Los Angeles County
Metropolitan Transportation Authority

East San Fernando Valley Shared Right-of-Way Study

Final Report

March 2025

Metro®

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1 INTRODUCTION

1.1 PROJECT BACKGROUND AND OVERVIEW

The Supplemental Analysis for the Sylmar/San Fernando to Van Nuys Boulevard Shared Railroad Right-of-Way study (Shared ROW Study or this Study) examines the impacts of the northern segment of the East San Fernando Valley Transit Corridor Project (ESFVTC Project) in a shared ROW corridor between Metro and the Metrolink Antelope Valley Line (AVL) ROW in the San Fernando Valley. The shared ROW corridor extends northwest from the intersection of Van Nuys Boulevard and San Fernando Road, 2.5-miles to the Sylmar/San Fernando Metrolink Station. The corridor passes through the neighborhoods of Pacoima and Sylmar in the City of Los Angeles, as well as the City of San Fernando.

Metro owns the ROW along the shared ROW corridor which currently features a single track for the Metrolink AVL and Union Pacific Railroad (UPRR). There has been renewed interest in adding a second Metrolink track for shared commuter/freight service along this corridor as part of the Brighton to Roxford double-track project. The Brighton to Roxford project was environmentally cleared under a California Environmental Quality Act (CEQA) exemption in May 2020. The Final Environmental Impact Report (FEIR) of the ESFVTC Project was certified by the Metro Board in December 2020. The Locally Preferred Alternative (LPA) of the ESFVTC Project included two Light Rail Transit (LRT) tracks and a single track for Metrolink/freight trains along the shared corridor (see the “Northern Segment” in Figure 1-1).

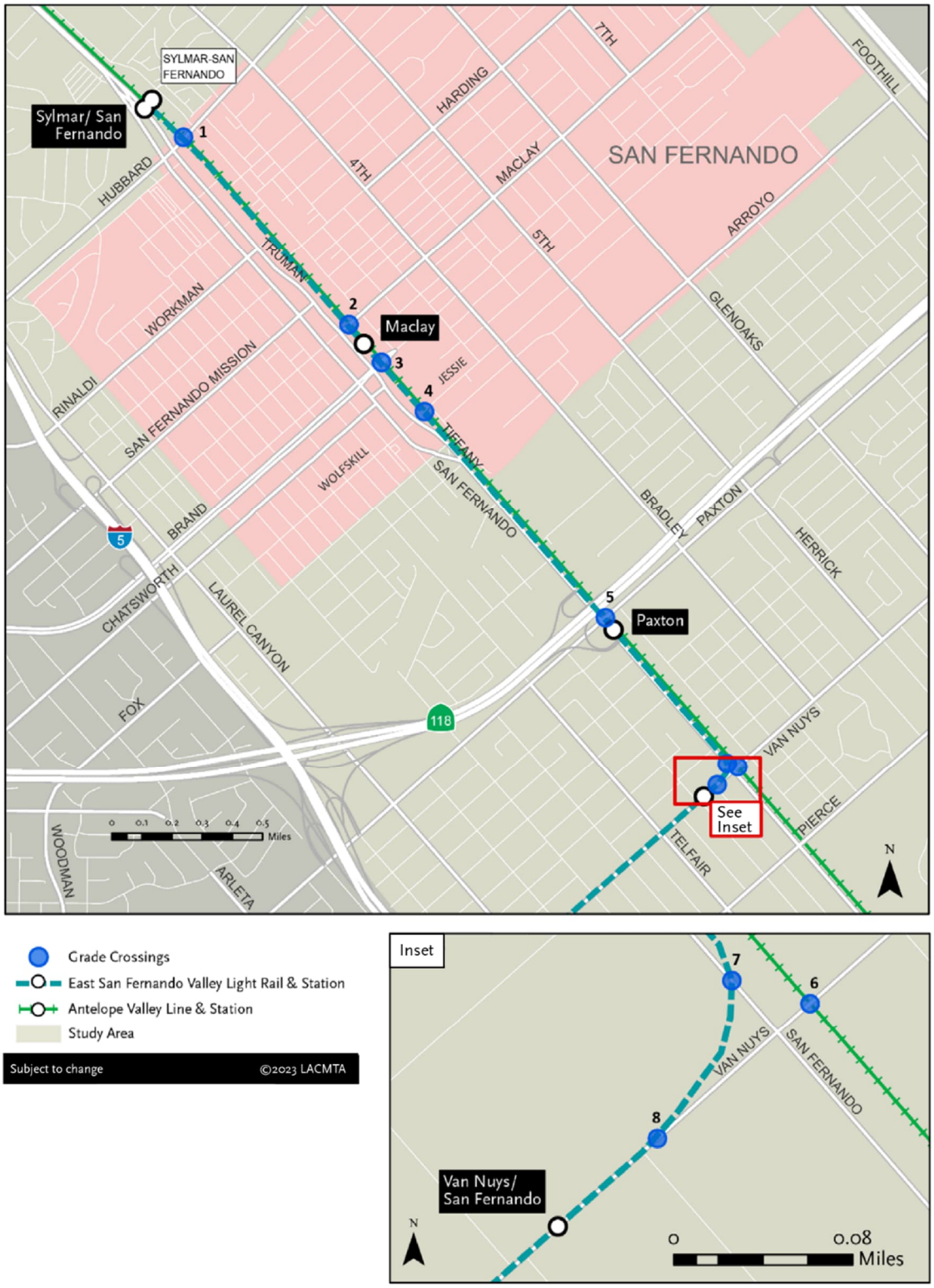
The Southern California Regional Rail Authority (SCRRA)/Metrolink and the City of San Fernando provided comments on the ESFVTC FEIS/FEIR expressing concerns about the unique safety and traffic-related challenges posed by a three track at-grade configuration at the six grade crossings with a potential fourth track when the Brighton to Roxford double-tracking is constructed. In March 2021, the Metro Board instructed staff to move forward with the southern segment of the ESFV LRT as the Initial Operating Segment (IOS) and to separately study the shared ROW portion of the LRT alignment to address comments and concerns from stakeholders. The scope of this Study includes defining and analyzing three Scenarios and recommending a preferred Scenario.

As part of this supplemental study, the six existing grade crossings are shown as crossing numbers 1 through 6 in Figure 1-2. Crossing numbers 7 and 8 comprise part of the ESFVTC Project, fronting the segment where the LRT could turn from Van Nuys Boulevard onto San Fernando Road.

For simplicity in this final report, the railroad ROW/San Fernando Road/Truman Street corridors will be described as running in a north-south direction and cross streets in the east-west direction.

Figure 1-1: ESFVTC Northern and Southern Segments

Figure 1-2: Grade Crossing Locations



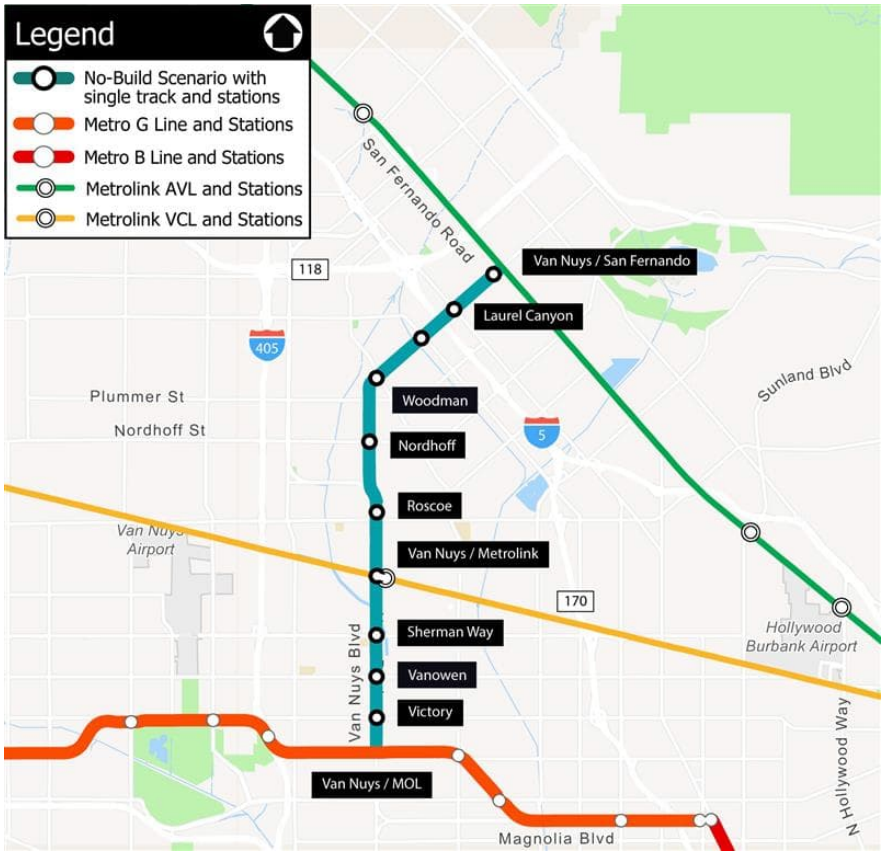
Source: Mott MacDonald, 2024

1.2 STUDY SCENARIOS

The main purpose of this Study is to evaluate the following scenarios and recommend the preferred scenario:

No-Build Scenario: In this scenario, the ESFVTC Project would terminate at the intersection of Van Nuys Boulevard and San Fernando Road, with no extension to the Metrolink Sylmar/San Fernando Station. As a result, there would be no rail connection or ESFV LRT tracks along the shared ROW from Van Nuys Boulevard to the Metrolink Sylmar/San Fernando Station. The No-Build Scenario also assumes existing conditions along the shared corridor with the single track. Additionally, there would be no new Metrolink infill station at the intersection of Van Nuys Boulevard and San Fernando Road (see Figure 1-3).

Figure 1-3: No-Build Scenario



Source: Mott MacDonald, 2024

Scenario 1 Full-Build LRT: A quadruple (4) track from Van Nuys Boulevard to the Metrolink Sylmar/San Fernando Station within the shared ROW comprised of two ESFV LRT tracks and two AVL/UPRR tracks (see Figure 1-4). It is anticipated that the Metrolink double-tracking project would proceed, resulting in the two aforementioned mainline AVL/UPRR tracks along the shared corridor. Three new LRT stations Paxton, Maclay, and Metrolink Sylmar/San Fernando Station would be added. The existing Metrolink Sylmar/San Fernando Station would

be reconfigured to connect to the new LRT station and accommodate the Metrolink double-tracking project.

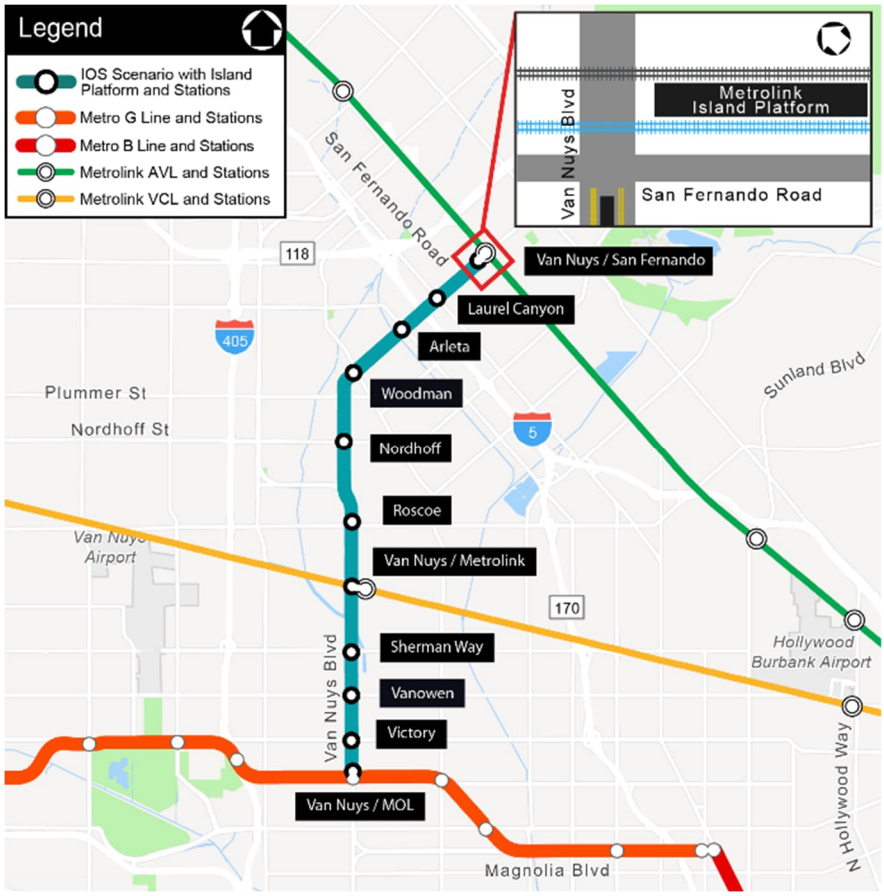
Figure 1-4: Scenario 1 Full-Build LRT

Source: Mott MacDonald, 2024

Grade crossing and safety analyses were conducted for Scenario 1 Full-Build LRT along the study corridor using the Metro Grade Crossing and Safety Policy for Light Rail Transit (Metro Policy). Based on the results of the analyses, the Full-Build LRT scenario was further developed into a Partial Grade Separation option (1a) and a Full Grade Separation option (1b), representing two different grade configurations of the two LRT tracks. Please see Section 3: Scenario Refinement and Conceptual Design for more details.

