new or updated avoidance, minimization, and mitigation measures are needed to control criteria pollutant emissions during construction activities. As stated in the Final SEIS/SEIR, mitigation measures will be implemented to reduce air quality impacts. These include the following: Mitigation Measure AQ-CNST-A would implement dust control measures to reduce fugitive dust, Mitigation Measure AQ-CNST-B requires the use of U.S. Environmental Protection Agency (EPA) Tier 4 or cleaner engines, Mitigation Measure AQ-CNST-C requires maintenance of construction equipment, Mitigation Measure AQ-CNST-D would minimize idling time, Mitigation Measure AQ-CNST-E requires use of equipment meeting CARB certification standards, Mitigation Measure AQ-CNST-F would ensure that heavy-duty diesel trucks comply with EPA emissions standards, Mitigation Measure AQ-CNST-G requires the use of low-sulfur fuel, Mitigation Measure AQ-CNST-H locates construction areas away from sensitive receptors, and Mitigation Measure AQ-CNST-I requires the use of low-volatile organic compound (VOC) coatings.

As noted previously, intermittent, partial lane closures on the south side of West Santa Clara Street may be necessary during construction at Diridon Station between Bush Street and Barack Obama Boulevard. These intermittent and partial lane closures would not result in new exceedances or substantially more severe exceedances of BAAQMD thresholds as summarized in Table 3-1; see table rows for onsite emissions (equipment exhaust), offsite emission (haul truck exhaust) under Diridon Station, concrete truck exhaust, and crew vehicles exhaust. As shown in Table 3-2, similar to the conclusion in the Final SEIS/SEIR, the annual increase in $PM_{2.5}$ concentrations and cancer risk would exceed the BAAQMD significance thresholds. With design refinements, the health risk impacts would be greater than what was disclosed in the Final SEIS/SEIR due to the anticipated increase in the

duration of construction activities at this station. However, Mitigation Measure AQ-CNST-B, included in the Final SEIS/SEIR, would require Tier 4 exhaust controls and would continue to reduce $PM_{2.5}$ concentrations and the cancer risk to below the threshold. Therefore, for the Phase II Project with design refinements, with the implementation of Mitigation Measure AQ-CNST-B identified in the Final SEIS/SEIR, air quality impacts related to $PM_{2.5}$ concentrations and the cancer risk would remain less than significant. This conclusion is consistent with 2018 Final SEIS/SEIR.

No new or worsened $PM_{2.5}$ significant impacts resulting from construction activities of the Phase II Project with design refinements would occur. No new or updated avoidance, minimization, and mitigation measures are needed to control toxic air contaminant emissions during construction activities.

Table 3-2. Construction Health Risk Assessment

Exposure Parameter	Unit	BAAQMD Threshold	Unmitigated Exposures	Mitigated Exposures
Phase II Project with Design Refinements				
Excess Cancer Risk	Probability per Million Population	10	60.2	5.0
Chronic Health Non-Cancer Risk	Hazard Index	1.0	0.08	0.01
Increase in $PM_{2.5}$ Concentration	Average Annual ($\mu g/m^3$)	0.3	0.38	0.03
Final SEIS/SEIR				
Excess Cancer Risk	Probability per Million Population	10	27.2	1.6
Chronic Health Non-Cancer Risk	Hazard Index	1.0	0.24	0.02
Increase in $PM_{2.5}$ Concentration	Average Annual ($\mu g/m^3$)	0.3	1.17	0.12

Sources: Terry A. Hayes Associates Inc. 2015, 2024.
$\mu g/m^3$ = micrograms per cubic meter.

Therefore, construction of the Phase II Project with design refinements would not result in any new significant environmental impacts or a substantial increase in the severity of significant impacts on air quality than previously identified in the Final SEIS/SEIR under Impact BART Extension AQ-1: Conflict with an air quality plan; Impact BART Extension AQ-2: Violate an air quality standard or contribute to an air quality violation; Impact BART Extension AQ-3: Cause a cumulatively considerable net increase in a criteria pollutant; Impact BART Extension AQ-4: Expose sensitive receptors to substantial pollutant concentrations; and Impact BART Extension AQ-5: Create objectionable odors that would affect a substantial number of people.

3.2.2 Operation

The operational analysis considers emissions benefits associated with vehicle mode shift. Output from the regional transportation model for trips within, to, and from Santa Clara County were used to estimate daily emissions from regional on-road VMT under Existing Conditions (2019) with and without the Phase II Project with design refinements, and future operation of the No Build Alternative and the Phase II Project. Table 3-3 shows the regional VMT associated with the No Build Alternative and the Phase II Project. The VMT and associated emissions analysis are presented for the 2019 Existing Conditions, 2039 Opening Year, and 2040 Forecast Year. The Forecast Year in the ROD was 2035; however, the Phase II Project with design refinements is not anticipated to open until 2039, and the Forecast Year was updated to 2040.

Table 3-3. Regional Vehicle Miles Traveled

Analysis Year	Vehicle Miles Traveled (Miles per Day)			Percent Change from No Build Alternative
	No Build Alternative	Build Alternative	Change in Daily On-Road VMT	
Phase II Project with Design Refinements				
2019 Existing Conditions	55,664,434	55,597,407	-67,027	-0.12%
2039 Opening Year	67,508,705	67,330,895	-177,810	-0.26%
2040 Forecast Year	68,154,823	67,966,920	-187,903	-0.28%
Final SEIS/SEIR Project				
2019 Existing Conditions	55,664,434	55,597,407	-67,027	-0.12%
2025 Opening Year	54,981,379	54,693,572	-287,807	-0.52%
2035 Forecast Year	59,777,409	59,492,258	-285,151	-0.48%

Source: Hexagon Transportation Consultant, Inc. 2015, 2024.

The Phase II Project with design refinements was modeled to result in a reduction or displacement of 67,027 daily VMT in the scenario year of 2019, a reduction or displacement of 177,810 daily VMT in the Opening Year of 2039, and a reduction or displacement of 187,903 daily VMT in the Forecast Year of 2040 relative to the No Build Alternative through increased regional BART ridership. A reduction or displacement of 187,903 daily VMT would equal an annual reduction of 68.6 million VMT in the horizon year of 2040.

The decrease in the VMT reduction for the Phase II Project with design refinements (i.e., a reduction of 177,810 daily VMT in the 2039 Opening Year versus a reduction of 285,151 in the 2035 Forecast Year from the Final SEIS/SEIR) is attributed to the use of FTA's "STOPS" Model for the re-evaluation analysis, which forecasted lower BART ridership compared to the "BART Travel Forecasting Model" that was used in the Final SEIS/SEIR analysis. The lower BART ridership forecast is correlated with a smaller reduction in daily VMT because not as many vehicle trips would be displaced by mode shift to transit. However, operation of the Phase II Project with design refinements would still

provide substantial environmental benefits with regards to decreasing regional transportation-related emissions, as demonstrated by the following analyses.

Under operational conditions, the estimated criteria air pollutant emissions by all vehicles in the region are shown in Table 3-4. The analysis shows that the Phase II Project with design refinements—similar to the analysis and conclusions in the Final SEIS/SEIR—would reduce regional criteria air pollutant emissions associated with on-road vehicle travel. The Phase II Project with design refinements would result in a daily reduction of 268 pounds of CO, which equates to an annual reduction of CO emissions of approximately 50 tons.

Implementation of the Phase II Project with design refinements would result in a regional air quality benefit by encouraging a modal transportation shift from single-occupancy vehicles towards transit. No new or worsened significant impacts would occur. No new or updated avoidance, minimization, and mitigation measures are needed to control criteria pollutant emissions during operational activities.

Table 3-4. Estimated Daily Operational Emissions

Criteria Air Pollutant or Ozone Precursor	Daily Emissions (pounds/day)				
	ROG	**NO_X**	**CO**	**PM_{10}**	**$PM_{2.5}$**
2039 Opening Year					
No Build Alternative	1,263	9,131	75,376	21,195	3,850
Phase II Project with Design Refinements	1,262	9,111	75,146	21,156	3,843
Net Change from No Build	**(<1)**	**(20)**	**(230)**	**(39)**	**(7)**
BAAQMD Significance Thresholds	54	54	--	82	54
Exceeds Threshold?	***No***	***No***	**--**	***No***	***No***
2040 Forecast Year					
No Build Alternative	1,245	8,977	75,158	21,431	3,886
Phase II Project with Design Refinements	1,243	8,960	74,890	21,389	3,879
Net Change from No Build	**(2)**	**(17)**	**(268)**	**(42)**	**(8)**
BAAQMD Significance Thresholds	54	54	--	82	54
Exceeds Threshold?	***No***	***No***	**--**	***No***	***No***
2035 Forecast Year (Final SEIS/SEIR Project)					
No Build Alternative	927	4,852	52,408	6,360	2,607
Phase II Project, BART Extension Alternative	924	4,839	52,158	6,331	2,595
Net Change from No Build	**(3)**	**(13)**	**(250)**	**(29)**	**(12)**
BAAQMD Significance Thresholds	54	54	--	82	54
Exceeds Threshold?	***No***	***No***	**--**	***No***	***No***

Sources: CARB 2015, 2022 (EMFAC2014, EMFAC2021); CAPCOA 2013, 2023 (CalEEMod version 2013 and version 2022.1); Terry A. Hayes Associates Inc. 2015, 2024.

With respect to mobile source air toxics (MSATs), the Phase II Project with design refinements would continue to be electrically powered and would not generate new MSAT emissions from rail activity. The Phase II Project continues to include new bus transfer points at the 28th Street/Little Portugal Station and the Santa Clara Station in addition to utilizing an

existing bus transit facility at the Diridon Station. VTA operates diesel-hybrid buses that generate significantly less diesel emissions than standard buses. Bus idling would increase localized emissions; however, idling time is typically limited to less than 1 minute per vehicle at each stop, and the CARB Commercial Vehicle Idling Restriction limits idling to no more than 5 minutes at a single location.

The Newhall Maintenance Facility would still include chemicals related to repair and cleaning activities, resulting in evaporative emissions. Chemicals would be stored in accordance with BAAQMD and State safety guidelines. No new or worsened significant impacts would occur. No new or updated avoidance, minimization, and mitigation measures are needed to control MSAT or toxic air contaminants emissions during operational activities.

Therefore, operation of the Phase II Project with design refinements would not result in any new significant environmental impacts or a substantial increase in the severity of significant impacts on air quality than previously identified in the Final SEIS/SEIR.

3.3 Greenhouse Gas Emissions

3.3.1 Construction

BAAQMD's CEQA Guidelines do not identify a quantitative GHG emission threshold for construction emissions. Instead, BAAQMD recommends that GHG emissions from construction be quantified and disclosed and that a determination regarding the significance of the GHG emissions be made. Both the implementation of best management practices and a project's consistency with Assembly Bill (AB) 32 GHG emission reduction goals are considered.

The analysis in the Final SEIS/SEIR estimated that total GHG emissions associated with construction of the Phase II Project would be 50,787 metric tons of carbon dioxide equivalents ($MTCO_2e$). Because construction activity was expected to last 8 years, average annual CO_2e emissions associated with the Phase II Project was estimated to be 6,348 $MTCO_2e$. Operational GHG reductions would offset short-term construction emissions within approximately 2 years of the 2025 Opening Year. In addition, construction GHG emissions would be reduced through the incorporation of Mitigation Measures AQ-CNST-B through AQ-CNST-G. Thus, the Phase II Project would be consistent with AB 32 GHG reduction goals, and would result in a less-than-significant impact on construction GHG emissions.

Construction of the Phase II Project with design refinements would generate 63,764 $MTCO_2e$ of GHG emissions, a higher total than under the Final SEIS/SEIR. However, because construction activity is now expected to last 11 years, average annual CO_2e emissions associated with the Phase II Project with design refinements is estimated to be 5,796 $MTCO_2e$, which would be lower than calculated in the Final SEIS/SEIR. Similar to the

Final SEIS/SEIR, construction GHG emissions would be reduced through the incorporation of Mitigation Measures AQ-CNST-B through AQ-CNST-G. The Phase II Project with design refinements would continue to be consistent with AB 32 GHG reduction goals. Accordingly, the Phase II Project with design refinements would result in a less-than-significant impact on construction GHG emissions. No new or worsened significant impacts would occur. No new or updated avoidance, minimization, and mitigation measures are needed to control construction-period GHG emissions.

Therefore, construction of the Phase II Project with design refinements would not result in any new significant environmental impacts or a substantial increase in the severity of significant impacts on GHG emissions than previously identified in the Final SEIS/SEIR.

3.3.2 Operation

Consistent with the Final SEIS/SEIR, the analysis for the Phase II Project with design refinements considers electricity-related emissions from operation of BART, as well as GHG benefits associated with vehicle mode shift. As shown in Table 3-5 and similar to the Final SEIS/SEIR, operation of the Phase II Project with design refinements would decrease GHG emissions due to reductions in VMT-related emissions. The Phase II Project with design refinements would reduce annual on-road VMT by approximately 68.6 million miles, which would result in a decrease of approximately 19,824 $MTCO_2e$/year. This mass quantity equates to a reduction of 21,850 standard tons of GHG emissions per year by 2040. This smaller reduction of regional transportation-related GHG emissions under the Phase II Project with design refinements is attributed to the smaller decrease in daily VMT. The decrease in the daily VMT reduction can be primarily attributed to the use of the FTA's "STOPS" Model for this analysis, which forecasts lower BART ridership compared to the "BART Travel Forecasting Model" and thus lower VMT reductions. The operational CO and GHG emissions are not proportionate to the VMT reduction. The CO and greenhouse gas reductions under the Phase II Project with design refinements were calculated using the EMFAC2021 model, which is a newer iteration of CARB's mobile source emissions inventory than the EMFAC2014 model used in the 2018 SEIS/SEIR. On a per-mile basis, the 2040 CO emission factors for light duty vehicles from the EMFAC2021 model are about 45% higher than the 2035 CO emission factors for light duty vehicles in the EMFAC2014 model. Even though the 2040 VMT reduction is approximately 34% lower (68.6 million VMT vs. 104.1 million VMT) than the 2035 reduction in the 2018 SEIS/SIER, the higher CO emission factors for light duty vehicles offsets the difference in VMT reduction.

Implementation of the Phase II Project with design refinements would still provide a substantial contribution to reducing regional GHG emissions through effective transportation and transit planning.

Operation of the Phase II Project with design refinements would not result in any new significant environmental impacts or a substantial increase in the severity of significant impacts on GHG emissions than previously identified in the Final SEIS/SEIR.

Table 3-5. Estimated Annual Greenhouse Gas Operational Emissions

Scenario and Emissions Sources	Annual GHG Emissions ($MTCO_2e$/year)
2019 Existing Conditions Scenario (Informational Purposes Only)	
No Build Alternative – Regional On-Road VMT Emissions	7,966,863
Phase II Project with Design Refinements – Regional On-Road VMT Emissions	7,958,673
Phase II Project with Design Refinements – Newhall Maintenance Facility Emissions	387
Net Emissions (No Build Alternative minus Project Emissions)	**(7,803)**
2039 Opening Year Scenario	
No Build Alternative – Regional On-Road VMT Emissions	6,883,276
Phase II Project with Design Refinements – Regional On-Road VMT Emissions	6,865,656
Phase II Project with Design Refinements – Newhall Maintenance Facility Emissions	314
Net Emissions (No Build Alternative minus Project Emissions)	**(17,306)**
2040 Forecast Year Scenario	
No Build Alternative – Regional On-Road VMT Emissions	6,886,183
Phase II Project with Design Refinements – Regional On-Road VMT Emissions	6,866,359
Net VMT Emissions (Project minus No Build Alternative VMT Emissions)	**(19,824)[1]**
Phase II Project with Design Refinements – Newhall Maintenance Facility Emissions	308
Net Emissions (Project Emissions minus No Build Alternative Emissions)	**(19,516)**
2018 Final SEIS/SEIR Project 2035 Horizon Year vs. Phase II Project with Design Refinements – 2039 Opening Year	
2018 SEIS/SEIR Project – Net Annual GHG Emissions (2035 Horizon Year)	(22,136)
Phase II Project with Design Refinements – Net Annual GHG Emissions (2039 Opening Year)	(17,306)

Sources: CARB 2022 (EMFAC2021); CAPCOA 2023 (CalEEMod Version 2022.1); Terry A. Hayes Associates Inc. 2015, 2024.
[1] 1 metric ton = 2,204.62 pounds; 19,824 $MTCO_2e$ x (2,204.62 [pounds/MT] / 2,000 [pounds/ton]) = 21,852 tons of GHG emissions.

Future operation of the Phase II Project with design refinements would be consistent with statewide goals to enhance transit connectivity and displace on-road passenger vehicle trips and would not result in an adverse impact related to air quality or global climate change.

Therefore, no new or worsened significant impacts would occur. No new or updated avoidance, minimization, and mitigation measures are needed to control GHG emissions during operational activities.

3.4 Land Use

3.4.1 Construction and Operation

In the Final SEIS/SEIR, the analysis concluded that construction of the Phase II Project would result in the permanent displacement of one residence at Diridon Station and 28–35

businesses for the Single-Bore, Downtown San Jose Station West, and Diridon North Options. Since that time, the summary of the displacement of residences and commercial businesses has been revised, as the construction methodology has been further defined, as described below.

The Phase II Project with design refinements would result in up to eight residential (apartment) displacements at the Downtown San Jose Station that were not disclosed in the Final SEIS/SEIR in addition to the one previously disclosed residential displacement at Diridon Station (Final SEIS/SEIR, Table 4.14-11). The eight apartment units are located on the second floor at 97 Santa Clara Street. This property was identified in the Final SEIS/SEIR in the proposed station plans as within the original project's footprint; however, its land use was noted as commercial. It was not known at the time that the second floor of the building contained residential apartments.

The reduction of the Diridon and Santa Clara Station footprints and the refinement of the construction methodology has resulted in updates to the displacement of commercial businesses and would eliminate the need for displacement of four businesses.

Also, due to the anticipated durations of lane closures to construct the West Ventilation Structure on Santa Clara and White Streets at Diridon Station, one additional business may be displaced due to restricted access. This property formerly contained one business but is currently vacant. However, if the owner finds a new tenant, construction of the West Ventilation Structure at this station may result in the displacement of the business during construction.

In addition, a property that is leased to a commercial business located just west of the primary headhouse at the Downtown San Jose Station has been identified as potentially needing preconstruction improvements to prevent damage to the building during construction. These improvements may include ground treatment (such as compensation grouting), underpinning, internal/external bracing, and/or other structural support. Construction of these improvements to protect the structural stability of the building may result in the need to either temporarily close or relocate the existing business operation for up to 12 months. If this occurs, the business owner will receive eligible relocation benefits in compliance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (Uniform Act). Additionally, the business owner may seek damages for loss of business goodwill under California law.

Overall, with the updates listed above, commercial displacements are still within the same range (28–35 businesses) as was disclosed in the Final SEIS/SEIR.

As stated in the Final SEIS/SEIR, all displacement and relocation activities would be conducted in accordance with the Uniform Act, including FTA guidelines and VTA's Relocation Program, which complies with federal relocation requirements and provides assistance to affected residents and business owners. VTA has prepared a Real Estate Acquisition Management Plan (RAMP) and Relocation Assistance Plan (RAP), as required

by FTA for properties and occupants affected. The Phase II Project will adhere to all applicable laws and regulations related to the acquisition of private property and displacement of existing residents and businesses.

Therefore, construction of the Phase II Project with design refinements would not result in any new significant environmental impacts or a substantial increase in the severity of significant impacts on land use than previously identified in the Final SEIS/SEIR.

3.5 Noise and Vibration

3.5.1 Noise

3.5.1.1 Construction

Similar to the conclusions in the Final SEIS/SEIR, construction of the Phase II Project with design refinements is anticipated to exceed FTA construction noise thresholds for Leq (equivalent sound level) during daytime and nighttime construction work. With incorporation of construction noise mitigation measures NV-CNST-A through NV-CNST-S, development of comprehensive construction noise specifications, and a noise mitigation and monitoring plan, construction noise impacts would be reduced to a less-than-significant level at all locations except at the Downtown San Jose and Diridon Stations.

Because of the proximity of sensitive noise receptors at these stations, construction of the Phase II Project with design refinements would result in significant and unavoidable noise impacts at the Downtown San Jose and Diridon Stations even after all feasible mitigation measures have been implemented, similar to the Final SEIS/SEIR. However, construction of the Phase II Project with design refinements would not result in new or worsened noise impacts, and no new or updated avoidance, minimization, and mitigation measures are needed to control noise during construction.

3.5.1.2 Operations

Groundborne Noise

In the Final SEIS/SEIR, the projected levels of groundborne noise for BART train operations within the tunnel were calculated for the single-bore tunnel in a side-by-side and a stacked train track configuration and would be approximately 70 feet below ground on average. The Phase II Project was required to install approximately 14,600 linear feet of Isolated Slab Track (IST) or equivalent to reduce groundborne noise impacts at 386 sensitive receptors, as outlined under Mitigation Measure NV-B for the Single Bore, Downtown San Jose Station West, and Diridon Station North Options.

For the Phase II Project with design refinements, there would be vertical alignment shifts (up to approximately 13 feet shallower and up to approximately 33 feet deeper) and horizontal alignment shifts of up to 125 feet at the widest diversion point of the tunnel (just west of

Diridon Station). The Phase II Project with design refinements would result in a reduction of sensitive receptors potentially affected by groundborne noise as compared to the Final SEIS/SEIR due to the change in track configuration within the tunnel, including crossovers. The Final SEIS/SEIR identified 386 potential sensitive receptors; however, with the design refinements, only 3 sensitive receptors have been identified as potentially affected. These 3 receptors, which are near a crossover, are multifamily residential, and they were not previously identified as affected sensitive receptors in the Final SEIS/SEIR. For these 3 receptors, implementation of Mitigation Measure NV-B will reduce anticipated impacts to below FTA groundborne noise thresholds.

Mitigation Measure NV-B still includes the requirement of IST or equivalent, as described in the Final SEIS/SEIR, to reduce anticipated groundborne noise impacts to below FTA thresholds. The application of highly resilient, direct-fixation (HRDF) fasteners for a total length of approximately 1,000 feet at the crossover (from STA 687+00 to 692+00 on both tracks) would mitigate potential impacts to below FTA thresholds. HRDF fasteners are an equivalent mitigation to IST and meet the requirements of Mitigation Measure NV-B to reduce groundborne vibration. Mitigation Measure NV-B also requires additional vibration propagation studies to be conducted during final design to determine the specific mitigation strategy (design feature such as IST, HRDF, or other effective method) that will achieve the FTA groundborne noise criteria.

Therefore, the Phase II Project with design refinements would not exceed FTA groundborne vibration criteria at any receptors after mitigation is incorporated, which is the same conclusion as presented in the Final SEIS/SEIR.

Airborne Noise

Airborne noise levels from train operations would be the same as reported in the Final SEIS/SEIR because the design refinements predominantly affected the noise of tunnel operations and not the above-grade portions of the work. No new mitigation is required for airborne noise from train operations.

Similar to the Final SEIS/SEIR, airborne noise levels from ancillary facilities would result in less-than-significant levels with the implementation of Mitigation Measure NV-A, which requires noise control measures to comply with applicable city criteria at ancillary facilities such as tunnel ventilation shafts, pressure relief shafts, traction power substations, and emergency backup generators. These treatments include sound attenuators, acoustical absorptive treatments, and perimeter noise walls.

3.5.2 Vibration

3.5.2.1 Construction

The TBM would be a source of vibration during construction, the impact of which depends on the proximity of the tunnel to sensitive receptors and soil conditions encountered.

In the Final SEIS/SEIR, the TBM was estimated to have a typical progress rate of 30 to 40 feet per day depending on soil conditions encountered. The Phase II Project with design refinements estimates a similar progress rate. The Final SEIS/SEIR concluded that, as the TBM progresses along the tunnel alignment, vibration may exceed the FTA impact criteria for occasional events (75 vibration velocity decibels [VdB]) at receptors 75 feet or less from the horizontal centerline of the tunnel. At these locations, vibration from the TBM would potentially be perceptible for up to 4 days. Different locations may experience perceptible vibration at different times, but the effect would be short term and temporary. Implementation of Mitigation Measures NV-CNST-P through NV-CNST-S and GEO-CNST-B and GEO-CNST-C will reduce this impact to less than significant.

Similar to the analysis in the Final SEIS/SEIR, vibration levels from the TBM would be below the most conservative building vibration criterion; impacts would be the same or less than described in the Final SEIS/SEIR. Previously identified Mitigation Measures NV-CNST-P through NV-CNST-S and GEO-CNST-B and GEO-CNST-C still apply, and no new mitigation is required.

3.5.2.2 Operations

All sensitive receptors adjacent to the at-grade segment of the alignment, which starts approximately 600 feet north of I-880, will be over 200 feet (i.e., 223 feet and greater) from the nearest track. The screening distance for vibration from a rail rapid transit system such as BART is 200 feet. Consequently, no vibration impacts are expected for the at-grade segment of the Phase II Project with design refinements, and no further analysis has been performed.

3.6 Water Resources, Water Quality, and Floodplains

3.6.1 Construction

The Phase II Project would be designed to withstand a 10 percent annual storm event (10-year flood event)[1], and specific facilities would be designed to withstand 1 percent and 0.2 percent annual storm events (100- and 500-year flood events, respectively), as required by BART Facility Standards and described in the Final SEIS/SEIR. Critical facilities would be set a minimum of 1 foot above the 0.2 percent water surface elevation and have an overland flood release path that would result in no more than 1 foot of ponding, which is required for critical facilities including traction power substations, gap breaker stations, train control and communications buildings, and ventilation shaft openings. The retained cut sections, retained fill sections, station entrances, and access points would have a freeboard of 6 inches to 1 foot above the base flood elevation[2]. Where the locations of critical facilities are

[1] A flood that has a 10% chance (1 out of 10) of occurring in any given year. Also known as a 10-year flood. It should not be confused as a flood event that could happen only once in 10 years.
[2] A factor of safety usually expressed in feet above a flood level for purposes of floodplain management.

not above the 0.2 percent flood elevation, the facilities would be raised above the 0.2 percent floodplain level.

The Newhall Maintenance Facility is a critical facility and would be designed in accordance with the standards and requirements for critical facilities. The facility would be within Zones D and X[3], areas that are not considered part of a base floodplain. Regardless, design refinements would include raising the final finished grade of this facility to 2-5 feet above existing grade to satisfy 100-year flood requirements. Construction impacts of raising the existing grade have been considered in the air quality, noise, and traffic analyses presented in this Addendum.

The design would incorporate underdrains, culverts, and permanent stormwater treatment facilities that will equalize offsite floodplain elevations such that the existing conditions remain unchanged after construction of the facility. In addition, the elevation of the Newhall Maintenance Facility site would be raised prior to and in advance of construction of other facility elements, such as maintenance buildings and critical facilities. To maintain existing flooding conditions, stormwater facilities would be constructed concurrent with raising the site elevation.

Mitigation Measure WQ-A from the Final SEIS/SEIR remains applicable for the entire Phase II Project. With implementation of this mitigation measure and other design features to address flooding and stormwater quality and quantity, there would be no impacts on water quality or floodplains, as concluded in the Final SEIS/SEIR.

3.6.2 Operations

Operation of the Phase II Project with design refinements would not result in any new significant environmental impacts or a substantial increase in the severity of significant impacts on water quality or floodplains than previously identified in the Final SEIS/SEIR. Raising the elevation of the Newhall Maintenance Facility by 2-5 feet above existing grade and incorporating stormwater infrastructure would protect critical infrastructure during a flood event, address water quality, and maintain existing flood conditions.

3.7 Cumulative Impacts

The proposed Phase II Project with design refinements addressed in this Addendum would not result in new significant cumulative impacts, nor would they result in the worsening or increased severity of previously significant cumulative impacts as described below.

The analysis, impacts, and mitigation measures for the following environmental subject areas have not changed since the Final SEIS/SEIR was approved, and, therefore, the cumulative

[3] Zone D is the flood insurance rate zone that corresponds to unstudied areas where flood hazards are undetermined but possible. Zone X is the flood insurance rate zone that corresponds to areas outside the 500-year floodplain, areas within the 500-year floodplain, and areas of 100-year flooding where average depths are less than 1 foot, areas of 100-year flooding where the contributing drainage area is less than 1 square mile, and areas protected from 100-year flood by levees. No base flood elevations or depths are shown within this zone.

analysis and conclusions in the Final SEIS/SEIR have also not changed: biological resources and wetlands; community facilities and public services; cultural resources; energy; geology, soils, and seismicity; hazards and hazardous materials; utilities and service systems; visual quality and aesthetics; and growth-inducing impacts.

The following cumulative evaluation focuses on the following environmental subject areas: transportation; air quality; GHG emissions; land use; noise and vibration; and water resources, water quality, and floodplains.

