Chapter 4

Affected Environment and Environmental Consequences

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Chapter 4 Affected Environment and Environmental Consequences

The affected environment is the current conditions around the Project area today. Environmental consequences include the probable beneficial and adverse social, economic, health, and environmental effects of alternatives under consideration. The Project's effects are characterized in terms of the context and intensity of the effect by considering, for example, the degree to which characteristics of the geographical area would change, as well as the duration of the effect, including short- and long-term effects. The assessment supports the development of measures to avoid, minimize, or mitigate any adverse effects.

This chapter presents the analysis that ATP conducted of the potential environmental effects of the No Build Alternative in comparison to the Build Alternative and Design Options. Each section describes the affected environment and the environmental consequences of the Project for each resource area analyzed. The direct and indirect effects of the Build Alternative and Design Options are identified in the discussions of environmental consequences. Long-term effects from operation of the light rail system and short-term or temporary construction effects are addressed.

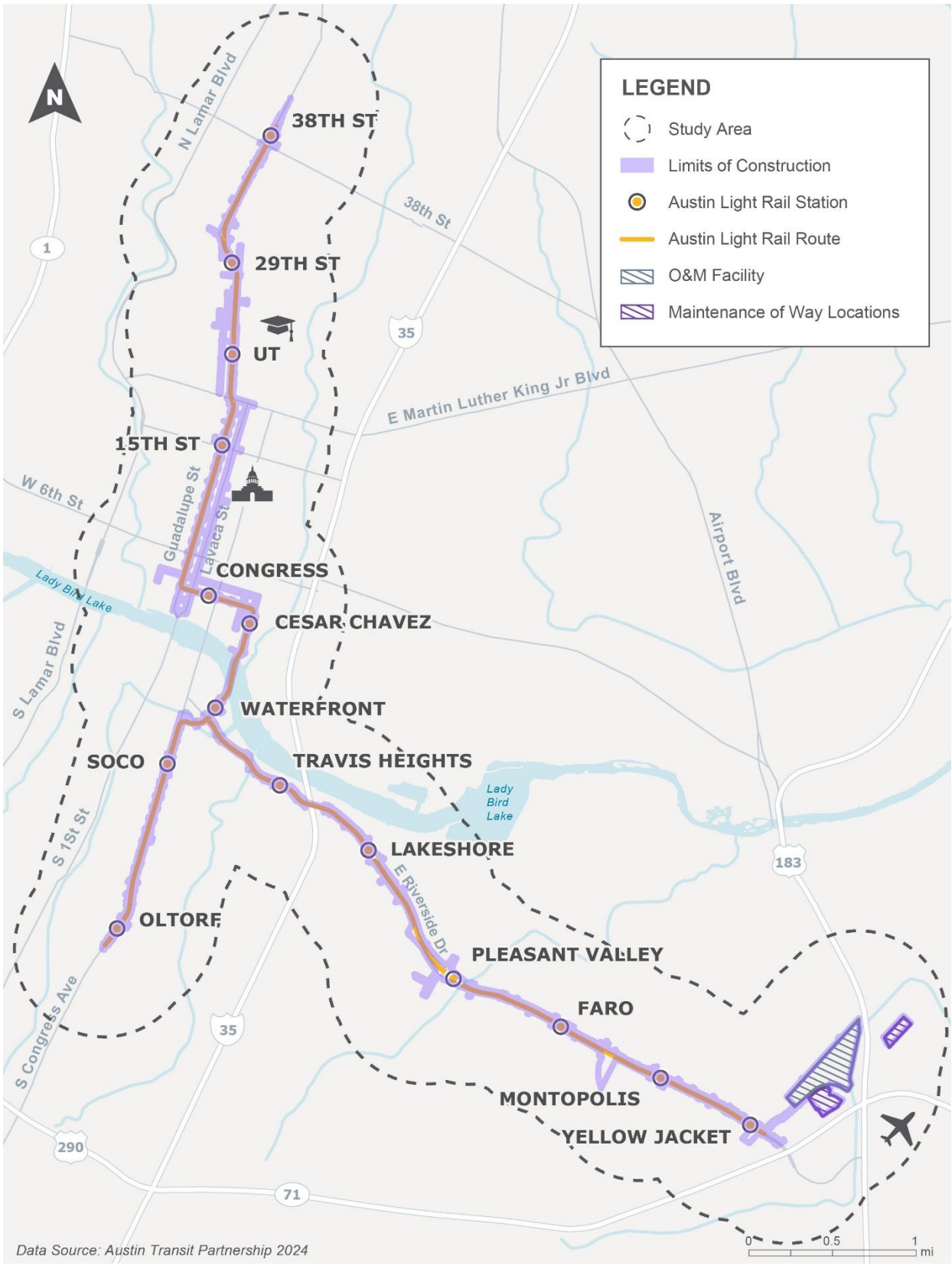
Where potential adverse effects occur, the mitigation measures that ATP may implement are described. Mitigation measures may be incorporated as integral components of a project's design, such as best management practices that are standard measures made proactively to lessen environmental impacts. Alternatively, mitigation measures may also be recommended to offset impacts that are unique to the Preferred Alternative. Both (1) mitigation to be included as integral components of the Project and (2) proposed mitigation to offset impacts that are unique to the Preferred Alternative are described in this chapter and will be available for public comment.

The regulatory setting and methodology used to evaluate each resource, along with a detailed description of the affected environment for each resource, are presented in **Appendix E and Appendix F**. Most of the operational and construction effects of the Project would not extend beyond 0.5 mile of the proposed light rail alignment and associated facilities. Therefore, ATP used a 0.5-mile buffer to study most Project effects. Some effects would occur only within the limits of Project construction, which is the boundary within which construction, materials storage, grading, landscaping, stormwater infrastructure, contractor access,

laydown/staging areas, and related activities would occur. These two Study Areas are shown in Error! Not a valid bookmark self-reference.. Each section describes the pertinent Study Area for the resource analyzed. Evaluations of effects were based on the conceptual designs in **Appendix C.**

This chapter refers to “the Project” when there would be no difference in effects between the Build Alternative and Design Options.

Figure 4-1: Study Area (0.5-mile Buffer) and Limits of Project Construction



4.1 Acquisitions and Displacements

Based on Project designs as of May 2024 (see **Appendix C**), ATP would need to acquire property for construction and operation of the Project. Most acquisitions would be temporary easements during construction or partial acquisitions affecting only a portion of a property, which would not interfere with the use or enjoyment of a property. Full acquisitions would also be needed. For full acquisitions, ATP would purchase property as a fee simple acquisition. All acquisitions would comply with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (Uniform Act).

Property acquisition would occur within the limits of Project construction for the components of the Build Alternative and Design Options, including the guideway, stations, OMF, MOW shops, park-and-rides, sidewalks, shared use paths, bicycle lanes, traction power substation and associated systems, utility relocations, and stormwater infrastructure. The following types of potential acquisitions are described in this section:

- **Partial Acquisition.** Only the portion of a parcel falling within the proposed Project ROW footprint would be acquired. A partial acquisition may include acquiring a portion of property in fee simple (outright transfer of ownership) or obtaining an easement (for drainage, utilities, etc.). Easement acquisition would not transfer possession of a portion of property but would allow ATP to use a specific area of the property for a specific purpose.
- **Full Acquisition.** A full acquisition in fee would be the purchase of an entire parcel, with no remaining interest of the seller in the property (unless mineral rights are retained). In cases where a partial acquisition would be needed based on the proposed Project ROW footprint, if the remaining parcel were an uneconomic remnant (i.e., the remaining portion of the parcel would have little to no value or utility), a full acquisition may occur.
- **Displacements.** A displacement is the result when an existing use is required to move from real property, or to move personal property from real property, permanently, due to acquisition, rehabilitation, or demolition for a project. Displacements can occur from full acquisitions or partial acquisitions that bisect buildings or create damages to the remainder property that affect current functionality.
- **Potential Displacements.** In some cases, partial acquisitions would remove or affect parking or access that could affect the use of a property but not the primary building or function. These situations are potential displacements and would be subject to continuing coordination with the property owner to determine if design solutions are available to mitigate effects and/or whether displacement of the owner/tenant would be required.
- **Temporary Construction Easements.** A temporary construction easement is used for various construction activities. It may include temporary use for the storage of materials and equipment, laydown yards, access to construction areas, site grading, or other construction-related activities.

Acquisitions and easements and potential effects on buildings and parcels are identified in ATP's conceptual design drawings for the Build Alternative and Design Options (see **Appendix C**). As the Project design advances, property acquisition requirements may change because ATP's goal is to minimize effects of property acquisition as practical. In addition, because properties that are currently underdeveloped or vacant could be developed between completion of the NEPA process and the time of acquisition, the number and/or type of displacements could vary between what is disclosed below and what would actually be required. In that event, ATP would reevaluate and update property needs in coordination with FTA.

4.1.1 Affected Environment

The Project corridor is an urban environment with residential, commercial, industrial, and public properties. Current and projected land uses along the alignment are discussed in Section 4.2. The existing transportation ROW varies in width along the alignment, with some areas more constrained by urban development than others. Public utilities, including subterranean utilities, are within the limits of Project construction.

4.1.2 Environmental Consequences

4.1.2.1 No Build Alternative

The No Build Alternative serves as the basis of comparison to analyze the effects of the Project. The No Build Alternative includes the existing transportation network and—without the proposed Project—proposed improvements included in the CAMPO *2045 Regional Transportation Plan* (2024a). A detailed description of the No Build Alternative is included in **Chapter 3, Transportation.** Under the No Build Alternative, the Project would not be built, no acquisitions or easements would be required, and no displacements or relocations would occur from the Project.

4.1.2.2 Build Alternative and Design Options

Operational (Long-Term) Effects

Based on current Project design, of the 567 parcels that are adjacent to the corridor, the Build Alternative would impact 304 parcels. Of these impacts, the corridor alignment would require 27 full acquisitions and 277 partial acquisitions, resulting in 59 business displacements. Eight residential condominium units (from one building) on East Riverside Drive could lose access to parking spaces in the Build Alternative. Loss of parking could result in displacement of the residents in affected units. ATP is investigating opportunities to avoid these displacements through design of an alternative access route to the parking spaces. The Lady Bird Lake Bridge Extension Design Option would avoid these impacts because it would require less property in this area, as discussed below in this section.

The proposed OMF near the US 183 and SH 71 interchange near Airport Commerce Drive would require the largest land acquisition under the Build Alternative and all Design Options, requiring approximately 62 acres of property from 10 full acquisitions, and the displacement of 24 businesses in a light industrial use area. Given this area's existing industrial and commercial uses, it may be possible to relocate the 24 businesses in the immediate area.

Outside the OMF, the remaining 35 business displacements include restaurants, retail, automotive, health care facilities, and other businesses. A search on LoopNet showed there are approximately 80 commercial real estate buildings for sale within the Austin city limits (LoopNet 2024). Relocation within the Study Area may also be possible through redevelopment of an existing site or by incorporation into larger developments.

The Build Alternative includes three park-and-rides, near 38th Street Station, Oltorf Station, and Yellow Jacket Station. The park-and-ride at 38th Street would require three business displacements on the northwest corner of West 38th and Guadalupe Streets. The other two park-and-rides would not displace any homes or businesses.

The Build Alternative and all Design Options would require property acquisition of public parkland, including the partial conversion of City-owned parkland at Waller Beach at Town Lake Metro Park. For a detailed analysis of the potential effects on publicly owned parks and recreation areas, and compliance with Section 4(f) and Section 6(f) regulations, see **Appendix G** and **Appendix H**.

The Wooldridge Square Station Design Option would add a station near Wooldridge Square and would require more ROW from fewer parcels than the Build Alternative to accommodate the proposed station footprint. Full acquisition of a parking lot across from Wooldridge Square Park would be required, as opposed to a partial acquisition under the Build Alternative. One partial acquisition for a utility easement at a parking garage that would be required under the Build Alternative would be avoided. This Design Option would also require a small temporary construction easement for construction of a retaining wall directly adjacent to Wooldridge Square (within the ROW).

Under the Build Alternative, the Cesar Chavez Station would be on Trinity Street between Cesar Chavez Street and 2nd Street. ATP is studying a Cesar Chavez Station Design Option that could promote privately owned transit-oriented development. The Design Option would place the station diagonally within the block bounded by San Jacinto Street, Trinity Street, 3rd Street, and 2nd Street, and would require a developer agreement. This Design Option would move forward only if an agreement could be reached with the private owners.

Under the Lady Bird Lake Bridge Extension Design Option, there would be six fewer parcel effects than under the Build Alternative; seven single-family, two multifamily, and one commercial parcel would not be affected by partial acquisitions, while four additional vacant parcels would be affected by the Design Option, for a net decrease of six parcels. Unlike the Build Alternative, the Design Option would not affect the parking associated with eight condominium units. However, it would affect parking and potentially displace a commercial building. Additional vacant parcels would be affected on the north side of East Riverside Drive between Alameda Avenue and Travis Heights Boulevard to accommodate the alignment shift of the elevated track. Effects on parks would remain the same for this Design Option as under the Build Alternative.

Under the Build Alternative, the Travis Heights Station would be located on East Riverside Drive just east of Travis Heights Boulevard and would require more than 2 acres of ROW from Norwood Tract at Town Lake Metro Park. ATP is studying the Travis Heights Station Design Option, which

would exclude the Travis Heights Station from the Project. Under this Design Option, there would be five fewer parcel effects than under the Build Alternative. Rather than acquire from the City portions of Norwood Park on the north side, the Design Option would stay truer to the existing alignment and would require small slivers of ROW from four single-family parcels on the south side to accommodate the guideway and shared use path. In doing so, the Design Option would avoid impact on Norwood Tract.

The Center-Running Bike/Pedestrian and Shade Tree Facilities on East Riverside Design Option would include center-running bicycle and pedestrian lanes next to the light rail east of I-35 on East Riverside Drive. In this part of the Project corridor, the roadway ROW is relatively wide, and the Center-Running Bike/Pedestrian and Shade Tree Facilities on East Riverside Design Option would improve shade cover and plant taller trees on the south side of the bicycle and pedestrian facilities. This Design Option could result in the displacement of five additional commercial properties and four single-family homes. Continuing design will prioritize reducing the impacts on potential residential displacements. Additionally, this Design Option would partially affect one more park parcel than the Build Alternative—the Aura Riverside Park and Trail on the south side of East Riverside Drive, between Grove Avenue and Montopolis Drive—to accommodate the wider facility.

The Grove Station Design Option would combine the Montopolis and Faro Stations proposed under the Build Alternative into a single station at Grove Boulevard. This Design Option would reduce ROW effects at Faro and Montopolis Streets but would affect six more parcels than the Build Alternative due to ROW and easement needs. The Variation to the Grove Station Design Option would require an additional sliver of ROW from one more parcel compared to the Build Alternative.

While the light rail guideway would be center-running in the roadway ROW for most of the alignment, the bicycle and pedestrian lanes planned as part of the Project would require additional width in certain locations. In some areas of constrained roadway ROW, ATP has minimized property acquisitions by including shared use paths instead of separate lanes for bicycles and pedestrians. ATP would obtain utility easements for the relocation of subterranean utilities that are in the roadway and in conflict with the light rail infrastructure. These utility easements would be permanent easements and are included in the total number of partial acquisitions. Most partial acquisitions would not displace occupants or interfere with the use or enjoyment of the property after construction is complete because only a portion (typically 10 feet) of the property would be affected. Permanent acquisitions and displacements by land use for the Build Alternative and Design Options are summarized in **Table 4-1**.

Table 4-1: Permanent Acquisitions and Displacements by Build Alternative and Design Options[1]

Alternative or Design Option	Number of Parcels	Partial[2]	Full[3]	Displacements
Parcels Adjacent to Corridor	567			
Build Alternative	304	277	27	59 Commercial
Wooldridge Square Station	-1	-2	+1	0
Cesar Chavez Station	+4	+4	0	0
Lady Bird Lake Bridge Extension	-6	-6	0	0
Travis Heights Station	-4	-4	0	0
Center-Running Bike/Pedestrian and Shade Tree Facilities on East Riverside	+14	+14	0	+ 5 Commercial + 4 Residential
Grove Station	+6	+6	0	0
Variation to the Grove Station Design Option	+1	+1	0	0

Note: Potential displacements, those that are affected by parking or access and do not incur building displacements, are not included in this table but are discussed below.

1 Based on Project design dated May 2024.

2 Partial acquisitions require ROW from a property but do not require the entire parcel. These could include acquisitions for utilities or drainage. These could also include displacement of people or businesses; if a partial acquisition affects parking or access, it could result in displacement even though a building is not affected.

3 Full acquisitions require acquisition of an entire parcel and could displace businesses or people.

Construction-Related (Short-Term) Effects

During construction, temporary construction easements would be needed for staging and parking areas as well as construction access. ATP anticipates that multiple staging areas would be used, some of which may be used for only part of the construction period. At the current stage of design, specific temporary construction areas have not been identified so an area of 10 feet from the proposed back of curb along the entire alignment was assumed for temporary construction easements. In some areas, where a building would be affected, less than 10 feet was proposed, and in some cases where more area was needed, more than 10 feet was proposed. Specific areas needed for temporary construction easements will be refined as designs progress.

Temporary construction activity in staging areas and construction easements would convert the existing land on which they occur to a temporary construction use; the owner of such lands would temporarily lose the use of that land until construction activity ends. After construction is

completed, the property would be restored to its previously existing condition or better, and the easement would be terminated or expire. All temporary construction easement negotiations and acquisitions would comply with the requirements of the Uniform Act.

Uniform Act Compliance

The Project must comply with the Uniform Act and its implementing regulations found at 49 CFR Part 24. The regulations at 49 CFR Part 24 are intended to ensure fair, equitable, and uniform treatment of all persons from whom real property is to be acquired or who may be displaced as a result of an acquisition. Real property interests necessary for the development of the Project would be acquired in compliance with the 49 CFR Part 24, Subpart B provisions. This applies to the acquisition of full fee and less than full fee interests needed for the Project. The fair market value of the property interests to be acquired for the Project would be determined through independently prepared appraisals and review appraisals defined at 49 CFR Section(s) 24.103 and 24.104. The Project would establish what it believes to be just compensation for the real property interests to be acquired, and in no case may it be less.

All persons determined to be displaced as a result of an acquisition of real property would be provided with assistance to relocate pursuant to the requirements of 49 CFR Part 24. ATP would prepare an adequately detailed relocation plan for the Project pursuant to the provisions in 49 CFR Section 24.205. All displaced persons (residential, commercial, and personal property) would be provided with advisory services as required in 49 CFR Section 24.205(c). All displaced persons would be provided with all required relocation notices as defined in 49 CFR Section 24.203. All nonresidential displaced persons would be provided with all assistance as applicable in 49 CFR Part 24, Subparts C and D. All displaced residential persons would be provided with at least one (preferably three) decent, safe, and sanitary comparable replacement dwelling(s) pursuant to the requirements of 49 CFR Section 24.204. All displaced persons would be provided with reasonable assistance necessary to complete and file any required claim for payment as required by 49 CFR Section 24.207. Further, expeditious payments for relocation claims shall be made, and dependent on demonstrable need, advance payments would be made to avoid or reduce hardships. No relocation payments would be made to any displaced person without first obtaining certification that the person is either a citizen or national of the United States, or an alien who is lawfully present in the United States pursuant to 49 CFR Section 24.208. Any person who feels that ATP has failed to properly consider the person's application for assistance would be provided with the opportunity to appeal such determination pursuant to the requirements of 49 CFR Section 24.10. Last Resort Housing benefits would be made available to all persons for whom comparable replacement housing is not available within their financial means pursuant to the requirements of 49 CFR Section 24.404.

For the potential displacements, ATP would make a determination as to whether or not the property/person would be displaced as a result of the acquisition based on final design. All persons deemed by ATP to be displaced as a result of an acquisition shall be provided assistance to relocate.

If any short-term construction uses would result in temporary relocations, ATP would provide financial and advisory benefits in compliance with the Uniform Act (HUD Exchange 2024).

4.1.3 Mitigation

As an integral component of the Project, ATP would collaborate with the City's Displacement Prevention team to develop and implement programs funded by the $300 million allocated for anti-displacement efforts (see **Chapter 6, Environmental Justice**).

ATP would develop a Business Assistance Program to reduce the burden on businesses prior to and during construction. ATP is considering several options to limit effects on displaced residents and businesses to be included in the Preferred Alternative, including, but not limited to, phasing acquisition and relocation activities, providing additional relocation consulting services not required by the Uniform Act, and extending the time frame for relocation activities.

4.2 Land Use and Zoning

Land use analysis characterizes the types of land use found in an area and the development trends that a project may affect. The degree of the change in land use that would result from new transportation elements is assessed in relation to the surrounding pattern of residential, commercial, and industrial development and compatibility with local land use plans and policies.

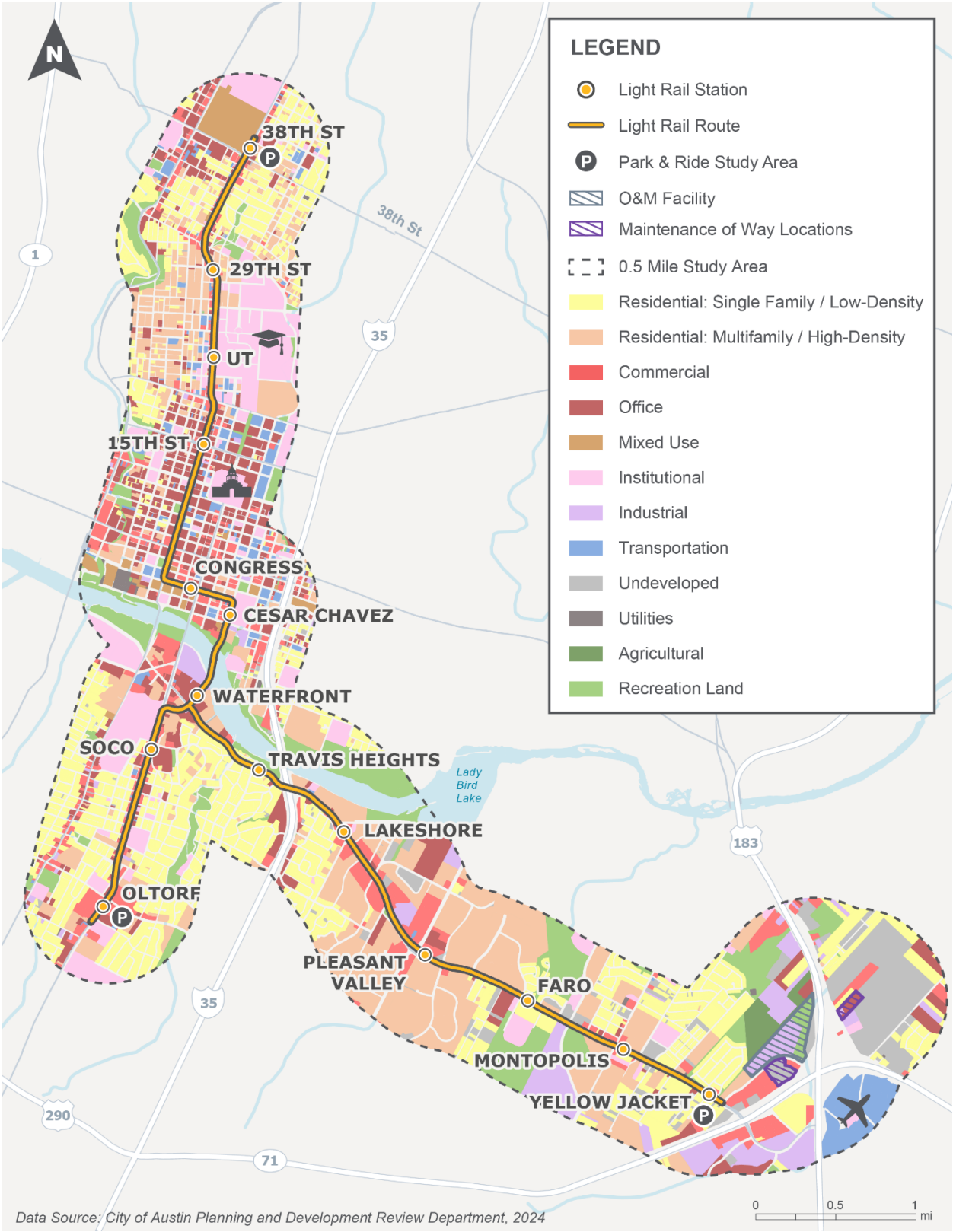
ATP assessed the compatibility of the Project with local land use, zoning, and public policies and reviewed the land use patterns and trends that the Project could affect. The Study Area for the land use and zoning analysis includes the area within a 0.5-mile buffer of the proposed alignment and facility locations. The Project is compatible with local plans to encourage growth in transit-oriented development zones, as summarized below. Section 4.4, Socioeconomics, addresses the potential of accelerated transit-oriented development growth to affect property values and the availability of affordable housing. The Project's effects on parkland and recreation areas are addressed in **Appendix G** and **Appendix H**.

4.2.1 Affected Environment

Existing land uses in the Study Area vary greatly in character and density but primarily consist of commercial and office, residential, civic, and transportation (including parking). In the North Section, between 38th Street and MLK Boulevard, single-family residences and the 431-acre UT campus are the dominant uses, interspersed with small commercial establishments, multifamily buildings, high-rise multifamily buildings in West Campus, and a mixed-use development, as shown in **Figure 4-2**.

Downtown Austin, in the Downtown Section of the Project, serves as the region's central business district featuring the State Capitol and other civic uses. Office and institutional uses are predominant. Multistory buildings, historic squares, and recently developed residential high-rises are in this area. Land use transitions to the parks and trails of the Town Lake Metropolitan Park system, which line the north (and south) shores of Lady Bird Lake, and to commercial, civic, and residential uses in the eastern portion of the Downtown Section.

Figure 4-2: Existing Land Use in the Study Area



In the South Section, public parkland is located on the south shore of Lady Bird Lake, and commercial and institutional uses line South Congress Avenue, with residential land use composing most of the land use west and east of the commercial strip. The southern tip of the Study Area hosts larger retail stores and a portion of the St. Edward's University campus. Along the eastern branch of the alignment in this section, East Riverside Drive has commercial uses at its intersection with South Congress, followed by multifamily and single-family residences with scattered commercial and office uses up to I-35. This section also features Norwood Tract at Town Lake Metro Park, which includes the historic Norwood House and a popular dog park, at the corner of East Riverside Drive and I-35, and the Ann and Roy Butler Hike and Bike Trail, which surrounds Lady Bird Lake.

In the East Section, the Study Area flanks East Riverside Drive, a major arterial and route to the Austin-Bergstrom International Airport. From I-35 to Montopolis Drive, the East Riverside Corridor is surrounded by a variety of housing consisting of apartments, condominiums, townhomes, and single-family homes. There is also a cluster of airport hotels near the Yellow Jacket Station. Beyond the main thoroughfare, it changes into more apartments in Montopolis to the south of Parker Lane and an area of single-family homes from I-35 to Parker Lane. Apartments from I-35 to Faro Drive and a neighborhood of single-family homes from Faro Drive to Yellow Jacket Lane are located to the north of East Riverside Drive. This neighborhood also has a substantial amount of affordable housing, primarily apartments.

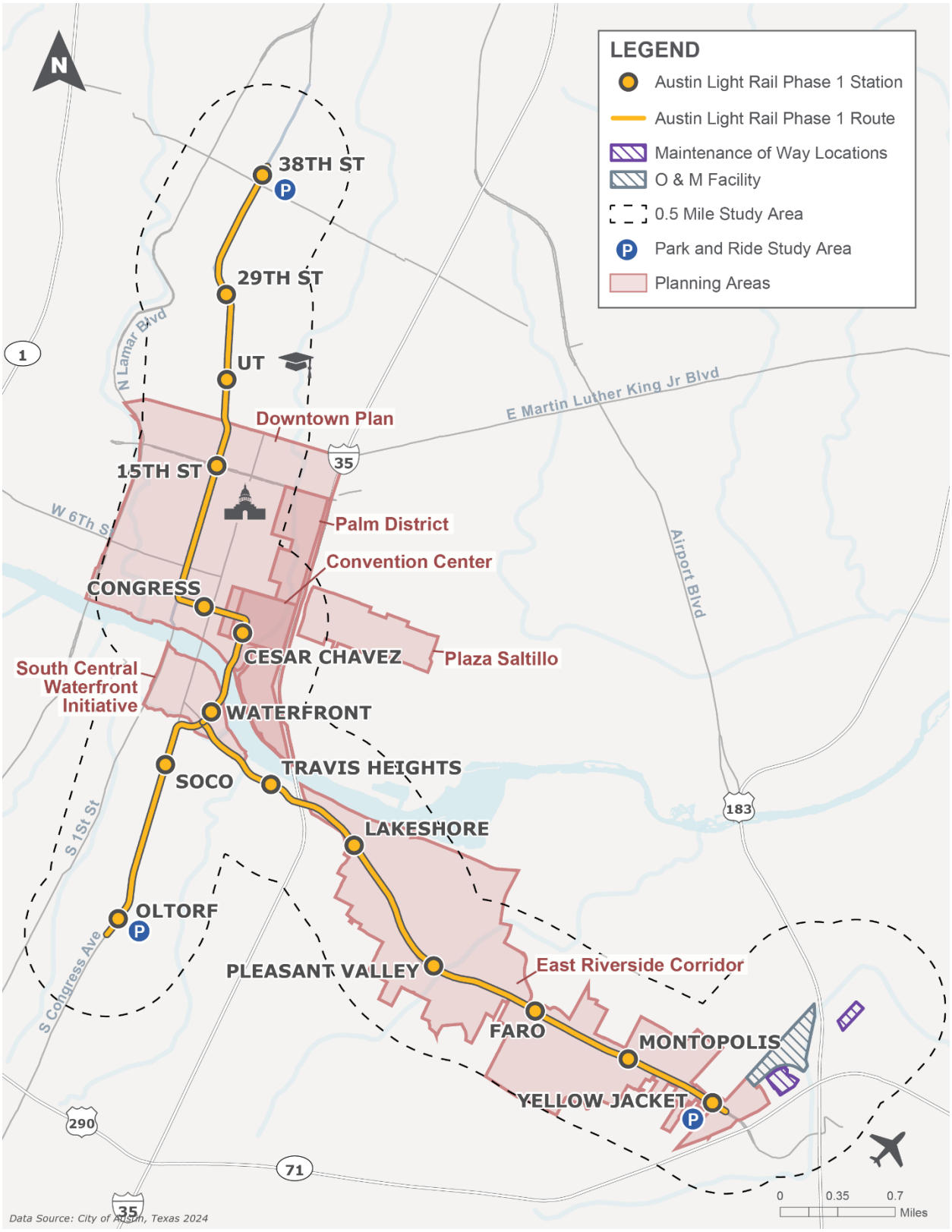
The City plans to meet the region's growth in a sustainable and equitable manner. Through long-range planning, neighborhood and small area plans, and the City's Land Development Code that regulate the development and use of property, the City aims to make Austin more walkable, transit-supportive, and environmentally friendly. While existing zoning designations generally reflect existing land use patterns in the Study Area, established and proposed Land Development Code amendments will dictate the type of growth and its location for future developments.