Scenario 2a ESFV IOS Metrolink Station, Island Platform: A new Metrolink station at the Van Nuys Boulevard/San Fernando Road intersection would be constructed, assuming completion of SCRRA double track between Van Nuys Boulevard and Metrolink Sylmar/San Fernando Station to support increased train frequencies on the Metrolink AVL. The new infill Metrolink station will feature an island platform. The design of the second track will minimize impacts on the existing single track (see Figure 1-5). Turnback tracks would be added at the Metrolink Sylmar/San Fernando Station to provide operational flexibility for the Metrolink AVL.

Figure 1-5: Scenario 2a ESFV IOS Metrolink Station, Island Platform



Source: Mott MacDonald, 2024

Scenario 2b ESFV IOS Metrolink Station, Side Platforms: A new Metrolink station at the Van Nuys Boulevard/San Fernando Road intersection would be constructed, assuming completion of SCRRA double track between Van Nuys Boulevard and Metrolink Sylmar/San Fernando Station to support increased train frequencies on the Metrolink AVL. The new infill Metrolink station will feature two side platforms. The existing track will be adjusted in the design to accommodate a second track and leave room for potential future use (see Figure 1-6). Turnback tracks would be added at the Metrolink Sylmar/San Fernando Station to provide operational flexibility for the Metrolink AVL.

Figure 1-6: Scenario 2b ESFV IOS Metrolink Station, Side Platforms

Source: Mott MacDonald, 2024

Table 1-1 summarizes the main operational characteristics of the study scenarios. Note that all scenarios assume “year 2040” as the horizon year to be consistent with the environmental clearance phase of the ESFVTC project. In all scenarios, the Metrolink AVL would operate with a 30-minute headway in both directions throughout the day as defined under the SCORE program. The ESFV LRT would operate with a 6-minute headway in both directions during the peak period (6-9 AM and 3-7 PM). The headway would be 12 minutes in both directions during the off-peak period (4-6 AM, 9 AM to 3 PM, 7 PM to 1 AM). Under the Full-Build LRT scenarios, there would be a total of 25 trains including one UPRR/freight train, four AVL Metrolink trains, and 20 LRT trains passing through the shared ROW corridor in both directions per hour. In the No-Build and ESFV IOS scenarios, there would be four AVL trains but no LRT trains running through the shared ROW corridor.

Table 1-1: Study Scenario Characteristics Summary

Scenario	AVL Infill Station at Van Nuys/San Fernando	ESFV LRT	Number of tracks	Headway in Minutes (Peak Period/Off-Peak Period)	
				AVL	ESFV LRT
No-Build	No	Southern Segment	1	23/90* 77	6/12
1a	No	Southern Segment + Northern Segment	4	30/30	6/12
1b	No	Southern Segment + Northern Segment	4	30/30	6/12
2a	Yes	Southern Segment	2	30/30	6/12
2b	Yes	Southern Segment	2	30/30	6/12

*The No-Build Scenario assumes 23-minute headways in the peak period direction, 90-minute headways in the peak period reverse direction, and 77-minute headways in the off-peak periods. This frequency definition was used for all the study scenarios under the environmental clearance phase of the ESFVTC project.

2 GRADE CROSSING ANALYSIS

Grade crossing analysis was conducted for the Full-Build LRT Scenario to help determine the need for grade separations at each crossing in the Shared ROW corridor. The Metro grade crossing analysis criteria are defined in the *Metro Grade Crossing Safety Policy (Metro Policy)*. The Metro policy has been applied to several existing Metro LRT lines including the environmental clearance phase of the ESFVTC project. It includes three sequential phases:

- Milestone 1 – Initial Screening
- Milestone 2 – Detailed Analysis
- Milestone 3 – Verification

2.1 MILESTONE 1 ANALYSIS

Milestone 1 Analysis is a preliminary assessment based upon roadway volumes and train frequencies leading to an initial categorization of roadway crossings into three groups: At-Grade Should be Feasible, Possible At-Grade Operation, and Grade Separation Usually Required. Table 2-1 summarizes the Milestone 1 Analysis using the highest determination (between AM and PM peak hours) for the Full-Build LRT Scenario. Five of the eight crossings fall in categories where grade separation might be needed. The Paxton Street crossing falls in the category of Grade Separation Usually Required.

Table 2-1: Milestone 1 Preliminary Results Using Highest Determination

No	Grade Crossing Location	Preliminary Results
1	Hubbard Avenue	Possible At-Grade Operation
2	Maclay Avenue	Possible At-Grade Operation
3	Brand Boulevard	At-Grade Operation Feasible
4	Jessie/Wolfskill Street	Possible At-Grade Operation
5	Paxton Street	Grade Separation Usually Required
6	Van Nuys Boulevard	At-Grade Operation Feasible
7	San Fernando Road (LRT)	Possible At-Grade Operation
8	Van Nuys Boulevard (LRT)	Possible At-Grade Operation

Note: Determinations represent the higher determination made between AM and PM peak hours.

2.2 MILESTONE 2 AND 3 ANALYSES

The most critical component of Milestone 2 of the Metro Policy that applies to this Study is a detailed operational check of roadway traffic in conjunction with an assessment of potential impacts on rail operations due to priority control. The traffic operations check determines whether operational factors would result in unacceptable traffic impacts due to the at-grade crossings.

The ESFV LRT line will run under cab signal control, which is similar to the existing control provided for Metrolink and UPRR, supplemented by automatic train protection (ATP) and automatic train stop (ATS) systems. Metro's rail operations group confirmed that the ESFV LRT line would require pre-emption of traffic signals within the influence zone, which is the same as Metrolink and UPRR. Therefore, train operations would be sufficient for all study scenarios.

Milestone 3 of the Metro Policy includes refining projected traffic volumes and validating traffic and rail operations using simulation modeling. The traffic analysis for this study was conducted using PTV's VISSIM software (Version 2022, Service Pack 11), a micro-simulation tool that is capable of capturing the gate-down activities at the crossings in calculating delays and queuing of the vehicular movements. Three measurements were used in evaluating the traffic operational conditions at the grade crossings and the nearby signalized intersections:

- **Intersection Level-of-Servces (LOS):** LOS values are a qualitative letter-grade-based rating measured in seconds per vehicle. LOS values range from a LOS value of A, for free-flow or excellent conditions to a LOS value of F, for roadways or intersections that are overloaded or operating above capacity. For intersections, the LOS is based upon the amount of control delay, measured in seconds per vehicle, a motor vehicle experiences due to traffic congestion and conflicts while traversing through an intersection.
- **Gate Spillback Queues**: a gate spillback queue is the queue of vehicles stopped at the grade crossing building along the cross street towards the adjacent intersection (see Figure 2-1).

Figure 2-1: Gate Spillback Queue at the Hubbard Avenue Crossing toward First Street (Looking West)

- **Influence Zone Queues:** the influence zone queue is the vehicular queue that builds from an adjacent downstream signalized intersection along the cross street towards the grade crossing (see Figure 2-2).

Figure 2-2: Influence Zone Queue at the Intersection of Hubbard Avenue and Truman Street

The analysis results shown in Table 2-2 lead to the conclusion that the pre-emption and gate down time would result in an unacceptable impact on progressive traffic flows along the cross streets of Hubbard Avenue, Maclay Avenue, Paxton Street, and Van Nuys Boulevard. Although the crossings at Paxton Street and Van Nuys Boulevard have sufficient Clear Storage Distance (CSD) for the 95th percentile influence zone queuing length, the excessive gate down times during the peak hours cause long gate spillback queues. The vehicles approaching the downstream intersections would often be blocked by the gates and traffic stagnation would lead to fewer vehicles being able to queue up at the downstream intersections.

The far-right column in Table 2-2 compares the vehicle traffic volume demands that intend to approach the downstream intersections and the traffic volumes that would be able to progress on the loaded cross streets. The percentage of loaded volumes to the demand volumes ranges from 42 percent at the two intersections on Van Nuys Boulevard to 85 percent at the two intersections on Wolfskill/Jessie Street. Overall, the traffic volumes that would be able to progress through the cross street are even less than 70 percent of the observed traffic volumes under the existing conditions.

Table 2-2: Traffic Operations Check, Future (2040) Scenario 1 Full-Build LRT

Crossing	Controlling Intersections LOS Values	Sufficient CSD* for 95th Percentile Influence Zone Queuing Length?	Sufficient Upstream Signal Spacing for 95th Percentile Gate Spillback Queuing Length?	Percentage of Loaded Volumes to Demand Volumes
Hubbard Avenue	F	No	No	46%
Maclay Avenue	F	No	No	47%
Brand Boulevard	D to F**	Yes	No	79%
Wolfskill /Jessie Street	D to F***	Yes	No	85%
Paxton Street	F	Yes	No	44%
Van Nuys Boulevard	F	Yes	No	42%

Note*: CSD = Clear Storage Distance
Note**: the intersection of Brand Boulevard and First Street would operate at LOS D during AM peak hour and LOS E during the PM peak hour; the intersection of Brand Boulevard and Truman Street would operate at LOS E during AM peak hour and LOS F during the PM peak hour
Note***: the intersection of Jessie/Wolfskill Street and First Street would operate at LOS E during the AM peak hour and LOS F during the PM peak hour; the intersection of Jessie/Wolfskill Street and Truman Street would operate at LOS D during the AM and PM peak hours

Although the Brand Boulevard crossing and Wolfskill/Jessie Street crossing are estimated to perform relatively better than the other four crossings, the need for grade separation at these two crossings is highly tied to the determination of the Maclay Avenue crossing and the proximity among these three crossings. An alternative option would be to close the crossings at Brand Boulevard and Wolfskill/Jessie Street. However, the additional volumes caused by the forced detour would further deteriorate the traffic operational conditions on Paxton Street and Maclay Avenue. Therefore, it is concluded that it is not feasible to close the Wolfskill/Jessie Street crossing.

3 SCENARIO REFINEMENT AND CONCEPTUAL DESIGN

3.1 SCENARIO FULL-BUILD LRT REFINEMENT

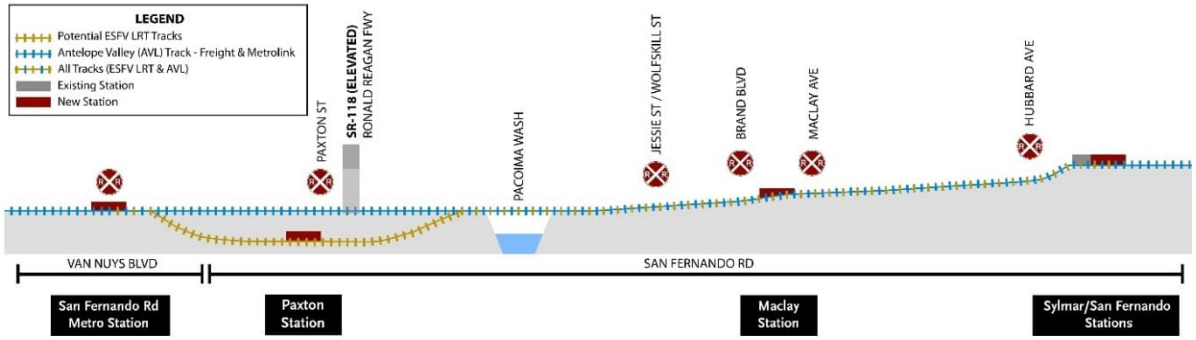
Under the Full-Build LRT Scenario, the two sets of ESFV LRT tracks would be located on the western side of the two sets of AVL/UPRR tracks (see Figure 3-1). Three new LRT stations would be added as planned under the environmental phase: Paxton, Maclay, and the Metrolink Sylmar/San Fernando Stations.

Figure 3-1: Schematic Alignment of Scenario 1 Full-Build LRT

Based on the grade crossing analysis results, two variations for the Full-Build LRT Scenario were proposed for further engineering feasibility analysis and performance assessment creating the refinement of Scenario 1a and Scenario 1b:

- **1a. Full-Build LRT, Partial Grade Separation:** the LRT tracks would only be grade-separated at the Paxton Street crossing and remain at-grade at the remaining five crossings. The AVL/UPRR tracks would remain at-grade at all six crossings (see Figure 3-2). The Paxton Street crossing is the only one that is determined to be "Grade Separation Usually Required" under the Metro Policy Milestone 1 Analysis. It is also estimated to have one of the worst traffic operational conditions under the Milestone 2 and 3 Analyses.

Figure 3-2: Schematic Vertical Profile of Scenario 1a



- **1b. Full-Build LRT, Full Grade Separation:** the LRT tracks would be grade-separated at all six crossings. The AVL/UPRR tracks would remain at grade at all six crossings (see Figure 3-3). Milestones 2 and 3 analyses indicated that the traffic operations would be at an unacceptable level (LOS E or F) at all six crossings. The Brand Boulevard and Jessie/Wolfskill Street crossings would be slightly better than the remaining four crossings. However, due to both these two crossings' proximity to the Maclay Avenue crossing, they were deemed to be grade-separated as well.