For transportation impacts during construction, with the revisions to the CEQA Guidelines in 2020, traffic congestion and automobile delay are no longer considered an impact under CEQA. In addition, the Phase II Project would result in a reduction in VMT once in operation, and the Final SEIS/SEIR has provided for mitigation measures to prepare and implement CTMPs in collaboration with the local cities to minimize impacts during construction to the extent feasible. As stated in the Final SEIS/SEIR, construction of the Phase II Project may coincide with construction of the California High Speed Rail Project. Therefore, there remains a potential for construction of the Phase II Project to result in a cumulative construction transportation impact at the Diridon and Santa Clara Station areas. Construction could result in disruptions to existing roadway, bicycle, pedestrian facilities, and parking as well as access to businesses. Given the possibility that the Phase II Project may overlap with various related projects during construction in time and location, there would still be a considerable contribution to a cumulative impact under CEQA at the Santa Clara and Diridon Station areas. VTA will implement the mitigation as described in Chapter 5 of the Final SEIS/SEIR and coordinate with the California High-Speed Rail Authority and Caltrain to coordinate the two projects to minimize transportation impacts during construction. However, this does not change the conclusions in the Final SEIS/SEIR.

For operational transportation, as stated in the Final SEIS/SEIR, the Phase II Project would not result in adverse impacts on study area intersections or freeway segments. It would provide a benefit to the regional transportation system and would result in a reduction in VMT. Therefore, the Phase II Project would not result in a cumulatively considerable traffic impact.

As stated in the Final SEIS/SEIR, construction of the Phase II Project would result in air quality impacts from the use of heavy-duty construction equipment and haul trucks as well as vehicle trips generated by construction workers while traveling to and from the various construction sites along the alignment. In addition, NO_X emissions would result primarily from the use of construction equipment and haul trucks. Mitigation Measures AQ-CNST-A through AQ-CNST-H will be implemented during construction to control fugitive dust and reduce NO_X emissions during the construction period. Even with the incorporation of these measures, air quality impacts (NO_X emissions only) from the construction activities would remain significant and unavoidable. Construction of the Phase II Project may occur simultaneously with projects in the area that could also result in significant air quality impacts during the construction activities. The Phase II Project, in combination with other

foreseeable projects in the surrounding area, could have an adverse cumulative effect or significant cumulative impact on air quality during the construction period. However, the construction schedule for the Phase II Project has shifted, which, in the case of air quality and GHG, provides for a cleaner construction vehicle fleet. Therefore, the conclusions in the Final SEIS/SEIR have not changed, and the Phase II Project would continue to result in a considerable contribution to a cumulative regional air quality impact during construction.

Overall, with the design refinements, during operation, the Phase II Project would continue to result in a regional air quality benefit due to the net benefit of decreasing regional VMT through mode shift and would not result in a considerable contribution to a cumulative impact under CEQA.

As stated in the Final SEIS/SEIR, construction and operation of the Phase II Project would be generally consistent with adjacent land uses and regional and local plans and policies. The land use impacts would be similar except that absence of the BART Extension would be inconsistent with the regional transportation plans. Therefore, there would be no cumulative impact as a result of cumulative development in the Association of Bay Area Governments region. Consequently, the cumulative land use impact would not be considerable and would not be significant under CEQA. With the design refinements, the Phase II Project has not changed substantively from the project in the Final SEIS/SEIR, and, therefore, the conclusions have not changed.

As stated in the Final SEIS/SEIR, construction of the Phase II Project would result in the potential for significant impacts due to noise and vibration during construction. With mitigation, vibration would be reduced to a less-than-significant impact, but noise would remain significant and unavoidable. Therefore, construction-related noise impacts would be cumulatively considerable and would be considered significant under CEQA. With the design refinements, the conclusions from the Final SEIS/SEIR have not changed. The Phase II Project would still result in significant unavoidable noise impacts during construction, and construction-related noise impacts would be cumulatively considerable and would be considered significant under CEQA.

As stated in the Final SEIS/SEIR, the contribution of the Phase II Project to operation-related noise impacts would not be cumulatively considerable and would not be significant under CEQA. The design refinements would result in a greatly reduced number of sensitive receptors potentially impacted by the Phase II Project due to groundborne noise, as well as a corresponding reduction in mitigation. There are no other changes to the conclusions in the Final SEIS/SEIR; therefore, the contribution of the Phase II Project to operation-related noise impacts would not be cumulatively considerable and would not be significant under CEQA.

As stated in the Final SEIS/SEIR, cumulative water quality, flooding, and stormwater runoff impacts for both construction and operation of the Phase II Project would not be considerable, and the impact would not be significant under CEQA. With the design refinements, raising the final finished grade of the Newhall Maintenance Facility would have

beneficial impacts on protecting critical infrastructure and would maintain existing flooding conditions, and the conclusions in the Final SEIS/SEIR would not change.

Therefore, for the reasons described above, there is no change to the conclusions in the Final SEIS/SEIR for the Phase II Project's contribution to a cumulatively significant impact in any of these resource areas described above.

3.8 References Cited

California Air Pollution Control Officers Association (CAPCOA). 2013. California Emissions Estimator Model (CalEEMod v2013.2). Updated July 2013.

California Air Pollution Control Officers Association (CAPCOA). 2023. California Emissions Estimator Model (CalEEMod v2022.1.1.3). Updated June 2023.

California Air Resources Board (CARB). 2015. On-Road EMission FACtor (EMFAC2014v1.0.7) Model. Updated May 2015.

California Air Resources Board (CARB). 2022. On-Road EMission FACtor (EMFAC2021 v1.0.2) Model. Updated May 2022.

Hexagon Transportation Consultants, Inc. 2015. *Daily Vehicle Miles By Speed Bin - Trips To, From and Within Santa Clara County.* November.

Hexagon Transportation Consultants, Inc. 2024. *Draft Memorandum: VMT Estimates for the BART Silicon Valley Phase II Extension Project*. March.

Terry A. Hayes Associates Inc. 2015. *Air Quality & Greenhouse Gas Emissions Calculation Files for the BART SVII Extension Project.* November.

Terry A. Hayes Associates Inc. 2024. *Air Quality & Greenhouse Gas Emissions Calculation Files for the BART SVII Extension Project Re-Evaluation.* November.

Chapter 4
Environmental Determination

The Final SEIS/SEIR evaluated the potential environmental impacts and effects of the construction and operation of the Phase II Project. This Addendum evaluates both an update to the opening year and design refinements since the Phase II Project was approved in 2018, such as minor modifications to the tunnel configuration and alignment, project elements associated with the stations, and ventilation facilities. Based on the evaluation of the design refinements presented in this Addendum, the analyses conducted and the conclusions reached in the Final SEIS/SEIR remain valid and no supplemental environmental review is required, pursuant to CEQA Guidelines Sections 15162, 15163, and 15164.

This Addendum has not identified any new significant adverse impact or any substantial increase in the severity of a significant adverse impact previously identified for the Phase II Project in the Final SEIS/SEIR, nor has any "new information of substantial importance" been presented pursuant the CEQA Guidelines Section 15162. No new mitigation has been identified, and all mitigation measures described in the Final SEIS/SEIR remain applicable and will be implemented as required by the approved Mitigation Monitoring and Reporting Program. Therefore, this Addendum to the Final SEIS/SEIR is the appropriate environmental document.

Appendix A
Technical Memorandums

Hexagon. 2024. *Vehicle Miles Traveled (VMT) Estimates for the BART Silicon Valley Phase II Extension Project*. March 2024.

Terry A. Hayes Associates Inc. 2024. *Re-Evaluation of the Air Quality Technical Report for the Santa Clara Valley Transportation Authority Bay Area Rapid Transit Silicon Valley Phase II Extension Memorandum.* March 2024.

Wilson Ihrig. 2024. *Noise and Vibration Analysis of Design Changes to VTA's BART Silicon Valley Phase II Extension Project Since the 2018 Record of Decision*. March 2024.

Hexagon Transportation Consultants, Inc.

Memorandum

Date: March 5,2024
To: Samantha Swan McCleary, Senior Environmental Planner, VTA
From: At van den Hout
Subject: VMT Estimates for the BART Silicon Valley Phase II Extension Project

Introduction

In February 2018, the Valley Transportation Authority (VTA) released the Final Supplemental Environmental Impact Statement/Subsequent Environmental Impact Report (SEIS/SEIR) for the BART Silicon Valley Phase II Extension Project (BSVII Project, hereafter referred to as the "Project"). On April 5, 2018, VTA's Board of Directors certified the SEIR under the California Environmental Quality Act (CEQA) and approved the Project. The traffic analysis prepared for the Project, and the resulting traffic data used in the air quality and greenhouse gases (GHG) emissions analysis, relied on ridership and vehicular traffic forecasts for the opening year 2025 and horizon year 2035. The opening year of the project has been delayed to 2039, and the horizon year has been extended to 2040. As a result, the air quality and GHG emissions analysis need to be updated to reflect the traffic conditions for these future years.

When BSVII SEIS/SEIR was prepared, transportation impacts on the environment according to CEQA and NEPA were measured using intersection level of service as the metric of significance. As of July 1, 2020, consistent with the revisions in State law to implement Senate Bill (SB) 743, public agencies in California are mandated to use vehicle miles traveled (VMT) as the metric for CEQA transportation analyses. The CEQA Guidelines identify VMT as the most appropriate metric for evaluating a project's transportation impacts. With the California Natural Resources Agency's certification and adoption of the changes to the CEQA Guidelines, automobile delay and congestion, as measured by level of service (LOS) and other similar metrics, no longer constitutes a significant environmental effect under CEQA.

The *Technical Advisory on Evaluating Transportation Impacts In CEQA*, December 2018, contains recommendations regarding the assessment of VMT, thresholds of significance, and mitigation measures. The document states that: *Transit and active transportation projects generally reduce VMT and therefore are presumed to cause a less-than-significant impact on transportation. This presumption may apply to all* ***passenger rail projects****, bus and bus rapid transit projects, and bicycle and pedestrian infrastructure projects. Streamlining transit and active transportation projects aligns with each of the three statutory goals contained in SB 743 by reducing GHG emissions, increasing multimodal transportation networks, and facilitating mixed-use development.* Since the Project is a passenger rail project, it is projected to reduce VMT and would therefore cause a less-than-significant impact on transportation.

This memorandum presents the Project description, background information, data needs for the air quality analysis, the modeling approach, VMT estimates, and a conclusion.

Project Description

The Project consists of an approximately 6-mile extension of the BART system from the Berryessa Station through downtown San Jose in an approximately 5-mile-long single-bore tunnel terminating in Santa Clara

near the Santa Clara Caltrain Station. The Project includes three underground stations in the City of San Jose (Little Portugal/28th Street, Downtown San Jose, and Diridon Stations), one at-grade station in the City of Santa Clara (Santa Clara Station), two mid-tunnel facilities, and the Newhall Maintenance Facility on the border of the Cities of San Jose and Santa Clara near the Project's terminus.

Background

On June 4, 2018, the Federal Transit Administration (FTA) issued a Record of Decision (ROD) under the National Environmental Policy Act (NEPA). Subsequently, the VTA, in coordination with the FTA, prepared a Re-evaluation under NEPA and an Addendum under CEQA to reflect optimization of the alignment, station configurations, and other facilities, consistent with local, state, and national codes (e.g., BART requirements, the California Building Code, and the National Fire Protection Act). The FTA signed the NEPA Re-Evaluation in March 2021. After the FTA approved the NEPA Reevaluation, the VTA made several design refinements to the Project.

The only design refinement affecting the ridership and vehicular forecast is the Project's opening and horizon years. The transportation analysis prepared for the 2018 BSVII Project EIR/EIS was developed with VTA's BART Travel Forecasting Model (BART model) and relies on transit ridership and vehicular forecasts for the opening year 2025 and horizon year 2035. The opening year of the Project has been delayed to 2039, and the horizon year is now 2040. As part of the Project FTA's Capital Investment Grant (CIG) New Starts submission, the transit ridership forecasts were recently updated with FTA's Simplified Trips-on-Project Software (STOPS) model. These forecasts are documented in *VTA's BART Silicon Valley Phase II Travel Forecast Results Report,* dated November 2, 2022. This report includes (a) a description of the project, (b) the primary mobility benefits of the project, and (c) Project and No Project forecasts for current (2019) and horizon (2040) year conditions. Because of the different forecast years and the changed forecasting tool, from VTA's BART model to FTA's STOPS model, the air quality and noise analysis need to be updated.

Air Quality Data Needs

VMT is the metric used in air quality and greenhouse gas emissions analyses because it indicates the use of automobile and truck travel in the region. More vehicle miles traveled generally means more air pollution. The air quality and greenhouse emission analysis requires VMT data as input to the simulation models. Daily auto and truck VMTs at five-minute speed intervals are needed for trips to, from, and within Santa Clara County for the following six scenarios:

- Existing Year 2019
- Existing Year 2019 plus Project
- Opening Year 2039 plus No Project
- Opening Year 2039 plus Project
- Horizon Year 2040 plus No Project
- Horizon Year 2040 plus Project

The data sources and assumptions that define the Project and No Project scenarios can be found in Chapter 4 of *VTA's BART Silicon Valley Phase II Travel Forecast Results Report.*

Modeling Approach

While the STOPS model estimates daily VMT savings for the current and future year scenarios, it does not provide estimates of daily vehicle trips, nor does it compute daily VMTs by speed interval as is required to calculate the impact of the Project on air quality and greenhouse emissions. To develop the required VMT metrics, a hybrid approach of STOPS output data and the BART model was used. The BART model predicted more transit riders than the STOPS model, and it would therefore result in less vehicular traffic and lower VMTs. Several adjustments were made to the BART model to align with the transit trip estimates from the STOPS model. These adjustments pertained to the boarding fares, walk distances, wait times, and transit headways. These modifications were applied to the primary transit services affecting this Project's ridership: Caltrain, BART, VTA LRT, and VTA Bus. **Note that these adjustments were not made to improve the BART model's ability to forecast transit ridership, but rather to avoid reducing the daily vehicle trips, which would result in lower VMT**. Table 1 compares the transit ridership developed with the STOPS and the Adjusted BART models for 2019, 2039, and 2040.

Table 1
Ridership Forecast Developed with the STOPS Model and the Adjusted BART Model

Transit Mode	2019 STOPS Model [1]	2019 Adjusted BART Model	2019 STOPS/ BART Ratio	2039 STOPS Model [2]	2039 Adjusted BART Model	2039 STOPS/ BART Ratio	2040 STOPS Model [1]	2040 Adjusted BART Model	2040 STOPS/ BART Ratio
VTA - LRT	35,155	33,884	0.96	65,005	64,083	0.99	66,498	66,730	1.00
VTA - Bus	93,514	96,161	1.03	128,928	127,445	0.99	130,699	130,448	1.00
BART	442,280	449,192	1.02	652,832	664,613	1.02	663,360	682,074	1.03
CalTrain	92,634	80,262	0.87	154,725	145,898	0.94	157,830	149,493	0.95
Total	**663,583**	**659,499**	**0.99**	**1,001,492**	**1,002,039**	**1.00**	**1,018,387**	**1,028,745**	**1.01**

[1] Ridership data obtained from VTA's BART Silicon Valley Phase II Travel Forecast Results Report, November 2, 2022.
[2] Ridership interpolated from 2019 and 2040 STOPS data.

VMT Estimates

AECOM provided 2019 and 2040 transit trip tables from the STOPS model for the Project and No Project scenarios. The trip tables contain forecasted transit trips for three trip purposes (Home-Based Work, Home Based Other, and Non-Home-Based) by mode of access (Walk, Park-and-Ride, and Kiss-and Ride). Table 2 presents the increase in transit trips between the Project and the No Project by trip purpose for 2019, 2039, and 2040. According to the STOPS data, the Project in 2040 is expected to generate 10,684 new transit riders (5,487 Home-Based Work, 3,506 Home-Based Other, and 1,691 Non-Home-Based). Without the Project, it is assumed that these 10,684 transit riders would use personal vehicles instead. To estimate the additional vehicle trips for the No Project scenario, the transit trips were converted to vehicle trips assuming vehicle drive percentages (drive alone, two-person carpool, and three+ person carpool) from the BART model. This resulted in 8,419 daily vehicle trips, which were then added to the daily vehicle trips for the Project scenario.

Table 2
Increase in Transit Trips from the STOPS Model: Project – No Project

Trip Purpose	2019 [1]	2039 [2]	2040 [1]
Home-Based Work	2,785	5,358	5,487
Home-Based Other	1646	3,417	3506
Non-Home-Based	751	1,646	1,691
Total	**5,182**	**10,422**	**10,684**

[1] Summary of STOPS Transit Trip Tables Provided by AECOM, email dated 03/14/2023.

[2] Transit Trips Interpolated From 2019 and 2040 STOPS Data.

Before the traffic was assigned to the roadway networks, time-of-day and directionality factors were applied to the vehicle trips occurring during the four-hour morning, six-hour midday, four-hour afternoon, and ten-hour evening/night period. The assignment of the trip tables to the roadway network uses a route selection procedure based on minimum travel time between TAZs using a capacity-constrained assignment process that enables the model to reflect the diversion of traffic around congested areas of the transportation system. The resulting traffic assignments provide information about vehicle miles traveled by speed interval needed for air quality and greenhouse gas (GHG) analysis. Table 3 presents the daily VMT made by personal vehicles in 5-minute speed intervals for the No Project and Project scenarios. Because the number of daily vehicle trips is less with the Project than the No Project, the Project would reduce the daily VMT by 67,016 in 2019, 177,488 in 2039, and 187,461 in 2040.

Table 3
Daily Vehicle Miles Traveled by Personal Vehicles: No Project and Project

Speed Interval (mph)	No Project			Project		
	2019	2039	2040	2019	2039	2040
0 - 5	42,368	274,888	306,554	42,071	275,783	307,607
5 - 10	106,560	850,313	894,469	105,966	838,845	890,203
10 - 15	467,406	1,986,666	2,066,867	470,403	1,978,031	2,039,116
15 - 20	1,529,298	3,650,053	3,807,471	1,513,070	3,640,409	3,705,194
20 - 25	6,643,767	10,208,178	10,120,502	6,647,631	10,131,016	10,169,124
25 - 30	5,997,324	9,120,079	8,287,538	5,979,857	9,100,820	8,257,675
30 - 35	4,556,435	4,749,652	5,884,106	4,537,348	4,792,166	5,755,941
35 - 40	2,855,342	3,198,557	3,315,197	2,861,371	3,139,836	3,364,963
40 - 45	3,454,730	3,702,792	3,696,189	3,452,555	3,650,011	3,720,064
45 - 50	2,429,266	2,654,114	2,656,697	2,426,016	2,695,833	2,769,162
50 - 55	4,124,139	4,102,683	4,193,706	4,068,985	4,047,528	4,032,613
55 - 60	11,786,122	10,909,044	10,904,269	11,839,324	11,029,700	10,841,119
60 - 65	7,607,285	6,991,519	6,879,823	7,588,429	6,901,072	6,973,146
Totals	**51,600,042**	**62,398,538**	**63,013,388**	**51,533,026**	**62,221,050**	**62,825,927**
	Project VMT - No Project VMT			**-67,016**	**-177,488**	**-187,461**

The same VMT data for trucks are displayed in Table 4. Although the number of trucks remains the same in both the Project and No Project scenarios, the results of the truck traffic assignments illustrate a minor decrease in VMT under Project conditions. This is because reducing passenger vehicles due to the Project would lead to less congestion. Trucks that would otherwise divert to other (slightly longer) routes to avoid congestion under No Project conditions would remain on the more direct (shorter) route under Project conditions.

Table 4
Daily Vehicle Miles Traveled by Truck: No Project and Project

Speed Interval (mph)	No Project			Project		
	2019	2039	2040	2019	2039	2040
0 - 5	2,816	18,150	19,160	2,822	18,178	19,198
5 - 10	5,932	53,903	55,902	5,907	53,518	55,880
10 - 15	24,553	107,360	112,352	24,762	107,209	111,439
15 - 20	68,122	155,615	168,510	67,085	156,168	159,848
20 - 25	212,280	400,199	383,624	213,352	393,997	392,303
25 - 30	220,676	381,158	363,414	220,235	383,688	362,770
30 - 35	257,039	344,170	376,332	256,536	346,349	371,945
35 - 40	173,095	244,119	258,867	173,085	240,421	257,115
40 - 45	283,273	354,769	348,007	283,187	351,956	349,391
45 - 50	156,410	246,045	262,418	156,375	253,089	277,995
50 - 55	328,247	447,970	456,830	323,626	442,821	443,146
55 - 60	973,511	994,787	987,520	977,605	1,019,058	973,380
60 - 65	1,358,438	1,361,922	1,348,499	1,359,804	1,343,393	1,366,583
Totals	**4,064,392**	**5,110,167**	**5,141,435**	**4,064,381**	**5,109,845**	**5,140,993**
	Project VMT - No Project VMT			**-11**	**-322**	**-442**

Conclusion

Subsequent to the certification of the SEIS/SEIR in 2018, VTA made several design refinements to the Project that affected the analysis presented in the Project's SEIS/SEIR. Specifically, the opening year of the Project has been delayed to 2039 and the horizon year to 2040, which resulted in a change to the vehicular traffic forecast and VMT estimates. The transit ridership and vehicular forecasts were recently updated as part of the Project FTA's Capital Investment Grant (CIG) New Starts submission. These new forecasts produced revised VMT estimates needed to update the air quality and greenhouse gas emissions analysis. The analysis showed that the Project would reduce the daily (the sum of personal vehicles and trucks) VMT by 67,027 in 2019, 177,810 in 2039, and 187,903 in 2040. According to the *Technical Advisory on Evaluating Transportation Impacts In CEQA,* passenger rail projects, such as the BSVII Project, are presumed to cause a less-than-significant impact on transportation because they generally reduce VMT. The analysis presented in this memorandum confirms that the Project would reduce VMT.

MEMORANDUM

Date: March 14, 2024

Subject: Re-Evaluation of the Air Quality Technical Report for the Santa Clara Valley Transportation Authority Bay Area Rapid Transit Silicon Valley Phase II Extension

INTRODUCTION

The Santa Clara Valley Transportation Authority (VTA), in cooperation with the Federal Transit Administration (FTA), proposes to develop the Bay Area Rapid Transit (BART) Phase II Extension Project (Project) in Santa Clara County, California. On June 4, 2018, the FTA issued the Record of Decision (ROD) for the Project associated with the 2018 Final Supplemental Environmental Impact Statement/Supplemental Environmental Impact Report (SEIS/SEIR). The ROD applied to an approximately 6-mile extension of the BART system from the terminus of VTA's BART Silicon Valley—Phase I Berryessa Extension Project in San José to Santa Clara. The Project will descend into an approximately 5-mile-long tunnel, continue through downtown San José, and terminate at grade near the Santa Clara Caltrain Station. The ROD included four passenger stations and the Newhall Maintenance Facility.

VTA has identified design refinements since obtaining the ROD from FTA. The design refinements that apply to the air quality and greenhouse gas (GHG) emissions assessments are listed below. Refer to the full reevaluation of the 2018 Final SEIS/SEIR for a list of all design refinements, including those not applicable to the air quality and GHG emissions assessments.

- **Construction Schedule.** The ROD included a construction schedule of approximately eight years, and the Project with design refinements forecasts a construction schedule of approximately 11 years.
- **Opening Year.** The ROD included an opening year of 2025/2026; however, based on current projections, the opening year will be 2039.
- **Tunnel Configuration and Alignment.** The current design includes an increase in the amount of exported soil due to an increased outer tunnel diameter from approximately 45 feet to 52 feet. The Project with design refinements would require approximately 3,938,963 cubic yards of export resulting in 245,800 total truck loads. The ROD included 1,833,000 cubic yards of export resulting in 92,050 total truck loads.

Terry A. Hayes Associates Inc.
3535 Hayden Avenue, Suite 350
Culver City, California 90232
310.839.4200 fax 310.839.4201

CONSTRUCTION EFFECTS

The following topics were included in the 2018 Final SEIS/SEIR and have the potential to be affected by the design refinements. The text below reflects the difference between the Project included in the 2018 ROD and the Project with design refinements.

Criteria Air Pollutant Emissions

Construction of the Project with design refinements is anticipated to begin in mid-2024 and last for approximately 11 years, followed by up to three to four years of testing and commissioning prior to service operations beginning in 2039. Exhaust emissions were estimated using a spreadsheet methodology and using emission factors and emission rates obtained from the California Air Resources Board (CARB) EMission FACtor (EMFAC) mobile source emissions inventory model for on-road vehicles and Appendix A - the Data Tables used by CalEEMod (Version 2022.1.1) for off-road construction equipment.[1] The emissions analysis accounts for avoidance, minimization, and mitigation measures to control fugitive dust (**AQ-1**) and reduce NO_X emissions (**AQ-2** through **AQ-8**), which were included in the ROD.

Table 1 presents updated equipment exhaust (on-site) and truck exhaust (off-site) emissions. Similar to the analysis and results disclosed in the 2018 SEIS/SEIR, maximum daily unmitigated emissions accounting for worst-case overlap of construction phases would exceed the Bay Area Air Quality Management District (BAAQMD) significance threshold for nitrogen oxides (NO_X). The construction thresholds published by the BAAQMD have been used as an indicator for emissions to result in an adverse effect under the National Environmental Policy Act (NEPA).

When compared to the emissions analysis presented in the 2018 SEIS/SEIR, construction would produce less emissions of reactive organic gases (ROG), NO_X, particulate matter 10 microns in diameter or less (PM_{10}), and particulate matter 2.5 microns in diameter or less ($PM_{2.5}$) on a daily basis. Daily carbon monoxide (CO) emissions would be higher than the emissions presented in the 2018 SEIS/SEIR, but there is no applicable project-level threshold of significance for regional CO emissions. Thus, the Project with design refinements would result in a similar short-term adverse effect related to NO_X emissions, although that effect would be of lesser magnitude than the air quality effect previously disclosed in the 2018 SEIS/SEIR.

[1]California Air Pollution Control Officers' Association, 2022. California Emissions Estimator Model User Guide Version 2022.1. Available at: https://caleemod.com/documents/user-guide/01_User%20Guide.pdf.

TABLE 1. ESTIMATED DAILY CONSTRUCTION EMISSIONS					
	Maximum Daily Emissions (lbs./day)				
Criteria Air Pollutant or Ozone Precursor	**ROG**	**NO_X**	**CO**	**PM_{10}**	**$PM_{2.5}$**
ON-SITE EMISSIONS (EQUIPMENT EXHAUST)					
Unmitigated	16	138	151	7	6
Mitigated (Tier 4 Exhaust Standards)	3	4	168	< 1	< 1
OFF-SITE EMISSIONS (HAUL TRUCK EXHAUST)					
28th Street/Little Portugal Station (*)	< 1	7	5	< 1	< 1
Downtown San José Station (*)	< 1	6	5	< 1	< 1
Diridon Station (*)	< 1	6	4	< 1	< 1
13th Street Ventilation Structure (*)	< 1	5	3	< 1	< 1
Stockton Avenue Ventilation Structure (*)	<1	5	4	< 1	< 1
West Portal (Import) (*)	< 1	16	12	< 1	< 1
West Portal (Export) (*)	< 1	19	14	< 1	< 1
East Portal	< 1	17	12	< 1	< 1
Tunnel (muck) – West Portal to East Portal (*)	< 1	50	36	< 1	< 1
OFF-SITE EMISSIONS (CONCRETE TRUCK EXHAUST)					
Various Locations	1	16	3	< 1	< 1
OFF-SITE EMISSIONS (CREW VEHICLES EXHAUST)					
Various Locations	< 1	2	26	< 1	< 1
TOTAL					
Maximum Daily Emissions - Unmitigated	17	258	261	8	7
Maximum Daily Emissions - Mitigated	5	124	278	3	2
BAAQMD Construction Significance Thresholds	*54*	*54*	--	*82*	*54*
Exceed Threshold?	**No**	**Yes**	**--**	**No**	**No**
COMPARISON TO 2018 SEIS/SEIR					
Project with Design Refinements – Unmitigated	17	258	261	8	7
2018 SEIS/SEIR – Unmitigated	23	308	154	12	9
Exceed Threshold?	***No***	***No***	***Yes***	***No***	***No***
Project with Design Refinements – Mitigated	5	124	278	3	2
2018 SEIS/SEIR – Mitigated	7	130	153	3	2
Exceed Threshold?	***No***	***No***	***Yes***	***No***	***No***

NOTE: Locations marked with (*) are included in the maximum daily emissions analysis based on schedule overlap. Construction activities at the East Portal are not anticipated to begin until 2026, and maximum daily emissions would occur sometime during the 2023–2025 scenario years.
SOURCE: CARB, EMFAC2021, 2022; CalEEMod Version 2022.1.0, 2023; and TAHA, 2023.