4.2.1.1 Plans and Policies

The City began collaborating with community members to create neighborhood plans in the 1990s and adopted *Imagine Austin* in 2012 to comprehensively guide development over a 30-year period. Last amended in May 2024, *Imagine Austin* promotes a more compact city connected by frequent and convenient bus and rail service and development in designated activity centers (City of Austin 2024a). Planning areas that are expected to experience the substantial change by 2045 are shown in **Figure 4-3**.

The *Downtown Austin Plan* was adopted in 2011 and includes, as a transformative action, regional connectivity among Downtown Austin, the Texas State Capitol complex, UT, and the East Riverside Corridor. It calls for the enhancement of Congress Avenue, known as the Main Street of Texas, to promote public transit as a high-quality mode of choice. Other actions include the construction of safe, secure, and affordable long-term housing and services, as well as Land Development Code amendments to promote a mix of uses, incentivize well-designed dense development, and preserve unique districts and destinations to create a vibrant public realm (City of Austin 2011).

Figure 4-3: City of Austin Planning Areas



At the eastern edge of Downtown Austin, the *Palm District Plan* presents a refined vision, a preferred development scenario, and an implementation plan with detailed recommendations emphasizing equity and sustainable development (City of Austin 2022b).

Waller Creek District is bounded roughly by Waterloo Park to the north, Lady Bird Lake to the south, Trinity Street and River Street to the west, and I-35 Frontage Road to the east. The *Waller Creek District Master Plan* emphasizes maintaining and restoring portions of the creek and calls for improving bicycle and pedestrian linkages in the district (particularly by improving and extending Sabine Street), as well as redeveloping the land adjacent to the creek corridor (City of Austin 2010a).

The *Plaza Saltillo TOD Station Area Plan* guides future development in the area surrounding the CapMetro Red Line station bounded by East 7th Street on the north, Chicon Street on the east, East 3rd Street on the south, and I-35 on the west. The plan designates mixed-use, corridor mixed-use, live/work flex, and low-density residential zones and makes recommendations for open space, street and other infrastructure improvements, and affordable housing (City of Austin 2008). A circulation concept plan is included, which emphasizes improving multimodal connectivity, creating enhanced pedestrian facilities, developing new pedestrian connections, and developing bicycle connections and a trail system. Since the adoption of the plan, dense mixed-use development has occurred around the Red Line station, along with the Red Line Trail, sidewalk systems, and upgraded cycling and pedestrian street crossings.

The University Neighborhood Overlay is a district within the West University neighborhood that promotes high-density redevelopment west of the UT campus. The University Neighborhood Overlay is divided into four subdistricts with a goal to protect character and create a pedestrian-friendly environment in a densely populated area. The density bonus program to create affordable housing units has been one of the most successful in Austin.

The South-Central Waterfront District Initiative seeks to develop the 118-acre industrial zone (and former floodplain) on the south shore of Lady Bird Lake into a mixed-use district with public spaces and waterfront access. The *South-Central Waterfront Vision Framework Plan* was adopted in 2016 with a vision of providing 20 percent new affordable housing units (City of Austin 2016).

The East Section of the Project alignment—currently occupied by auto-oriented commercial and residential uses—is guided by the *East Riverside Corridor Master Plan,* which proposes substantial redevelopments. The vision includes urban mixed-use development in a transit-oriented, pedestrian-friendly environment and a planned transportation center near Austin-Bergstrom International Airport (City of Austin 2010b). The *Regulating Plan for the East Riverside Corridor Zoning District* proposes development bonuses in the areas around proposed transit stops in exchange for specified community benefits, such as affordable housing (City of Austin 2013).

Major recent and planned developments include 45 projects within the Study Area. Sixteen of the 45 projects are multifamily, and the remaining 30 are mixed use with multifamily development. Combined, these projects will add more than 10,000 residential units to the Study Area. These projects are listed and shown in **Appendix E-2**.

4.2.1.2 Transit-Supportive Land Development Code Amendments

The City, in coordination with ATP and CapMetro, is conducting land use and economic development planning activities associated with the Project, including the ETOD Study and *ETOD Policy Plan*. ETOD attempts to mitigate displacement pressures and create new economic opportunities to help communities thrive. The City has adopted the following land use development regulations and amendments in conjunction with development of the Project:

- In May 2024, the ETOD Overlay was adopted, which applies to approximately 850 acres of multifamily and commercially zoned properties along the Project alignment. The overlay restricts new non-transit supportive uses, such as auto- and storage-related uses, and creates a density bonus program that allows more height (up to 120 feet within 0.25 mile of the light rail line and 90 feet within 0.5 mile) and relaxes zoning standards in exchange for affordable housing and transit supportive infrastructure. To protect existing naturally occurring affordable housing, the bonus program includes a requirement to replace these units with new affordable units when redevelopment occurs. Additionally, design standards to create an active, pedestrian-oriented ground floor are required for developments participating in the bonus program. The ETOD station areas and typologies from the *ETOD Policy Plan* were incorporated into *Imagine Austin* and its growth concept map series to align development goals.
- In May 2024, the Austin City Council passed new compatibility rules to reduce the effect of height restrictions near single-family homes on housing capacity. The previous compatibility standards limited building height for up to 540 feet away from a single-family property. The new standards limit height for 75 feet from a single-family property, which increases the estimated housing capacity across Austin by about 63,000 units. The new compatibility rules substantially increase by-right entitlements for properties zoned commercial and multifamily within the Study Area.
- In May 2024, to support multi-modal travel and reduce traffic congestion, the Austin City Council passed new maximums on parking in Downtown Austin, building on its earlier code amendment that removed parking minimums citywide.
- In July 2023, the Austin City Council adopted a resolution initiating zoning code amendments, colloquially known as HOME (Housing Options for Mobility and Equity), with the goals of making homeownership more attainable for middle-income earners, as well as giving families the flexibility to have multigenerational housing options and generate income on their properties. Over two phases, the Austin City Council adopted changes to the predominant single-family zoning districts across Austin. The first phase, adopted in December 2023, allows three units on all standard-size lots (5,750 square feet), which is an increase of one or two units per lot. The second phase, adopted in May 2024, reduces the minimum lot size for one unit from 5,750 square feet to 1,800 square feet. New zoning regulations for these homes promote pedestrian-friendly building

design by reducing the front setback and including design standards that reduce the effect of garages and driveways along the street. Future code amendments under the HOME resolution will increase missing middle housing options across Austin.

- Adopted in December 2023, the Unrelated Adult Occupancy code amendment eliminated the dwelling unit occupancy limit for residential uses.
- In August 2023, updated regulations to deter the displacement of residents early in the redevelopment process were adopted and include tenant notification and relocation protections.
- The existing *East Riverside Corridor Master Plan* and the *Regulating Plan for the East Riverside Corridor Zoning District* cover multiple Project station areas (City of Austin 2010b, 2013). As of November 2024, the City has initiated updates to incorporate ETOD goals into the East Riverside Corridor plans.
- As envisioned, the South Central Waterfront Initiative will create new regulations in the South Central Waterfront District to help realize the *South Central Waterfront Vision Framework Plan* and other applicable City goals and policies. This district includes the Waterfront Station area of the Project.

4.2.2 Environmental Consequences

4.2.2.1 No Build Alternative

The No Build Alternative includes the existing transportation network and—without the proposed Project—proposed improvements included in the CAMPO *2045 Regional Transportation Plan* (2024a). The No Build Alternative would be inconsistent with many neighborhood, City, and regional land use and transportation plans because it would not address growing travel demand with a reliable transit system that efficiently connects planned activity centers or improves access between affordable housing and jobs. Although existing and planned transit improvements, such as bus rapid transit and potential commuter rail enhancements, would provide some additional transit options, they are not expected to fully address the projected increases in travel demand. Further, while recent code amendment changes may generate some gentle densification in central Austin under the No Build Alternative, the lack of corresponding mobility improvements would likely lead to more congestion and longer travel times, particularly during peak hours. The No Build Alternative would therefore provide limited support for local goals of encouraging development of communities in compact forms with a mix of uses so that environmentally sensitive areas, rural landscapes, and farmland can be preserved. Under both the No Build and Build Alternatives, automobile VMT would increase in the region due to an increase in population and employment. However, without additional transit capacity, congestion would worsen under the No Build Alternative because the existing roadway network and planned roadway improvements, including bus rapid transit and commuter rail, would not have the capacity to accommodate the growth.

4.2.2.2 Build Alternative and Design Options

Operational (Long-Term) Effects

The Build Alternative would support *Imagine Austin*'s vision of creating a more compact city connected by public transit. It would connect areas of high employment, including four of the activity centers identified in the plan (Downtown, Plaza Saltillo, South Central Waterfront, and

Riverside Stations). In addition, the Build Alternative would be designed to connect with other transit routes, further expanding connections between some of the largest activity centers in central Austin and beyond. Providing urban transportation to support a more compact city would help reduce urban sprawl caused by housing shortages and affordability, reduce vehicle emissions caused by current and potential suburban commuters, help preserve farmlands and ecological sites from sprawl development, and improve the quality of life for surrounding neighborhoods.

The Study Area is becoming increasingly developed as there are many large-scale emerging projects in various stages of development along the Study Area corridor. The Build Alternative would provide better connections and more convenient, reliable transit access to these developments than the No Build Alternative.

The Build Alternative would be consistent with the vision, goals, and policy priorities expressed in the adopted City plans that inform land use and zoning in the Study Area. Specifically, the Project would realize the vision of the:

- *Downtown Austin Plan* to create an urban rail system connecting Downtown Austin with East Austin and other destinations (City of Austin 2011);
- *Waller Creek District Master Plan* in the redevelopment of the area into a mix of uses, supported by access to light rail via the Cesar Chavez Station (City of Austin 2010a);
- *Palm District Plan* to support an affordable and reliable new transportation option (City of Austin 2022b);
- *Plaza Saltillo TOD Station Area Plan* to create new multimodal connections to the CapMetro Red Line station supporting the area's redevelopment (City of Austin 2008);
- *South Central Waterfront Vision Framework Plan* via the SoCo Station and Waterfront Station, which would serve the new development and provide access to the new public spaces along the waterfront (City of Austin 2016);
- *East Riverside Corridor Master Plan* to build light rail along East Riverside Drive and promote the creation of employment-focused activity served by five proposed light rail stations; the park-and-ride and OMF would be consistent with the planned transportation center at the east end of East Riverside Drive (City of Austin 2010b);
- University Neighborhood Overlay near UT to increase housing density to accommodate a growing student population, encourage pedestrian-friendly development with affordable housing incentives, enhance neighborhood livability, and manage urban growth (City of Austin 2022c); and
- *ETOD Policy Plan* to create and promote accessible transportation, affordable housing, close racial gaps, support jobs and neighborhoods, and preserve cultural heritage and minority[1] businesses (City of Austin 2023d).

[1] FTA identifies minority populations as persons who are American Indian and Alaska Native, Asian, Black or African American, Hispanic or Latino, and Native Hawaiian and other Pacific Islander (FTA 2012). The analysis in this EIS also considers minority to include persons identified as being either "some other race" or "two or more races" in the census data. ATP identified a census block group as a minority block group if 50 percent or more of the residents identified as minority.

In terms of direct effects, the Project would be built largely within the existing transportation ROW. The proposed OMF would result in the biggest change in land use because it would convert 62 acres of land to transportation use. However, the site is largely buffered from surrounding uses and is currently occupied by light industrial businesses. The OMF and its operations would comply with the City's commercial zoning designation. As a result, the light rail operations and maintenance activities would not adversely affect land use in the Study Area. Other direct effects would occur from the acquisition of approximately 23 acres of ROW and 7 acres of easements, dispersed along 9.8 miles of the proposed alignment, for the traction power substations, park-and-rides, and other associated light rail equipment. These effects would result in minor changes in an already urban environment.

The Build Alternative and Design Options would affect future land use patterns in a similar manner. The Wooldridge Square Station and Cesar Chavez Station Design Options would further support growth in Downtown Austin. The Lady Bird Lake Bridge Extension Design Option exists in a commercially developed area and would have limited effects on future land use whether the Waterfront Station is elevated or not. Similarly, the Travis Heights Station Design Option is within a historic residential neighborhood where there is limited development potential, so the Project's effect on land use patterns would be the same with or without the Travis Heights Station.

The Center-Running Bike/Pedestrian and Shade Tree Facilities on East Riverside Design Option would be consistent with the *East Riverside Corridor Master Plan* for reconstruction of East Riverside Drive east of I-35 into a multimodal corridor that allows for safe and efficient movement of all transportation modes, including public transit vehicles, bicyclists, and pedestrians.

Construction-Related (Short-Term) Effects

The Project would require temporary construction easements and the conversion of land into active construction sites. Construction easements would be temporary, and when feasible, the used property would be returned to preconstruction conditions upon completion. Following construction, redevelopment of parcels would occur consistent with land use regulations for the parcels. Construction activities on the OMF site would not affect access to adjacent residential or commercial uses, and because the land is currently used for light industry, construction effects are anticipated to be minor.

4.2.3 Mitigation

The Project would not adversely affect land use patterns in the Study Area and is consistent with established plans and policies; therefore, mitigation measures related to land use effects would not be required.

4.3 Neighborhoods and Community Resources

Analysis of neighborhoods and community resources evaluates the way in which a project would affect neighborhood character. Neighborhood character is a mixture of the various elements that distinguish a neighborhood, including, but not limited to, community resources, urban design, visual resources, historic resources, socioeconomics, transportation, noise, and community cohesion. The ability of community resources to satisfy the demand for services both with and without a project is also considered, including potential effects on access to resources such as schools, medical facilities, and recreational areas.

ATP evaluated the Project's potential to directly and indirectly affect neighborhood character, community cohesion, and community resources. Community resources include community centers, entertainment centers, medical facilities, museums, parks, places of worship, and schools. The Study Area for this analysis includes the area within a 0.5-mile buffer of the proposed Project alignment and facility locations.

4.3.1 Affected Environment

The Study Area intersects 24 neighborhoods, each of which is unique and has its own distinct social history, as shown in **Figure 4-4**. Data obtained from the U.S. Census Bureau (2020) indicate that the most populous neighborhoods in the Study Area are the West University, Pleasant Valley, Riverside, and Downtown neighborhoods. The neighborhoods that are predominantly composed of minorities and contain the highest proportion of populations with limited English proficiency are located east of I-35 in the Riverside, Montopolis, and Pleasant Valley neighborhoods. Those with the lowest median household incomes are West University, North University (due to the high percentage of student residents), and Montopolis. The neighborhoods with the highest proportion of children under 18 include Southeast, Montopolis, and Windsor Road; while the highest proportion of elderly residents 65 and over reside in Rosedale, Holly, and Old West Austin. The highest proportion of residents with a disability reside in the Holly, Southeast, and Montopolis neighborhoods. East Cesar Chavez, West University, and UT contain the highest proportion of zero car households (U.S. Census Bureau 2020).

The Study Area contains a total of 246 community resources, including 63 places of worship, 47 parks, 34 social services, 17 community services, 21 schools, 15 museums, 15 childcare facilities, 14 libraries, 12 medical facilities, and 8 emergency service facilities. About half of these community facilities are located in the Downtown neighborhood. **Figure 4-5** identifies the locations of community resources in the Study Area.

Of the 24 neighborhoods in the Study Area, 17 have neighborhood plans approved by the City, which are described in **Appendix E-3**. A summary of neighborhood conditions near the light rail is provided below.

Figure 4-4: Neighborhoods in the Study Area

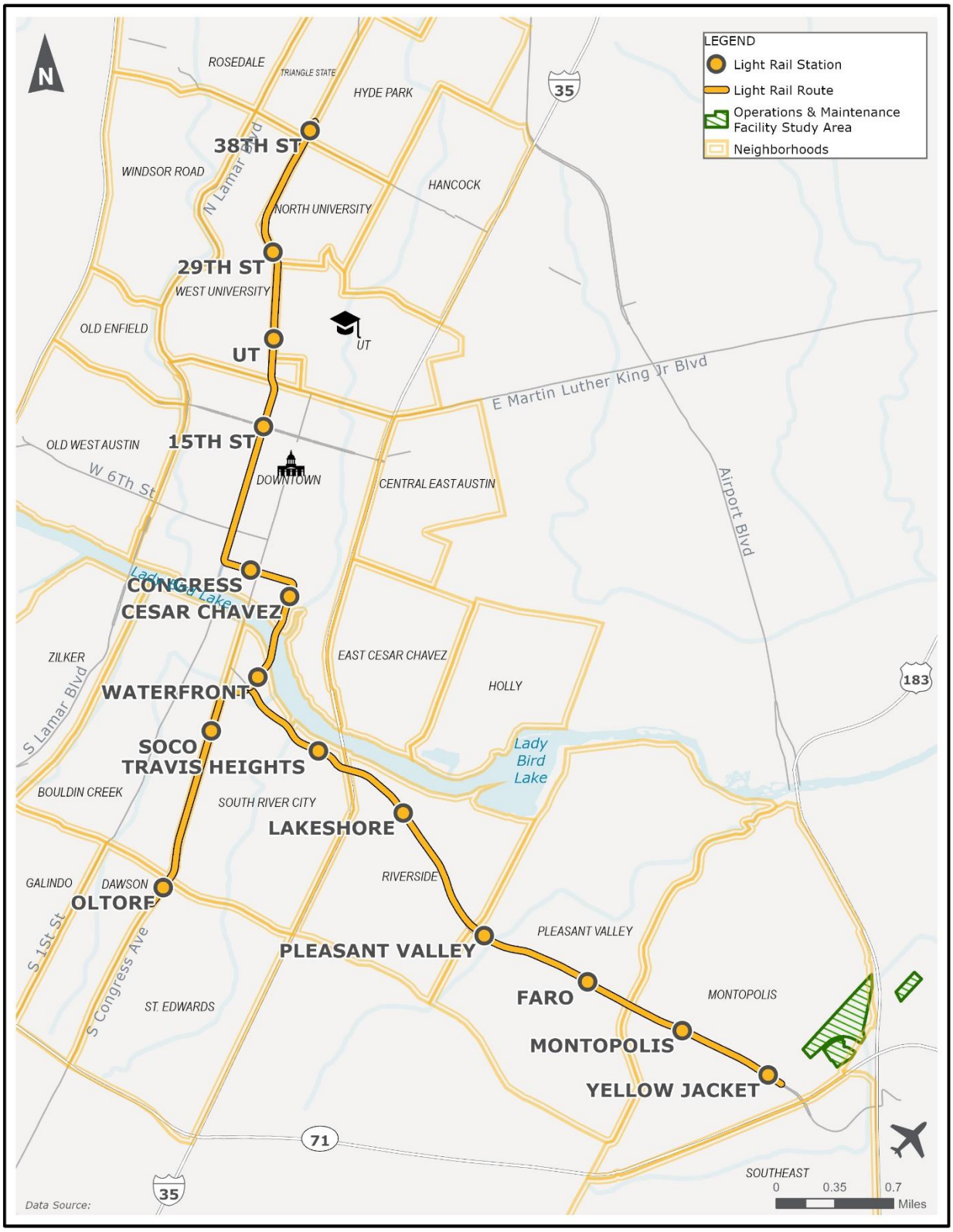
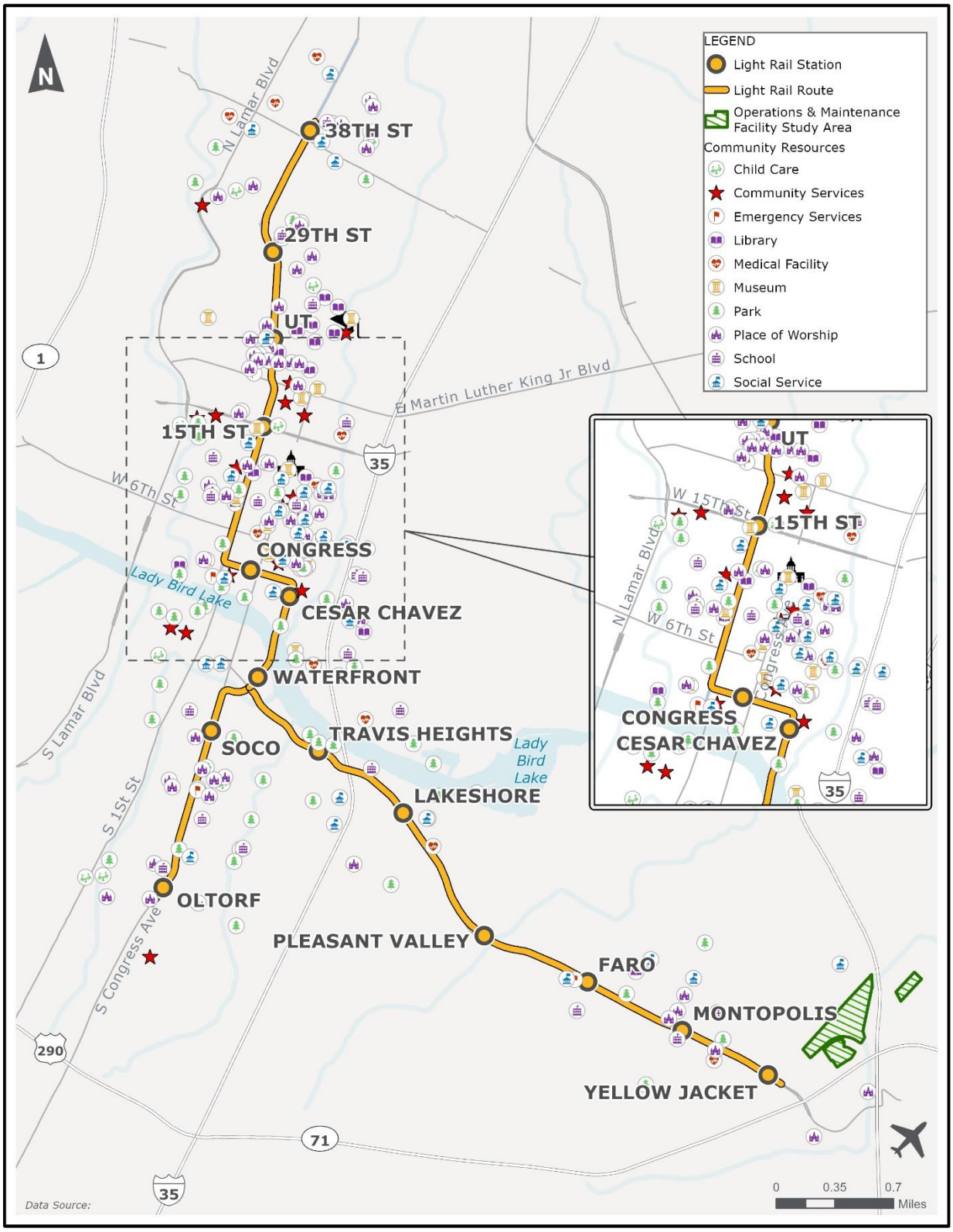


Figure 4-5: Community Resources in the Study Area



4.3.1.1 North Section

In the North Section, the neighborhoods have social histories dating back to the mid- to late nineteenth century.

The portion of the Triangle State neighborhood in the Study Area is mostly composed of campuses for various Texas state agencies, including Austin State Hospital and UT's Berry M. Whitaker Sports Complex. Hyde Park and Hancock feature single-family homes adjacent to duplexes and small apartments. Windsor Road features homes predominantly from the 1950s and 1960s of various sizes and styles, and residents include seniors, young professionals, and UT faculty.

The West University, North University, and UT neighborhoods are characterized by their relatively young populations, and streets that are active with walking, biking, and public transportation. West University has a dense urban feel with multifamily housing targeted for university students; 90 percent of the housing is renter occupied (U.S. Census Bureau 2020). North University, originally a land grant and home to exclusive residences, evolved via subdivisions and housing shortages that have led to the construction of garage apartments and two-story buildings in the neighborhood. The UT neighborhood has a history dating back to the 1880s. Initially an academic enclave, it has grown to become a diverse community centered around the campus.

4.3.1.2 Downtown Section

The Downtown neighborhood has origins dating to the founding of Austin. The 1839 Waller Plan laid out the Downtown area and established Austin's street grid, four public squares, and Capitol Square. The Texas State Capitol is the focal point of Downtown, as well as Austin as a whole. As Downtown transformed into a modern central business district with many high-rise developments, Capitol View Corridor and Capitol Dominance Overlay legislation was enacted to preserve the views of the Capitol.

Today, the Downtown neighborhood has many attractions for special events, tourism, and celebrations, as well as cultural institutions and historic structures that are important to the identity of Austin. Many annual festivals, including South by Southwest, the Moontower Comedy Festival, the Texas Tribune Festival, the ATX Television Festival, and the Pecan Street Festival occur in the Downtown neighborhood. Additionally, recurring events such as the Sustainable Food Center Farmer's Market and the Austin Marathon and Half-Marathon occur in the Downtown neighborhood.

4.3.1.3 South Section

The Bouldin Creek neighborhood was one of Austin's first suburbs. During the neighborhood's rapid growth period in the 1920s through the 1940s, Bouldin Creek originally catered to a diverse population of Black and Hispanic/Latino residents due to the low cost of land. The frequent flooding of Lady Bird Lake, before dams and other flood control measures were put in place, kept land prices low. The Texas School for the Deaf was established in the neighborhood in 1856 and remains the largest institution in the Bouldin Creek neighborhood today (City of Austin 2002). The neighborhood contains two major commercial corridors: South First Street

and South Congress Avenue. The revitalization of these commercial corridors has changed the area dramatically in recent decades, resulting in higher property values, increased development, and changing demographics. Additionally, the neighborhood contains Auditorium Shores at Town Lake Metro Park, which has hosted many annual festivals such as the Austin Food and Wine Festival, Austin Reggae Festival, and the 4th of July Fireworks and Symphony.

Similar to the Bouldin Creek neighborhood, floods affected the South River City neighborhood before the City implemented flood control measures. However, by the late nineteenth century, the area was developing with housing subdivisions and the beginnings of South Congress Avenue as a commercial strip. The housing subdivisions were promoted as "upscale, owner-occupied, 'garden suburbs'" (City of Austin 2005). Travis Heights, a subdivision named for its location on the hills and bluffs, was developed primarily in the early twentieth century and was one of the most widely advertised subdivisions of its time. The subdivision included a range of lot sizes for single-family homes and prohibited multifamily and commercial uses by way of deed restrictions (City of Austin 2005). The South River City neighborhood is frequently called Travis Heights today due to the prominence of the subdivision. A public park now known as Stacy Park was also developed during this time to serve as a major recreational area for residents of the adjacent subdivisions.

The Dawson neighborhood is a mixed-use neighborhood distinguished by major commercial corridors on South 1st Street and South Congress Avenue. The neighborhood has many older homes from the 1950s and a close-knit community, but it is attracting new residents due to its convenient location. The neighborhood is just west of St. Edwards University and just south of popular shops and restaurants on South Congress Avenue.

The St. Edwards neighborhood is primarily residential with tree-lined streets that surround St. Edward's University. Many local shops and restaurants are walkable for residents. Single-family residential uses are located mostly north of the university. Multifamily land uses are also located near the university and adjacent to South Congress Avenue. The southern areas near Ben White Boulevard include more light industrial land uses. St. Edwards University was founded in 1877 when south Austin was primarily farmland. Today over 3,500 students attend the university. The neighborhood is known for its young population, low-traffic streets, and proximity to the restaurants and shops along South Congress Avenue.

4.3.1.4 East Section

The Riverside neighborhood was almost entirely undeveloped or agricultural cropland until the late 1950s when I-35 was constructed. The area continued to develop through the 1960s and 1970s when the City annexed portions of the neighborhood. By 1976, the City had annexed the entire Riverside neighborhood (City of Austin 2006). During this time, developers and UT officials began working together to construct off-campus housing for university students in the neighborhood (Gaar 2018). Multifamily housing, particularly geared toward students, continued developing in the neighborhood from the 1980s to today. Additionally, in the mid-1990s, the Riverside neighborhood transformed into a multicultural immigrant community, gaining residents "from Mexico and elsewhere in Latin America, but also from numerous Asian countries" (Gaar 2018). In recent years, the area has seen major investment and redevelopment, including a

locally iconic music venue, Emo's, relocating to the Riverside neighborhood, as well as new luxury apartment complexes constructed near the lakeside.

Similar to the Riverside neighborhood, the Pleasant Valley neighborhood was mostly undeveloped until the late 1950s. The Austin Country Club moved from its Hancock location to the neighborhood in 1949 and remains a major amenity for the neighborhood today as the now-public Riverside Golf Course. In the late 1980s, the Austin Community College Riverside campus was constructed in the neighborhood, along with large-scale industrial developments such as SEMATECH and the Tokyo Electron U.S. headquarters. Today, the neighborhood is mostly made up of multifamily housing complexes that house many students and lower income families, and the 400-acre Roy G. Guerrero Park, which opened in July 2013 (City of Austin 2006).

Before Austin was established, the Montopolis neighborhood was settled and named for its location on top of a hill (Smyrl 2016). Montopolis began in the 1830s as a settlement at a popular crossing of the Colorado River (known today as Lady Bird Lake). After the Emancipation Proclamation, the area gained a freedman's community known as Burditt's Prairie, and later, more residents moved to the area to farm the land's fertile soil and for its modest land prices (Barnes 2018). As Dr. Fred McGhee writes, "the African American legacy of Montopolis is reflected in such institutions as St. Edward's Baptist Church, the oldest Black Baptist church still in operation in Travis County, and the Burditt Prairie Cemetery, which is the final resting place of the enslaved African Americans owned by local planter Jesse F. Burditt and their descendants" (McGhee 2014). In the early twentieth century, Mexican immigrants began moving to the Montopolis neighborhood (McGhee 2014). The area remained a small community separate from Austin until the 1950s, when the City began annexing portions of the Montopolis neighborhood. The City fully annexed Montopolis in the 1970s (Curbed 2020).

For much of the Southeast neighborhood's early history, the area was mostly rural and used primarily for agriculture. In 1942, just east of the Southeast neighborhood, construction of the Del Valle Army Air Base (now the Austin-Bergstrom International Airport) began for use by the U.S. Air Force to train pilots to fight in World War II. Military families moved to the area just east of the Southeast neighborhood, and growth continued over the next decade. In 1960, construction of the Ben White Boulevard and US 183 interchange began, which created the current boundaries for the neighborhood.

4.3.2 Environmental Consequences

4.3.2.1 No Build Alternative

Under the No Build Alternative, the rate of development in neighborhoods with adopted vision plans would continue to depend on economic conditions and accessibility within the corridor. While projects like CapMetro Express Bus, Rapid Bus, and Commuter Rail are assumed to be built under this alternative, the neighborhoods would fall short of fulfilling the comprehensive vision outlined in their plans. These visions include high-capacity transit, multimodal improvements, and denser, mixed-use development, which are essential to meeting the community's long-term objectives.