Figure 3-3: Schematic Vertical Profile of Scenario 1b

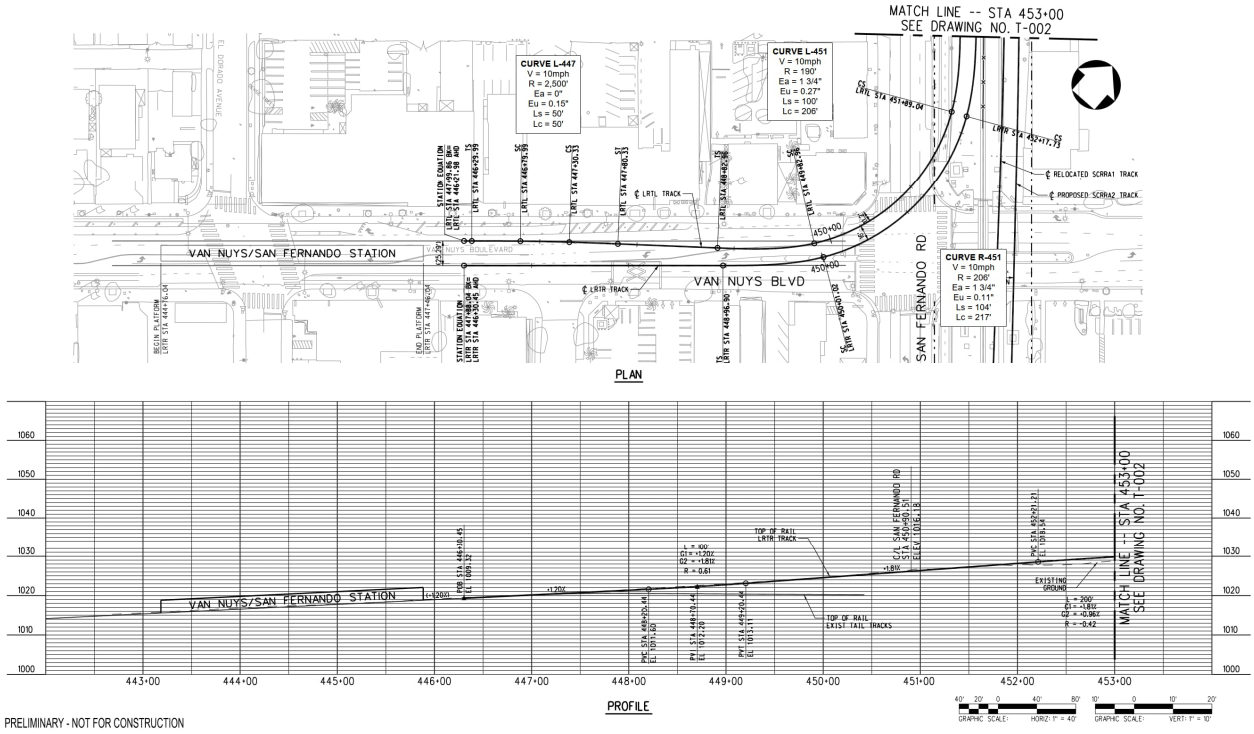
3.2 CONCEPTUAL DESIGN

3.2.1 SCENARIO 1A FULL-BUILD LRT PARTIAL GRADE SEPARATION

The LRT alignment extends the ESFV LRT southern segment alignment, currently under construction, from the proposed Van Nuys/San Fernando Station to the Sylmar/San Fernando Metrolink Station just north of Hubbard Avenue within the shared ROW corridor, with only the crossing at Paxton Street being grade separated (LRT underpass). The concept will include new LRT Stations at Paxton Street (underpass), Maclay Avenue, and a terminal station at Sylmar/San Fernando to connect through a pedestrian underpass with the existing Metrolink Station platform, which would be modified to meet SCRRA's station standards.

The proposed tail tracks that are to be constructed for the ESFV LRT on Van Nuys Boulevard currently under construction would be removed, and then the alignment would continue through the Van Nuys Boulevard/San Fernando Road intersection on a 10 mph curve into the shared ROW corridor as to limit property takes (see Figure 3-4). To provide operational flexibility, a pocket track would be added between Filmore Street and Weidner Street.

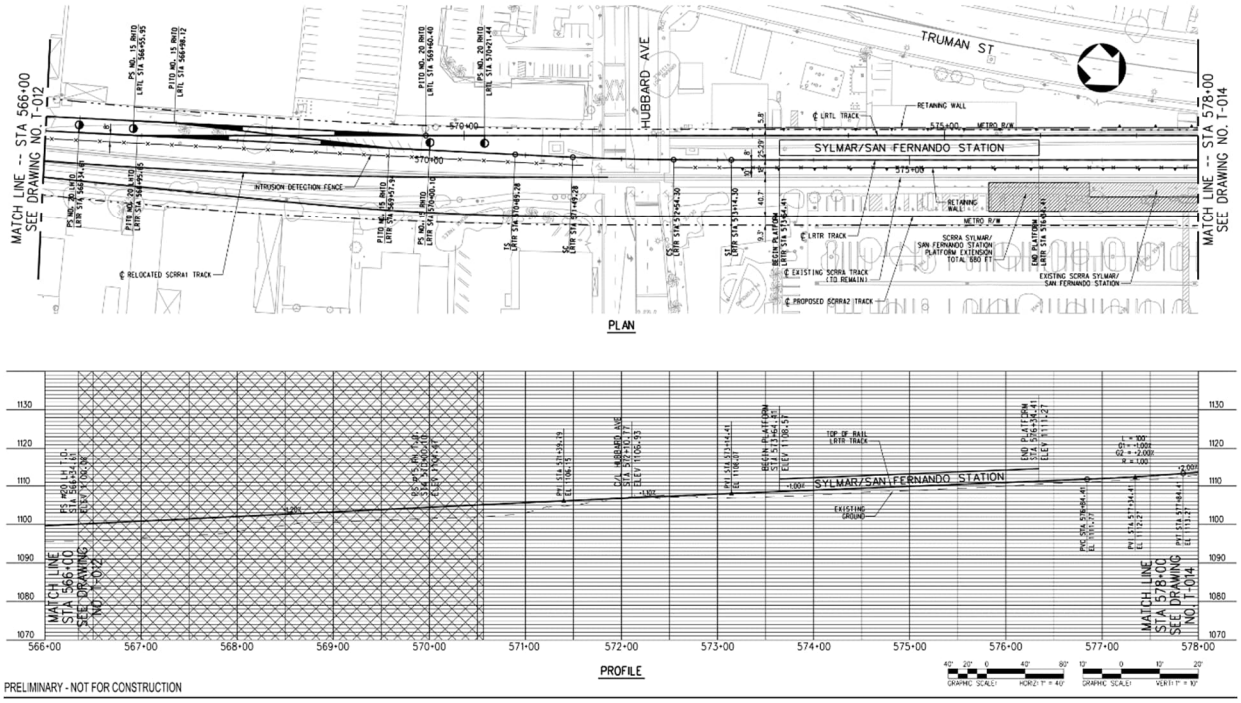
Figure 3-4: Scenario 1a LRT Tracks at Van Nuys Boulevard/San Fernando Road



The AVL/UPRR tracks would remain at grade throughout the shared ROW corridor. In order to fit the LRT tracks within the shared ROW corridor, the existing Metrolink mainline must be relocated to the eastern side of the corridor. The new second AVL/UPRR mainline track would parallel the existing mainline track on the east side. The realignment begins south of Van Nuys Boulevard and continues north of the Sylmar/San Fernando Station. In some places, additional ROW is required to fit the second mainline track.

The second Metrolink mainline track is proposed to widen out at Hubbard Avenue to allow for a center platform (see Figure 3-5). The pedestrian underpass at the LRT station would connect the LRT station with the Sylmar/San Fernando Metrolink station, and the adjacent parking lot to the east. The existing Metrolink station platform is 425 feet long and 15 feet wide, which is not the SCRRA standard size. The station platform would be extended to be a full-length platform by SCRRA standard (680 feet long).

Figure 3-5: Scenario 1a: Sylmar/San Fernando LRT and Metrolink Stations

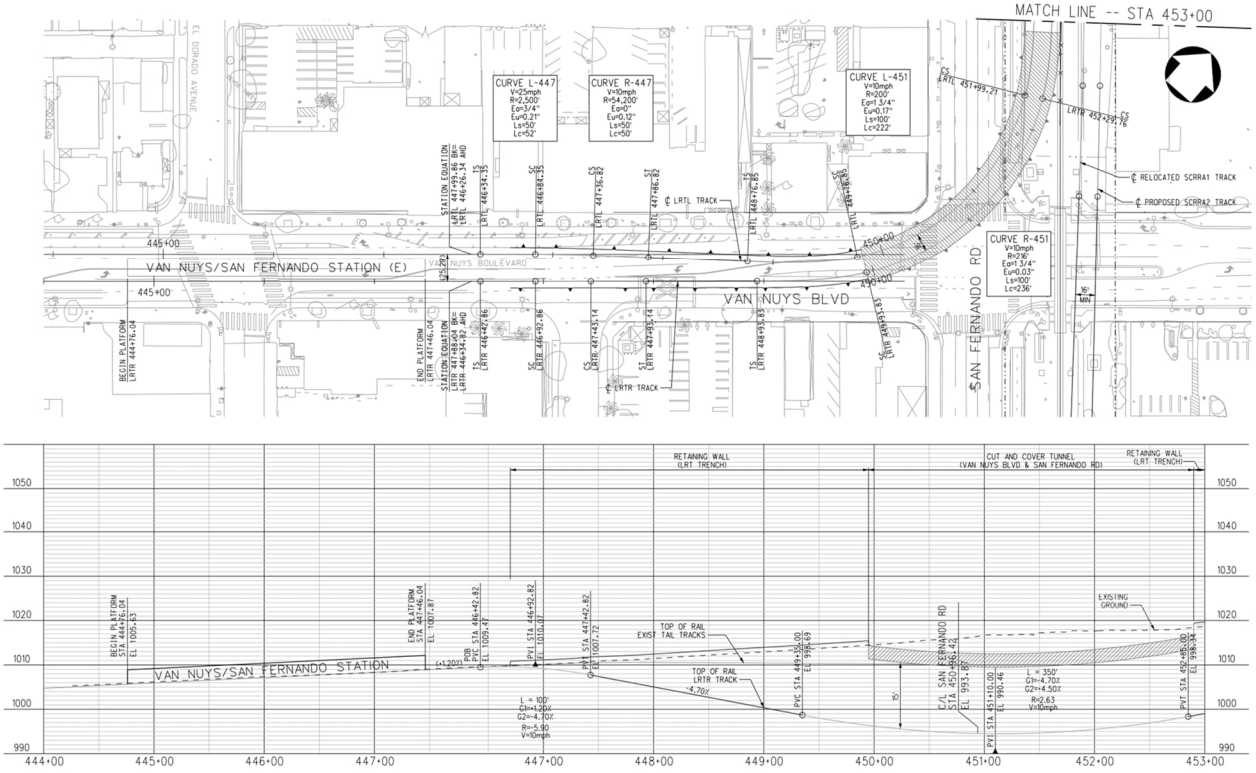


3.2.2 SCENARIO 1B FULL-BUILD LRT FULL GRADE SEPARATION

The LRT alignment extends the ESFV LRT southern segment alignment, currently under construction, from the proposed Van Nuys/San Fernando Station to the Sylmar/San Fernando Metrolink Station just north of Hubbard Avenue within the shared ROW corridor, with the crossing at Van Nuys Boulevard and Paxton Street being in a cut-and-cover tunnel (LRT underpass). The LRT tracks would be elevated at the crossings at Jessie/Wolfskill Street, Brand Boulevard, Maclay Avenue, and Hubbard Avenue. The concept includes three new LRT stations at Paxton Street (underpass), Maclay Avenue (elevated), and a terminal station (elevated) at Sylmar/San Fernando to connect through a pedestrian underpass or overpass with the existing Metrolink Station, which would be expanded to meet the SCRRA station standards.

The currently proposed tail tracks to be constructed for the ESFVTC project would be removed allowing for the alignments continuation in a cut-and-cover tunnel under the Van Nuys Boulevard/San Fernando Road intersection on a 10 mph curve into the shared ROW corridor so as not to require any property takes (see Figure 3-6). To provide operational flexibility, a pocket track would be added between Filmore Street and Weidner Street.