Despite the number of hauling truckloads increasing for construction of the Project with design refinements compared to the 2018 SEIS/SEIR analysis, the daily emissions would be of similar magnitude due to mandatory compliance with the CARB Truck and Bus Regulation that went into effect in 2023, requiring all heavy-duty trucks to be outfitted with engines of model year 2010 or newer. Pushing back the construction start date to 2024 for the Project with design refinements substantially reduces aggregate average haul truck emissions on a per-mile basis relative to the 2018 SEIS/SEIR analysis because of updated heavy-duty truck emissions standards. Therefore, no new adverse effects would occur; and no new or updated avoidance, minimization, and mitigation measures are needed to control criteria pollutant emissions during construction activities.

Toxic Air Contaminants

The the 2018 SEIS/SEIR included a construction health risk analysis that assessed exposure to $PM_{2.5}$ and diesel PM. Due to the length of the alignment and the number of stations, one representative location was chosen to inform the risk. The 28th Street/Little Portugal Station location was selected based on the duration and intensity of the subterranean station construction activity and proximity to sensitive receptors (e.g., Five Wounds Church and Elementary School approximately 65 feet southeast of the construction zone). It is anticipated that the construction-related health risk would be comparable at other subterranean station locations based on similar construction activities and shorter schedule durations. Exposure to construction-related diesel PM was assessed by predicting the health risks in terms of excess cancer, non-cancer hazard impacts, and elevated $PM_{2.5}$ concentrations. The AERMOD dispersion model was used to predict diesel PM and $PM_{2.5}$ concentrations at sensitive land uses, based on daily PM_{10} and $PM_{2.5}$ exhaust mass emissions, with exhaust emissions of PM_{10} used as a surrogate for diesel PM.

The results of the health risk assessment for off-site maximally exposed individual—residential receptor exposure for excess cancer risk and receptor exposures at Five Wounds Church and Elementary School approximately 65 feet to the southeast for chronic hazard index and annual $PM_{2.5}$ concentrations—are presented in **Table 2**. Similar to the conclusion in the 2018 SEIS/SEIR, the annual increase in $PM_{2.5}$ concentrations and cancer risk would exceed the BAAQMD significance thresholds. Mitigation Measure AQ-2, included in the ROD, would require Tier 4 exhaust controls and would reduce $PM_{2.5}$ concentrations and the cancer risk to below the threshold. No new adverse effects would occur. No new or updated avoidance, minimization, and mitigation measures are needed to control toxic air contaminant emissions during construction activities.

TABLE 2. CONSTRUCTION HEALTH RISK ASSESSMENT

Exposure Parameter	Unit	BAAQMD Threshold	Unmitigated Exposures	Mitigated Exposures
PROJECT WITH DESIGN REFINEMENTS				
Excess Cancer Risk	Probability per Million Population	10	**60.2**	**5.0**
Chronic Health Non-Cancer Risk	Hazard Index	1.0	**0.08**	**0.01**
Increase in $PM_{2.5}$ Concentration	Average Annual (µg/m³)	0.3	**0.38**	**0.03**
2018 SEIS/SEIR				
Excess Cancer Risk	Probability per Million Population	10	27.2	1.6
Chronic Health Non-Cancer Risk	Hazard Index	1.0	0.24	0.02
Increase in $PM_{2.5}$ Concentration	Average Annual (µg/m³)	0.3	1.17	0.12

SOURCE: Terry A. Hayes Associates Inc., 2015 and 2023.

OPERATIONAL EFFECTS

The analysis considers emissions benefits associated with vehicle mode shift. Output from the regional transportation model for trips within, to, and from Santa Clara County were used to estimate daily emissions from regional on-road vehicle miles traveled (VMT) under Existing Conditions (2019) with and without the Project, and future operation of the No Build Alternative and the Project. **Table 3** shows the regional VMT associated with the No Build Alternative and the Project. The VMT and associated emissions analysis are presented for the 2019 Existing Conditions, 2039 Opening Year, and 2040 Forecast Year. The Forecast Year in the ROD was 2035; however, the Project with design refinements is not anticipated to open until 2039, and the Forecast Year was updated to 2040.

TABLE 3. REGIONAL VEHICLE MILES TRAVELED

Analysis Year	Vehicle Miles Traveled (Miles per Day)			Percent Change from No Build Alternative
	No Build Alternative	Build Alternative	Change in Daily On-Road VMT	
PROJECT WITH DESIGN REFINEMENTS				
2019 Existing Conditions	55,664,434	55,597,407	-67,027	-0.12%
2039 Opening Year	67,508,705	67,330,895	-177,810	-0.26%
2040 Forecast Year	68,154,823	67,966,920	-187,903	-0.28%
2018 SEIS/SEIR PROJECT				
2019 Existing Conditions	55,664,434	55,597,407	-67,027	-0.12%
2025 Opening Year	54,981,379	54,693,572	-287,807	-0.52%
2035 Forecast Year	59,777,409	59,492,258	-285,151	-0.48%

SOURCE: Hexagon Transportation Consultant, Inc., 2015 and 2024.

The Project with design refinements is forecasted to induce the displacement of 67,027 daily VMT in the scenario year of 2019, a displacement of 177,810 daily VMT in the Opening Year of 2039, and a displacement of 187,903 daily VMT in the Forecast Year of 2040 relative to the No Build Alternative through increased regional BART ridership. A displacement of 187,903 daily VMT would equal an annual reduction of 68.6 million VMT in the horizon year of 2040.

The decrease in the VMT reduction for the Project with design refinements (i.e., a reduction of 177,810 daily VMT in the 2039 Opening Year versus a reduction of 285,151 in the 2035 Forecast Year from the 2018 SEIS/SEIR) is attributed to the use of FTA's "STOPS" Model for the re-evaluation analysis, which forecasted lower BART ridership compared to the "BART Travel Forecasting Model" that was used in the 2018 SEIS/SEIR analysis. The lower BART ridership forecast is correlated with a smaller reduction in daily VMT because not as many vehicle trips would be displaced by mode shift to transit. However, operation of the Project with design refinements would still provide substantial environmental benefits with regards to decreasing regional transportation-related emissions as demonstrated by the following analyses.

Criteria Air Pollutant Emissions

Estimated criteria air pollutant emissions by all vehicles in the region are shown in **Table 4**. The analysis shows that the Project with design refinements—similar to the Project assessed in the 2018 SEIS/SEIR—would reduce regional criteria air pollutant emissions associated with on-road vehicle travel. The Project with design refinements would result in a daily reduction of 268 pounds of CO, which equates to an annual reduction of CO emissions of approximately 50 tons. Implementation of the Project would result in a regional air quality benefit by encouraging a modal transportation shift from single-occupancy vehicles towards transit. No new adverse effects would occur. No new or updated avoidance, minimization, and mitigation measures are needed to control criteria pollutant emissions during operational activities.

TABLE 4. ESTIMATED DAILY OPERATIONAL EMISSIONS

Criteria Air Pollutant or Ozone Precursor	Daily Emissions (lbs./day)				
	ROG	NO_X	CO	PM_{10}	$PM_{2.5}$
2039 OPENING YEAR					
No Build Alternative	1,263	9,131	75,376	21,195	3,850
Project with Design Refinements	1,262	9,111	75,146	21,156	3,843
Net Change from No Build	**(<1)**	**(20)**	**(230)**	**(39)**	**(7)**
BAAQMD Significance Thresholds	54	54	--	82	54
Exceeds Threshold?	***No***	***No***	**--**	***No***	***No***
2040 FORECAST YEAR					
No Build Alternative	1,245	8,977	75,158	21,431	3,886
Project with Design Refinements	1,243	8,960	74,890	21,389	3,879
Net Change from No Build	**(2)**	**(17)**	**(268)**	**(42)**	**(8)**
BAAQMD Significance Thresholds	54	54	--	82	54
Exceeds Threshold?	***No***	***No***	**--**	***No***	***No***
2035 FORECAST YEAR (2018 SEIS/SEIR APPROVED PROJECT)					
No Build Alternative	927	4,852	52,408	6,360	2,607
BART Extension Alternative	924	4,839	52,158	6,331	2,595
Net Change from No Build	**(3)**	**(13)**	**(250)**	**(29)**	**(12)**
BAAQMD Significance Thresholds	54	54	--	82	54
Exceeds Threshold?	***No***	***No***	**--**	***No***	***No***

SOURCE: CARB, EMFAC2014 and EMFAC2021; CalEEMod version 2013 and version 2022.1; and TAHA, 2015 and 2024.

Mobile-Source Air Toxics (MSAT) and Toxic Air Contaminants

The 2018 SEIS/SEIR included a basic qualitative analysis of the likely MSAT and toxic air contaminants emission impacts. This assessment and the conclusions would not change with the proposed design refinements. The Project with design refinements would continue to be electrically powered and would not generate MSAT emissions from rail activity. The Project continues to include new bus transfer points at the 28th Street/Little Portugal Station and the Santa Clara Station in addition to utilizing an existing bus transit facility at the Diridon Station. VTA operates diesel-hybrid buses that generate significantly less diesel emissions than standard buses. Bus

idling would increase localized emissions; however, idling time is typically limited to less than one minute per vehicle at each stop, and the CARB Commercial Vehicle Idling Restriction limits idling to no more than five minutes at a single location.

The Newhall Maintenance Facility would still include chemicals related to repair and cleaning activities, resulting in evaporative emissions. Chemicals would be stored in accordance with BAAQMD and state safety guidelines. No new adverse effects would occur. No new or updated avoidance, minimization, and mitigation measures are needed to control MSAT or toxic air contaminants emissions during operational activities.

TRANSPORTATION CONFORMITY

Transportation conformity is required under Clean Air Act Section 176(c) (42 United States Code 7506[c]) to ensure that federally supported transit project activities are consistent with the purpose of the State Implementation Plan. Conformity for the purpose of the State Implementation Plan means that transportation activities will not cause new air quality violations, worsen existing violations, or delay timely attainment of the relevant National Ambient Air Quality Standards (NAAQS).

Regional Conformity

The Project with design refinements is listed in the Plan Bay Area 2050 Regional Transportation Plan (RTP) (ID 21-T11-109) and the 2023 Transportation Improvement Program (TIP) (ID BRT030001) with the description: "San José: From Berryessa Station to San José and Santa Clara: Extend BART Line." The Project entry in the Plan Bay Area 2050 RTP is listed within the Opening Period 2021–2035 with the title, "Rail | Service Expansion | BART | to Santa Clara ("Silicon Valley Phase II")." The scope of the RTP entry states: "This program includes funding to extend BART's existing Green Line and Orange Line rail services from Berryessa to Santa Clara, including four new stations and park-and-ride facilities." Passenger service for the Project with design refinements is anticipated to begin in 2039, otherwise the scope and title remain applicable. Therefore, the description and scope of the Project are accurately characterized within the 2023 TIP and the Plan Bay Area 2050; however, the RTP and TIP entries are in the process of being updated by the MTC to reflect the updated Opening Year of 2039.

Project Conformity

Conformity requires a demonstration that a project will not result in new local CO or $PM_{2.5}$ exceedances or worsen existing violations. The assessment of project-level conformity for the Project with design refinements is consistent with the analysis disclosed in the 2018 SEIS/SEIR.

The traffic study prepared by Hexagon Transportation Consultants for the 2018 SEIS/SEIR assessed 17 signalized intersections in the vicinity of the 28th Street/Little Portugal Station, 29 signalized intersections in the vicinity of the Diridon Station (South and North Options), and 16

signalized intersections in the vicinity of the Santa Clara Station (South and North Options). The identified intersections were determined to be traversed by fewer than 5,000 vehicles during the weekday AM and PM peak hours. Similar to the analysis presented in the 2018 SEIS/SEIR, implementation of the Project with design refinements would not increase traffic volumes at any intersection in the traffic study area to more than 24,000 vehicles per hour, which would require more than a quadrupling of the vehicle volumes recorded. No potential exists for a new localized CO hot spot.

A quantitative PM hot-spot analysis is required only for a project that has been identified as a Project of Air Quality Concern (POAQC), as defined in 40 Code of Federal Regulations 93.123(b)(1). MTC confirmed during interagency consultation on June 23, 2016, that the Project is not a POAQC. The design refinements would not change the fact that the Project is a heavy rail transit project that would not directly increase diesel truck traffic and associated PM emissions on the roadway network. Regarding bus transfers and as discussed in the 2018 SEIS/SEIR, VTA operates diesel-hybrid buses that generate significantly less diesel emissions than standard buses. Bus idling would increase localized emissions; however, idling time is typically limited to less than one minute per vehicle. Consistent with the ROD, the Project with design refinements would not result in PM hot-spot.

Construction Emissions

The construction period for the Project with design refinements spans approximately 136 months (11 years), with construction lasting more than five years at one or more specific sites. Construction would intermittently move along the length of the alignment, although it is anticipated that construction activity at the 28th Street/Little Portugal Station site could last up to seven years and construction of the combined Santa Clara Station and Newhall Maintenance Facility sites could last up to eight years. Results of the regional-scale construction emissions analysis are presented in **Table 1**. As described previously, the only adverse effect identified is related to regional NOx emissions, which would be of marginally lesser magnitude than those disclosed in the 2018 SEIS/SEIR. Despite an increase in hauling activities for construction of the Project with design refinements, compliance with the CARB Truck and Bus Regulation would substantially reduce heavy-duty haul truck emissions on a per-mile basis, and no new or worsened adverse air quality effects would occur.

At the localized scale, **Table 2** presents the results of a health risk assessment that was prepared to characterize nearby sensitive receptor exposures during construction. Construction of the Project with design refinements would not generate magnitudes of emissions that would be considered new or exacerbated adverse effects relative to those that were environmentally cleared for the Project in the SEIS/SEIR.

GREENHOUSE GAS EMISSIONS

Consistent with the 2018 SEIS/SEIR, the analysis for the Project with design refinements considers electricity-related emissions from operation of BART, as well as GHG benefits associated with vehicle mode shift. As shown in **Table 5** and similar to the 2018 SEIS/SEIR, operation of the Project with design refinements would decrease GHG emissions due to reductions in VMT-related emissions. The Project with design refinements would reduce annual on-road VMT by approximately 68.6 million miles, which would result in a decrease of approximately 19,824 MTCO2e/year. This mass quantity equates to a reduction of 21,850 standard tons of GHG emissions per year by 2040. The lesser magnitude of the regional transportation-related GHG emissions reduction under the Project with design refinements is attributed to the smaller decrease in daily VMT discussed previously due to lower ridership forecast estimates produced by the FTA "STOPS" Model. Implementation of the Project would still provide a substantial contribution to reducing regional GHG emissions through effective transportation and transit planning.

TABLE 5. ESTIMATED ANNUAL GREENHOUSE GAS EMISSIONS

Scenario and Emissions Sources	Annual GHG Emissions ($MTCO_2e$/year)
2019 EXISTING CONDITIONS SCENARIO [INFORMATIONAL PURPOSES ONLY]	
No Build Alternative Regional On-Road VMT Emissions	7,966,863
Project Regional On-Road VMT Emissions	7,958,673
Project Newhall Maintenance Facility Emissions	387
Net Emissions (No Build Alternative minus Project Emissions)	***(7,803)***
2039 OPENING YEAR SCENARIO	
No Build Alternative Regional On-Road VMT Emissions	6,883,276
Project with Design Refinements – Regional On-Road VMT Emissions	6,865,656
Project with Design Refinements – Newhall Maintenance Facility Emissions	314
Net Emissions (No Build Alternative minus Project Emissions)	***(17,306)***
2040 FORECAST YEAR SCENARIO	
No Build Alternative Regional On-Road VMT Emissions	6,886,183
Project Regional On-Road VMT Emissions	6,866,359
Net VMT Emissions (Project minus No Build Alternative VMT Emissions)	***(19,824)****
Project with Design Refinements – Newhall Maintenance Facility Emissions	308
Net Emissions (Project Emissions minus No Build Alternative Emissions)	***(19,516)***
2018 SEIS/SEIR PROJECT 2035 HORIZON YEAR VS PROJECT WITH REFINEMENTS 2039 OPENING YEAR	
2018 SEIS/SEIR Project Net Annual GHG Emissions (2035 Horizon Year)	(22,136)
Project Net Annual GHG Emissions (2039 Opening Year)	(17,306)

SOURCE: CARB EMFAC2021, CalEEMod Version 2022.1, and TAHA, 2015 and 2024.
***** 1 metric ton = 2,204.62 lbs.; 19,824 $MTCO_2e$ x (2,204.62 [lbs./metric ton] / 2,000 [lbs./ton]) = 21,852 tons of GHG emissions.

Future operation of the Project with design refinements would be consistent with statewide goals to enhance transit connectivity and displace on-road passenger vehicle trips and would not result in an adverse effect related to air quality or global climate change. No new adverse effects would occur. No new or updated avoidance, minimization, and mitigation measures are needed to control GHG emissions during operational activities.

CONCLUSION

Implementation of the Project with design refinements would not result in new or exacerbated adverse air quality or GHG emissions effects relative to those disclosed in the 2018 SEIS/SEIR. Furthermore, the design refinements would not trigger the need for new or more stringent avoidance, minimization, or mitigation measures. The results of the re-evaluation assessment for air quality and GHG emissions are consistent with the determinations disclosed in the 2018 SEIS/SEIR.

WILSON IHRIG
ACOUSTICS, NOISE & VIBRATION

CALIFORNIA
WASHINGTON
NEW YORK

WI #13-137

MEMORANDUM

March 13, 2024

To: Samantha Swan McCleary, VTA Senior Environmental Planner

From: Deborah Jue, Principal
Patrick Faner, Associate Consultant

SUBJECT: Noise and Vibration Analysis of Design Refinements to VTA's BART Silicon Valley – Phase II Extension Project Since the 2018 Record of Decision

1 Introduction

The Santa Clara Valley Transportation Authority's (VTA's) Bay Area Rapid Transit (BART) Silicon Valley – Phase II Extension Project (Phase II Project) consists of the approximately 6-mile extension of the BART system from the terminus of VTA's BART Silicon Valley Phase I Project (Phase I Project) at Berryessa/North San Jose Station through downtown San Jose terminating in Santa Clara near the Santa Clara Caltrain Station. The Phase II Project includes an approximately 5-mile single-bore tunnel, three underground stations in the City of San Jose (28th Street/Little Portugal, Downtown San Jose, and Diridon Stations), one at-grade station in the City of Santa Clara (Santa Clara Station), two mid-tunnel facilities, and the Newhall Maintenance Facility on the border of the Cities of San Jose and Santa Clara near the Phase II Project's terminus.

In February 2018, the Santa Clara Valley Transportation Authority (VTA) released the Final Supplemental Environmental Impact Statement/Subsequent Environmental Impact Report (SEIS/SEIR) for the Phase II Project. On April 5, 2018, VTA's Board of Directors certified the SEIR under the California Environmental Quality Act (CEQA) and approved the Phase II Project. Then, on June 4, 2018, the Federal Transit Administration (FTA) issued a Record of Decision (ROD) under the National Environmental Policy Act (NEPA). VTA, in coordination with FTA, is now conducting a Re-evaluation under NEPA and an Addendum under CEQA to address the design refinements that have occurred since issuance of the ROD. This technical memorandum supports both the Re-evaluation and Addendum.

The purpose of this memorandum is to evaluate design refinements to the Phase II Project[1] to determine whether they would result in new noise or vibration impacts since the 2018 Final SEIS/SEIR was certified and the Phase II Project was approved in 2018. This memorandum evaluates the 2024 Single-Bore Design Refinements as compared to the 2018 Single-Bore Design.

The noise and vibration technical report in support of the SEIS/SEIR, *VTA's BART Silicon Valley—Phase II Extension Project Noise and Vibration Technical Report,* by Wilson Ihrig, was completed in November 2017 (2017 Technical Report), and the results were summarized in the 2018 Final SEIS/SEIR. The 2017 Technical Report was an update to the 2016 technical report of the same name. The 2016 technical report supported the 2016 Draft SEIS/SEIR.

Based on the following analysis, the Phase II Project's overall impact and mitigation conclusions have not changed. An exhibit showing the differences between the 2018 Single-Bore Design and the 2024 Single-Bore Design Refinements is included as Attachment A.

2 Analysis of Design Refinements Since the ROD

2.1 Design Refinements

The design refinements described herein have been proposed subsequent to the 2018 Record of Decision (ROD) issued by FTA and approval of the Project. They include project-wide and specific refinements and innovations that result in the optimization of project alignment, station configurations, and other facilities. All design refinements listed are located within the original project footprint. The following two bullet items apply project wide.

2.1.1 Project-Wide Refinements

- **Opening Year.** The 2018 Final Supplemental Environmental Impact Statement/Subsequent Environmental Impact Report (SEIS/SEIR) stated an opening year of 2025/2026; however, based on the current schedule, construction is expected to commence in mid-2024 with opening in 2039.
- **Tunnel Configuration and Alignment.** Two tunnel configuration options (twin-bore and single-bore) were considered in the Final SEIS/SEIR, and the Single-Bore Option was selected in the ROD. The single-bore alignment configuration approved in the ROD included both a stacked and a side-by-side configuration, with transition zones in between. Since the ROD was issued in 2018, the single-bore configuration was further refined. The entire alignment would now be in a side-by-side configuration and no longer in a stacked configuration (see figure below). To maintain minimum platform widths at the three underground stations, the tunnel's inner and outer diameters would be increased from approximately 41 feet to 48 feet and 45 feet to 52 feet, respectively. In addition, there have been vertical alignment shifts (up to approximately 13 feet shallower and up to approximately 33 feet deeper) and horizontal alignment shifts (up to 125 feet at the tunnel curve at the widest diversion point just west of

[1] The Phase II Project that is the subject of this memorandum includes the BART Extension only. The transit-oriented development (TOD) analyzed under CEQA in the SEIS/SEIR is not included in this analysis. Any changes to the TOD that was analyzed in the SEIS/SEIR will be addressed in future environmental documents as necessary as these projects move forward subject to market forces.

Diridon Station to accommodate the larger tunnel diameter, side-by-side track configuration, and maximum design speeds).

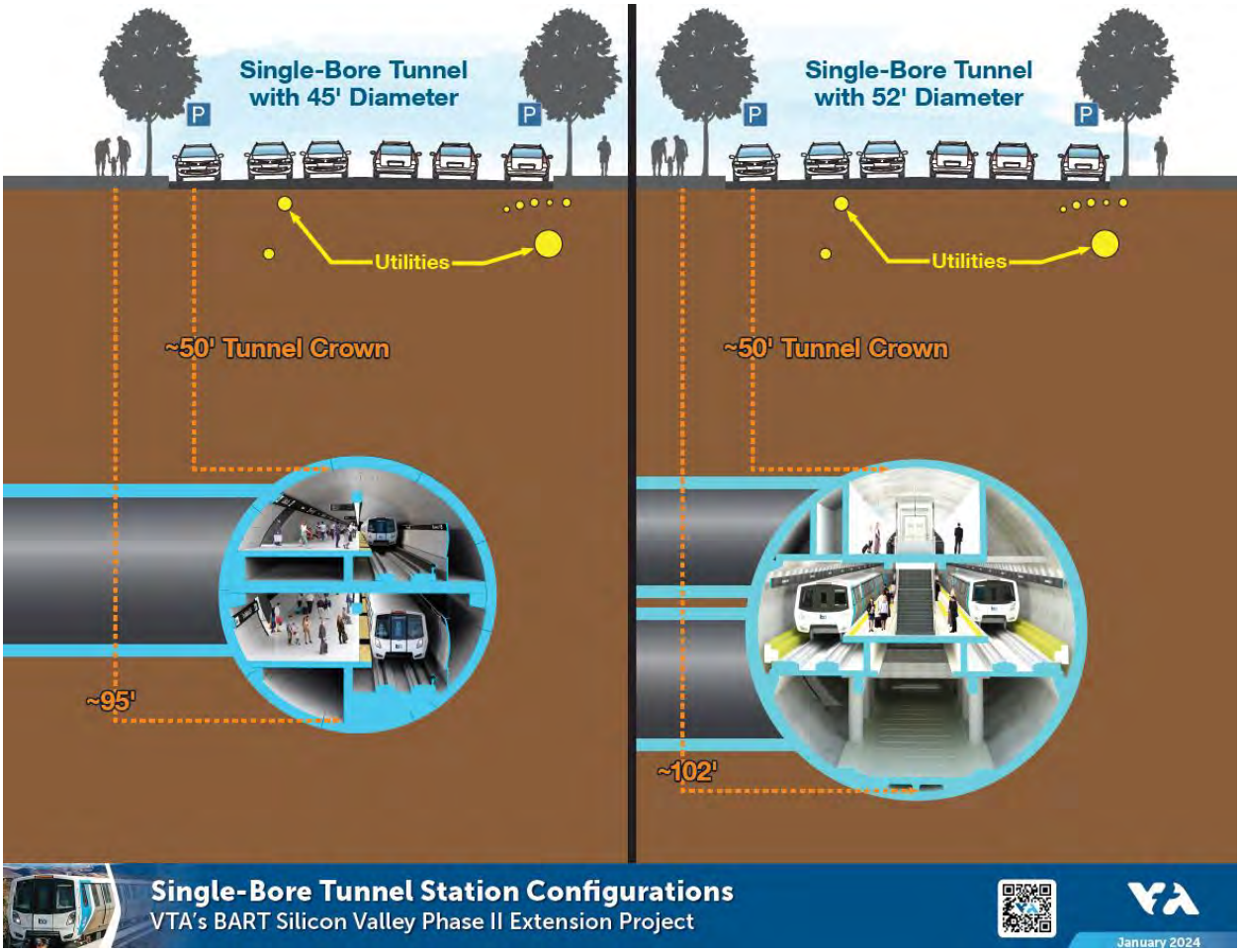


Figure 1 Comparison of 2018 Design (left) and Design Refinements (right)

2.1.2 Project Elements

Each of the project elements analyzed in this report are listed below from east to west. The East/13th Street and West/Stockton Avenue Mid-Tunnel Ventilation Structures were evaluated in the analysis as an option but have been eliminated. The proposed fans near the East and West Tunnel Portals have also been included in the analysis. The Downtown San Jose Station Secondary Entrance and the Diridon Station East Egress Facility have been included in the analysis as options but may be eliminated. All design refinements listed are located within the original project footprint.

- **28th Street/Little Portugal Station.** The 1,200-space parking garage shifted from the north end of station near East St. James Street to the southeast closer to 30th Street and U.S. 101.

- **East Mid-Tunnel Facility at Santa Clara and 13th Streets.** This facility was evaluated in the analysis, but the finalization of the design of the ventilation system resulted in the elimination of the Mid-Tunnel Facilities.
- **Downtown San Jose Station.** The 0.7-acre construction staging area at the northwest corner of Santa Clara and 4th Streets that was identified in the 2018 Final SEIS/SEIR has been eliminated. In addition, the finalization of the design of this station may result in the elimination of the Secondary Entrance between 1st and 2nd Streets on the north side of Santa Clara Street but is included in the analysis as an option.
- **Diridon Station.** The overall footprint of the station has been reduced from the layout in the 2018 Final SEIS/SEIR.
- **West Mid-Tunnel Facility at Stockton Avenue and Taylor Street.** This facility was evaluated in the analysis, but the finalization of the design of the ventilation system resulted in the elimination of the Mid-Tunnel Facilities.
- **Santa Clara Station.** The Santa Clara Station footprint has been shifted south of Brokaw Road and incorporated into the 40-acre VTA-owned property that will contain the Newhall Maintenance Facility, which has been slightly reconfigured to provide space for the station. An approximately 12-acre private property north of Brokaw Road in the City of Santa Clara is no longer needed for Santa Clara Station and has been removed from the project footprint.

2.2 Background

When the first Draft EIS/EIR was released in 2004, the Phase II Project included a twin-bore tunnel configuration, where the northbound trains would operate in one tunnel and the southbound trains would operate in the second tunnel. The environmental documents that followed also included only twin-bore tunnel configurations. However, tunneling technology advanced over the years, and the 2016 Draft SEIS/SEIR evaluated two options for the configuration of the tunnel: the Twin-Bore Option and the Single-Bore Option. The Twin-Bore Option was in the same two-tunnel configuration as in prior environmental documents. However, the Single-Bore Option was based on a relatively new tunneling methodology where both the northbound and southbound tracks were contained within one larger-diameter tunnel separated by a large concrete slab.

The technical analysis of the projected levels of groundborne noise and vibration for train operations within the tunnel for the Twin-Bore Option had been updated for each environmental document since the first Draft EIS/EIR was released in 2004. The 2004 analysis was based on vibration prediction models using vibration propagation testing at the anticipated depth of the tunnel at that time, which was 40 feet. However, the Single-Bore Option was approximately 70 feet deep on average, meaning that, on average, the Single-Bore Option was deeper than the Twin-Bore Option. Vibration propagation testing data at 70-foot depths was not available during preparation of the 2017 Technical Report, and, therefore, the projected levels of groundborne noise and vibration were based on a comparative analysis comparing the deeper Single-Bore Option to the shallower Twin-Bore Option.

