2 PROJECT DESCRIPTION

2.1 OVERVIEW AND HISTORY

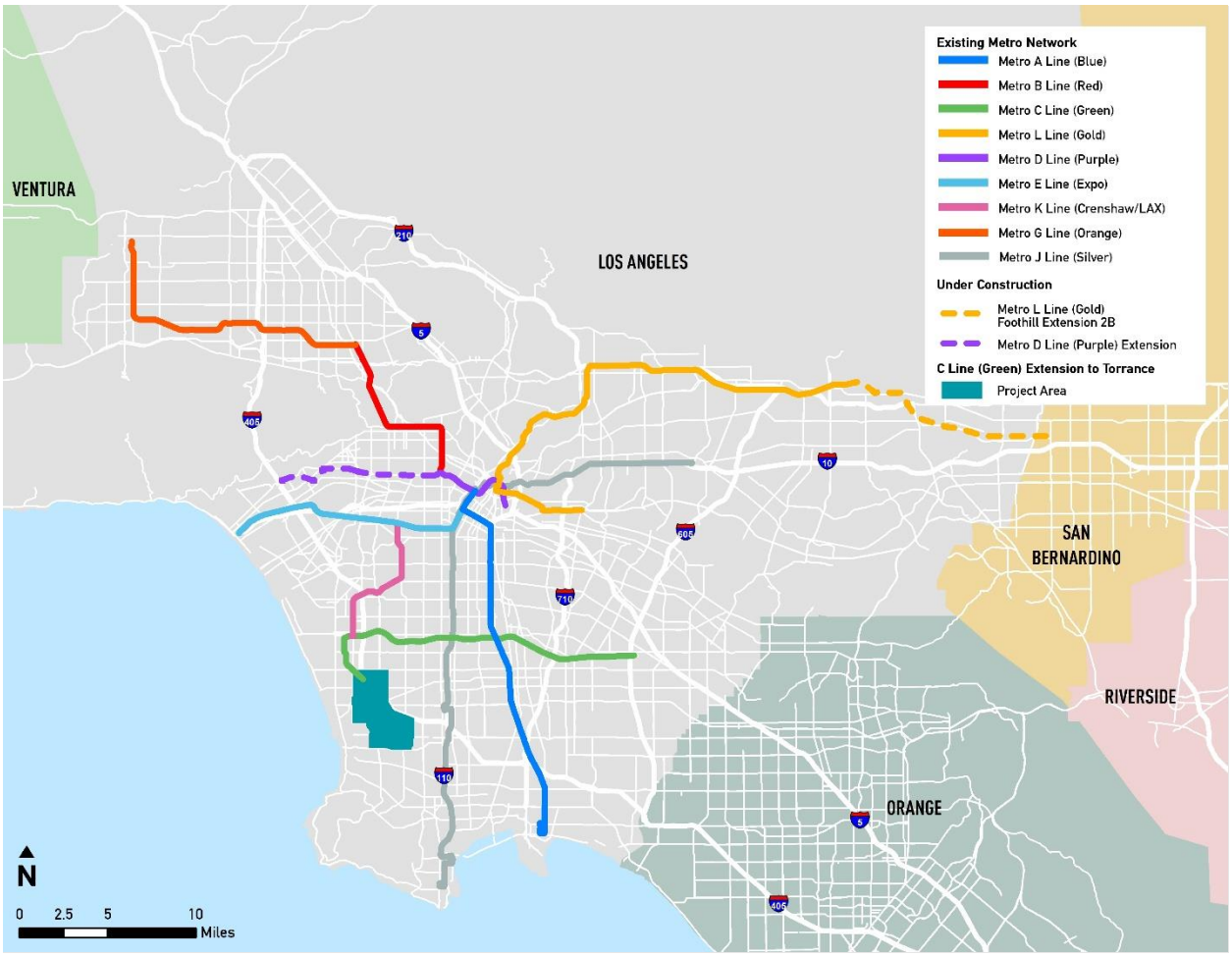
This chapter introduces and defines the Proposed Project studied in this Draft EIR. The purpose of this Draft EIR is to analyze and disclose the Proposed Project's potential significant effects on the environment and to identify mitigation measures and alternatives to avoid or lessen significant effects. The analysis presented in this Draft EIR is in compliance with the CEQA (Pub. Resources Code, § 21000 et seq.) and the CEQA Guidelines (14 Cal. Code. Regs., § 15000 et seq.).

2.1-1 Project Location and Surrounding Uses

Figure 2.1-1 shows the project location within the South Bay region of Los Angeles County. Figure 2.1-2 shows the Project Area, which follows the Metro-owned railroad right-of-way (Metro ROW) along a 4.5-mile north-south corridor from the existing Redondo Beach (Marine) Metro C Line (Green) Station traveling southeast to the Torrance Transit Center (TC). The Proposed Project would travel through the cities of Lawndale, Redondo Beach, and Torrance. The boundaries of the Project Area form roughly a one-mile buffer around the Metro ROW, with the borders generally following city limits and/or major roadways. A one-mile buffer is generally the area in which potential benefits and ridership of a major transportation project are likely to be focused.

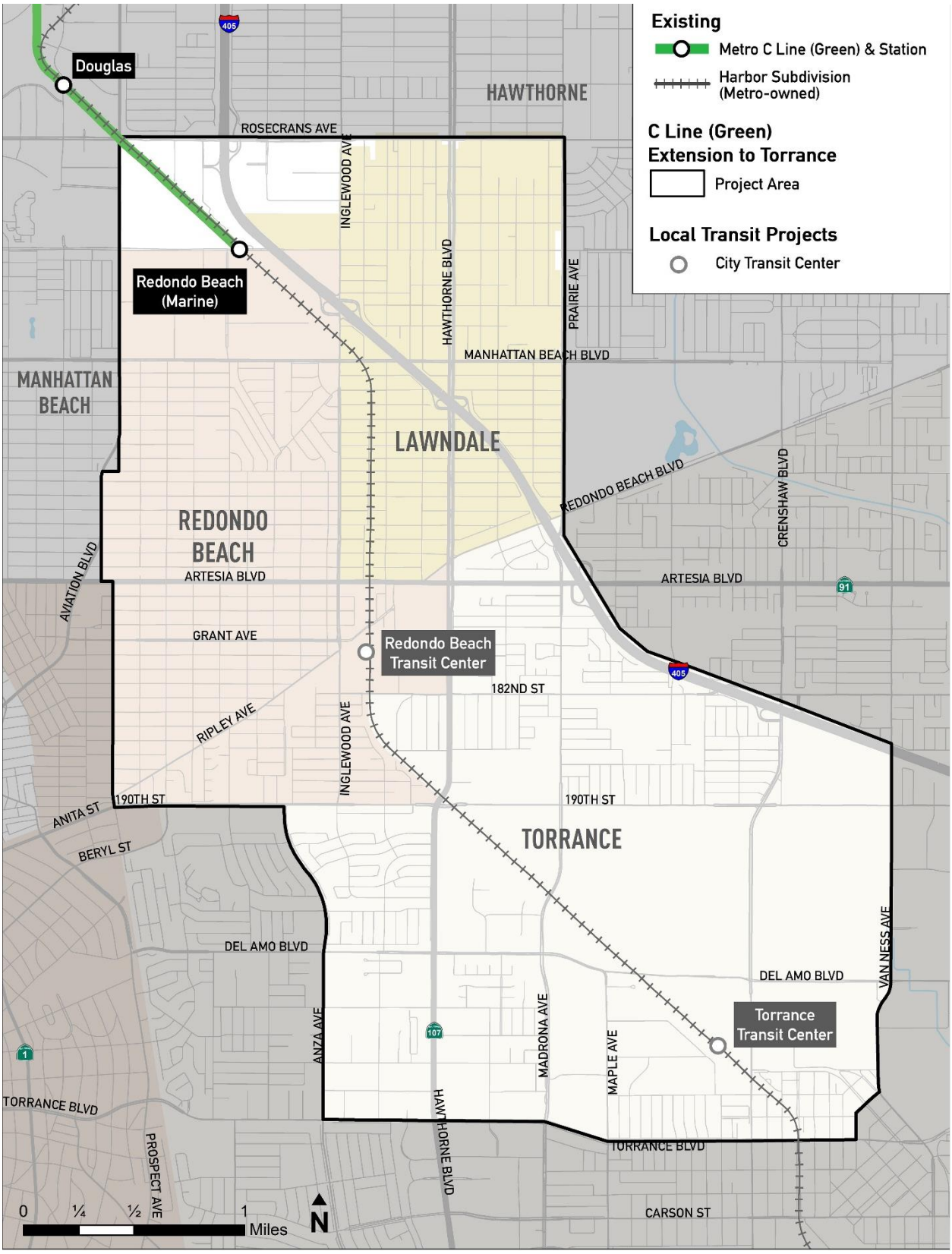
The Project Area includes single family and multi-family residential areas, industrial and institutional uses, as well as commercial and recreational areas. The Project Area also includes major activity centers, such as the South Bay Galleria, and high-capacity bus transit centers, such as the Redondo Beach TC and Torrance TC.

Figure 2.1-1. Project Location and Regional Vicinity



Source: Metro, STV, 2022

Figure 2.1-2. Project Area



Source: Metro, STV, 2022

2.1-2 Project History

Metro purchased the Harbor Subdivision from the precursor to the BNSF Railway in the early 1990s. It currently carries limited freight traffic through the Metro ROW, typically one or two trains a day. A number of studies have examined the potential for transit service along all or portions of the Metro ROW, which are described below.

- **Metro Harbor Subdivision Transit Corridor Alternatives Analysis (AA) Study (2009)** – Metro completed an AA study evaluating various transit options along the Metro ROW between Downtown Los Angeles, Los Angeles International Airport (LAX), and the Ports of Los Angeles and Long Beach. The 2009 Study analyzed various transit modal options such as light rail transit, bus rapid transit, self-propelled railcar, electric multiple unit vehicles, and commuter rail transit. The segment between the Redondo Beach (Marine) Station and the Torrance TC emerged as the highest-priority project, with light rail as the preferred mode. The Freight Track Alternative was also recommended for further study. In December 2009, the Metro Board approved the preparation of a Draft Environmental Impact Statement (EIS)/EIR for the Project.
- **South Bay Metro Green Line Extension Draft EIS/EIR (2010 to 2014)** – Metro held scoping meetings for the South Bay Metro Green Line Extension EIS/EIR in 2010 and began conducting environmental analysis on the two alternatives recommended in the 2009 AA (a light rail alternative and a freight track alternative). Several alternatives and alignment options were considered during the preparation of the Draft EIS/EIR, but were rejected from further study for a number of reasons, including poor cost effectiveness, lack of public support, and/or substantial environmental impacts. Alternatives and options rejected from further study included the Freight Track Alternative, several light rail alignment options, and several maintenance facility options. After the failure of Measure J in November 2012, the Project was put on hold due to funding uncertainty.
- **Green Line Extension to Torrance Supplemental Alternatives Analysis (SAA) (2017 to 2018)** – Measure M was passed in November 2016, which provided a source of funding for the Project in addition to the previously allocated funding from Measure R, passed in 2009. In spring 2017, Metro reinitiated the Project with an SAA, which renamed the Project as the Green Line Extension to Torrance Project. With the elimination of the Freight Track Alternative in 2011, the Project Area was reduced to focus on the area potentially affected by the light rail alternative. The revised Project Area boundaries focused on the 4.5-mile segment of the Metro ROW from the existing Redondo Beach (Marine) Station to the Torrance TC. The SAA study focused on soliciting feedback from corridor cities and stakeholders to refine and update alternatives previously identified in the 2009 AA and 2010-2014 Draft EIS/EIR. Its goal was to gain consensus on revised alternatives for the Project. On September 27, 2018, the Metro Board voted to approve two alternatives to be carried forward for environmental analysis: the Metro ROW and the Hawthorne Boulevard alignment (both primarily at-grade alignments).
- **C Line (Green) Extension to Torrance EIR (2018 to Present) –** Following Metro Board approval, Metro initiated environmental review to study the two alignments (Metro ROW and Hawthorne Boulevard) recommended in the SAA. In February 2021, Metro conducted scoping for this EIR. As a result of community input, the project team included an additional design option along the Metro ROW, which would travel below street level in an open-air trench. As part of the planning and conceptual engineering process, Metro determined that the Hawthorne Boulevard alignment would need to be elevated to address safety. There was not a safe design solution to locate the light rail at street level along Hawthorne Boulevard, which is a busy arterial that provides access to Interstate 405 (I-405), along with pedestrians, vehicles, and cyclists. For purposes of defining the project under CEQA, the alignment options were renamed for this Draft EIR. This Draft EIR serves to evaluate the

potential environmental impacts of the Proposed Project (Metro ROW Elevated/Street-Level alignment) and two Options: Trench Option (Metro ROW Trench/Below-Grade) and Hawthorne Option (entirely elevated), described in more detail in this chapter. This Draft EIR also analyzes a No Project Alternative, a High-Frequency Bus Alternative, and a 170th/182nd Grade-Separated Light Rail Alternative, described in further detail in Chapter 4, Alternatives.

The Metro ROW Elevated/Street-Level alignment is referred to as the Proposed Project in the Draft EIR because it is the alignment that has been historically studied and advanced for the extension of the C Line (Green) to the South Bay region. This term does not, however, convey any preference or recommendation as to the alignment or Options. Metro staff will prepare a recommendation on its preferred alignment in Spring 2023 based on findings from the Draft EIR, public comments made during the comment period, technical analysis, stakeholder input, and other factors such as cost, ridership, and project objectives.

2.2 PROJECT OBJECTIVES

The underlying purpose of the Proposed Project is to provide high-capacity transit service in the South Bay. Metro has identified the following project objectives:

> Improve mobility within the South Bay and encourage mode shift by:

- Introducing high-frequency transit service options from the current C Line terminus south to Torrance.
- Creating direct connections between the regional transit network and local transit hubs for convenient transfers.
- Providing an alternative mode of transportation for commuters traveling along congested arterials and I-405.
- Providing first-last mile facilities to connect to neighborhoods to station areas.

> Reduce air pollution and greenhouse gas emissions by making transit a more viable transportation choice.

> Avoid and minimize environmental impacts on environmental resources to the maximum extent feasible.

> Provide a cost-effective project.

> Provide more equitable access to regional destinations by improving connections to the Metro regional rail system.

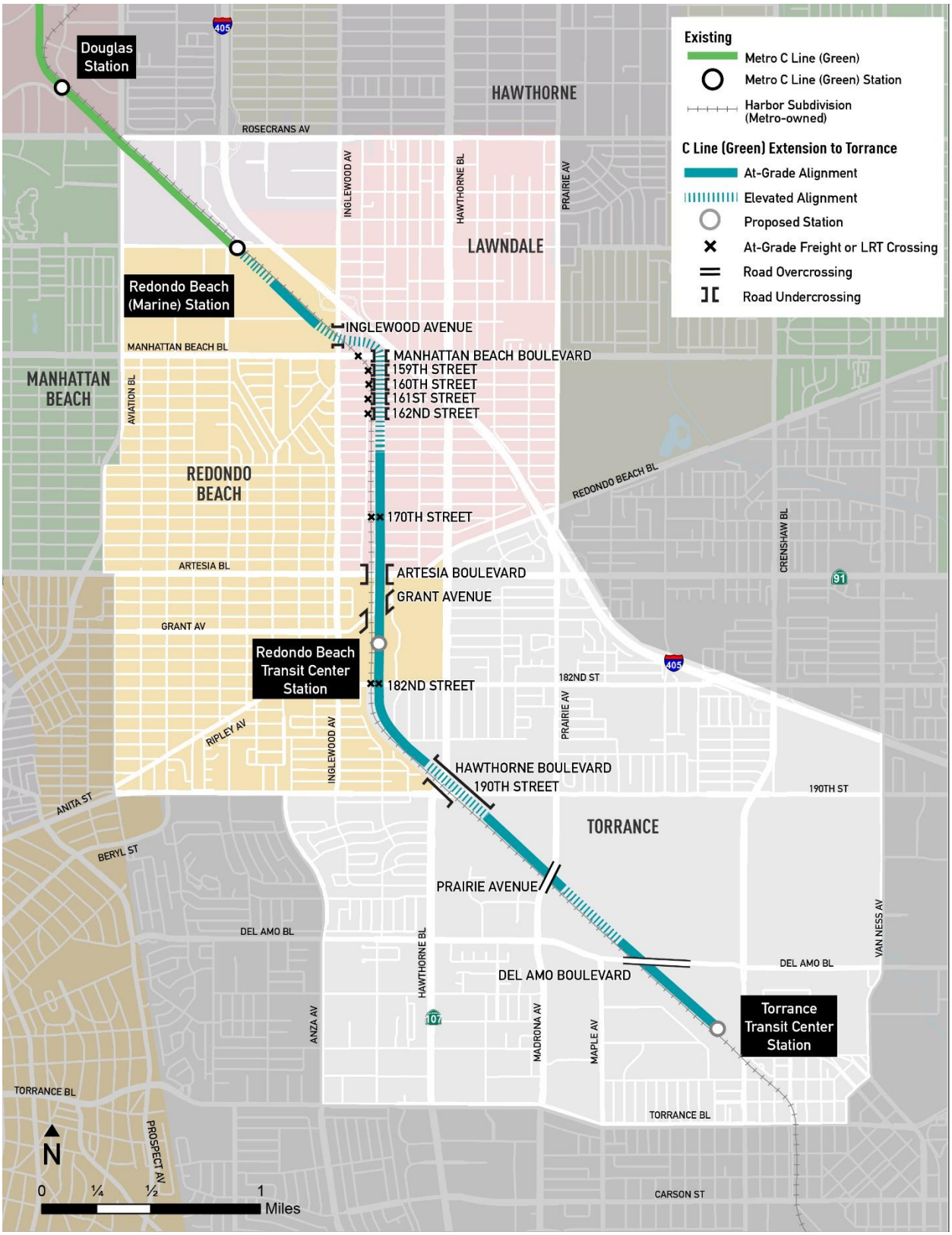
2.3 PROJECT AND PROJECT OPTIONS CONSIDERED IN THE EIR

2.3-1 Proposed Project

The Proposed Project would extend the Metro C Line (Green) approximately 4.5 miles to the south by providing a light rail line that follows the existing Metro ROW for the length of the Project. Two stations are proposed: Redondo Beach TC Station and Torrance TC Station. Figure 2.3-1 shows an overview of the Proposed Project. Between the existing Redondo Beach (Marine) Station and 190th Street within the Metro ROW, BNSF operates a single freight track. As part of the Proposed Project, Metro would build two new light rail tracks and relocate the existing freight track in some areas within the Metro ROW, which is discussed in greater detail below. The Proposed Project includes multi-use recreational paths within the Metro ROW, where there is sufficient room, discussed further below. South of 190th Street, BNSF and Metro share ownership of the freight corridor. Metro owns approximately 15 feet in width

and would acquire or lease additional ROW from BNSF to accommodate two new light rail tracks between 190th Street and the Torrance TC Station. Appendix 2-A, Select Advanced Conceptual Engineering Drawings provides detailed drawings of the alignment.