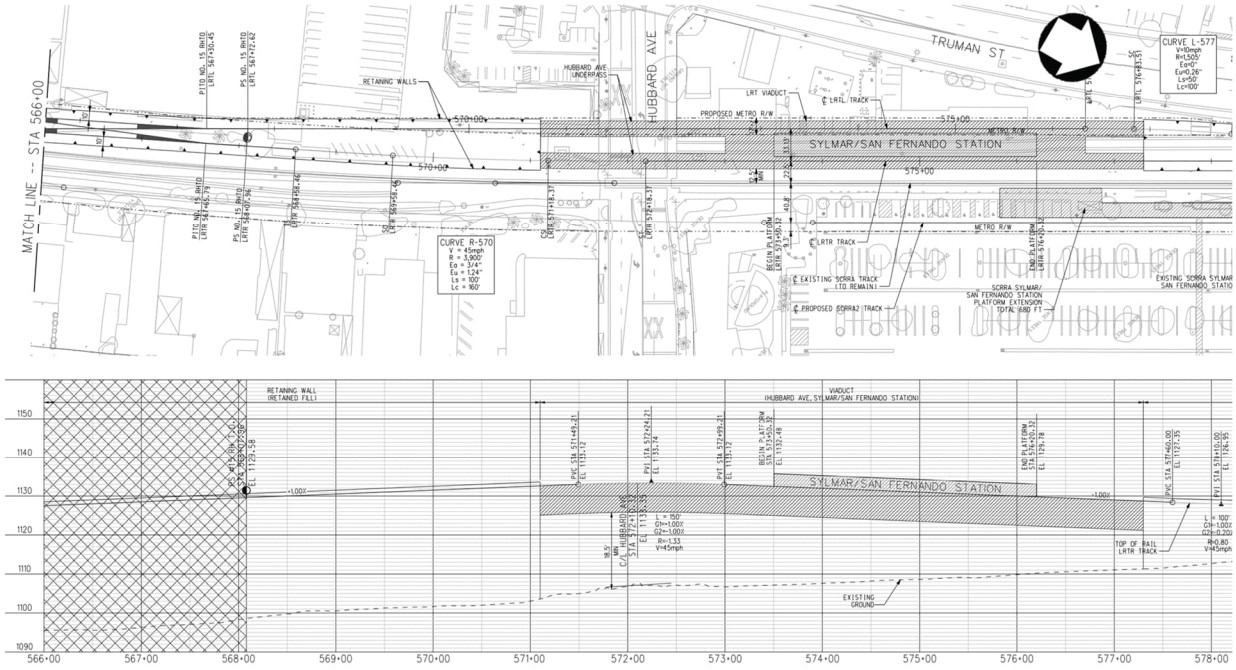
Figure 3-6: Scenario 1b LRT Tracks at Van Nuys Boulevard/San Fernando Road



The extended LRT racks in Scenario 1b would have multiple track curves through the crossings to minimize property takes and to maneuver the Metrolink tracks through the corridor for stations, bridges, and the pocket track. The design of these curves has been carefully considered so track alignments meet SCRRA Design Criteria for the design speeds and to ensure there is no superelevation on the relocated Metrolink mainline track(s). Reducing or eliminating the superelevation through the crossing provides for level-grade crossing profiles.

The LRT tracks would terminate at the Sylmar/San Fernando LRT station, which is located just north of Hubbard Avenue, with the tracks shifted further west when compared with Scenario 1a. This is due to the existing Metrolink track remains in place and spacing requirements. Space is required for the retaining wall between the LRT and Metrolink tracks, as well as a wider platform to allow for pedestrian circulation between the ground and elevated station (see Figure 3-7). The platform is located to allow for a pedestrian ramp to an overpass or underpass to connect with the Sylmar/San Fernando Metrolink Station. The configuration of the pedestrian connection will be slightly different from Scenario 1a, as the tracks and station platform will be elevated due to the grade separation at Hubbard Avenue. The AVL tracks would remain at grade throughout the shared ROW corridor.

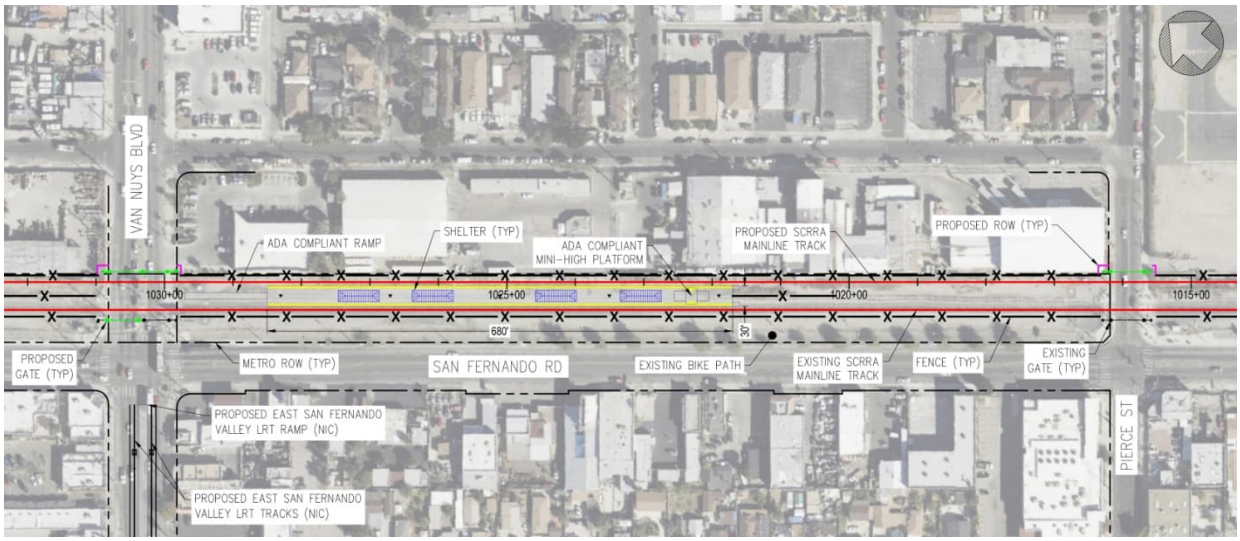
Figure 3-7: Scenario 1b Sylmar/San Fernando LRTand Metrolink Stations



3.2.3 SCENARIO 2A ESFV IOS METROLINK STATION, ISLAND PLATFORM

The infill Metrolink station would be placed in the southeast quadrant of the intersection of Van Nuys Boulevard and San Fernando Road, providing a connection to the southern segment of the ESFV LRT on Van Nuys Boulevard. As shown in Figure 3-8, this station would be a center platform station. The station would be placed east of the existing mainline track. The second mainline track would be placed east of the proposed infill Metrolink station. There is enough space in the corridor to fit the station and both mainline tracks within the existing ROW.

Figure 3-8: Scenario 2a ESFV IOS Metrolink Station, Island Platform Configuration



The existing AVL/UPRR track would remain untouched for most of the shared ROW corridor. The second AVL/UPRR track would be located east of the existing track throughout most of the corridor, except for north of the Sylmar/San Fernando Station, where the new track would be west of the existing track. At the Sylmar/San Fernando Station, the existing platform is approximately 425 feet long and 15 feet wide. This platform would be expanded to be 680 feet long and 16 feet wide, all within existing ROW. A new side platform would be added on the west side of the corridor, serving the proposed second mainline track.

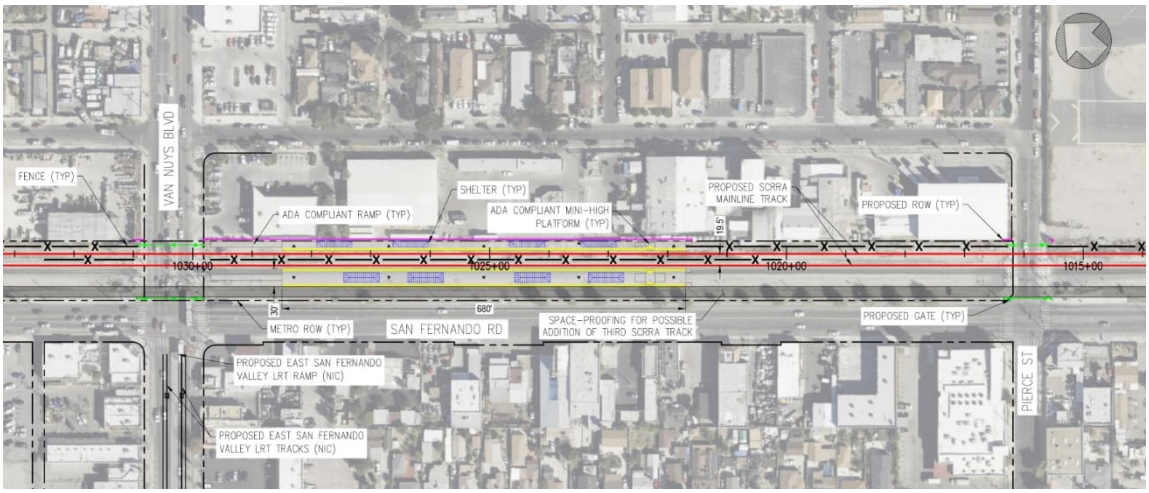
As shown in Figure 3-9, north of the Sylmar/San Fernando Station, number 14 turnouts would be utilized to begin a turnback track. In this area, the eastern mainline track would be the existing track, and the proposed second mainline track would be west of the existing track. The turnback tracks would be on the far west side of the corridor, west of the proposed track.

Figure 3-9: Scenario 2a Turnback Tracks at Sylmar/San Fernando Metrolink and LRT Stations

3.2.4 SCENARIO 2B ESFV IOS METROLINK STATION, SIDE PLATFORMS

An infill Metrolink station would be placed in the southeast quadrant of the intersection of Van Nuys Boulevard/San Fernando Road, providing a connection to the southern segment of ESFV LRT on Van Nuys Boulevard. As shown in Figure 3-10, this station would contain side platforms. There would be space allotted on the west side of the corridor for potential future use. The proposed design reserves space for the proposed western side platform so it could be expanded from a typical 16-foot side platform to a 30-foot island platform if a future use were to be identified. The proposed design for Scenario 2b would require the acquisition of approximately three (3) feet of additional ROW east of the shared ROW corridor between Van Nuys Boulevard and Pierce Street. Further coordination with SCRRA/Metrolink in the conceptual engineering phase would be required in order to analyze in greater detail if ROW takes can be avoided through an SCRRA design deviation.

Figure 3-10: Scenario 2b ESFV IOS Metrolink Station, Side Platforms Configuration



The existing Sylmar/San Fernando Metrolink platform would be widened to function as a center platform with mainline tracks on either side. The existing platform would be expanded to be 680 feet long and 25 feet wide, allowing the proposed features to stay within the station area and not intrude on parking spaces east of the station area. Additionally, there would be sufficient space west of the existing tracks for any potential future use in the station area.

Immediately north of the Sylmar/San Fernando Station, both sets of mainline tracks would shift westward to avoid an open channel on the west side of the corridor, north of the station (see Figure 3-11). After the shift is complete, number 14 turnouts would be utilized to begin a turnback track. The turnback tracks would be on the far west side of the corridor, west of the proposed tracks. The turnback track on the west side of the corridor would be in the space provided for potential future use.

Figure 3-11: Scenario 2b Turnback Tracks at Sylmar/San Fernando Metrolink and LRT Stations

4 TRANSPORTATION BENEFITS/SYSTEMS PERFORMANCE ANALYSIS

The proposed study scenarios were evaluated for transportation benefits in terms of travel time savings, ridership, and the quality of multi-modal connectivity. The No-Build Scenario is included in the analyses for comparison purposes.

For the travel time estimation of the representative origin-destination (O-D) pairs and ridership forecasting, Scenarios 1a and 1b were not treated differently due to their similarities in operational characteristics and will be categorized as the Full-Build LRT Scenario. Similarly, Scenarios 2a and 2b will be categorized as the ESFV IOS Metrolink Station Scenario for the same reason.

4.1 TRAVEL TIME OF REPRESENTATIVE ORIGIN-DESTINATION PAIRS

The representative origin-destination (O-D) pairs analysis provides insight into potential travel patterns, time savings, and route choice for transit riders going to and traveling from ESFV under each proposed Scenario. The origins and destinations in the selected O-D pairs are activity centers located in or around neighborhoods with high employment or population density. They are also on the route that could potentially benefit from the infill station at the Van Nuys Boulevard/San Fernando Road intersection on the AVL or the implementation of the northern segment of the ESFV LRT.

The No-Build Scenario would perform the worst for most travelers, due to the missing rail service gap along the San Fernando Road Shared ROW corridor, less frequency of the Metrolink AVL, and the lack of a transfer point between Metrolink AVL and Metro ESFV LRT.

The Full-Build LRT Scenarios (both 1a and 1b) would mainly benefit travel within the East San Fernando Valley, especially the areas along the alignment of the ESFV LRT Project.