The conclusions of the anticipated impacts of the Single-Bore Option in the 2017 Technical Report were conservative and were determined by comparing the projected noise and vibration levels for

selected receptors along the tunnel alignment to determine what, if any, differences might be expected between the two options. Due to the greater depth of the Single-Bore Option tunnel configuration, the conclusions in the 2017 Technical Report stated that, "projected groundborne noise levels would be less than those from the Twin-Bore Option tunnel. However, the difference is only projected to be in the range of 1 to 2 A-weighted decibels (dBA) less. In the engineering phase of the project, vibration propagation test data would be required for tunnel depths of the Single-Bore Option tunnel to define the specific mitigation required, if this is the selected alternative. For purposes of this analysis, where groundborne noise levels for the Twin-Bore Option exceed the noise criterion by 1 dBA or less, mitigation would not be required for the Single-Bore Option." Since that time, due to the design refinements described herein and with mitigation previously identified in the 2018 ROD, there would be no increases to the number of groundborne noise and vibration impacts, All applicable mitigation measures have been provided in Attachment B.

2.3 Noise and Vibration Considerations

This analysis includes evaluation of the BART extension alone; it does not include an evaluation of the impacts associated with the Transit-Oriented Joint Development that was analyzed in the 2018 Final SEIS/SEIR. Any additional analysis of the Transit-Oriented Joint Development component of the Phase II Project will be addressed separately. Therefore, the noise analysis within this technical report does not include an analysis for Transit-Oriented Joint Development.

The following design refinements affected the noise and vibration analysis.

- Tunnel Configuration and Alignment
    - The larger single-bore tunnel diameter, which is generally lower in elevation than the original Project.
    - Tunnel horizontal and vertical alignment changes.
    - Train speed adjustments.
- Track Configuration and Design
    - The side-by-side trackway will be supported by a viaduct/bridge structure within the tunnel.
    - The viaduct structure will use modular concrete box girders and concrete column bents supported by the bottom of the tunnel.
    - There are no direct connections between the trackway and the tunnel side walls. Vibrations from the trackway will travel down through the columns to the bottom of the tunnel.
    - Different crossover locations.
- Station Platforms and Mezzanines
    - Station platforms and mezzanines will now be contained within the tunnel envelope.

  - Cut-and-cover construction will be limited to ventilation/emergency egress shafts and station headhouses.

- Gap Breaker Stations Above the Tunnel
  - These have been consolidated into the station and ventilation structure footprints included in the 2018 Final SEIS/SEIR.
  - Some are proposed in the vicinity of the Newhall Maintenance Facility and Santa Clara Station.
- Ventilation Structures
  - Mid-tunnel ventilation structures were included in this analysis as an option but have since been eliminated.
  - Proposed fan plants near the East and West Tunnel Portals have been included in this analysis.

3 Operational Impacts from Modifications to Tunnel Design

3.1 Tunnel Alignment Impact Analysis

Since the design refinements include substantial changes to the in-tunnel structure, groundborne noise and vibration levels for the tunnel portion of the alignment have been projected for the interiors of occupied buildings that are noise and vibration sensitive.

Noise and vibration predictions contained herein are based on empirical models developed for the U.S. Department of Transportation and adopted by the Federal Transit Administration (FTA). The environmental noise and vibration criteria used in this analysis are contained in the FTA's Transit Noise and Vibration Impact Assessment (2018), which is sometimes referred to as the FTA Guidance Manual. The resulting airborne noise, groundborne noise, and vibration predictions and vibration reduction measures, as determined by the vibration prediction model and applicable criteria, form the basis of the groundborne noise and vibration impact assessment for the Phase II Project.

This memo provides the groundborne noise and vibration impact analysis, and identifies feasible mitigation measures, where necessary, to reduce noise and/or vibration levels to achieve the FTA criteria for the design refinements. See a comparison to the 2018 Final SEIS/SEIR in

Table 2.

The analysis concludes that there are zero (0) groundborne vibration impacts with the design refinements. This is consistent with the prior results of the approved Project (2018 Final SEIS/SEIR single-bore alignment), which also identified zero (0) receptors impacted by groundborne vibration. A full summary of groundborne vibration levels for the Phase II Project with design refinements is provided in Attachment C.

Compared to the conclusions in the SEIS/SEIR for the Phase II Project, the overall number of receptors where groundborne noise levels exceed the FTA threshold would decrease: the SEIS/SEIR

indicated groundborne noise impacts at 386 receptors; this analysis identifies 3 receptors potentially impacted by groundborne noise prior to mitigation.

- The 2018 Final SEIS/SEIR noise technical report (Wilson Ihrig 2017) identified 386 groundborne noise impacts at sensitive receptors. Of these, 377 are residential receptors (including a 218-unit multi-family residential residence), 8 are institutional or medical office receptors, and 1 is a hospital.
- This analysis for the Phase II Project with design refinements identifies 3 receptors impacted by groundborne noise. The 3 receptors are all residential receptors.
- This analysis no longer shows an impact at the 218-unit multi-family residence [754 The Alameda near station (STA 745+00)]. Since the 2018 Final SEIS/SEIR, a new high-rise building has been constructed near the Project at 505 E. Santa Clara Street (STA 663+00), but no impact is indicated. There would be no increase in impacted structures since the 2018 Final SEIS/SEIR. A full summary of groundborne noise levels for the Phase II Project with design refinements is provided in Table C2.

3.2 Groundborne Noise and Vibration Mitigation

As indicated in Table C1, no vibration impacts are projected along the tunnel alignment when comparing the FTA 1/3-octave band criteria to the predicted levels of vibration.

Isolated slab track (IST) mitigation was identified in the 2018 Final SEIS /SEIR to reduce groundborne noise levels below the FTA threshold for all potentially affected receptors. However, alternate measures also appear to be adequate to reduce groundborne noise levels for the three (3) potentially affected receptors. The analysis indicates that where groundborne noise levels are projected to exceed the FTA criteria for three (3) receptors near a crossover, as shown in Table C2, the use of an HRDF fastener would be sufficient to reduce the groundborne noise by at least 2 dBA. Implementation of these measures would reduce groundborne noise levels at all receptors below the FTA threshold. The amount of mitigation required would be approximately 1,000 feet of HRDF, as listed in Table 1. As indicated in Mitigation Measure **NV-B** (see Attachment B), final design will determine the specific mitigation strategy, which could include alternative strategies that similarly achieve the FTA groundborne noise criteria consistent with Mitigation Measure **NV-B.**

The overall conclusions of the 2018 Final SEIS/SEIR, including Mitigation Measure **NV-B**, would not change with the Single-Bore Design Refinements. Overall, the number of groundborne noise impacts at receptors would be fewer under the Single-Bore Design compared to both the 2018 Twin-Bore Design and 2018 Single-Bore Design.

Table 1 Groundborne Noise Mitigation – 2024 Single-Bore Design Refinements

S1 Track	**S2 Track**
687+00 to 692+00	687+00 to 692+00
Total HRDF fasteners length: 1,000 feet	

4 Temporary Construction Impacts

4.1 Tunnel Boring Machine Groundborne Vibration

The 2017 Technical Report used the same tunnel boring machine (TBM) analysis for both the 2018 Twin-Bore and 2018 Single-Bore Designs, relying initially on the geometry of the 2018 Twin-Bore Option. Since the Single-Bore Design Refinements is deeper than the 2018 Twin-Bore Design, a conservative approach assumes the same impact analysis for the Single-Bore Design Refinements as was done for the 2018 Single-Bore Design and the 2018 Twin-Bore Design.

The 2017 Technical Report indicated that, as the TBM progresses along the tunnel alignment, groundborne vibration levels may exceed the impact criteria for occasional events (75 VdB) at receptors 75 feet or less from the horizontal centerline of the tunnel. Groundborne vibration would potentially be perceptible for up to 4 days at a given location. Under the 2018 Single-Bore Design, different locations may have experienced perceptible groundborne vibration at different times, but the effect would be short-term and temporary, and vibration levels from the TBM would not result in an exceedance of FTA standards. Similarly, groundborne vibration levels from the TBM under the Single-Bore Design Refinements would reach a maximum level of 0.02 inch/second peak particle velocity (PPV), which would be below the most conservative building vibration criterion of 0.12 inch/second PPV. Therefore, impacts would be the same or less than described in the SEIS/SEIR. Previously identified Mitigation Measures **NV-CNST-A** through **NV-CNST-S** and **GEO-CNST-B** through **GEO-CNST-D** still apply, and no new mitigation is required.

4.2 Construction and Operational Airborne Noise and Vibration – Stations

4.2.1 28th Street/Little Portugal Station (formerly 28th Street/Alum Rock Station)

The design refinements for this station would be within the same footprint as the original design. The location of the station facilities would be similar to the original design, with the exception of the parking garage, which would move from the northwest corner near East St. James Street to adjacent to U.S. 101 and 30th Street and two ventilation shafts. These aboveground features would generate noise, but their noise levels are expected to be the same or lower than under the original design. There would be no changes to the extent of the construction staging area. There would be no change in conclusions from the 2018 Final SEIS/SEIR, and the same Mitigation Measures, **NV-CNST-A** through NV-**CNST-S** and **NV-A** and **NV-B**, apply to the Phase II Project.

4.2.2 Downtown San Jose Station

The design refinements for the Downtown San Jose Station would be similar to the previous design, with minor changes in the location of one tunnel ventilation shaft and the addition of a second ventilation shaft on the eastern side of the station. Noise attenuation would be required for the ventilation shaft as per the FTA's requirements in accordance with Mitigation Measure **NV-A**. The construction approach would be the same as the original design, and the construction staging area would occupy a smaller overall area than under the previous design. There would be no change in conclusions from the 2018 Final SEIS/SEIR: Because of the proximity of sensitive noise receptors at this station, the construction of the Phase II Project would result in significant and unavoidable noise impacts at the Downton San Jose Station. The same mitigation measures outlined above would apply.

4.2.3 Diridon Station

The design refinements for Diridon Station would reduce the size of the BART station footprint compared to the original design. The construction staging area would also occupy a smaller area compared to the original design, and, given the reduced footprint, construction noise and vibration levels would be the same or lower as compared to the original design. The design refinements have identified a location for the 450 temporary replacement parking spaces required in Mitigation Measure TRA-CNST-D, which is located about a half mile northwest of Diridon Station at 501 Cinnabar Street in San Jose. This facility would provide replacement parking spaces during the construction period. This location is surrounded by industrial and commercial use, and the nearest residential and lodging receptors are more than 500 feet from this location, which is greater than the screening distance of 125 feet for assessment of noise impacts at these facilities per FTA guidance. Noise from this parking facility would not be noticeable at this distance and would be overshadowed by local traffic and Caltrain operations. There would be no change in conclusions from the 2018 Final SEIS/SEIR: Because of the proximity of sensitive noise receptors at this station, the construction of the Phase II Project would result in significant and unavoidable noise impacts at the Diridon Station. The same mitigation measures outlined above would apply.

4.2.4 Santa Clara Station and Newhall Maintenance Facility

The design refinements for Santa Clara Station would locate station facilities south of Brokaw Road on VTA property; the original design located the station on private property north of Brokaw Road. The design refinements would reconfigure the Newhall Maintenance Facility to accommodate Santa Clara Station facilities on the VTA-owned property south of Brokaw Road. Due to the new location of the parking garage, parking would be located nearer to residential receptors, but still about 400 feet to the west of the property.

The increase in noise levels from the parking facility would not be noticeable at these receptors and would be overshadowed by existing Caltrain and Union Pacific Railroad (UPRR) operations and traffic on adjacent roads. The Newhall Maintenance Facility would still be located within the same footprint as the original design and within VTA-owned property. The design refinements include the same BART facilities as in the original design, but the layout of these facilities has been reconfigured. The changes in location of yard components would not significantly affect noise levels at residential receptors with frontage along the Caltrain corridor (about 200 feet from the yard) or single-family homes along Newhall Street with frontage along Interstate (I-) 880 (about 300 feet from the yard). Noise levels at receptors southwest of the Newhall Maintenance Facility would be overshadowed by existing train noise, and overall noise levels from the site would also be attenuated by an existing sound wall along the frontage of the Caltrain/UPRR corridor, which is the same as conditions evaluated in the SEIS/SEIR. Noise levels from the Newhall Maintenance Facility would similarly be overshadowed by traffic noise from I-880 at homes along Newhall Road, and, as such, any increase in noise levels at the receptors is unlikely to be noticeable at these locations.

The construction approach would be similar to the original design, and the Santa Clara Station construction staging area would occupy a smaller overall area than the original design; consequently, noise levels during construction would be the same or lower than previously analyzed. Therefore, there would be no change in conclusions from the 2018 Final SEIS/SEIR, and the same mitigation measures outlined above would apply to the Single-Bore Design Refinements.

5 Conclusions

A noise and vibration assessment was conducted for design refinements to the Phase II Project since the 2018 ROD. Groundborne vibration levels under the Single-Bore Design Refinements would not exceed FTA groundborne vibration criteria at any receptors; therefore, there would be no impacts due to groundborne vibration, which is the same conclusion as the 2018 Final SEIS/SEIR. The analysis of the potential operational impacts from modifications to tunnel design shows that the Single-Bore Design Refinements would result in an overall reduction in potential groundborne noise impacts.

As described above, the Single-Bore Design Refinements has the potential to exceed FTA groundborne noise criteria at 3 sensitive receptors as compared to the 386 sensitive receptors identified for the 2018 Twin-Bore Design and 2018 Single-Bore Design. Of these 3 sensitive receptors, all are residential receptors. These three receptors were not previously identified as impacted sensitive receptors in the 2018 Final SEIS/SEIR. However, implementation of Mitigation Measures **NV-A** and **NV-B** would reduce anticipated impacts to below FTA groundborne noise thresholds.

Mitigation Measure **NV-A** has not changed since the 2018 Final SEIS/SEIR. Mitigation Measure **NV-B** allows for the option to apply alternative strategies that achieve compliance with the FTA groundborne noise criteria, and a lesser performing measure such as HRDF appears to be suitable. **NV-B** still includes the requirement of IST, as described in the 2018 Final SEIS/SEIR, to reduce anticipated groundborne noise impacts to below FTA thresholds. The 2018 Final SEIS/SEIR stated that, under Mitigation Measure **NV-B**, the Phase II Project was required to install up to approximately 22,700 linear feet of IST in the most conservative case for the Twin-Bore Option and 14,600 linear feet for the Single-Bore Option (including Downtown West Option and Diridon North Option). The Single-Bore Design Refinements results in the requirement of approximately 1,000 linear feet of HRDF to reduce groundborne noise impacts at 3 sensitive receptors. These 3 receptors are single-family or multi-family residences. As indicated in Mitigation Measure **NV-B** in the 2018 Final SEIS/SEIR, following the completion of additional vibration propagation studies at the deeper track elevations, final design will determine the specific mitigation strategy, which could include alternative strategies that similarly achieve the FTA groundborne noise criteria consistent with Mitigation Measure **NV-B**.

The analysis of the minor changes at the four stations, two mid-tunnel facilities, and maintenance facility concludes that these are not anticipated to result in new long-term operational adverse effects due to noise or vibration. Therefore, the changes to the Phase II Project described above are not expected to result in new long-term operational adverse effects due to noise or vibration with the implementation of Mitigation Measure **NV-A**.

During construction, groundborne vibration would be below the most conservative building vibration criterion and would be temporary. Therefore, impacts would be the same or less than described in the SEIS/SEIR. Previously identified Mitigation Measures **NV-CNST-P**, **NV-CNST-Q**, **NV-CNST-**R, **NV-CNST-S** and **GEO-CNST-B** and **GEO-CNST-C** still apply, and no new mitigation is required.

The table below provides a comparison of the noise and vibration impacts between the prior 2018 Final SEIS/SEIR and the current project. The table also discusses the applicable mitigation measures identified in the 2018 Final SEIS/SEIR and their adequacy for the current project.

Table 2 Impact Comparisons – 2018 Final SEIS/SEIR and Current Project

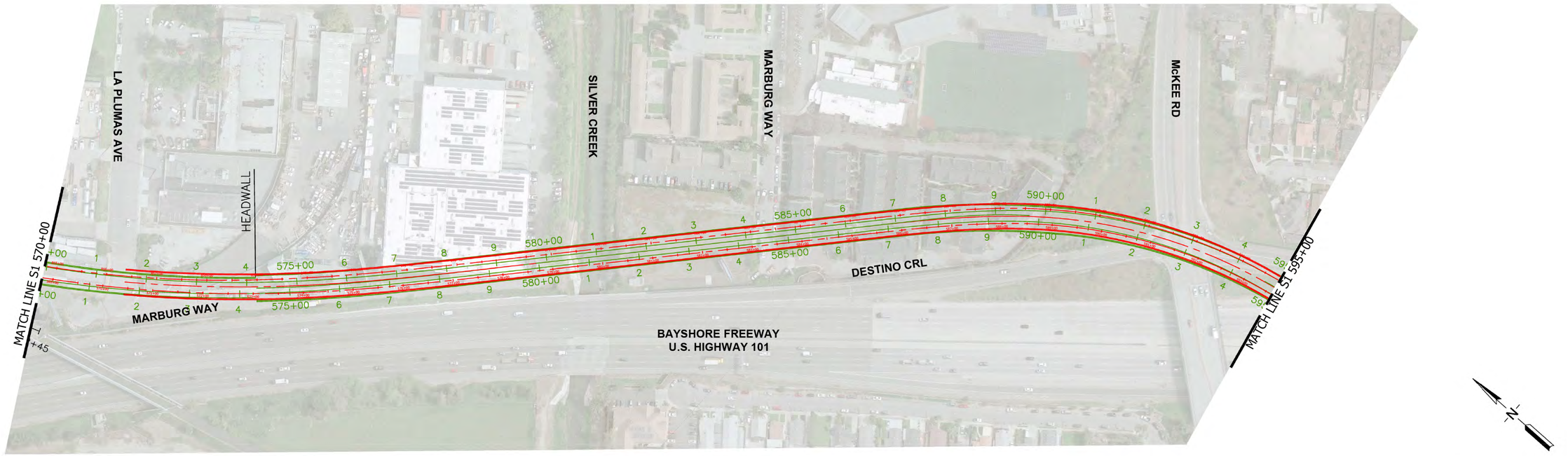
2018 Final SEIS/SEIR	New Impacts/Changes in Impacts
Construction	
Groundborne Vibration	
The Final SEIS/SEIR indicated that, as the tunnel boring machine (TBM) progresses along the tunnel alignment, groundborne vibration may exceed the FTA impact criteria for occasional events (75 vibration velocity decibels [VdB]) at receptors 75 feet or less from the horizontal centerline of the tunnel. At these locations, vibration from the TBM would potentially be perceptible for up to 4 days. Different locations may experience perceptible vibration at different times, but the effect would be short-term and temporary. Implementation of mitigation measures NV-CNST-P through NV-CNST-S and GEO-CNST-B and GEO CNST-C will reduce this to less than adverse.	Similar to the analysis in the Final SEIS/SEIR, groundborne vibration levels from the TBM would be below the most conservative building vibration criterion; impacts would be the same or less than described in the Final SEIS/SEIR. Previously identified mitigation measures NV-CNST-P through NV-CNST-S and GEO-CNST-B and GEO-CNST-C still apply, and no new mitigation is required.
Noise	
Construction of the Project is anticipated to exceed FTA construction noise thresholds for L_{eq} (equivalent sound level) during daytime and nighttime construction work. With incorporation of construction noise mitigation measures NV-CNST-A through NV-CNST-S, development of comprehensive construction noise specifications, and a noise mitigation and monitoring plan, construction noise impacts would be reduced to a less-than-significant level at all locations except near the Downtown San Jose and Diridon Stations. Because of the proximity of sensitive noise receptors at these stations, construction of the Project would result in significant and unavoidable noise impacts at the Downtown San Jose and Diridon Stations even after all feasible mitigation measures have been implemented.	Noise impacts adjacent to the yard and portals would be the same as previously identified, and previously identified mitigation measures NV-CNST-P through NV-CNST-S and GEO-CNST-B and GEO-CNST-C still apply, and no new mitigation is required. Mitigation measures NV-CNST-A through NV-CNST-S, and GEO-CNST-B and GEO-CNST-C still apply and will be implemented, and no new mitigation is required. Because of the proximity of sensitive noise receptors, the construction of the Phase II Project would still result in significant and unavoidable noise impacts at the Downtown San Jose and Diridon Stations even after all feasible mitigation measures have been implemented similar to what was concluded in the Final SEIS/SEIR. The East/13th Street and West/Stockton Avenue Mid-Tunnel Ventilation Structures may be eliminated and replaced with new ventilation fans and a fan plant at the East and West Tunnel Portals. However, these new facilities would not result in new adverse effects nor substantial increase in the severity of previously disclosed adverse effects. Therefore, there would be no change to the prior conclusion in the Final SEIS/SEIR that the Project would not result in adverse effects at the East and West Portals.

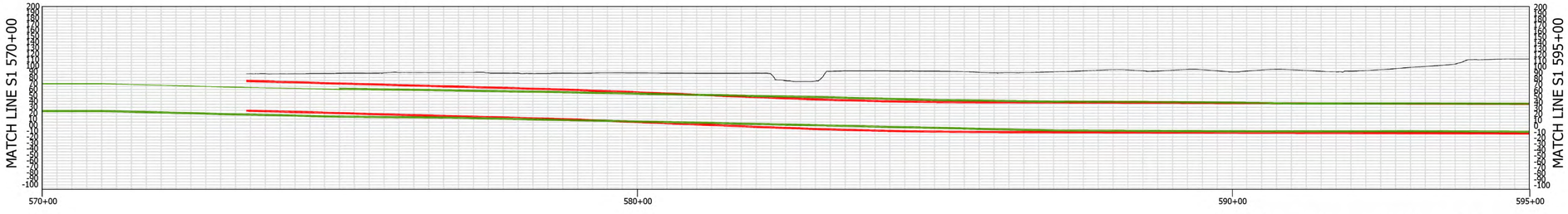
2018 Final SEIS/SEIR	New Impacts/Changes in Impacts
Operations	
The noise and vibration analysis was conducted in accordance with FTA's *Transit Noise and Vibration Impact Assessment Manual*.	A noise and vibration assessment using the current FTA Guidance Manual was conducted to consider the design refinements. The design refinements include vertical alignment shifts of up to 13 feet shallower/33 feet deeper and horizontal alignment shifts of up to 125 feet at the widest diversion point (just west of Diridon Station) in addition to modifications to track configuration/ arrangement within the tunnel.
Groundborne Vibration	
As described in the Final SEIS/SEIR, groundborne vibration levels will not exceed FTA groundborne vibration criteria; therefore, there will be no impacts due to groundborne vibration, and no mitigation is required.	With the design refinements described above, groundborne vibration levels of the Phase II Project would still not exceed FTA groundborne vibration criteria at any receptors, which is the same conclusion as presented in the Final SEIS/SEIR.
Groundborne Noise	
As stated in the Final SEIS/SEIR, the Phase II Project has the potential to result in groundborne noise levels in exceedance of FTA criteria at 386 sensitive receptors prior to mitigation. Of these, 377 were residential receptors, 8 were institutional or medical office receptors, and 1 was a hospital receptor. The number of residential receptors includes a 218-unit multifamily residence. However, with the implementation of mitigation measure NV-B (groundborne noise reduction measures), the Phase II Project will result in no adverse impacts due to groundborne noise from operations.	The results of the analysis show a substantial reduction of sensitive receptors potentially affected by groundborne noise as compared to the Final SEIS/SEIR due to the change in track configuration within the tunnel including crossovers. With the design refinements, 3 sensitive receptors are potentially affected as compared to the 386 receptors identified in the Final SEIS/SEIR. These 3 receptors, which are near a crossover, are multifamily residential, and they were not previously identified as affected sensitive receptors in the Final SEIS/SEIR. For these 3 receptors, implementation of mitigation measure NV-B, as described below, will reduce anticipated impacts to below FTA groundborne noise thresholds.
Mitigation Measure NV-B includes the requirement of an isolated slab track (IST), or equivalent mitigation, to reduce anticipated groundborne noise impacts to less than the FTA criteria. The Phase II Project was required to install approximately 14,600 linear feet of IST to reduce groundborne noise impacts at 386 sensitive receptors. The Phase II Project final design will determine the specific mitigation strategy, which could include alternative strategies that similarly achieve the FTA groundborne noise criteria.	Mitigation measure NV-B includes application of highly-resilient, direct-fixation (HRDF) fasteners for a total length of approximately 1,000 feet at the crossover (from STA 687+00 to 692+00 on both tracks) to mitigate potential impacts to below FTA thresholds. HRDF fasteners are an equivalent mitigation to IST and meet the requirements of mitigation measure NV-B to reduce groundborne vibration. Mitigation measure NV-B also requires additional vibration propagation studies to be conducted during final design to determine the specific mitigation strategy (design feature such as IST, HRDF, or other effective method) that would achieve the FTA groundborne noise criteria. Therefore, the Phase II Project with design refinements would not exceed FTA groundborne vibration criteria at any receptors

2018 Final SEIS/SEIR	New Impacts/Changes in Impacts
	after mitigation is incorporated, which is the same conclusion as presented in the Final SEIS/SEIR.
Airborne Noise	
With regard to airborne noise from operation of trains, noise levels were found to result in a moderate noise impact at one ground-floor receiver and two second-story receivers, all located over 200 feet away from the alignment near Santa Clara Station north of I-880 where the track will be at grade. The increase in noise levels was less than 2 A-weighted decibels (dBA) at these three receptors. Because this increase did not exceed the mitigation policy of 5 dBA adopted for the Phase II Project, no mitigation was required.	Airborne noise levels from train operations would be the same as reported in the Final SEIS/SEIR. No new mitigation is required for airborne noise from train operations.
Mitigation Measure NV-A includes the requirement for noise reduction treatments at ancillary facilities such as tunnel ventilation shafts, pressure relief shafts, traction power substations, and emergency backup generators such that noise levels comply with applicable city criteria. These treatments include sound attenuators, acoustical absorptive treatments, and perimeter noise walls.	Mitigation Measure NV-A (control airborne noise from ancillary facilities) would still require noise control measures to comply with applicable city criteria. These treatments include sound attenuators, acoustical absorptive treatments, and perimeter noise walls.