Figure 2.3-1. Proposed Project – Overview

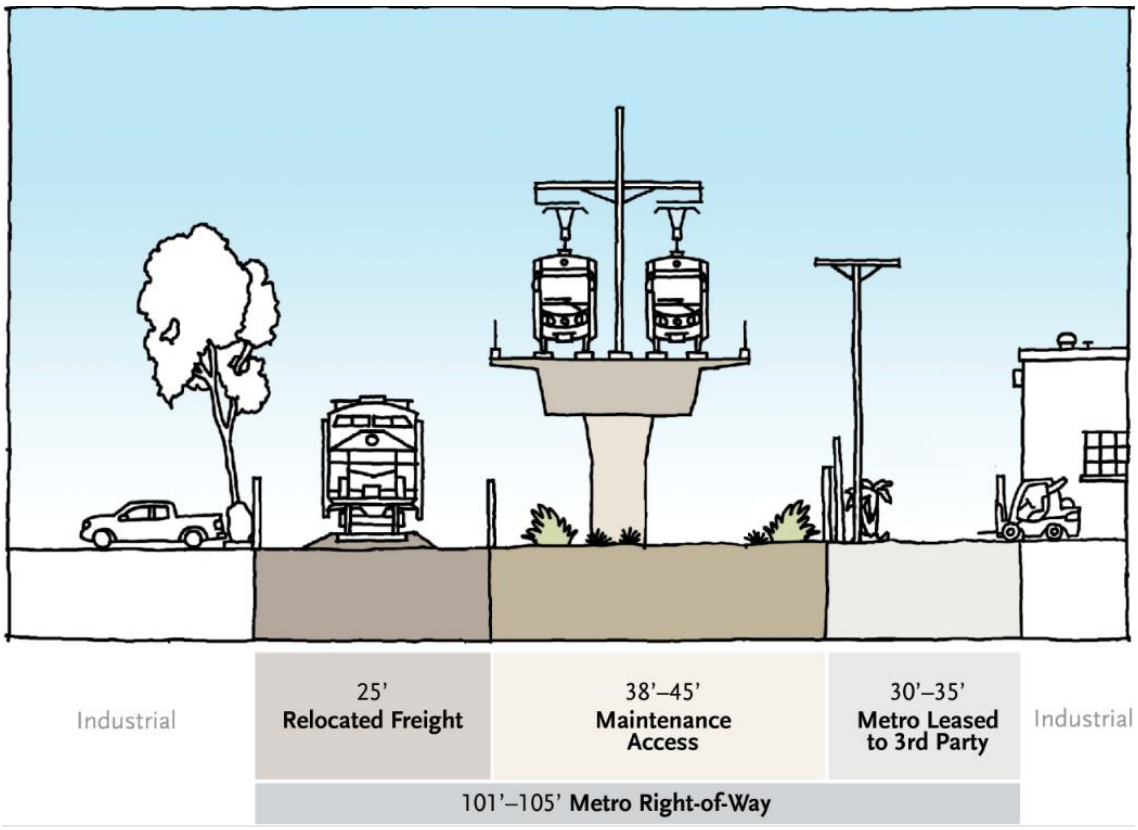


Source: STV, 2022

2.3-1.1 Alignment

The Proposed Project would begin at the existing Redondo Beach (Marine) Station, where the existing light rail tracks and station are elevated above street level in a guideway supported by columns. The Proposed Project would continue south in an elevated configuration within the existing Metro ROW, running parallel to and west of the existing freight tracks, which run at-grade (street level). Approximately 400 feet south of the station, the light rail tracks would descend and travel at-grade for approximately 800 feet before ascending back up to an elevated structure to cross over Inglewood Avenue and Manhattan Beach Boulevard into the City of Lawndale (Figure 2.3-2). Just south of Manhattan Beach Boulevard, the light rail guideway would cross over the existing freight tracks and shift to travel along the east side of the Metro ROW as it continues south. The existing freight track crossings at Inglewood Avenue and Manhattan Beach Boulevard would be rebuilt and remain at-grade.

Figure 2.3-2. Proposed Project – Looking South Between Inglewood Avenue and Manhattan Beach Boulevard



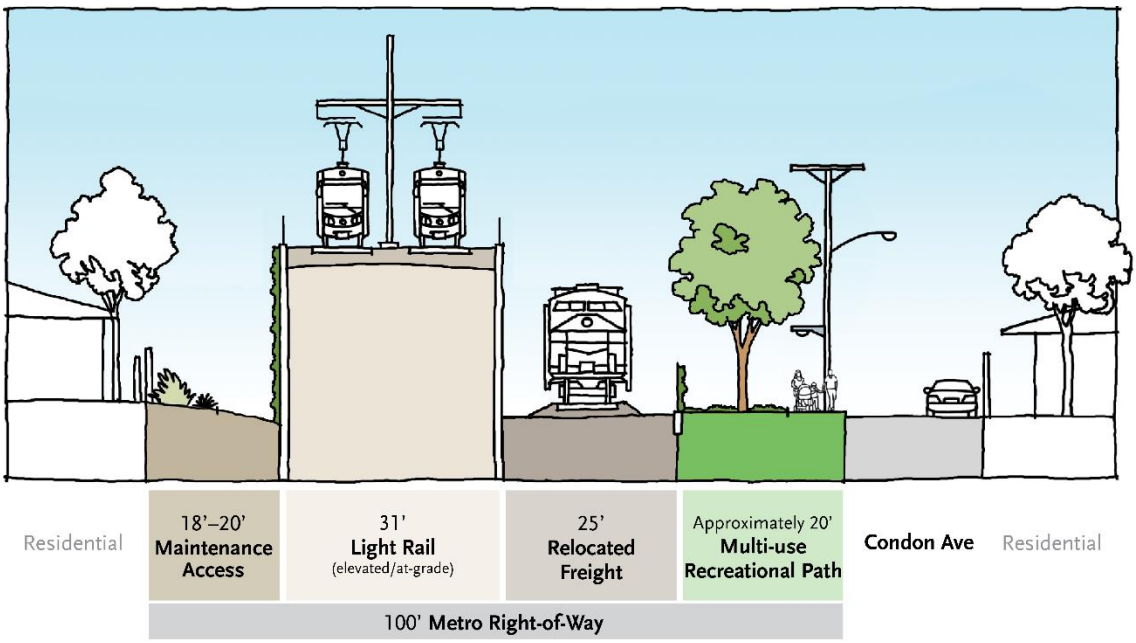
Source: Cityworks Design, 2022
Dimensions and ROW boundaries are preliminary and subject to confirmation in future phases of design.

Continuing south, the light rail tracks would cross over 159th Street, 160th Street, 161st Street, and 162nd Street on an elevated structure supported by columns, and then would descend on retained fill[1] until it reaches street level to near 165th Street. The retained fill section is shown in Figure 2.3-3. Between 165th and 170th Street, the light rail tracks would be at-grade, shown in Figure 2.3-4. The segment between Manhattan Beach Boulevard and 170th Street is wide enough to accommodate a

[1] The retained fill would be an elevated platform made of reinforced walls which are filled with soil material.

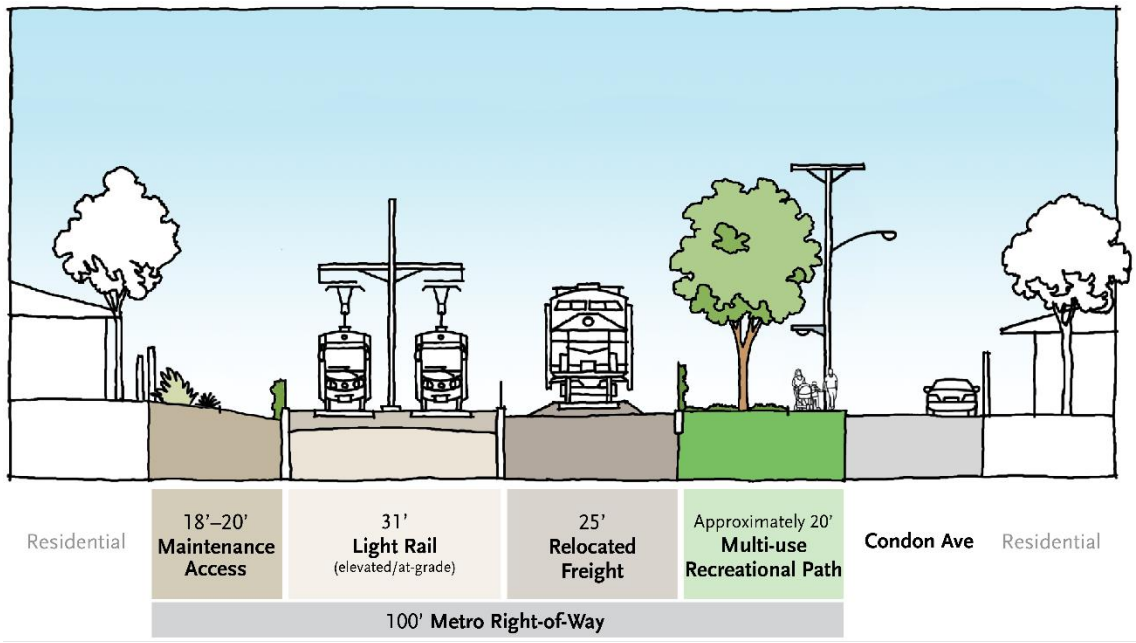
multi-use path parallel to the freight track, discussed further below. The light rail tracks would cross 170th Street at-grade parallel to the freight track with safety gates and equipment to prohibit conflicts between passing trains, vehicles, pedestrians, and cyclists. Between 170th Street and Grant Avenue, the Metro ROW narrows and there is not sufficient room to accommodate a multi-use path. The cross-section between 170th Street and Artesia Boulevard is shown in Figure 2.3-5.

Figure 2.3-3. Proposed Project – Looking South of 162nd Street



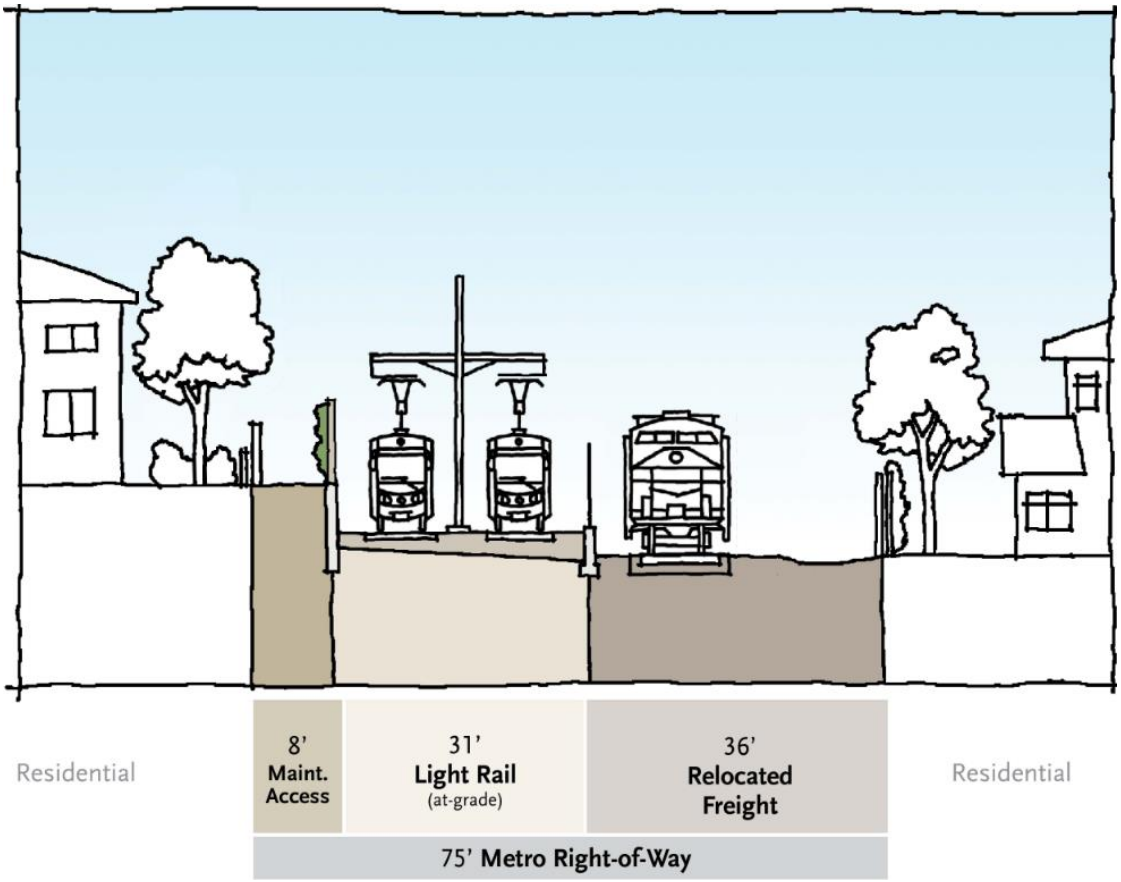
Source: Cityworks Design, 2022
Dimensions and ROW boundaries are preliminary and subject to confirmation in future phases of design.

Figure 2.3-4. Proposed Project – Looking South Between 165th Street and 170th Street



Source: Cityworks Design, 2022
Dimensions and ROW boundaries are preliminary and subject to confirmation in future phases of design.

Figure 2.3-5. Proposed Project – Looking South Between 170th Street and Artesia Boulevard

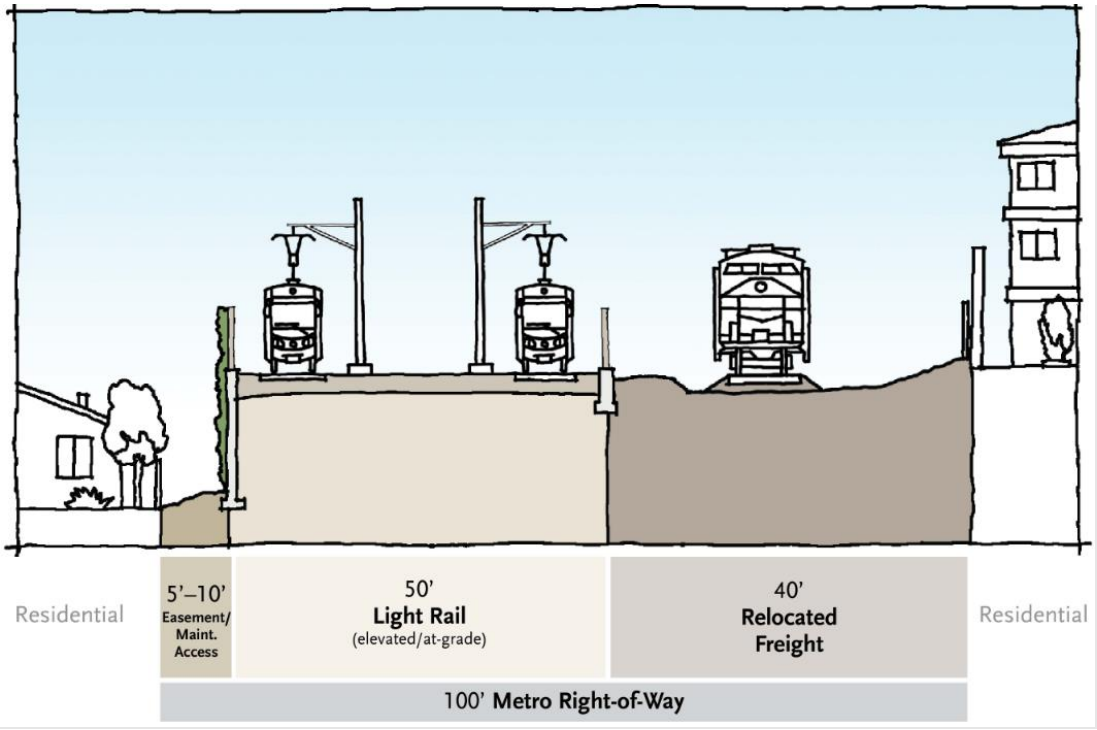


Source: Cityworks Design, 2022
Dimensions and ROW boundaries are preliminary and subject to confirmation in future phases of design.

The light rail tracks would cross over Artesia Boulevard into the City of Redondo Beach on a new bridge adjacent to the existing freight bridge. South of Artesia Boulevard, the light rail tracks continue to travel at-grade within the Metro ROW, as shown in Figure 2.3-6.

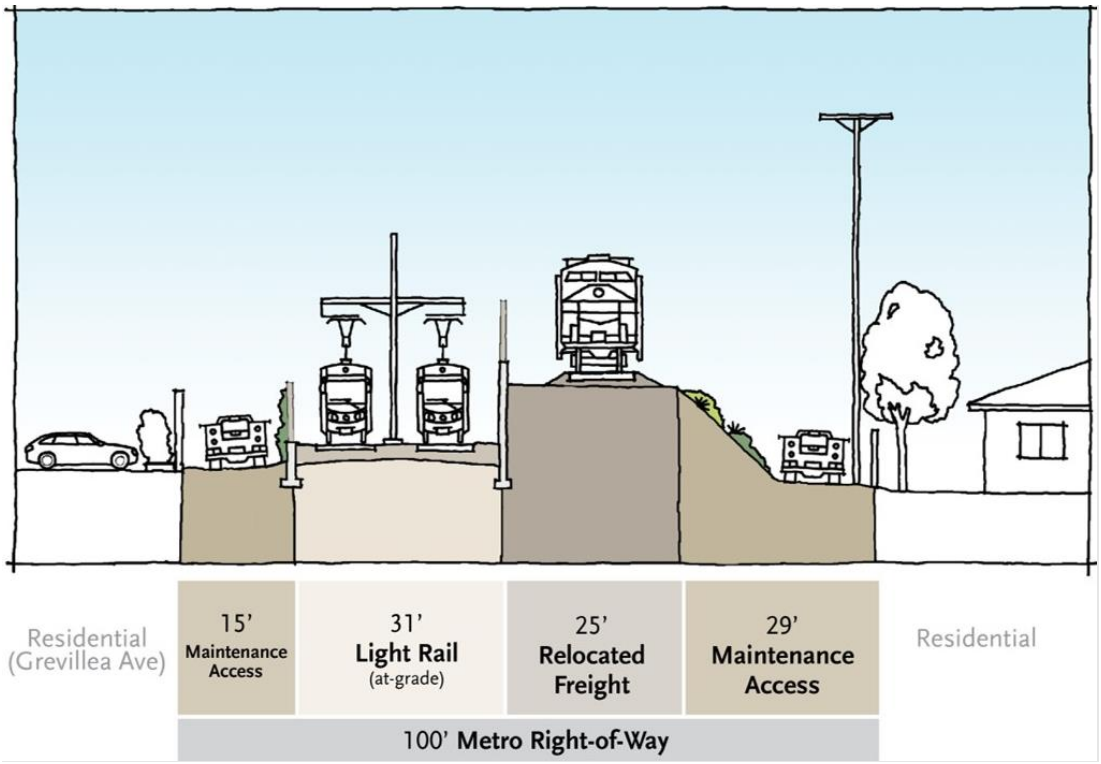
The light rail tracks would cross over Grant Avenue on a new light rail bridge parallel to the existing freight bridge, which would need to be demolished and rebuilt farther to the west. Immediately south of Grant Avenue, the light rail tracks would rise up on retained fill (approximately four to six feet higher than the existing freight track) to reach the elevated Redondo Beach TC Station, described in more detail in Section 2.3-1.4. From the Redondo Beach TC Station, the light rail tracks would descend on retained fill to reach street-level and cross over 182nd Street at-grade parallel to the existing freight track. From south of 182nd Street to Hawthorne Boulevard, the light rail tracks would run parallel to the freight track on a retained fill, as shown in Figure 2.3-7. The light rail tracks would be lower than the freight track to reduce their visibility, in response to community input.

Figure 2.3-6. Proposed Project – Looking South of Artesia Boulevard



Source: Cityworks Design, 2022
Dimensions and ROW boundaries are preliminary and subject to confirmation in future phases of design.

Figure 2.3-7. Proposed Project – Looking South Between 186th Street and Hawthorne Boulevard



Source: Cityworks Design, 2022
Dimensions and ROW boundaries are preliminary and subject to confirmation in future phases of design.

The light rail tracks would then cross over Hawthorne Boulevard and 190th Street on new bridges parallel to the existing freight bridge. South of 190th Street, the light rail tracks would travel at-grade within the Metro ROW, cross under the Prairie Avenue bridge, and rise up onto an elevated structure, and then descend to cross under Del Amo Boulevard. This elevated light rail structure is required to maintain freight operations, as described in more detail in the section below. South of Del Amo Boulevard, the light rail tracks would continue at-grade and end at a terminus station adjacent to the Torrance TC, just west of where the Metro ROW meets Crenshaw Boulevard. Tail tracks, which can be used for train carparking, storing, or reversing the direction of the light rail trains, would extend beyond the station platform and end west of Crenshaw Boulevard.

The entire light rail guideway would be enclosed, either with a fence, a combination of a fence on top of a low wall, or a sound wall in areas where noise mitigation is proposed.

Utility lines, including oil, gas, and electrical, currently run underneath the Metro ROW. The Proposed Project would relocate these lines within the Metro ROW in several areas or protect them in place. Utilities are discussed further in Section 3.11, Utilities and Service Systems.