The O-D travel time analysis concludes that the ESFV IOS Metrolink Station Scenarios (2a and 2b) would mainly benefit regional travel in the following directions:

- Between Central LA and the Van Nuys Boulevard Corridor, where the southern segment of the ESFV LRT would be built
- Between Northern Los Angeles County and West San Fernando Valley
- Between Northern Los Angeles County and South San Fernando Valley
- Between Northern Los Angeles County and Van Nuys Boulevard Corridor

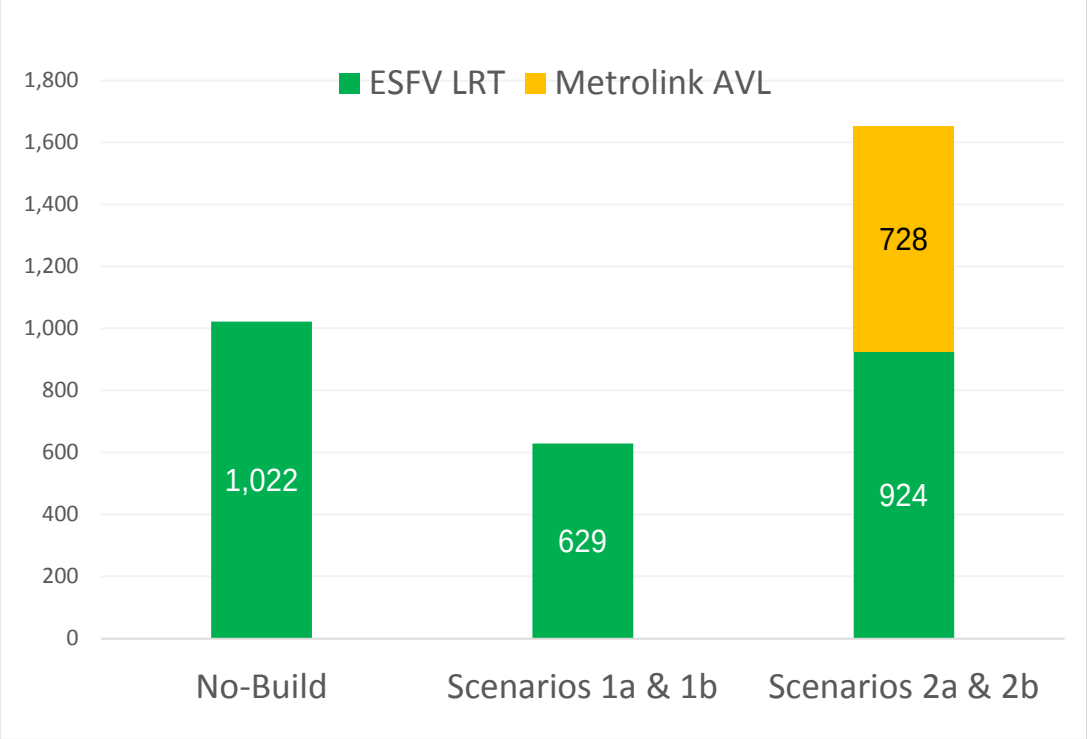
The Metrolink infill station at the Van Nuys Boulevard/San Fernando Road intersection would provide an easy transfer between the Metrolink service and the Metro ESFV LRT service, which saves travel time for transit riders.

4.2 RIDERSHIP FORECASTING

Under the ESFV IOS Metrolink Station Scenarios (2a and 2b), the Metrolink infill station along the AVL at the southeast corner at the intersection of Van Nuys Boulevard and San Fernando

Road is forecasted to generate daily boardings of approximately 730 on a typical weekday. The daily ridership at the Van Nuys/San Fernando ESFV LRT Station is forecasted to be around 920, an increase of about 300 from the Full-Build LRT Scenario and 180 more than the No-Build Scenario (see Chart 4-1).

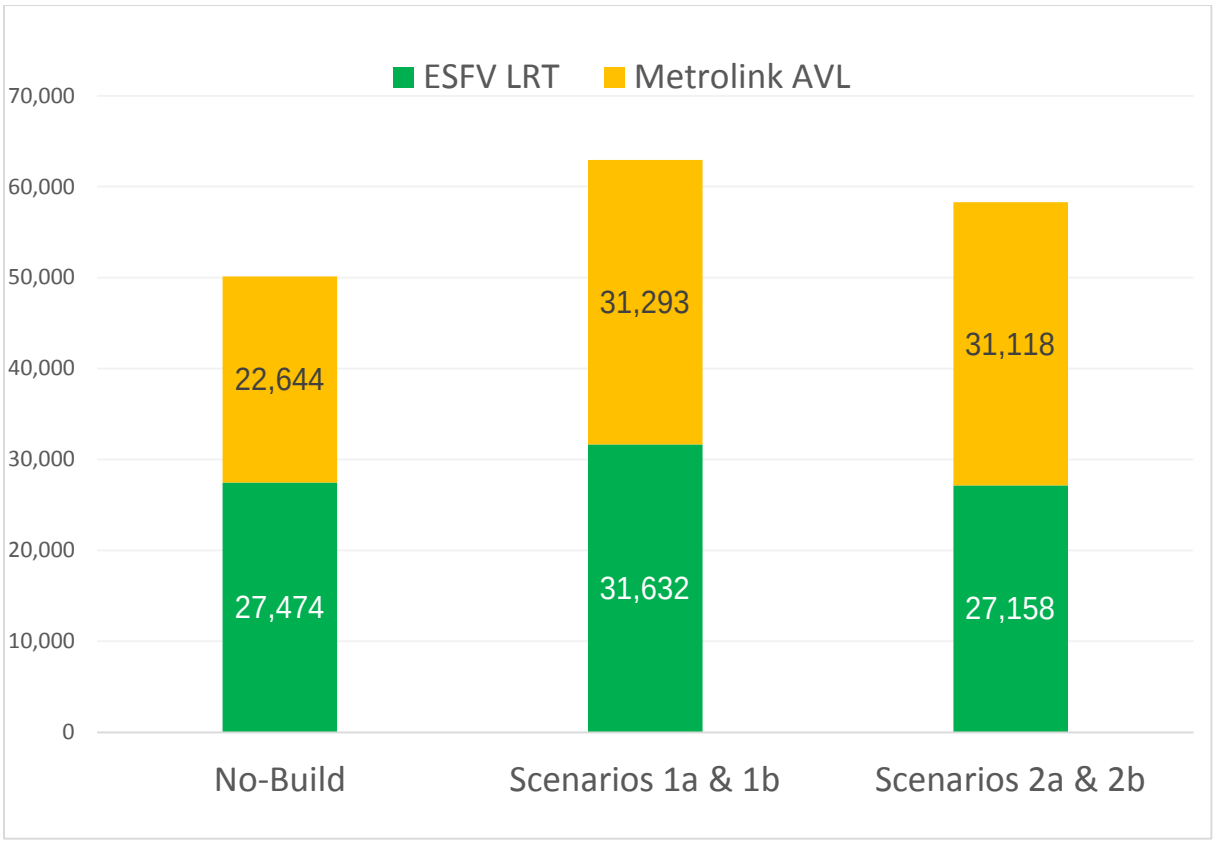
Chart 4-1: Estimated Future (2040) Typical Weekday Daily Ridership at Van Nuys/San Fernando



Under Scenarios 1a and 1b, the daily boarding on the ESFV LRT line is forecasted to be approximately 31,600, which is 4,150 more than the No-Build Scenario. However, the average boardings on the three stations in the northern segment would be approximately 1,600, which is much lower than the average boardings on the 11 stations in the southern segment, which is forecasted to be approximately 2,400. The forecasted ridership on the entire Metrolink AVL would increase to nearly 31,300 from approximately 22,600 in No-Build. This is mainly because of the enhanced service frequency of the AVL in the peak and off-peak periods.

The forecasted ridership on the entire ESFV LRT Line does not change much from No-Build to Scenarios 2a and 2b (see Chart 4-2). Although the infill Metrolink Station would connect the light rail line with AVL, the frequency enhancement would also make AVL more competitive against the ESFV LRT for some travel markets (e.g. between East San Fernando and Downtown Los Angeles). Therefore, the ridership on the ESFV LRT would not necessarily increase from No-Build to Scenarios 2a and 2b. The daily ridership for the entire AVL is estimated to be approximately 31,100 under Scenarios 2a and 2b.

Chart 4-2: Estimated Future (2040) Typical Weekday Daily Ridership on ESFV LRT and AVL



As summarized in Table 4-1, there would be a total of nearly 1,915,000 transit trips in the entire transit system in Southern California on a typical weekday in the No-Build Scenario. The total transit trips would increase to approximately 1,924,600 under Scenarios 1a and 1b, which would be about 9,600 new transit trips compared with the No-Build Scenario. Scenarios 2a and 2b would have approximately 6,500 new transit trips compared with the No-Build Scenario. These new transit trips would be shifted from driving or non-vehicular modes with enhanced transit services brought by the AVL and the ESFV LRT improvements.

Table 4-1: Systemwide Transit Trips Summary

Scenario	Total Transit Trips	New Transit Trips (compared with No-Build)
No-Build	1,914,986	-
Scenarios 1a and 1b	1,924,626	9,640
Scenarios 2a and 2b	1,921,507	6,521

4.3 QUALITY OF MULTI-MODAL CONNECTIVITY

The quality of multi-modal connectivity was evaluated by assessing each scenario's level of connectivity with transit services, the frequency of those services, and the type of services whether they provide regional or local connections. The quality of transfer conditions and impacts to surrounding existing bicycle lanes and facilities was also considered. A summary of this analysis is shown in Table 4-2.

Table 4-2: Transit & Multimodal Connectivity Summary

Criteria	No-Build	Scenario 1: Full-Build LRT		Scenario 2: ESV IOS Metrolink Station	
		1a: Partial Grade Separation	1b: Full Grade Separation	2a: With Island Platform	2b: With Side Platform
# of Connecting Services	18	23	23	19	19
Bus Connection Frequency (min) (peak/off-peak)	15 38	15 35	15 35	15 35	15 35
Impact to existing bike path along the Shared ROW	None	Impacted	Impacted	Impacted	Impacted
Quality of Transfer Conditions	No elevation changes	Fewer elevation changes	More elevation changes	No elevation changes	No elevation changes
Regional Connectivity (Metrolink connections)	VCL	VCL, AVL	VCL, AVL	VCL, AVL	VCL, AVL

Note: 1= top number=peak period, bottom number =off-peak period.

The No-Build Scenario would provide no transfer between the ESFV LRT and the Metrolink AVL. Under the Full-Build LRT Scenarios 1a and 1b, riders would be able to transfer between the ESFV LRT and the Metrolink AVL at the Sylmar/San Fernando Station. Scenario 1a would result in fewer elevation changes at the Maclay Station for passengers to access, however, there would be wider at-grade crossings with four tracks (two LRT and two AVL/UPRR) at the Maclay Avenue and Brand Boulevard crossings. In contrast, under Scenario 1b, passengers would need to go upstairs to access the Maclay Station while the at-grade crossings would be narrower with two AVL/UPRR tracks at the Maclay Avenue and Brand Boulevard crossings.

In the ESFV IOS scenarios (2a and 2b), a transfer could be made between the ESFV LRT and the Metrolink AVL at the Van Nuys Boulevard/San Fernando Road intersection. The total transfer walk time would be between two to four minutes, depending on whether the pedestrianwill encounter a green or red light at the intersection. Under Scenario 2a ESFV IOS Metrolink Station, Island Platform, riders would need to walk across one railroad track to access the location of the Metrolink infill station but would not be required to cross any LRT tracks (see Figure 4-1).

Under Scenario 2b ESFV IOS Metrolink Station, Side Platforms, riders would need to cross two railroad tracks if traveling northbound and zero railroad tracks if traveling southbound to reach the Metrolink station platform. Clear wayfinding would be needed to support riders in choosing the correct platform. This scenario would not require transit riders to cross any LRT tracks at the Van Nuys Boulevard/San Fernando Road intersection.

Figure 4-1: ESFV LRT Station at Van Nuys Blvd./San Fernando Rd. Intersection, Scenario 2a

Source: Mott MacDonald, 2024

5 IMPACT ANALYSIS

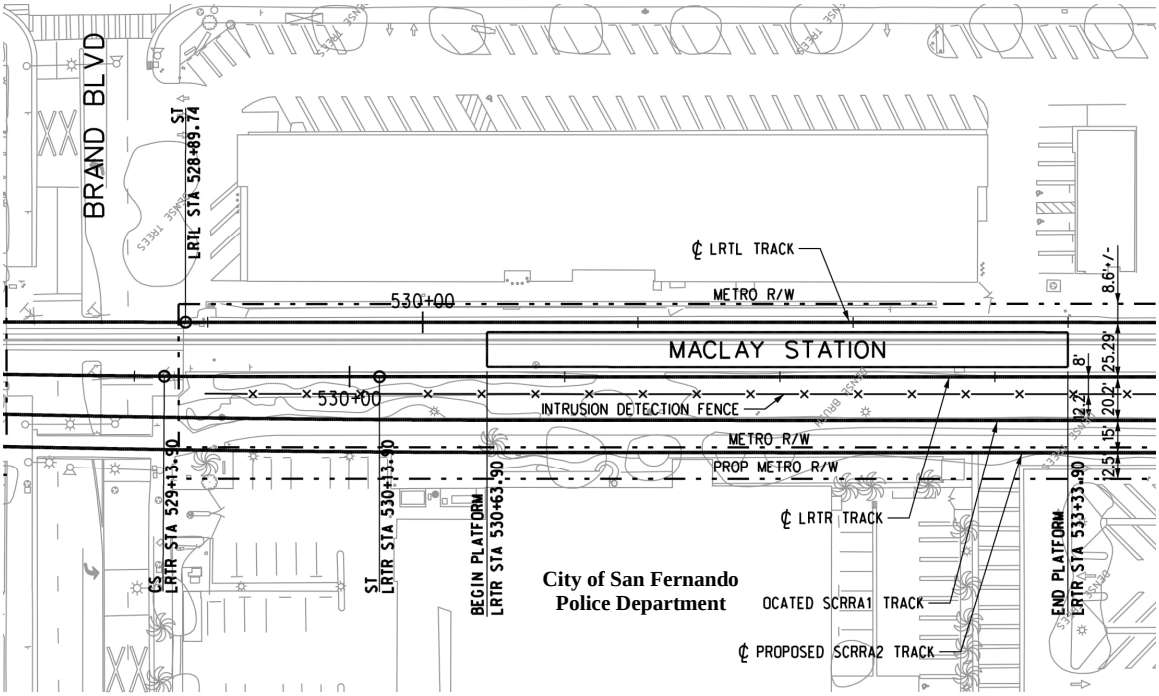
Five types of impacts were assessed for the Full-Build LRT and ESFV IOS Metrolink Station scenarios: right-of-way (ROW), utility, existing bicycle network, traffic, and parking.