Under the No Build Alternative, the expected increase in population and employment would heighten the need for additional community resources and reliable transportation to access these resources. Congestion would also increase because the existing roadway network and planned improvements would not have the capacity to accommodate the growth. The Riverside, Pleasant Valley, and Montopolis neighborhoods would likely experience greater impacts from the No Build Alternative because they have more available space for growth.

4.3.2.2 Build Alternative and Design Options

Operational (Long-Term) Effects

The Project would positively affect neighborhood character by improving transportation access, reliability, and connections to existing and planned activity centers in accordance with plans developed by the City in coordination with each neighborhood. Neighborhoods (particularly those near the stations) would experience improved access, residential infill, employment growth, and greater patronage of local businesses. The Project would be built largely within the transportation ROW; however, individual properties may be affected as described in Section 4.1.

Community Cohesion

The Project would improve the public realm (publicly accessible spaces) by providing additional locations where people naturally interact, such as along sidewalks and bicycle lanes, and in light rail station areas. The Project would support transit-oriented development plans in many neighborhoods that seek to form cohesive, walkable neighborhoods. The addition of light rail infrastructure, especially stations, would encourage increased interaction among community members, creating spaces where people can meet and connect. The Project would also facilitate non-vehicular travel, including the use of bicycle lanes, sidewalks, and pedestrian-friendly infrastructure. Neighborhoods to the south of Lady Bird Lake would be connected to Downtown Austin and areas north via bicycle, pedestrian, and light rail infrastructure that would facilitate travel throughout Austin. ATP would develop a public art program to support local arts with the implementation of the Project.

The Project would not separate or isolate neighborhoods, ethnic groups, or other special groups because it would be constructed primarily within ROW already designated for transportation use. The Project would not create new barriers or impede the movement of people and goods across communities. The at-grade and elevated sections have been designed to be integrated into the existing transportation network while preserving and enhancing access for vehicles, cyclists, pedestrians, and the movement of goods. The elevated section on East Riverside Drive under the Lady Bird Lake Bridge Extension Design Option would be constructed at sufficient height to allow for the uninterrupted flow of traffic, cyclists, and pedestrians beneath it.

Based on the analysis in Section 4.5, Visual Quality and Aesthetics, it is not anticipated that the Project would result in an adverse effect related to community character and cohesion because the elevated extension along East Riverside Drive from the Lady Bird Lake Bridge Extension Design Option would be located along an existing transportation corridor and would not further divide any neighborhoods.

As detailed in Section 4.10, Noise and Vibration, projected noise levels would increase to the threshold of resulting in a moderate impact in some locations but would not interfere with the ability of people to converse. ATP is evaluating measures to mitigate the noise impacts (see Section 4.10.3) and will document selected mitigation measures in the FEIS.

The OMF would be built on a 62-acre site at the southwest edge of the Montopolis neighborhood. The site currently contains light industrial land uses and is buffered by major roadways to the east and south. The design of the facility would include landscaping and architectural elements to minimize potential visual and aesthetic effects on residents in the adjacent neighborhood (see Section 4.5, Visual Quality and Aesthetics). The acquisition of property for the three park-and-ride facilities and the substations and equipment needed to operate the trains would be dispersed along the alignment and would not affect community cohesion.

With the exception of the Lady Bird Lake Bridge Extension Design Option, there would be nominal differences between the Build Alternative and the Design Options with respect to community character and cohesion.

The Lady Bird Lake Bridge Extension Design Option includes an elevated structure approximately 30 feet high in the median of East Riverside Drive, which could block distant views of Downtown Austin for some residences in the South River City neighborhood and in the Travis Heights-Fairview Park Historic District, which spans both sides of East Riverside Drive. Views of historic properties near Lady Bird Lake in the historic district may also be impeded.

The Wooldridge Square Station Design Option would provide the Downtown neighborhood with increased accessibility to surrounding neighborhoods. The Grove Station Design Option and the Variation to the Grove Station Design Option would support plans for four activity “Hubs” on East Riverside Drive (City of Austin 2010b) and the City’s plans for affordable housing on the Tokyo Electron U.S. headquarters site. The Center-Running Bike/Pedestrian and Shade Tree Facilities Design Option would provide an enhanced experience for bicyclists and pedestrians due to the protected lanes separated from vehicular traffic.

Access and Mobility

The Project would improve mobility in the Study Area by offering an alternative and improved mode of travel that is safe, reliable, and efficient. The three park-and-rides would provide access to the light rail system for those who are not within an accessible distance to a station. ATP, in coordination with CapMetro, is currently analyzing both new and relocated bus stop locations to provide close connections to the proposed light rail stations and facilitate multimodal connections. The Project includes roadway reconfiguration that would change localized travel patterns, including two transit/bike/pedestrian-only corridors where vehicular traffic would be prohibited and rerouted to nearby streets. **Chapter 3** describes the effects of these changes and planned changes to the existing bus network. The Project would remove some on-street parking, making it more difficult for customers to access community resources and businesses by car.

Community Resources and Services

ATP does not anticipate permanent or long-term noise and vibration effects on any of the 246 community resources identified in the Study Area (see Section 4.10, Noise and Vibration). The Project would displace one community resource: the Waller Creek Boathouse, a facility located on City-owned parkland on the north shore of Lady Bird Lake, which offers a club house and water-related recreation. The facility would be acquired under the federal Uniform Act and in compliance with Section 6(f) of the Land and Water Conservation Fund Act, and parkland of at least equal value, location, and usefulness to the affected area would be acquired as replacement property in Austin. Visual effects resulting from the introduction of a prominent new structure spanning Lady Bird Lake on users of the parks and trails in the vicinity are discussed in Section 4.5, Visual Quality and Aesthetics. Overall net benefits to community resources are anticipated due to the improved public transit access and enhanced mobility provided by the Build Alternative and each of the Design Options. See **Appendix H, Section 6(f) Evaluation**, for additional information.

Construction-Related (Short-Term) Effects

Construction activities would temporarily affect neighborhood quality in nearby areas. The presence and movement of equipment and materials, clearing and exposure of soils, introduction of lights for nighttime work, and general changes in viewed landscape during facility construction would occur. Temporary increases in noise, dust, and traffic congestion would occur along the corridor and at staging areas. There would be short-term effects on users of parkland and the Ann and Roy Butler Hike and Bike Trail. Adjacent neighborhoods may experience increased difficulty accessing community centers and residential, commercial, and office properties because of road or lane closures. However, ATP would maintain access to private properties and community resources and would minimize any barriers to social interaction through best practices and adherence to a Construction Management Plan. ATP would coordinate detours with the City and would obtain appropriate permits for use of local roadways.

4.3.3 Mitigation

ATP would incorporate measures to minimize the effects on neighborhoods and community resources both as integral components of the Project and as proposed measures for the Preferred Alternative, as identified in visual effects (Section 4.5), noise and vibration (Section 4.10), Section 4(f) (Appendix G) and Section 6(f) (Appendix H). ATP would maintain access to private properties and community resources and would minimize any barriers to social interaction through best practices and adherence to a Construction Management Plan. ATP would develop a public art program to support local arts with the implementation of the Project. The Project would provide a net benefit to community resources and neighborhood cohesion; therefore, additional mitigation measures would not be required.

4.4 Socioeconomics

Socioeconomic conditions relate to an area's population, housing, and economic activity. A project could result in changes to socioeconomic conditions because of direct or indirect displacements, which may affect a locality's tax base, and could influence the cost of living or doing business in an area. Projects could also generate economic activity due to the investment in an area and providing permanent employment and temporary construction jobs.

ATP evaluated the Project's potential effects on socioeconomic conditions in the Study Area. The Study Area for the socioeconomic analysis includes the area within a 0.5-mile buffer of the proposed alignment and facility locations. Affordable housing in the Study Area was assessed, and the Project's potential to affect property values to such an extent that indirect displacements or forced migration would occur was evaluated. ATP calculated the losses to the tax base due to property acquisitions and displacements and the local and regional economic effects that would result from Project operation and construction.

4.4.1 Affected Environment

Based on the 2020 Census, approximately 8 percent of the population of Travis County lives within the Study Area (population of 108,324 out of 1,290,188 in the county). Based on U.S. Census Bureau 2018–2022 American Community Survey 5-year data, the median household income is approximately $9,500 lower in the Study Area than for Travis County overall ($83,254 for the Study Area and $92,731 for Travis County) but is more than $10,000 higher than the median household income for the state, which was $73,035. The Study Area has a higher percentage of persons with incomes below the poverty threshold, likely due to the number of students attending UT, St. Edward's University, and other schools in the vicinity (U.S. Census Bureau 2023).

The CAMPO population, employment, and housing 2045 forecasts are shown in **Table 4-2**. The CAMPO forecast model uses transportation analysis zones as the base geography. In all demographic forecasts, the transportation analysis zones that intersect the 0.5-mile buffer were included in the analysis. The Study Area is projected to experience over 120 percent population growth between 2015 and 2045. Travis County is also expected to experience a population increase of almost 100 percent in the same time period. Employment is expected to increase by over 68 percent in the Study Area between 2015 and 2045, and almost 107 percent within Travis County during the same time period. The number of households within the Study Area and Travis County are expected to increase approximately 118 and 112 percent, respectively, between 2015 and 2045.

Table 4-2: Population, Employment, and Households (2015 and 2045)

Geography	Population			Employment			Households		
	2015	2045	% Increase	2015	2045	% Increase	2015	2045	% Increase
Study Area	108,833	240,000	120.5	155,037	260,636	68.1	47,178	102,807	117.9
Travis County	1,098,745	2,196,582	99.9	601,298	1,243,916	106.9	428,448	908,162	111.9

Source: CAMPO 2020.

As described in Section 4.2, Land Use and Zoning, many City and Travis County planning initiatives were developed to respond to the population and employment growth in activity centers designated in the Study Area.

Increasing housing costs in Austin, coupled with population growth, have affected low-income and middle-income residents in Austin. According to the UT *Uprooted* report, gentrification occurs when a low-income household is displaced by a higher-income household, resulting in higher housing costs, increased property taxes, transformation of the neighborhood, and cultural change to the neighborhood (UT 2018). This study identified areas in Austin that are most vulnerable to displacement. Within the Study Area, those areas occur east of I-35, especially along the East Riverside Drive corridor close to US 183.

The City adopted the *Austin Strategic Housing Blueprint* (City of Austin 2017) to address ongoing issues of affordable housing. The goal of the *Austin Strategic Housing Blueprint* is to preserve affordable homes in established communities and increase the supply of affordable housing. The multifaceted approach to create and preserve affordable housing includes fostering strategic investment collaborations, streamlining the City's construction permit process, assisting with leveraging density bonus programs, and setting goals for 60,000 units to be affordable to households at 80 percent of the median family income and below.

4.4.2 Environmental Consequences

4.4.2.1 No Build Alternative

Under the No Build Alternative, population and employment in the region would continue to grow. However, CAMPO's projections are unconstrained in the sense that they do not assume that any deterioration in the existing transportation network would occur over time. Based on population growth and employment increases, traffic levels are expected to increase by more than the existing and future planned roadway capacities. As a result, traffic congestion would increase, as would the time required for commuting to work and delivering goods and services in Austin. Longer travel times would increase the cost of doing business and could make Austin a less desirable place to live and do business. Important criteria for selecting a business location include the quality of the area's transportation infrastructure, and the availability and quality of the work force.

As growth and the associated demand for housing push up housing costs, displacement in the Study Area is occurring and would continue to occur.

4.4.2.2 Build Alternative and Design Options

Operational (Long-Term) Effects

Local and Regional Economic Effects

The Project would generate employment, earnings, and tax revenue. Direct economic effects of the Project would occur because of the spending and employment required to operate the Project. Indirect economic effects may occur later in time or as part of a chain of events and are a reasonably foreseeable outcome of the Project. Indirect economic effects are the business-to-business transactions that occur when the affected industry spends money on goods or services in its supply chain.

Total employment generated by Project operations, when accounting for growth in supply chain industries and consumer spending, are estimated to be approximately 1,173 new permanent jobs per year in Travis County. Labor income represents the total growth in earnings for individuals in new employment positions and is estimated at approximately $34.7 million annually, beginning in the projected operations year of 2033 (IMPLAN 2024).

The Project may trigger nearby investments and increase the value of nearby land for more intense developments. The City, in collaboration with ATP and CapMetro, is conducting land use and economic development planning activities associated with the Project. These include the adoption of an ETOD Overlay to enable greater densities along light rail while also incentivizing the development of affordable housing.

Other City initiatives complement the Project as a catalyst for growth and a tool to achieve other housing objectives. In March 2024, the City purchased the 107-acre Tokyo Electron campus located at 2400 Grove Boulevard, paid for in part by the Project Connect Anti-Displacement Fund Program. The acquisition will enable the City to advance their aggressive affordable housing plan and develop additional income-restricted units close to the proposed light rail stations on East Riverside Drive. The Variation to the Grove Station Design Option recommended by ATP to be advanced would serve this planned affordable housing development and the residents of Montopolis.

Economic Effects Associated with Acquisitions

The scale of direct displacement of businesses and employees associated with the Project, and summarized in Section 4.1, would not be expected to change overall socioeconomic conditions in the Study Area. As noted in **Table 4-2** above, CAMPO projects that the Study Area would support over 260,636 jobs by 2045. ATP would provide relocation assistance to displaced businesses in accordance with the Uniform Act. Businesses may choose to relocate to sites in the same area, relocate to other areas, or permanently close after their property is purchased. While a small number of jobs may be lost, this number would be offset by jobs created by the Project's construction and operation and the substantial employment growth in the region that would be supported by the light rail service.

The loss of parking spaces in the business districts of Downtown and South Congress Avenue may result in loss of revenue from some customers who choose to patronize other businesses that have available and convenient parking. ATP expects that this loss in revenue would be

short-term and offset by the anticipated increased activity in the station areas and the population growth of the region. Additionally, as people adapt to using alternative transportation options, businesses in station areas may benefit from a more consistent and diverse customer base, including individuals who previously relied on parking but are now accessing these areas via public transit.

Acquisition of property required for the Project would result in a nominal loss of City tax revenue, composing approximately 0.056 percent of the fiscal year 2025 tax levy across the different taxing jurisdictions. Property tax losses would likely be offset by new property tax revenue produced by increasing land values around station areas. The mechanisms by which station area property values and associated tax revenues would be likely to increase include increased demand for properties near new light rail stations, which can moderately increase the value of land and existing improvements on those properties; and new high-density development near stations, which would change the total improved value of a property.

In addition to changes in property taxes, the Project would spur additional spending in Travis County from new labor income, which would benefit sales tax revenue.

Construction-Related (Short-Term) Effects

Economic Benefits During Construction

Construction of the Project would generate economic benefits for the City and the region from the creation of construction jobs and the wages and salaries paid to construction workers, as well as economic activity generated from the direct expenditures throughout the regional economy (i.e., the “ripple” or “multiplier effect”). Assuming a construction duration of approximately 6 years, the Project would generate substantial economic benefits. As a result of direct expenditures, employment from construction activities could generate an estimated 7,282 temporary jobs per year and $589 million annually (IMPLAN 2024).

Potential Adverse Economic Effects During Construction

Businesses near construction sites would be adversely affected if noise, dust, traffic, and parking conditions cause customers to avoid shopping at those establishments. Access to adjacent properties would be expected to remain open as much as possible. Changes in business access would be communicated by signs, displays, and social media platforms to adequately inform potential shoppers or visitors. Safe and convenient alternative routes would be designed to maintain access for people with disabilities.

4.4.3 Mitigation

The extent and type of direct displacements caused by the Project would not have the potential to change socioeconomic conditions in the Study Area. To address the Project’s potential for indirect displacement of residents and businesses related to accelerated development near train stations, as an integral component of the Project, ATP would collaborate with the City’s Displacement Prevention team to develop and implement programs funded by the $300 million allocated for anti-displacement efforts. The Community Advisory Committee (CAC) has been established to direct the use of the $300 million fund for displacement prevention.

Additionally, ATP is working in regional partnerships across government, non-profit, and private industry to develop workforce development programs for local residents to be trained and ready for job opportunities and career pathways resulting from the Project, as well as other major infrastructure projects in the region. These efforts paved the way for the development of the new Infrastructure Academy in Austin and are anticipated to have a positive effect on socioeconomic conditions in Austin.

To mitigate potential effects on businesses due to construction activities, as part of the Preferred Alternative, ATP would develop a Construction Management Plan. The Construction Management Plan would include requirements for maintaining access to businesses, facilitating deliveries, developing signage, and creating traffic, noise and vibration, and dust control plans. When approved and executed, the plan would likely include mitigation measures and responsibilities for ATP and their construction contractors.

In addition, as part of the Preferred Alternative, ATP would develop a Business Assistance Program to reduce the burden on businesses prior to and during construction.

4.5 Visual Quality and Aesthetics

The visual quality and aesthetics of an area shape and affect a person's experience. A visual impact assessment considers whether and how a project may change the surroundings due to new visual elements introduced by a project, whether significant viewsheds would be interrupted by new visual elements, and the sensitivity of different viewer groups affected by any change that affects the viewsheds. The analysis relies on photographs, renderings, and viewshed analyses to allow the public to see what a project would look like if constructed.

ATP assessed the Project's potential to affect visual quality and aesthetics in the Study Area by characterizing existing visual quality and visual resources, identifying key views of affected populations, and assessing the compatibility, sensitivity, and degree of Project effect (defined as beneficial, adverse, or neutral change to visual quality) based on viewer exposure and awareness. The Study Area for this analysis is referred to as the area of visual effect (AVE), defined by the physical constraints of the environment and the physiological limits of human sight.

4.5.1 Affected Environment

The Federal Highway Administration's *Guidelines for the Visual Impact Assessment of Highway Projects* (2015), which represents current best practices for conducting a thorough evaluation of visual effects caused by a linear transportation project, defines visual quality as what viewers like and dislike about the visual features that compose a particular scene. Visual quality is inherently subjective—different viewers may evaluate visual features differently. In general, people respond favorably to scenes that create a sense of perceived harmony, order, and coherence. Landscape sections are commonly used to divide long, linear projects into logical geographic areas for visual impact assessment purposes. Landscape sections generally are made up of areas with similar visual characteristics, although smaller locations within each landscape section might differ from the overall section's character. For the purposes of this visual quality analysis, the AVE is divided into four landscape sections: (1) North Section:

38th Street to MLK Boulevard; (2) Downtown Section: MLK Boulevard to Lady Bird Lake; (3) South Section: Lady Bird Lake to Oltorf Street and South Congress Avenue to I-35; and (4) East Section: I-35 to Yellow Jacket Station (including the OMF and MOW shops). To document the visual resources in the AVE, ATP conducted field observations, using geographic information system data and aerial imagery, and analyzed different viewpoints using Google Earth Pro (2021). The impact assessment was based on the evaluation of visual contrast, comparing photos of existing conditions to available renderings. This evaluation considered factors such as form, line, color, texture, and scale to assess how the Project's new visual elements would contrast with or complement the existing environment.

Visual quality for the landscape sections in the AVE was rated as follows:

- **High.** Section, or portions thereof, is of significant visual quality to the primary viewers. These areas may be memorable, distinctive, unique (in a positive way), intact natural or park-like areas, or urban areas with strong and consistent architectural and urban design features.
- **Moderate.** Section is of average visual quality to the primary viewers, meaning that the area can be generally pleasant but may lack distinctiveness, memorability, and compositional harmony, or may simply be common and ordinary landscapes.
- **Low.** Section is of low visual quality to the primary viewers meaning that there may be features in the area that seem visually out of place, lack visual coherence, do not have compositional harmony, or contain eyesores.

Project elements were considered in relation to Capitol View Corridors regulations, which impose height restrictions on structures throughout Austin that may have a direct sightline to the dome of the Texas State Capitol. The Capitol View Corridors begin at the dome of the Capitol and extend outward to variable extents. Austin zoning and Texas state law limits structure height within these corridors. The Project does not intersect any of the height-restricted zones. Because new elements would be below the height restrictions of Capitol View Corridors, no adverse effects on views of the Capitol would result.

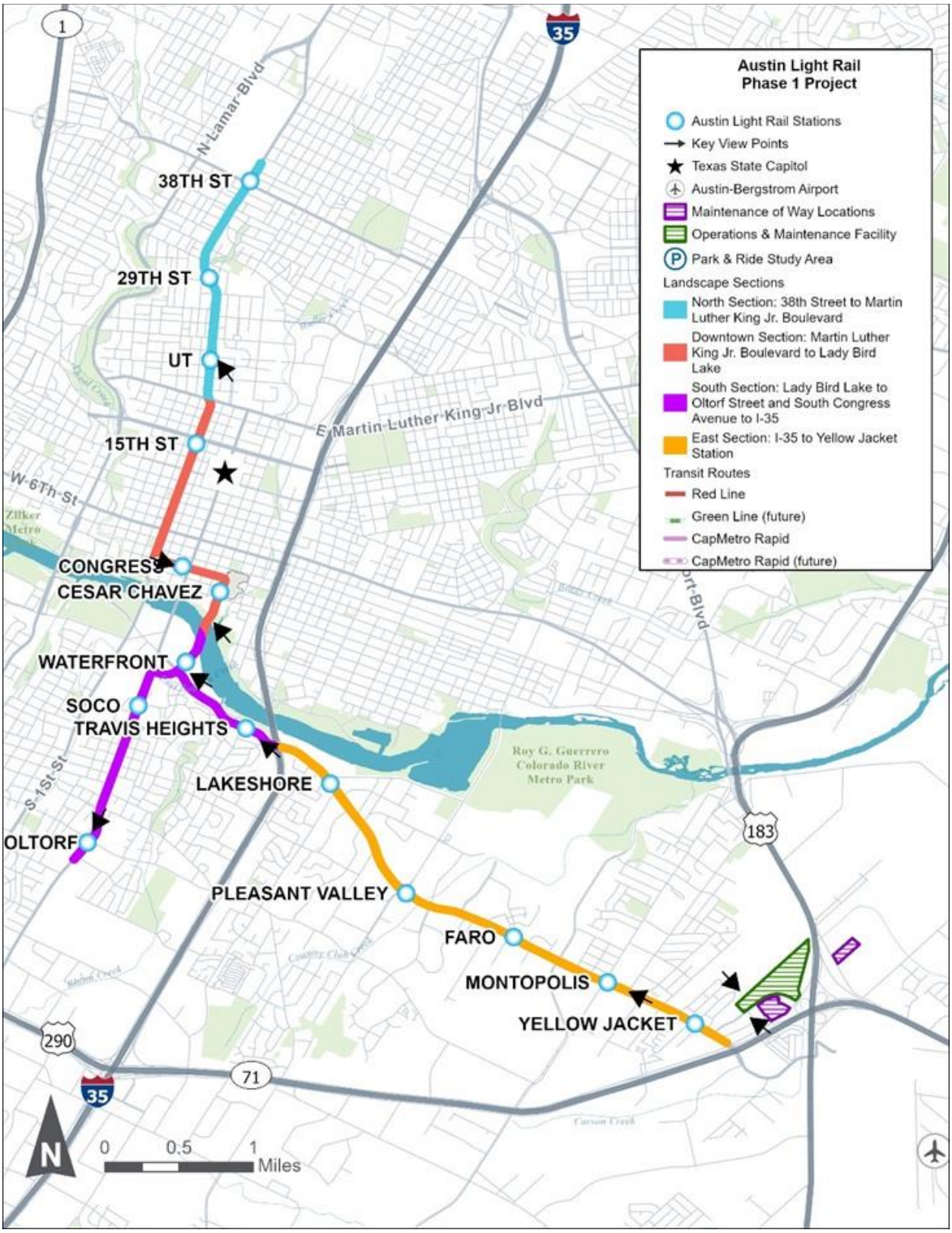
The AVE includes some of the more highly visible and recognizable downtown features, including historic buildings, architecturally unique buildings, parks, and public spaces. The AVE is highly urbanized and is characterized by dense development north of Lady Bird Lake, and medium to high density land development south of the lake and east toward Austin-Bergstrom International Airport. Much of the AVE is currently dedicated to transportation ROW. Surface parking areas and existing overhead electrical lines on utility poles are visible from most locations, particularly along East Riverside Drive. Lady Bird Lake and areas along its shores, within the Town Lake Metro Park System, is a dominant visual resource in the AVE. The shores of Lady Bird Lake provide key viewpoints for the Downtown Austin skyline. Descriptions of each landscape section are provided in **Table 4-3**, along with the general rating of each section. **Figure 4-6** identifies the key viewpoints within the AVE that correspond to the photographs and renderings included below.

Table 4-3: Visual Assessment Ratings

Landscape Section	Primary Viewers*	Visual Quality	Visual Resources	Key Viewpoint
North Section: 38th Street to MLK Boulevard	A, B, C, D, E, G	High	• Central Park • Aldridge Place • UT Campus • The Drag (Guadalupe Street through UT Campus)	• UT Station
Downtown Section: MLK Boulevard to Lady Bird Lake	A, C, D, E, G	High	• State Capitol • Republic Square • Wooldridge Square • Congress Avenue Bridge • Waller Beach at Town Lake Metro Park • Ann and Roy Butler Hike and Bike Trail • Lady Bird Lake	• Congress Avenue Station • Proposed Bridge over Lady Bird Lake
South Section: Lady Bird Lake to Oltorf Street and South Congress Avenue to I-35	A, B, C, D, E, G	Moderate to High	• Lady Bird Lake • Ann and Roy Butler Hike and Bike Trail • South Congress Avenue – “SoCo District” • East Bouldin Creek • Austin Boardwalk • Travis Heights Historic District/Neighborhood • Norwood Tract at Town Lake Metro Park	• Waterfront Station • Oltorf Station • Travis Heights Station
East Section: I-35 to Yellow Jacket Station (including OMF and MOW shops)	A, B, C, D, E, F, G	Moderate to Low	• Country Club Creek Trail • Riverside Meadows Neighborhood	• Montopolis Station • OMF

*Primary Viewers:
A = Motorist
B = Single-Family Resident
C = Multifamily Resident
D = Recreational User
E = Commercial/Office Tenant
F = Industrial Tenants
G = Pedestrians

Figure 4-6: Visual Sections and Key Viewpoints in AVE



4.5.2 Environmental Consequences

ATP assessed visual effects by considering the compatibility of the new visual element and the sensitivity of the viewer to see and care about the change. Compatibility is the ability of the environment to absorb the proposed change. ATP established four contrast levels to evaluate the visual elements of the Project:

- **Not Noticeable.** Changes in the landscape scenery or views that would not be evident unless pointed out due to such factors as previous disturbance, distance, terrain and vegetation screening, dominance of adjacent landscape features, and background terrain.
- **Noticeable.** Changes in the landscape scenery or views that would be evident, but visually subordinate to the setting due to the factors described above. These changes may attract slight attention, but do not compete with adjacent landscape scenery or views.
- **Co-dominant.** Changes in the landscape scenery or views that attract attention and begin to compete with adjacent landscape scenery or views. Changes are typically viewed in the middle ground and are unobstructed or partially screened in the foreground.
- **Dominant.** Changes in the landscape scenery or views that become the focal point or most significant (dominant) feature in the setting. Changes are typically viewed in the foreground and are unobstructed. In extreme cases, they may be partially screened. Such changes often have a lasting effect.

Effects are defined as either beneficial, adverse, or neutral change to visual quality based on the compatibility of the Project element and the sensitivity of the viewer groups in the AVE.

4.5.2.1 No Build Alternative

Proposed No Build Alternative projects such as planned bus enhancements, and sidewalk and trail improvements would introduce minimal facility elements (bus routing and pedestrian infrastructure) and would unlikely substantially change visual quality in the AVE.

4.5.2.2 Build Alternative and Design Options

Operational (Long-Term) Effects

The Project would introduce new visual elements within the AVE that could affect visually sensitive resources by altering the view to and/or from the resource, or by adding an element that would be out of scale or character of the existing visual context. These new visual elements would include the light rail vehicles and trackway, including at-grade and elevated guideway and supporting structures; station platforms and shelters; traction power substations, catenary poles, overhead wiring, communications cabinets, bungalows, signal houses, and crossing cases; safety features at crossings, including gates, signals, barriers, and warning devices; light standards; existing ROW modifications or displacements; new or modified sidewalks and shared use paths; bridges and retaining walls; park-and-rides or garages; and the OMF.

The Project and its elements would become a prominent visual component in Austin, much like the existing CapMetro buses and stops and the existing Red Line Commuter Rail. ATP anticipates that the effects of the Project would be most similar to those of the existing Red Line Corridor. Visual and aesthetic effects of the Red Line Corridor were minimal in the downtown area or have since been mitigated and were primarily related to the station elements located along 4th Street. Likewise, this Project would integrate new elements within the existing urban character and streetscape and would be designed so as not to obstruct any important views, and to be compatible with the surrounding urban and transportation elements.

For visual Project elements, ATP would incorporate design features that are compatible with the surrounding area. Features of stations and new bridges would be designed under an architecture and design program that would solicit community input. ATP would work collaboratively to develop architectural treatments, visual screening, landscape, and other features designed to enhance visual quality and aesthetics within the urban realm. ATP would also attempt to preserve existing protected and heritage trees within the Project, would transplant appropriate candidates as is feasible, and would plant replacement trees for those that could not be preserved due to construction. Based on these measures, the light rail guideway, catenary poles and overhead wiring, light standards, signal houses, retaining walls, at-grade stations, traction power substations, train control and communications bungalows and cabinets, would have a **Neutral** effect in all landscape sections (see **Table 4-4**). **Figure 4-6** shows the key viewpoints used to analyze effects from Project elements, and **Table 4-4** summarizes effects within each landscape unit. Additional elements that are specific to individual landscape sections are discussed, by section, below.

Table 4-4: Potential Visual Effects by Landscape Section

Landscape Section	Visual Quality	Visual Resources	Key Viewpoints	Project Features / Elements	Compatibility	Potential Visual Effect
North Section: 38th Street to MLK Boulevard	High	• Central Park • Aldridge Place • UT Campus • The Drag (Guadalupe Street through Campus)	• UT Station	Light Rail System: Catenary poles and overhead wiring, light standards, signal house, retaining walls, new at-grade stations and safety features at crossings, traction power substations, train control and communications bungalows and cabinets, removal of approximately 12 commercial buildings, and removal of trees as needed.	**Noticeable**	**Neutral** Effect – Project elements would be designed to be compatible with the surrounding area.
				Multistory park-and-ride	**Co-dominant**	**Neutral** Effect – Viewers are primarily transient office and retail workers who have low sensitivity.
Downtown Section: MLK Boulevard to Lady Bird Lake	High	• State Capitol • Republic Square • Wooldridge Square • Congress Avenue Bridge • Waller Beach at Town Lake Metro Park	• Congress Avenue Station • Proposed Bridge over Lady Bird Lake	Light Rail System: Catenary poles and overhead wiring, light standards, signal house, retaining walls, new at-grade stations and safety features at crossings, traction power substations, train control and communications bungalows and cabinets, retaining wall, removal of approximately	**Noticeable**	**Neutral** Effect – Project elements would be designed to be compatible with the surrounding area. No difference among Build Alternative and all Design Options.