Freight Track Modifications

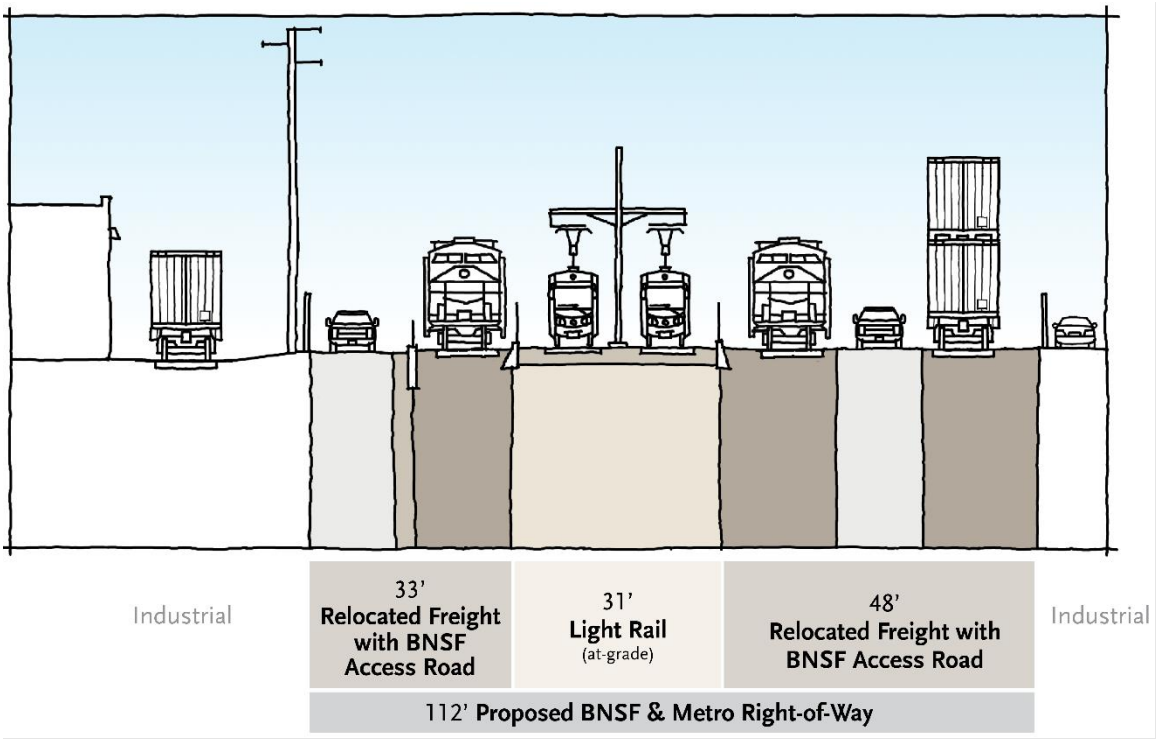
The width of the Metro ROW varies throughout the project area. This section discusses where the existing freight track would be shifted within the Metro ROW as part of the Proposed Project to accommodate the light rail tracks.

Just south of the Redondo Beach (Marine) Station, the two existing freight tracks would be shifted slightly to the east within the existing Metro ROW. Two new siding tracks and an access road would be added to the east of the new siding tracks, within Southern California Edison ROW. The existing siding tracks near Inglewood Avenue would be removed, to accommodate the new light rail tracks. The two mainline freight tracks would merge into a single track at Inglewood Avenue. At Manhattan Beach Boulevard, the freight track would cross under the elevated light rail structure to the west side of the Metro ROW, running west of the light rail tracks. Between Manhattan Beach Boulevard and 172nd Street, the existing freight track would be relocated to the west up to 14 feet within the Metro ROW. In this segment, the freight trains would continue to cross streets at-grade as they do today. Between 172nd Street and Artesia Boulevard, the freight track would remain in its current location. Between Artesia Boulevard to 182nd Street, the freight track would be relocated to the west up to 25 feet to allow the light rail to approach an elevated station at the Redondo Beach TC, and a new freight bridge would be constructed at Grant Avenue (see Figure 2.3-11). The freight crossing at 182nd Street would remain at-grade with safety improvements. Between 182nd Street and Hawthorne Boulevard, the freight track would be relocated to the west, from approximately three feet at 182nd Street up to 12 feet near El Nido Park. Just north of Hawthorne Boulevard, the existing freight track would remain in its existing location to cross over the existing freight bridges at Hawthorne Boulevard and 190th Street as it does today.

South of 190th Street, the character of the Metro ROW changes from a single freight track to a denser network of freight tracks, storage tracks to stage cargo, and spur tracks serving adjacent properties along the Metro ROW. To accommodate the light rail, the existing freight tracks would be shifted on both sides (east and west) of the Metro ROW to allow the light rail tracks to travel in between freight tracks to cross under two bridges: Prairie Avenue and Del Amo Boulevard. In various areas throughout this segment, the BNSF ROW would be expanded on both sides of the existing corridor, to accommodate the freight tracks and new access roads. Figure 2.3-8 shows the light rail and freight track configuration in this area. To provide access for freight track maintenance, there would be crossover tracks between Prairie Avenue and Del Amo Boulevard. The light rail tracks in this section would be elevated in an aerial

structure to cross over the freight tracks. The Del Amo Boulevard bridge span would be demolished and reconstructed with a wider span to accommodate an additional BNSF track underneath and to allow BNSF to maintain access to adjacent properties.

Figure 2.3-8. Proposed Project – Typical Cross-Section between 190th Street and Prairie Avenue



Source: Cityworks Design, 2022
Dimensions and ROW boundaries are preliminary and subject to confirmation in future phases of design.

Multi-Use Recreational Paths

Where there is sufficient room within the Metro ROW, the Proposed Project would provide two multi-use recreational paths for walking, cycling, etc. Parallel to Condon Avenue between 159th Street and 170th Street, a multi-use path would be provided on the west side of the freight track. This path would vary in width, and be approximately 20 feet wide. It would allow residents and visitors to safely walk or cycle along the Metro ROW next to Condon Avenue, which does not have a sidewalk. A fence would be provided between this multi-use path and freight track for safety. An example cross-section of the alignment and the multi-use path are shown in Figure 2.3-4.

Between Grant Avenue and 182nd Street, a multi-use recreational path would be provided on the east side of the light rail tracks, as shown in Figure 2.3-11. This path would be approximately 10 to 20 feet wide and provide access to the Redondo Beach TC Station, as well as enhance access within the neighborhood.

2.3-1.2 Roadway Modifications

Figure 2.3-9 shows the vertical profile of the Proposed Project and all the roadways that the light rail would cross. The light rail tracks would be separated from all roadways except for 170th and 182nd Streets, where the light rail would cross at-grade. The freight track would remain at-grade throughout the length of the corridor (see Figure 2.3-1). The roadway crossings are described below from north to south, and would include the following modifications:

- Inglewood Avenue: The roadway would cross under the elevated light rail structure, and the freight track would remain an at-grade crossing. New pedestrian gates and warning devices would be upgraded and installed on both sides of the freight track crossing. A new median and new vehicular safety gates would also be installed.
- Manhattan Beach Boulevard: The roadway would cross under the elevated light rail structure, and the freight track would remain an at-grade crossing. The pedestrian crossings would be reconfigured and include gates on both sides of the freight track crossing. The vehicular gates and signals would be relocated.
- 159th, 160th, 161st and 162nd Streets: These roadways would cross under the elevated light rail structure, and the freight track would remain an at-grade crossing. The multi-use recreational path would run at-grade parallel to the freight track, and at each roadway crossing, pedestrian gates and signals would be provided on both sides of the freight track, on both sides of each street. The multi-use path would cross each street with a signed and continental ("zebra") striped crosswalk. The vehicular gates and signals would be relocated.
- 170th Street: Both the light rail and freight tracks would cross the roadway at-grade. The multi-use path would run at-grade parallel to the freight track. The at-grade crossing would include gates and other crossing protection, and pedestrian upgrades on the sidewalks on both sides of the tracks and both sides of 170th Street. The multi-use path would cross the street with a signed and continental ("zebra") striped crosswalk.
- Artesia Boulevard: Both the light rail and freight tracks would cross over the roadway on bridges. No modifications to the roadway are required, except for new columns in the existing median to support rail bridges.
- Grant Avenue: Both the light rail and freight track would cross over Grant Avenue on bridges. No modifications to the roadway are required, except for new columns within the existing median to support rail bridges. A new pedestrian crossing would be provided at Grant Avenue and Condon Avenue, to provide access to the multi-use path that connects to the Redondo Beach TC station, and would include advance pedestrian signals to warn approaching drivers.
- 182nd Street: Both the light rail and freight tracks would cross the roadway at-grade. The at-grade crossing would include gates and other crossing protection, and pedestrian upgrades on the sidewalks on both sides of the tracks and both sides of 182nd Street, including a continental ("zebra") striped crosswalk on the east side of the Metro ROW.
- Hawthorne Boulevard and 190th Street: These roadways would cross under the new light rail and existing freight bridges. No modifications to the roadways are required.
- Prairie Avenue: The roadway would cross over the light rail and freight tracks on the existing roadway bridge. The west embankment would be cut back to make room for the relocated freight tracks and access road, but no modifications to the roadway bridge are required.
- Del Amo Boulevard: The bridge span would be reconstructed to make room for new light rail and freight tracks that travel below the roadway bridge.

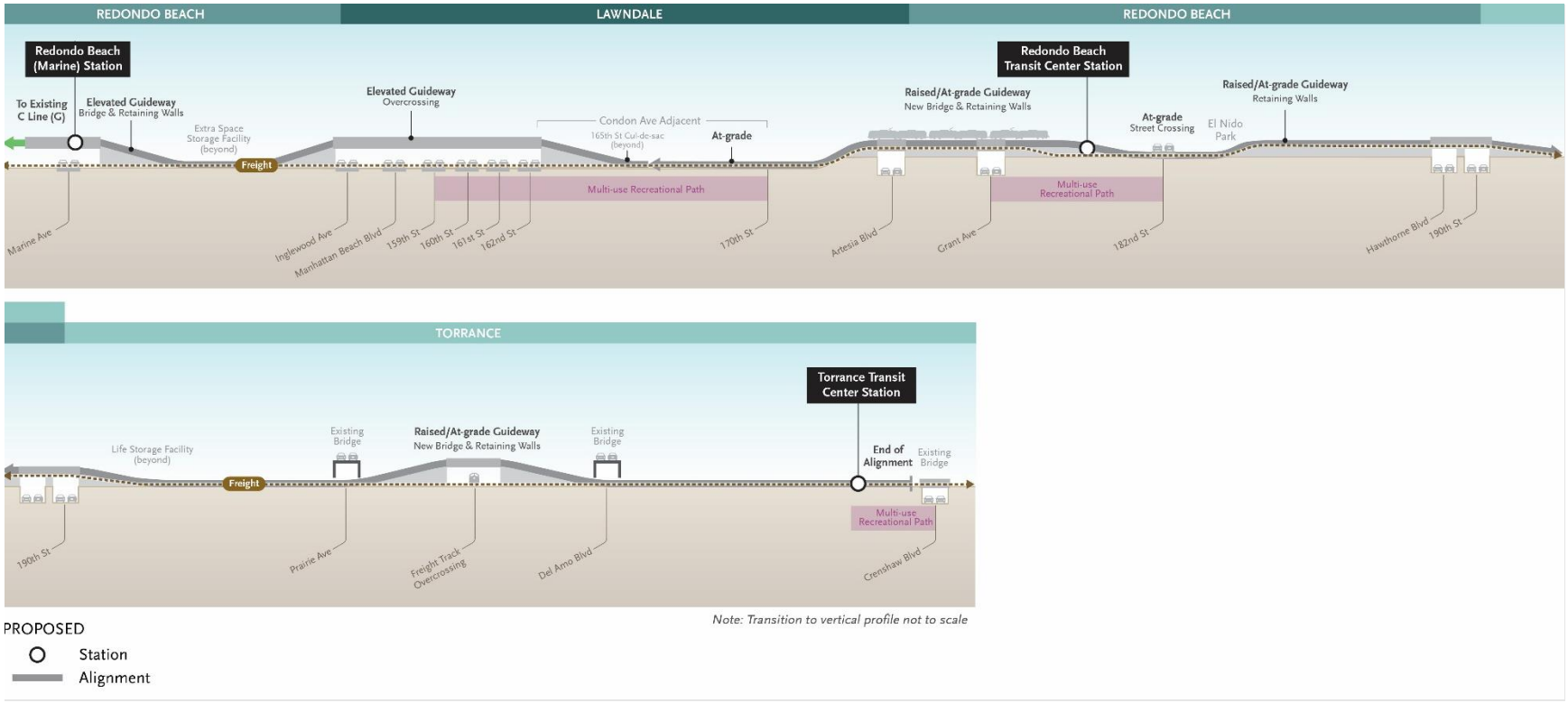
The Proposed Project would not modify any street parking.

2.3-1.3 Quiet Zones

All at-grade roadway crossings would comply with California Public Utilities Commission (CPUC) regulations to ensure they are safely designed, constructed, and maintained. The at-grade crossings (for

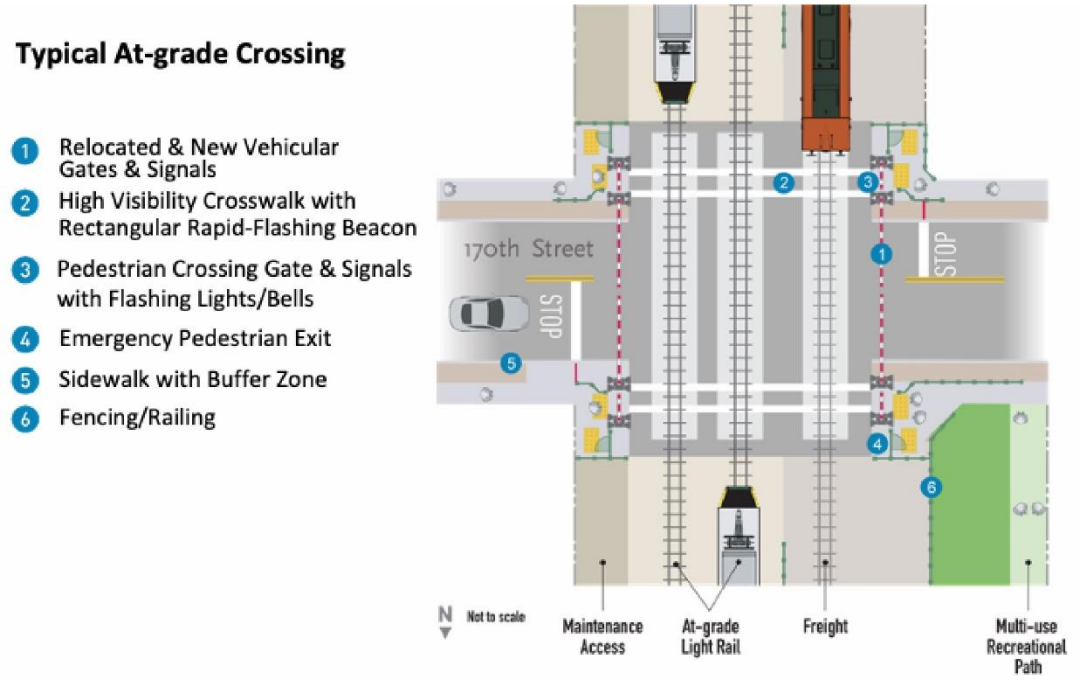
both freight and light rail) would be designed and upgraded to be “quiet zone ready”, which would allow local jurisdictions to implement a quiet zone policy for the corridor in the future. A quiet zone would reduce noise along the corridor by allowing freight trains to eliminate the use of horns when approaching at-grade crossings, which would have safety gates and enhancements for trains, vehicles, and pedestrians. The quiet zone ready design includes site-specific safety infrastructure such as vehicle gates, pedestrian gates, signals such as lights and bells, and sidewalks and ramps that are all compliant with the American Disability Act (ADA). Figure 2.3-10 shows the elements of a crossing where both the light rail and freight tracks are at-grade. For crossings where the light rail tracks are separated from the roadway, but the freight track is at-grade, all safety crossing amenities would still be included. Implementation of a quiet zone would result in the elimination of freight horns for a distance of approximately three miles, from north of Inglewood Avenue to south of 182nd Street.

Figure 2.3-9. Proposed Project – Vertical Profile Diagram



Source: Cityworks Design, 2022

Figure 2.3-10. Typical At-Grade Crossing for both Light Rail and Freight (e.g., 170th and 182nd Streets)



Source: Cityworks Design, 2022

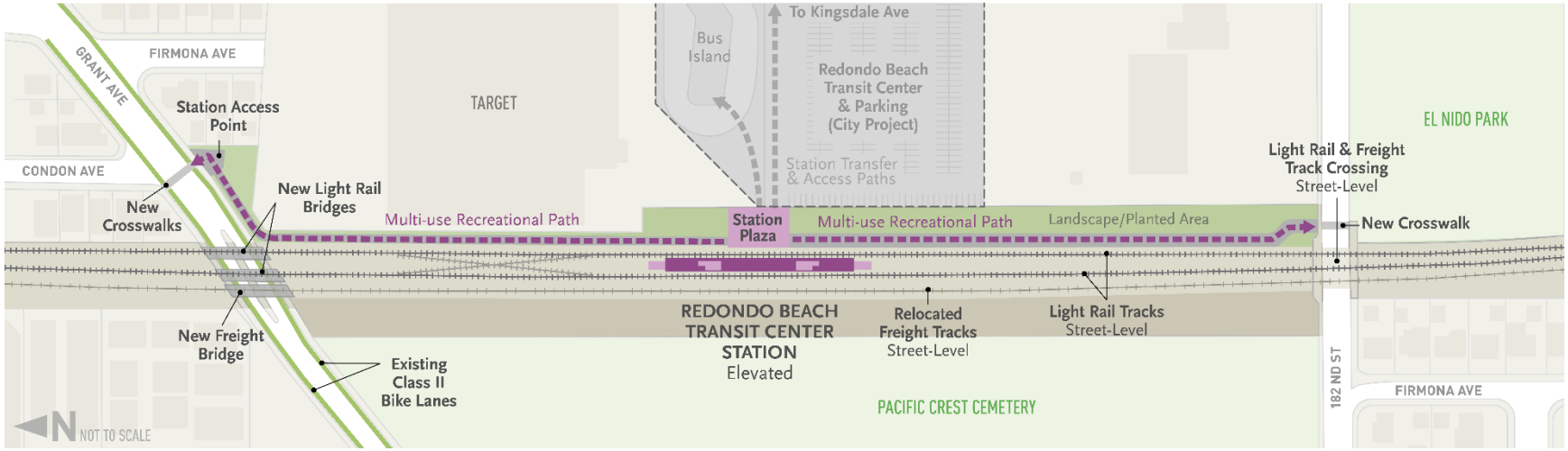
2.3-1.4 Station Sites

The Proposed Project includes two new light rail stations. The stations would follow Metro's Systemwide Station Design Standards consistent with the Metro Boards Systemwide Station Design Policy. Pursuant to Metro Board Policy, stations shall be required to have a consistent canopy design, station entrance, signage, communications equipment, fare collection equipment, and safety and security systems. Metro's Systemwide Station Design Standards include elements of variability, such as landscaping and integrated site-specific artwork that connects the station within the broader community context. All the stations are proposed as a center-platform configuration, allowing passengers to access trains from either direction from the same platform. The station platforms would be capable of accommodating three-car trains in the future if ridership increases and additional capacity is needed along the Metro C Line. The stations would allow level-boarding and full accessibility to comply with the ADA. Bicycle parking would be provided at all station sites.

Redondo Beach TC Station

The City of Redondo Beach's new regional transit center, Redondo Beach TC, is located between Kingsdale Avenue and the Metro ROW, south of the existing Target store. The City's Redondo Beach TC is a regional hub for local and regional bus lines, and also includes parking for Redondo Beach TC bus patrons. The Proposed Project would include a two-level light rail station located approximately 580 feet south of the Grant Avenue crossing, adjacent to the city's transit center (shown in Figure 2.3-11 and Figure 2.3-12). Light rail riders would arrive at the elevated light rail station platform, and descend to the lower level station plaza to connect to the city's transit center. As described in Section 2.3-1.1, the Proposed Project would also include a multi-use recreational path that would provide direct access to the light rail station via Grant Avenue and 182nd Street.