5.1 RIGHT-OF-WAY (ROW) IMPACTS

The ROW impacts under Scenarios 1a and 1b would be mainly between Jessie/Wolfskill Street and Maclay Avenue, the narrowest portion of the shared ROW corridor. There would also be some ROW impacts on the parcels near the Hubbard Avenue crossing and the existing Sylmar/San Fernando Metrolink Station.

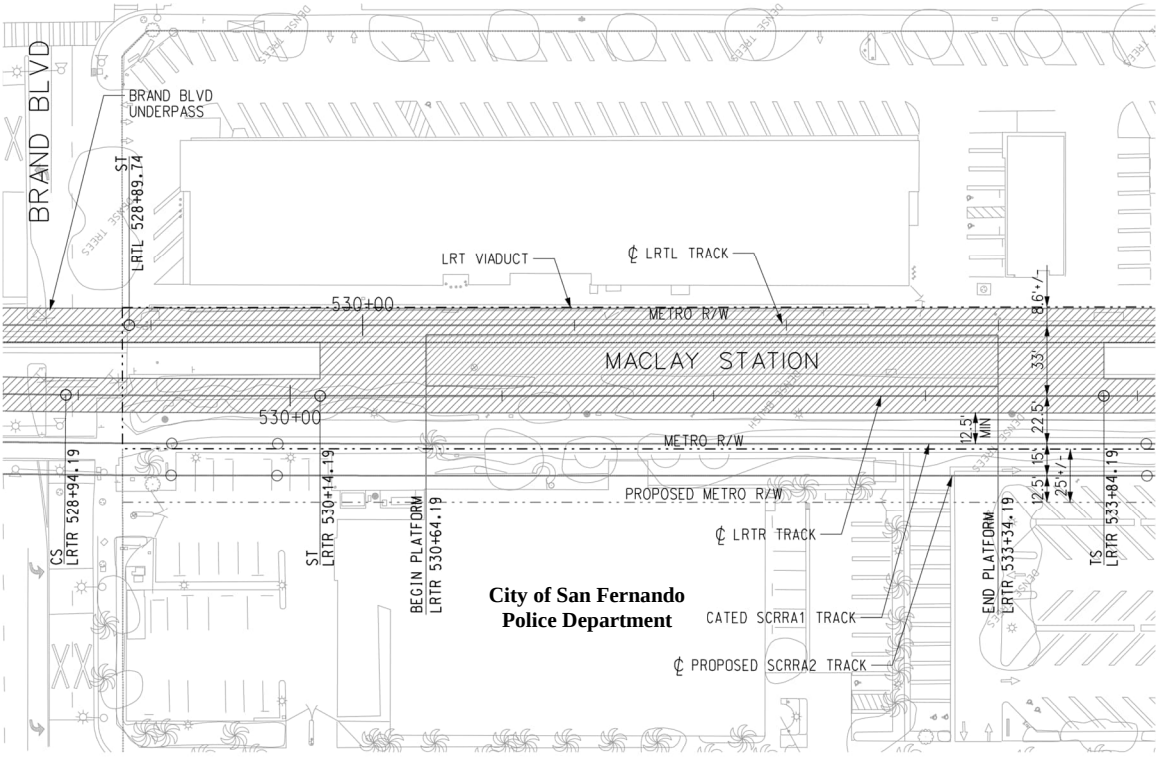
Specific to Scenario 1a, the second AVL/UPRR track would not impact the San Fernando Police Department as it would be 16.5 feet away from the west side of the police station. As shown in Figure 5-1, a partial easement would be required as the new ROW line would impact the parcel but not the building.

Figure 5-1: Permanent Right-of-Way (ROW) Impact at the City of San Fernando Police Department, Scenario 1a



Under Scenario 1b, the new ROW line would impact both the parcel and the building (see Figure 5-2). Therefore, it is assumed that a permanent full easement will be required, and the police station will need to be relocated.

Figure 5-2: Permanent Right-of-Way (ROW) Impact at the City of San Fernando Police Department, Scenario 1b



The shared railroad ROW corridor would be able to accommodate two AVL/UPRR tracks under Scenarios 2a and 2b, without any Metro or Metrolink design criteria deviations/exceptions. However, some partial ROW take would be required for the relocated and new gate arms and signal equipment. Specific to Scenario 2b partial ROW takes would occur between Van Nuys Boulevard and Pierce Street to accommodate the new track and the two side platforms of the proposed infill station unless Metrolink design criteria deviations/exceptions are granted.

The permanent ROW impacts for the four Scenarios are summarized in Table 5-1. Scenario 1a would have the most partial parcel takes whereas Scenario 1b would have the most full parcel takes. Scenario 2a would have the least permanent ROW impacts among all the build scenarios.

Table 5-1: Permanent Right-of-Way (ROW) Impacts Summary

Scenario	Impacted Number of Parcels		Main Impacted Areas
	Full Take	Partial Take	
No-Build Scenario	0	0	None.
Scenario 1a	3	15	East of the shared ROW corridor between Jessie/Wolfskill St and Maclay Ave; Hubbard Crossing and Station Area.
Scenario 1b	6	10	East of the shared ROW corridor between Jessie/Wolfskill St and Maclay Ave; Hubbard Crossing and Station Area;
Scenario 2a	0	6	Corner parcels at crossings to accommodate new gate arms/signal equipment.
Scenario 2b	0	13	Corner parcels at crossings to accommodate new gate arms/signal equipment; East of the Shared ROW corridor between Van Nuys Boulevard and Pierce Street

5.2 UTILITY IMPACTS

In all the study scenarios, most of the existing wet and dry facilities may be protected including pipe encasement for the sanitary sewer lines with a few facilities needing further depth confirmation. In Scenarios 1a and 1b, most of the oil pipelines ranging from 8-36 inches in diameter will need to be relocated by their owner either prior to construction or during construction. This is a major and costly utility impact. In addition to the oil pipelines, under Scenario 1b, various telecommunication facilities would need to be removed and relocated.

5.3 IMPACTS ON THE EXISTING BICYCLE NETWORK

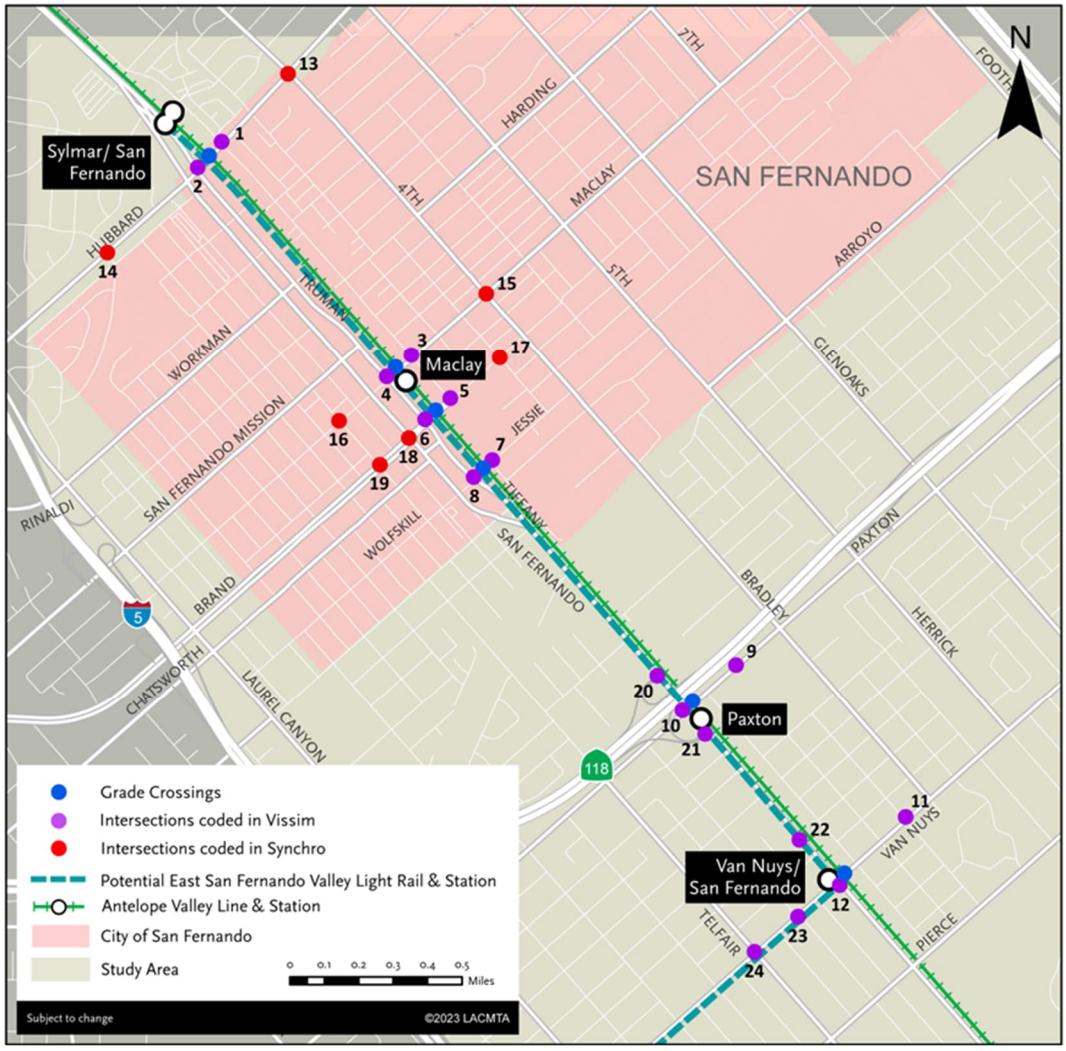
Scenarios 1a and 1b would have the greatest impact to existing bicycle networks in which the relocation of most of the Mission City Trail and the San Fernando Road Bike Path around the Hubbard Station would be needed.

Scenario 2a would have some impacts to the San Fernando Road Bike Path at Sylmar Metrolink Station for localized improvements while Scenario 2b would impact the San Fernando Road Bike Path around the Hubbard Station and the new infill Metrolink Station, as well as some stretches of the Mission City Trail.

5.4 TRAFFIC IMPACTS

A total of 24 study intersections along the study corridor are included in the traffic operational analysis. The locations of these intersections are shown in Figure 5-3.

Figure 5-3: Study Intersections for Traffic Operational Analysis



Source: Mott MacDonald, 2024

The level of service (LOS) values for the study intersections under the study scenarios are summarized in Table 5-2.

Table 5-2: Future Year 2040 Peak Hour Intersection LOS Summary

#	Intersection	No-Build		Scenario 1a		Scenario 1b		Scenario 2a		Scenario 2b	
		AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour
1	Hubbard Ave & First St/Frank Modugno Dr	**E**	**E**	**F**	**F**	**E**	**E**	**E**	**E**	**E**	**E**
2	Hubbard Ave & Truman St	D	**E**	**F**	**F**	D	**E**	D	**E**	D	**E**
3	Maclay Ave & First St	**E**	C	**F**	**F**	**E**	C	**E**	C	**E**	C
4	Maclay Ave & Truman St	D	**E**	**F**	**F**	D	**E**	D	**E**	D	**E**
5	Brand Blvd & First St	B	B	D	**E**	B	B	B	B	B	B
6	Brand Blvd & Truman St	D	D	**F**	**F**	D	D	D	D	D	D
7	Jessie/Wolfskill St. & First St	**F**	**F**	**E**	**F**	**F**	**F**	**F**	**F**	**F**	**F**
8	Wolfskill St & Truman St	B	B	D	D	B	B	B	B	B	B
9	Paxton St & Plaza Pacoima Dr	D	**E**	**E**	**F**	D	**E**	D	**E**	D	**E**
10	Paxton St & San Fernando Rd	**E**	**E**	**F**	**F**	**F**	**F**	**E**	**E**	**E**	**E**
11	Van Nuys Blvd & Pala Ave	**F**	**F**	**F**	**F**	**F**	**F**	**F**	**F**	**F**	**F**
12	Van Nuys Blvd & San Fernando Rd	**E**	**E**	**F**	**F**	**E**	**E**	**E**	**E**	**E**	**E**
13	Hubbard Ave & Fourth St	B	B	B	B	B	B	B	B	B	B
14	Hubbard Ave & Envoy St/Jackson Ave	B	A	B	A	B	A	B	A	B	A
15	Maclay Ave & Fourth St	C	D	C	B	C	D	C	D	C	D
16	Maclay Ave & Pico St	B	B	B	B	B	B	B	B	B	B
17	Brand Ave & Third St	B	B	B	B	B	B	B	B	B	B
18	Brand Ave & San Fernando Rd	A	B	A	B	A	B	A	B	A	B
19	Brand Ave & Pico St	B	B	B	B	B	B	B	B	B	B
20	San Fernando Rd & SR-118 WB on-off Ramp	D	D	**E**	D	D	D	D	D	D	D
21	San Fernando Rd & SR-118 EB on-off Ramp	B	D	**F**	**F**	B	D	B	D	B	D
22	San Fernando Rd & Pinney St	D	**F**	**F**	**F**	D	**F**	D	**F**	D	**F**
23A	Van Nuys Blvd & El Dorado St - North	A	A	A	A	A	A	A	A	A	A
23B	Van Nuys Blvd & El Dorado St - South	**F**	**F**	**F**	**F**	**F**	**F**	**F**	**F**	**F**	**F**
24A	Van Nuys Blvd & Telfair Ave - North	A	A	A	A	A	A	A	A	A	A
24B	Van Nuys Blvd & Telfair Ave - South	F	F	**F**	**F**	**F**	**F**	**F**	**F**	**F**	**F**

Under Scenario 1a, the number of trains through the six at-grade crossings would increase to 25 in both directions during the AM and PM peak hours, including 20 LRT trains, four AVL trains, and one freight train. The intensive gate-down activities would cause significant disruption to the traffic flows at the crossing and other nearby streets. Half (12) of the 24 study intersections are projected to operate at a LOS value of F during both peak hours. Two intersections would operate at LOS values of F during either the AM or PM peak hour and an additional two intersections would operate at LOS value E during either the AM or PM peak hour.