Landscape Section	Visual Quality	Visual Resources	Key Viewpoints	Project Features / Elements	Compatibility	Potential Visual Effect
		• Ann and Roy Butler Hike and Bike Trail • Lady Bird Lake		2 commercial buildings, and removal of trees as needed.		
				Bridge over Lady Bird Lake	**Dominant** (transient viewer groups) **Noticeable** (high-sensitivity viewer groups)	**Neutral** Effect – The scale of the new bridge would be compatible with surrounding urban environment and similar in height to the adjacent bridges under the Build Alternative and all Design Options. ATP is designing the bridge with a focus on aesthetics and the objective of creating a new visual resource for Austin.
				Wooldridge Square Station Design Option only – retaining wall	**Noticeable**	**Neutral** Effect – Small retaining wall (approximately 2 to 4 feet in height) within the transportation ROW to accommodate a profile change needed to make the station area level.
				Cesar Chavez Station Design Option only -- off-street station on a diagonal	**Noticeable**	**Neutral** Effect – Would not be appreciably different from the Build Alternative, where the station would be built center-running along Trinity Street.

Landscape Section	Visual Quality	Visual Resources	Key Viewpoints	Project Features / Elements	Compatibility	Potential Visual Effect
South Section: Lady Bird Lake to Oltorf Street and South Congress Avenue to I-35	Moderate to High	• Lady Bird Lake • Ann and Roy Butler Hike and Bike Trail • South Congress Avenue - SoCo District • East Bouldin Creek • Austin Boardwalk • Travis Heights Historic District/ Neighborhood • Norwood Tract at Town Lake Metro Park	• Waterfront Station • Oltorf Station • Travis Heights Station	Light rail system: Catenary poles and overhead wiring, light standards, signal house, retaining walls, new at-grade stations and safety features at crossings, traction power substations, train control and communications bungalows and cabinets, retaining wall, park-and-ride, removal of approximately 7 buildings, and removal of trees as needed.	**Noticeable**	**Neutral** Effect – Project elements would be designed to be compatible with the surrounding area. No difference among Build Alternative and Design Options.
				Retaining walls and roadway realignment proposed at Travis Heights Station (for Build Alternative)	**Co-dominant**	**Neutral** Effect – Retaining wall would be visible to only a small number of residents on the south side of East Riverside Drive, and the roadway realignment would be minimally visible. *Note: Travis Heights Station Design Option would eliminate the need for a retaining wall.*

Landscape Section	Visual Quality	Visual Resources	Key Viewpoints	Project Features / Elements	Compatibility	Potential Visual Effect
				Lady Bird Lake Bridge Extension Design Option only - bridge extension along East Riverside Drive and elevated Waterfront Station	**Dominant**	**Adverse** Effect -- Bridge extension would be visible to several residents on East Riverside Drive and park users. Views from some residences adjacent to the elevated portion of the Project may experience obstructed views. This Design Option affects more views and viewers of high sensitivity.
East Section: I-35 to Yellow Jacket Station (including OMF and MOW shops)	Moderate to Low	• Country Club Creek Trail • Riverside Meadows Neighborhood	• Montopolis • OMF	Light rail system: Catenary poles, and overhead wiring, light standards, signal house, retaining walls, new at-grade stations and safety features at crossings, TPSS, train control and communications bungalows and cabinets, removal of approximately 8 buildings, removal of trees as needed, a park-and-ride and an elevated structure over Country Club Creek Trail in a perpendicular orientation with a retaining wall at the crossing of East Riverside Drive.	**Noticeable**	**Neutral** Effect – Project elements would be designed to be compatible with the surrounding area. Primary viewers are anticipated to have moderate sensitivity. No difference among Build Alternative and Design Options.

Landscape Section	Visual Quality	Visual Resources	Key Viewpoints	Project Features / Elements	Compatibility	Potential Visual Effect
				At OMF – Buildings for administration, operations and maintenance staff, a light rail control center, lighting effects from 24-hour operations, light rail vehicle maintenance area and storage yard, MOW shops, and associated light rail equipment storage functions.	**Noticeable**	**Neutral** Effect – OMF facility would be noticeable to some nearby residents, but the buildings that comprise the OMF would be similar in appearance to the industrial buildings currently on the site, in terms of both height and mass. No difference among Build Alternative and Design Options.
				Center-Running Bike/Pedestrian and Shade Tree Facilities on East Riverside Design Option only - wider ROW along the alignment resulting in more building removal.	**Noticeable**	**Neutral** Effect - Due to moderate visual quality and viewer sensitivity in this section, and because Project elements would be designed to be compatible with the surrounding area.

North Section: 38th Street to MLK Boulevard

Visual quality in this section is high with a historic neighborhood, a renowned commercial strip (the Drag), and the UT campus all abutting the ROW. Primary viewers in this area are sensitive to changes in views; however, because of the densely populated and transient nature of this corridor, viewers in this section are also accustomed to transportation and other urban infrastructure. Throughout the section, the Project would generally be compatible with the existing transportation network (vehicular, transit, and pedestrian) and the urban environment. Visual elements including catenary poles and wires, light standards, signal houses, retaining walls, new at-grade stations, and traction power substations would be integrated with the existing urban character and streetscape and designed so as not to obstruct any important views, and to be compatible with the surrounding urban and transportation elements. The Project would also include the removal of approximately 12 commercial buildings under the Build Alternative, to accommodate the park-and-ride, traction power substations, stations, and widened ROW. These elements are anticipated to be **Noticeable**. Because the Project elements would be compatible with the surrounding area, their visual effect has been categorized as **Neutral** for the Build Alternative and all Design Options.

The multi-story parking garage proposed at 38th Street is anticipated to be **Co-dominant** because only one other building within the AVE near 38th Street is over two stories (i.e., the three-story Sunflower Bank Building further west on 38th Street). This change would attract attention and could compete with adjacent landscape scenery or views because of the height of the proposed garage and its proximity to Central Park, a large green space across Guadalupe Street. However, because viewers in this area are primarily office and retail workers or student renters who are transient and have relatively low sensitivity to change, the effect is categorized as **Neutral**.

There would be no difference in visual effects among the Build Alternative and Design Options for this section. **Figure 4-7** and **Figure 4-8** show existing and proposed conditions, respectively, at the key viewpoint—the proposed UT Station.

Figure 4-7: Existing Conditions at UT West Mall (Guadalupe and 22nd Street) Facing Northeast

Figure 4-8: Proposed UT Station Center Platform at West Mall Facing Northwest

Note: Artist representation, subject to change.

Downtown Section: MLK Boulevard to Lady Bird Lake

Visual quality in this section is considered high due to the downtown skyline, Lady Bird Lake, Town Lake Metro Park, Ann and Roy Butler Hike and Bike Trail, and hundreds of historical markers and buildings. Primary viewers in this area are sensitive to changes in views; however, viewers in this section are also accustomed to transportation and other urban infrastructure.

In the segments where the track would be center-running, areas of new ROW would be needed primarily for sidewalks or shared use paths. Two commercial buildings would be removed to accommodate transit substation facilities under the Build Alternative. These elements are anticipated to be **Noticeable**; however, they would be integrated into the existing urban streetscape and designed so as not to obstruct any important views. These Project elements along with the at-grade stations have been categorized as having a **Neutral** visual effect for the Build Alternative and all Design Options.

The proposed Lady Bird Lake Bridge under the Build Alternative and all Design Options would not interfere with important viewsheds from residential properties or any location with highly sensitive viewer groups. It would be a **Dominant** visual element for visitors of Waller Beach at Town Lake Metro Park and other transient viewer groups (e.g., boaters on the Lake and users of the Ann and Roy Butler Hike and Bike Trail as they approach and pass beneath the bridge). The height of the bridge would be similar to that of the nearby bridges and its scale contextual with the high-rise buildings and other elements of the urban environment seen from Waller Beach and immediately adjacent areas. Viewsheds of natural areas from observation points on Lady Bird Lake are already interrupted by the existing bridge structures that flank the proposed alignment (i.e., the Congress Avenue and I-35 bridges). The proposed bridge would not create noticeable interruption to the existing viewsheds seen from these observation points or for the motorists on the nearby bridges. The visual effect has been characterized as **Neutral** given the context of the surrounding environment, the limited number and sensitivity of viewer groups affected, and ATP's intent to design and build an aesthetically pleasing bridge.

The Wooldridge Square Station Design Option would introduce visual elements of a new at-grade station to Downtown Austin, including a small retaining wall (approximately 2 to 4 feet in height) within the transportation ROW, to accommodate a profile change needed to make the station area level. These elements are anticipated to be **Noticeable**; however, because the Project elements would be compatible with the surrounding area, and the station would be center-running, leaving the urban park intact, the visual effect has been categorized as **Neutral** in this section.

The Cesar Chavez Station Design Option would introduce an off-street station on a diagonal through the corner lot at Trinity Street and 3rd Street. However, this would not be appreciably different from the Build Alternative, where the station would be built center-running along Trinity Street and therefore was categorized as **Noticeable** and **Neutral**.

Figure 4-9 shows the proposed bridge over Lady Bird Lake and integration with the existing trail and park system.

Figure 4-9: Proposed Bridge over Lady Bird Lake at Waller Beach Facing West

Note: Artist representation, subject to change.

South Section: Lady Bird Lake to Oltorf Street and South Congress Avenue to I-35

Visual quality in this section is considered to range from moderate to high. Along the south branch, there is high pedestrian activity on South Congress Avenue, a renowned commercial strip, and dense commercial and retail land uses. The Capitol can be seen at the intersection of Riverside Drive and Congress Avenue, but the Project would not intersect the Capitol View Corridors restricted zones. Viewers here are considered highly sensitive with a high visual awareness because they are on “Austin’s Main Street.” The alignment and stations in this section would be designed to integrate with the surrounding area. The introduction of a center-running guideway and two at-grade stations as well as a park-and-ride would be **Noticeable** but would not compete with adjacent landscape scenery or views. The Project would also involve the removal of approximately seven buildings in this section under the Build Alternative. Because the Project elements introduced in this section would be compatible with the surrounding area, this visual effect has been categorized as **Neutral**.

The segment along East Riverside Drive to I-35 is characterized as having moderate visual quality. It is close to Lady Bird Lake, Norwood Tract at Town Lake Metro Park, and the Ann and Roy Butler Hike and Bike Trail but these resources are not typically visible from the roadway. There are several mature trees along the sidewalks and medians of East Riverside Drive, several bus stops, and overhead utility lines and poles along the segment. The Build Alternative would remove trees and the landscaped median along East Riverside Drive and introduce new visual elements for pedestrians, motorists, and nearby residents, including light standards, signal retaining walls, and new at-grade stations. The alignment and station in this section

would be designed to integrate with the surrounding area and replacement trees would be planted where possible within this section.

Under the Build Alternative, a continuous shared use path would be constructed on both sides of the roadway along this section and two new bus stops, and a retaining wall would be installed between Travis Heights Boulevard and Alameda Drive. The retaining wall would result in an encroachment on Norwood Tract within the Town Lake Metro Park and would be visible to residents on the south side of East Riverside Drive opposite the fenced in off-leash Dog Area. Viewers have a moderate sensitivity to visual changes here due to the area's existing visual quality and urban location with major transportation corridors and elements already present. While the retaining wall would be considered a **Co-dominant** visual element, a small number of viewers would be subject to this change and this effect has been characterized as **Neutral**. The Travis Heights Station Design Option would not build the station or retaining wall, and therefore would not introduce any Co-dominant Project elements in this section.

Under the Lady Bird Lake Bridge Extension Design Option, the elevated station and bridge extension would introduce a **Dominant** visual element to park users as well as a number of residents on East Riverside Drive, including a seven-story apartment building, a condominium complex, and seven single-family residences in the Travis Heights Historic District neighborhood. The limits of the elevated light rail would be from east of the Waterfront Station to before Travis Heights Boulevard along East Riverside Drive. Current views from residences along East Riverside Drive include Downtown Austin (in the distance) would be obstructed by the new bridge extension structure. For this reason, the change in visual quality from this Design Option has been characterized as **Adverse**.

Figure 4-10 shows existing conditions at the area proposed for the Waterfront Station. **Figure 4-11** shows proposed conditions under the Build Alternative and the Design Option. **Figure 4-12** illustrates the elevated concept on East Riverside Drive near the Waterfront Station. **Figure 4-12** is intended to depict the scale of the light rail arterial structure relative to its surroundings. **Figure 4-13** and **Figure 4-14** show the existing and proposed conditions at the key viewpoint for the Oltorf Station.

Figure 4-10: Existing Conditions of Area of Proposed Waterfront Station on East Riverside Drive Extension, Facing Northwest

Figure 4-11: Design Option with Elevated Waterfront Station and Elevated Bridge Extension on East Riverside Drive Facing East

Note: Artist representation, subject to change.

Figure 4-12: Representation of Elevated Light Rail along East Riverside Drive

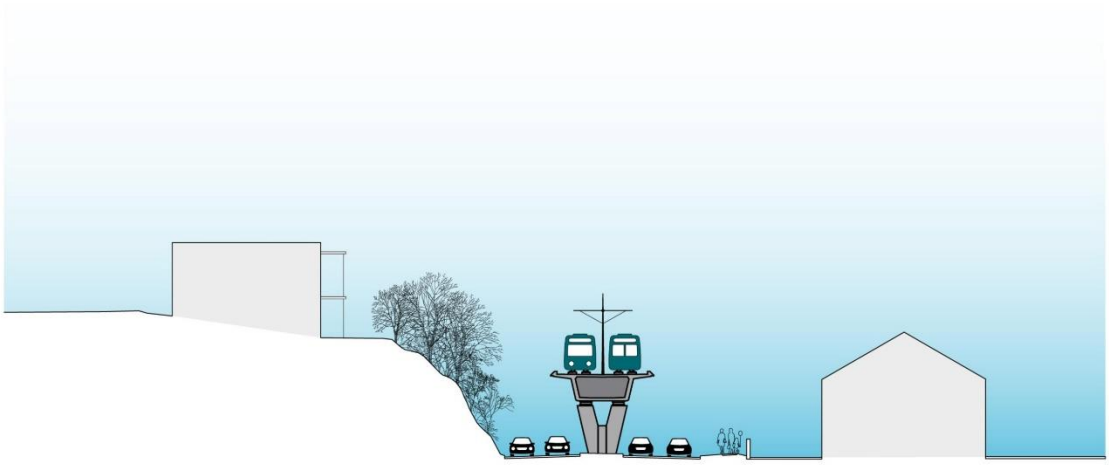


Figure 4-13: Existing Conditions at South Congress Avenue and Oltorf Street Facing South

Figure 4-14: Proposed Oltorf Station Center Platform at South Congress Avenue Facing West

Note: Artist representation, subject to change.

East Section: I-35 to Yellow Jacket Station (including OMF and MOW shops)

This section is characterized as an area of moderate to low visual quality. Modern urban elements such as tree-lined sidewalks, low and mid-rise commercial buildings, residences, hotels, drive-through restaurants, warehouses, and surface parking lots can be seen throughout much of this section. Overhead power lines are also visible for the length of East Riverside Drive. The OMF location is proposed in the vicinity of the US 183/SH 71 interchange along Airport Commerce Drive in a light-industrial/commercial use area occupied by active businesses.

New visual light rail elements include trains and operations equipment, at-grade stations, a park-and-ride, and the OMF. The Project would also involve the removal of approximately 15 buildings in this section under the Build Alternative, approximately 8 of which are for the OMF and MOW shops. The effects of the Build Alternative are anticipated to be largely **Beneficial** because design of the alignment and stations would provide an opportunity to provide sidewalks and bicycle lanes in an area that lacks active transportation infrastructure. ATP would also replace trees and other landscaping, where possible, within this section. ATP anticipates that primary viewers would have a moderate sensitivity to visual changes that would occur as a result of the Build Alternative; therefore, the Build Alternative and Design Options are

anticipated to be **Noticeable** in the East Section. Because the Project elements introduced in the East Section would be compatible with the surrounding area, this visual effect has been categorized as **Neutral**.

An elevated structure is proposed over Country Club Creek Trail in a perpendicular orientation. The Project would include a retaining wall at the crossing of East Riverside Drive and would replace the existing sidewalk with a wider shared use path in this area. Primary viewers are anticipated to have a moderate sensitivity to visual changes that would occur as a result of the Build Alternative; therefore, the Build Alternative is anticipated to be **Noticeable** in this section. Because the Project elements introduced in this section would be compatible with the surrounding area, this visual effect has been categorized as **Neutral**.

The Center-Running Bike/Pedestrian and Shade Tree Facilities on East Riverside Design Option would include more building and tree removal due to the wider ROW and is categorized as **Noticeable.** However, because of the moderate visual quality and viewer sensitivity in this section, and because Project elements would be designed to be compatible with the surrounding area, this visual effect has been categorized as **Neutral**.

The proposed OMF and MOW sites at the US 183/SH 71 interchange are in an area of low visual quality. Under the Build Alternative and all Design Options, the OMF would be a **Noticeable** change to some residents in the Riverside Meadows neighborhood who reside along the western border of the proposed OMF site, and to the Esparanza Community to the north. However, the buildings that comprise the OMF would be similar in appearance to the industrial buildings currently on the site in terms of both height and mass. The design of the facility would include landscaping and architectural elements to minimize potential visual and aesthetic effects on residents in the adjacent neighborhood. For these reasons, the change in visual quality has been characterized as **Neutral**. **Figure 4-15** and **Figure 4-16** show existing and proposed conditions, respectively, at the proposed OMF from the Riverside Meadows Neighborhood.

Figure 4-15: Existing Conditions from Riverside Meadows Neighborhood behind Proposed OMF, Facing East

Figure 4-16: Proposed OMF Facing East from Riverside Meadows Neighborhood

Construction-Related (Short-Term) Effects

Construction effects would include temporary changes in views of and from the construction area. Construction activities at stations along the alignment and staging areas are expected to introduce heavy equipment such as cranes and associated vehicles, including bulldozers, backhoes, graders, scrapers, and trucks, into the view corridor of public streets, sidewalks, and surrounding properties. These pieces of equipment, along with stockpiled construction materials such as concrete, steel, and rail components would create visual disruption. Mature vegetation, including trees, would be removed from some areas further affecting the visual character of the area. Views of the construction staging activities may be possible from residential land uses on some of the adjacent parcels, either directly through fencing, through entrance gates, or over fencing from second story and higher windows. The construction staging activities could temporarily affect adjacent viewers. In addition, the need for nighttime construction in staging areas and along the alignment could also affect viewers, including nearby residential properties.

4.5.3 Mitigation

As an integral component of the Project, landscape treatments and/or fencing that provide visual screening of construction sites would be implemented in residential areas. Landscape would include regionally native plants to minimize adverse construction and operation effects on the natural habitat. Additionally, all lighting (for construction and operation) would be in accordance with the Texas Health and Safety Code Title 5 §425.002 regarding light pollution, City lighting code ordinances, and would also be included in ATP's Architectural and Urban Design Guidelines, and the Sustainability Guidelines. To the extent practicable, outdoor lighting fixtures would only be installed and operated if the purpose of the lighting cannot be achieved

by installing reflective road markers, lines, warning, or informational signs, or other effective passive methods. Additionally, full consideration would be given to conserving energy, reducing glare, minimizing light pollution, and preserving the natural light environment. An example of commonly used lighting meeting these considerations is the use of high-pressure sodium lamps equipped with glare shields.

As part of the Preferred Alternative, to mitigate the adverse effects of the bridge extension along East Riverside Drive, the bridge would be designed to minimize bulk, and the aesthetics of the bridge columns and elevated structure would be improved through architectural design. The bridge would be designed to minimize shadows and blend into the existing natural environment following the TxDOT Bridge Design Guide (2023b). The public would have an opportunity to comment on the bridge design options.

ATP would incorporate design features that are compatible with the surrounding area. Features of stations and new bridges would be designed under an architecture and design program that would solicit community input. ATP would work collaboratively to develop architectural treatments, visual screening, landscape, and other features designed to enhance visual quality and aesthetics within the urban realm. ATP would also attempt to preserve existing protected and heritage trees within the Project, would transplant appropriate candidates as is feasible, and would plant replacement trees for those that could not be preserved due to construction.

4.6 Cultural Resources

Cultural resources are historic architectural and archaeological resources, as well as tribal cultural resources, including historically significant buildings, structures, objects, sites, and districts. Archaeological resources are almost always underground, and their significance cannot be known until they are surveyed and analyzed. Cultural resource assessments include surveys and a consultation process that helps protect the cultural heritage of an area.

This section identifies historic and archaeological resources that could potentially be affected by the proposed Project and discusses ongoing coordination related to the identified resources as required by Section 106 of the National Historic Preservation Act of 1966. The Study Area for this analysis is called the area of potential effects (APE) and is described for each resource area below.

Historic Architectural Resources

4.6.1 Affected Environment

In coordination with the Texas Historical Commission, ATP established an APE consisting of parcels intersected by a 150-foot area from the limits of Project construction. To account for areas of the APE where Project components are limited to small-scale actions such as roadway restriping, curb reconstruction, and sidewalk modifications, the historic resources survey was limited to parcels intersected by a 75-foot buffer within the APE. Larger scale components, such as transit stations, were captured in the 150-foot APE. Additionally, to account for potential effects of the proposed bridge over Lady Bird Lake, the APE extends to 0.25 mile from the proposed bridge's footprint across the lake.

ATP identified 218 historic architectural resources that are listed in, eligible for listing in, or recommended eligible for listing in the National Register of Historic Places within the APE. These resources include historic districts, parks, and buildings, and their historic importance is described in **Appendix E-6**. Based on a preliminary evaluation of Project effects, ATP found that 10 properties are no longer extant, and the Project would have no effect on 100 properties due to the distance from the alignment and intervening buildings.

The remaining 108 historic properties were evaluated to determine whether the Project would have an adverse effect on them. An adverse effect occurs when an undertaking may alter, directly or indirectly, any of the characteristics of a historic property that qualify that property for listing in the National Register of Historic Places in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association. At more than half of these properties, ATP would acquire easements for Project elements such as sidewalks, shared use paths, and utilities. The proposed easement acquisitions at historic properties are shown in **Appendix G, Section 4(f) and Chapter 26 Evaluations**. Based on the conceptual designs in **Appendix C**, ATP found that no adverse effect would occur as a result of the Project.

4.6.2 Environmental Consequences

4.6.2.1 No Build Alternative

Under the No Build Alternative, the Project would not be built, and there would be no Project-related effects on historic resources.

4.6.2.2 Build Alternative

Under the Build Alternative and all Design Options, the new Lady Bird Lake Bridge would be consistent with similar-scale structures and buildings such as Congress Avenue Bridge, high-rise buildings along Red River Street, and high-tension electrical towers and lines. The new bridge would not introduce a visual or auditory element that would diminish the integrity of the historic Town Lake Metropolitan Park system or its design, setting, materials, workmanship, feeling, or association.

The Lady Bird Lake Bridge Extension Design Option would be elevated in the East Riverside Drive median and would traverse the Travis Heights-Fairview Park Historic District. The proposed guideway's scale through the district would be tempered by orientation of contributing resources to the district, topography, and its location along the district's northern edge. Along the northern boundary of the district, between Newning Avenue and Alameda Drive, contributing resources are oriented predominantly away from East Riverside Drive and, therefore, away from the proposed elevated guideway. Within this section, a single contributing resource on Academy Drive would likely have an oblique view of the guideway. Moving eastward, between Alameda Drive and Travis Heights Boulevard, six contributing resources (of 911 total contributing resources) are oriented such that their primary façade would directly face the proposed elevated section.

Topographically, all but six contributing resources located between Alameda Drive and Travis Heights Boulevard are constructed on heavily wooded bluffs above East Riverside Drive.

Although the elevated guideway would likely be at or slightly below the level of the bluff, views from the rear of these contributing resources would be attenuated by the existing trees and foliage.

In summary, although the proposed elevated guideway would introduce a new visual element through the district, the proposed location extends along the northernmost edge of the National Register of Historic Places boundary, and its perceived spatial bifurcation would separate eight contributing properties located along Edgecliff Terrace from the rest of the district. However, these residences are already separated by East Riverside Drive. Although the Lady Bird Lake Bridge Extension Design Option would introduce a new visual element to the district's setting, as a whole the district would retain sufficient integrity to communicate its historic significance. Integrity of location, design, materials, workmanship, feeling, and association would all remain intact. Impacts on integrity of setting would occur but would be minor because construction would be at the uppermost limit (northern boundary) of the district and 7 out of 911 contributing resources would have views of the guideway; additionally, topographically the guideway would be at or lower than the flanking bluffs, so most of the contributing resources on these bluffs would not be impacted.

Under the Wooldridge Square Station Design Option, Project construction would include reconstruction of the existing curbs and sidewalks along Guadalupe Street, West 10th Street, and West 9th Street, all within the existing ROW. A temporary construction easement would be acquired by ATP for access to construct a small retaining wall within the ROW. Proposed construction would not introduce substantial new visual or auditory elements and would not diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association.

4.6.3 Mitigation

No adverse effects are anticipated from the Project; therefore, no mitigation is required at this time. ATP continues to use the Section 106 consultation process to identify any historic properties potentially affected by the Project; to accurately assess the Project's effects; and to identify reasonable ways to avoid, minimize, and mitigate any adverse effect on historic properties the Project may have. ATP continues to consult with the Texas Historical Commission and other parties with interests in the effects of the Project on historic properties.

Archaeological Resources

4.6.4 Affected Environment

In coordination with the Texas Historical Commission, ATP established the Project limits of construction (the boundary within which construction, materials storage, grading, landscaping, stormwater infrastructure, contractor access, laydown/staging areas, and related activities would occur) as the APE for the archaeological resources evaluation. Depths of disturbance for most of the archaeological APE would average 1 to 2 feet below ground surface, with the exception of the following areas:

- Proposed detention pond locations would average 6 to 10 feet in depth;

- Depth of bridge piers is yet to be determined; however, they would generally be deep enough to penetrate the underlying bedrock by at least 10 feet; and
- Utility relocation would be coordinated when design plans are more advanced.

ATP conducted a preliminary intensive archaeological survey in the APE where the potential to encounter archaeological resources has been identified (see **Appendix E-7**). The preliminary survey area, totaling 32.5 acres, was subject to an archaeological survey using systematic shovel testing, pedestrian survey, and mechanical trenching between June 3 and August 15, 2024.

The survey resulted in the identification of one post-contact site consisting of a brick and limestone foundation feature, a push pile, a surficial concentration of twentieth century glass and building materials, and a large brick scatter. The site is located at the southern terminus of the APE within the proposed OMF site. A house and associated small structure within the site boundary can be seen on historical aerial images beginning during the 1960s and are no longer seen after 1981. Archival research indicates that the property passed from an individual, John Joseph, to Dunsmuir Properties in 1980; it is likely the house was demolished for development. The brick scatter as well as push piles of foundation slabs and building materials are likely associated with the demolition of the house and small structure at that time.

The site is highly disturbed and does not appear to be associated with persons or events significant to local, state, or national historic events. The building materials at the site are common and do not exhibit the potential to interpret distinctive architecture or engineering patterns, styles, or types. The site has largely been destroyed; therefore, the site possesses very little research potential and is recommended Not Eligible for listing in the National Register of Historic Places due to lack of significance.

The El Camino Real de Los Tejas National Historic Trail (El Camino Real) intersects the southern portion of the APE within the OMF site. The trail was the primary overland route for Spanish colonization of what later became Texas and Louisiana (National Park Service 2024). While listed as a Historic Trail, the majority of El Camino Real's route through this portion of Texas has been subject to development throughout the twentieth century. It is unlikely that significant elements of the original El Camino Real route have been preserved within this area, and no evidence of historic resources related to the trail were found during the survey.

Obtaining right-of-entry for parcels within the survey area is ongoing; therefore, the archaeological survey has taken a phased approach. In areas surveyed, no further archaeological investigations are proposed. Additional surveys will continue in previously recommended areas as right-of-entry is obtained.

ATP intends to perform construction monitoring for areas potentially containing historic features and areas of high probability for containing archaeological deposits that are currently inaccessible for survey due to existing structures or pavement. The areas of proposed grade

changes on either side of the Lady Bird Lake crossing, which are currently covered in concrete, would be monitored during construction in addition to the following locations:

- 422 Guadalupe Street
- 510 Guadalupe Street
- 810 Guadalupe Street
- 1305 Guadalupe Street
- 411 West MLK Boulevard
- 2825 Guadalupe Street
- 3402 Guadalupe Street
- 517 West 39th Street
- Trinity Street at the proposed Cesar Chavez Station

4.6.5 Mitigation

Archaeological surveying will continue in previously recommended areas as right-of-entry is obtained. Archaeological monitoring will take place during construction in previously recommended areas where survey is not currently feasible. A final report detailing the results of the archaeological survey and monitoring will be submitted to FTA and the Texas Historical Commission for review after all surveys and monitoring are completed.

4.7 Hazardous Materials

Large infrastructure projects have the potential to increase the exposure of people or the environment to hazardous materials, which could affect public health and natural resources. Many sites in urban areas contain soil and groundwater that have been exposed to contaminated materials. Sites may have been affected by past uses and may have no obvious signs of contamination. The potential to encounter hazardous materials during construction is analyzed in order to plan for the necessary measures that protect workers, the public, and the environment, and to comply with local, state, and federal laws.

ATP analyzed the Project's potential to encounter hazardous materials during construction. The analysis for this section is based on the conceptual design drawings that were prepared for the Build Alternative and Design Options and are presented in **Appendix C.** The Study Area for this analysis includes a 300-foot distance from either side the centerline of the proposed at-grade improvements.