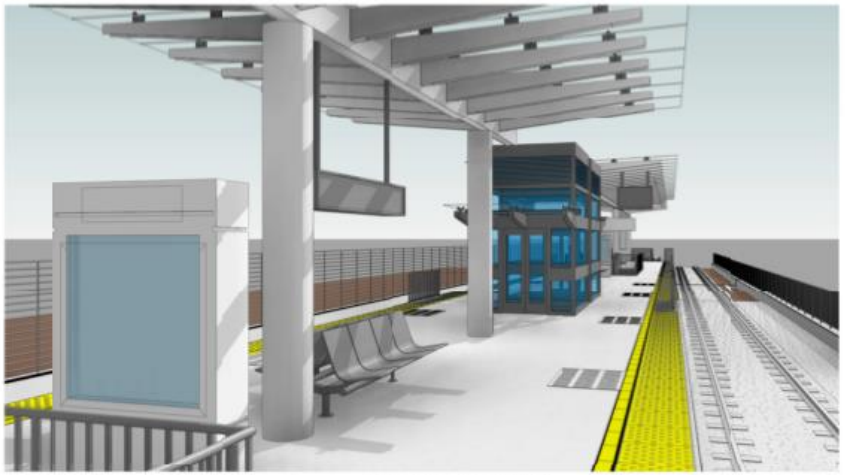
Figure 2.3-11. Proposed Project – Redondo Beach TC Station Layout



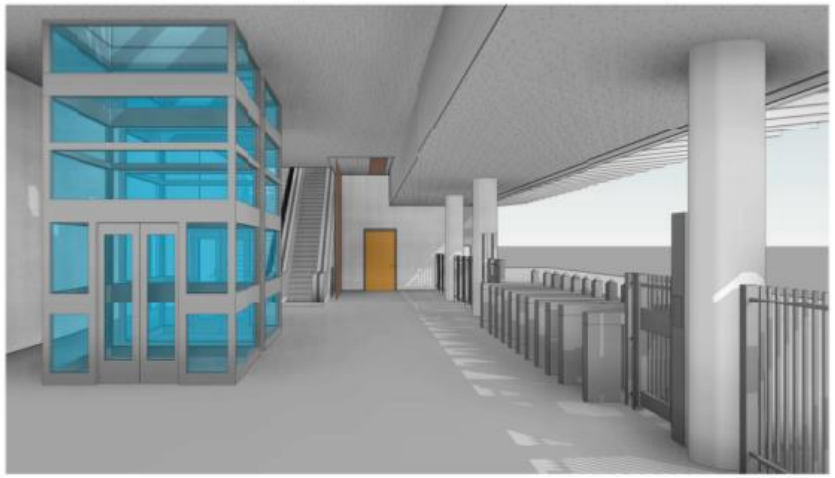
Source: Cityworks Design, 2022
Not to scale

Figure 2.3-12. Proposed Project – Renderings of Elevated Station at Redondo Beach TC

SW FACING - MAIN ENTRANCE PLAZA LEVEL



N FACING - PLATFORM



N FACING - PLAZA LEVEL PAID AREA

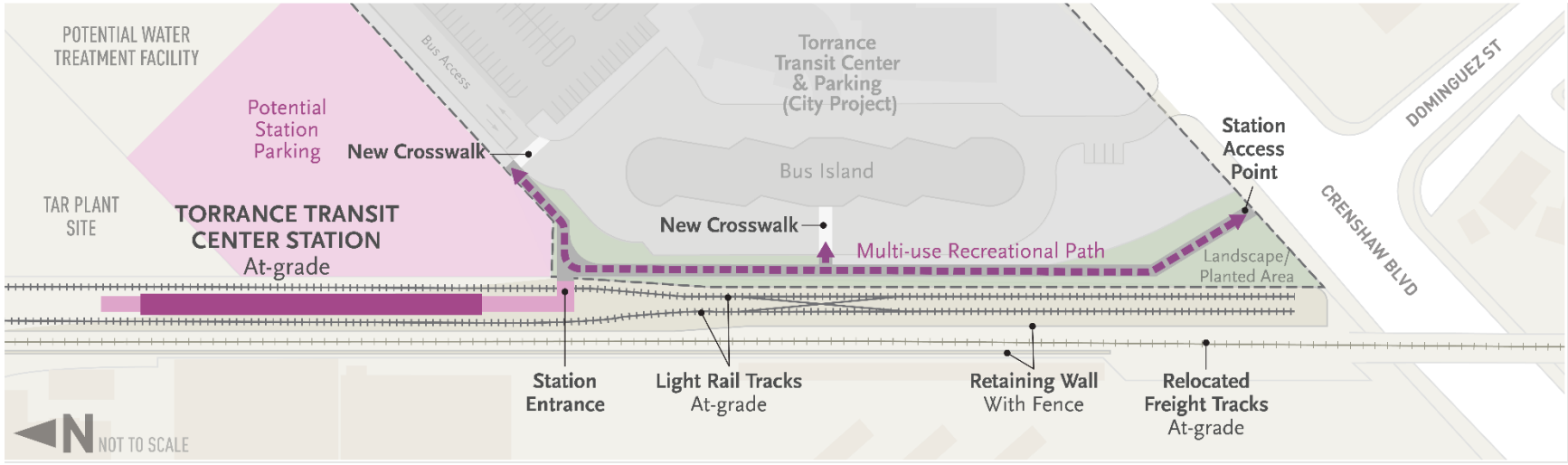
W FACING - MAIN ENTRANCE

Source: STV, 2022

Torrance TC Station

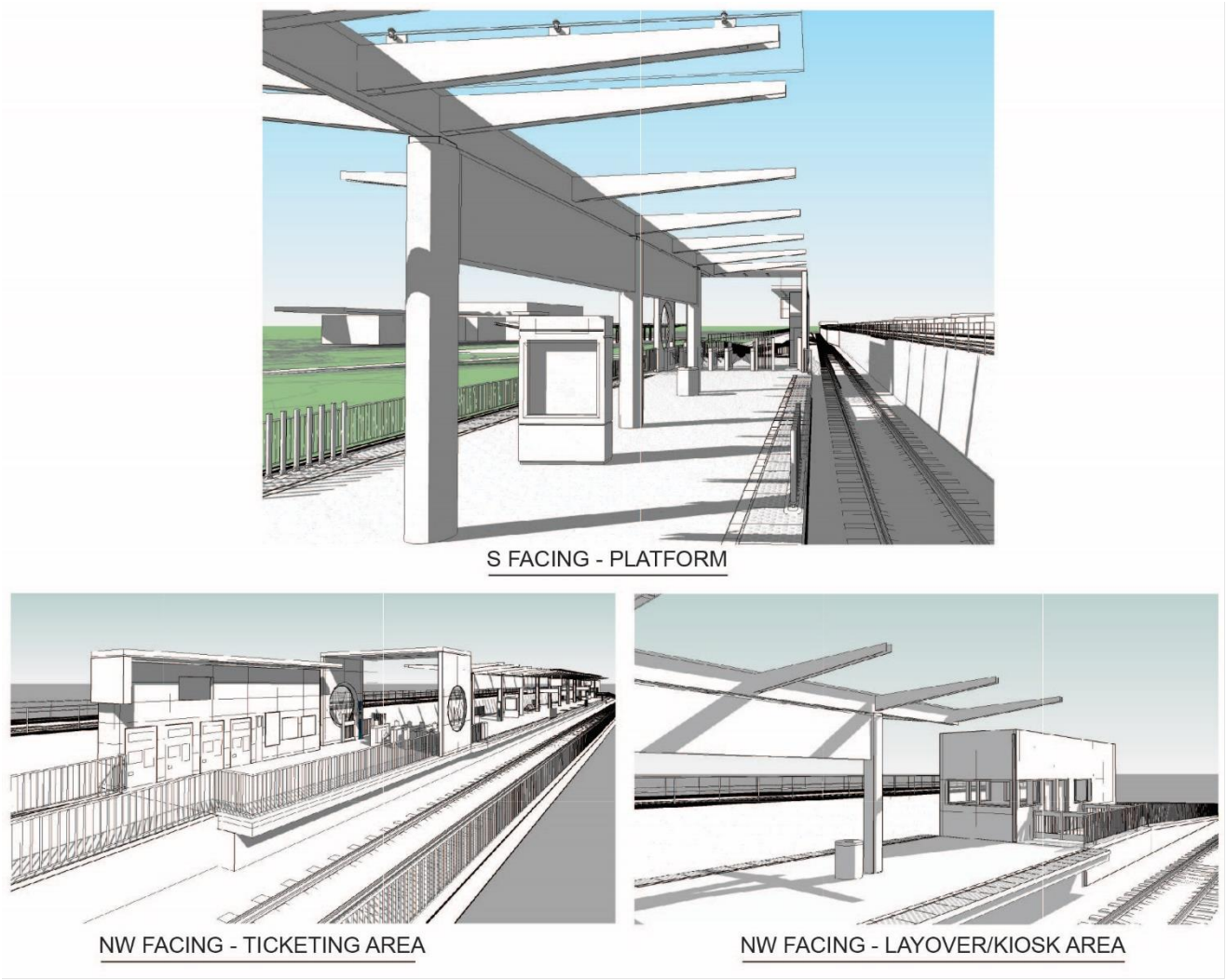
The City of Torrance's regional transit center, the Torrance TC, is located west of Crenshaw Boulevard and east of the Metro ROW. The Proposed Project would include an at-grade light rail station adjacent to the city's transit center, slightly north of the bus plaza (shown in Figure 2.3-14). The Proposed Project station would also include a surface parking lot with approximately 180 spaces, north of the city transit center's parking area. The light rail station platform would be accessible by pedestrian pathways and crosswalks from the Torrance TC bus plaza and parking areas, and as well as a path from Crenshaw Boulevard. This would be the southern terminus station for the Proposed Project.

Figure 2.3-13. Proposed Project – Torrance TC Station Layout



Source: Cityworks Design, 2022
Not to scale

Figure 2.3-14. Proposed Project – Renderings of Torrance TC Station (Terminus)

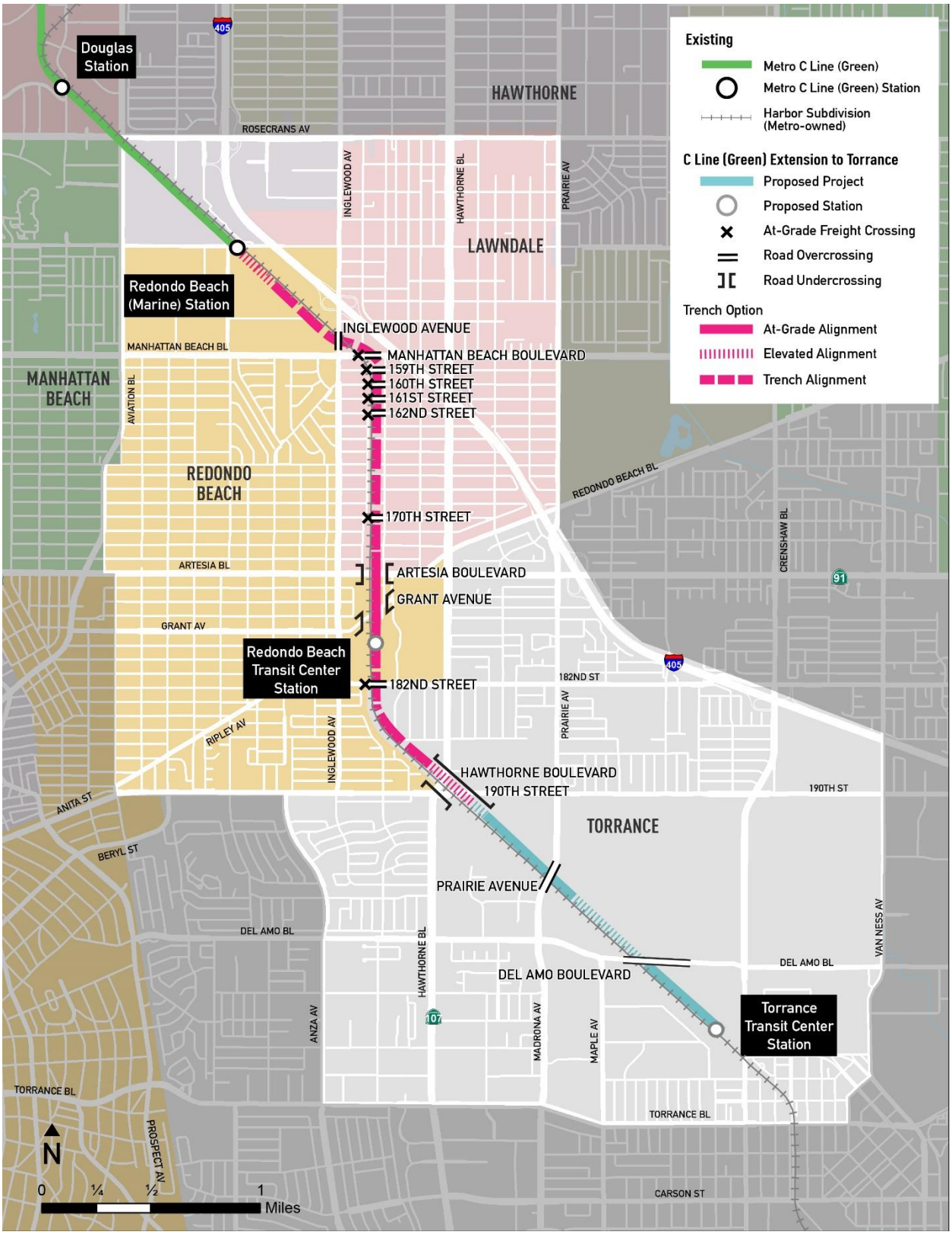


Source: STV, 2022

2.3-2 Trench Option

Along the Metro ROW, there is an option being considered between Marine Avenue and 190th Street called the Trench Option. Like the Proposed Project, the Trench Option would follow the existing Metro ROW, but would have a different vertical configuration (height) and be completely grade-separated with eight light rail under-crossings. All freight crossings would remain at-grade as they are today. One station is proposed in this segment: Redondo Beach TC Station. Figure 2.3-15 provides an overview of the Trench Option. South of 190th Street, the alignment and Torrance TC Station would be identical to the Proposed Project. Appendix 2-A, Select Advanced Conceptual Engineering Drawings provides detailed drawings of the alignment.

Figure 2.3-15. Trench Option – Overview

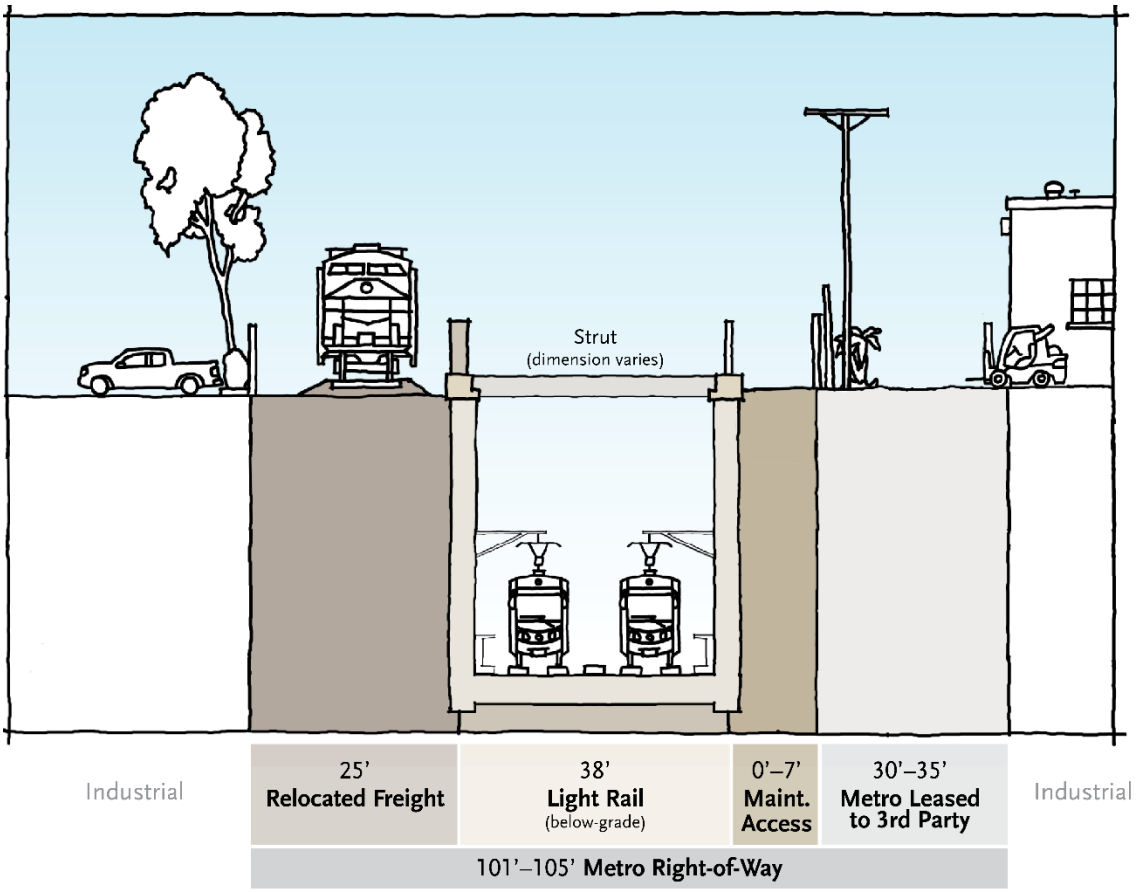


Source: STV, 2022

2.3-2.1 Alignment

The Trench Option would begin at the existing Redondo Beach (Marine) Station, where the existing light rail tracks and station are elevated above street level. Approximately 400 feet south of the station, the elevated light rail tracks would start descending on retained fill and transition below street level into an open-air trench configuration to cross under Inglewood Avenue and Manhattan Beach Boulevard. An example cross-section of the Trench Option configuration is shown in Figure 2.3-16.

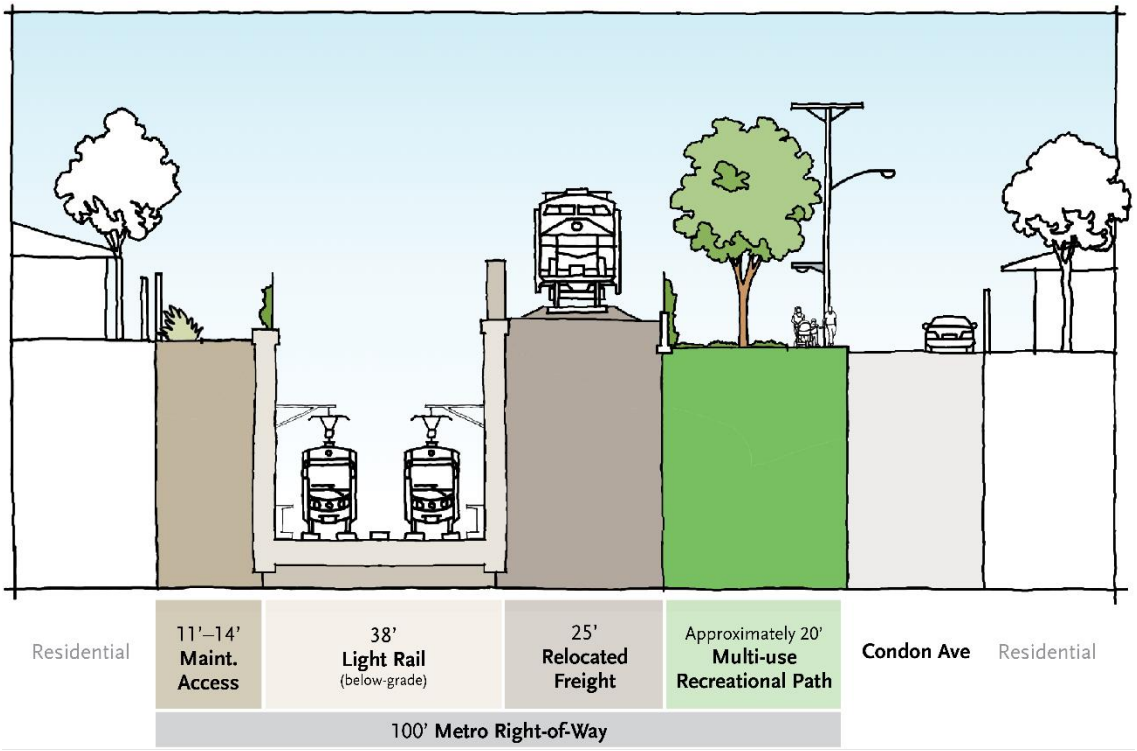
Figure 2.3-16. Trench Option – Looking South Between Inglewood Avenue and Manhattan Beach Boulevard



Source: Cityworks Design, 2022
Dimensions and ROW boundaries are preliminary and subject to confirmation in future phases of design.