Scenario 2a and 2b would have seven intersections operating at LOS values of E during one or both peak hours. Five intersections are estimated to operate at a LOS value of F during either the AM or PM peak hour. The traffic operations at the six crossings and the nearby intersections would only be disrupted by the AVL trains running through the shared ROW corridor.

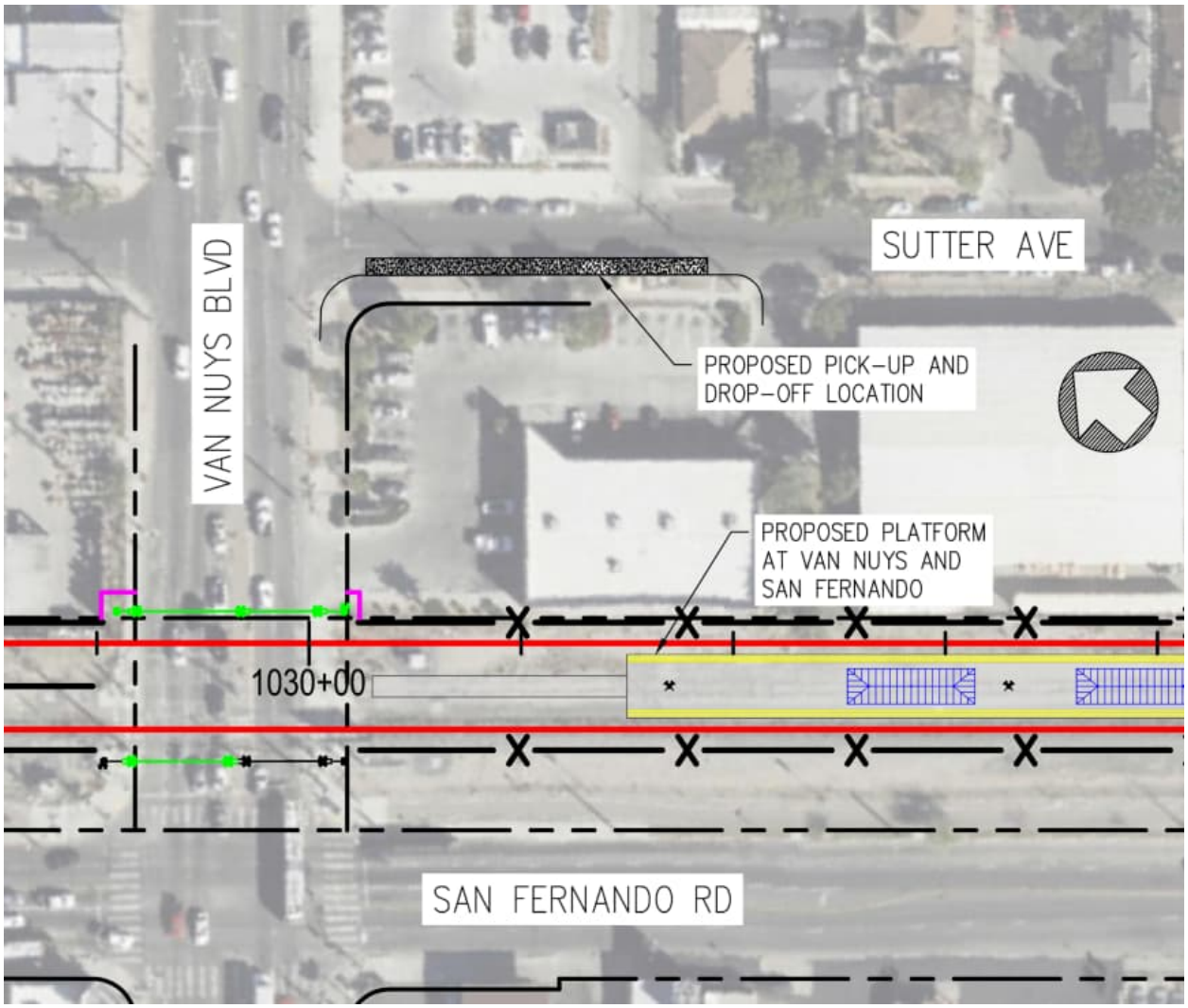
Under Scenario 1b Full-Build LRT Full Grade Separation Option, the traffic operational conditions for most study intersections would be similar to those under the ESFV IOS scenarios. This is because all the crossings would be grade-separated and the traffic operations would only be disrupted by the gate down activities when the four AVL trains and the one freight train approach the crossings during the peak hour, but not by the ESFV LRT trains. The lane geometry for intersection #10 - Paxton Street & San Fernando Road would be different. The northbound approach would have four lanes under the ESFV IOS scenarios and three lanes under Scenario 1b. In this case, this intersection would more likely operate at LOS F during the peak hours (as under Scenario 1a) instead of LOS E (as under the ESFV IOS scenarios).

5.5 PARKING IMPACTS

The No-Build Scenario would not have any parking impacts. Scenarios 1a and Scenario 1b would not impact any on-street parking along the study corridor. However, the Sylmar/San Fernando Metrolink Station adjacent to the new LRT station would require relocating nearly 20 accessible parking spaces. The total number of available parking spaces at the parking lot might be reduced after restriping the parking lot. Scenario 2a would not require the removal of accessible parking spaces at the Sylmar/San Fernando Metrolink Station. This differs from Scenario 2b which would require relocation of nearly 20 accessible parking spaces in the parking lot.

Under Scenarios 2a and 2b, up to eight on-street parking spaces on Sutter Street may be lost to provide a pickup and drop-off area for the new Metrolink infill station that would be added at the southeast corner of Van Nuys/San Fernando (see Figure 5-4). The No-Build Scenario, Scenarios 1a, and Scenario 1b would not have the Metrolink infill Station and therefore would not incur any parking impacts on Sutter Street.

Figure 5-4: Proposed Passenger Pick-Up and Drop-Off for Scenarios 2a and 2b



6 COST ESTIMATES

Planning-level capital cost estimates and Operations and Maintenance (O&M) costs were developed for all the study scenarios.

6.1 CAPITAL COST

The capital cost estimating methodology complies with the Federal Transit Administration (FTA) Standard Cost Categories (SCC) for major capital projects. This cost estimate was developed in a spreadsheet format that presents construction cost items and unit quantities which were sorted according to individual line items based on FTA SCC categories. To estimate project capital cost quantities, a breakdown of the 5% conceptual design elements was performed.

The cost estimate was developed using multiple resources, derived from historical bid data, price books, supplier quotes, completed projects, and information obtained from similar projects along the West Coast. In some cases, pricing was compared to other LA Metro projects. Unit prices used for this estimate are in current year dollars (Q4 2023) when the estimate was initially prepared. In addition to this, the estimator's professional judgment was used to allow for the specific type, location, size, and complexity. Unit prices were applied to the unit quantities identified for each cost item to produce an overall unit price for each element.

At this level of design, the level of confidence for cost estimate is an American Association of Cost Engineers (AACE) Class 5. The AACE guidance for the low range of a Class 5 estimate is -20% to -50%. The high range of a Class 5 estimate is recommended to be +30% to +100%. +50% was chosen for this estimate. Estimator opinion was used to create a static upper and lower limit. The 30% lower limit was chosen for the rare case of contingency being over-applied. On the high side, 50% was chosen because the confidence is there that the cost shouldn't double but based on material and labor trends cost could be 50% higher than the current estimate.

Contingencies have been applied to the cost estimates. After a discussion with Metro's capital cost estimation group, it was determined that the percentage values of hard construction cost used in this estimate are:

- 40 percent on FTA SCC categories 10 through 50 and 80
- 50 percent for FTA SCC categories 60
- 16 percent for FTA SCC categories 70
- 33 percent for professional service
- 10 percent for unallocated contingency

Table 6-1 summarizes the capital cost estimate ranges in 2023 dollars without escalation. The capital cost of Scenario 1a, Full-Build LRT Partial Grade Separation is estimated to be approximately $432 million to $926 million in 2023 dollars. Scenario 1b, Full-Build LRT Full Grade Separation is estimated to have the highest capital cost among all the proposed transit options at $561 million to $1.20 billion in 2023 dollars.

The capital cost for Scenario 2a, ESFV IOS Island Platform Metrolink Station is estimated to be approximately $71 to $153 million in 2023 dollars. The capital cost of Scenario 2b, ESFV IOS with Side Platforms Metrolink Station is estimated to be about 28.3 percent higher than that of Scenario 2a at $92 to $196 million. Whereas the No-Build scenario would incur zero capital costs because there would not be any capital improvements.

Table 6-1: Capital Cost Estimate Summary ($ millions) in 2023 Dollars

AACE Class 5 Estimate Cost Ranges	No-Build Scenario	Scenario 1: Full-Build LRT		Scenario 2: ESFV IOS Metrolink Station at Van Nuys Blvd/San Fernando Rd	
	Single Metrolink track without new infill Metrolink station	1a: Partial Grade Separation	1b: Full Grade Separation	2a: Island Platform	2b: Side Platforms
Low Range (AACE: -20% to -50%) assumed -30%	$0	$432	$561	$71	$92
Class 5, 100% - Estimate of Probable Cost	$0	$618	$801	$102	$131
High Range (AACE: +30% to +100%) assumed +50%	$0	$926	$1,202	$153	$196

This cost estimate is validated in 2023 dollars, but total project costs have been presented in the base year and escalated to the proposed year of expenditure, 2038, the estimated midpoint of the construction. The actual anticipated start date has yet to be decided. To estimate the capital cost in the future year 2038, Engineering News-Record (ENR) Construction Cost Index (CCI) data nationwide average from 2013 to 2023 was compiled. The average rate (2013 to 2023) is 3.41 percent so it was decided to use 3.5 percent as a round number.

Table 6-2 summarizes the capital cost estimate ranges escalated to 2038 dollars. The highest cost for a scenario alternative belongs to Scenario 1b with a high range cost estimated to exceed $2 billion in 2038 dollars. This is significantly different from Scenario 2a in which high-cost range is estimated to be $256 million in 2038 dollars.

Table 6-2: Escalated Capital Cost Estimate Summary ($ millions) in 2038 Dollars

AACE Class 5 Estimate Cost Ranges	No-Build Scenario	Scenario 1: Full-Build LRT		Scenario 2: ESFV IOS Metrolink Station at Van Nuys Blvd/San Fernando Rd	
	Single track without new infill Metrolink station	1a: Partial Grade Separation	1b: Full Grade Separation	2a: Island Platform	2b: Side Platforms
Low Range (AACE: -20% to -50%) assumed -30%	$0	$724	$940	$120	$154
Class 5, 100% - Estimate of Probable Cost	$0	$1,035	$1,343	$171	$219
High Range (AACE: +30% to +100%) assumed +50%	$0	$1,552	$2,014	$256	$329

Table 6-3 summarizes the cost-effectiveness of all the build scenarios. Cost-effectiveness measures the incremental capital cost per new project trip compared with the No-Build scenario. Scenario 2a is estimated to have the best cost-effectiveness: the capital cost for each projected trip would be approximately $26.2 thousand in 2038 dollars. Scenario 1b would have the worst cost-effectiveness with $139.3 thousand per project trip.

Table 6-3: Cost-effectiveness (2038 dollars, millions)

Scenario	Incremental Capital Cost* Range in 2038 US Dollars (millions)	New Transit Trips**	Incremental Capital Cost per New Transit Trip (thousands)
1a: Full-Build LRT Partial Grade Separation	$1,034.5	9,640	$107
1b: Full-Build LRT Full Grade Separation	$1,342.5	9,640	$139
2a: ESFV IOS Metrolink Station, Island Platform	$170.9	6,521	$26
2b: ESFV IOS Metrolink Station, Side Platforms	$219.3	6,521	$34

Note*: The capital cost of each build scenario minus the capital cost of the No-Build Scenario, which is zero in this case
Note**: The number of transit trips in each build scenario minus the number of transit trips in the No-Build Scenario

6.2 OPERATIONS AND MAINTENANCE (O&M) COST

Data on Operations and Maintenance (O&M) costs for Metro LRT and Metrolink services were collected to develop a typical unit cost for each type of service. The primary data source for O&M costs is the National Transit Database (NTD), which collects information on the financial, operating, and asset conditions of transit systems.