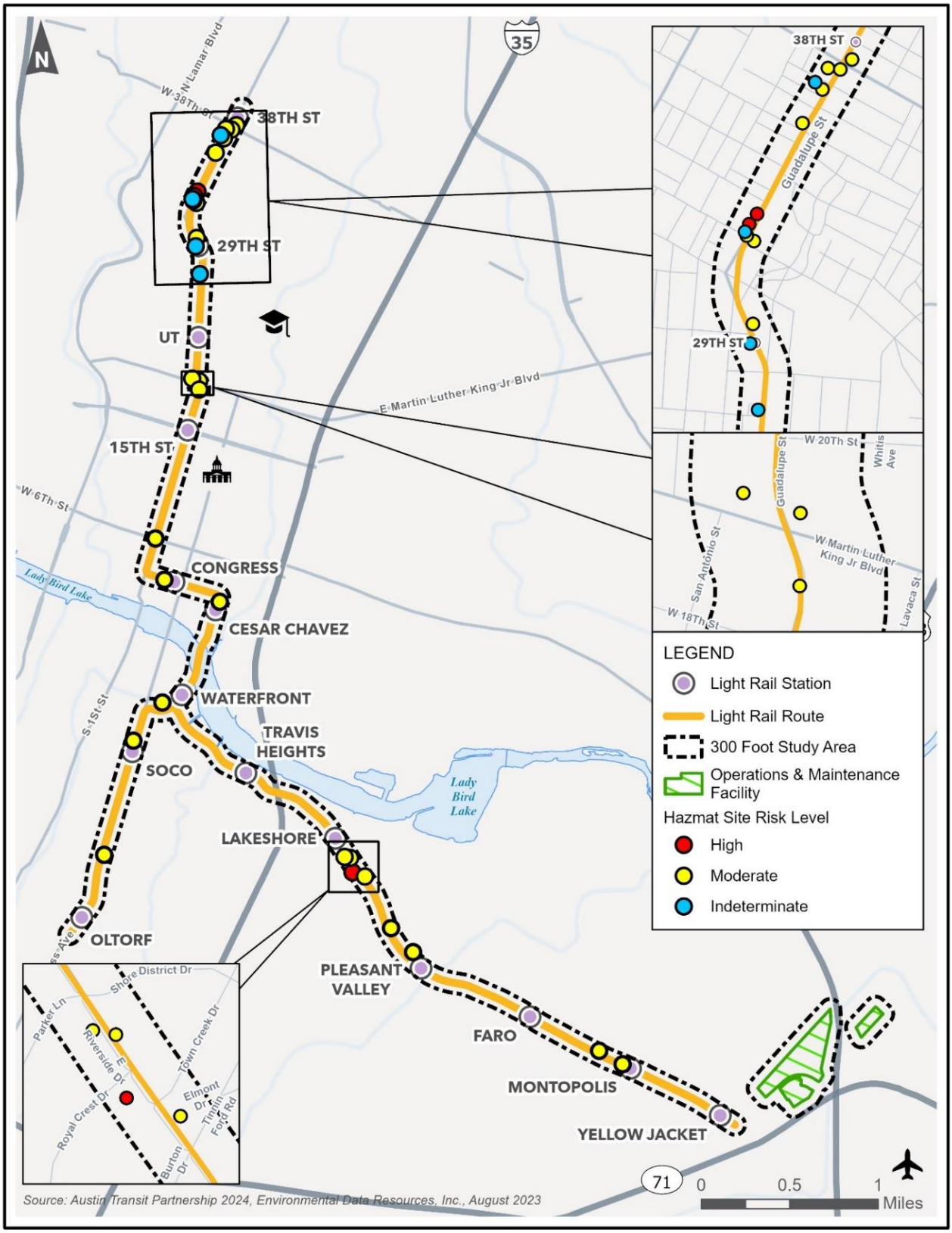
4.7.1 Affected Environment

A total of 150 hazardous materials listings were identified within the 300-foot Study Area for the Project based on the database search. Once identified, sites within the Study Area were evaluated and ranked using a relative risk ranking system to identify "Sites of Concern" within the Study Area. A Site of Concern is a site that has been determined to have sufficient possibility of contamination that warrants further investigation under a Phase I Environmental Site Assessment that conforms with ASTM International (formerly known as the American Society for Testing and Materials) standards. Potential sites were ranked as High Risk, Moderate Risk, Low Risk, or Indeterminate Risk based on the type of listing; distance to the

Project alignment; topographic gradient; probable pathway for contaminant migration; status of the site; and the history of releases, spills, or violations.

Of the 150 potential risk sites within the Study Area, 3 sites are ranked as High Risk, 24 as Moderate Risk, 4 as Indeterminate Risk, and 119 as Low Risk. The potential risk sites are scattered throughout the Project corridor with a dense grouping in the North Section, where proposed construction activities are anticipated to occur 1 to 2 feet below ground surface. In areas where excavation is anticipated to be greater (i.e., bridge piers), no high-risk sites were identified. Most of the sites ranked as Low Risk were eliminated from further consideration because they had database listings for issues such as paperwork violations, air pollutant emission sites, or other listings that would not lead to a risk of contaminant release. The High and Moderate Risk sites are those sites that either have a high potential for releasing hazardous materials to the soil or groundwater or that have a recorded release issue or some indications of possible hazardous materials issues. The High Risk sites include current service stations. The Moderate Risk sites include auto repair garages, welding shops, or manufacturing facilities. The Indeterminate Risk sites are those that, at the time of report preparation, did not include sufficient information to assign a High, Moderate, or Low Risk ranking. **Figure 4-17** identifies Moderate, High, and Indeterminate Risk hazardous materials sites within the 300-foot Study Area.

Figure 4-17: Hazardous Materials within the 300-foot Study Area



4.7.2 Environmental Consequences

4.7.2.1 No Build Alternative

Under the No Build Alternative, the Project would not be built, and property-related acquisition would not occur. Any effects related to hazardous materials because of the committed improvements would be determined for each individual project implemented under the No Build Alternative.

4.7.2.2 Build Alternative and Design Options

The presence of hazardous or contaminated materials threatens human health only when exposure to those materials can occur. Operational effects and construction-related effects related to hazardous materials concerns would be similar under the Build Alternative and each of the Design Options, including the Variation to the Grove Station Design Option. Construction activities would involve primarily near-surface disturbances related to track construction, which would average 1 to 2 feet below ground surface. The depth of bridge piers has not been determined; however, they would generally penetrate the underlying bedrock around 10 feet below ground surface. The greater the depth of disturbance, the greater the chance to encounter groundwater. As the design progresses, ATP would conduct Phase I Environmental Site Assessments conforming with ASTM International standards along with underground storage tank documentation reviews for the High, Moderate, and Indeterminant Risk sites from which ROW would be acquired. ATP would determine the need for soil and groundwater sampling prior to the start of construction (i.e., Phase II sampling) based on the results of the Phase I Environmental Site Assessments.

Operational (Long-Term) Effects

Hazardous materials concerns would be similar under the Build Alternative and each of the Design Options, and the risk management recommendations apply to all Design Options under consideration. Hazardous materials could include diesel fuel, lubricants, hydraulic fluids, and cleaning products used during the routine maintenance of the ROW, rail vehicles, and stations. Operation and maintenance of the Project would also involve handling, transporting, generating, and disposing of hazardous and solid waste.

The solid waste generated during operation of the Project is not anticipated to have an adverse effect on existing landfill capacity. No long-term operational effects would be anticipated as a result of the Project because the transporting and handling of hazardous materials is heavily regulated, and transit employees responsible for operations and their contractors would follow existing state and local hazardous material handling protocol and best management practices to minimize environmental risks. Best management practices incorporated in the OMF would include modern ventilation systems, spill containment systems, worker training, and stormwater management systems. As a result, operation of the Project would not have an adverse effect related to the transportation and handling of hazardous materials.

Construction-Related (Short-Term) Effects

During construction, the Project would require excavation and disturbance of soil. This would occur largely within the existing transportation ROW and would involve surface construction, limited trenching, and excavation for bridge piers and viaduct foundations. Surface construction

would include activities such as laying new track, constructing stations, and adding or relocating utilities. During construction, there would be a low potential for adverse effects on public health, workers, and the environment to occur from the Sites of Concern identified in the Study Area because construction sites would be carefully managed, and contractors would be monitored for compliance with all local, state, and federal laws.

Detection of hazardous materials in a Phase II sampling program would result in development of an environmental remediation program in coordination with the regulatory community, including the Texas Commission on Environmental Quality (TCEQ), as well as site cleanup and/or precautions to protect the environment. TCEQ enforces solid and hazardous waste regulations. The Texas Department of State Health Services enforces asbestos regulations. Depending on the amount of hazardous waste generated, ATP may prepare a Resource Conservation and Recovery Act Contingency Plan.

Prior to construction, ATP would prepare a Hazardous Materials Management Plan to ensure that the handling, use, storage, and disposal of hazardous materials would be in accordance with applicable local, state, and federal regulations during construction and operation activities. ATP would require its construction contractor and any other entities handling hazardous materials during construction to adhere to the Hazardous Materials Management Plan.

Prior to construction, ATP would also prepare a Waste Management Plan to address handling, transporting, and disposing of hazardous waste and construction and demolition waste generated during construction. The Waste Management Plan would be consistent with applicable local, state, and federal regulations and would specify that, where practicable, uncontaminated construction and demolition waste would be diverted from landfills by reuse or recycling. Reuse of material may include reuse on the construction Project site when fill is needed.

For unanticipated encounters with hazardous materials, contractors would be prepared and would have proper equipment available to protect their workers and the environment. Appropriately trained staff with environmental remediation expertise would be available during all ground-disturbing activities. For all contaminants, if contaminated soil or rock would require excavation, procedures would be developed to properly separate contaminated material from non-contaminated material and ensure proper management of the solid waste and contaminated soils. Excavated contaminated and uncontaminated soils would be disposed of in accordance with applicable local, state, and federal guidelines and regulations under a Waste Management Plan and a Hazardous Materials Management Plan and would generally be handled through a program of excavation and off-site disposal. In addition, any existing structures would be surveyed for the presence of hazardous/regulated materials such as asbestos-containing materials, lead-based paint, and chemical storage prior to their demolition or modification. These investigations would provide a basis for determining construction health and safety specifications; contaminated soil and groundwater remediation and disposal procedures; and asbestos or lead-based paint management or remediation practices. The design and preparation of required monitoring and remediation plans would be coordinated with TCEQ.

The dense, urban development of the Project corridor includes extensive utility corridors with excavations and, in some cases, pipes and concrete conduit. Given the presence of multiple release sites including volatile organic compounds and semi-volatile organic compounds, there is a possibility that vapor intrusion into utility chases or underground spaces has occurred. During a Phase I Environmental Site Assessment that conforms with ASTM International standards, this issue would be further analyzed.

4.7.3 Mitigation

Because ATP and its contractors would comply with all local, state, and federal policies and regulations governing hazardous and contaminated materials, adverse effects on human health and the environment would not be expected to occur under the Build Alternative or the Design Options. As an integral component of the Project, ATP would acquire permits; prepare operations and construction plans pertaining to the handling, transporting, and disposing of hazardous materials; and monitor contractor compliance with best management practices. ATP would conduct Phase I Environmental Site Assessments and associated investigations when required and would develop a Hazardous Materials Management Plan and a Waste Management Plan.

Mitigation measures would be needed only in areas where construction activities encounter known or suspected contaminated soil or groundwater. Mitigation may be required near utility corridors close to leaking petroleum storage tank sites or dry cleaner facilities where a higher potential to encounter contaminated materials may exist. Where the alignment is located near or over part of a known contaminated site, construction may involve excavation to a depth that exposes contaminated soil.

4.8 Utilities

Light rail projects have the potential to affect utilities due to demand for electricity and required coordination with utility companies for placement of lighting, traction power substations, and overhead wires (catenary). In addition, existing utilities sometimes have to be removed or moved.

ATP identified existing utilities within the Study Area and assessed the Project's potential effects on utilities. The Study Area for this assessment includes the limits of Project construction. The analysis presented in this section is based on the conceptual design drawings that have been prepared for the Build Alternative and Design Options (see **Appendix C**).

4.8.1 Affected Environment

The major utilities within the Project corridor include electric distribution (overhead and underground network), electric transmission, traffic signals, control boxes, street lighting, reclaimed water, water, wastewater, storm drains, chilled water, gas pipelines, telecommunications lines, and fiber optic cables. ATP has identified 33 private utility companies and 7 public utilities within the Study Area. These existing utilities run both parallel to and across the light rail corridor and are included in **Appendix E-9**.

4.8.2 Environmental Consequences

4.8.2.1 No Build Alternative

Under the No Build Alternative, the Project would not be built. Utilities would continue to be constructed, relocated, rehabilitated, removed, and replaced based on local and regional needs. Specific effects on utilities from other transportation projects would be determined for each individual project.

4.8.2.2 Build Alternative and Design Options

Operational (Long-Term) Effects

The light rail system would increase electricity usage in the Study Area through operation of trains and lighting installed at facilities and along the alignment. Traction power substations spaced approximately 1 mile apart would distribute power to the overhead catenary system, nearby stations, the OMF, and the train control and communications systems, facilities, or bungalows. A traction power substation provides electricity to the train and all other system components requiring electric power, such as stations, lighting, and communications. An overhead catenary system is a system of overhead wires above rail tracks and connected to the substations; overhead catenary systems are used to supply electricity to light rail vehicles. Traction power substations would be powered by the electric lines connecting to the nearest pole. In some cases, additional distribution lines may be needed to service individual traction power substations. A dedicated traction power substation with direct current traction power distribution network would be included in the building structure of the OMF.

Underground utilities in or adjacent to the Project footprint, including communications, gas, sewer, water, reclaimed water, and electric lines, could be susceptible to corrosion from stray electrical currents traveling from the traction power substation to overhead catenary system poles. Trenched areas along the alignment, common to the Build Alternative and all Design Options, have the potential to produce stray currents. Stray currents are electric discharges released into the subgrade that have the potential to disrupt nearby sensitive equipment or metal objects and also have the potential to accelerate the rate of corrosion on subsurface metal conduits and piping. ATP would coordinate with utility providers to identify appropriate control measures to avoid or minimize corrosion. Typical control measures include:

- installing cathodic protection systems, which protect metal utility lines from corrosion that could occur due to stray electrical currents. (Cathodic protection therefore helps lengthen the lifespan of metallic subsurface infrastructure. Cathodic protection measures and metallic casing pipes would protect different types of metal objects and utilities such as water, wastewater, and chilled water lines.);
- installing insulating unions to break the electrical conductivity of the utility;
- installing polywrap encasement, a sleeve around metallic pipe that protects the pipe from corrosion;
- isolating electrical rails from the ground; and
- installing stray-current-control track fastening systems, where appropriate.

Major service disruptions to utility customers during light rail repair and maintenance operations are unlikely. ATP would design the light rail system to maintain access to utilities for

maintenance and repair. In some cases, this would require ATP to relocate sewer manholes, pipes, vaults, or other access points. ATP would work closely with utility providers to maintain required access to these utilities and any relocated sewer holes and vaults, utility mains, fire hydrants, and other features. For maintenance access to the Waller Creek Tunnel, ATP would coordinate with the City to determine the adequacy of existing access points and would evaluate opportunities for new access, if needed.

The design of utility relocations and access points would be in accordance with the Utility Rules of Practice that ATP developed for the Project with input from CapMetro regarding operating considerations. ATP would integrate efficient operating practices at the new facilities and would use equipment to reduce energy and water demand and to recycle water. Implementing these and other sustainable practices would reduce consumption and demand on utilities.

Long-term effects would be similar for the Build Alternative and the Design Options based on the current design stage and selected locations of the surface and structured parking areas. The Build Alternative would affect more utilities than the Lady Bird Lake Bridge Extension Design Option, which provides opportunities to avoid utility conflicts by using piers for the elevated structures of the light rail.

Both the Build Alternative and the Cesar Chavez Station Design Option would require relocation of the Austin Energy chilled water infrastructure, and both would require clearing additional ROW on Trinity Street and 3rd Street to support the rebuild of the chilled water line extension back to the Convention Center. However, the Cesar Chavez Station Design Option would be located on more private property and would have fewer utility conflicts within and adjacent to the ROW and would also avoid direct conflict with most of the 66-inch-diameter water main.

The Center-Running Bike/Pedestrian and Shade Tree Facilities on East Riverside Design Option would require widening the cross section which would result in more utility conflicts when compared to the Build Alternative. The Utility Rules of Practice may be revised to restrict or limit the presence of utilities within the center-running bicycle and pedestrian facilities zone.

The Travis Heights Station Design Option eliminates the station; therefore, it would affect fewer utilities than the Build Alternative. The same is true for the Grove Station Design Option due to the wider guideway and utility free zone, which would be eliminated at Faro and Montopolis and replaced with a standard width guideway that can more closely follow the existing roadway alignment. Utility conflicts associated with the Variation to the Grove Station Design Option would be similar to the Grove Station under the Build Alternative. There would be no substantial differences between the Build Alternative and the Wooldridge Square Station Design Option.

Construction-Related (Short-Term) Effects

The proposed guideway would consist of two parallel tracks serving bidirectional trains. The typical separation of the tracks is 14 feet from centerline of track to centerline of track. The embedded tracks would be supported by concrete foundations directly under the tracks. The typical width of the guideway is 28 feet. The guideway would include a utility review zone that is 5.5 feet below the surface of the guideway and 10 feet from either side of the light rail track centerline. Utilities within the utility review zone would be reviewed to determine whether they

would be protected in place or relocated. Pressurized water mains within the utility review zone would be relocated. During construction, utility services would be maintained, and temporary services would be installed if the main services are shut off. The construction contractor would install, operate, protect, and maintain the respective temporary services during the construction period until the permanent utility can be placed back into service. The guideway would also include a utility free zone, which is the area between the surface and 2.5 feet below the surface of the guideway and covers the width of the guideway. Utilities within this zone would be relocated outside the utility free zone; relocation efforts would be coordinated with the respective utility owners and providers.

Major existing utilities that would be affected by construction of the Project include water; reclaimed water; wastewater; manholes and handholes; stormwater, storm drains, and catch basin laterals; energy; electrical; traffic signals; street lighting; gas; telecommunications; and other. ATP would coordinate with utility providers to establish replacement procedures and facility design standards as applicable. Construction-related (short-term) effects would be similar for the Build Alternative and the Design Options. Details on how each of these would be managed are included in **Appendix E-9, Utilities Technical Report**.

Preconstruction Measures and Coordination with Utility Providers

Utilities to be protected, relocated, abandoned-in place, or removed would be coordinated in advance of construction activities. Private utility companies operating in City ROW are covered under existing City Franchise Agreements. Upon completion of the Project, the City would own and maintain all City utility infrastructure relocated or replaced as a result of construction. In addition to the applicable regulatory requirements listed above, the Project is governed by the 2023 Utility Rules of Practice and a Joint Powers Agreement among ATP, CapMetro, and the City. The Utility Rules of Practice, a comprehensive document to support efforts to relocate utilities for the purpose of implementing high-capacity transit, is provided in **Attachment A to Appendix E-9, Utilities Technical Report**. It provides guidance and methodology for analyzing, reviewing, and approving potential utility conflicts.

The Utility Rules of Practice also consider private utility companies operating in City ROW, which remain covered under existing City Franchise Agreements. Upon completion of the Project, the City would own and maintain all City utility infrastructure relocated or replaced as a result of construction.

During final design, a subsurface utility company would complete detailed utility investigations and update the utility base maps. After all utilities have been recorded, a comprehensive conflict analysis would be performed, and the Utility Tracking Matrix would be updated. The subsurface utility company would work with utility owners and designers to minimize effects, determine relocation needs, and assist in creating supplemental agreements that align with the Utility Rules of Practice. ATP would complete an assessment to determine which underground utilities could be crossed and which would need to be relocated outside the proposed ROW and within a separate easement. The assessment would be completed in accordance with the Utility Rules of Practice and the criteria developed by ATP, the City, and the respective utility owner. Overhead utilities would be addressed in a similar manner through coordination with the utility

companies; the final order, lead time, and cost of the utility relocations would also be determined. Additional details are provided in the **Appendix E-9**.

Access for maintenance operations would be maintained via existing access points or new access points coordinated with the City's representative departments. Where possible, ATP and the City would collaborate to evaluate and implement solutions to protect subsurface utilities to extend the design life and minimize future maintenance needs.

4.8.3 Mitigation

ATP would be responsible for funding and constructing public utilities that must be relocated due to conflicts of the existing utilities in the ROW with the proposed Project corridor. As an integral component of the Project, the utility relocations would be guided by the Utility Rules of Practice jointly adopted by ATP and each of the public utilities. Conflicts with private (franchise) utilities that would require relocation would be governed by Master Utilities Agreement(s), currently under development in coordination with the franchise utility companies. Through planning, preconstruction measures, coordination with utility providers, and compliance with all local, state, and federal requirements, adverse effects on utilities would not be expected to occur. Therefore, no mitigation related to utilities would be required.

As part of the Preferred Alternative, ATP would coordinate with the City to discuss existing access to the Waller Creek Tunnel and would evaluate opportunities for new access points, if needed. During final design, ATP would continue to work with the City, utility owners, utility providers, and other stakeholders within the Study Area to determine and coordinate protection, relocation, and removal of affected utilities. ATP would develop and implement standard control measures in consultation with utility owners to avoid the potential of stray currents that can damage or corrode utility systems. If additional effects are identified during final design of the Project, ATP would work with the potentially affected utility owners or utility provider to determine whether mitigation is warranted.

4.9 Safety and Security

Public transportation is largely recognized as one of the safest ways to travel. The American Public Transportation Association reports that public transportation is 10 times safer than traveling by car and that transit-oriented development communities are 5 times safer with one-fifth per capita traffic casualty rate compared to automobile-oriented communities (American Public Transportation Association 2016). Nevertheless, public transit improvement projects must address site-specific safety and security measures tailored to the area's unique conditions for construction and operation of the new service.

ATP assessed the Project's potential effects on safety and security in the Study Area. ATP evaluated onboard passenger and operator safety, bicycle and pedestrian safety, safety and security at facilities design (stations, park-and-rides, OMF), and emergency response. The Study Area considered for this section includes the area within a 0.5-mile buffer of the proposed alignment and station locations. Safety requirements for construction and operation of public transportation projects are regulated by state and federal laws. ATP would develop an Agency Safety Plan to assess performance and report findings to FTA on an annual basis as required

by 49 CFR Part 673. TxDOT would serve as the state safety oversight agency for the light rail system. Through this safety oversight and the incorporation of safety and security design elements, adverse effects related to safety and security are not anticipated.

4.9.1 Affected Environment

4.9.1.1 Onboard Passenger and Operator Safety

The Austin Transportation and Public Works Department has identified 13 initial project areas within their "High Injury Network" to implement immediate, low-cost solutions. Two project areas are in the Study Area: Riverside Drive and South Pleasant Valley Road, where improvements such as new pedestrian hybrid beacons, wider shared use paths, dedicated turn lanes, and new signal infrastructure and signal phasing are substantially complete.

According to the *Vision Zero Two-Year Update: 2021-2022* (City of Austin 2023e), Vision Zero completed four major intersection safety improvement projects within the Study Area, including Congress Avenue and Oltorf Street, Pleasant Valley Road and Elmont Drive, I-35 and 7th Street, and I-35 and 8th Street. The program's investments have started to show positive signs in improving safety, including a 31 percent reduction in serious injury and fatal crashes at major intersection safety project locations. However, fatal crashes on state-owned roadways continued to increase in 2021 and 2022 while fatal crashes on non-state-owned roadways remain relatively flat. Pedestrian fatalities also continued to rise, and Austin's Black population continued to be significantly overrepresented among severe crash victims. While Black people make up less than 7 percent of the Austin population, they accounted for 15 percent of people seriously injured or killed in crashes in 2021 and 2022 (City of Austin 2023e).

4.9.1.2 Bicycle and Pedestrian Safety

Within the Study Area, bicycle and pedestrian facilities include off-street urban trails, sidewalks along roadways, pedestrian signals, curb ramps, and pedestrian crosswalks. Roadway intersections are controlled by either a traffic signal or stop sign. Existing bicycle facilities and sidewalks lack connectivity in some locations throughout the Study Area. Currently, large volumes of bicyclists and pedestrians interact with the Project corridor at existing CapMetro Rapid station locations and throughout the UT campus, along South Congress Avenue, and in downtown areas. While the sidewalk network is more complete between UT West Mall station and Republic Square (93 to 96 percent), peak pedestrian volumes can exceed sidewalk capacity during special events or when UT is in session. **Appendix D** provides existing bicycle and pedestrian facilities maps, including the existing sidewalk networks.

4.9.1.3 Safety and Security at Facilities

Local crime rates are a key factor in understanding transit station area security risks. In general, Austin has higher crime rates compared to the State of Texas and the nation overall, especially in the categories of robbery, aggravated assault, property crime, burglary, larceny/theft, and vehicle theft as shown in **Table 4-5**.

Table 4-5: Reported Crime Rates for 2022 per 100,000 Residents

Location	Homicide	Rape	Robbery	Aggravated Assault	Property Crime	Burglary	Larceny-Theft	Vehicle Theft
City of Austin	7.1	54.7	97.3	381.2	3,590	498.9	2,536.3	554.6
Texas	6.7	50.0	70.5	304.7	2,999.9	334.3	1,634.4	331.2
National	6.3	40.0	66.1	268.2	1,954.4	269.8	1,401.9	282.7

Source: Federal Bureau of Investigation 2023.

Until recently, CapMetro has relied on the Austin Police Department to provide security and respond to any distress calls from the system. To address safety concerns and due to Austin's continued growth, CapMetro has implemented its own Public Safety Program, which includes public safety ambassadors, community intervention specialists, and transit police officers to support the program. The role of the program's police officers is to prevent and investigate crimes committed within CapMetro's property and contact the Austin Police Department when needed.

4.9.1.4 Emergency Response

Emergency service providers in the Study Area include fire (Austin Fire Department), law enforcement (Austin Police Department), and emergency medical services (Austin-Travis County Emergency Medical Services). Medical services include hospitals and in-patient emergency facilities, including any in-patient behavioral health facilities. Fire, police, and Austin-Travis County Emergency Medical Services stations are identified in the **Appendix E-10**.

4.9.2 Environmental Consequences

4.9.2.1 No Build Alternative

Under the No Build Alternative, the Project would not be built. The No Build Alternative would not attract new light rail riders, and no Project-related safety and security improvements would be made.

4.9.2.2 Build Alternative and Design Options

Operational (Long-Term) Effects

Onboard Passenger and Operator Safety

The Build Alternative would introduce a new, comparatively safe transportation alternative for those travelling in the Project corridor.

Train derailments occur when any of a train's wheels leave its designated location on the track. Except in cases of emergency or special circumstances, light rail vehicles would operate on separate tracks for each direction of service (i.e., there would be no bidirectional tracks) to reduce the risk of rail-on-rail collisions. The potential for derailment would be mitigated through design (i.e., curvature and operating speed restrictions would be consistent with industry best practices) and regular maintenance of the light rail track and equipment. Light rail vehicles would have separate ROW from automobiles and buses to minimize the potential for collisions.

While there is a risk that automobiles would turn in front of the light rail vehicles, collision risk at grade crossings would be mitigated by using signals, gates, and whistles.

The potential for fire on the light rail trainset or at facilities is low because the system would be constructed primarily of steel and concrete and there would be no source of combustible fuel on the vehicles or in the stations, with the exception of fuel needs at the OMF. Mechanical failure could pose some risk to passengers or employees if it results in being confined to a non-operational vehicle and could introduce safety hazards for employees performing emergency maintenance. Additionally, mechanical failure of the doors could affect the safety of boarding or alighting passengers. The occurrence of mechanical failure would be minimized by implementing an inspection, testing, and maintenance program. Any hazards posed by the electrical power system would be managed per regulatory requirements.

There would be nominal differences among the Build Alternative and Design Options in terms of safety and security. Regardless of the number or location of stations, station design would comply with industry standards for safety and security and would meet applicable emergency access/egress requirements. The Center-Running Bike/Pedestrian and Shade Tree Facilities on East Riverside Design Option, which includes center-running bike and pedestrian facilities east of I-35 on Riverside Drive, would provide protected lanes fully buffered from vehicular traffic and safe crossing locations for access to the lanes. The Build Alternative would include protected curbside bike and pedestrian lanes or shared use paths on Riverside Drive. Both the Build Alternative and the Design Options would improve safety for all users.

Bicycle and Pedestrian Safety

Bicycle and pedestrian activity is likely to increase throughout the Project corridor as a result of increasing population, job densities, and planned transportation improvements. The Build Alternative would improve bicycle and pedestrian connectivity by creating consistent, connected, and dedicated bicycle/pedestrian lanes and shared use paths. Pedestrian crossings across the guideway would be permitted at signalized intersections via crosswalks with pedestrian signals. In addition, separate signalized pedestrian crossings with pedestrian-activated signals would be provided where the spacing of signalized intersections is considered too far apart to provide for safe pedestrian crossings, particularly near proposed stations. Crossing would include bells and other auditory warnings to ensure that cyclists and pedestrians are aware of approaching light rail vehicles. The proposed crossings would ensure that pedestrians can safely cross the at-grade guideway, mitigating the risks associated with interactions among cyclists, pedestrians, and the light rail. Pedestrian crossing protection measures in open transit areas such as UT have yet to be determined but could likely include restricted crossing access.

Compared to existing CapMetro Rapid buses, the larger light rail vehicles and additional doors for boarding and alighting would reduce bicycle/pedestrian conflicts, particularly in high-volume pedestrian areas like along Guadalupe Street through the UT campus. Multiple doors (more entry/exit options) reduce congestion by dispersing crowds of passengers and providing better visibility for vehicle operators at stations lowering the potential of accidents.

Under the Build Alternative, portions of Guadalupe Street would function as a transit/bike/pedestrian-only corridor, with general traffic redirected to the surrounding roadways. Along the Drag, a 12-foot-wide bike lane would be built on each side of the guideway, which may also be used for emergency and delivery vehicles. Between Congress Avenue and Colorado Street, 3rd Street would be converted to a light rail/pedestrian-only corridor, and the existing bicycle lane would be relocated to 4th Street.

The Center-Running Bike/Pedestrian and Shade Tree Facilities on East Riverside Design Option would fully buffer bicyclists and pedestrians from vehicular traffic. Bicyclists and pedestrians would be provided crossings at specific locations to access the center-running lanes to discourage crossing outside of those locations. Under the Build Alternative, protected curbside bike and pedestrian facilities or shared use paths would be provided. In either case, ATP would expect fewer conflicts among bicycles, pedestrians, and motor vehicles due to the safety features included in the Project design and the decreased traffic volumes in the Study Area. **Appendix D** discusses the traffic analysis.

Safety and Security at Facilities

Safety and security design elements for the stations, guideway, park-and-rides, and OMF would comply with the American Public Transportation Association's Crime Prevention Through Environmental Design and would meet applicable emergency access/egress and structural federal emergency preparedness requirements. Many transit systems use Crime Prevention Through Environmental Design by creating open sightlines and providing ample lighting at the stations and park-and-rides, security cameras, and access fencing/barriers. Applying Crime Prevention Through Environmental Design throughout the system to create a design can affect behaviors and reduce risk by:

- providing guidance to transit planners, designers, and builders;
- deterring criminal activity;
- increasing perceived risk of apprehension;
- maximizing the perceived presence of transit and law enforcement staff;
- minimizing out-of-sight activity; and
- managing access to authorized areas and controlling access to non-public areas.

By adopting Crime Prevention Through Environmental Design criteria, the Build Alternative would create stations and area designs to deter possible criminal activity. Stations and other Build Alternative facilities would be designed to maximize visibility. Such designs would provide reciprocal observations from public areas into the facilities, bring transit riders to new activity hubs in the area, and strengthen community involvement within public spaces. At-grade crossings would be fully equipped with modern safety features, including grade crossing warning systems and, in some cases, gate arms/mechanisms.

Prior to beginning regular service operations, ATP would develop an Inspection, Testing, and Maintenance Plan that specifies minimum standards and schedules for inspection, testing, and maintenance of vehicles, track, and other critical infrastructure required for the prevention of

mechanical failures. During operations, the transit operator would perform the specified inspections, tests, and maintenance tasks at the identified intervals.