Attachment A

2018 Single-Bore Design and 2024 Design Refinements Comparison Plan and Profiles





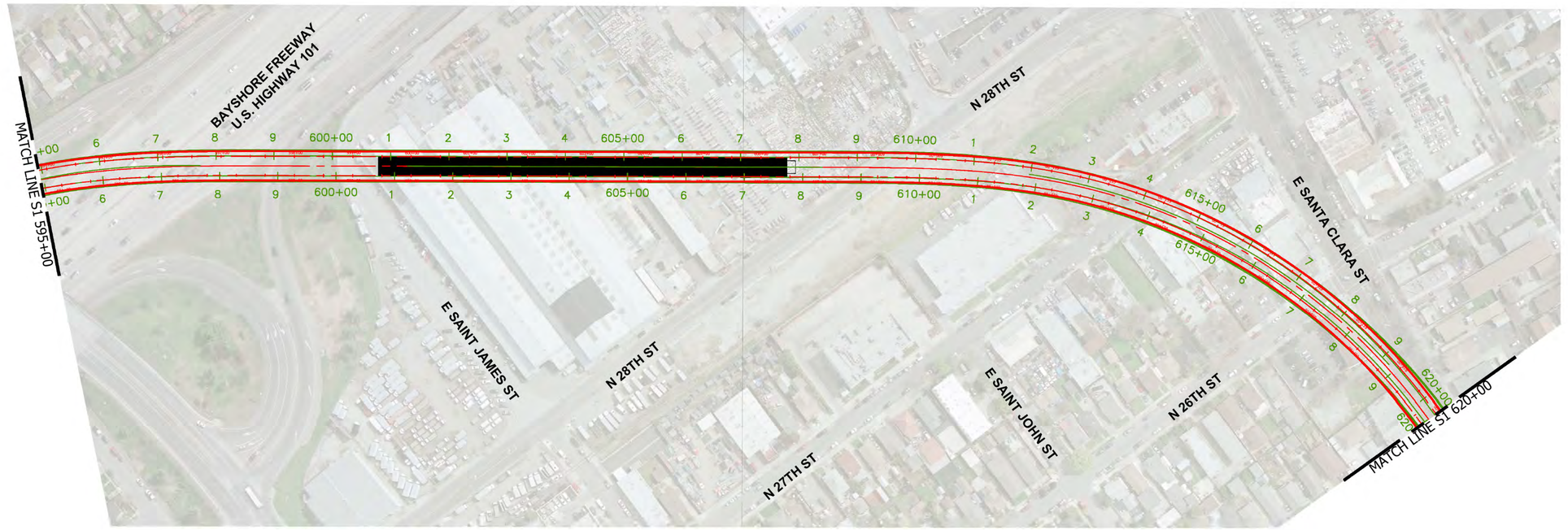
LEGEND

- 2024 DESIGN REFINEMENTS
- 2018 SEIS/SEIR TUNNEL ALIGNMENT
- EXISTING GROUND SURFACE

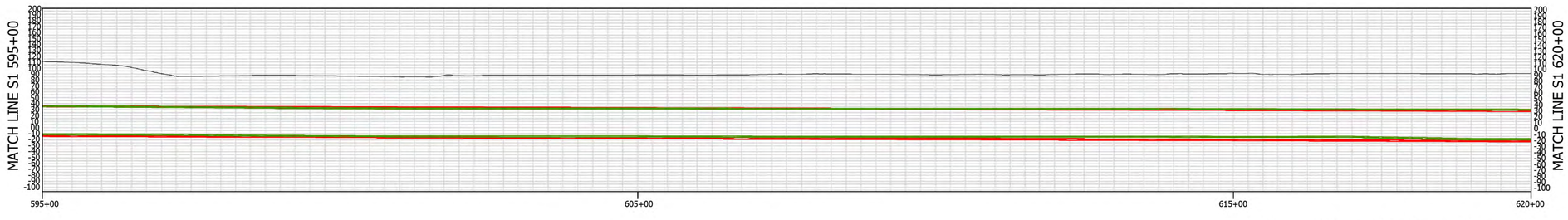
Santa Clara Valley Transportation Authority

2018 SEIS/SEIR ALIGNMENT COMPARED TO DESIGN REFINEMENTS

C:\Users\Sven\Documents\Keish Files\Exhibit for Tunnel\Track Profile Comparison\Single Bore trac & profile 2018-2023 Exh bit.dwg Modified: 2/8/2024 by Sven



0 100 200
Scale in Feet



0 100 200
Scale in Feet
Vertical Scale

0 400 800
Scale in Feet
Horizontal Scale

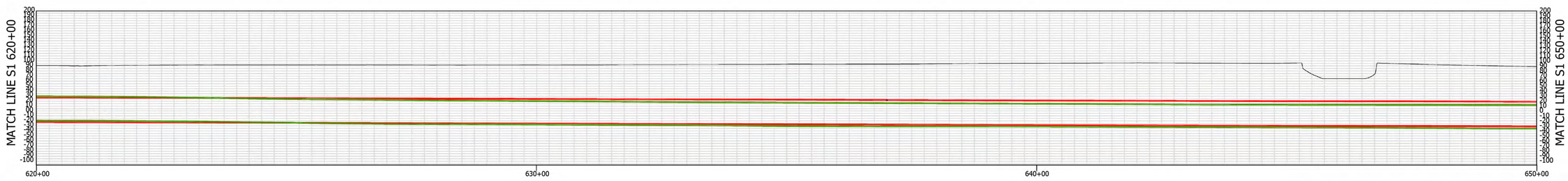
LEGEND

- 2024 DESIGN REFINEMENTS
- 2018 SEIS/SEIR TUNNEL ALIGNMENT
- EXISTING GROUND SURFACE

Santa Clara Valley Transportation Authority

2018 SEIS/SEIR ALIGNMENT COMPARED TO DESIGN REFINEMENTS

C:\Users\Sven\Documents\Kiosk Files\Exhibit for Tunnel\Track Profile Comparison\Single Bore track & profile 2018-2024 Exhibit.dwg Modified: 2/8/2024 by Sven



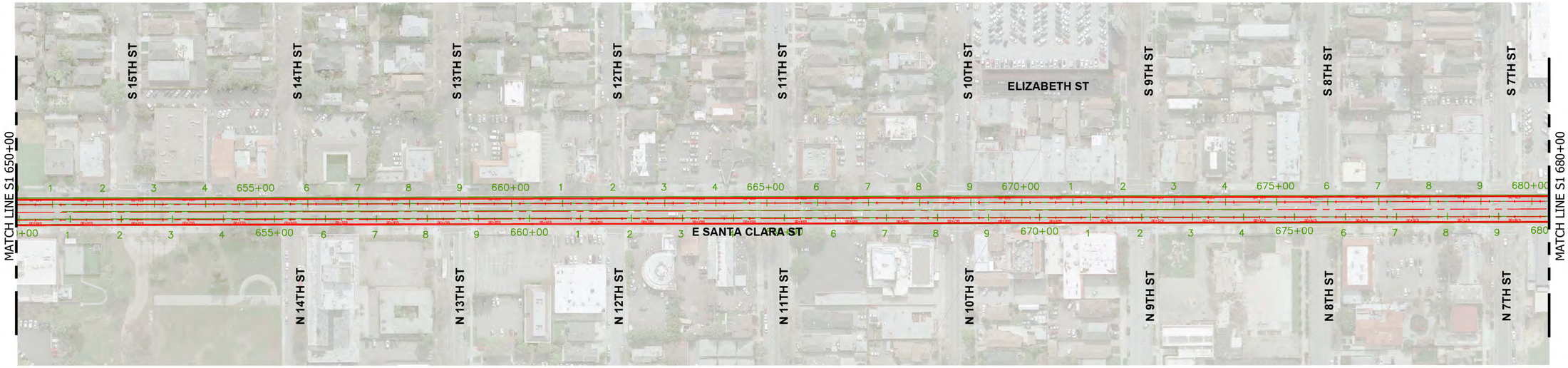
LEGEND

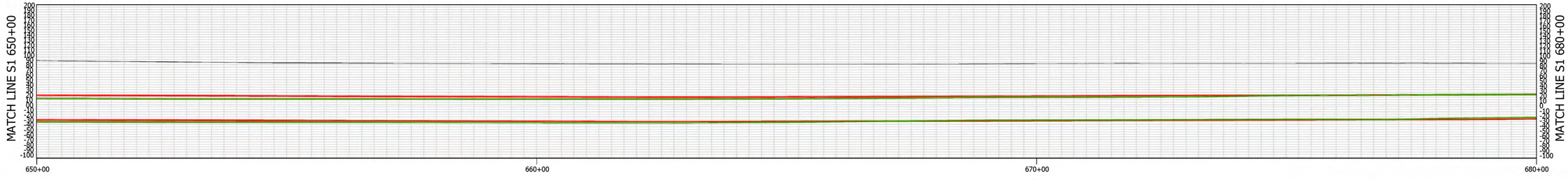
- 2024 DESIGN REFINEMENTS
- 2018 SEIS/SEIR TUNNEL ALIGNMENT
- EXISTING GROUND SURFACE

Santa Clara Valley Transportation Authority

2018 SEIS/SEIR ALIGNMENT COMPARED TO DESIGN REFINEMENTS

C:\Users\Sven\Documents\Keish Files\Exhibit for Tunnel\Track Profile Comparison\Single Bore trac & profile 2018-2023 Exh bit.dwg Modified 2/8/2024 by Sven





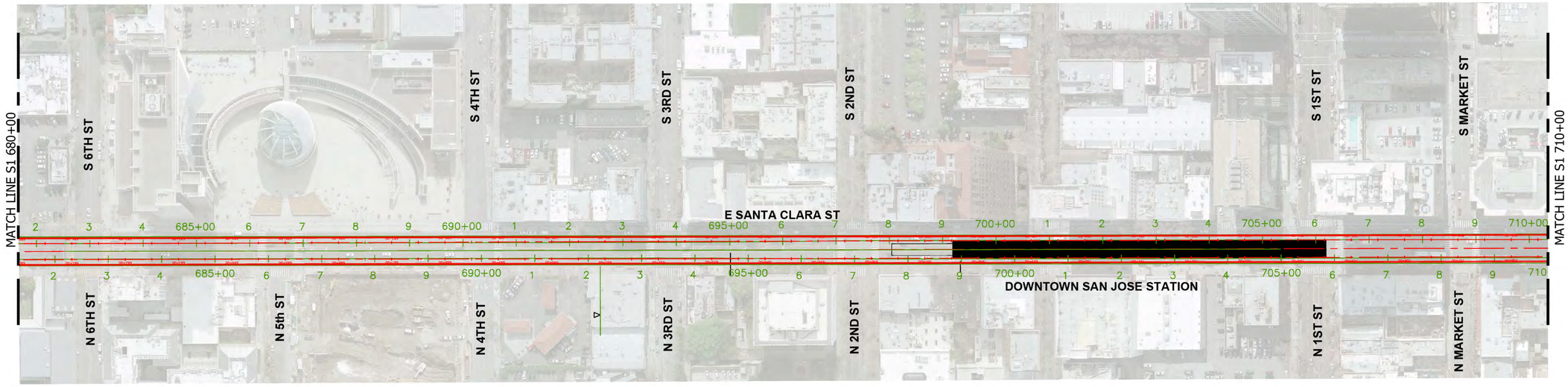
LEGEND

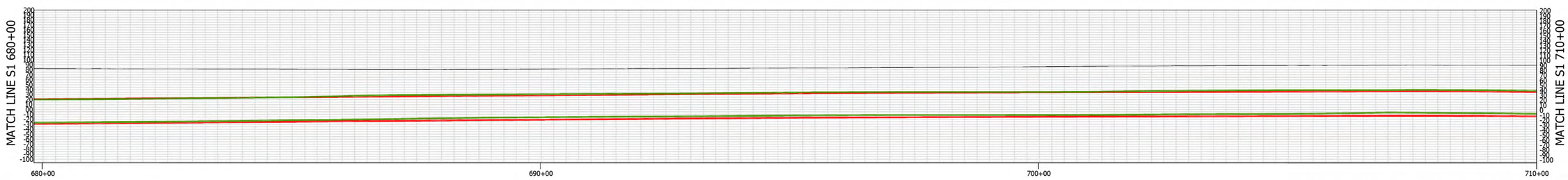
- 2024 DESIGN REFINEMENTS
- 2018 SEIS/SEIR TUNNEL ALIGNMENT
- EXISTING GROUND SURFACE

Santa Clara Valley Transportation Authority

2018 SEIS/SEIR ALIGNMENT COMPARED TO DESIGN REFINEMENTS

C:\Users\Sven\Documents\Keish Files\Exhibit for Tunnel Track Profile Comparison\Single Bore trac & profile 2018-2023 Exh bit.dwg Modified: 2/8/2024 by Sven





0 100 200 Scale in Feet Vertical Scale

0 400 800 Scale in Feet Horizontal Scale

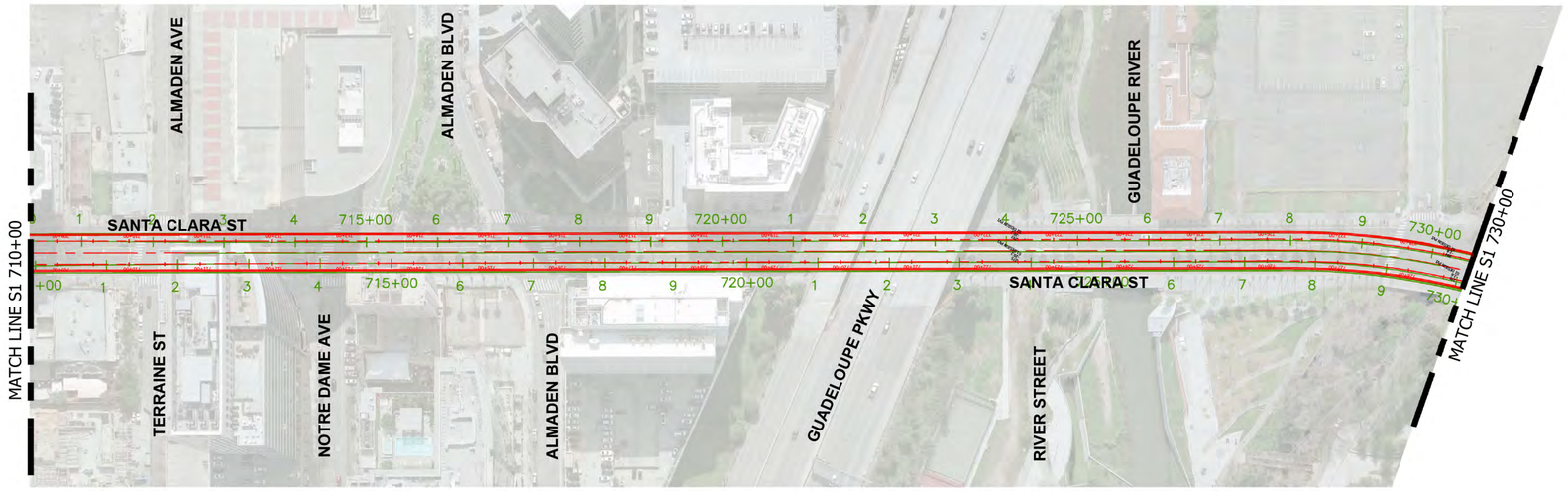
LEGEND

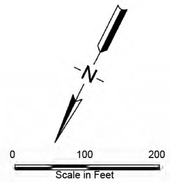
- 2024 DESIGN REFINEMENTS
- 2018 SEIS/SEIR TUNNEL ALIGNMENT
- EXISTING GROUND SURFACE

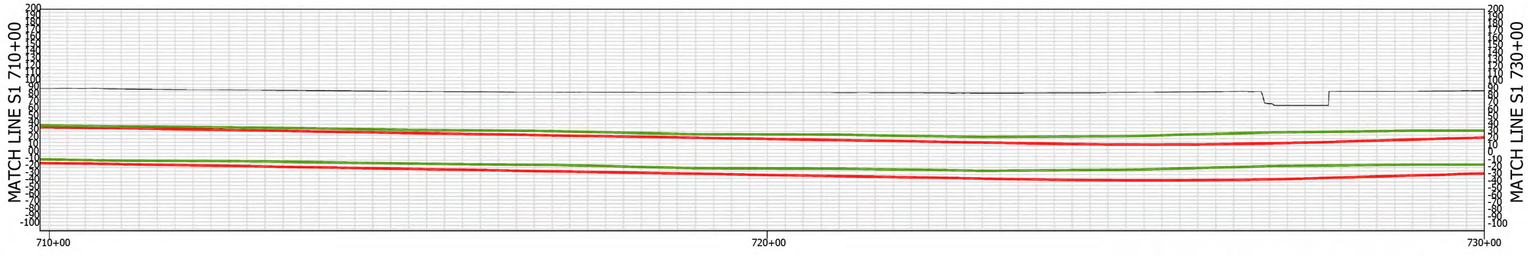
Santa Clara Valley Transportation Authority

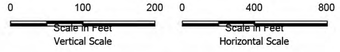
2018 SEIS/SEIR ALIGNMENT COMPARED TO DESIGN REFINEMENTS

C:\Users\Sven\Documents\Keish Files\Exhibit for Tunnel\Track Profile Comparison\Single Bore trac & profile 2018-2023 Exh bit.dwg Modified: 2/8/2024 by Sven









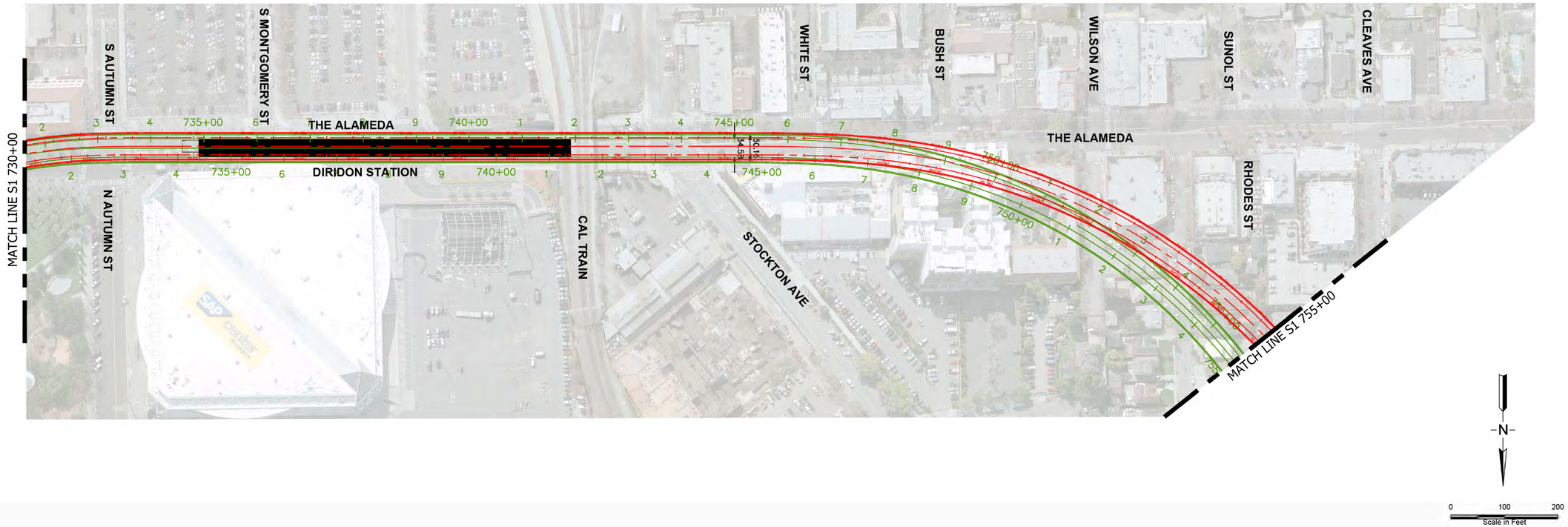
LEGEND

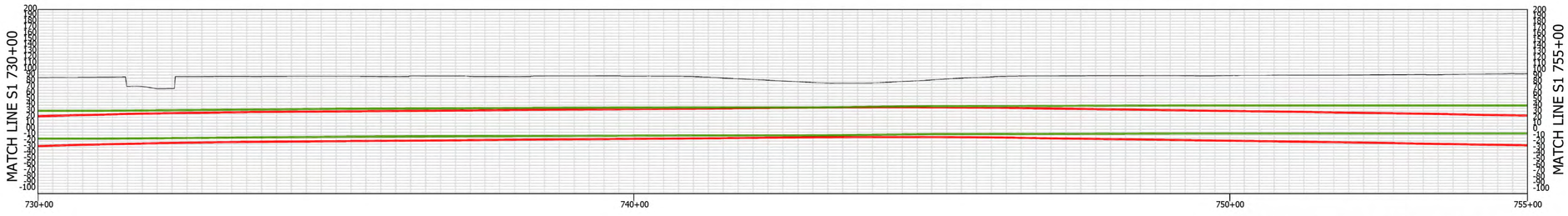
- 2024 DESIGN REFINEMENTS
- 2018 SEIS/SEIR TUNNEL ALIGNMENT
- EXISTING GROUND SURFACE

Santa Clara Valley Transportation Authority

2018 SEIS/SEIR ALIGNMENT COMPARED TO DESIGN REFINEMENTS

C:\Users\Sven\Documents\Keish Files\Exhibit for Tunnel\Track Profile Comparison\Single Page.trzx & profile 2018-2023 Exhibit.dwg Modified: 2/8/2024 by Sven





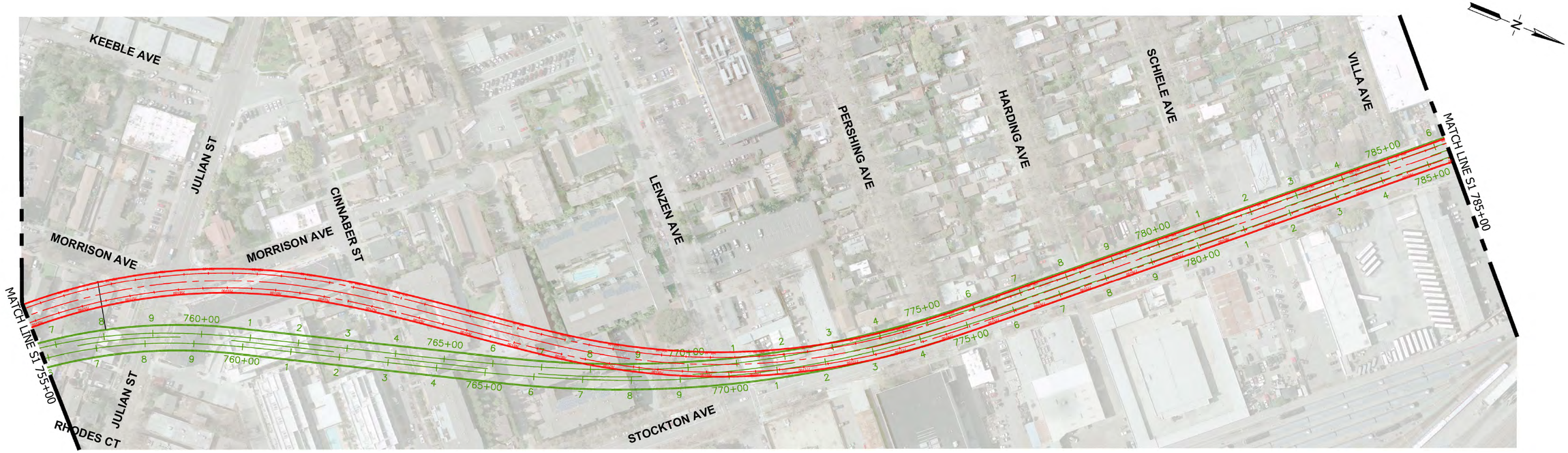
LEGEND

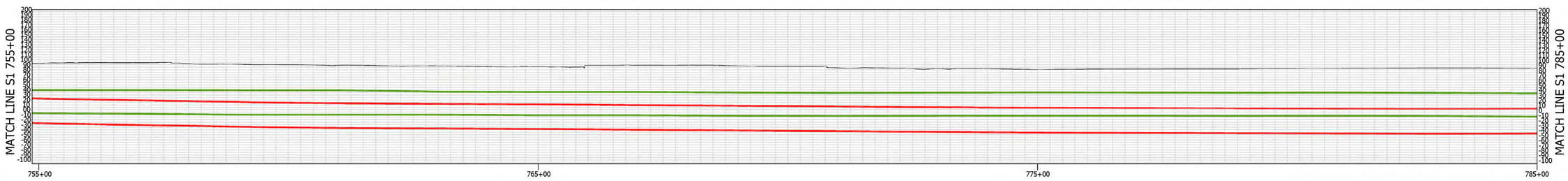
- 2024 DESIGN REFINEMENTS
- 2018 SEIS/SEIR TUNNEL ALIGNMENT
- EXISTING GROUND SURFACE

Santa Clara Valley Transportation Authority

2018 SEIS/SEIR ALIGNMENT COMPARED TO DESIGN REFINEMENTS

C:\Users\Sven\Documents\Keith Files\Exhibit for Tunnel\Track Profile Comparison\Single Bore trac & profile 2018-2023 Exhibit.dwg Modified: 2/8/2024 by Sven





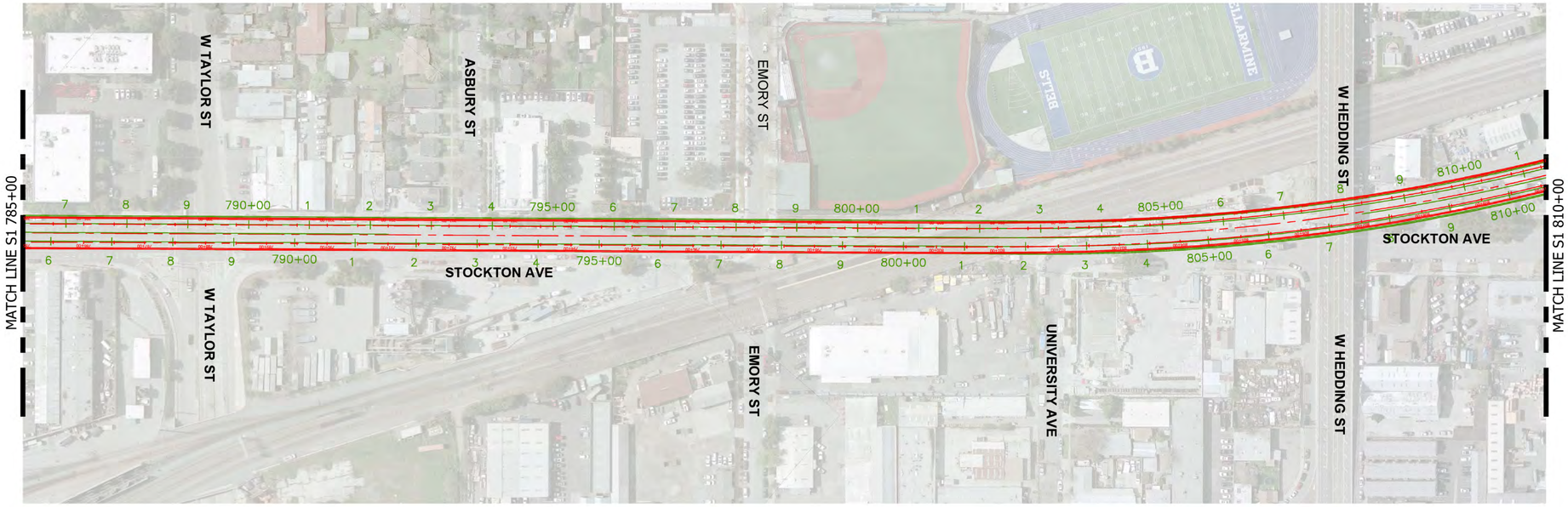
LEGEND

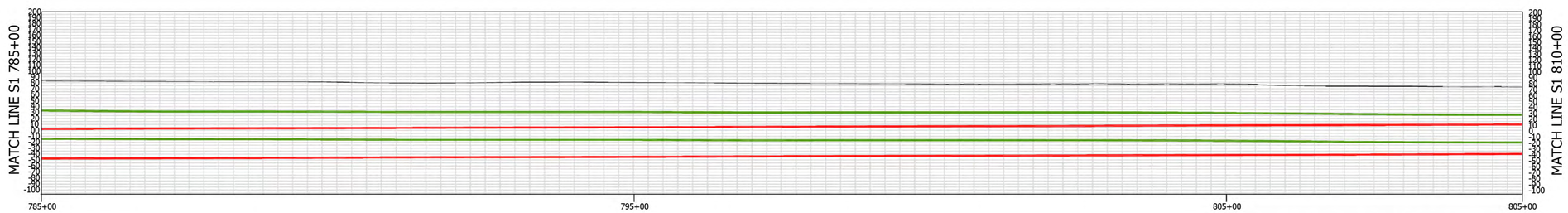
- 2024 DESIGN REFINEMENTS
- 2018 SEIS/SEIR TUNNEL ALIGNMENT
- EXISTING GROUND SURFACE

Santa Clara Valley Transportation Authority

2018 SEIS/SEIR ALIGNMENT COMPARED TO DESIGN REFINEMENTS

C:\Users\Sven\Documents\Keish Files\Exhibit for TunnelTrack Profile Comparison\Single Bore trac & profile 2018-2023 Exhibit.dwg Modified: 2/8/2024 by Sven





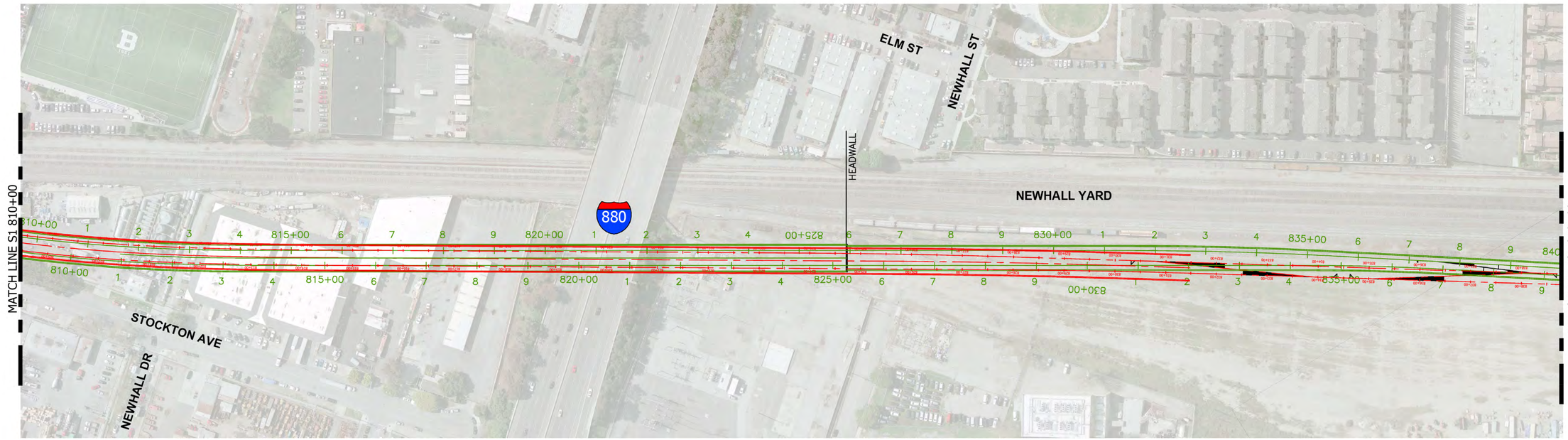
LEGEND

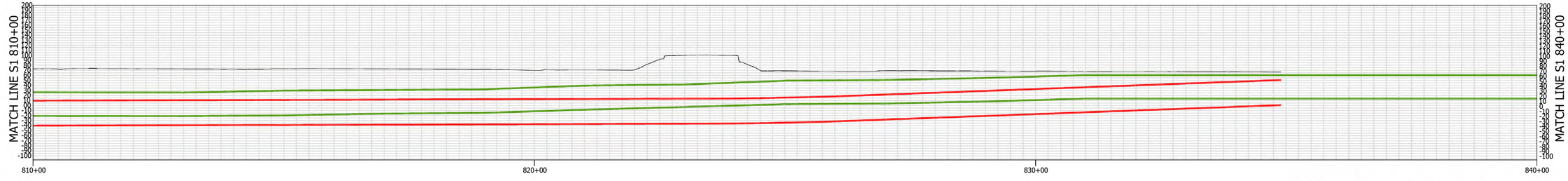
- 2024 DESIGN REFINEMENTS
- 2018 SEIS/SEIR TUNNEL ALIGNMENT
- EXISTING GROUND SURFACE