South of Manhattan Beach Boulevard, the Trench Option would continue to run below street level with the light rail tracks located on the east side of the Metro ROW, parallel to (and west of) the existing freight tracks. The light rail tracks would travel under local streets through the City of Lawndale, with the local streets remaining open for vehicles, pedestrians, etc. to cross over the trench on bridge structures. Figure 2.3-17 shows the Trench Option configuration through this area. To avoid underground utilities between located below cross streets between Inglewood Avenue and 166th Street, the trench would be approximately 30 to 40 feet deep. The trench would be approximately 20 feet in depth at 170th Street.

Figure 2.3-17. Trench Option – Looking South between 162nd Street and 168th Street

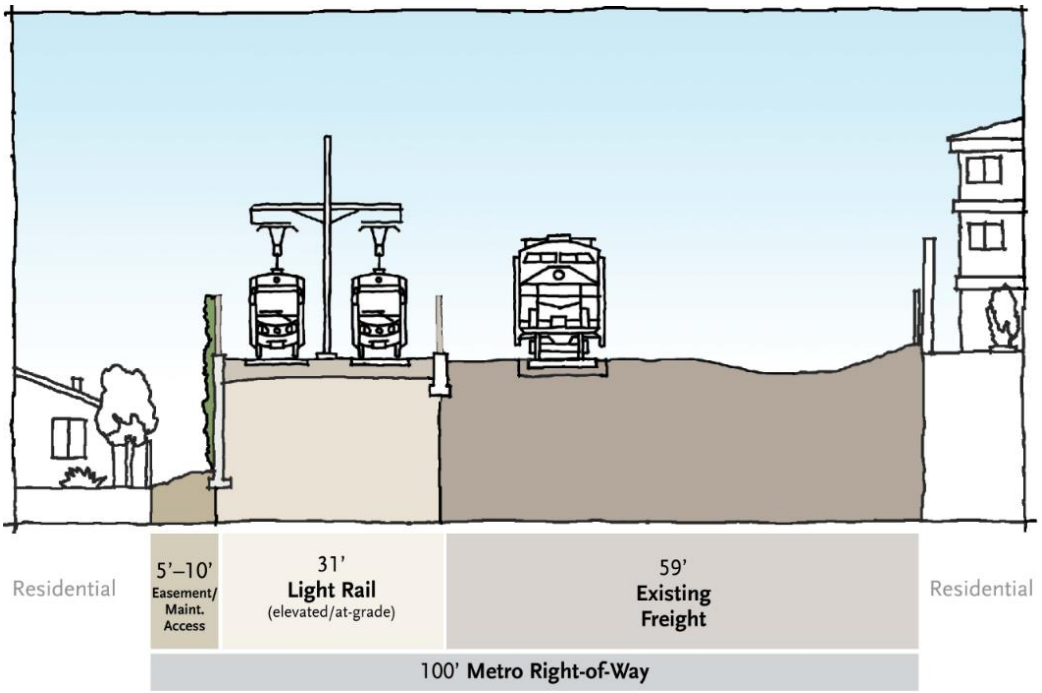


Source: Cityworks Design, 2022
Dimensions and ROW boundaries are preliminary and subject to confirmation in future phases of design.

South of 170th Street, the light rail tracks would ascend to run at-grade near 173rd Street in order to cross over Artesia Boulevard into the City of Redondo Beach on a new light rail bridge adjacent to the existing freight bridge. South of Artesia Boulevard, the Trench Option would continue at-grade, as shown in Figure 2.3-18. The light rail tracks would cross over Grant Avenue on a new light rail bridge before descending to reach the Redondo Beach TC Station. The station under the Trench Option would have a lower elevation and different layout from the elevated station under the Proposed Project, in order to cross under 182nd Street, discussed in more detail in Section 2.3-1.4.

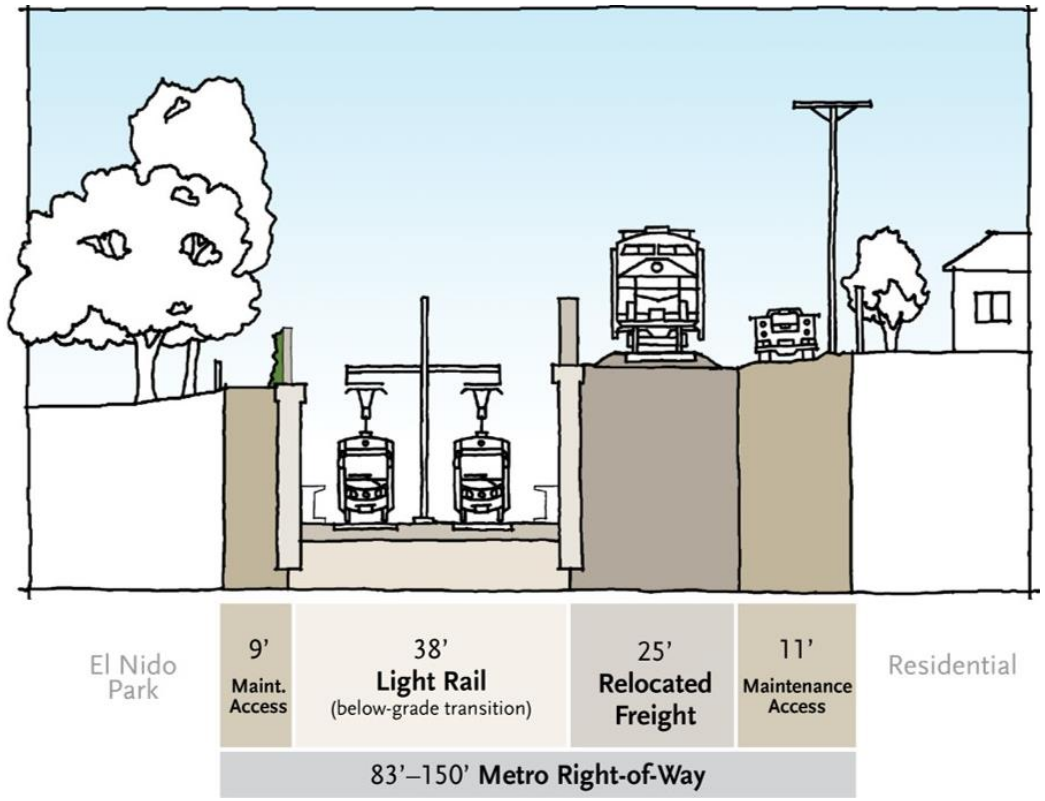
From the station, the light rail tracks would continue to descend into a short trench to cross under 182nd Street (shown in Figure 2.3-19). The trench would be between 18 to 24 feet deep below 182nd Street, before the light rail tracks rise back to at-grade near 186th Street. The light rail tracks would be approximately at the same elevation as the existing freight track to cross over Hawthorne Boulevard and 190th Street on new light rail bridges (parallel to the existing freight bridge). South of 190th Street, the alignment is the same as the Proposed Project, see Section 2.3-1.1.

Figure 2.3-18. Trench Option – Looking South of Artesia Boulevard



Source: Cityworks Design, 2022
Dimensions and ROW boundaries are preliminary and subject to confirmation in future phases of design.

Figure 2.3-19. Trench Option – Looking South of 182nd Street



Source: Cityworks Design, 2022
Dimensions and ROW boundaries are preliminary and subject to confirmation in future phases of design.

The entire light rail guideway would be enclosed, either with a fence, a combination of a fence on top of a low wall, or a sound wall in areas where noise mitigation is proposed. Similar to the Proposed Project, the existing utility lines underneath the Metro ROW would need to be relocated within the Metro ROW in several areas or be protected in place.

The Trench Option would require a sump drainage system to collect any water that enters the trench. Two sump pumps are proposed at low points along the trench, near Manhattan Beach Boulevard and near 182nd Street. All water would be collected, treated, and discharged in accordance with Regional Water Quality Control Board requirements, as described in more detail in Section 3.10, Hydrology and Water Quality.

Freight Track Modifications

As part of the Trench Option, existing freight tracks would need to be rebuilt and relocated in some areas within the Metro ROW. Between the Redondo Beach (Marine) Station to Manhattan Beach Boulevard, the freight track would be located on the east side of the Metro ROW, east of the light rail tracks. At Manhattan Beach Boulevard, the freight track would cross at-grade on a bridge over the light rail trench to the west side of the Metro ROW, running west of the light rail tracks. The existing freight track would be relocated approximately 12 feet west (within the Metro ROW) south of Manhattan Beach Boulevard to 172nd Street. Between 172nd Street and Artesia Boulevard, the freight track would remain in its existing location. The freight track would cross Grant Avenue on the existing freight bridge (see Figure 2.3-22). South of Grant Avenue, the freight track would shift approximately five to seven feet to the west and continue south to Hawthorne Boulevard to cross over 190th Street on the existing freight bridge to continue south to Torrance.

Multi-Use Recreational Paths

Similar to the Proposed Project, the Trench Option would provide two multi-use recreational paths within the Metro ROW. Parallel to Condon Avenue between 159th Street and 170th Street, a multi-use path would be provided on the west side of the freight track. This path would vary in width, and would be approximately 20 feet wide along the Metro ROW. It would allow residents and visitors to safely walk or cycle along the Metro ROW next to Condon Avenue, which does not have a sidewalk. A fence would be provided between this multi-use path and freight track for safety. An example cross-section of the alignment and the multi-use path along Condon Avenue is shown in Figure 2.3-17.

Between Grant Avenue and 182nd Street, a multi-use recreational path of approximately 10 to 20 feet in width would be provided on the east side of the light rail tracks. This path would provide access to the Redondo Beach TC Station, as well as enhance access within the neighborhood.

2.3-2.2 Roadway Modifications

Figure 2.3-20 shows the vertical profile of the Trench Option and all eight roadways that the light rail would cross under. The light rail tracks would be separated from all roadways, while the freight track would remain at-grade throughout the length of the corridor. The roadway crossings are described below from north to south, and would include the following modifications:

> Inglewood Avenue: The roadway would be reconstructed as a bridge over the trench, and the freight track would remain an at-grade crossing. New pedestrian gates and warning devices would be upgraded and installed on both sides of the freight track crossing. New vehicular safety gates would also be installed.

> Manhattan Beach Boulevard: The roadway would be reconstructed as a bridge over the trench, and the freight track would remain an at-grade crossing. The pedestrian crossings would be reconfigured

and include gates on both sides of the freight track crossing. The vehicular gates and signals would be relocated.

- 159th, 160th, 161st, 162nd, and 170th Streets: The roadways would be reconstructed as bridges over the trench, and the freight track would remain an at-grade crossing at each roadway. The multi-use path would run at-grade parallel to the freight track. Pedestrian gates and signals would be provided on both sides of the freight track, on both sides of each street. The multi-use path would cross each street with a signed and continental ("zebra") striped crosswalk. The vehicular gates and signals would be relocated. Figure 2.3-21 shows the elements of a typical light rail trench crossing.
- Artesia Boulevard: The roadway would cross under the light rail and freight track bridges. No modifications to the roadway are required, except a new column in the existing median.
- Grant Avenue: The roadway would cross under the light rail and freight track bridges, and no modifications to the roadway are required, except for new columns within the existing median. A new pedestrian crossing would be provided at Grant Avenue and Condon Avenue, to provide access to the station path.
- 182nd Street: The roadway would be reconstructed as a bridge over the trench, and the freight track would remain an at-grade crossing. New pedestrian gates and warning devices would be upgraded and installed on both sides of the freight track crossing, including a continental ("zebra") striped crosswalk on the west side of the Metro ROW. New vehicular safety gates would also be installed.

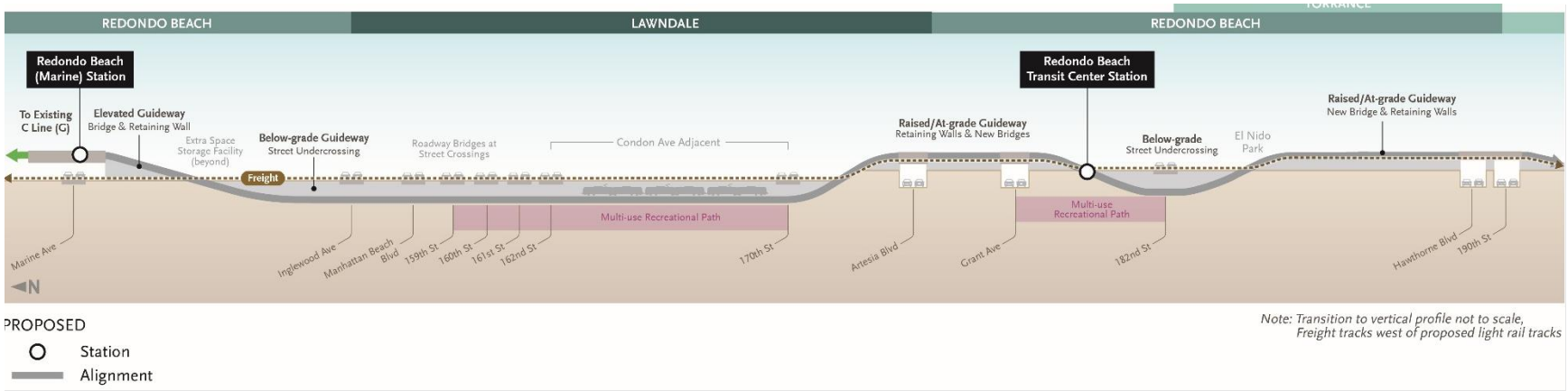
The roadways south of 182nd Street would have the same modifications as the Proposed Project, described in Section 2.3-1.2.

The Trench Option would not modify any street parking.

2.3-2.3 Quiet Zones

As described in Section 2.3-1.3, all at-grade freight crossings would be designed and upgraded to be "quiet zone ready", which would allow local jurisdictions to implement a quiet zone policy for the corridor in the future. While all roadways would be separated from the light rail under the Trench Option, all the at-grade freight crossings would be designed to be quiet zone ready. The freight crossings would comply with CPUC regulations and include site-specific safety infrastructure. Figure 2.3-21 shows the elements of a crossing for the Trench Option.

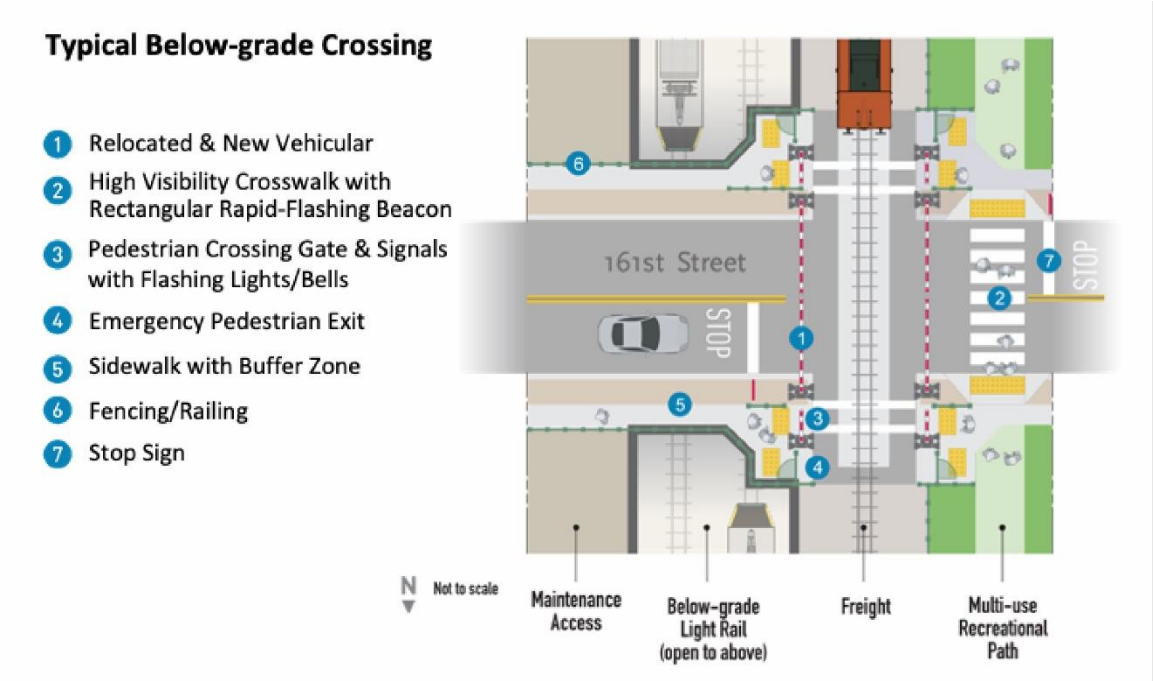
Figure 2.3-20. Trench Option – Vertical Profile Diagram



Source: Cityworks Design, 2022

Note: South of 190th Street, the alignment is the same as the Proposed Project.

Figure 2.3-21. Trench Option – Typical Below-Grade Crossing for Light Rail & At-Grade Freight Crossing



Source: Cityworks Design, 2022

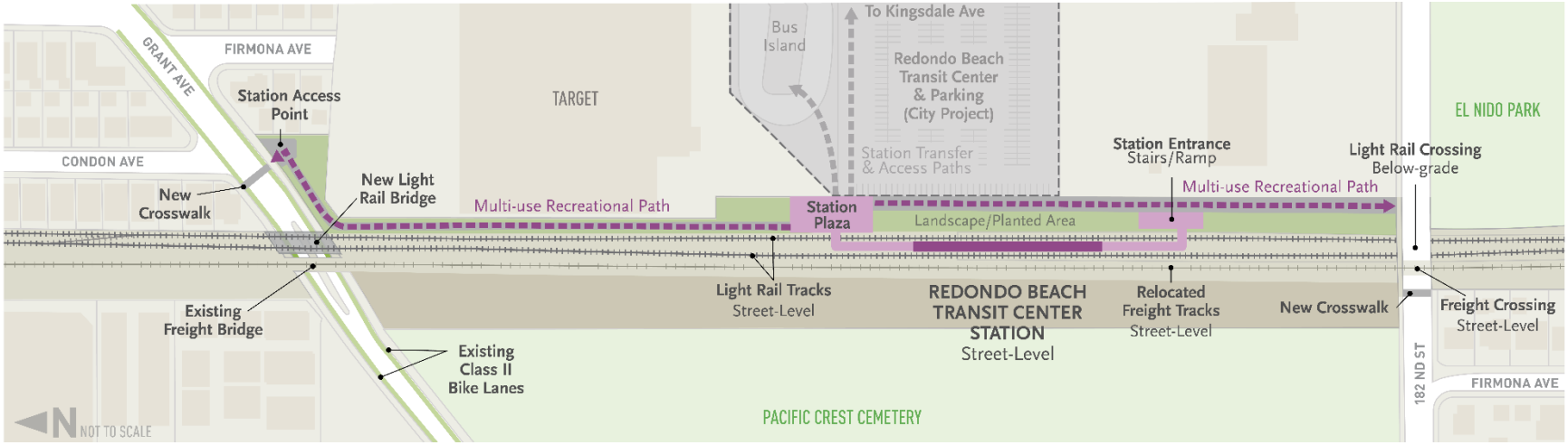
2.3-2.4 Station Sites

The Trench Option station would follow the same design criteria and include the same elements as described in Section 2.3-1.4.