To develop the O&M cost estimates, either the operating cost per vehicle revenue hour or cost per revenue mile could be used. Vehicle operations costs are typically linked with costs per revenue hour since vehicle maintenance is approximately proportional to how many hours vehicles are running. Vehicle maintenance costs are often linked with costs per revenue mile since vehicle maintenance is approximately proportional to how many miles the vehicles operate. For this study, costs were calculated using the unit cost per vehicle revenue hour to focus on the changes in operational parameters between each scenario.

The LRT service is based on operations for 21 hours per day, with seven of those hours operating peak period service headways (6 minutes) and 14 hours operating off-peak service headways (12 minutes) on weekdays. Peak period LRT trains would be comprised of 3-car sets and off-peak period LRT trains would be comprised of 2-car sets. The LRT weekend and holiday service is assumed to operate for 21 hours with 12 minutes headway throughout the day. Each LRT train would be composed of 2-car sets.

The No-Build Scenario assumes similar to the existing Metrolink AVL service on the single-tracked corridor. Future Metrolink AVL service is based on SCORE operations with 30-minute bidirectional service providing 36 round trips per weekday and current levels of weekend service with 12 round trips. Each train is comprised of one locomotive plus three coach cars for all trips.

For each scenario, it was assumed that of the 365 days per year, 255 of those days are weekdays and 110 days are weekend days or holidays.

A summary of the estimated O&M costs in 2022 dollars is shown in Table 6-4. The No-Build Scenario is estimated to have the lowest O&M Cost at approximately 73.9 million in 2022 dollars. Scenarios 1a and 1b are the costliest scenarios to operate due to providing the highest number of trains and thus the highest total annual revenue hours of service. The annual O&M cost is estimated to be approximately $90.5 million in 2022 dollars. The annual O&M cost for Scenarios 2a and 2b is estimated to be approximately $81.6 million in 2022 dollars.

Table 6-4: Annual O&M Cost Estimates by Scenario (2022 dollars, millions)

Scenario	LRT	Metrolink	Total
No-Build Scenario	$66.5	$7.4	$73.9
Scenario 1a	$77.1	$13.4	$90.5
Scenario 1b	$77.1	$13.4	$90.5
Scenario 2a	$66.5	$15.1	$81.6
Scenario 2b	$66.5	$15.1	$81.6

The costs developed in this study originate from 2022 unit costs and are initially presented in 2022 US dollars. Similar to the capital cost estimating methodology, an annual escalation rate of 3.5 percent was used to determine operating costs for 2040, the year of planned operations. The future year defined for the ESFVTC project under the environmental clearance phase was 2040. This annual growth rate was applied with compounding for 18 years to escalate costs from 2022 to 2040 dollars.

A summary of the O&M costs broken down by study scenario in 2040 dollars is shown in Table 6-5. The annual O&M cost for the No-Build Scenario is estimated to be approximately $137.3 million in 2040 dollars. The annual O&M cost for Scenarios 1a and 1b is estimated to be approximately $168.2 million in 2040 dollars. The annual O&M cost for Scenarios 2a and 2b are estimated to be approximately $151.6 million in 2040 dollars.

Table 6-5: Annual O&M Cost Estimates by Scenario (2040 dollars, millions)

Scenario	LRT	Metrolink	Total
No-Build Scenario	$123.5	$13.8	$137.3
Scenario 1a	$143.3	$24.9	$168.2
Scenario 1b	$143.3	$24.9	$168.2
Scenario 2a	$123.5	$28.1	$151.6
Scenario 2b	$123.5	$28.1	$151.6

7 ALTERNATIVE EVALUATION

The study scenarios were evaluated for transportation system benefits, operational compatibility, multi-modal connectivity, cost to build and operate, as well as impacts on ROW, utility, traffic, and parking.

7.1 EVALUATION CRITERIA AND PERFORMANCE MEASURES

Each scenario will be quantitatively and qualitatively evaluated against 19 criteria within the categories on a points system, with the more favorable scenarios receiving the most points. The following subsections describe how each scenario will be evaluated against the eight categories. The 19 criteria are shown in Table 7-1.

Table 7-1: Evaluation Criteria

No.	Category	Criteria	Score Range
1	Integration of Operations	Does the scenario preclude future freight or regional rail expansion?	0-1
2	Transit and Multimodal Connectivity	How many transit services does this scenario connect with?	0-2
3		What are the median peak and off-peak frequencies of connecting transit services?	Not Scored
4		Does the scenario impact the existing bike network?	0-2
5		What is the quality of the transfer conditions at the LRT/AVL stations based on the safety and comfort aspects of the surrounding walking environment and bicycle amenities?	0-2
6		Does the scenario enhance regional connectivity?	0-1
7	Safety	How many at-grade railway tracks do pedestrians need to walk across?	0-2
8		Is there an adequate storage length for gate spillback queuing?	0-1
9		Is there an adequate storage length for influence zone queuing?	0-1
10	Travel Time Savings and Ridership	Which scenario has the lowest median travel time of the representative O-D pairs?	0-2
11		Which scenario has the highest typical weekday ESFV LRT ridership for 2040?	0-2
12		Which scenario has the highest per ESFV LRT station ridership forecasted for 2040?	0-2
13		Which scenario has the highest typical weekday AVL ridership for 2040?	0-2
14		Which scenario has the highest systemwide total linked trips in Southern California?	0-2
15		Which scenario has the highest user benefits in hours on a typical weekday?	0-2
16	Capital and O&M Costs	Which scenario has the lowest capital cost estimate?	0-4

No.	Category	Criteria	Score Range
17		Which scenario has the lowest O&M cost estimate?	0-2
18	ROW Impacts	Which scenario has the least ROW impacts?	0-4
19	Traffic and Parking Considerations	In 2040, what will be the peak hour traffic operational conditions at key intersections in the study corridor?	0-2
20		Does the scenario impact the existing parking supply?	0-2
21	Equity Considerations	How many people living in EFC[1] tracts would benefit from a new LRT station within a 1/2-mile radius?	0-1

Note: [1]EFC = Equity Focus Communities

7.2 EVALUATION RESULTS

Based on the analysis, the top-performing scenario has been identified as Scenario 2a ESFV IOS Metrolink Station with an island platform. Scenario 2a provided competitive connectivity and ridership benefits when compared to the other scenarios, with lower estimated costs and impacts to ROW and future traffic volumes. The No-Build scenario would have no proposed changes to existing traffic patterns or ROW, but provided the least potential benefits to transit riders. Both Scenarios 1a and 1b received the lowest scores among all scenarios. While an extended ESFV LRT to Sylmar could reach more transit riders, the forecasted benefits in ridership and new transit trips added are comparable to other lower-cost scenarios.

The scoring calculated from the previous sections' criteria is summarized in Table 7-2.

[1] Equity Focused Community

Table 7-2: Summary of Scenario Scoring by Category

Category	No-Build	Scenario 1: Full-Build LRT		Scenario 2: ESFV IOS	
		1a: Partial Grade Separation	1b: Full Grade Separation	2a: Island Platform Metrolink Station	2b: Side Platforms Metrolink Station
1. Integration of Operations	1	0	0	1	1
2. Transit and Multimodal Connectivity	4	3	3	4	4
3. Safety	3	0	3	2	2
4. Travel time Savings and Ridership	2	10	10	8	8
5. Capital and O&M Costs	6	1	0	4	3
6. Right-of-Way (ROW) Impacts	4	1	0	3	2
8. Traffic and Parking Considerations	4	0	1	3	2
9. Equity Considerations	0	1	1	0	0
Results	24	16	18	25	22

Notes: Category 7: Stakeholder preferences were not included in this table. The input provided by the City of San Fernando and SCRAA/Metrolink will not be scored as part of this analysis but is documented for further consideration.

8 INSTITUTIONAL STAKEHOLDER ENGAGEMENT

Stakeholders play a crucial role in this study as they provide diverse perspectives on the community, inform decision-makers, and gather future community support for the implementation of the preferred alternative. As this study is an extension of the ESFVTC Project, currently under construction, the stakeholders and communities were already involved in the previous planning study, conceptual engineering, and environmental clearance process. Therefore, Metro was fortunate to be working with stakeholders who are well-informed and have desires on how they would like to influence a future extension or connection to the ESFVTC Project.

The 2.5 miles of the shared ROW corridor directly links with three key stakeholders that were included in this study. This includes the City of Los Angeles (neighborhoods of Pacoima and Sylmar), the City of San Fernando, and Southern California Regional Rail Authority (SCRRA) which operates the Metrolink regional rail service. The following meetings and touchpoints were conducted to encourage interaction and input from these stakeholders:

- Southern California Regional Rail Authority (Metrolink)
  - April 2022 – Study kick-off meeting
  - August 2022 – Shared the Metro Milestone 1 analysis results
  - March 2023 – Refined the study scenarios for Milestone 2
  - February 2024 – Scenario refinement and results of grade crossing analysis
- City of San Fernando
  - May 2022 – Study kick-off and seek inputs on data collection and grade crossing analysis methodologies
  - July 2022 – Presented study overview to the City Council
  - September 2022 – Presented design plans to City staff
  - January 2023 – Presented the Metro Grade Crossing Analysis Milestone 1 and Metrolink Grade Crossing Analysis Step 1; sought input for circulation plan study intersections
  - February 2024 – Scenario refinement and results grade crossing analysis
- City of Los Angeles
  - February 2023 – Presented the Metro Grade Crossing Analysis Milestone 1 and Metrolink Grade Crossing Analysis Step 1; sought input for circulation plan study intersections
  - August 2023 – Presented study overview to Council District 7

Inputs from these stakeholder meetings allowed for refinements to various outputs of the study. Examples of these refinements included expanding the location and number of traffic counts, refinement of scenarios studied to meet the existing status with the ESFVTC project, and inclusion of two LRT grade separation alternative scenarios.

9 MAJOR FINDINGS

9.1 SUMMARY OF MAJOR FINDINGS OF THE STUDY SCENARIOS

The major findings of studying the four proposed scenarios are summarized as follows:

- All the study scenarios except for the No-Build scenario assume the completion of the SCRRA double track between Van Nuys Boulevard and Metrolink Sylmar/San Fernando Station. The double tracking would support the safe operation of the AVL to improve to 30 minutes in both directions throughout the day. The design of the second track will minimize impacts on the existing single track. An infill Metrolink Station would be built near the intersection of Van Nuys Boulevard and San Fernando Road under Scenarios 2a and 2b.
- In Scenario 1a, the Full-Build LRT – Partial Grade Separation, the Paxton Street crossing is where the LRT tracks need to be grade separated. Therefore, a partial grade separation option with an underpass at the Paxton Street crossing is defined.
- In Scenario 1b, the Full-Build LRT – Full Grade Separation, the LRT tracks would be grade separated at all six grade crossings. The two AVL/UPRR tracks would remain at grade in both options.
- Scenario 1a would have the worst traffic operational conditions due to the frequent gate down activities by as many as 25 LRT, AVL, and freight trains during peak hours.
- Scenario 1b would have better and similar traffic operational conditions as Scenarios 2a and 2b because there would be only up to five AVL and freight trains per hour running through the shared ROW corridor. Both Scenario 1a and 1b would be significantly more expensive to build than Scenario 2a and Scenario 2b. The capital cost range for the two IOS scenarios would be between $120 to $329 million in 2038 dollars and the cost range for the two Full-Build LRT scenarios would be between $724 million to $2 billion to construct. Whereas the No-Build Scenario is not expected to incur any capital costs.
- Scenarios 1a and 1b would add approximately 4,800 boardings to the ESFV LRT on a typical weekday. However, the estimated average daily boardings on the three new stations in the San Fernando Road shared ROW corridor would be 1,600, which is much lower than the estimated 2,400 average daily boardings on the 11 stations along Van Nuys Boulevard.
- The average capital cost in 2038 dollars to generate each new transit trip going to or from San Fernando Valley is estimated to be $107 to $139 thousand for Scenarios 1a and 1b, $26.2 thousand for Scenario 2a, and $33.6 thousand for Scenario 2b.
- Scenarios 1a and 1b would have significantly more ROW impacts than Scenario 2a and 2b, mainly east of the shared ROW corridor between Jessie/Wolfskill St and Maclay Ave, which is the narrowest stretch of the shared ROW corridor. Furthermore, Scenario 1b would most likely have a full take of the parcel currently occupied by the City of San Fernando Police Department.
- In Scenarios 1a and 1b, most of the oil pipeline ranging from 8” to 36” in diameter will need to be relocated by its owner either prior to construction or during construction. This is a major and costly utility impact.

- Scenarios 1a and 1b would have a greater impact to existing bike infrastructure networks where the realignment or relocation of most of the Mission City Trail would be needed.
- Scenario 2b would have similar benefits as Scenario 2a in terms of providing a transfer between AVL and ESFV LRT and saving travel time for long-distance riders going to and from East San Fernando Valley. However, the capital cost and ROW impacts of Scenario 2b would be much more than Scenario 2a.