Station areas, park-and-rides, and the OMF would be in active areas with adequate lighting and security cameras and designed in accordance with Crime Prevention Through Environmental Design principles to deter possible criminal activity. Access would be restricted at the OMF via a 24-hour guard booth and security fencing around the site's perimeter. In addition, transit safety and security would be employed through contract and/or partners to prevent and investigate crimes committed within the Project. There would be nominal differences between the Build Alternative and the Design Options because safety and security measures would be implemented uniformly at all facilities.

Emergency Response

Traffic analyses performed for the Build Alternative and its Design Options found that the traffic volumes would decrease compared to the No Build Alternative along the corridor due to the reduction in VMT. Overall, the Build Alternative would reduce personal vehicle trips, resulting in fewer cars at intersections as compared to the No Build Alternative traffic volumes. Traffic flow would retain similar patterns to the No Build Alternative: The AM peak period would have prominent flow toward the direction of downtown, while PM peak period would have traffic flow away from downtown. The Build Alternative would shift traffic patterns in various areas along the corridor. Roadways and intersection modifications (to be designed in accordance with the City's Transportation Criteria Manual) would include protected bicycle and pedestrian facilities behind the curb (either separate raised bicycle lane and sidewalk or, where constrained, a shared use path). Intersections would be designed as protected intersections, with physical separation for bicyclists, pedestrians, and motor vehicles (see the conceptual design drawings in **Appendix C**). At-grade intersections would create delays and interruptions to traffic flow, especially during the peak AM and PM periods. Cross movements of at-grade roadway intersections would experience increased delay as traffic signal priority would be given to light rail vehicles. This would cause a brief interruption of traffic flow. Vehicles moving north or south along the Project corridor would benefit from the same transit signal priority improvements designed to improve light rail transit travel speeds. Negative effects on emergency response times are more likely for east-west movements on streets perpendicular to the Project corridor and may occur through: (1) reduced speeds due to traffic or level of service effects on the existing grid; or (2) physical modifications to corridor intersections, which would limit particular movements and require alternate routing of an emergency response vehicle.

To mitigate this potential effect, ATP would conduct an emergency vehicle response analysis and coordinate with emergency response providers to establish an emergency response plan and communication protocols to address any increase in response times during Project construction, beginning in 2027, and operation, beginning in 2033.

The Lady Bird Lake Bridge Extension Design Option would eliminate the potential for conflicts with east-west movements by grade-separating (elevating) the track at Riverside Drive, which would benefit emergency responders from Austin Fire Station 6 and Austin-Travis County Emergency Medical Services Demand 3. Provisions for emergency access under the other

Design Options and their effect on response times will be further analyzed, as Project design is advanced, as will any movement restrictions associated with the at-grade alignment in downtown.

Construction-Related (Short-Term) Effects

Effects on pedestrians would occur as sidewalks would be temporarily closed during construction. Safe pedestrian detours, including signage and fencing, would be provided around construction areas. If not properly operated, secured, and maintained, construction equipment could create a risk due to potential theft of equipment. As is common in infrastructure projects, construction site access would be limited to authorized personnel. Temporary lane and road closures and modified traffic routing would occur during the construction period. At these construction sites, lane and road closures and detours could potentially create a distraction to automobile drivers, bicyclists, and pedestrians, and lead to conflicts. In addition, lane and road closures, detours, and localized automobile congestion could increase the response time for law enforcement, fire and emergency services personnel, transit, and school buses. The resulting localized automobile congestion could increase the response time for emergency vehicles, including law enforcement, fire, and emergency medical services, as noted in **Appendix D,** Transportation Technical Report.

ATP would conduct an emergency vehicle response analysis and would coordinate with emergency response providers to establish an Emergency Response Plan and communication protocols to mitigate any increase in response times during Project construction and operation. This analysis would include a detailed evaluation of current emergency routes, anticipated traffic congestion, lane and road closures, and detours that may affect the ability of law enforcement, fire services, and emergency medical service to reach critical areas. The Emergency Response Plan would identify alternative routes, contingency plans, and response protocols during both construction and operation of the Project. Emergency response providers would be included in the planning process to ensure that access to critical facilities (such as hospitals, fire stations, and police stations) remains uninterrupted. Additionally, the Emergency Response Plan would ensure that construction schedules are shared with emergency services so they can adjust patrols, staffing levels, and response strategies as needed.

4.9.3 Mitigation

As an integral component of the Project, ATP would comply with local, state, and federal safety and security plans, policies, and regulations.

As part of the Preferred Alternative, under 49 CFR Part 673, ATP would develop an Agency Safety Plan and annually assess implementation and report the findings to FTA. TxDOT would serve as the state safety oversight agency. In addition, ATP anticipates conducting an emergency vehicle response analysis and coordinating with emergency response providers to establish an Emergency Response Plan and communication protocols to mitigate any increase in response times during Project construction and operation. ATP would also develop an Inspection, Testing, and Maintenance Plan that specifies minimum standards and schedules for inspection, testing, and maintenance of vehicles, track, and other critical infrastructure required

for the prevention of mechanical failures. During operations, ATP would ensure that the specified inspections, tests, and maintenance tasks are performed at the identified intervals.

4.10 Noise and Vibration

Noise, by definition, is unwanted sound. Prolonged exposure to high levels of noise can lead to sleep disturbances, stress, and long-term health issues such as hypertension and anxiety. Train noise is comprised of a series of events over time. Depending on the location of the receptor and ambient or existing noise levels, these single events may or may not be distinguishable from background noise levels. Light rail vehicles do not produce engine noise, but the wheel/rail interaction, warning bells, and movements when they cross tracks produce both noise and vibration.

ATP performed a noise and vibration impact assessment to evaluate the effects of the Project on noise and vibration levels in the Study Area in accordance with the FTA *Transit Noise and Vibration Impact Assessment Manual* (FTA 2018). The noise and vibration Study Area extends approximately 350 feet from the proposed Project alignment and stations.

4.10.1 Affected Environment

Land use in the Study Area includes a combination of residential, institutional, commercial, and industrial zones. Sensitive receptors located in the Study Area include single-family and multifamily residences, hotels, places of worship, schools, the KUT Radio station (NPR Austin) inside the GB Dealey Center for New Media, and the Jesse H. Jones Communication Center – Building B (CMB) on the UT campus. Existing noise sources in the Study Area include traffic on East Riverside Drive, South Congress Avenue, Guadalupe Street, other major roadways, local roadway traffic, aircraft overflights, and local community activities. The existing ambient sound levels vary by location, depending on the proximity to major roadways, and are generally typical of a suburban environment near busy arterial roadways. The locations of the 13 long-term (LT; 24-hour) and 7 short-term (ST; 1-hour) noise measurements are shown in **Figure 4-18**, and monitoring results are presented in **Table 4-6**.

Figure 4-18: Noise Measurement Locations

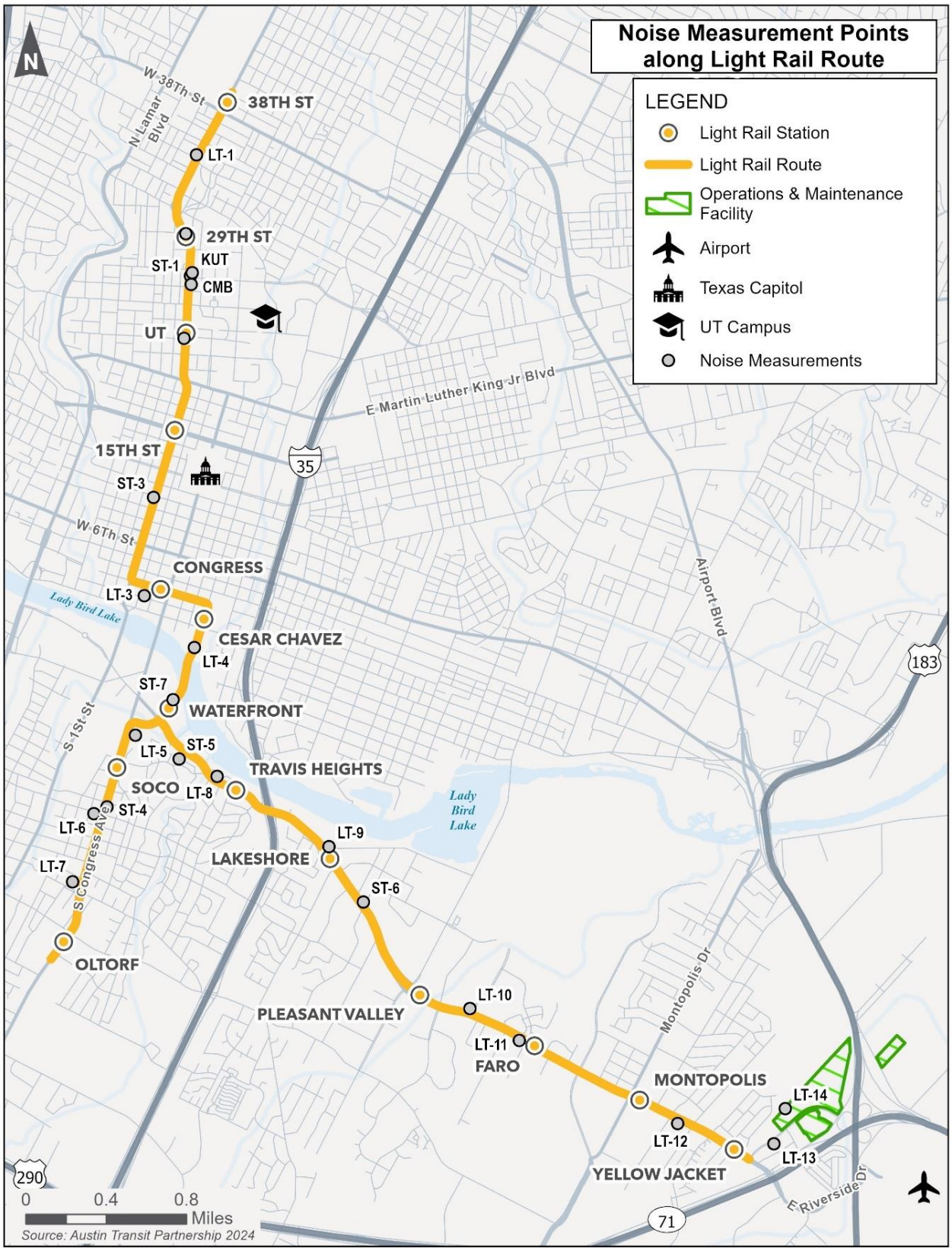


Table 4-6: Summary of Existing Ambient Noise Measurements Results

Location No.[1]	Measurement Location Description	Start Date	Start Time	Meas. Duration (hours)	Noise Exposure (dBA) Ldn	Noise Exposure (dBA) 1-hour Leq
LT-1	3200 Guadalupe Street	5/8/2024	00:00	3 [2]	71	73
LT-2	Villas on Guadalupe -- 2810 Hemphill Park	2/26/2024	15:00	24	72	70
LT-3	AMLI Downtown -- 201 Lavaca Street	2/27/2024	11:00	24	68	65
LT-5	Muse at SoCo -- 1007 South Congress Avenue	2/27/2024	11:00	24	61	60
LT-6	107 W Monroe Street	2/28/2024	15:00	24	61	53
LT-7	2107 Eva Street	2/28/2024	9:00	24	55	54
LT-8	807 Edgecliff Terrace	4/27/2021	17:00	24	67	65
LT-9	AMLI South Store	4/27/2021	15:00	24	70	66
LT-10	Tempo at Riverside	4/27/2021	14:00	24	69	65
LT-11	Austin Fire Station 22	4/27/2021	15:00	24	69	66
LT-12	Riverside Nursing and Rehab	4/26/2021	15:00	24	65	63
LT-13	Home2Suites -- 1705 Airport Commerce Dr	2/28/2024	16:00	24	62	60
LT-14	1340 Airport Commerce Dr	2/29/2024	14:00	3 [2]	57	61
ST-1	Guadalupe St and W Dean Keaton St	2/27/2024	8:21	1	64 [3]	66
ST-2	Guadalupe St and 22nd St	2/27/2024	11:53	1	65 [3]	67
ST-3	10th St and Guadalupe St	2/29/2024	9:23	1	62 [3]	64
ST-4	1503 South Congress Ave	2/29/2024	11:33	1	66 [3]	68
ST-5	500 Sunny Lane	4/28/2021	10:52	1	51 [3]	53

Location No.[1]	Measurement Location Description	Start Date	Start Time	Meas. Duration (hours)	Noise Exposure (dBA) Ldn	Noise Exposure (dBA) 1-hour Leq
ST-6	Austin Emergency Center – 2020 Riverside Drive	4/27/2021	12:07	1	63 [3]	65
ST-7	222 East Riverside Drive	4/26/2021	16:30	1	52 [3]	54

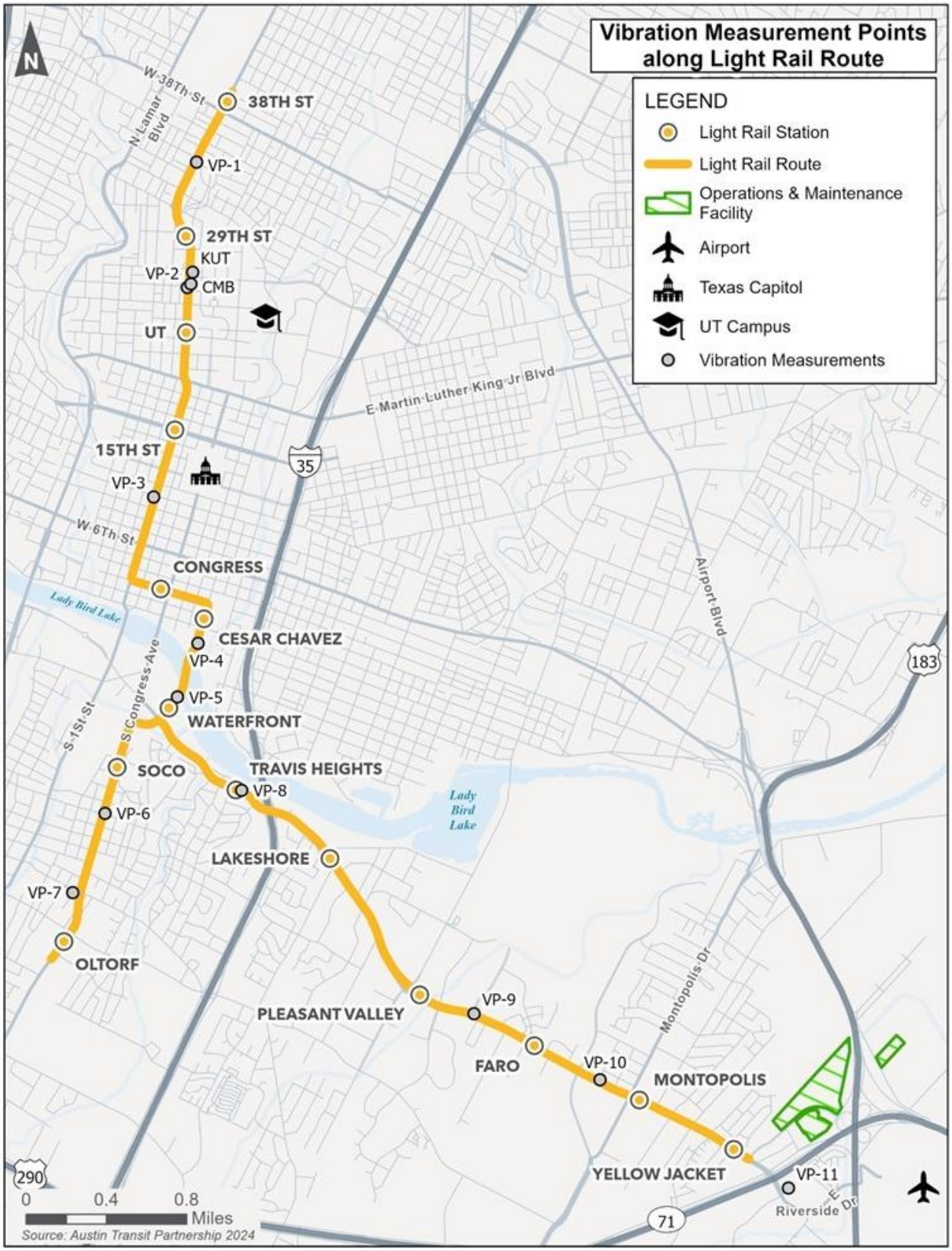
Source: Cross-Spectrum Acoustics 2024.
Ldn = day-night sound level; Leq = equivalent sound level; 1-hour Leq = Leq of a fluctuating source over a 1-hour period

[1] LT = long-term (24 hours); ST = short-term (1 hour).
[2] Due to limitations of access, ATP used three 1-hour short-term noise measurements to estimate an Ldn using FTA guidance.
[3] The Ldn at these locations was estimated from the Leq using the methods described in the FTA guidance.

4.10.1.1 Vibration

Vibration-sensitive land use for the Project is the same as the noise-sensitive land use described above. Existing vibration sources in the Study Area include auto, bus, and truck traffic on local streets. However, vibration from street traffic is not generally perceptible at receivers in the Study Area unless streets have substantial bumps, potholes, or other uneven surfaces. Furthermore, the FTA vibration impact criteria are not ambient based; that is, future Project vibrations are not compared with existing vibrations to assess impact. Therefore, the vibration measurements for the Project focused on characterizing the vibration propagation through various soil conditions along the track rather than on characterizing the existing vibration levels. The locations of the vibration measurements are shown in **Figure 4-19**, and the soil propagation results are presented in **Appendix I**.

Figure 4-19: Vibration Measurement Locations



4.10.2 Environmental Consequences

4.10.2.1 No Build Alternative

The No Build Alternative would not result in any transit noise or vibration impacts. There would likely be increases in highway and local roadway noise due to increased traffic volumes, and increased transit and rail volumes based on proposed improvements included in the No Build Alternative.

4.10.2.2 Build Alternative and Design Options

Operational (Long-Term) Impacts

Noise Impacts

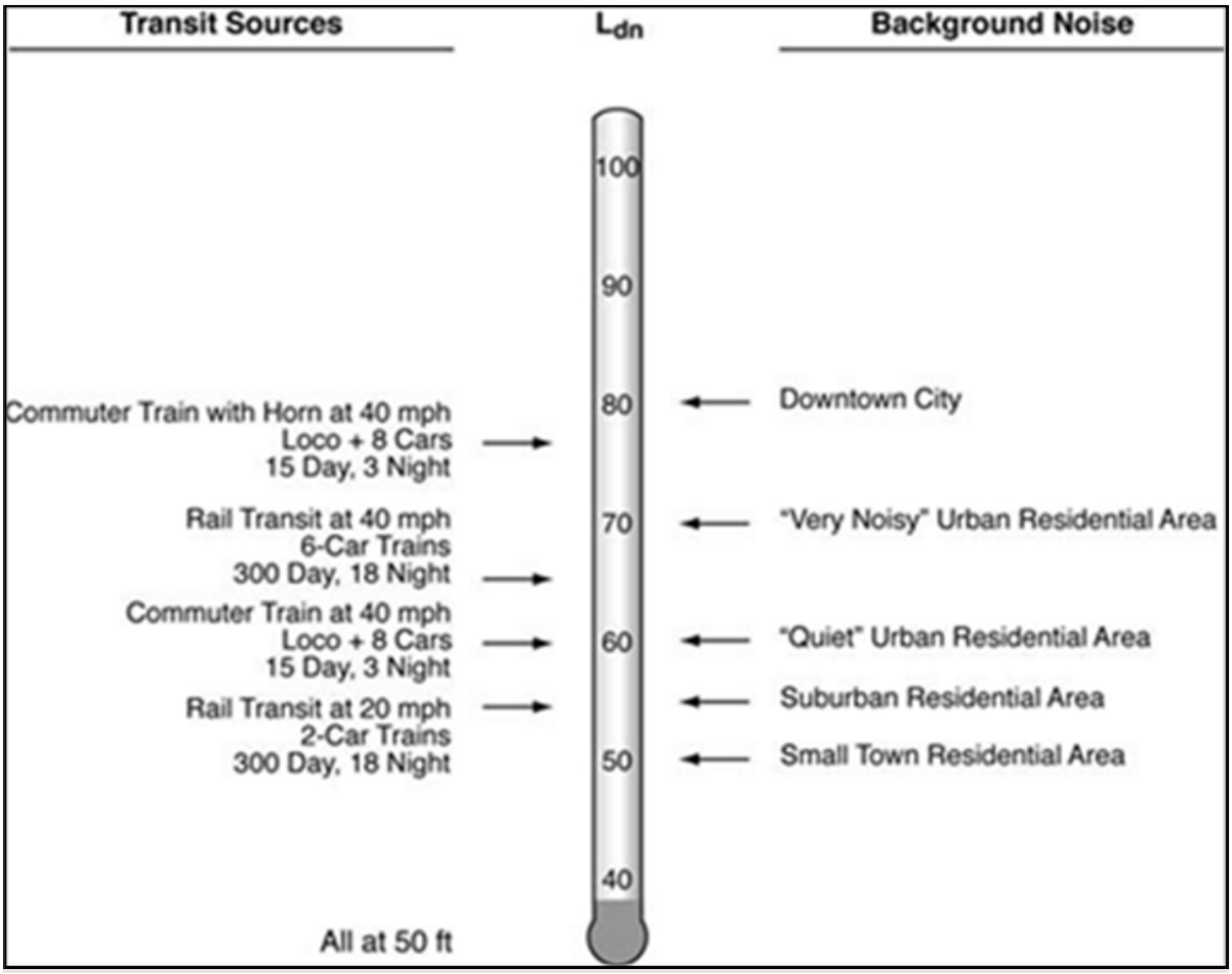
Potential noise and vibration impacts resulting from construction and operation of the Project were assessed in accordance with guidelines specified in FTA's *Transit Noise and Vibration Impact Assessment Manual* (FTA 2018). ATP determined the projection of wayside noise and vibration levels from light rail transit operations at sensitive receptors using the reference levels and models specified in the FTA guidance manual. Project specific information, including train speeds, number of cars per train, daily operating hours, and number of trains per hour, along with the location of elevated structures, crossovers, and stations for the Build Alternative and Design Options, was included in the assessment.

ATP characterized existing ambient noise levels through direct measurements at selected locations in the Study Area, which consisted of 13 long-term (24-hour) and 7 short-term (1-hour) monitoring locations of sound levels measured in A-weighted decibels (dBA). The dBA is used to describe noise levels from transit sources because it most closely matches the human ear's response to audible noise. All the measurement locations were in or near noise-sensitive areas and were selected to represent a range of existing noise conditions in the Study Area.

Two primary noise measurement descriptors are used to assess noise impacts in accordance with FTA criteria: the constant equivalent sound level (Leq) of a fluctuating source over a 1-hour period (1-hour Leq) and the day-night sound level (Ldn), a cumulative 24-hour level that accounts for greater nighttime sensitivity for noise. Typical Ldn noise exposure levels from transit sources are shown in **Figure 4-20**.

The FTA defines noise criteria based on outdoor noise levels and the specific type of land that would be affected. Information regarding the types of noise sensitive land uses is contained in **Appendix I.** Three types of noise impacts—severe impacts, moderate, and no impacts—are defined for each land use category based on the existing outdoor noise level and the "project noise exposure," which is the noise generated by the Project. Because the dBA scale is logarithmic, a 10-decibel (dB) increase in a noise level is perceived as a doubling of loudness, while a 3-dB increase in a noise level in an outdoor setting is typically just perceptible to the human ear.

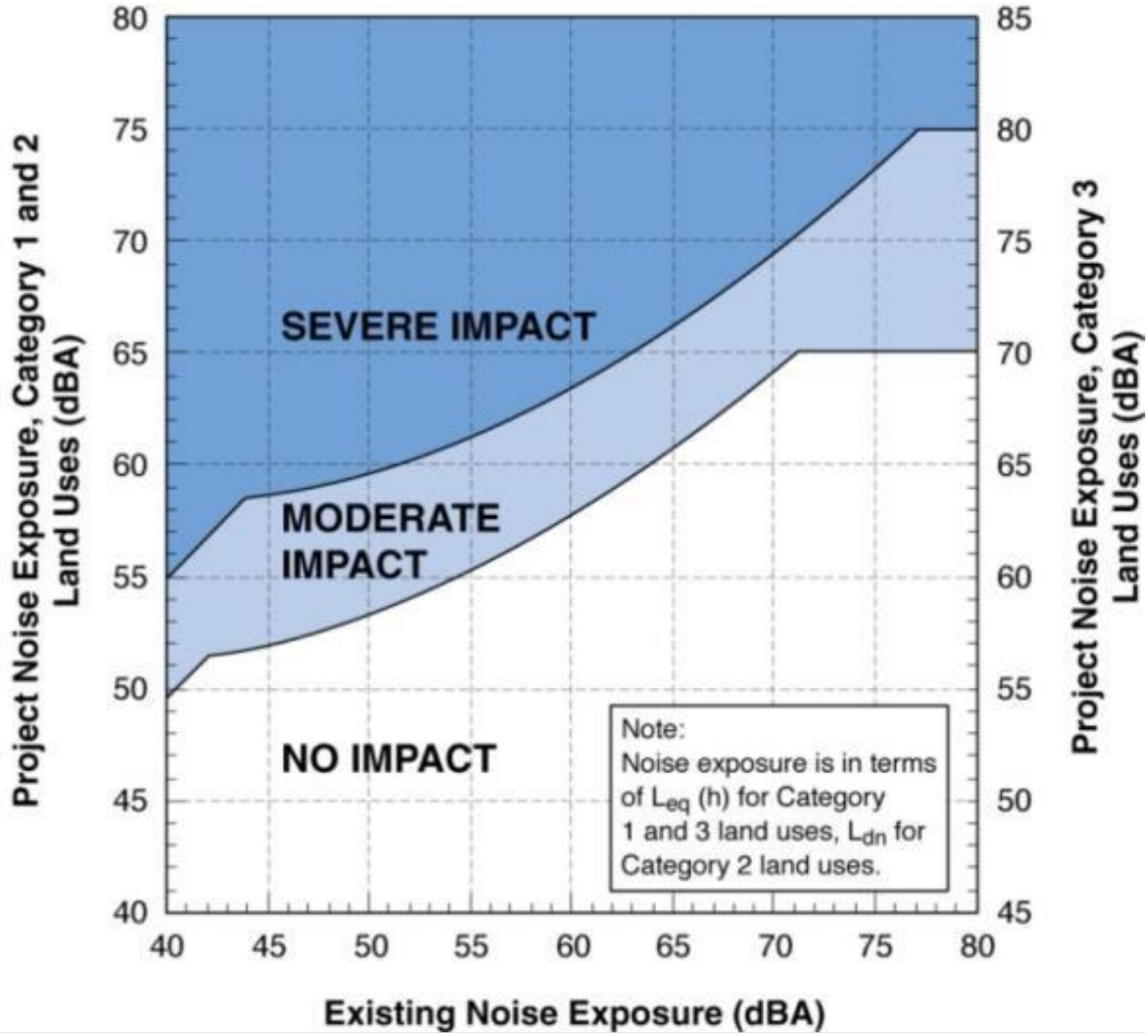
Figure 4-20: Typical Day-Night Sound Level (Ldn) Noise Exposure Levels



Source: FTA 2018.

Given the complex nature of the FTA criteria, the following example is provided to clarify how impacts are identified. The FTA noise impact criteria are shown in **Figure 4-21**. Based on **Figure 4-21**, consider an example of a residential land use (FTA Category 2) with an existing Ldn of 65 dBA. If the projected noise from light rail operations is below 61 dBA, there is no noise impact. A moderate impact would occur if light rail noise levels were between 61 and 66 dBA, and a severe noise impact would occur if light rail noise were above 66 dBA. If noise from the light rail is 62 dBA Ldn (a moderate impact), the total future noise would be 67 dBA Ldn (because noise is added on a logarithmic scale), a 2 dB increase in the overall noise. Typically, for outdoor noise sources, an increase of less than 3 dB is not perceptible to an average person. Although the 2 dB increase is not likely to be perceptible, it could still be identified as an impact under FTA criteria, and mitigation would be considered based on the existing noise levels, the Project contribution, and the land use type. This example shows how the Project contribution could be lower than the existing noise levels and still result in a noise impact. It also illustrates how FTA criteria focuses on preventing increasing noise levels in areas that already have high levels of background noise.

Figure 4-21: FTA Noise Impact Criteria



Source: FTA 2018.

Noise-generating activities from light rail operations include rail noise, bells, and activities around stations, parking facilities, traction power substations, and OMF operations. The Build Alternative would result in moderate noise impacts at 16 residential buildings affecting 487 residential units and severe noise impacts at 2 residential buildings affecting 344 residential units (see **Table 4-7**). The OMF lead track would result in 1 moderate noise impact at a hotel along Riverside Drive due to the crossover tracks. Noise impacts are not predicted to result from maintenance activities at the OMF or at the KUT Radio Station or the CMB. As described above, FTA's methodology for identifying noise impacts is conservative, and the predicted increases in noise due to the Project would be minimal or not noticeable in most locations. With the exception of two segments along the alignment, the increase in outdoor noise levels as a result of the Project would be 3 dB or less at the nearest sensitive land use. A 3-dB increase in noise in an outdoor setting is generally considered to be barely noticeable to the human ear.

Increases in noise levels due to the Project would be noticeable in locations where the ambient noise is relatively low (between 50 and 55 dB).

In the North Section, the Build Alternative would result in 144 moderate noise impacts at one building north of UT. These impacts are due to the proximity of the tracks and bells at nearby stations (see **Figure 4-22**).