Redondo Beach TC Station

Similar to the Proposed Project, the Trench Option proposes a station adjacent to the city's Redondo Beach TC along the east side of the Metro ROW, approximately 800 feet south of the Grant Avenue bridge (shown in Figure 2.3-22 and Figure 2.3-23). The Trench Option station would be a one-level station, with the platform located approximately 10 feet below the existing ground level. The lower station configuration allows the light rail to cross under 182nd Street. Light rail riders would arrive at the station platform, and connect to a station plaza via pedestrian pathways, ramps, and stairs to access the adjacent city's transit center and proposed multi-use path between 182nd Street and Grant Avenue.

Figure 2.3-22. Trench Option – Redondo Beach TC Proposed Station Layout

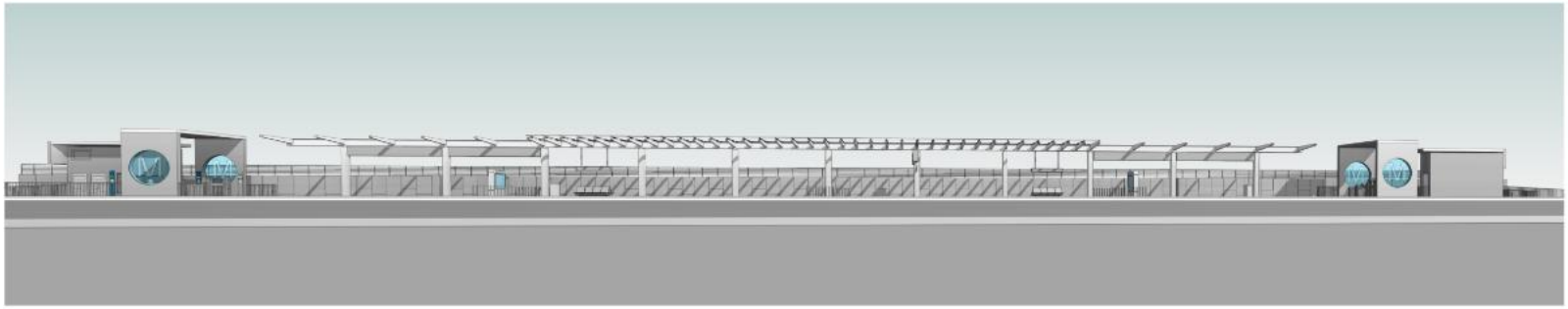


Source: Cityworks Design, 2022
Not to scale

Figure 2.3-23. Trench Option – Renderings of At-Grade Station at Redondo Beach TC

W FACING - TICKETING AREA

NW FACING - PLATFORM AREA



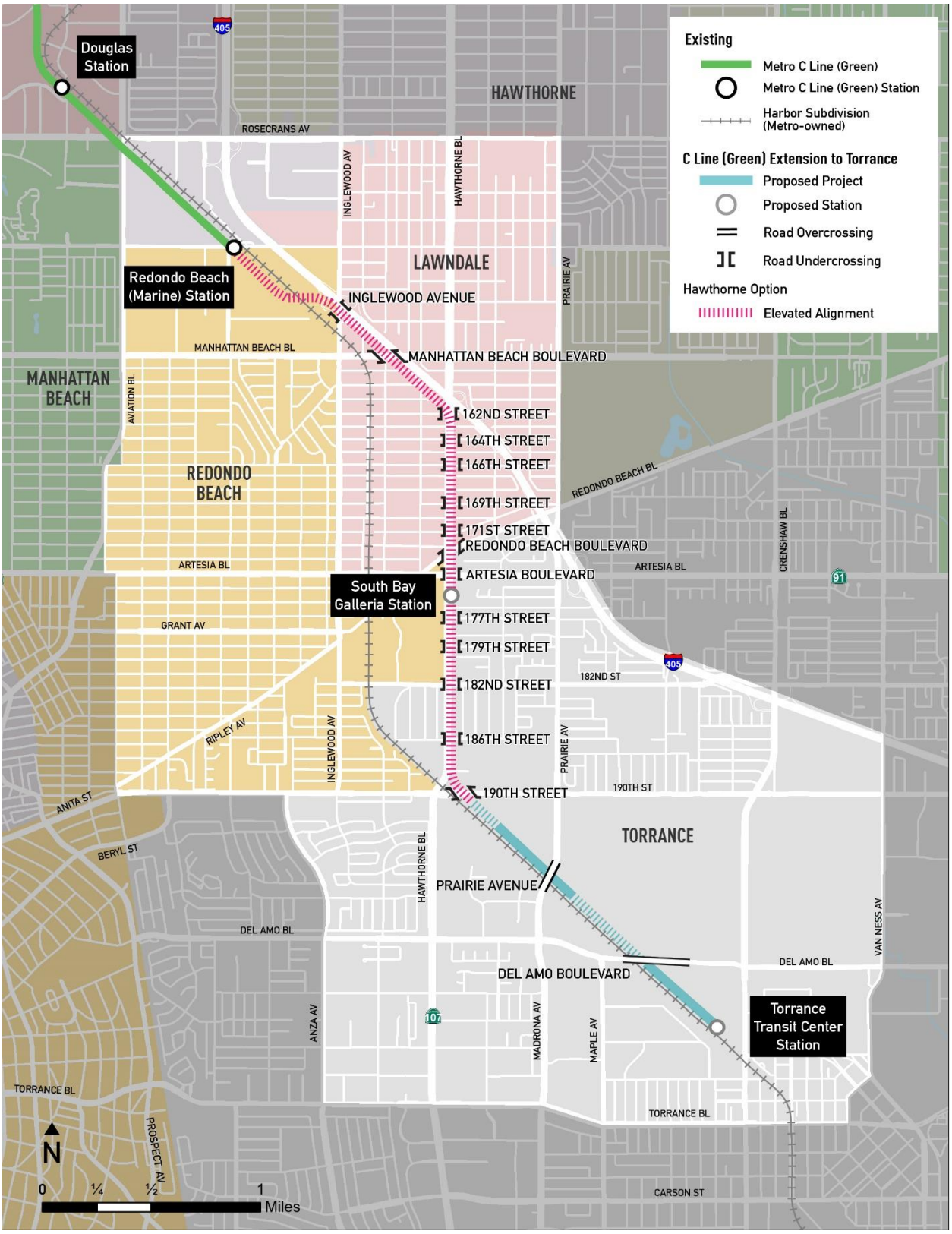
W FACING - OVERALL PLATFORM

Source: STV, 2022

2.3-3 Hawthorne Option

Between the Redondo Beach (Marine) Station and 190th Street, the Hawthorne Option is being considered, which is entirely elevated. It would start within the existing Metro ROW, leave the Metro ROW to parallel I-405 between Inglewood Avenue and Hawthorne Boulevard, and follow Hawthorne Boulevard south (Figure 2.3-24) between 162nd Street and 190th Street. One station is proposed in this segment: South Bay Galleria Station south of Artesia Boulevard. Near 190th Street, the Hawthorne Option would turn southeast to join the Metro ROW. South of 190th Street, the alignment and Torrance TC Station would be identical to the Proposed Project. Appendix 2-A, Select Advanced Conceptual Engineering Drawings provides detailed drawings of the alignment.

Figure 2.3-24. Hawthorne Option – Overview

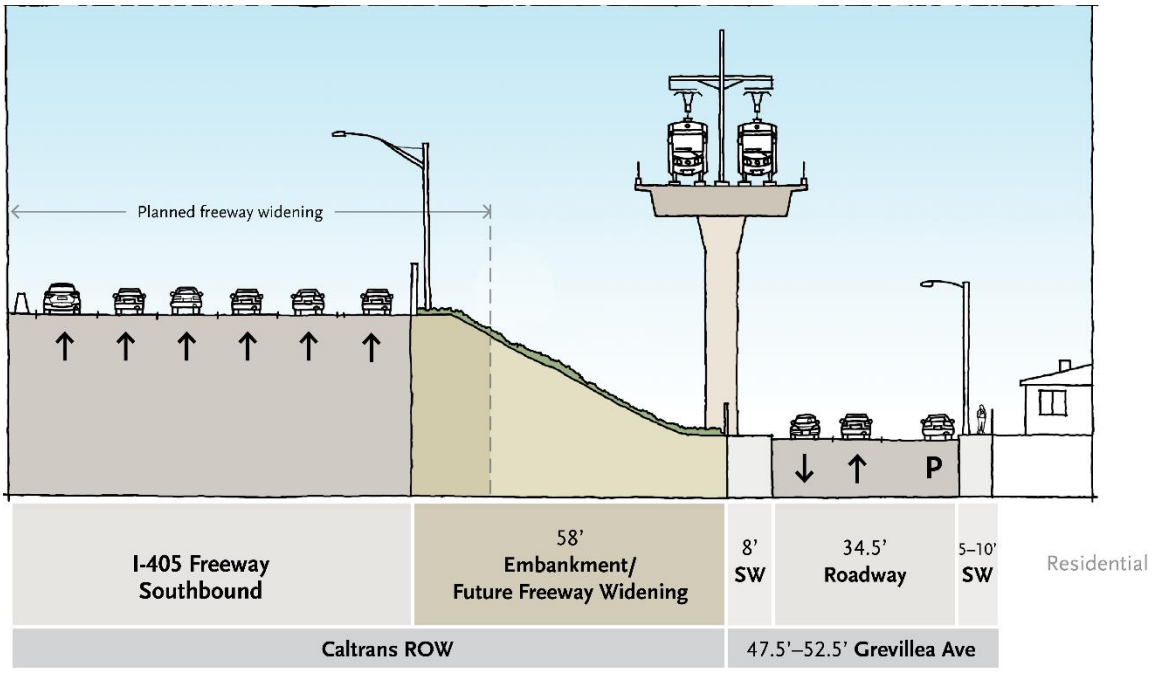


Source: STV, 2022

2.3-3.1 Alignment

The Hawthorne Option would begin at the existing Redondo Beach (Marine) Station, where the existing tracks and station are elevated above street level. Within the Hawthorne Option segment, the alignment would be entirely elevated. The elevated light rail tracks would travel within the existing Metro ROW for approximately 850 feet west of Inglewood Avenue. In this segment, existing overhead transmission lines would need to be relocated to avoid conflicts with the elevated structure. South of Inglewood Avenue, the light rail tracks would turn east (out of the Metro ROW), crossing over the existing freight track and Inglewood Avenue, and immediately south of the southbound I-405 on- and off-ramps. From Inglewood Avenue to 160th Street, the elevated tracks would run within the California Department of Transportation (Caltrans) ROW parallel to I-405, as shown in Figure 2.3-25. The light rail structure would be located at the edge of the Caltrans ROW to avoid potential future conflicts with freeway widening; Metro will coordinate with Caltrans as designs for the projects progress, to ensure there would not be any conflicts. Overhead transmission lines along Grevillea Avenue would need to be relocated to avoid conflicts with the elevated structure.

Figure 2.3-25. Hawthorne Option – Looking South of 159th Street



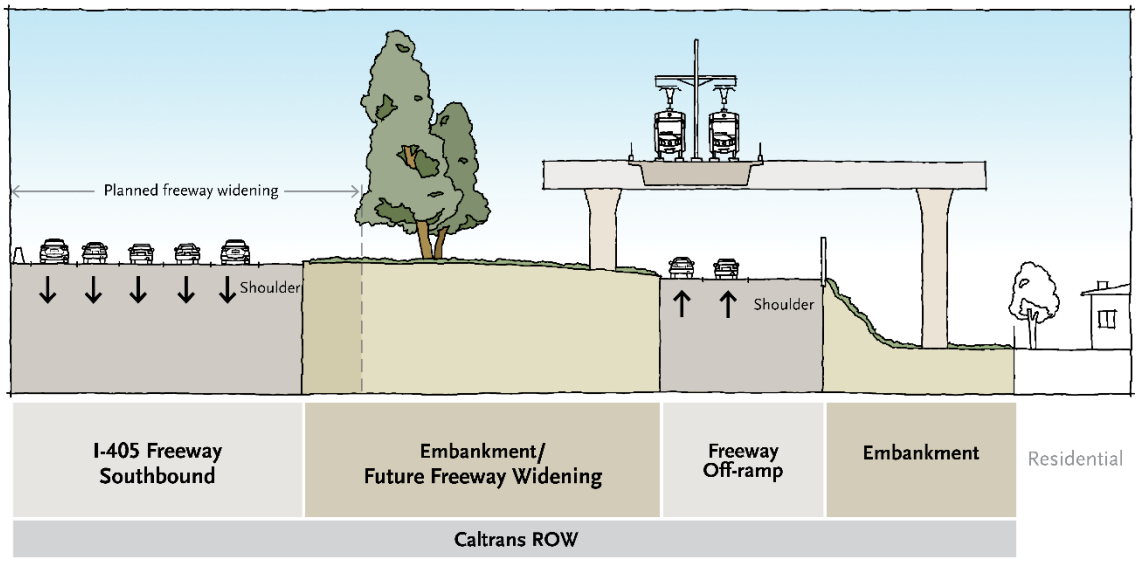
Source: Cityworks Design, 2022
Dimensions and ROW boundaries are preliminary and subject to confirmation in future phases of design.
SW = sidewalk

South of 160th Street, the elevated tracks would cross over the I-405 southbound on- and off-ramps for Hawthorne Boulevard, and then turn south to travel within the median of Hawthorne Boulevard on an elevated structure. A straddle bent would be required in this transition area, shown in Figure 2.3-26.

The Hawthorne Option would remain on an elevated structure down Hawthorne Boulevard until 190th Street, where it would curve to the east and rejoin the Metro ROW. A typical cross-section of the alignment along Hawthorne Boulevard is shown in Figure 2.3-27. For the transition area near 190th Street where the light rail tracks rejoin the Metro ROW, a straddle bent would be required. Between 177th and 178th Street, overhead transmission lines that currently cross perpendicular to Hawthorne Boulevard would need to be raised to avoid conflicts with the elevated structure. Additionally, an

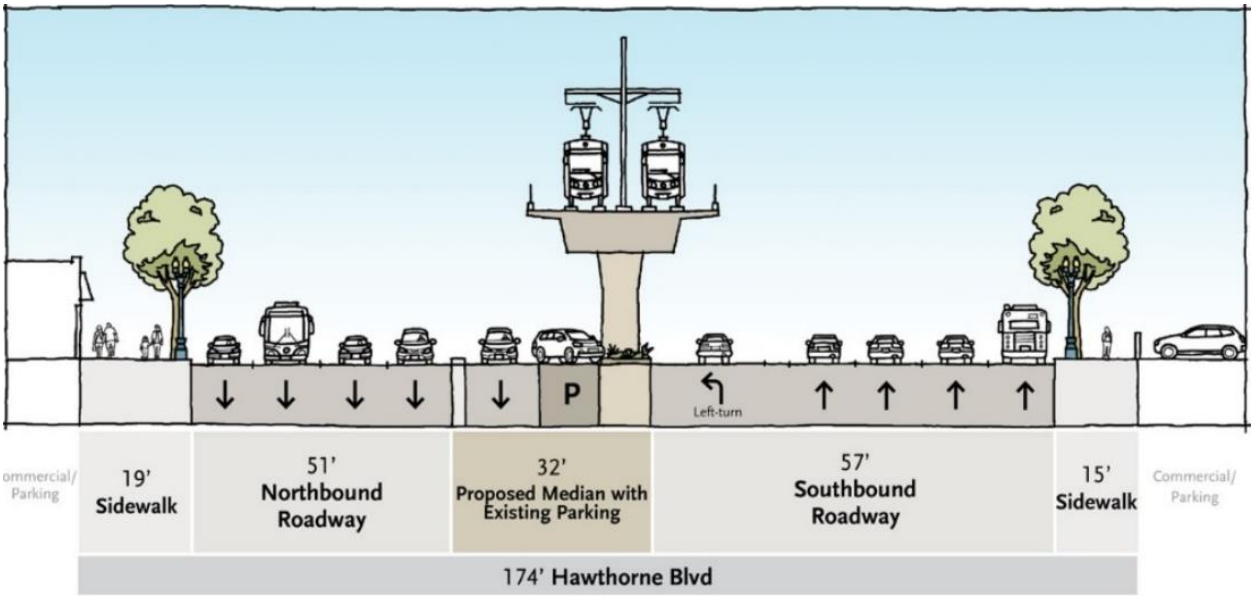
existing storm drain that runs underneath the Hawthorne Boulevard median would need to be relocated to avoid conflicts with the column footings. After rejoining the Metro ROW, the alignment of the Hawthorne Option would be identical to that of the Proposed Project, described in Section 2.3-1.1.

Figure 2.3-26. Hawthorne Option – Looking South Between 160th Street and Hawthorne Boulevard



Source: Cityworks Design, 2022
Dimensions and ROW boundaries are preliminary and subject to confirmation in future phases of design.

Figure 2.3-27. Hawthorne Option – Looking South at 170th Street



Source: Cityworks Design, 2022
Dimensions and ROW boundaries are preliminary and subject to confirmation in future phases of design.

The entire light rail guideway would be enclosed, either with a fence, a combination of a fence on top of a low wall, or a sound wall in areas where noise mitigation is proposed.

Freight Track Modifications

Within the Hawthorne Option segment, no modifications to freight tracks would be required.

Multi-Use Recreational Paths

No multi-use recreational paths are proposed within the Hawthorne Option segment.

2.3-3.2 Roadway Modifications

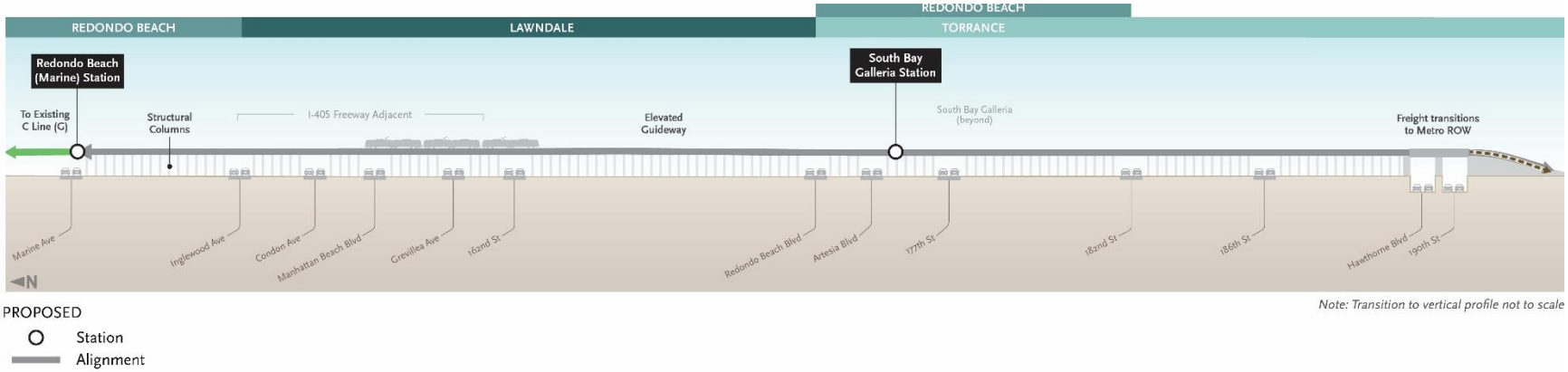
Figure 2.3-28 shows the vertical profile of the Hawthorne Option and all the roadways that the light rail would cross on an elevated structure, separated from all vehicles, pedestrians, and cyclists. The Hawthorne Option would require relocation and realignment of several lanes along Hawthorne Boulevard to accommodate the elevated structure columns, as well as new traffic signalizations at some intersections. However, there would be no reduction in the number of travel lanes. The roadway crossings are described below from north to south, and would include the following modifications:

- Inglewood Avenue, Manhattan Beach Boulevard, I-405 Hawthorne Boulevard on- and off-ramps, and 162nd Street: The roadways would cross under the light rail elevated structure. No modifications to the roadways are required.
- 164th Street: The intersection would be signalized. The existing southbound left turn lane would be shifted east and the northbound existing left-turn lane would be shifted west.
- 166th Street: The existing southbound left turn lane would be shifted east and the northbound existing left-turn lane would be shifted west.
- Midblock pedestrian crossing south of 167th Street: The roadway would cross under the light rail elevated structure. No modifications to the pedestrian crossing are required.
- 169th Street: The existing southbound left turn lane would be shifted east and the northbound existing left-turn lane would be shifted west.
- 171st Street: The roadway would cross under the light rail elevated structure. The southbound turn lane would be shifted east. No modifications to the pedestrian crossing are required.
- Redondo Beach Boulevard: Northbound and southbound left turn lanes would be slightly realigned to accommodate column placement.
- Artesia Boulevard: Southbound left turn lanes would be realigned between straddle-bent columns.
- New South Bay Galleria Station Mid-Block Crossing: New signalized mid-block crossings would be constructed approximately 360 feet south of Artesia Boulevard, at the south end of the station, to provide station access to either side of Hawthorne Boulevard. The southbound right turn pocket into the South Bay Galleria, which is also currently shared with a major bus stop serving multiple routes, would be replaced with a bus-only turnout, and a curb extension would be added at the crosswalk to improve safety, visibility, and reduce the pedestrian crossing distance.
- 177th Street: Northbound left turn lanes would be realigned, and the northbound left turn pocket would be reduced from two lanes to one longer lane.
- 179th Street: The intersection would be signalized, and new pedestrian crossing would be added. The existing left turn lane would be extended.
- 180th Street: The median would be closed at this location.
- 182nd Street: The roadway would cross under the light rail elevated structure. No modifications to the pedestrian crossing are required. The left turn lanes would be realigned.
- 186th Street: The northbound left turn lane would be realigned to the west.