Santa Clara Valley Transportation Authority

2018 SEIS/SEIR ALIGNMENT COMPARED TO DESIGN REFINEMENTS

C:\Users\Sven\Documents\Keish Files\Exhibit for Tunnel\Track Profile Comparison\Single Bore trac & profile 2018-2023 Exhibit.dwg Modified: 2/8/2024 by Sven





LEGEND

- 2024 DESIGN REFINEMENTS
- 2018 SEIS/SEIR TUNNEL ALIGNMENT
- EXISTING GROUND SURFACE

Santa Clara Valley Transportation Authority

2018 SEIS/SEIR ALIGNMENT COMPARED TO DESIGN REFINEMENTS

C:\Users\SvenDocuments\Keish Files\Exhibit for TunnelTrack Profile Comparison\Single Bore trac & profile 2018-2023 Exhibit.dwg Modified: 2/8/2024 by Sven

Attachment B

Applicable Mitigation Measures from 2018 Record of Decision

NV-A	**Implement Noise Reduction Treatments at Ancillary Facilities** The contractor will implement noise reduction treatments at ancillary facilities such as tunnel ventilation shafts, pressure relief shafts, traction power substations, and emergency backup generators such that noise levels comply with applicable Cities of San Jose and Santa Clara noise criteria at nearby developed land uses. Treatments that will be implemented, if necessary, include but are not limited to: • Sound attenuators and acoustical absorptive treatments in ventilation shafts and facilities. • Sound attenuators for the tunnel emergency ventilation fans. • Perimeter noise walls (nominally an 8 -foot -high wall) placed around emergency generators.
NV-B	**Reduce Groundborne Noise Levels** The contractor will implement an Isolated Slab Track (IST) as the mitigation strategy for groundborne noise. An IST is a form of floating slab track (FST). The IST system is constructed with a continuous elastomeric mat instead of discrete elastomeric pads that are typically used for an FST system. An IST can be designed to provide from 10 to 13 dBA of noise reduction. This strategy can also be used under a crossover. The locations for implementing this measure are shown in Tables 4.12-21 through 4.12-25. The project's final design will determine the specific mitigation strategy, which could include alternative strategies that similarly achieve the FTA groundborne noise criteria.
NV-CNST-A	**Incorporate FTA Criteria Compliant Construction Noise and Vibration Specifications** VTA will incorporate a comprehensive construction noise and vibration specification into all construction bid documents requiring compliance with FTA criteria. VTA will emphasize the existence and importance of noise and vibration control specifications at pre-bid and preconstruction conferences.
NV-CNST-B	**Locate Equipment as Far as Feasible from Sensitive Sites** The contractor will locate stationary equipment, such as generators and compressors as far as feasible from noise and vibration sensitive sites and will acoustically treat such equipment. The contractor will also locate grout batch plants, grout silos, mixers, pumps, diesel pumping equipment, and similar noise and vibration generating equipment as far as feasible from noise sensitive sites, and acoustically treat the same if necessary.
NV-CNST-C	**Construct Temporary Noise Barriers** The contractor will install temporary noise barriers or noise control blankets in areas between noisy activities and noise-sensitive receptors, where practical and effective. Temporary noise barriers can reduce construction noise by 5 to 15 dB, depending on the height of the barrier and the placement of the barrier. To be most effective, the contractor will place the barrier as close as possible to the noise source or the sensitive receptor. Temporary barriers tend to be particularly effective because they can be easily moved as work progresses to optimize performance. If temporary noise barriers and site layout do not result in compliance with the noise limit, the contractor may consider retrofitting existing windows and doors with new acoustically rated units for the residential structures.
NV-CNST-D	**Operate Equipment to Minimize Annoying Noise and Vibration** Contractors will implement the following measures: • Use electric instead of diesel-powered equipment, hydraulic tools instead of pneumatic impact tools, and electric instead of air- or gasoline-driven saws, where feasible. • Use an augering drill-rig for setting piles in lieu of impact pile drivers, where feasible. • Operate equipment so as to minimize banging, clattering, buzzing, and other annoying types of noises, especially near residential areas during nighttime hours.

	• Line haul truck beds with rubber or sand to reduce noise, if needed and requested by VTA. Line or cover hoppers, conveyor transfer points, storage bins, and chutes with sound-deadening material. • During nighttime and weekends, use strobe warning lights and/or back-up observers during any back-up operations, where permitted by the local jurisdiction.
NV-CNST-E	**Route Construction Trucks along Truck Routes Least Disturbing to Residents** The contractor will route construction-related truck traffic along truck routes and roadways that would cause the least disturbance to residents. The contractor will lay out loading and unloading zones to minimize truck idling near sensitive receptors and to minimize truck reversing so back-up alarms are minimized near residences.
NV-CNST-F	**Secure Steel and Concrete Plates over Excavated Holes and Trenches** The contractor will secure steel and/or concrete plates over excavated holes and trenches to reduce rattling when vehicles pass over. If complaints are received, the contractor will use thicker plates, stiffer beams beneath the plates, and/or rubber gaskets between the beams and plates to further reduce rattling noise and vibration.
NV-CNST-G	**Use Best Available Practices to Reduce Excess Noise and Vibration** The contractor will use the best available practices to reduce the potential for exceedances of noise and vibration criteria due to construction activities. This may require the use of equipment with special exhaust silencers, construction of temporary enclosures or noise barriers around activities, and tracks for the tracked vehicles to be in good condition.
NV-CNST-H	**Adhere to Local Jurisdiction Construction Time Periods, to the Extent Feasible** The contractor will adhere to local jurisdiction construction time periods, to the extent feasible, recognizing that nighttime and weekend construction may be necessary and/or preferred by VTA and local jurisdictions to reduce other related environmental effects such as traffic. VTA will coordinate with the cities of San Jose and Santa Clara on construction operations during nighttime and weekends, and where feasible adhere to local ordinances. San Jose Ordinance 26248, 26594 restricts construction to between 7 a.m. and 7 p.m. Santa Clara Ordinance 1549 § 1, 7-15-86; Ord. 1556 § 1, 9-16-86. Formerly § 18-32.3 restricts construction to between 7 a.m. and 6 p.m. on weekdays, and between 9 a.m. and 6 p.m. on Saturday.
NV-CNST-I	**Perform Preconstruction Ambient Noise Measurements at All CSAs** The contractor will perform preconstruction ambient noise measurements at all construction staging areas, which include the tunnel portals, stations, and mid-tunnel ventilation sites. These measurements will document the noise environment just prior to start of construction at representative locations along the alignment. These measurements will be performed continuously over a minimum of 10 days (240 hours).
NV-CNST-J	**Implement a Construction Noise Control and Monitoring Plan** The contractor will submit a Noise Control and Monitoring Plan to VTA for approval. The plan will be prepared by a qualified acoustical engineer whose qualifications and proposed noise control and monitoring activities will be subject to approval of VTA prior to construction activities. The contractor will update the Noise Control and Monitoring Plan every 3 months and will include all the pertinent information about construction equipment and site layout, the projected noise levels, and the noise mitigation measures that may be required to comply with the noise limits for each sensitive receptor. The Noise Control and Monitoring Plan will also outline the monitoring equipment and procedures the contractor will use to perform noise measurements and to identify noise-sensitive receptors in the immediate vicinity of construction operations, including details regarding the noise measurement locations, frequency, and duration of measurements. The contractor will document the results of noise monitoring and submit the documentation to VTA weekly. In the event that levels exceed allowable noise limits, VTA will ensure that contractually required corrective measures consistent with the Noise Control and Monitoring Plan are implemented.

NV-CNST-K	**Require Minimum Qualifications for the Acoustical Engineer** The minimum qualifications for the Acoustical Engineer will be a Bachelor of Science or Engineering degree, from a qualified program in engineering or physics offered by an accredited university or college, and 5 years in noise control engineering and construction noise analysis.
NV-CNST-L	**Prohibit Operation of Noise-Generating Equipment Prior to Acceptance of Noise Control and Monitoring Plan** The contractor will not operate noise-generating equipment at the construction site prior to acceptance of the Noise Control and Monitoring Plan.
NV-CNST-M	**Install Long-Term Noise Monitors at CSAs during all Construction Phases** The contractor will install stationary noise monitors at all construction staging areas, which include the tunnel portals, stations, and mid-tunnel ventilation sites, during all the construction phases. Noise sampling will be performed continuously at representative monitoring locations nearest the most sensitive receptor at each location. A minimum of two stationary monitors will be required at the Downtown San Jose Station and Diridon Station locations. The monitoring locations may be moved as the construction work progresses. If required, additional noise monitoring site(s) may be added by the VTA to address any specific situation or concern. At the Alum Rock/28th Street Station and the West Portal staging area, stationary noise monitors will also be initially installed and may be removed if the noise levels are in compliance with the noise limits when the full-production construction activities are closest to the sensitive receptors. All data gathered by the contractor will be continuously available to VTA and submitted weekly to VTA for approval. In addition to these stationary noise monitors, the contractor will conduct 30-minute noise sampling with hand-held monitors weekly at the station sites and at other construction sites, including the ventilation shafts and gap breaker stations, to ensure compliance with the noise criteria. If required, additional noise monitoring site(s) may be added by VTA to address any specific situation or concern. The contractor will submit noise data to VTA for approval on a weekly basis and will include details on location and type of construction activity and details, photographs, and sketches of noise monitoring locations. A qualified acoustical engineer will determine whether work was within thresholds or not, and indicate any steps taken during monitoring to lower noise levels to within limits.
NV-CNST-N	**Ensure Equipment is Pre-certified to Meet Noise Limits** For major equipment to be used at the surface of the construction site for a total duration greater than 5 days, the contractor will ensure that the equipment is pre-certified by the acoustical engineer during field measurements at a test site or guaranteed by the equipment vendor to meet the noise limits developed for construction equipment as shown in Table 5-8. VTA will re-examine and develop the final limits to be applied during the engineering phase, and the contractor will verify these limits during initial and active performance of the work when the equipment arrives on site. The contractor will retest construction equipment at 6-month intervals while in use onsite. Any equipment used during construction may be subject to confirmatory noise level testing while performing the work at the request of VTA.
NV-CNST-O	**Implement a Complaint Resolution Procedure** The contractor will implement a complaint resolution procedure to rapidly address any noise and vibration problems that may develop during construction. After a complaint is received, the contractor will assign the complaint a case number and will contact the person making the complaint to receive further clarification on the concern. The contractor will then discuss the issue with the construction team to determine the appropriate action to resolve the issue. The contractor will then again contact the person making the complaint to describe how the issue has been resolved.
NV-CNST-P	**Implement a Construction Vibration Control and Monitoring Plan** The contractor will be required to submit a Construction Vibration Control and Monitoring Plan to VTA for approval. The plan will be prepared by a qualified Vibration specialist whose qualifications and proposed vibration control and monitoring activities will be

	subject to approval of VTA prior to construction activities. The Construction Vibration Control and Monitoring Plan will be updated every 3 months and include all the pertinent information about construction equipment and site layout, the projected vibration levels, and the vibration control measures that may be required to comply with the vibration limits as outlined in this measure for each building type. The Construction Vibration Control and Monitoring Plan will also outline the monitoring equipment and procedures the contractor will use to perform vibration measurements for vibration-sensitive receptors in the vicinity of construction operations, including details regarding the vibration measurement locations, frequency, and duration of measurements at each location. The plan will outline the protocol for monitoring existing cracks in buildings over time, to determine any construction-related impacts. At a minimum, crack gauges will be installed on existing cracks prior to construction, and monitoring of the gauges will be performed continuously over the course of construction to assess whether new construction-related damage has occurred. The contractor must obtain approval from VTA and the QP to install any crack gauges on or in historic buildings that require alteration of the building. The results of vibration monitoring will be documented and submitted to VTA weekly. In the event that levels exceed allowable vibration limits, the work will be halted immediately to ensure that no structural damage occurs, and additional required corrective measures consistent with the Construction Vibration Control and Monitoring Plan will be implemented. The contractor will initially conduct vibration monitoring daily at the nearest affected buildings during any construction activities that could induce vibration impacts, typically within 100 feet of any building. Vibration will also be monitored where vibration is expected to approach the applicable limit based on the building type and condition, as determined by VTA in coordination with the structural engineer for non-historic buildings, and VTA and the historic QP for historic buildings. Monitoring of utilities that are sensitive to vibration will be coordinated with the utility companies and performed for the nearest affected vibration-sensitive utilities during any construction activities that could induce vibration impacts. The contractor will perform monitoring continuously at the closest receptor during all demolition and construction activities to ensure vibration levels will not exceed the FTA construction vibration damage criteria for applicable building type, as follows: 0.12 peak particle velocity (PPV) (inches/second) for buildings that are extremely susceptible to vibration damage, 0.2 PPV (inches/second) for non-engineered timber and masonry buildings, 0.3 PPV (inches/second) for engineered concrete and masonry (no plaster) buildings and 0.5 PPV (inches/second) for reinforced-concrete, steel or timber (no plaster) buildings. For historic buildings, the vibration threshold will likely be between 0.12 to 0.2 PPV (inches/second) depending on the buildings' condition. The results of the preconstruction surveys and building Conditions Assessment Report as outlined in Mitigation Measure **NV-CNST-R** will be utilized to confirm the structure types and determine which vibration thresholds apply in consultation with a qualified structural engineer and the historic QP. For utilities, vibration thresholds will follow industry standards in coordination with utility companies, and typically adhere to a 0.5 PPV (inches/second) threshold. The contractor will measure vibration in buildings in the vertical direction on the ground surface or building floor and for utilities in accordance with meter instructions and industry best practices. Vibration levels will be measured continuously during daily construction operations to ensure that peak vibration-generating work is captured. Daily monitoring will be performed during a continuous work shift (typically 8 hours) that includes the closest and most vibration-inducing work. The contractor will compare vibration in buildings against both structural damage and nuisance thresholds in terms of velocity levels in dB or PPV. Vibration for utilities will be compared against structural damage thresholds in terms of PPV. If the measured vibration data are in compliance with the vibration limits after work has completed start-up and entered full-production mode (typically within 2 weeks to

	30 days), vibration monitoring may be performed once a week instead of continuously each day if approved by VTA. For non-historic structures, if construction vibration exceeds the structural or nuisance threshold, the contractor must stop construction and adjust construction methods to meet appropriate vibration limits so that the threshold is not exceeded again. For historic structures, if construction vibration approaches the structural damage threshold, the historic QP will be notified immediately, in real time. If construction vibration exceeds the structural damage threshold, Contractor must notify the historic QP and VTA immediately, in real time, and stop all vibration-inducing construction work immediately to adjust methods. The contractor will adjust work methods and techniques to meet appropriate vibration limits so that the threshold is not exceeded again before work is restarted. In the event of inadvertent, construction-related damage to historic buildings, repairs will be conducted in accordance with the Secretary of the Interior's *Standards for the Treatment of Historic Properties* and consistent with 36 CFR 800.13(b). VTA and the historic QP will implement these repairs in consultation with FTA and SHPO.
NV-CNST-Q	**Perform Vertical Direction Vibration Monitoring** The contractor will perform continuous vertical direction vibration (root mean square) monitoring on the ground at the nearest representative residential structure during muck extraction and supply train operations in the tunnels. These measurements will be repeated for a minimum of 1 week at approximately 1-mile intervals along the tunnel construction until it is demonstrated that the levels are below the FTA thresholds.
NV-CNST-R	**Implement Preconstruction and Post-Construction Building Condition Surveys for Vibration** Prior to construction or release of the TBM and cut-and-cover construction contract(s), the contractor will survey all structures that may be potentially impacted by construction vibration and submit the results to VTA for approval. Surveys will be conducted in all historic buildings or structures where vibration is expected to approach the applicable limit, and in non-historic buildings based on the building type and condition. VTA will determine the list of historic structures that may be affected by the project in consultation with a qualified structural engineer and the historic QP. Preconstruction building condition surveys of the interiors and exteriors of these structures will be conducted by independent surveyors to assess the baseline condition of each property that could be affected by construction vibration. The surveys will include written and photographic (video and still) records, including written descriptions and photos of any cracks. For historic structures, the Condition Assessment Report in accordance with Section 106 will be prepared along with the preconstruction building condition surveys. The surveys will be performed prior to any vibration-inducing construction to establish baseline building conditions. The results of the preconstruction surveys will be utilized to establish the structure types and determine which vibration thresholds apply in consultation with a qualified structural engineer and a qualified architectural historian or a historic architect, as outlined in Mitigation Measure **NV-CNST-P**. Vibration will be monitored as required in Mitigation Measure **NV-CNST-P** to avoid adverse effects on properties during construction activities. The post-construction survey results will be compared with preconstruction condition surveys so that any construction vibration effects on structures can be assessed. For historic structures, a Condition Assessment Report in accordance with Section 106, will be conducted after construction is complete. In the event of inadvertent, construction-related damage to historic buildings, repairs will be conducted in accordance with the Secretary of the Interior's *Standards for the Treatment of Historic Properties* and consistent with 36 CFR 800.13(b). VTA and the historic QP will implement these repairs in consultation with FTA and SHPO.
NV-CNST-S	**Implement Measures to Reduce Vibration from Muck Extraction and Supply Trains** The contractor will ensure that muck extraction and supply train operations do not result in groundborne vibration in excess of 72 VdB at nearby residences. Measures that can be implemented include, but are not limited to, placement of ballast mats underneath tracks on which the muck extraction train rides or the use of a conveyor in place of a train.

GEO-CNST-B	**Implement Preconstruction and Post-Construction Building Condition Surveys for Settlement** VTA will conduct preconstruction building condition surveys of the interiors and exteriors of select structures, both historic and non-historic buildings, within the settlement trough along the tunnel alignment and within the limit of influence around the cut-and-cover excavations to assess the baseline condition of each property that could be affected by project-induced settlement. These surveys will include written and photographic (video and still) records, including written descriptions and photos of any cracks. VTA will also conduct post-construction building condition surveys of the same structures. VTA will compare the results of these surveys with the preconstruction condition surveys so that any construction-related effects of tunneling and cut-and-cover construction on structures can be assessed. For historic structures, the Condition Assessment Report, in accordance with Section 106, will be prepared along with the preconstruction building condition surveys. Results will be used by a structural engineer in coordination with the historic Qualified Professional (QP) to identify structural settlement thresholds for each historic structure prior to construction. If anticipated maximum settlement due to tunneling or cut-and-cover activities would cause more than cosmetic damage, then ground treatment technologies outlined in Section 5.3.1.4, *Ground Treatment,* will be employed to further reduce settlement to within building-specific structural settlement thresholds. In the event of inadvertent, construction-related damage to historic buildings, repairs will be conducted in accordance with the Secretary of the Interior's *Standards for the Treatment of Historic Properties* and consistent with 36 CFR 800.13(b). VTA and the historic QP will implement these repairs in consultation with FTA and SHPO. For the cut-and-cover activities, surveys will be performed prior to any construction in the cut-and-cover work area to establish the baseline building condition. For construction of the tunnel via Tunnel Boring Machine (TBM), surveys will be performed as close to the planned dates of tunneling as possible so that the results are as current as possible. Therefore, surveys will be performed prior to passage of the TBMs, with some surveys conducted once tunneling has commenced. For historic structures, surveys prior to either cut-and-cover or tunneling will be performed enough in advance of the construction to allow adequate time for any necessary ground treatment that may be required to reduce settlement to be performed.
GEO-CNST-C	**Monitor Ground Surface during Tunneling Activities** The contractor will conduct ground surface monitoring prior to and after tunneling by licensed land surveyors. The contractor will mount survey monitoring points on potentially affected structures and representative historic buildings, including the most susceptible structures, select utilities susceptible to settlement, and in representative locations immediately adjacent to streams within the settlement trough along the tunnel alignment to monitor ground movements and effects of tunnel boring. The contractor must obtain approval from VTA and the historic QP to install any monitoring devices or crack gauges on or in historic buildings that require alteration of the building. The contractor will provide settlement monitoring data to VTA immediately upon completion of the field survey and use the data to assist in minimizing adverse effects along the tunnel alignment.
GEO-CNST-D	**Monitor Settlement Effects around Cut-and-Cover Excavations** For the cut and cover activities, the contractor will perform building and ground surface monitoring prior to, during, and after construction to survey the effects of cut-and-cover activities on structures, historic buildings, and utilities. The contractor will mount survey monitoring points on all potentially affected structures and historic buildings, including the most susceptible structures, select utilities susceptible to settlement, and in representative locations within the limit of influence around the cut-and-cover excavations to monitor any effects of settlement. The contractor must obtain approval from VTA and the historic QP to install any monitoring devices or crack gauges on or in historic buildings that require alteration of the building. Survey monitoring points will be field surveyed by licensed land surveyors at a frequency determined by the preconstruction

	building survey or Condition Assessment Report (for historic buildings). The contractor will provide settlement field survey monitoring data to VTA immediately upon completion of the field survey. The data will be used to direct real-time modifications to shoring and ground treatment practices and procedures as appropriate to minimize adverse effects within the limit of influence around the cut-and-cover excavations.

Attachment C

Groundborne Noise and Vibration Calculations

Table C1: Groundborne Vibration for the 2024 Single-Bore Design Refinements (Project)

Civil Station	Receiver Location	Land Use	BVR	Design Speed (mph)	Horizontal Distance to Near Track CL (feet)	Rail Depth (feet)	FTA GBV 1/3 Octave Band Criteria (VdB)	1/3 Octave Band GBV Without Mitigation (VdB)	# of Receptors	GBV with Mitigation (VdB)
583	1515 Marburg Way	MFR	SOG2	67	189	79	72	66	--	--
583	1505 Marburg Way	MFR	RSF2	67	111	79	72	58	--	--
584	1500 Marburg Way	SFR	RSF2	67	4	80	72	57	--	--
586	303 Destino Circle #56	SFR	RSF2	48	44	85	72	61	--	--
586	333 N 33rd Street	INST[3]	zero	48	172	86	78	59	--	--
586	309 Destino Circle	SFR	RSF2	48	20	86	72	53	--	--
586	367 Destino Circle	SFR	RSF2	48	7	86	72	53	--	--
586	365 Destino Circle	SFR	RSF2	48	0	86	72	53	--	--
586	363 Destino Circle	SFR	RSF2	48	30	86	72	56	--	--
586	361 Destino Circle	SFR	RSF2	48	52	86	72	62	--	--
586	359 Destino Circle	SFR	RSF2	48	72	86	72	60	--	--
586	357 Destino Circle	SFR	RSF2	48	97	86	72	61	--	--
592	290 N 31st Street	SFR	RSF1	48	212	105	72	61	--	--
594	263 N 31st Street	SFR	RSF1	48	133	89	72	60	--	--
594	269 N 31st Street	SFR	RSF1	48	64	89	72	66	--	--
594	261 N 31st Street	SFR	RSF1	48	116	81	72	62	--	--
594	259 N 31st Street	SFR	RSF1	48	168	81	72	61	--	--
595	251 N 31st Street	SFR	RSF1	48	183	82	72	62	--	--
595	241 N 31st Street	SFR	RSF1	48	214	82	72	61	--	--
595	233 N 31st Street	SFR	RSF1	48	232	83	72	60	--	--
608	5 Wounds Lane	INST	SOG2	48	293	88	78	63	--	--

Civil Station	Receiver Location	Land Use	BVR	Design Speed (mph)	Horizontal Distance to Near Track CL (feet)	Rail Depth (feet)	FTA GBV 1/3 Octave Band Criteria (VdB)	1/3 Octave Band GBV Without Mitigation (VdB)	# of Receptors	GBV with Mitigation (VdB)
608	1389 E Santa Clara Street	INST[3]	RSF2	48	241	88	78	60	--	--
608	100 N 27th Street	INST[3]	zero	48	262	88	78	58	--	--
610	1375 E Santa Clara Street	INST[3]	SOG2	48	357	89	78	63	--	--
613	37 N 27th Street	INST[3]	SOG2	48	23	90	78	54	--	--
615	26 N 26th Street	SFR	RSF1	48	176	92	72	61	--	--
616	23 N 26th Street	SFR	RSF1	48	142	91	72	59	--	--
617	1245 E Santa Clara Street	INST[3]	zero	48	0	92	78	52	--	--
617	9 S 26th Street	SFR	RSF1	48	199	92	72	61	--	--
618	1236 E Santa Clara Street	SFR	zero	48	81	93	72	52	--	--
618	1241 Shortridge Avenue	MFR	GMF2	48	167	93	72	54	--	--
618	1226 E Santa Clara Street	SFR	RSF1	48	84	93	72	55	--	--
618	20 N 25th Street	SFR	RSF2	48	157	93	72	54	--	--
618	1211 E Santa Clara Street	MFR	SOG2	48	19	93	72	53	--	--
618	1220 E Santa Clara Street	INST[3]	SOG2	48	58	93	78	60	--	--
619	1210 E Santa Clara Street	SFR	zero	48	52	93	72	55	--	--
619	1206 E Santa Clara Street	MFR	SOG2	48	85	93	72	57	--	--

Civil Station	Receiver Location	Land Use	BVR	Design Speed (mph)	Horizontal Distance to Near Track CL (feet)	Rail Depth (feet)	FTA GBV 1/3 Octave Band Criteria (VdB)	1/3 Octave Band GBV Without Mitigation (VdB)	# of Receptors	GBV with Mitigation (VdB)
620	1188 E Santa Clara Street	MFR	SOG2	48	76	94	72	58	--	--
620	45 N 25th Street	SFR	RSF1	48	227	94	72	56	--	--
621	1169 E Santa Clara Street	SFR	RSF2	48	60	94	72	55	--	--
622	16 S 24th Street	SFR	RSF1	48	124	95	72	54	--	--
622	16 N 24th Street	SFR	SOG1	48	96	95	72	47	--	--
623	11 S 24th Street	SFR	RSF2	48	150	95	72	53	--	--
624	13 Carnegie Square	SFR	RSF2	48	163	95	72	54	--	--
624	1102 E Santa Clara Street	INST[3]	zero	67	42	95	78	56	--	--
624	1125 E Santa Clara Street	INST[3]	zero	67	29	95	78	52	--	--
625	1115 E Santa Clara Street	INST[3]	SOG2	67	49	95	78	63	--	--
626	9&11 S 23rd Street	MFR	RSF2	67	118	96	72	54	--	--
626	15 S 23rd Street	SFR	RSF1	67	175	96	72	60	--	--
627	1098 E Santa Clara Street	INST[3]	zero	67	37	96	78	55	--	--
627	1082 E Santa Clara Street	MFR	RSF2	67	33	96	72	54	--	--
627	16 S 22nd Street	SFR	RSF1	67	136	96	72	58	--	--
627	1072 E Santa Clara Street	MFR	SOG2	67	30	96	72	58	--	--

Civil Station	Receiver Location	Land Use	BVR	Design Speed (mph)	Horizontal Distance to Near Track CL (feet)	Rail Depth (feet)	FTA GBV 1/3 Octave Band Criteria (VdB)	1/3 Octave Band GBV Without Mitigation (VdB)	# of Receptors	GBV with Mitigation (VdB)
628	1075 E Santa Clara Street	INST[3]	zero	67	90	96	78	53	--	--
629	1049 E Santa Clara Street	SFR	RSF2	67	82	97	72	55	--	--
629	1050 E Santa Clara Street	SFR	RSF1	67	44	97	72	60	--	--
629	15 S 22nd Street	SFR	RSF1	67	172	97	72	60	--	--
630	1047 E Santa Clara Street	SFR	RSF1	67	81	97	72	59	--	--
630	1044 E Santa Clara Street	SFR	SOG1	67	44	97	72	54	--	--
630	1026 E Santa Clara Street	SFR	RSF2	67	47	98	72	58	--	--
631	8 S 21st Street	SFR	RSF1	67	141	98	72	59	--	--
631	16 N 21st Street	SFR	RSF1	67	158	99	72	60	--	--
633	19 S 21st Street	SFR	RSF2	67	151	99	72	56	--	--
633	990 E Santa Clara Street	MFR	zero	67	47	99	72	57	--	--
634	966 E Santa Clara Street	MFR	SOG2	67	30	100	72	58	--	--
634	20 S 20th Street	SFR	RSF1	67	164	100	72	60	--	--
635	22 N 20th Street	MFR	zero	67	204	101	72	56	--	--
635	16 N 20th Street	MFR	zero	67	152	101	72	56	--	--
635	901 E Santa Clara Street	INST[3]	zero	67	39	101	78	55	--	--