Table 4-7: FTA Category 2 Noise Impacts for Build Alternative

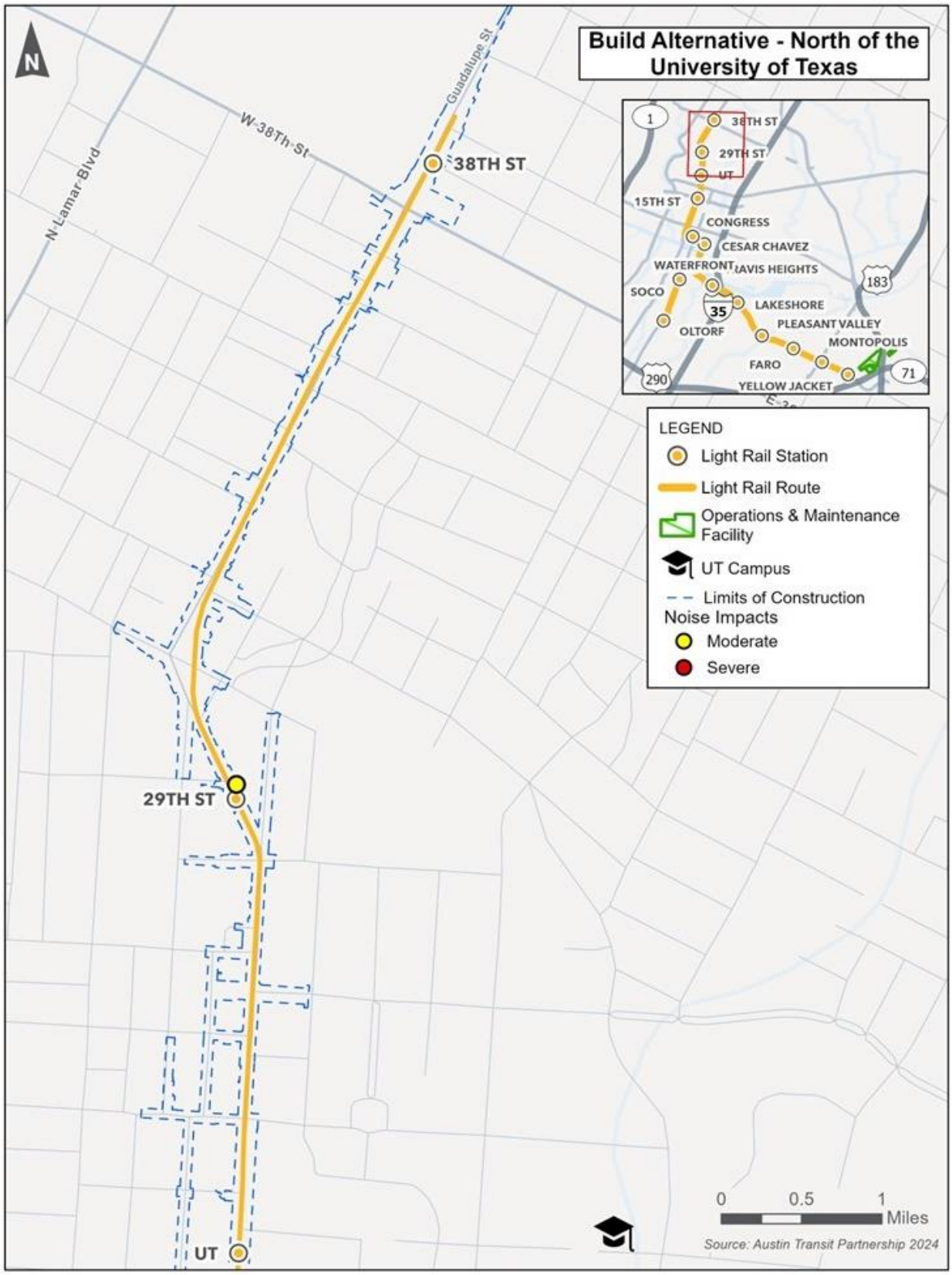
Location	Side of Track	Distance to Near Track (feet)	Existing Noise Level (Ldn, dBA)	Project Noise Level (Ldn, dBA)	Moderate Noise Criteria (Ldn, dBA)	Severe Noise Criteria (Ldn, dBA)	# of Moderate Impacts	# of Severe Impacts
38th St to 30th St	NB	45	71	62	65	70	0	0
38th St to 30th St	SB	43	71	63	65	70	0	0
30th St to 27th St	NB	36	72	67	65	71	144 (1)	0
30th St to 27th St	SB	108	72	53	65	71	0	0
27th St to 24th St	NB	58	72	56	65	71	0	0
27th St to 24th St	SB	37	72	59	65	71	0	0
24th St to MLK Blvd	NB	N/A*	N/A*	N/A*	N/A*	N/A*	N/A*	N/A*
24th St to MLK Blvd	SB	N/A*	N/A*	N/A*	N/A*	N/A*	N/A*	N/A*
MLK Blvd to 15th St	NB	28	62	62	59	64	79 (1)	0
MLK Blvd to 15th St	SB	N/A*	N/A*	N/A*	N/A*	N/A*	N/A*	N/A*
15th St to 9th St	NB	98	62	58	59	64	0	0
15th St to 9th St	SB	N/A*	N/A*	N/A*	N/A*	N/A*	N/A*	N/A*
9th St to 3rd St	NB	36	68	61	63	68	0	0
9th St to 3rd St	SB	37	68	61	63	68	0	0
Guadalupe St to Trinity St	NB	46	68	64	63	68	1 (1)	0
Guadalupe St to Trinity St	SB	25	68	68	63	68	1 (1)	308 (1)
3rd St to Lady Bird Lake	NB	56	68	58	63	68	0	0
3rd St to Lady Bird Lake	SB	42	68	66	63	68	1 (1)	0

Location	Side of Track	Distance to Near Track (feet)	Existing Noise Level (Ldn, dBA)	Project Noise Level (Ldn, dBA)	Moderate Noise Criteria (Ldn, dBA)	Severe Noise Criteria (Ldn, dBA)	# of Moderate Impacts	# of Severe Impacts
Lady Bird Lake to East Riverside Dr	NB	53	52	65	54	60	27 (2)	36 (1)
Lady Bird Lake to East Riverside Dr	SB	N/A*	N/A*	N/A*	N/A*	N/A*	N/A*	N/A*
East Riverside Dr to Elizabeth St	NB	84	61	55	58	64	0	0
East Riverside Dr to Elizabeth St	SB	59	61	57	58	64	0	0
Elizabeth St to Mary St	NB	219	61	58	58	64	0	0
Elizabeth St to Mary St	SB	211	61	45	58	64	0	0
Mary St to Oltorf St	NB	50	55	59	55	61	40 (1)	0
Mary St to Oltorf St	SB	86	55	60	55	61	107 (5)	0
Newing Ave to Academy Dr	NB	46	67	59	62	68	0	0
Newing Ave to Academy Dr	SB	72	67	57	62	68	0	0
Academy Dr to I-35	NB	87	67	57	62	68	0	0
Academy Dr to I-35	SB	77	67	58	62	68	0	0
I-35 to S Lakeshore Blvd	NB	91	70	55	65	70	0	0
I-35 to S Lakeshore Blvd	SB	97	70	54	65	70	0	0
S Lakeshore Blvd to Tinnin Ford Rd	NB	N/A*	N/A*	N/A*	N/A*	N/A*	N/A*	N/A*
S Lakeshore Blvd to Tinnin Ford Rd	SB	114	63	53	59	65	0	0
Tinnin Ford Rd to S Pleasant Valley Rd	NB	N/A*	N/A*	N/A*	N/A*	N/A*	N/A*	N/A*

Location	Side of Track	Distance to Near Track (feet)	Existing Noise Level (Ldn, dBA)	Project Noise Level (Ldn, dBA)	Moderate Noise Criteria (Ldn, dBA)	Severe Noise Criteria (Ldn, dBA)	# of Moderate Impacts	# of Severe Impacts
Tinnin Ford Rd to S Pleasant Valley Rd	SB	132	69	52	63	68	0	0
S Pleasant Valley Rd to Crossing Pl	NB	103	69	54	63	68	0	0
S Pleasant Valley Rd to Crossing Pl	SB	91	69	55	63	68	0	0
Crossing Pl to Faro Dr	NB	85	69	55	63	69	0	0
Crossing Pl to Faro Dr	SB	73	69	56	63	68	0	0
Faro Dr to Grove Blvd	NB	198	69	59	63	69	0	0
Faro Dr to Grove Blvd	SB	71	69	59	63	69	0	0
Grove Blvd to Lawrence St	NB	N/A*	N/A*	N/A*	N/A*	N/A*	N/A*	N/A*
Grove Blvd to Lawrence St	SB	62	65	62	61	66	80 (1)	0
Lawrence St to Coriander Dr	NB	77	65	61	61	66	6 (1)	0
Lawrence St to Coriander Dr	SB	80	65	61	61	66	1 (1)	0
						Total	487 (16)	344 (2)

Source: Cross-Spectrum Acoustics 2024.
Notes: (N/A*) There are no residential noise sensitive receivers in this location.
Numbers in parentheses represent the number of buildings with noise impact.

Figure 4-22: Build Alternative Noise Impacts – North of the University of Texas



In the Downtown Section, the Build Alternative would result in 82 moderate noise impacts at four buildings and 308 severe noise impacts at one building in the Downtown Austin area (see **Figure 4-23**). These impacts are due to the proximity of the tracks and nearby crossovers.

In the South Section, the Build Alternative would result in 27 moderate noise impacts at two buildings and 36 severe noise impacts at one building south of Lady Bird Lake before the split to the branch lines. These impacts are due to the low existing noise levels and the proximity of the tracks and nearby station. The Build Alternative would result in 149 moderate noise impacts at six buildings along South Congress Avenue. These impacts are due to the proximity of the tracks and a nearby crossover (see **Figure 4-24**).

In the East Section, the Build Alternative would result in 87 moderate noise impacts at three different buildings along East Riverside Drive. These impacts are due to the proximity of the tracks and nearby crossovers (see **Figure 4-25**).

Table 4-8 compares the existing and Project noise levels for the OMF operations and includes the results for FTA Category 2 (residential) receptors with both daytime and nighttime sensitivity to noise for the Design Option. There are no FTA Category 3 (institutional) receptors located near the OMF.

Table 4-8 Summary of FTA Category 2 Noise Impacts for the OMF

Location	Side of Track	Distance to Near Track (feet)	Existing Noise Level (Ldn, dBA)	Project Noise Level (Ldn, dBA)	Moderate Noise Criteria (Ldn, dBA)	Severe Noise Criteria (Ldn, dBA)	# of Moderate Impacts	# of Severe Impacts
Lead Track	South	19	65	61	61	66	1	0
Lead Track	North	56	62	55	59	65	0	0
Coriander Drive	--	173	57	45	56	62	0	0

Source: Cross-Spectrum Acoustics 2024.

Noise levels at the nearest residential cluster to the OMF site would not result in a noticeable change as a result of light rail operations or maintenance. The Project exposure noise level at Coriander Drive is predicted to be well below the FTA criteria for moderate impact. The OMF operations would result in one moderate noise impact at the Motel 6 Austin, TX - Airport along the lead track. The impact is due to the nearby turnout and proximity of the tracks.

Figure 4-23: Build Alternative Noise Impacts – Downtown Austin

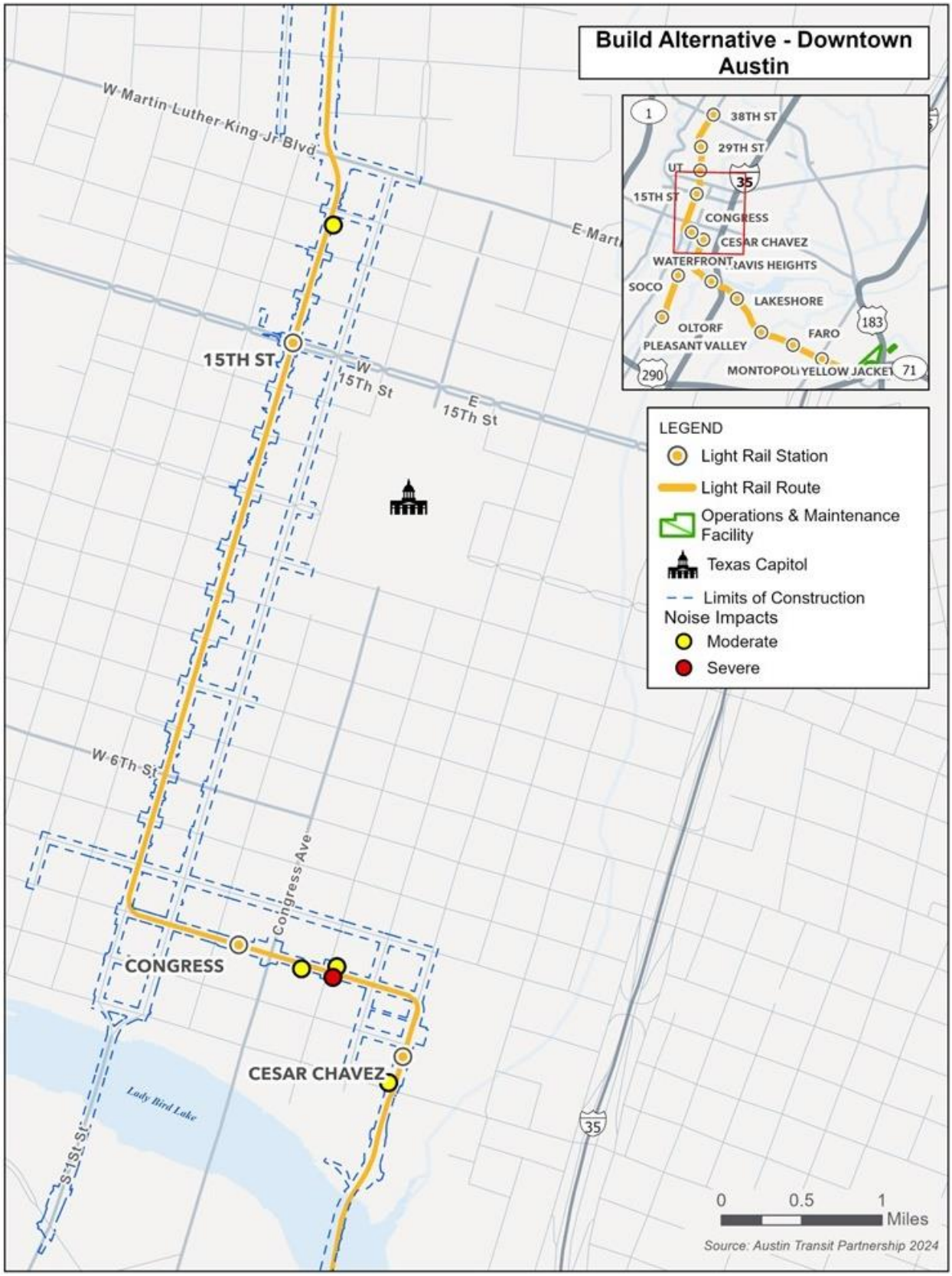


Figure 4-24: Build Alternative Noise Impacts – South Congress Avenue

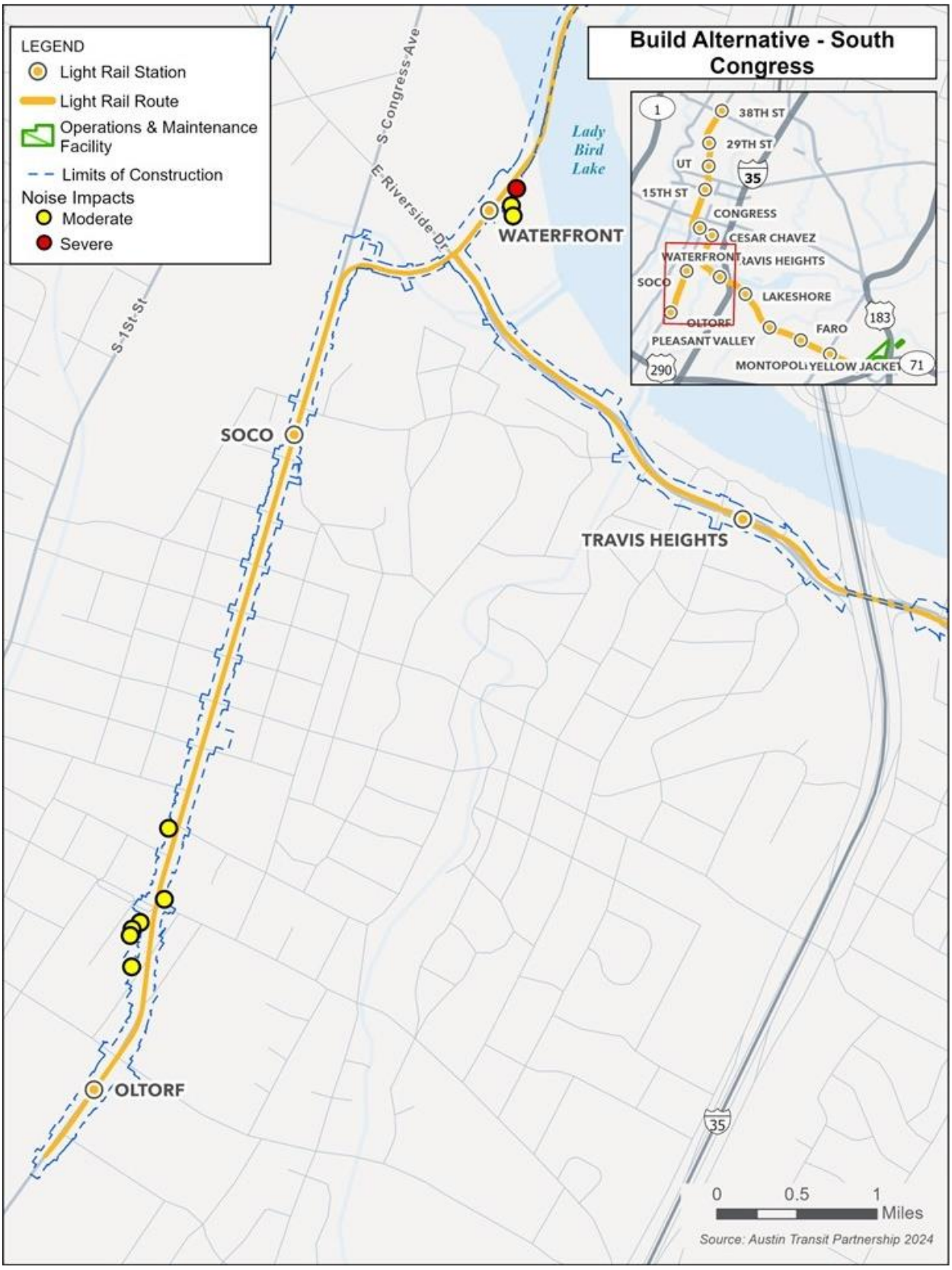
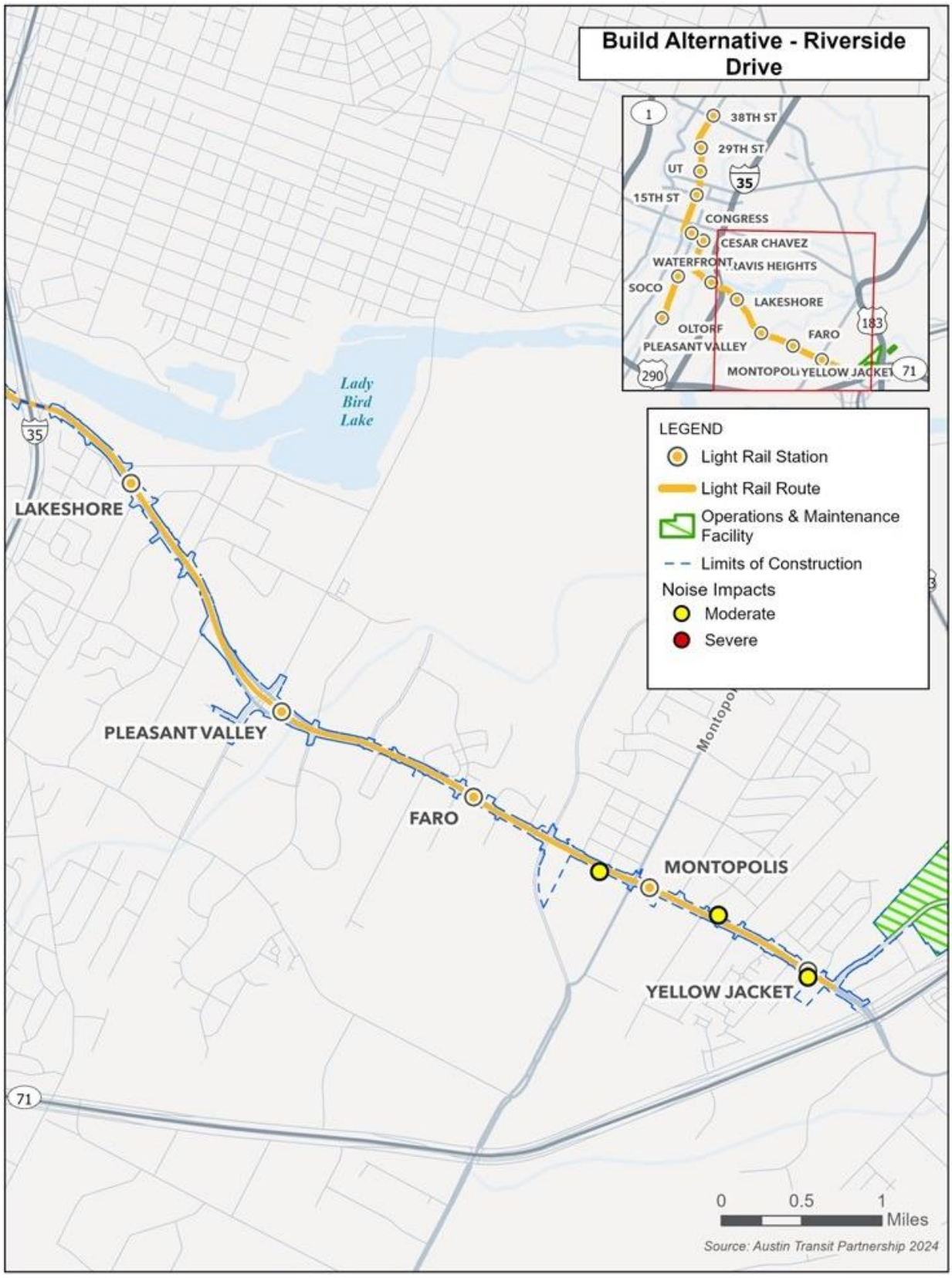


Figure 4-25: Build Alternative Noise Impacts – Riverside Drive



There are two special buildings along the proposed alignment that require a more detailed assessment: the KUT Radio station inside the GB Dealey Center for New Media and the CMB. Both buildings have facilities that are more sensitive to noise and vibration than residential or institutional receivers. The results of the noise impact assessment show that the Project would not have a noise impact at either building (see **Table 4-9**).

Table 4-9: Summary of Noise Impacts at KUT and CMB

Name	Side of Track	Distance to Near Track (feet)	Existing Interior Background Noise Level (Leq, dBA)	Interior Project Noise Level (Leq, dBA)	Impacts
KUT 90.5 FM (NPR Austin)	NB	66	34	62	None
CMB 3rd Floor	NB	52	42	204	None
CMB 4th Floor	NB	52	34	14	None

Implementation of the Wooldridge Square Station, Travis Heights Station, and Center-Running Bike/Pedestrian and Shade Tree Facilities on East Riverside Design Options would result in the same noise impacts as identified for the Build Alternative. Three Design Options—Cesar Chavez Station, Lady Bird Lake Bridge Extension, and Grove Station—would result in different noise impacts at residential properties.

Cesar Chavez Station Design Option

This Design Option would reduce the severity of impacts compared to the Build Alternative. The Cesar Chavez Station Design Option would result in 309 moderate noise impacts at one multifamily building and the JW Marriott Austin hotel along 3rd Street between Guadalupe Street and Trinity Street (see **Figure 4-26**) due to the proximity of the tracks and the nearby station. With the Build Alternative, there would be two moderate and 308 severe noise impacts in this location.

Figure 4-26: Cesar Chavez Station Design Option Noise Impacts

Table 4-10 provide comparisons of the existing and Project noise levels for the Cesar Chavez Station Design Option and includes the results for FTA Category 2 (residential) receptors with both daytime and nighttime sensitivity to noise for the Design Option.

Table 4-10: Summary of FTA Category 2 Noise Impacts for Cesar Chavez Station Design Option

Location	Side of Track	Distance to Near Track (feet)	Existing Noise Level (Ldn, dBA)	Project Noise Level (Ldn, dBA)	Moderate Noise Criteria (Ldn, dBA)	Severe Noise Criteria (Ldn, dBA)	# of Moderate Impacts	# of Severe Impacts
Guadalupe St to Trinity St	NB	46	68	61	63	68	0	0
Guadalupe St to Trinity St	SB	25	68	65	63	68	309 (2)	0
3rd St to Lady Bird Lake	NB	56	68	55	63	68	0	0
3rd St to Lady Bird Lake	SB	22	73	61	65	71	0	0

Source: Cross-Spectrum Acoustics 2024.
Note: Numbers in parentheses represents the number of buildings with noise impact.

Lady Bird Lake Bridge Extension Design Option

The Lady Bird Lake Bridge Extension Design Option would result in an increase in the number and severity of noise impacts compared to the Build Alternative. This Design Option would result in 9 moderate noise impacts at one building and 54 severe noise impacts at two buildings (see **Figure 4-27**) due to the low existing noise levels and the elevated structure. **Table 4-11** compares the existing and Project noise levels for the Design Option that extends the light rail bridge south of Lady Bird Lake for FTA Category 2 (residential) receptors with both daytime and nighttime sensitivity to noise for the Design Option. With the Build Alternative, there would be 27 moderate impacts at two buildings and 36 severe noise impacts at one building in this location.

Figure 4-27: Lady Bird Lake Bridge Extension Design Option Noise Impacts

Table 4-11: Summary of FTA Category 2 Noise Impacts for Lady Bird Lake Bridge Extension Design Option

Location	Side of Track	Distance to Near Track (feet)	Existing Noise Level (Ldn, dBA)	Project Noise Level (Ldn, dBA)	Moderate Noise Criteria (Ldn, dBA)	Severe Noise Criteria (Ldn, dBA)	# of Moderate Impacts	# of Severe Impacts
Lady Bird Lake to East Riverside Dr	NB	53	52	65	54	60	9 (1)	54 (2)
Lady Bird Lake to East Riverside Dr	SB	N/A*	N/A*	N/A*	N/A*	N/A*	N/A*	N/A*
Newing Ave to Academy Dr	NB	59	67	59	62	68	0	0
Newing Ave to Academy Dr	SB	61	67	59	62	68	0	0
Academy Dr to I-35	NB	87	67	58	62	68	0	0
Academy Dr to I-35	SB	77	67	57	62	68	0	0

Source: Cross-Spectrum Acoustics 2024.
Notes: (*) There are no residential noise sensitive receivers in this location.
Numbers in parentheses represent the number of buildings with noise impact.

Grove Station Design Option

The Grove Station Design Option would reduce the number of noise impacts compared to the Build Alternative. This Design Option would result in 81 moderate noise impacts at one multifamily building and one single-family home (**Figure 4-28**) due to nearby crossovers. With the Build Alternative, there would be 87 moderate noise impacts in this location. **Table 4-12** compares the existing and Project noise levels for the Grove Station Design Option and includes the results for FTA Category 2 (residential) receptors with both daytime and nighttime sensitivity to noise for the Design Option.

Figure 4-28: Grove Station Design Option Noise Impacts

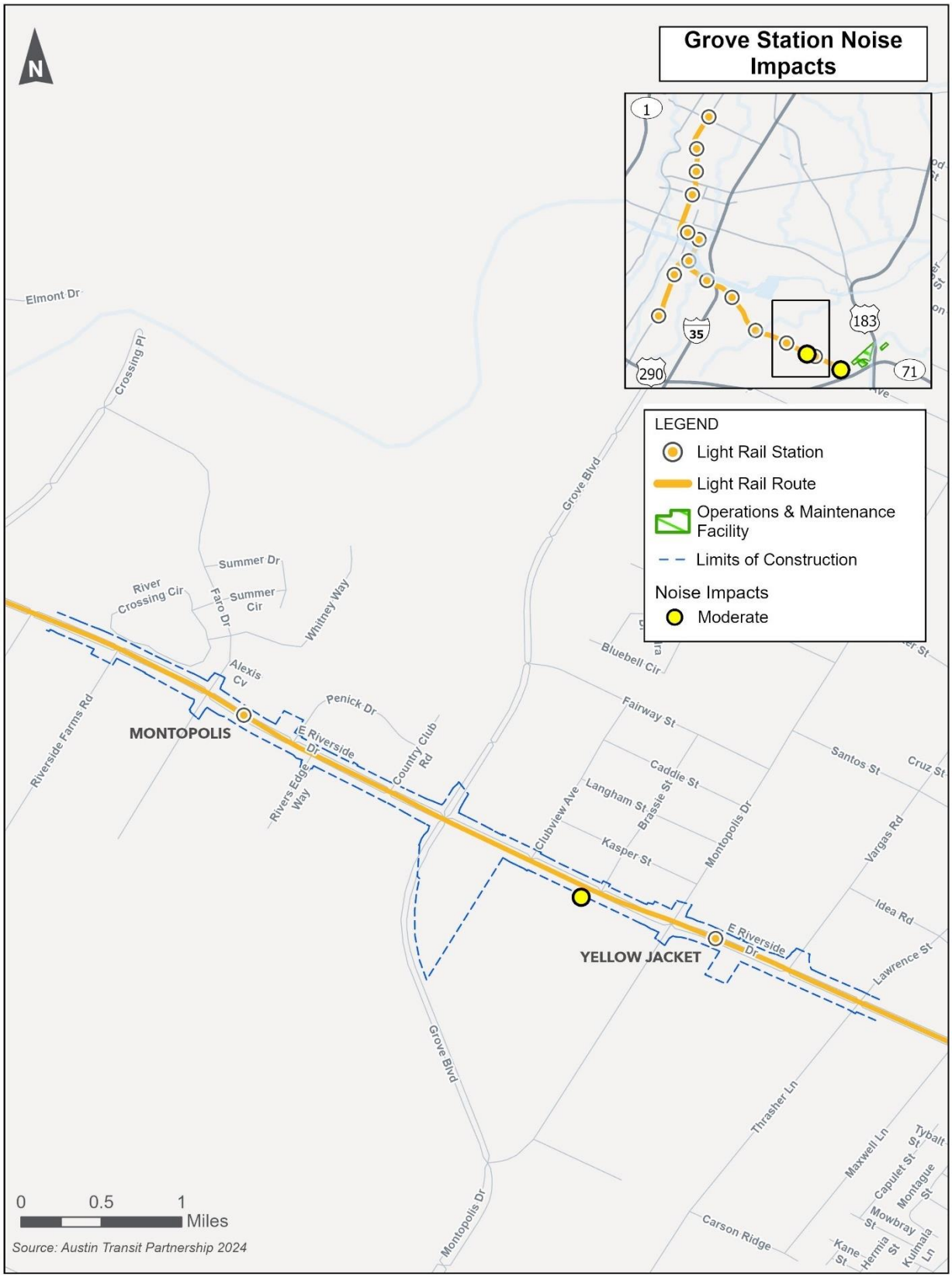


Table 4-12: Summary of FTA Category 2 Noise Impacts for Grove Station Design Option

Location	Side of Track	Distance to Near Track (feet)	Existing Noise Level (Ldn, dBA)	Project Noise Level (Ldn, dBA)	Moderate Noise Criteria (Ldn, dBA)	Severe Noise Criteria (Ldn, dBA)	# of Moderate Impacts	# of Severe Impacts
Crossing Pl to Faro Dr	NB	85	69	55	63	69	0	0
Crossing Pl to Faro Dr	SB	73	69	56	63	68	0	0
Faro Dr to Grove Blvd	NB	210	69	59	63	69	0	0
Faro Dr to Grove Blvd	SB	67	69	57	63	69	0	0
Grove Blvd to Lawrence St	NB	N/A*	N/A*	N/A*	N/A*	N/A*	N/A*	N/A*
Grove Blvd to Lawrence St	SB	71	65	65	61	66	80 (1)	0
Lawrence St to Coriander Dr	NB	80	65	55	61	66	0	0
Lawrence St to Coriander Dr	SB	80	65	61	61	66	1 (1)	0

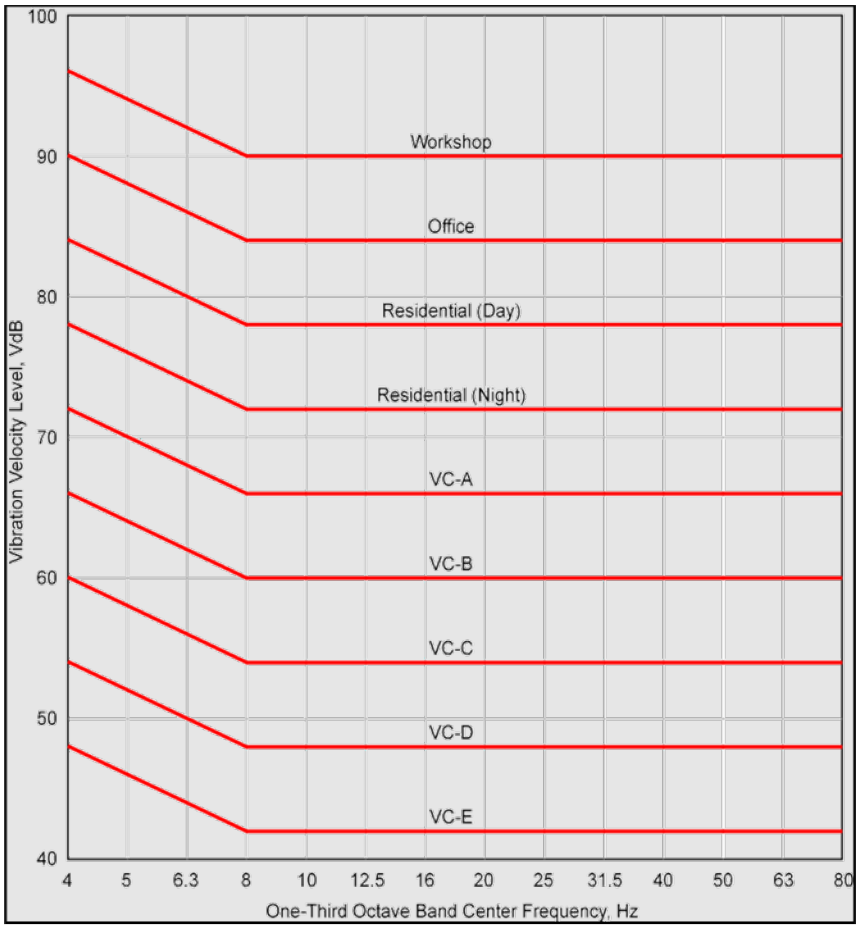
Source: Cross-Spectrum Acoustics 2024.
Notes: (*) There are no residential noise sensitive receivers in this location.
The number in parentheses is the number of buildings impacted.