> New median access south of 186th Street: Immediately south of 186th Street, an unsignalized southbound left turn would be provided to maintain access businesses on the east side of Hawthorne Boulevard.

Currently, street parking is available within the median of Hawthorne Boulevard from 162nd Street to 171st Street. The Hawthorne Option would locate columns within the median and reconfigure the parking spaces, with an overall reduction of approximately 20 spaces. The Hawthorne Option would not modify side street parking.

Figure 2.3-28. Hawthorne Option – Vertical Profile Diagram



Source: Cityworks Design, 2022

Note: South of 190th Street, the alignment is the same as the Proposed Project.

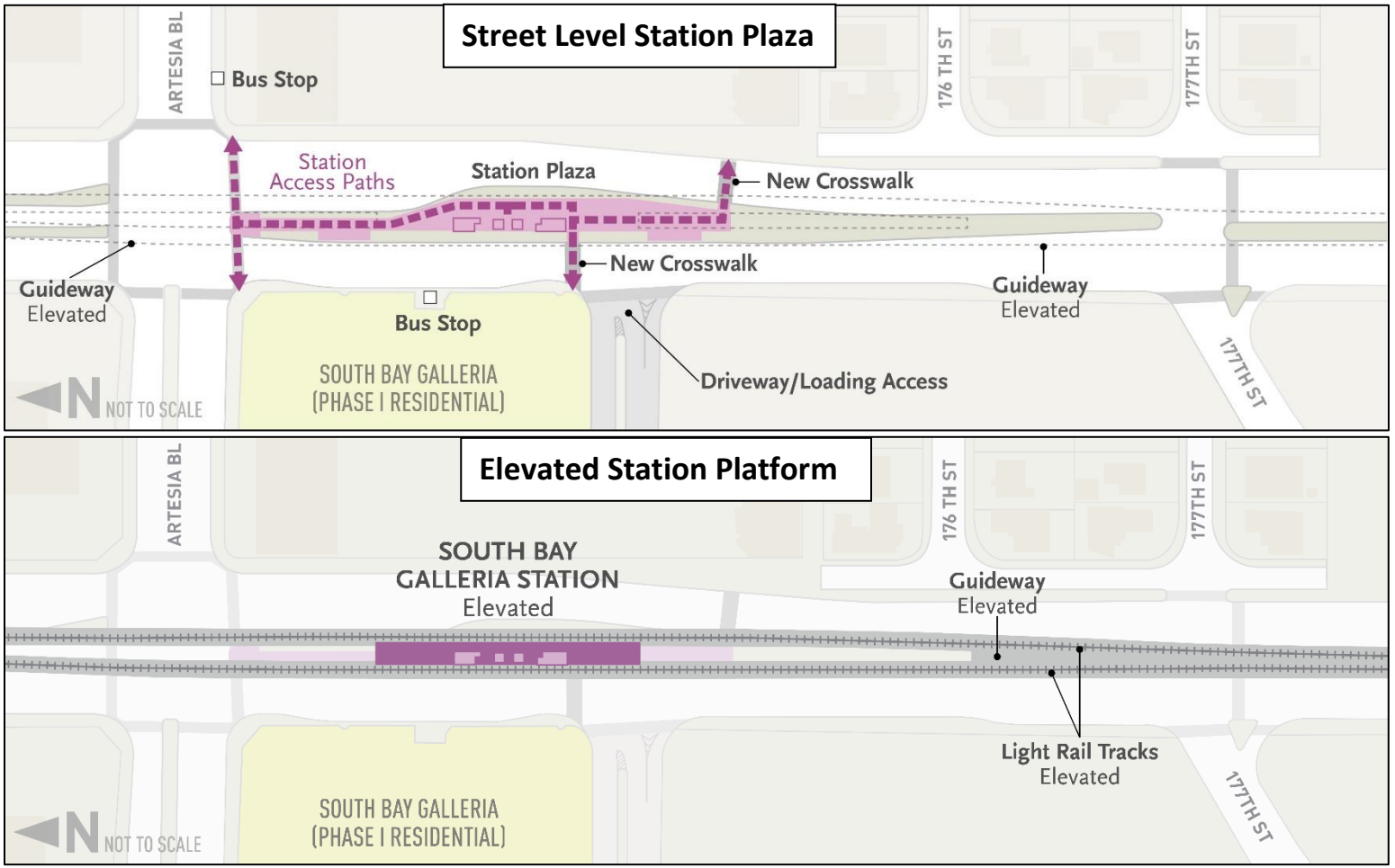
2.3-3.3 Station Sites

The Hawthorne Option station would follow the same design criteria and include the same elements as described in Section 2.3-1.4.

South Bay Galleria Station

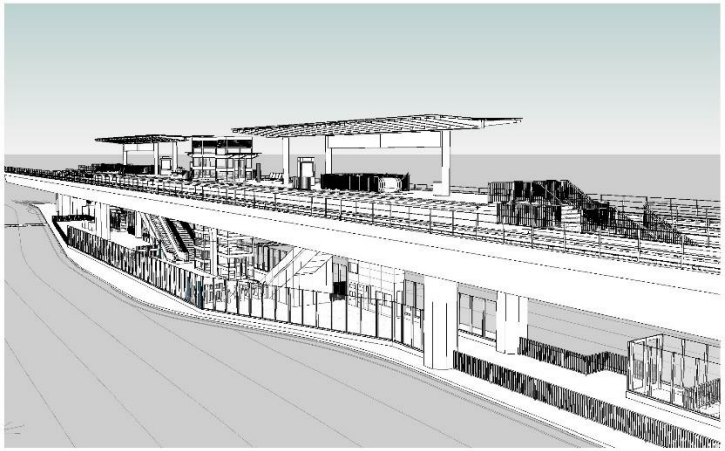
The Hawthorne Option includes a new two-level station to the east of the South Bay Galleria. The elevated station (shown in Figure 2.3-29 and Figure 2.3-30) would be located in the median of Hawthorne Boulevard between Artesia Boulevard and 177th Street, featuring a center platform on the second level. Light rail riders would descend via stairs/escalators or elevators to the street-level station plaza, which would be connected via pedestrian pathways to Artesia Boulevard at the north end and the new midblock crossings north of 177th Street at the south end.

Figure 2.3-29. Hawthorne Option – South Bay Galleria Proposed Station Layout

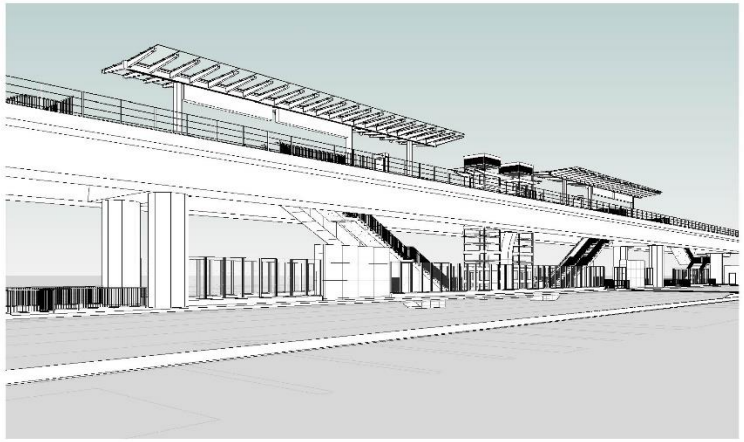


Source: Cityworks Design, 2022
Not to scale

Figure 2.3-30. Hawthorne Option – Renderings of Elevated South Bay Galleria Station

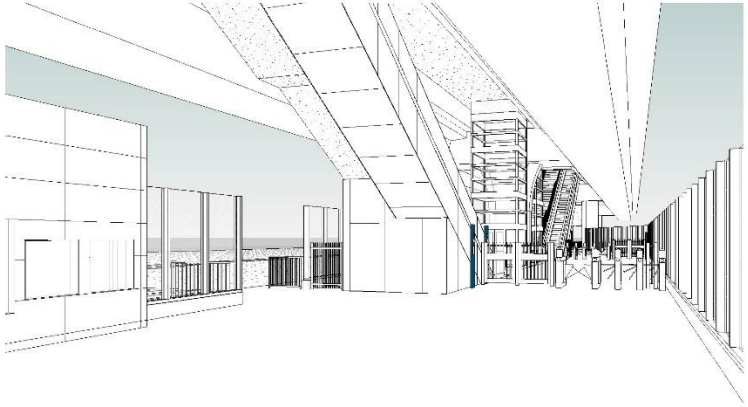


NE FACING - BIRD'S EYE VIEW



W FACING VIEW

S FACING - ENTRANCE AT ARTESIA BLVD



N FACING - STREET-LEVEL PLAZA

Source: STV, 2022

2.3-4 System Components and Ancillary Facilities

The following section describes the required system components for the Proposed Project and Options. The light rail system components would adhere to the Metro Rail Design Criteria and would use a similar design as existing Metro light rail lines.

2.3-4.1 Light Rail Guideways

At-grade light rail guideways would run at or close to the grade of the existing ground, with some variation in heights to accommodate changes in topography. The distance between the at-grade light rail track centerlines would be a minimum of 14 feet, and the distance between the nearest realigned freight track centerline and light rail track centerline would be a minimum of 18 feet. Figure 2.3-4 shows a typical cross-section of at-grade light rail tracks.

Elevated light rail guideways would be supported by structures including retained fill embankments, columns, or straddle bents. Retained fill guideways would be constructed where there is a transition between the at-grade and elevated guideway. They would be raised above the existing ground level on a platform made of reinforced walls. Typical elevated structures would be approximately 32 feet wide, with elevated structure columns placed in approximately 150-feet intervals. The permanent vertical clearances of the elevated structure over Hawthorne Boulevard would range from approximately 16 to 29 feet, depending on the location and falsework depth. For the transition areas described in Section 2.3-3.1, straddle bents would be needed, which consist of a pier structure that spans the functional limit of the roadway. Figure 2.3-27 shows a typical cross-section of elevated structure, and Figure 2.3-26 shows an example of a straddle bent.

Trench guideways would consist of the light rail tracks in an open trench, which varies in depth depending on site conditions and location of underground utilities. In the northern part of the Trench Option (between Inglewood Avenue and 166th Street), the trench would be deeper than the south end, approximately 30 to 40 feet below ground level (shown in Figure 2.3-16). Near 170th Street and 182nd Street, the trench would be shallower, approximately 20 feet. The trench guideways would be approximately 30 feet wide.

2.3-4.2 Light Rail Vehicles

It is assumed that existing Metro light rail vehicles would be used for this Project. For purposes of this analysis, the model P3010 light rail cars, manufactured by Kinkisharyo, are assumed. An example vehicle is shown in Figure 2.3-31. These vehicles are typically six-axle, double ended and articulated, and could be combined in trains up to three cars in length. The light rail would operate at speeds of up to 65 miles per hour and would carry approximately 70 seated passengers per car. The light rail vehicles would be configured with a driver's cab at either end so that the train could run in either direction without the need to turn around. An additional five light rail vehicles would need to be added to Metro's fleet to operate the Proposed Project.

Figure 2.3-31. Example Metro Light Rail Vehicle

Source: Kinkisharyo

2.3-4.3 Maintenance Facility

The Proposed Project would not include a new or modified maintenance facility. The light rail vehicles would be serviced, maintained, and stored at the existing Division 16 Southwestern Yard, located in El Segundo.

2.3-4.4 Ancillary and Support Facilities

Multiple additional elements are required to support light rail vehicle operations, including an overhead catenary system (OCS), traction power substations (TPSS), and communications and signaling buildings.

2.3-4.4.1 *OCS*

An OCS is a network of overhead wires that distributes electricity to light rail vehicles. The OCS poles would be approximately 25 feet tall with a base of approximately 15 inches, generally located between the two light rail tracks and spaced 90 to 170 feet apart. In some locations, the poles would be located on both sides of the tracks. Figure 2.3-32 shows an example of an OCS pole and wires.

Figure 2.3-32. Typical OCS

Source: STV, 2022

2.3-4.4.2 *Traction Power Substations*

TPSSs supply the electricity for light rail operations by receiving high voltage power from utility companies and converting the alternating current power to direct current for distribution to the light rail vehicles. The TPSSs are enclosed structures that would be spaced approximately one mile apart along the alignment and would require approximately 4,800 square feet of land. The siting and screening of TPSSs would follow principles of urban design. A representative example of a TPSS is shown in Figure 2.3-33. Between four and six TPSSs would be needed for the Proposed Project and Options, with several options available for some locations. Access would be provided to each via maintenance roadways from the nearest public street and shielded with landscaping where possible. Table 2.3-1 lists the locations that have been identified as possible TPSS sites, which are also shown in Figure 2.3-34.

Figure 2.3-33. Typical TPSS Facility

Source: STV, 2012

Table 2.3-1. TPSS Sites

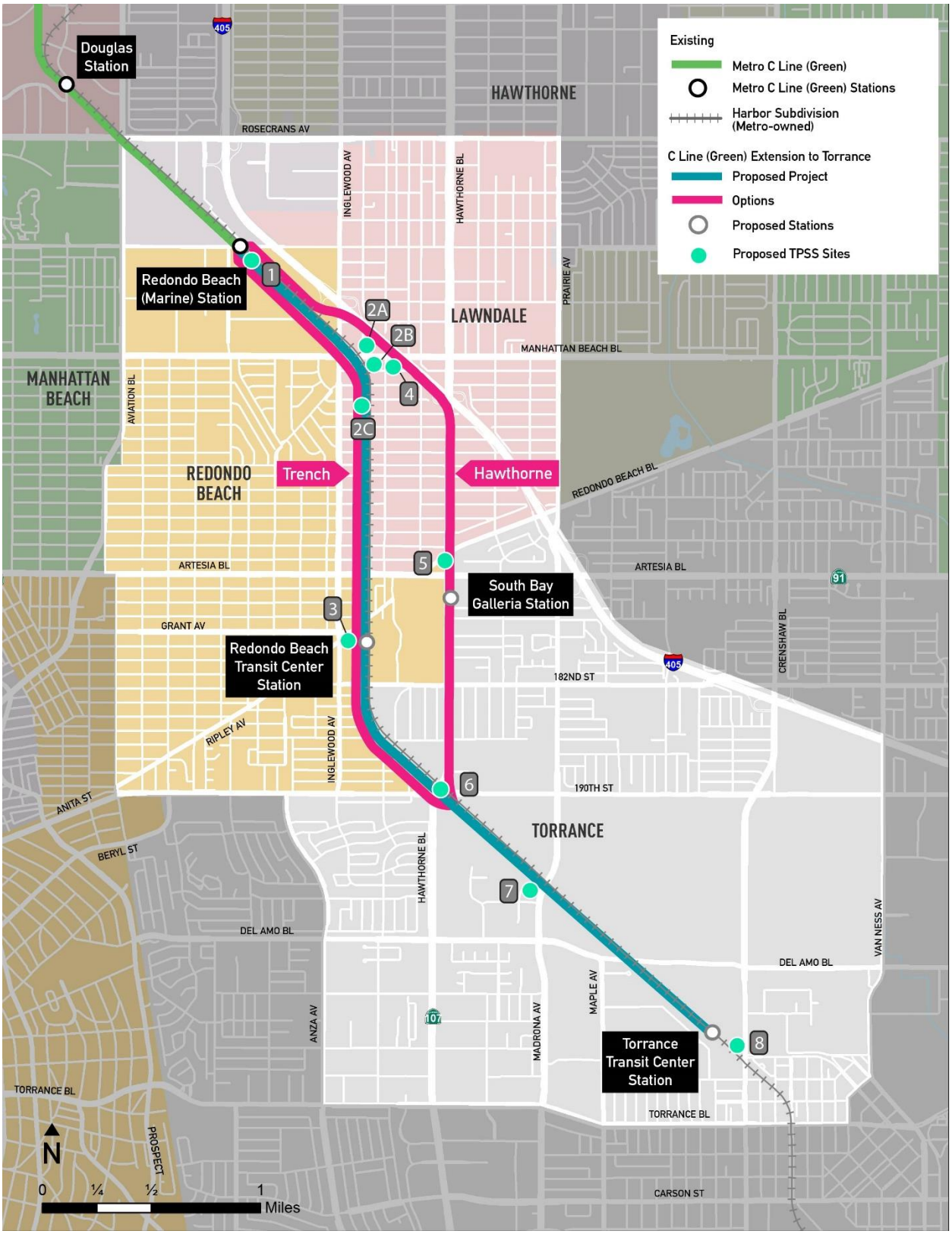
TPSS ID[1]	Applies to	Description
1	Proposed Project, Trench Option, Hawthorne Option	South of the Redondo Beach (Marine) Station within Metro ROW
2A	Trench Option	North of Manhattan Beach Boulevard, west of Condon Avenue within private property
2B	Proposed Project	Between Manhattan Beach Boulevard and 159th Street, west of the Metro ROW within private property
2C	Proposed Project, Trench Option	North of 162nd Street, within Metro ROW
3	Proposed Project, Trench Option	South of Grant Avenue, west of Metro ROW within private property
4	Hawthorne Option	South of Manhattan Beach Boulevard, west of I-405 within private property
5	Hawthorne Option	South of Redondo Beach Boulevard, west of Hawthorne Boulevard within private property
6	Proposed Project, Trench Option, Hawthorne Option	North of 190th Street, east of Hawthorne Boulevard, west of Metro ROW within private property
7	Proposed Project[2]	North of Prairie Avenue, west of Metro ROW within private property
8	Proposed Project[2]	West of Crenshaw Boulevard, east of Metro ROW within private property

Source: STV, 2022

[1]TPSS ID number corresponds with Figure 2.3-34.

[2]The Project Options end at 190th Street. South of 190th Street, there is only the Proposed Project.

Figure 2.3-34. TPSS Locations



Source: STV, 2022
Not to scale

2.3-4.4.3 *Communications and Signaling Buildings*

Communications and signaling buildings contain train control and communications equipment. They would be located at each station as well as at each at-grade crossing. These facilities are typically constructed as enclosures either underneath the station platforms or as small stand-alone structures along the guideway away from major pedestrian access. The communications buildings would require approximately 500 square feet area and signaling buildings would require approximately 100 square feet. Figure 2.3-35 shows an example of a train communications and signaling building.

Figure 2.3-35. Typical Train Communications and Signaling Building

Source: Metro, 2019

2.4 CONSTRUCTION SCENARIOS

Construction of the Proposed Project would employ conventional construction techniques and equipment typically used (and permitted) in Southern California for highway, bridge, utility, transit, and railroad projects. The following section summarizes the construction assumptions and requirements for the Proposed Project and Options. Appendix 2-B, Construction Methods Memorandum provides additional details, including durations of construction activities, approximate quantities of soil to be imported or exported, and detailed lists of construction equipment.