Civil Station	Receiver Location	Land Use	BVR	Design Speed (mph)	Horizontal Distance to Near Track CL (feet)	Rail Depth (feet)	FTA GBV 1/3 Octave Band Criteria (VdB)	1/3 Octave Band GBV Without Mitigation (VdB)	# of Receptors	GBV with Mitigation (VdB)
636	19 S 20th Street	SFR	RSF1	67	188	102	72	60	--	--
639	896 E Santa Clara Street	MFR	SOG2	67	28	104	72	57	--	--
640	884 E Santa Clara Street	MFR	SOG2	67	30	104	72	58	--	--
644	802 E Santa Clara Street	MFR	RSF1	67	44	104	72	65	--	--
646	777 E Santa Clara Street	INST[1,2,3]	zero	67	35	100	65	59	--	--
649	31 S 16th Street	SFR	RSF2	67	187	97	72	64	--	--
649	725 E Santa Clara Street	INST[3]	zero	67	57	97	78	62	--	--
649	748 E Santa Clara Street	MFR	RSF2	67	51	97	72	64	--	--
649	675 E Santa Clara Street	INST[2,3]	LRGC&S	67	469	97	65	59	--	--
650	716 E Santa Clara Street	MFR	RSF2	67	59	96	72	64	--	--
650	22 S 15th Street	SFR	RSF1	67	175	96	72	65	--	--
651	702 E Santa Clara Street	MFR	SOG2	67	42	96	72	66	--	--
652	696 E Santa Clara Street	INST[3]	zero	67	40	95	78	60	--	--
653	678 E Santa Clara Street	MFR	SOG2	67	40	96	72	66	--	--

Civil Station	Receiver Location	Land Use	BVR	Design Speed (mph)	Horizontal Distance to Near Track CL (feet)	Rail Depth (feet)	FTA GBV 1/3 Octave Band Criteria (VdB)	1/3 Octave Band GBV Without Mitigation (VdB)	# of Receptors	GBV with Mitigation (VdB)
653	Former SJ Hospital – Future Affordable Housing	MFR	zero	67	90	96	72	62	--	--
653	670 E Santa Clara Street	MFR	SOG2	67	39	95	72	65	--	--
654	652 E Santa Clara Street	INST	RSF1	67	38	95	78	64	--	--
655	648 E Santa Clara Street	INST[3]	zero	67	41	95	78	66	--	--
655	25 N 14th Street	INST[3]	LRGC&S	67	46	95	78	59	--	--
657	28 S 13th Street	SFR	RSF2	67	179	95	72	64	--	--
657	602 E Santa Clara Street	INST[3]	zero	67	40	95	78	60	--	--
657	30 N 13th Street	MFR	RSF2	67	149	95	72	63	--	--
659	29 S 13th Street	INST[3]	RSF1	67	188	96	78	64	--	--
659	55 N 13th Street	INST[3]	RSF1	67	134	96	78	63	--	--
660	26 S 12th Street	SFR	RSF2	67	184	95	72	64	--	--
660	32 N 12th Street	MFR	RSF2	67	208	95	72	63	--	--
660	551 E Santa Clara Street	INST[3]	zero	67	105	95	78	60	--	--
661	15 S 12th Street	SFR	RSF1	67	142	95	72	63	--	--
663	505 E Santa Clara Street	MFR	LRGC&S	67	42	95	72	56	--	--
663	12 S 11th Street	MFR	RSF1	67	160	94	72	65	--	--
663	32 N 11th Street	MFR	SOG2	67	207	94	72	66	--	--

Civil Station	Receiver Location	Land Use	BVR	Design Speed (mph)	Horizontal Distance to Near Track CL (feet)	Rail Depth (feet)	FTA GBV 1/3 Octave Band Criteria (VdB)	1/3 Octave Band GBV Without Mitigation (VdB)	# of Receptors	GBV with Mitigation (VdB)
665	35 N 11th Street	MFR	RSF1	67	187	94	72	64	--	--
665	23 S 11th Street	SFR	RSF1	67	188	94	72	64	--	--
665	478 E Santa Clara Street	INST[3]	SOG2	67	43	94	78	63	--	--
666	30 N 10th Street	MFR	RSF1	67	189	94	72	64	--	--
667	22 S 10th Street	MFR	RSF1	67	177	94	72	65	--	--
667	471 E Santa Clara – Chapel	INST[3]	zero	67	52	94	78	62	--	--
668	445/447 E Santa Clara Street	SFR	SOG1	67	81	94	72	59	--	--
668	39 N 10th Street	SFR	RSF1	67	184	94	72	64	--	--
668	11 S 10th Street	MFR	SOG2	67	88	94	72	64	--	--
668	25 S 10th Street	MFR	RSF2	67	149	94	72	63	--	--
669	425 E Santa Clara Street	MFR	RSF2	67	29	94	72	58	--	--
669	425 Elizabeth Street	SFR	RSF1	67	155	94	72	65	--	--
669	421 Elizabeth Street	SFR	RSF1	67	152	94	72	64	--	--
669	417 Elizabeth Street	SFR	RSF1	67	136	94	72	63	--	--
670	24 N 9th Street	MFR	RSF1	67	171	94	72	65	--	--
670	18 S 9th Street	SFR	RSF1	67	146	94	72	64	--	--
670	401 E Santa Clara Street	MFR	SOG2	67	45	94	72	67	--	--
672	23 S 9th Street	MFR	RSF2	67	178	93	72	64	--	--
672	51 N 9th Street	INST[3]	RSF1	67	212	93	78	64	--	--

Civil Station	Receiver Location	Land Use	BVR	Design Speed (mph)	Horizontal Distance to Near Track CL (feet)	Rail Depth (feet)	FTA GBV 1/3 Octave Band Criteria (VdB)	1/3 Octave Band GBV Without Mitigation (VdB)	# of Receptors	GBV with Mitigation (VdB)
672	390 E Santa Clara Street	MFR	SOG2	67	40	93	72	66	--	--
673	365 E Santa Clara Street	INST[3]	zero	67	78	93	78	63	--	--
674	26 S 8th Street	MFR	RSF2	67	189	93	72	64	--	--
675	25 S 8th Street	MFR	RSF2	67	183	92	72	64	--	--
675	345 E Santa Clara Street	INST[3]	RSF2	67	52	92	78	64	--	--
675	33 N 8th Street	INST[3]	RSF1	67	191	92	78	64	--	--
677	24 S 7th Street	MFR	RSF2	67	213	91	72	63	--	--
677	202 E Santa Clara Street	INST[3]	RSF1	67	175	91	78	65	--	--
679	55 N 7th Street	INST[3]	zero	67	36	89	78	60	--	--
682	27 N 6th Street	MFR	LRGC&S	67	122	86	72	54	--	--
683	200 E Santa Clara Street	INST[3]	LRGC&S	67	47	85	78	59	--	--
683	235 E Santa Clara Street	MFR	LRGC&S	67	41	85	72	56	--	--
684	24 N 5th Street – Church	INST[3]	zero	67	48	83	78	62	--	--
685	24 N 5th Street – School	INST[3]	zero	67	123	83	78	57	--	--
688	181 E Santa Clara Street (X-Over)	MFR[1]	LRGC&S	67	64	82	72	65	--	--
688	28 N 4th Street (X-Over)	Hotel	LRGC&S	67	123	81	72	57	--	--

Civil Station	Receiver Location	Land Use	BVR	Design Speed (mph)	Horizontal Distance to Near Track CL (feet)	Rail Depth (feet)	FTA GBV 1/3 Octave Band Criteria (VdB)	1/3 Octave Band GBV Without Mitigation (VdB)	# of Receptors	GBV with Mitigation (VdB)
690	148 E Santa Clara Street (X-Over)	MFR	SOG2	67	44	81	72	67	--	--
690	138 E Santa Clara Street (X-Over)	MFR	SOG2	67	40	80	72	66	--	--
690	134 E Santa Clara Street (X-Over)	MFR	SOG2	67	40	80	72	66	--	--
691	124-126 E Santa Clara Street	MFR	SOG2	67	34	80	72	64	--	--
691	118 E Santa Clara Street	MFR	SOG2	67	31	80	72	63	--	--
692	60 N 3rd Street	MFR	LRGC&S	67	226	80	72	58	--	--
692	101 E Santa Clara Street	MFR	SOG2	67	38	80	72	66	--	--
692	100 E Santa Clara Street	Hotel	SOG2	67	28	80	72	62	--	--
695	20 S 2nd Street	MFR	SOG2	67	237	80	72	66	--	--
695	52 E Santa Clara Street	MFR	SOG2	48	28	80	72	55	--	--
697	11 S 2nd Street	MFR	SOG2	48	41	81	72	57	--	--
698	29 E Santa Clara Street	MFR	SOG2	48	35	81	72	56	--	--
698	17-25 E Santa Clara Street	MFR	SOG2	48	39	81	72	57	--	--
698	40 N 1st Street	MFR	SOG2	48	213	81	72	59	--	--
701	38 W Santa Clara Street	MFR	SOG2	48	47	82	72	58	--	--

Civil Station	Receiver Location	Land Use	BVR	Design Speed (mph)	Horizontal Distance to Near Track CL (feet)	Rail Depth (feet)	FTA GBV 1/3 Octave Band Criteria (VdB)	1/3 Octave Band GBV Without Mitigation (VdB)	# of Receptors	GBV with Mitigation (VdB)
702	55 W Santa Clara Street	INST[3]	zero	48	47	82	78	59	--	--
704	84 W Santa Clara Street	INST[3]	zero	48	61	82	78	60	--	--
706	1 S Market Street	MFR	LRGC&S	67	33	83	72	55	--	--
708	155 W Santa Clara Street	MFR	SOG2	67	36	84	72	65	--	--
709	161 W Santa Clara Street (X-Over)	MFR	SOG2	67	39	84	72	66	--	--
709	28 N Almaden Avenue	MFR	LRGC&S	67	223	85	72	58	--	--
714	233 W Santa Clara Street	Hotel	LRGC&S	67	40	89	72	58	--	--
719	350 W Santa Clara Street	Hotel	LRGC&S	67	34	96	72	56	--	--
725	374 W Santa Clara Street	INST[3]	zero	48	48	98	78	58	--	--
731	450 W Santa Clara Street	INST[3]	zero	33	41	89	78	54	--	--
743	130 Stockton Avenue	MFR	LRGC&S	48	226	82	72	59	--	--
744	746 The Alameda	INST[3]	zero	48	72	84	78	60	--	--
745	754 The Alameda	MFR	SOG2	48	66	85	72	61	--	--
747	787 The Alameda	MFR	zero	48	3	89	72	52	--	--
749	817 The Alameda	Hotel	GMF2	48	14	92	72	57	--	--
752	128 Rhodes Court	SFR	RSF1	48	41	101	72	61	--	--
752	87 Rhodes Court	SFR	RSF1	48	31	102	72	58	--	--
752	152 Rhodes Court	SFR	RSF1	48	67	102	72	66	--	--

Civil Station	Receiver Location	Land Use	BVR	Design Speed (mph)	Horizontal Distance to Near Track CL (feet)	Rail Depth (feet)	FTA GBV 1/3 Octave Band Criteria (VdB)	1/3 Octave Band GBV Without Mitigation (VdB)	# of Receptors	GBV with Mitigation (VdB)
753	176 Rhodes Court	INST[3]	RSF1	48	119	102	78	61	--	--
753	109 Rhodes Court	SFR	RSF1	48	1	103	72	57	--	--
753	133 Rhodes Court	SFR	RSF1	48	4	103	72	57	--	--
753	200 Rhodes Court	SFR	RSF1	48	146	103	72	59	--	--
753	224 Rhodes Court	SFR	RSF1	48	193	104	72	61	--	--
754	925 The Alameda	MFR	SOG2	48	161	104	72	61	--	--
754	157 Rhodes Court	SFR	RSF1	48	4	104	72	57	--	--
754	179 Rhodes Court	SFR	RSF2	48	29	105	72	55	--	--
754	248 Rhodes Court	SFR	RSF1	48	213	105	72	61	--	--
754	201 Rhodes Court	SFR	RSF1	48	29	106	72	57	--	--
755	229 Rhodes Court	SFR	RSF1	48	77	104	72	66	--	--
755	253 Rhodes Court	SFR	RSF1	48	119	104	72	61	--	--
755	176 N Morrison Avenue	SFR	RSF1	48	39	104	72	60	--	--
755	275 Rhodes Court	SFR	RSF1	48	137	105	72	59	--	--
755	204 N Morrison Avenue	SFR	RSF1	48	2	105	72	54	--	--
756	295 Rhodes Court	SFR	RSF1	48	180	104	72	61	--	--
756	230 N Morrison Avenue	SFR	RSF1	48	1	104	72	54	--	--
756	173 N Morrison Avenue	INST[3]	RSF1	48	176	104	78	61	--	--
756	908 W Julian Street	SFR	RSF1	48	115	105	72	62	--	--
756	197 N Morrison Avenue	SFR	RSF1	48	153	105	72	61	--	--

Civil Station	Receiver Location	Land Use	BVR	Design Speed (mph)	Horizontal Distance to Near Track CL (feet)	Rail Depth (feet)	FTA GBV 1/3 Octave Band Criteria (VdB)	1/3 Octave Band GBV Without Mitigation (VdB)	# of Receptors	GBV with Mitigation (VdB)
756	920 W Julian Street	SFR	RSF1	48	84	105	72	66	--	--
756	225 N Morrison Avenue	SFR	RSF1	48	135	105	72	60	--	--
757	264 N Morrison Avenue	MFR	RSF1	48	5	105	72	54	--	--
757	936 W Julian Street	SFR	RSF1	48	46	105	72	62	--	--
758	909 W Julian Street	SFR	RSF1	48	194	105	72	61	--	--
758	899 W Julian Street	SFR	RSF2	48	129	105	72	57	--	--
758	921 W Julian Street	SFR	RSF2	48	119	105	72	58	--	--
758	923 W Julian Street	SFR	RSF2	48	108	105	72	60	--	--
758	929 W Julian Street	SFR	RSF2	48	94	105	72	61	--	--
758	937 W Julian Street	SFR	RSF2	48	83	105	72	60	--	--
758	300 N Morrison Avenue	SFR	RSF2	48	61	105	72	61	--	--
758	939 W Julian Street	SFR	RSF2	48	75	105	72	59	--	--
759	356 N Morrison Avenue	SFR	RSF2	48	27	105	72	54	--	--
759	358 N Morrison Avenue	SFR	RSF2	48	23	105	72	53	--	--
759	360 N Morrison Avenue	SFR	RSF2	48	21	105	72	53	--	--
759	362 N Morrison Avenue	SFR	RSF2	48	16	105	72	53	--	--
759	364 N Morrison Avenue	SFR	RSF2	48	11	105	72	53	--	--

Civil Station	Receiver Location	Land Use	BVR	Design Speed (mph)	Horizontal Distance to Near Track CL (feet)	Rail Depth (feet)	FTA GBV 1/3 Octave Band Criteria (VdB)	1/3 Octave Band GBV Without Mitigation (VdB)	# of Receptors	GBV with Mitigation (VdB)
759	366 N Morrison Avenue	SFR	RSF2	48	6	105	72	53	--	--
759	945 W Julian Street	SFR	RSF1	48	58	105	72	64	--	--
759	368 N Morrison Avenue	SFR	RSF2	48	1	105	72	53	--	--
759	372 N Morrison Avenue	SFR	RSF2	48	7	105	72	53	--	--
760	374 N Morrison Avenue	SFR	RSF2	48	10	105	72	53	--	--
760	379 N Morrison Avenue	SFR	RSF1	48	100	105	72	66	--	--
760	376 N Morrison Avenue	SFR	RSF2	48	14	105	72	53	--	--
760	378 N Morrison Avenue	SFR	RSF2	48	10	105	72	53	--	--
760	382 N Morrison Avenue	SFR	RSF2	48	4	104	72	53	--	--
760	384 N Morrison Avenue	SFR	RSF2	48	2	104	72	53	--	--
760	956 Cinnabar Street	SFR	RSF1	48	154	104	72	59	--	--
760	962 Cinnabar Street	SFR	RSF1	48	194	104	72	61	--	--
761	899 Morrison Park Dr	MFR	LRGC&S	48	39	104	72	53	--	--
761	910 Cinnabar Street	SFR	RSF1	48	2	105	72	57	--	--
761	955 Cinnabar Street	SFR	RSF1	48	191	105	72	61	--	--
762	890 Cinnabar Street	SFR	RSF1	48	17	105	72	57	--	--

Civil Station	Receiver Location	Land Use	BVR	Design Speed (mph)	Horizontal Distance to Near Track CL (feet)	Rail Depth (feet)	FTA GBV 1/3 Octave Band Criteria (VdB)	1/3 Octave Band GBV Without Mitigation (VdB)	# of Receptors	GBV with Mitigation (VdB)
762	945 Cinnabar Street	SFR	RSF1	48	118	105	72	61	--	--
762	870 Cinnabar Street	SFR	RSF1	48	48	104	72	62	--	--
762	927 Cinnabar Street	SFR	RSF1	48	74	104	72	66	--	--
762	850 Cinnabar Street	SFR	RSF1	48	83	105	72	66	--	--
762	909 Cinnabar Street	SFR	RSF1	48	45	105	72	62	--	--
763	434 N Morrison Avenue	SFR	RSF1	48	151	105	72	59	--	--
764	875 Cinnabar Street	MFR	SOG2	48	1	109	72	53	--	--
765	417 Stockton Avenue	SFR	RSF1	48	139	110	72	59	--	--
766	808 Lenzen Avenue	MFR	GMF2	48	297	109	72	60	--	--
766	790 Lenzen Avenue	MFR	SOG2	48	32	109	72	54	--	--
766	875 Stockton Avenue	MFR	SOG2	48	9	109	72	53	--	--
769	777 Lenzen Avenue	SFR	RSF2	48	285	105	72	60	--	--
770	707 Lenzen Avenue	MFR	SOG2	48	17	107	72	53	--	--
772	489 Stockton Avenue	SFR	RSF1	48	42	108	72	61	--	--
773	738 Pershing Avenue	SFR	RSF1	48	188	108	72	61	--	--
773	495 Stockton Avenue	SFR	RSF1	48	42	107	72	61	--	--
773	714 Pershing Avenue	SFR	RSF1	48	93	107	72	65	--	--
773	726 Pershing Avenue	SFR	RSF1	48	143	107	72	59	--	--
775	737 Pershing Avenue	SFR	RSF1	48	188	108	72	61	--	--
775	711 Pershing Avenue	SFR	RSF1	48	89	108	72	65	--	--
775	725 Pershing Avenue	SFR	RSF1	48	137	108	72	59	--	--
775	501 Stockton Avenue	SFR	RSF1	48	42	108	72	61	--	--
776	726 Harding Avenue	SFR	RSF1	48	151	108	72	59	--	--

Civil Station	Receiver Location	Land Use	BVR	Design Speed (mph)	Horizontal Distance to Near Track CL (feet)	Rail Depth (feet)	FTA GBV 1/3 Octave Band Criteria (VdB)	1/3 Octave Band GBV Without Mitigation (VdB)	# of Receptors	GBV with Mitigation (VdB)
776	738 Harding Avenue	SFR	RSF1	48	195	108	72	61	--	--
776	549 Stockton Avenue	SFR	RSF1	48	39	108	72	60	--	--
776	714 Harding Avenue	SFR	RSF1	48	102	109	72	64	--	--
778	713 Harding Avenue	SFR	RSF1	48	95	109	72	66	--	--
778	725 Harding Avenue	SFR	RSF1	48	144	109	72	59	--	--
778	737 Harding Avenue	SFR	RSF1	48	188	109	72	61	--	--
778	551 Stockton Avenue	SFR	RSF1	67	49	110	72	66	--	--
779	595 Stockton Avenue	SFR	RSF1	67	42	110	72	65	--	--
779	714 Schiele Avenue	SFR	RSF1	67	95	110	72	67	--	--
779	738 Schiele Avenue	SFR	RSF1	67	193	110	72	64	--	--
779	599 Stockton Avenue	SFR	RSF1	67	43	110	72	65	--	--
779	726 Schiele Avenue	MFR	RSF2	67	150	110	72	63	--	--
781	733 Schiele Avenue	SFR	RSF1	67	179	110	72	65	--	--
781	745 Schiele Avenue	SFR	RSF1	67	222	110	72	64	--	--
782	623 Stockton Avenue	SFR	RSF1	67	58	109	72	67	--	--
782	635 Stockton Avenue	SFR	RSF1	67	56	109	72	67	--	--
783	641 Stockton Avenue	SFR	RSF1	67	44	108	72	65	--	--
783	647 Stockton Avenue	SFR	RSF1	67	63	108	72	66	--	--
783	744 Villa Avenue	SFR	RSF1	67	203	108	72	64	--	--
783	732 Villa Avenue	SFR	RSF1	67	157	108	72	65	--	--
790	727 Stockton Avenue	SFR	RSF2	67	55	105	72	64	--	--
792	712 Asbury Street	SFR	RSF1	67	87	104	72	69	--	--
792	722 Asbury Street	SFR	RSF1	67	129	104	72	63	--	--
792	732 Asbury Street	SFR	RSF1	67	169	104	72	65	--	--

Civil Station	Receiver Location	Land Use	BVR	Design Speed (mph)	Horizontal Distance to Near Track CL (feet)	Rail Depth (feet)	FTA GBV 1/3 Octave Band Criteria (VdB)	1/3 Octave Band GBV Without Mitigation (VdB)	# of Receptors	GBV with Mitigation (VdB)
792	702 Asbury Street	SFR	RSF1	67	40	104	72	64	--	--
795	779 Stockton Avenue	SFR	RSF1	67	56	101	72	67	--	--
807	699 Hamline Street	SFR	RSF1	67	109	93	72	66	--	--
828	1121 Irlanda Place	SFR	GMF2	67	242	61	72	62	--	--
828	1117 Irlanda Place	SFR	GMF2	67	271	59	72	62	--	--
828	1125 Irlanda Place	SFR	GMF2	67	246	59	72	62	--	--
828	1149 Irlanda Place	SFR	GMF2	67	243	58	72	62	--	--
828	1145 Irlanda Place	SFR	GMF2	67	271	58	72	62	--	--
829	1153 Sierra Madres Terrace	SFR	GMF2	67	246	57	72	62	--	--
829	1177 Finka Place	SFR	GMF2	67	241	55	72	62	--	--
829	1181 Finka Place	SFR	GMF2	67	244	54	72	62	--	--
829	1173 Sierra Madres Terrace	SFR	GMF2	67	271	54	72	62	--	--
830	1205 Sierra Madres Terrace	MFR	GMF2	67	243	52	72	62	--	--
830	1201 Sierra Madres Terrace	SFR	GMF2	67	268	52	72	62	--	--
830	1209 Sierra Madres Terrace	SFR	GMF2	67	247	52	72	62	--	--
830	1213 Sierra Madres Terrace	SFR	GMF2	67	245	51	72	62	--	--
831	1270 De Altura Common	SFR	GMF2	67	247	50	72	62	--	--

Civil Station	Receiver Location	Land Use	BVR	Design Speed (mph)	Horizontal Distance to Near Track CL (feet)	Rail Depth (feet)	FTA GBV 1/3 Octave Band Criteria (VdB)	1/3 Octave Band GBV Without Mitigation (VdB)	# of Receptors	GBV with Mitigation (VdB)
831	1264 De Altura Common	SFR	GMF2	67	268	50	72	62	--	--
831	1271 De Altura Common	SFR	GMF2	67	267	48	72	62	--	--
831	165 De Altura Common	SFR	GMF2	67	289	48	72	61	--	--
832	1277 De Altura Common	SFR	GMF2	67	270	46	72	62	--	--
832	1283 De Altura Common	SFR	GMF2	67	266	45	72	62	--	--
832	886 Alegre Place	SFR	GMF2	67	267	44	72	62	--	--
832	892 Alegre Place	SFR	GMF2	67	290	44	72	61	--	--
833	887 Alegre Place	SFR	GMF2	67	268	42	72	62	--	--
833	893 Alegre Place	SFR	GMF2	67	288	42	72	61	--	--
833	1289 De Altura Common	SFR	GMF2	67	270	41	72	62	--	--
833	1295 De Altura Common	SFR	GMF2	67	268	40	72	62	--	--
833	894 Rancho Place	SFR	GMF2	67	291	39	72	61	--	--
834	888 Rancho Place	SFR	GMF2	67	269	38	72	62	--	--
834	895 Rancho Place	SFR	GMF2	67	291	37	72	61	--	--
834	889 Rancho Place	MFR	GMF2	67	268	36	72	62	--	--
834	1301 De Altura Common	SFR	GMF2	67	271	35	72	62	--	--
835	1303 De Altura Common	SFR	GMF2	67	267	34	72	62	--	--

Civil Station	Receiver Location	Land Use	BVR	Design Speed (mph)	Horizontal Distance to Near Track CL (feet)	Rail Depth (feet)	FTA GBV 1/3 Octave Band Criteria (VdB)	1/3 Octave Band GBV Without Mitigation (VdB)	# of Receptors	GBV with Mitigation (VdB)
835	890 Alta Mar Terrace	SFR	GMF2	67	271	33	72	62	--	--
835	896 Alta Mar Terrace	SFR	GMF2	67	292	33	72	61	--	--
835	891 Alta Mar Terrace	SFR	GMF2	67	269	31	72	62	--	--
835	897 Alta Mar Terrace	SFR	GMF2	67	289	31	72	61	--	--
836	1307 De Altura Common	SFR	GMF2	67	270	30	72	62	--	--
836	1311 De Altura Common	SFR	GMF2	67	270	29	72	62	--	--
836	1315 De Altura Common	SFR	GMF2	67	271	27	72	62	--	--
836	1319 De Altura Common	SFR	GMF2	67	293	27	72	61	--	--

[1] Building or land use did not exist during prior evaluation for 2018 Final SEIS/SEIR.
[2] To be conservative, sensitive equipment was assumed, Category 1 for groundborne vibration analysis.
[3] FTA provided guidance that clarified detailed analysis at buildings with institutional should use vibration impact criteria.
BVR = building vibration response; CL = center line; GBV = groundborne vibration; GMF2 = Garage below multi-family 2nd story; INST = Institutional use; LRGC&S = large concrete & steel; MFR = multi--family residential use, RSF1 = raised single-family 1-story; RSF2 = raised single-family 2-story; SFR = single-family residential use; SOG1 = slab on-grade 1-story; SOG2 = slab on-grade 2-story; zero = flat response.