2.4-1 Construction Activities

Construction is anticipated to last approximately five to seven years, depending on the Proposed Project or Option. Construction would typically occur during daytime hours on weekdays, although some night construction may be required at times to avoid congested freeways and surface streets or due to the nature of certain construction processes, such as construction of freight track to avoid disruption to BNSF operations or construction of bridges over major arterials. Greater detail regarding construction schedule, equipment, and effort is included in Appendix 2-B, Construction Methods Memorandum. Key construction elements required to construct the Proposed Project and Options are summarized below, generally in the order in which they would occur.

- **Clearing and Demolition of Existing Structures** – The ground would be cleared of vegetation in an early stage of the construction work. In some locations, the demolition of existing structures (or parts thereof) would be required to shift the freight track and/or to install the light rail tracks, stations, and facilities. The debris generated from demolition would be recycled in part and disposed of in part.

- **Utility Relocations** – Construction would require some existing utilities to be protected in place or relocated. Utility relocation work would generally occur within the affected ROW and on adjacent and nearby streets. Affected utilities would include storm drains, sanitary sewers, power lines, gas pipelines, electrical duct banks, oil pipelines, electrical transmission lines, lighting, irrigation pipelines, water lines, fiber optic lines, telephone, and cable lines. Aboveground and underground utilities would be relocated or protected in place, if possible, to prevent damage or interruption of use of these facilities. Aboveground utilities, such as poles, would be relocated, or removed with the utility line relocated underground. Underground utilities would require soil excavation to varying depths, and disturbed ground would be backfilled with the same material or clean material.
- **Embankment Work** – The embankment that would support the new or relocated tracks and stations would require the removal of vegetation and debris, shaping and compacting the soil, importing, or exporting soil as needed to achieve the required embankment and compacting the soil and importing crushed rock base material to support the track and structure foundations.
- **Freight Track At-Grade Street Crossings** – The existing freight track at the at-grade crossings would be relocated to accommodate the new light rail tracks. The subgrade would first be constructed and then the new track would be installed. Temporary street and lane closures would be coordinated to ensure no two adjacent streets would be closed concurrently.
- **Bridges and Elevated Structures** –Bridges and elevated structures would be constructed by first installing piles and then the columns and piers that support the superstructure. The horizontal support of the elevated guideway would then be constructed, using cast-in-place concrete temporarily supported by falsework. Where new light rail bridges are adjacent to existing freight track bridges, a portion of the abutment/retaining walls would be demolished before construction of the new structure.
- **Trenches** – Trenches could be constructed with different methods depending on the trench depth. Shallow guideway trenches (in the southern segment near 170th and 182nd Streets) would likely be constructed by driving steel sheet piles and then excavating between them to construct a U-shaped reinforced concrete trench structure. Where necessary, ground replacement or improvement would be undertaken to strengthen the base of the trench, and any gaps between sheet pile and trench walls would be backfilled with self-compacting material. Deeper sections of trench (in the northern segment) would likely utilize drilled hole piles backfilled with concrete to form the trench walls, with alternating large and small secant piles. Existing soil would then be excavated to form the trench void and construction of the concrete base of the trench structure would follow. The deepest sections of trench would have supporting concrete strut beams installed near the tops of the walls. The top of the pile walls would be capped by a cast-in-place longitudinal reinforced concrete beam. All trench walls would be waterproofed and constructed with drainage systems behind the walls to adequately remove water and prevent the buildup of hydrostatic pressure, with sump pumps at the low points of the trench.
- **Retaining Walls** – Retaining walls would be constructed in different ways, depending on the location and wall type. Mechanically stabilized earth (MSE) walls are generally used in fill areas, and would be constructed by first building a “leveling pad” foundation, followed by placement of prefabricated concrete facing panels and steel geo-reinforcing straps as the wall is back-filled. When the walls have been built to the finished elevations, concrete caps would be placed over the top panels. Soldier pile or secant pile walls would be used in cut areas, and would be constructed by first drilling shafts, placing steel piles, and backfilling the holes. The area would be excavated from top-down, and then the cast-in-place concrete facing would be placed. Cast-in-place retaining walls may be used in some areas, which consist of first constructing the foundation, followed by cast-in-place

concrete walls. All walls would be constructed with drainage systems behind the walls to adequately remove water and prevent the buildup of hydrostatic pressure.

- **Stations** – The construction approach varies according to the proposed station location and layout. The Redondo Beach TC Station would be constructed following a similar sequence as described for trenches and retaining walls, with the walls constructed first, followed by the foundation and track bed and then construction of platforms. Platforms would involve cast-in-place concrete or pre-cast panels. The Hawthorne Option elevated South Bay Galleria Station would be constructed following a similar sequence as described above for elevated structures, with the foundations and columns constructed first, followed by the station platform which is typically constructed of cast-in-place concrete with falsework. The at-grade Torrance TC Station would involve cast-in-place concrete or pre-cast panels to construct the station platform with ramps and stairs. For all station types, the station operational equipment and furnishings (e.g., vertical circulation elements, lighting, seating, signage, artwork and fare vending equipment) would be added after the station platform is constructed.
- **Railroad/Light Rail Track** – Construction activities for at-grade light rail track would include preparation of the track bed and installation of the supporting base, followed by installation of the rails and ties. Rails would be flash-butt welded either on site or in a nearby staging yard. On-track regulators and tampers would be utilized to set and align the tracks, with grinders used to adjust the rail heads to match train wheel profiles. For elevated guideways, the light rail track would be installed via direct fixation (i.e., rail fastened directly to a bridge superstructure). Construction activities for the relocated BNSF tracks would be coordinated with BNSF.
- **Systems Construction** – This would include the installation of wayside signals, crossing warning signals, conduits, control houses, the OCS, and TPSSs. The OCS construction would start with the foundations for the OCS poles, followed by duct banks and conduit for the electrical feeder lines from the TPSS, and then the OCS poles. TPSS construction would involve first grading the site, and then installing the TPSS structure and connecting it to the utilities. Signal houses are typically prefabricated metal-clad buildings, which are placed upon a concrete foundation.

The Proposed Project and Options would require acquisitions (full or partial) and easements (temporary or permanent) of nearby properties during construction and operation. North of 190th Street, the Proposed Project and Trench Option would have limited property acquisitions, with some acquisitions required only for the TPPSs. The Hawthorne Option would require property acquisitions for the elevated structure in some areas, as well as for TPSSs. South of 190th Street, the Proposed Project would require property acquisitions to build the light rail tracks and accommodate multiple relocated or new freight tracks, storage tracks, spurs, and access roads. For any properties that may have existing contamination at the site, Metro would conduct a Phase II site investigation and conduct remediation as needed, which is described in further detail in Section 3.9, Hazards and Hazardous Materials.

2.4-2 Construction Equipment

The construction equipment that would be used for the Proposed Project is typical of that found engaged in contemporary highway, building, bridge and utility work plus some specialized railroad track and OCS construction equipment. All equipment would conform to current applicable safety and environmental regulations. The general construction equipment (subject to final selection by the contractor) could include the following:

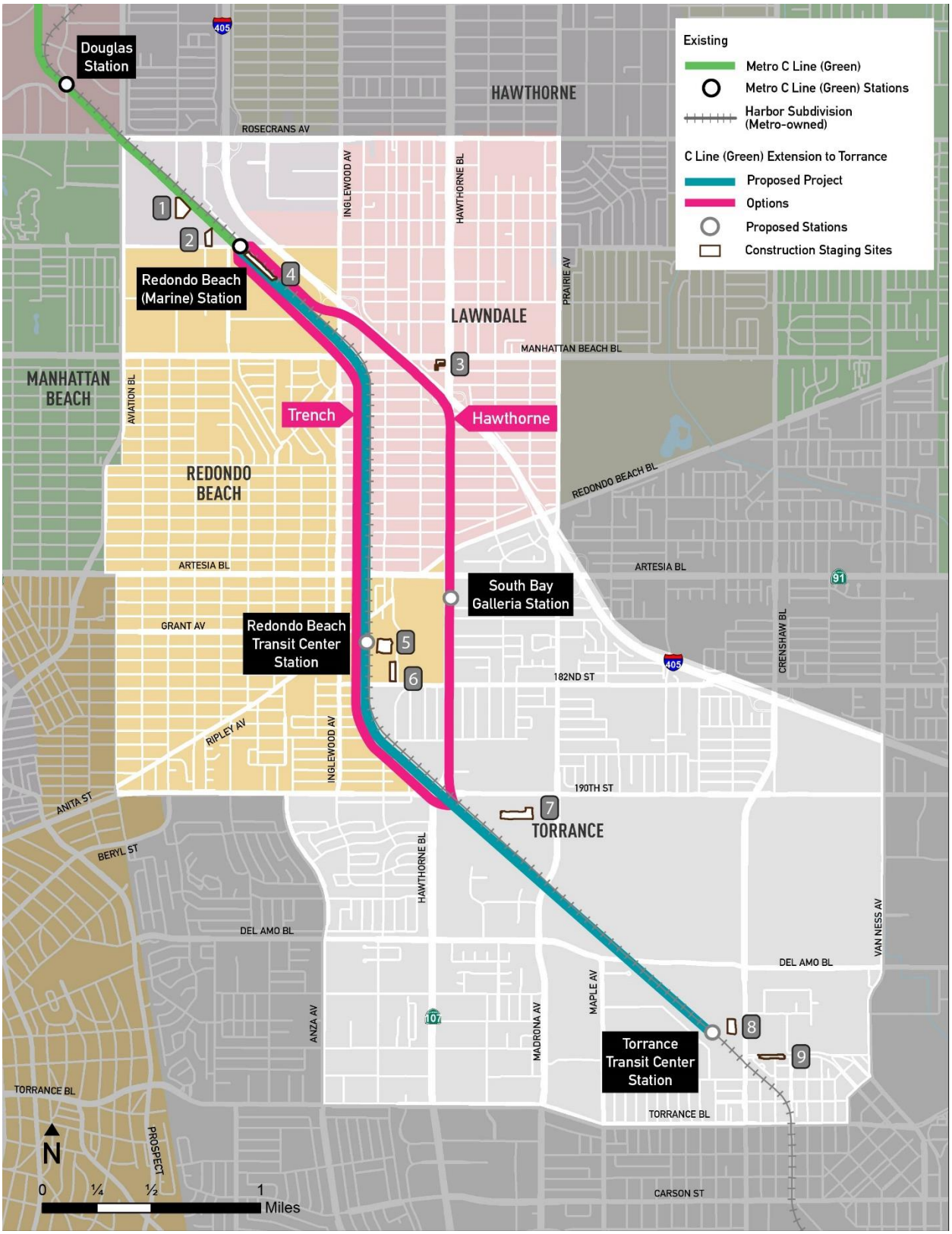
- Aerial Lifts
- Air Compressors
- Bore/Drill Rigs
- Cement and Mortar Mixers

- Concrete/Industrial Saws
- Cranes
- Crawler Tractors
- Crushing/Processing Equipment
- Dumpers/Tenders
- Excavators
- Forklifts & Rough Terrain Forklifts
- Generator Sets
- Graders
- Pavers & Paving Equipment
- Plate Compactors
- Pressure Washers
- Pumps
- Rollers
- Rubber Tired Dozers
- Rubber Tired & Skid Steer Loaders
- Signal Boards
- Surfacing Equipment
- Sweepers/Scrubbers
- Tractors/Loaders/Backhoes
- Trenchers
- Welders
- Support vehicles, including employee personal transportation, fuel delivery trucks, mechanics' trucks and utility trucks used by supervisors and inspector

Appendix 2-B, Construction Methods Memorandum, provides additional details, including equipment to be used for each construction activity.

The Proposed Project would also include potential off-site locations for temporary use during construction for laydown of tools, materials, equipment, and vehicles. A map of the potential locations is shown in Figure 2.4-1, and images of each site are included in Figure 2.4-2 and Figure 2.4-3.

Figure 2.4-1. Construction Staging Sites



Source: STV, 2022
Site numbers correspond with Figures 2.4-2 and 2.4-3.

Figure 2.4-2. Construction Staging Locations: Sites 1-6

Source: STV, 2022

Figure 2.4-3. Construction Staging Locations: Sites 7-9

Source: STV, 2022

2.4-3 Construction Durations

Table 2.4-1, Table 2.4-2, and Table 2.4-3 show the approximate construction schedules, as well as amount of soil that would be moved per phase for the Proposed Project and Options. Appendix 2-B, Construction Methods Memorandum provides additional details on durations of construction activities.

Table 2.4-1. Proposed Project – Construction Schedule

Phase Name	Total Duration	Activity Frequency (days/week)	Maximum Soil Import/ Export	Approx. Maximum Daily Truck Loads
Early Utility Relocation	18 months	5	12,400 CY	2
Project Start Up	6 months	5	121,000 CY	101
Utility Relocation	15 months	5	3,100 CY	2
Retaining Walls, Grading and Embankment for Freight Track Relocation	12 months	5	112,100 CY	60
Freight Track Bridges	10 months	5	1,000 CY	1
Freight Railroad At-Grade Crossings	4 months	5	4,200 CY	2
Freight Trackwork (By BNSF)	4 months	5	72,400 CY	21
Stations and Access	18 months	5	11,000 CY	1
Retaining Walls, Grading and Embankment for LRT Guideway	8 months	5	72,400 CY	7
LRT Guideway Bridges	25 months	5	66,500 CY	6
LRT Trackwork	15 months	5	80,000 CY	21
Systems Construction	12 months	5	-	-
Contingency	11 months	-	-	-
Testing/Commissioning	9 months	5	-	-
Revenue Service	-	-	-	-

CY = cubic yard; LRT = light rail

Table 2.4-2. Trench Option – Construction Schedule

Phase Name	Total Duration	Activity Frequency (days/week)	Maximum Soil Import/ Export	Approx. Maximum Daily Truck Loads
Early Utility Relocation	18 months	5	13,600 CY	2
Project Start Up	6 months	5	49,800 CY	35
Utility Relocation	15 months	5	3,400 CY	2
Retaining Walls, Grading and Embankment for Freight Track Relocation	18 months	5	105,500 CY	54
Freight Track Bridges	8 months	5	14,000 CY	2
Freight Railroad At-Grade Crossings	4 months	5	4,200 CY	4
Freight Trackwork (By BNSF)	25 months	5	71,100 CY	21
Stations and Access	20 months	5	15,100 CY	1
Retaining Walls, Grading and Embankment for LRT Guideway	8 months	5	155,800 CY	110
LRT Guideway Bridges	32 months	5	22,900 CY	4
LRT Guideway Trench	36 months	5	277,700 CY	200
LRT Trackwork	15 months	5	80,000 CY	21
Systems Construction	12 months	5	-	-
Contingency	15 months	-	-	-
Testing/Commissioning	9 months	5	-	-
Revenue Service	-	-	-	-

CY = cubic yard; LRT = light rail

Table 2.4-3. Hawthorne Option- Construction Schedule

Phase Name	Total Duration	Activity Frequency (days/week)	Maximum Soil Import/ Export	Approx. Maximum Daily Truck Loads
Early Utility Relocation	18 months	5	8,000 CY	1
Project Start Up	6 months	5	87,100 CY	73
Utility Relocation	15 months	5	2,000 CY	1
Retaining Walls, Grading and Embankment for Freight Track Relocation	6 months	5	68,400 CY	35
Freight Trackwork (By BNSF)	8 months	5	29,700 CY	21
Stations and Access	22 months	5	7,800 CY	1
Retaining Walls, Grading and Embankment for LRT Guideway	8 months	5	2,000 CY	1
LRT Guideway Bridges	35 months	5	278,700 CY	27
LRT Trackwork	14 months	5	81,000 CY	21
Systems Construction	12 months	5	-	-
Contingency	11 months	-	-	-
Testing/Commissioning	9 months	5	-	-
Revenue Service	-	-	-	-

CY = cubic yard; LRT = light rail

2.5 PROJECT FEATURES

As a part of the Proposed Project and Options, several project features would be implemented during construction or operations, which would ensure compliance with the laws, guidelines, and best practices of regulatory agencies. These project features consist of design features, best management practices, and other measures that would be required by law and/or permit approvals by federal, state, regional or local agencies or that demonstrate best practices in transit construction and operation.

The project features are listed below. They are described further in each respective section within Chapter 3, as well as in Appendix 2-C, Project Features.

> Transportation

- PF-T-1. Construction Traffic Management Plan

> Aesthetics

- PF-AES-1. Local Zoning Ordinances
- PF-AES-2. Metro Design Standards

> Air Quality

- PF-AQ-1. Metro Green Construction Policy Compliance
- PF-AQ-2. SCAQMD Rule 403 Compliance
- PF-AQ-3. Metro 2020 Moving Beyond Sustainability Strategic Plan Compliance
- PF-AQ-4. Metro Rail Design Guidelines

> Noise and Vibration (subject to future agency approval)

- PF-NV-1. Quiet Zone Equipment Installation
- PF-NV-2. Crossing Signal Bell Shrouds
- PF-NV-3. Gate-Down-Bell-Stop Variance

> Geology and Soils

- PF-GEO-1. Metro Geotechnical Design Standards

> Hazards and Hazardous Materials

- PF-HHM-1. Handling, Storage, and Transport of Hazardous Materials and Wastes
- PF-HHM-2. Demolition Plans
- PF-HHM-3. Property Acquisition Phase II Site Investigation
- PF-HHM-4. Soil, Soil Vapor, and Groundwater Management Plans
- PF-HHM-5. Disposal of Groundwater

> Hydrology and Water Quality

- PF-HWQ-1. SWPPP Implementation per Construction General Permit and MS4 Permit
- PF-HWQ-2. Groundwater Treatment and Discharge per RWQCB Waste Discharge Requirements for Construction Dewatering

- PF-HWQ-3. Trench Construction Groundwater Pressure Control
- PF-HWQ-4. Trench Construction Runoff Collection and Treatment
- PF-HWQ-5: Temporary Storm Drain Inflow Rerouting
- PF-HWQ-6. LID BMPs per Regional Requirements
- PF-HWQ-7. Trench Option Runoff Collection and Treatment
- PF-HWQ-8. City of Torrance Flood Zone Requirements

> Utilities and Service Systems

- PF-US-1. Utility identification and Coordination
- PF-US-2. Service Interruption Notification

2.6 PERMITS AND APPROVALS

This Draft EIR may be used in connection with permits and other discretionary approvals necessary for construction implementation of the Proposed Project. Construction and implementation of the Proposed Project would require permits and approvals from responsible agencies such as the City of Lawndale, City of Redondo Beach, and the City of Torrance, and other departments and owners with jurisdiction over impacted resources. The anticipated permits and approvals required for the Proposed Project are listed in Table 2.6-1.

Table 2.6-1. Permits and Approvals

Agency/Jurisdiction		Permit/Approval Required
State	California Department of Transportation	Permit approvals for encroachment on Caltrans ROW (I-405 and Hawthorne Boulevard for Hawthorne Option, Artesia Boulevard and Hawthorne Boulevard bridges for Proposed Project and Trench Option)
	State Department of Toxic Substances Control	Hazardous materials cleanup
	State Water Resources Control Board	Construction General Permit and SWPPP
		NPDES Dewatering Permit
		LA County MS4 NPDES Package
	California Public Utilities Commission	Grade separations, crossings, state safety oversight
	California Department of Fish and Wildlife	Consultation on protected species
Regional	Metro Board	Certification of the Final EIR, adoption of CEQA Findings, a Statement of Overriding Considerations, and Mitigation Monitoring and Reporting Program, and approval of the Project
	Regional Water Quality Control Board	Construction General Permit and SWPPP
	Southern California Edison	Permits for utility relocation
	LA County Department of Public Works	Permits for utility relocation
	LA County Fire Department	Discretionary actions
	BNSF Railroad	Approval of track relocations
Local	City of Lawndale City of Redondo Beach City of Torrance	Permits (traffic, street use, lighting, landscape, building demolition)
	Redondo Beach Fire Department Torrance Fire Department	Discretionary actions