Table C2: Groundborne Noise for Single Bore Design Refinements

Civil Station	Receiver Location	Land Use	BVR	Design Speed (mph)	Horizontal Distance to Near Track CL (feet)	Rail Depth (feet)	FTA GBN Criteria (dBA)	GBN Without Mitigation (dBA)	# of Receptors	GBN with Mitigation (dBA)
583	1515 Marburg Way	MFR	SOG2	67	189	79	35	24	--	--
583	1505 Marburg Way	MFR	RSF2	67	111	79	35	35	--	--
584	1500 Marburg Way	SFR	RSF2	67	4	80	35	27	--	--
586	303 Destino Circle #56	SFR	RSF2	48	44	85	35	25	--	--
586	333 N 33rd Street	INST	zero	48	172	86	40	28	--	--
586	309 Destino Circle	SFR	RSF2	48	20	86	35	23	--	--
586	367 Destino Circle	SFR	RSF2	48	7	86	35	23	--	--
586	365 Destino Circle	SFR	RSF2	48	0	86	35	23	--	--
586	363 Destino Circle	SFR	RSF2	48	30	86	35	23	--	--
586	361 Destino Circle	SFR	RSF2	48	52	86	35	25	--	--
586	359 Destino Circle	SFR	RSF2	48	72	86	35	26	--	--
586	357 Destino Circle	SFR	RSF2	48	97	86	35	24	--	--
592	290 N 31st Street	SFR	RSF1	48	212	105	35	26	--	--
594	263 N 31st Street	SFR	RSF1	48	133	89	35	28	--	--
594	269 N 31st Street	SFR	RSF1	48	64	89	35	34	--	--
594	261 N 31st Street	SFR	RSF1	48	116	81	35	30	--	--
594	259 N 31st Street	SFR	RSF1	48	168	81	35	27	--	--
595	251 N 31st Street	SFR	RSF1	48	183	82	35	27	--	--
595	241 N 31st Street	SFR	RSF1	48	214	82	35	26	--	--
595	233 N 31st Street	SFR	RSF1	48	232	83	35	26	--	--
608	5 Wounds Lane	INST	SOG2	48	293	88	40	17	--	--
608	1389 E Santa Clara Street	INST	RSF2	48	241	88	40	18	--	--

Civil Station	Receiver Location	Land Use	BVR	Design Speed (mph)	Horizontal Distance to Near Track CL (feet)	Rail Depth (feet)	FTA GBN Criteria (dBA)	GBN Without Mitigation (dBA)	# of Receptors	GBN with Mitigation (dBA)
608	100 N 27th Street	INST	zero	48	262	88	40	27	--	--
610	1375 E Santa Clara Street	INST	SOG2	48	357	89	40	17	--	--
613	37 N 27th Street	INST	SOG2	48	23	90	40	24	--	--
615	26 N 26th Street	SFR	RSF1	48	176	92	35	27	--	--
616	23 N 26th Street	SFR	RSF1	48	142	91	35	28	--	--
617	1245 E Santa Clara Street	INST	zero	48	0	92	40	29	--	--
617	9 S 26th Street	SFR	RSF1	48	199	92	35	27	--	--
618	1236 E Santa Clara Street	SFR	zero	48	81	93	35	29	--	--
618	1241 Shortridge Avenue	MFR	GMF2	48	167	93	35	23	--	--
618	1226 E Santa Clara Street	SFR	RSF1	48	84	93	35	28	--	--
618	20 N 25th Street	SFR	RSF2	48	157	93	35	15	--	--
618	1211 E Santa Clara Street	MFR	SOG2	48	19	93	35	21	--	--
618	1220 E Santa Clara Street	INST	SOG2	48	58	93	40	23	--	--
619	1210 E Santa Clara Street	SFR	zero	48	52	93	35	19	--	--
619	1206 E Santa Clara Street	MFR	SOG2	48	85	93	35	23	--	--
620	1188 E Santa Clara Street	MFR	SOG2	48	76	94	35	23	--	--
620	45 N 25th Street	SFR	RSF1	48	227	94	35	21	--	--
621	1169 E Santa Clara Street	SFR	RSF2	48	60	94	35	20	--	--
622	16 S 24th Street	SFR	RSF1	48	124	95	35	25	--	--
622	16 N 24th Street	SFR	SOG1	48	96	95	35	16	--	--
623	11 S 24th Street	SFR	RSF2	48	150	95	35	16	--	--
624	13 Carnegie Square	SFR	RSF2	48	163	95	35	15	--	--
624	1102 E Santa Clara Street	INST	zero	67	42	95	40	30	--	--

Civil Station	Receiver Location	Land Use	BVR	Design Speed (mph)	Horizontal Distance to Near Track CL (feet)	Rail Depth (feet)	FTA GBN Criteria (dBA)	GBN Without Mitigation (dBA)	# of Receptors	GBN with Mitigation (dBA)
624	1125 E Santa Clara Street	INST	zero	67	29	95	40	28	--	--
625	1115 E Santa Clara Street	INST	SOG2	67	49	95	40	26	--	--
626	9&11 S 23rd Street	MFR	RSF2	67	118	96	35	20	--	--
626	15 S 23rd Street	SFR	RSF1	67	175	96	35	25	--	--
627	1098 E Santa Clara Street	INST	zero	67	37	96	40	29	--	--
627	1082 E Santa Clara Street	MFR	RSF2	67	33	96	35	21	--	--
627	16 S 22nd Street	SFR	RSF1	67	136	96	35	27	--	--
627	1072 E Santa Clara Street	MFR	SOG2	67	30	96	35	24	--	--
628	1075 E Santa Clara Street	INST	zero	67	90	96	40	31	--	--
629	1049 E Santa Clara Street	SFR	RSF2	67	82	97	35	23	--	--
629	1050 E Santa Clara Street	SFR	RSF1	67	44	97	35	30	--	--
629	15 S 22nd Street	SFR	RSF1	67	172	97	35	25	--	--
630	1047 E Santa Clara Street	SFR	RSF1	67	81	97	35	31	--	--
630	1044 E Santa Clara Street	SFR	SOG1	67	44	97	35	19	--	--
630	1026 E Santa Clara Street	SFR	RSF2	67	47	98	35	22	--	--
631	8 S 21st Street	SFR	RSF1	67	141	98	35	26	--	--
631	16 N 21st Street	SFR	RSF1	67	158	99	35	25	--	--
633	19 S 21st Street	SFR	RSF2	67	151	99	35	18	--	--
633	990 E Santa Clara Street	MFR	zero	67	47	99	35	21	--	--
634	966 E Santa Clara Street	MFR	SOG2	67	30	100	35	23	--	--
634	20 S 20th Street	SFR	RSF1	67	164	100	35	25	--	--
635	22 N 20th Street	MFR	zero	67	204	101	35	25	--	--
635	16 N 20th Street	MFR	zero	67	152	101	35	25	--	--

Civil Station	Receiver Location	Land Use	BVR	Design Speed (mph)	Horizontal Distance to Near Track CL (feet)	Rail Depth (feet)	FTA GBN Criteria (dBA)	GBN Without Mitigation (dBA)	# of Receptors	GBN with Mitigation (dBA)
635	901 E Santa Clara Street	INST	zero	67	39	101	40	29	--	--
636	19 S 20th Street	SFR	RSF1	67	188	102	35	25	--	--
639	896 E Santa Clara Street	MFR	SOG2	67	28	104	35	22	--	--
640	884 E Santa Clara Street	MFR	SOG2	67	30	104	35	22	--	--
644	802 E Santa Clara Street	MFR	RSF1	67	44	104	35	33	--	--
646	777 E Santa Clara Street	INST[1]	zero	67	35	100	40	23	--	--
649	31 S 16th Street	SFR	RSF2	67	187	97	35	22	--	--
649	725 E Santa Clara Street	INST	zero	67	57	97	40	36	--	--
649	748 E Santa Clara Street	MFR	RSF2	67	51	97	35	26	--	--
650	716 E Santa Clara Street	MFR	RSF2	67	59	96	35	27	--	--
650	22 S 15th Street	SFR	RSF1	67	175	96	35	30	--	--
651	702 E Santa Clara Street	MFR	SOG2	67	42	96	35	28	--	--
652	696 E Santa Clara Street	INST	zero	67	40	95	40	34	--	--
653	678 E Santa Clara Street	MFR	SOG2	67	40	96	35	28	--	--
653	Former SJ Hospital – Future Affordable Housing	MFR	zero	67	90	96	35	27	--	--
653	670 E Santa Clara Street	MFR	SOG2	67	39	95	35	28	--	--
654	652 E Santa Clara Street	INST	RSF1	67	38	95	40	34	--	--
655	648 E Santa Clara Street	INST	zero	67	41	95	40	37	--	--
655	25 N 14th Street	INST	LRGC&S	67	46	95	40	23	--	--
657	28 S 13th Street	SFR	RSF2	67	179	95	35	23	--	--
657	602 E Santa Clara Street	INST	zero	67	40	95	40	34	--	--
657	30 N 13th Street	MFR	RSF2	67	149	95	35	22	--	--
659	29 S 13th Street	INST	RSF1	67	188	96	40	30	--	--

Civil Station	Receiver Location	Land Use	BVR	Design Speed (mph)	Horizontal Distance to Near Track CL (feet)	Rail Depth (feet)	FTA GBN Criteria (dBA)	GBN Without Mitigation (dBA)	# of Receptors	GBN with Mitigation (dBA)
659	55 N 13th Street	INST	RSF1	67	134	96	40	31	--	--
660	26 S 12th Street	SFR	RSF2	67	184	95	35	30	--	--
660	32 N 12th Street	MFR	RSF2	67	208	95	35	22	--	--
660	551 E Santa Clara Street	INST	zero	67	105	95	40	34	--	--
661	15 S 12th Street	SFR	RSF1	67	142	95	35	30	--	--
663	505 E Santa Clara Street	MFR	LRGC&S	67	42	95	35	20	--	--
663	12 S 11th Street	MFR	RSF1	67	160	94	35	30	--	--
663	32 N 11th Street	MFR	SOG2	67	207	94	35	22	--	--
665	35 N 11th Street	MFR	RSF1	67	187	94	35	30	--	--
665	23 S 11th Street	SFR	RSF1	67	188	94	35	30	--	--
665	478 E Santa Clara Street	INST	SOG2	67	43	94	40	26	--	--
666	30 N 10th Street	MFR	RSF1	67	189	94	35	30	--	--
667	22 S 10th Street	MFR	RSF1	67	177	94	35	30	--	--
667	471 E Santa Clara – Chapel	INST	zero	67	52	94	40	36	--	--
668	445/447 E Santa Clara Street	SFR	SOG1	67	81	94	35	25	--	--
668	39 N 10th Street	SFR	RSF1	67	184	94	35	30	--	--
668	11 S 10th Street	MFR	SOG2	67	88	94	35	29	--	--
668	25 S 10th Street	MFR	RSF2	67	149	94	35	22	--	--
669	425 E Santa Clara Street	MFR	RSF2	67	29	94	35	24	--	--
669	425 Elizabeth Street	SFR	RSF1	67	155	94	35	30	--	--
669	421 Elizabeth Street	SFR	RSF1	67	152	94	35	30	--	--
669	417 Elizabeth Street	SFR	RSF1	67	136	94	35	31	--	--
670	24 N 9th Street	MFR	RSF1	67	171	94	35	30	--	--

Civil Station	Receiver Location	Land Use	BVR	Design Speed (mph)	Horizontal Distance to Near Track CL (feet)	Rail Depth (feet)	FTA GBN Criteria (dBA)	GBN Without Mitigation (dBA)	# of Receptors	GBN with Mitigation (dBA)
670	18 S 9th Street	SFR	RSF1	67	146	94	35	30	--	--
670	401 E Santa Clara Street	MFR	SOG2	67	45	94	35	28	--	--
672	23 S 9th Street	MFR	RSF2	67	178	93	35	23	--	--
672	51 N 9th Street	INST	RSF1	67	212	93	40	38	--	--
672	390 E Santa Clara Street	MFR	SOG2	67	40	93	35	28	--	--
673	365 E Santa Clara Street	INST	zero	67	78	93	40	37	--	--
674	26 S 8th Street	MFR	RSF2	67	189	93	35	22	--	--
675	25 S 8th Street	MFR	RSF2	67	183	92	35	23	--	--
675	345 E Santa Clara Street	INST	RSF2	67	52	92	40	27	--	--
675	33 N 8th Street	INST	RSF1	67	191	92	40	30	--	--
677	24 S 7th Street	MFR	RSF2	67	213	91	35	22	--	--
677	202 E Santa Clara Street	INST	RSF1	67	175	91	40	39	--	--
679	55 N 7th Street	INST	zero	67	36	89	40	34	--	--
682	27 N 6th Street	MFR	LRGC&S	67	122	86	35	21	--	--
683	200 E Santa Clara Street	INST	LRGC&S	67	47	85	40	33	--	--
683	235 E Santa Clara Street	MFR	LRGC&S	67	41	85	35	21	--	--
684	24 N 5th Street – Church	INST	zero	67	48	83	40	36	--	--
685	24 N 5th Street – School	INST	zero	67	123	83	40	33	--	--
688	181 E Santa Clara Street (X-Over)	MFR[1]	LRGC&S	67	64	82	35	28	--	--
688	28 N 4th Street (X-Over)	Hotel	LRGC&S	67	123	81	35	22	--	--
690	148 E Santa Clara Street (X-Over)	MFR	SOG2	67	44	81	35	37	3	23 to 30

Civil Station	Receiver Location	Land Use	BVR	Design Speed (mph)	Horizontal Distance to Near Track CL (feet)	Rail Depth (feet)	FTA GBN Criteria (dBA)	GBN Without Mitigation (dBA)	# of Receptors	GBN with Mitigation (dBA)
690	138 E Santa Clara Street (X-Over)	MFR	SOG2	67	40	80	35	34	--	--
690	134 E Santa Clara Street (X-Over)	MFR	SOG2	67	40	80	35	32	--	--
691	124-126 E Santa Clara Street	MFR	SOG2	67	34	80	35	30	--	--
691	118 E Santa Clara Street	MFR	SOG2	67	31	80	35	30	--	--
692	60 N 3rd Street	MFR	LRGC&S	67	226	80	35	18	--	--
692	101 E Santa Clara Street	MFR	SOG2	67	38	80	35	30	--	--
692	100 E Santa Clara Street	Hotel	SOG2	67	28	80	35	30	--	--
695	20 S 2nd Street	MFR	SOG2	67	237	80	35	22	--	--
695	52 E Santa Clara Street	MFR	SOG2	48	28	80	35	27	--	--
697	11 S 2nd Street	MFR	SOG2	48	41	81	35	27	--	--
698	29 E Santa Clara Street	MFR	SOG2	48	35	81	35	27	--	--
698	17-25 E Santa Clara Street	MFR	SOG2	48	39	81	35	27	--	--
698	40 N 1st Street	MFR	SOG2	48	213	81	35	19	--	--
701	38 W Santa Clara Street	MFR	SOG2	48	47	82	35	28	--	--
702	55 W Santa Clara Street	INST	zero	48	47	82	40	24	--	--
704	84 W Santa Clara Street	INST	zero	48	61	82	40	35	--	--
706	1 S Market Street	MFR	LRGC&S	67	33	83	35	22	--	--
708	155 W Santa Clara Street	MFR	SOG2	67	36	84	35	29	--	--
709	161 W Santa Clara Street (X-Over)	MFR	SOG2	67	39	84	35	34	--	--
709	28 N Almaden Avenue	MFR	LRGC&S	67	223	85	35	18	--	--

Civil Station	Receiver Location	Land Use	BVR	Design Speed (mph)	Horizontal Distance to Near Track CL (feet)	Rail Depth (feet)	FTA GBN Criteria (dBA)	GBN Without Mitigation (dBA)	# of Receptors	GBN with Mitigation (dBA)
714	233 W Santa Clara Street	Hotel	LRGC&S	67	40	89	35	23	--	--
719	350 W Santa Clara Street	Hotel	LRGC&S	67	34	96	35	21	--	--
725	374 W Santa Clara Street	INST	zero	48	48	98	40	32	--	--
731	450 W Santa Clara Street	INST	zero	33	41	89	40	29	--	--
743	130 Stockton Avenue	MFR	LRGC&S	48	226	82	35	16	--	--
744	746 The Alameda	INST	zero	48	72	84	40	35	--	--
745	754 The Alameda	MFR	SOG2	48	66	85	35	28	--	--
747	787 The Alameda	MFR	zero	48	3	89	35	20	--	--
749	817 The Alameda	Hotel	GMF2	48	14	92	35	29	--	--
752	128 Rhodes Court	SFR	RSF1	48	41	101	35	30	--	--
752	87 Rhodes Court	SFR	RSF1	48	31	102	35	29	--	--
752	152 Rhodes Court	SFR	RSF1	48	67	102	35	32	--	--
753	176 Rhodes Court	INST	RSF1	48	119	102	40	29	--	--
753	109 Rhodes Court	SFR	RSF1	48	1	103	35	28	--	--
753	133 Rhodes Court	SFR	RSF1	48	4	103	35	28	--	--
753	200 Rhodes Court	SFR	RSF1	48	146	103	35	27	--	--
753	224 Rhodes Court	SFR	RSF1	48	193	104	35	27	--	--
754	925 The Alameda	MFR	SOG2	48	161	104	35	20	--	--
754	157 Rhodes Court	SFR	RSF1	48	4	104	35	28	--	--
754	179 Rhodes Court	SFR	RSF2	48	29	105	35	20	--	--
754	248 Rhodes Court	SFR	RSF1	48	213	105	35	26	--	--
754	201 Rhodes Court	SFR	RSF1	48	29	106	35	28	--	--
755	229 Rhodes Court	SFR	RSF1	48	77	104	35	32	--	--

Civil Station	Receiver Location	Land Use	BVR	Design Speed (mph)	Horizontal Distance to Near Track CL (feet)	Rail Depth (feet)	FTA GBN Criteria (dBA)	GBN Without Mitigation (dBA)	# of Receptors	GBN with Mitigation (dBA)
755	253 Rhodes Court	SFR	RSF1	48	119	104	35	29	--	--
755	176 N Morrison Avenue	SFR	RSF1	48	39	104	35	29	--	--
755	275 Rhodes Court	SFR	RSF1	48	137	105	35	28	--	--
755	204 N Morrison Avenue	SFR	RSF1	48	2	105	35	27	--	--
756	295 Rhodes Court	SFR	RSF1	48	180	104	35	27	--	--
756	230 N Morrison Avenue	SFR	RSF1	48	1	104	35	27	--	--
756	173 N Morrison Avenue	INST	RSF1	48	176	104	40	27	--	--
756	908 W Julian Street	SFR	RSF1	48	115	105	35	29	--	--
756	197 N Morrison Avenue	SFR	RSF1	48	153	105	35	26	--	--
756	920 W Julian Street	SFR	RSF1	48	84	105	35	32	--	--
756	225 N Morrison Avenue	SFR	RSF1	48	135	105	35	27	--	--
757	264 N Morrison Avenue	MFR	RSF1	48	5	105	35	27	--	--
757	936 W Julian Street	SFR	RSF1	48	46	105	35	31	--	--
758	909 W Julian Street	SFR	RSF1	48	194	105	35	27	--	--
758	899 W Julian Street	SFR	RSF2	48	129	105	35	20	--	--
758	921 W Julian Street	SFR	RSF2	48	119	105	35	20	--	--
758	923 W Julian Street	SFR	RSF2	48	108	105	35	21	--	--
758	929 W Julian Street	SFR	RSF2	48	94	105	35	23	--	--
758	937 W Julian Street	SFR	RSF2	48	83	105	35	23	--	--
758	300 N Morrison Avenue	SFR	RSF2	48	61	105	35	24	--	--
758	939 W Julian Street	SFR	RSF2	48	75	105	35	24	--	--
759	356 N Morrison Avenue	SFR	RSF2	48	27	105	35	20	--	--
759	358 N Morrison Avenue	SFR	RSF2	48	23	105	35	19	--	--

Civil Station	Receiver Location	Land Use	BVR	Design Speed (mph)	Horizontal Distance to Near Track CL (feet)	Rail Depth (feet)	FTA GBN Criteria (dBA)	GBN Without Mitigation (dBA)	# of Receptors	GBN with Mitigation (dBA)
759	360 N Morrison Avenue	SFR	RSF2	48	21	105	35	19	--	--
759	362 N Morrison Avenue	SFR	RSF2	48	16	105	35	19	--	--
759	364 N Morrison Avenue	SFR	RSF2	48	11	105	35	19	--	--
759	366 N Morrison Avenue	SFR	RSF2	48	6	105	35	19	--	--
759	945 W Julian Street	SFR	RSF1	48	58	105	35	32	--	--
759	368 N Morrison Avenue	SFR	RSF2	48	1	105	35	19	--	--
759	372 N Morrison Avenue	SFR	RSF2	48	7	105	35	19	--	--
760	374 N Morrison Avenue	SFR	RSF2	48	10	105	35	19	--	--
760	379 N Morrison Avenue	SFR	RSF1	48	100	105	35	30	--	--
760	376 N Morrison Avenue	SFR	RSF2	48	14	105	35	19	--	--
760	378 N Morrison Avenue	SFR	RSF2	48	10	105	35	19	--	--
760	382 N Morrison Avenue	SFR	RSF2	48	4	104	35	19	--	--
760	384 N Morrison Avenue	SFR	RSF2	48	2	104	35	19	--	--
760	956 Cinnabar Street	SFR	RSF1	48	154	104	35	27	--	--
760	962 Cinnabar Street	SFR	RSF1	48	194	104	35	27	--	--
761	899 Morrison Park Dr	MFR	LRGC&S	48	39	104	35	18	--	--
761	910 Cinnabar Street	SFR	RSF1	48	2	105	35	28	--	--
761	955 Cinnabar Street	SFR	RSF1	48	191	105	35	27	--	--
762	890 Cinnabar Street	SFR	RSF1	48	17	105	35	27	--	--
762	945 Cinnabar Street	SFR	RSF1	48	118	105	35	29	--	--
762	870 Cinnabar Street	SFR	RSF1	48	48	104	35	31	--	--
762	927 Cinnabar Street	SFR	RSF1	48	74	104	35	32	--	--
762	850 Cinnabar Street	SFR	RSF1	48	83	105	35	32	--	--

Civil Station	Receiver Location	Land Use	BVR	Design Speed (mph)	Horizontal Distance to Near Track CL (feet)	Rail Depth (feet)	FTA GBN Criteria (dBA)	GBN Without Mitigation (dBA)	# of Receptors	GBN with Mitigation (dBA)
762	909 Cinnabar Street	SFR	RSF1	48	45	105	35	31	--	--
763	434 N Morrison Avenue	SFR	RSF1	48	151	105	35	27	--	--
764	875 Cinnabar Street	MFR	SOG2	48	1	109	35	21	--	--
765	417 Stockton Avenue	SFR	RSF1	48	139	110	35	27	--	--
766	808 Lenzen Avenue	MFR	GMF2	48	297	109	35	25	--	--
766	790 Lenzen Avenue	MFR	SOG2	48	32	109	35	22	--	--
766	875 Stockton Avenue	MFR	SOG2	48	9	109	35	21	--	--
769	777 Lenzen Avenue	SFR	RSF2	48	285	105	35	17	--	--
770	707 Lenzen Avenue	MFR	SOG2	48	17	107	35	19	--	--
772	489 Stockton Avenue	SFR	RSF1	48	42	108	35	29	--	--
773	738 Pershing Avenue	SFR	RSF1	48	188	108	35	27	--	--
773	495 Stockton Avenue	SFR	RSF1	48	42	107	35	29	--	--
773	714 Pershing Avenue	SFR	RSF1	48	93	107	35	31	--	--
773	726 Pershing Avenue	SFR	RSF1	48	143	107	35	27	--	--
775	737 Pershing Avenue	SFR	RSF1	48	188	108	35	27	--	--
775	711 Pershing Avenue	SFR	RSF1	48	89	108	35	31	--	--
775	725 Pershing Avenue	SFR	RSF1	48	137	108	35	27	--	--
775	501 Stockton Avenue	SFR	RSF1	48	42	108	35	30	--	--
776	726 Harding Avenue	SFR	RSF1	48	151	108	35	27	--	--
776	738 Harding Avenue	SFR	RSF1	48	195	108	35	26	--	--
776	549 Stockton Avenue	SFR	RSF1	48	39	108	35	29	--	--
776	71s4 Harding Avenue	SFR	RSF1	48	102	109	35	30	--	--
778	713 Harding Avenue	SFR	RSF1	48	95	109	35	30	--	--

Civil Station	Receiver Location	Land Use	BVR	Design Speed (mph)	Horizontal Distance to Near Track CL (feet)	Rail Depth (feet)	FTA GBN Criteria (dBA)	GBN Without Mitigation (dBA)	# of Receptors	GBN with Mitigation (dBA)
778	725 Harding Avenue	SFR	RSF1	48	144	109	35	27	--	--
778	737 Harding Avenue	SFR	RSF1	48	188	109	35	27	--	--
778	551 Stockton Avenue	SFR	RSF1	67	49	110	35	33	--	--
779	595 Stockton Avenue	SFR	RSF1	67	42	110	35	33	--	--
779	714 Schiele Avenue	SFR	RSF1	67	95	110	35	34	--	--
779	738 Schiele Avenue	SFR	RSF1	67	193	110	35	29	--	--
779	599 Stockton Avenue	SFR	RSF1	67	43	110	35	32	--	--
779	726 Schiele Avenue	MFR	RSF2	67	150	110	35	22	--	--
781	733 Schiele Avenue	SFR	RSF1	67	179	110	35	29	--	--
781	745 Schiele Avenue	SFR	RSF1	67	222	110	35	29	--	--
782	623 Stockton Avenue	SFR	RSF1	67	58	109	35	33	--	--
782	635 Stockton Avenue	SFR	RSF1	67	56	109	35	33	--	--
783	641 Stockton Avenue	SFR	RSF1	67	44	108	35	32	--	--
783	647 Stockton Avenue	SFR	RSF1	67	63	108	35	34	--	--
783	744 Villa Avenue	SFR	RSF1	67	203	108	35	29	--	--
783	732 Villa Avenue	SFR	RSF1	67	157	108	35	29	--	--
790	727 Stockton Avenue	SFR	RSF2	67	55	105	35	26	--	--
792	712 Asbury Street	SFR	RSF1	67	87	104	35	35	--	--
792	722 Asbury Street	SFR	RSF1	67	129	104	35	31	--	--
792	732 Asbury Street	SFR	RSF1	67	169	104	35	30	--	--
792	702 Asbury Street	SFR	RSF1	67	40	104	35	33	--	--
795	779 Stockton Avenue	SFR	RSF1	67	56	101	35	34	--	--
807	699 Hamline Street	SFR	RSF1	67	109	93	35	33	--	--

Civil Station	Receiver Location	Land Use	BVR	Design Speed (mph)	Horizontal Distance to Near Track CL (feet)	Rail Depth (feet)	FTA GBN Criteria (dBA)	GBN Without Mitigation (dBA)	# of Receptors	GBN with Mitigation (dBA)
828	1121 Irlanda Place	SFR	GMF2	67	242	61	35	29	--	--
828	1117 Irlanda Place	SFR	GMF2	67	271	59	35	28	--	--
828	1125 Irlanda Place	SFR	GMF2	67	246	59	35	29	--	--
828	1149 Irlanda Place	SFR	GMF2	67	243	58	35	29	--	--
828	1145 Irlanda Place	SFR	GMF2	67	271	58	35	28	--	--
829	1153 Sierra Madres Terrace	SFR	GMF2	67	246	57	35	29	--	--
829	1177 Finka Place	SFR	GMF2	67	241	55	35	29	--	--
829	1181 Finka Place	SFR	GMF2	67	244	54	35	29	--	--
829	1173 Sierra Madres Terrace	SFR	GMF2	67	271	54	35	28	--	--
830	1205 Sierra Madres Terrace	MFR	GMF2	67	243	52	35	29	--	--
830	1201 Sierra Madres Terrace	SFR	GMF2	67	268	52	35	28	--	--
830	1209 Sierra Madres Terrace	SFR	GMF2	67	247	52	35	29	--	--
830	1213 Sierra Madres Terrace	SFR	GMF2	67	245	51	35	29	--	--
831	1270 De Altura Common	SFR	GMF2	67	247	50	35	29	--	--
831	1264 De Altura Common	SFR	GMF2	67	268	50	35	28	--	--
831	1271 De Altura Common	SFR	GMF2	67	267	48	35	28	--	--
831	165 De Altura Common	SFR	GMF2	67	289	48	35	28	--	--
832	1277 De Altura Common	SFR	GMF2	67	270	46	35	28	--	--
832	1283 De Altura Common	SFR	GMF2	67	266	45	35	28	--	--

Civil Station	Receiver Location	Land Use	BVR	Design Speed (mph)	Horizontal Distance to Near Track CL (feet)	Rail Depth (feet)	FTA GBN Criteria (dBA)	GBN Without Mitigation (dBA)	# of Receptors	GBN with Mitigation (dBA)
832	886 Alegre Place	SFR	GMF2	67	267	44	35	28	--	--
832	892 Alegre Place	SFR	GMF2	67	290	44	35	28	--	--
833	887 Alegre Place	SFR	GMF2	67	268	42	35	28	--	--
833	893 Alegre Place	SFR	GMF2	67	288	42	35	28	--	--
833	1289 De Altura Common	SFR	GMF2	67	270	41	35	28	--	--
833	1295 De Altura Common	SFR	GMF2	67	268	40	35	28	--	--
833	894 Rancho Place	SFR	GMF2	67	291	39	35	28	--	--
834	888 Rancho Place	SFR	GMF2	67	269	38	35	28	--	--
834	895 Rancho Place	SFR	GMF2	67	291	37	35	28	--	--
834	889 Rancho Place	MFR	GMF2	67	268	36	35	28	--	--
834	1301 De Altura Common	SFR	GMF2	67	271	35	35	28	--	--
835	1303 De Altura Common	SFR	GMF2	67	267	34	35	28	--	--
835	890 Alta Mar Terrace	SFR	GMF2	67	271	33	35	28	--	--
835	896 Alta Mar Terrace	SFR	GMF2	67	292	33	35	28	--	--
835	891 Alta Mar Terrace	SFR	GMF2	67	269	31	35	28	--	--
835	897 Alta Mar Terrace	SFR	GMF2	67	289	31	35	28	--	--
836	1307 De Altura Common	SFR	GMF2	67	270	30	35	28	--	--
836	1311 De Altura Common	SFR	GMF2	67	270	29	35	28	--	--
836	1315 De Altura Common	SFR	GMF2	67	271	27	35	28	--	--
836	1319 De Altura Common	SFR	GMF2	67	293	27	35	28	--	--

[1] Building or land use did not exist during prior evaluation for 2018 Final SEIS/SEIR.
Note: cells that are shaded indicate impacts.
BVR = building vibration response; CL = center line; INST = Institutional use; GBN = groundborne noise; GMF2 = Garage below multi-family 2nd story; LRGC&S = large concrete & steel; MFR = multi-family residential use; RSF1 = raised single-family 1-story; RSF2 = raised single-family 2-story; SFR = single-family residential use, SOG1 = slab on-grade 1-story; SOG2 = slab on-grade 2-story; zero = flat response.