Vibration Impacts

To measure vibration, ATP focused on characterizing the soil conditions along the Project. ATP selected 11 vibration propagation test locations for the vibration measurements. All the measurement locations were in or near vibration-sensitive land uses (see **Appendix I** for more information on sensitive land use descriptions) and were selected to represent a range of vibration and soil conditions in the Study Area.

The vibration impact criteria for a detailed vibration assessment are based on the curves shown in **Figure 4-29**, and descriptions of the curves are shown in **Table 4-13**. That is, the lower the curve, the more sensitive the use is and the more stringent the criteria. If the Project vibration level at any frequency is higher than the curves, there would be an impact. Conversely, if the entire proposed vibration spectrum of the Project is below the curve, there would be no impact.

Figure 4-29: FTA Detailed Vibration Criteria



Source: FTA 2018.

Table 4-13: Interpretation of Vibration Criteria for Detailed Analysis

Criterion Curve[1]	Max. Level (VdB)[2]	Description of Use
Workshop	90	Vibration that is distinctly felt. Appropriate for workshops and similar areas not as sensitive to vibration.
Office	84	Vibration that can be felt. Appropriate for offices and other areas not as sensitive to vibration.
Residential Day	78	Vibration that is barely felt. Adequate for computer equipment and low-power optical microscopes (up to 20X).
Residential Night Operating Rooms	72	Vibration is not felt, but ground-borne noise may be audible inside quiet rooms. Suitable for medium-power optical microscopes (100X) and other equipment of low sensitivity.
VC-A	66	Adequate for medium- to high-power optical microscopes (400X), microbalances, optical balances, and similar specialized equipment.
VC-B	60	Adequate for high-power optical microscopes (1000X) and inspection and lithography equipment to 3-micron line widths.
VC-C	54	Appropriate for most lithography and inspection equipment to 1-micron detail size.
VC-D	48	Suitable in most instances for the most demanding equipment, including electron microscopes operating to the limits of their capabilities.
VC-E	42	The most demanding criterion for extremely vibration-sensitive equipment.

Source: FTA 2018.
VdB = vibration decibel
[1] See **Figure 4-29**.
[2] As measured in 1/3-octave bands of frequency over the frequency range 8 to 80 hertz.

Vibration impacts would not be expected to result at any residential or institutional buildings under the Build Alternative or any of the Design Options. Two vibration impacts would be expected to result at a hotel on East Riverside Drive and a multifamily building due to crossover for the lead track to the OMF under the Build Alternative and all Design Options (**Figure 4-30**). None of the Design Options would result in any additional vibration impacts.

Table 4-14 provides the results of the vibration and ground-borne noise assessment at KUT Radio and CMB. The results show that the Project (Build Alternative and all Design Options) would not result in vibration or ground-borne noise impacts at either building.

Figure 4-30: Operations and Maintenance Facility Vibration Impacts

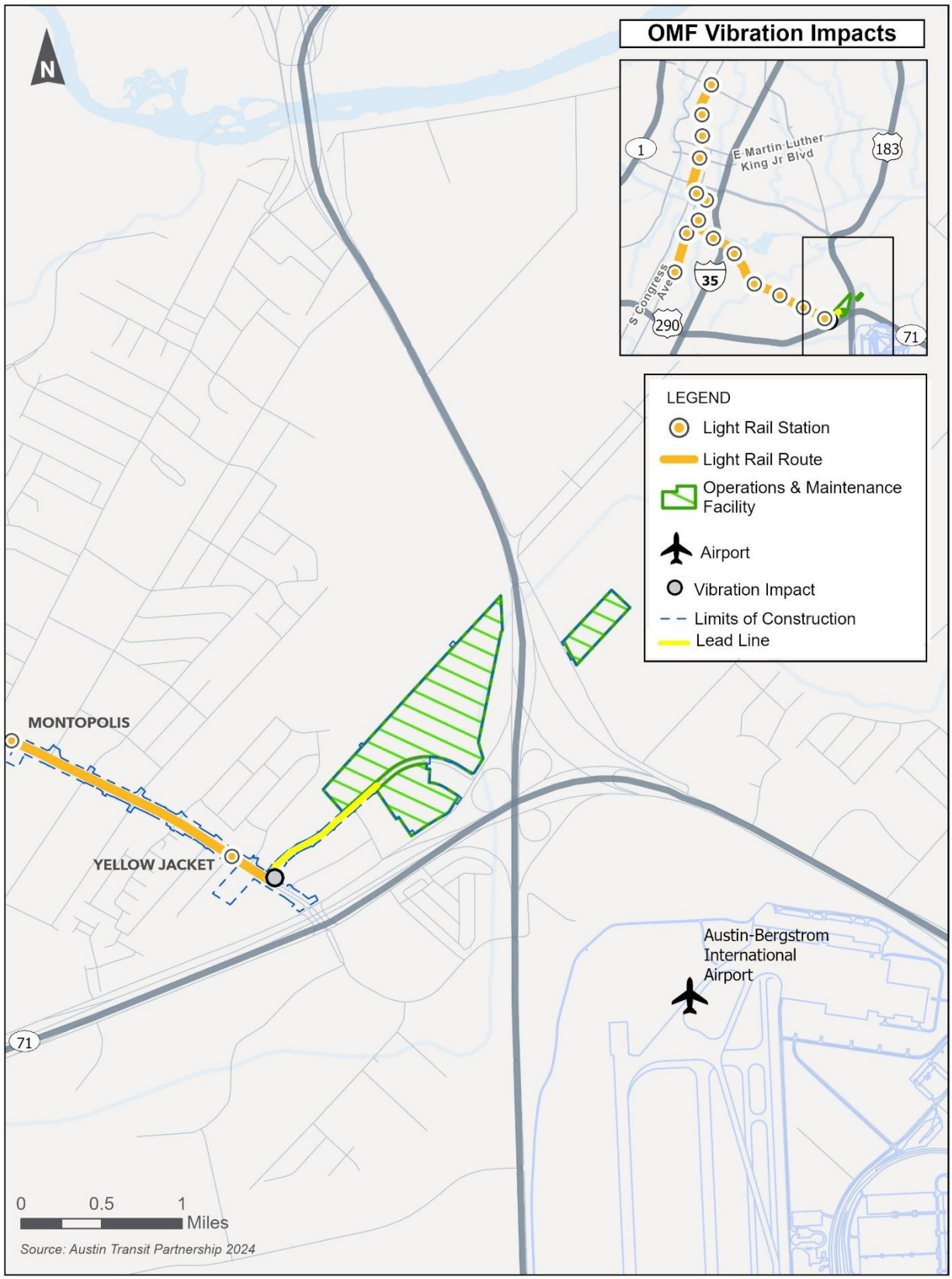


Table 4-14: Summary of Vibration and Ground Borne Noise at KUT and CMB

Name	Side of Track	Distance to Near Track (feet)	Project 1/3 Octave Band Maximum Vibration Level (VdB)	Project Vibration 1/3 Octave Band Frequency (Hz)	FTA Vibration Criterion (VdB)	# of Impacts	Project Ground Borne Noise Levels (dBA)	FTA Ground Borne Noise Criterion (dBA)	# of Impacts
KUT 90.5 FM (NPR Austin)	NB	66	47	63	65	0	19	25	0
CMB	NB	52	51	20	65	0	19	25	0
					Total	0		**Total**	0

Source: Cross-Spectrum Acoustics 2024.
Hz = hertz; VdB = vibration decibel

Construction-Related (Short-Term) Impacts

Project-related construction noise is assessed in accordance with FTA criteria. The FTA construction noise criteria provides adequate protection for short-term noise impacts and allows for reasonable mitigation measures to be applied to the Project.

For residential land use, the potential for short-term at-grade track construction noise impact during the daytime could extend to approximately 120 feet from the proposed alignment and stations, however, if nighttime construction is conducted, the potential for short-term noise impact from at-grade construction could extend to approximately 380 feet from the alignment and stations. For elevated structure construction, the distance for noise impact during the daytime could be up to 250 feet for impact pile driving, assuming a usage factor of 20 percent during the day. If alternative methods of piling are used, the distance to impact could be less. When a specific piling method is determined, a screening distance could be calculated.

While the City of Austin Code of Ordinances Chapter 9-2 regulates construction noise, the City has passed an ordinance regarding construction limits and construction noise specifically for transit system projects. This ordinance provides greater flexibility for construction noise and requires submission of a construction noise mitigation and monitoring plan, project noise requirements for construction contractors and a public communications plan. To the extent there is a conflict with Chapter 9-2 (Noise and Amplified Sound), the approved noise and mitigation Plan will control.

With the exception of impact pile driving, the potential for vibration damage would be limited to within 25 feet of construction activities. For impact pile driving, the distance for the potential for vibration damage is up to 55 feet. However, any potential for impacts would depend on the piling method chosen.

4.10.3 Mitigation

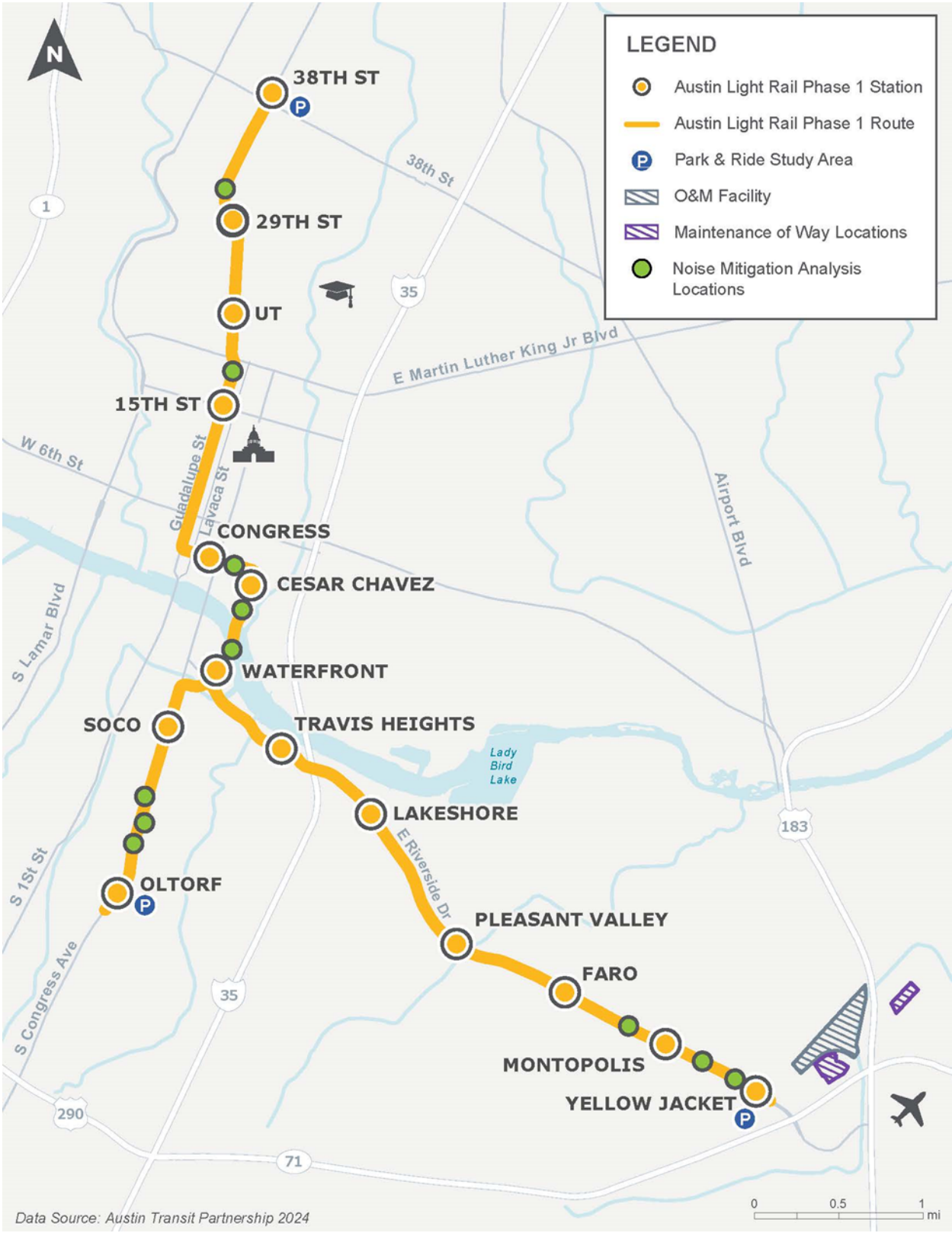
4.10.3.1 Operational Noise

The FTA (2018) guidance manual states that, in determining the need for noise mitigation, severe impacts should be mitigated unless there are no practical means to do so. At the moderate impact level, more discretion should be used, and other Project-specific factors should be included in the consideration of mitigation. These other factors can include the predicted increase over existing noise levels, the types and number of noise-sensitive land uses affected, existing outdoor-to-indoor sound insulation, and the cost-effectiveness of mitigating noise to more acceptable levels. The mitigation analysis sites are shown in **Figure 4-31**.

Potential mitigation measures for reducing noise impacts as part of the Preferred Alternative are described below:

- **Noise Barriers.** Installation of noise barriers beside the tracks is commonly used to reduce noise from surface transportation sources. Depending on the height and location relative to the tracks, noise barriers can achieve between 5 and 15 dB of noise reduction. The primary requirements for an effective noise barrier are that (1) the barrier must be high enough and long enough to break the line of sight between the sound source and the receiver, (2) the barrier must be of an impervious material with a minimum surface density of 4 pounds per square foot, and (3) the barrier must not have any gaps or holes between the panels or at the bottom. Because many materials meet these requirements, the selection of materials for noise barriers is usually dictated by aesthetics, durability, cost, and maintenance considerations. Noise barriers for transit projects typically range in height from 8 to 12 feet for at-grade track and 4 to 6 feet in height on elevated structures.
- **Building Sound Insulation.** Although sound insulation of buildings has no effect on noise in exterior areas, it may be the best choice for sites where noise barriers are not feasible or desirable and for buildings where indoor sensitivity is of most concern. Substantial improvements in building sound insulation (on the order of 5 to 10 dBA) can often be achieved by adding an extra layer of glazing to the windows, by sealing holes in exterior surfaces that act as sound leaks, and by providing forced ventilation and air-conditioning so that windows do not need to be opened.
- **Special Trackwork.** Because the impacts of rail vehicle wheels over rail gaps at track turnout locations (which are used to allow trains to move from one track to another) increase airborne noise by about 6 dB close to the track, crossovers and turnouts are a major source of noise impact when they are in sensitive areas. If turnouts cannot be relocated away from sensitive areas, other noise control measures can be used such as the use of spring-rail, flange-bearing, or moveable-point turnouts in place of standard rigid turnouts. These devices allow the flangeway gap to remain closed in the main traffic direction for revenue service trains.

Figure 4-31: Operational Noise Mitigation Analysis Sites



There are four locations on the Build Alternative with noise impacts where mitigation to be considered would involve using one of the types of special trackwork described above to eliminate impacts:

1. **Guadalupe Street and Trinity Street.** The first location is at an apartment building (reduced from a severe noise impact to a moderate noise impact) and two hotels along 3rd Street between Guadalupe Street and Trinity Street where a crossover is located;
2. **Mary Street and Oltorf Street.** The second location is at three single-family homes along South Congress Avenue between Mary Street and Oltorf Street where a crossover is located;
3. **Grove Boulevard and Lawrence Street.** The third location is at one multifamily building along East Riverside Drive between Grove Boulevard and Lawrence Street where a crossover is located; and
4. **Lawrence Street and Coriander Drive.** The fourth location is at one multifamily building and one single-family home along East Riverside Drive between Lawrence Street and Coriander Drive where a crossover is located.

The crossover located at Grove Boulevard and Lawrence Street in the Grove Station Design Option would also be a candidate for using one of the types of special trackwork described above to eliminate the impact at one multifamily building along East Riverside Drive.

All the other noise impacts associated with the Build Alternative and the Design Options are not due to crossover noise and most are also not in locations where noise barriers would be feasible. At these locations, sound insulation would be assessed for potential noise mitigation. For the noise impacts associated with the extended elevated structure south of Lady Bird Lake, a noise barrier on the northbound side on the elevated structure could be feasible to mitigate the noise impacts. If other mitigation measures are identified as the Project progresses, these could be incorporated as part of the Preferred Alternative.

4.10.3.2 Operational Vibration

A number of different approaches have been used by rail transit systems to reduce ground-borne vibration and ground-borne noise. The most common vibration mitigation measures used on light rail systems consist of placing a resilient layer between the track and the soil. Some standard approaches for vibration mitigation are described below:

- **Ballast mats.** A ballast mat is a pad made of rubber or other material placed underneath the ballast and mounted on top of an asphalt or concrete base. Ballast mats provide a modest reduction in vibration levels at frequencies above 40 hertz;
- **Tire-derived aggregate.** Tire-derived aggregate, or shredded tires, consists of a layer of tire shreds wrapped in geotechnical fabric placed underneath the ballast and placed on hard packed ground. This is a low-cost mitigation option that provides a reduction in vibration levels at frequencies above 25 hertz;
- **Resilient fasteners.** Direct-fixation track fasteners are used to attach the rail to the concrete track slab in a tunnel or on an elevated structure. Resilient fasteners include a

soft, resilient element to provide greater vibration isolation than standard rail fasteners in the vertical direction;

- **Floating slabs.** Floating slabs consist of a concrete slab supported by elastomer springs on a concrete foundation. The frequency range at which a floating slab is effective depends on the thickness of the slab and the stiffness of the springs. Floating slabs are very effective at reducing vibration levels, particularly at low frequencies. However, they are also very expensive;
- **Low-impact special trackwork.** The impacts of vehicle wheels over rail gaps at special trackwork locations such as turnouts and switches can increase vibration levels by up to 10 dB. If special trackwork cannot be located away from vibration-sensitive receivers, another approach is to use low-impact frogs. Spring-rail and moveable point frogs allow the flangeway gap to remain closed in the main traffic direction for revenue service trains and can almost completely reduce the vibration increase caused by special trackwork. Monoblock frogs are milled out of a single block of steel and their tolerances can be tighter than a traditional frog, which reduces the vibration increase. Flange-bearing frogs include a ramp to support the flange of the wheel to minimize banging. Well-designed monoblock and flange-bearing frogs can reduce the vibration level increase by about half compared to a standard frog; and
- **Alternative approaches.** There are alternative vibration mitigation approaches that may be applied under specific circumstances. Examples include increasing the thickness of the concrete under the track, specifying straighter rails, and building the track on top of pile foundation systems when the track would traverse very soft sections of soil.

There are two locations that would need to be considered for vibration mitigation. The Motel 6 Austin, TX – Airport and a multifamily building along the lead track for the OMF would be affected by vibration due to the proximity of the rail and the turnouts associated with the lead tracks. Specific mitigation options at this location would be examined during the design phase of the Project as part of the Preferred Alternative. This could include special types of turnouts or vibration isolation systems.

4.10.3.3 Construction Noise and Vibration

As an integral component of the Project, ATP would conduct construction activities in compliance with all applicable local noise regulations. ATP would refine specific construction noise and vibration avoidance, minimization, and mitigation measures during the design phase of the Project when more detailed construction information is available. ATP would apply the following measures, as needed, to minimize temporary construction noise and vibration impacts:

- Limiting nighttime construction in residential areas;
- Locating stationary construction equipment as far as possible from noise-sensitive sites;
- Constructing noise barriers, such as temporary walls or piles of excavated material, between noisy activities and noise-sensitive receptors;
- Routing construction-related truck traffic to roadways that would cause the least disturbance to residents; and

- Using alternative construction methods to minimize the use of impact and vibratory equipment (e.g., pile drivers and compactors). If use of this equipment is necessary, limit the time of day the activity can occur.

In addition to the measures above, ATP would prepare a noise control plan in accordance with Ordinance No. 20221115-048. A noise control engineer or acoustician would work with the contractor to prepare a Noise Control Plan in conjunction with the contractor's specific equipment and methods of construction. Key elements of a Noise Control Plan include:

- contractor's specific equipment types;
- schedule (dates and times of day) and methods of construction;
- maximum noise limits for each piece of equipment with certification testing;
- prohibitions on certain types of equipment and processes during the night or daytime hours per local agency coordination and approved variances;
- identification of specific sensitive locations near construction sites;
- methods for projecting construction noise levels;
- implementation of noise and vibration control measures where appropriate; and
- methods for responding to community complaints.

4.11 Air Quality and Greenhouse Gases

Ambient air quality, or the quality of the surrounding air, is affected by air pollutants produced by all transportation modes, referred to as mobile sources. Investment in transit projects would be expected to reduce the use of automobiles and single-occupant vehicles that contribute air pollutants and greenhouse gas (GHG) emissions. Light rail vehicles are electrically powered with no local air emissions. However, train and station power consumption of electricity from the electric grid would contribute to GHG emissions at power plants; these are known as upstream GHG emissions.

ATP assessed the Project's potential to affect criteria air pollutants, mobile source air toxics, and GHG emissions in a regional study area encompassing the Austin-Round Rock-Georgetown Metropolitan Statistical Area (Austin MSA).[2] The Austin MSA is the air quality control region defined by the U.S. Environmental Protection Agency (EPA) to monitor the attainment or nonattainment of the federal air quality standards.

4.11.1 Affected Environment

Air quality is affected by pollutants generated by all transportation modes. The largest contributor to elevated pollution levels are the modes that burn fossil fuels. EPA has designated areas of the country as being in attainment when meeting National Ambient Air Quality Standards (NAAQS) or nonattainment when not meeting the NAAQS on a pollutant-by-pollutant basis. In Texas, EPA delegated authority for monitoring and enforcing air quality regulations to TCEQ. The regulated criteria air pollutants are carbon monoxide, lead, nitrogen dioxide,

[2] The Austin MSA consists of Bastrop, Caldwell, Hays, Travis, and Williamson Counties, which have been participating in regional air quality planning efforts since 2002. The Austin MSA is also referred to as the Austin-Round Rock-San Marcos Metropolitan Statistical Area.

particulate matter (including particulate matter smaller than 10 microns in diameter [PM_{10}] and particulate matter smaller than 2.5 microns in diameter [$PM_{2.5}$]), ozone, and sulfur dioxide. **Table 4-15** summarizes NAAQS related to the six criteria air pollutants. Travis County is designated as attainment or unclassifiable for all NAAQS (TCEQ 2024). However, as it relates to $PM_{2.5}$ and ozone, recent monitoring values for the Austin MSA detected pollutant concentrations above the 2015 ozone NAAQS and the new $PM_{2.5}$ NAAQS, published in 2024 (**Appendix F-1**).

On February 7, 2024, EPA announced a final rule to strengthen the NAAQS for fine particulate matter, $PM_{2.5}$ (EPA 2024a); this new rule lowered the primary annual $PM_{2.5}$ standard from 12 micrograms per cubic meter (µg/m^3) to 9.0 µg/m^3. Travis County's recent air quality monitoring data recorded an average annual design value of 9.3 ug/m^3 in 2022 and 9.6 µg/m^3 in 2023, which exceeds the new 2024 $PM_{2.5}$ standard of 9.0 µg/m^3. In accordance with the Clean Air Act, EPA will make initial attainment/nonattainment designations based on the new standard (likely within the next 2 years) working closely with states throughout the designations process. If EPA designates the Austin MSA as nonattainment for this standard, TCEQ will need to develop and submit an attainment plan no later than 18 months after EPA finalizes designations (EPA 2024a).

Table 4-15: National Ambient Air Quality Standards

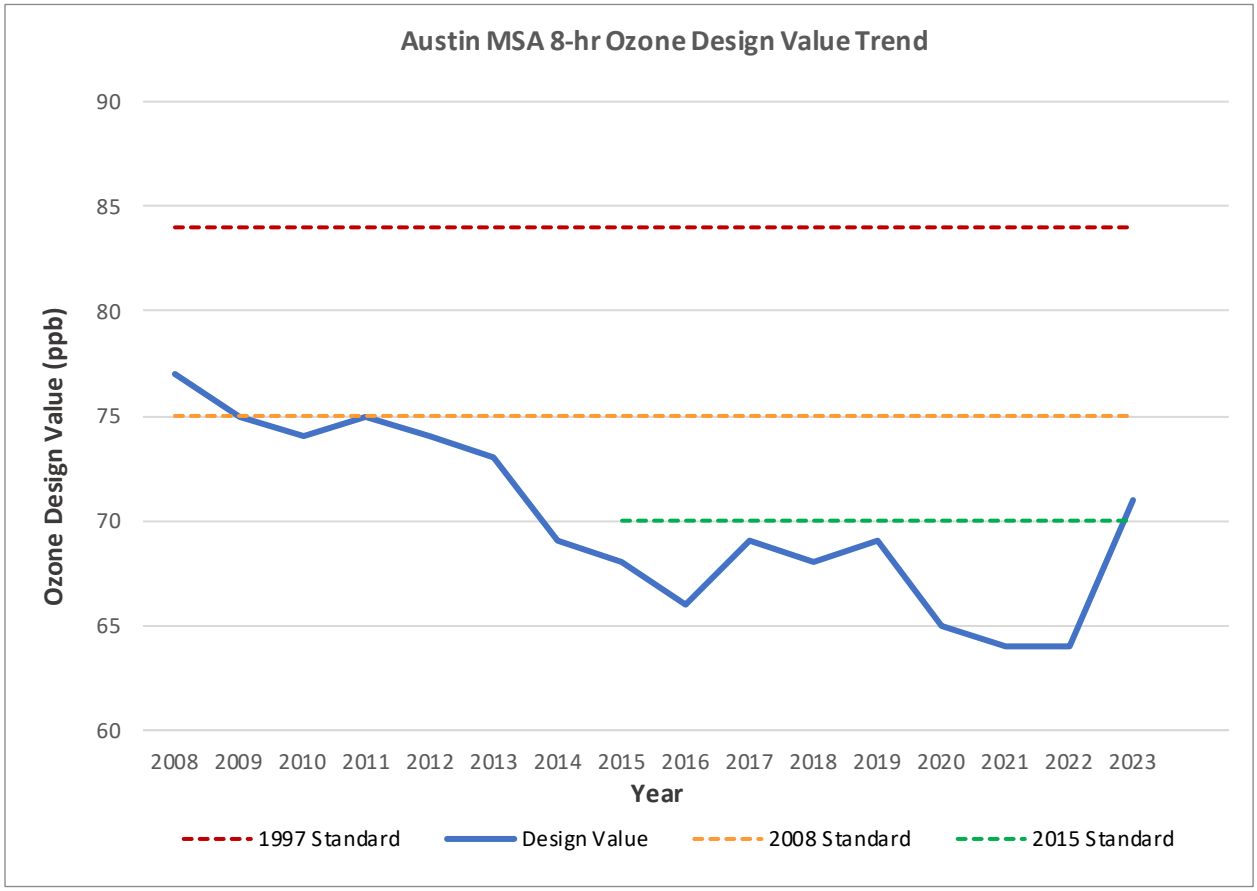
Pollutant	Primary Standard	Average Times	Secondary Standards	Notes
Carbon monoxide (CO)	9 ppm (10 mg/m^3)	8-hour	None	Not to be exceeded more than once per year
	35 ppm (40 mg/m^3)	1-hour	None	
Lead (Pb)	0.15 µg/m^3	Rolling 3-month average	Same as Primary	Not to be exceeded
Nitrogen dioxide (NO_2)	100 ppb (0.100 ppm)	1-hour	None	98th percentile of 1-hour daily maximum concentrations, averaged over 3 years
	53 ppb (0.053 ppm)	Annual (arithmetic mean)	Same as Primary	Annual mean
Particulate matter smaller than 10 microns in diameter (PM_{10})	150 µg/m^3	24-hour	Same as Primary	Not to be exceeded more than once per year on average over 3 years

Pollutant	Primary Standard	Average Times	Secondary Standards	Notes
Particulate matter smaller than 2.5 microns in diameter ($PM_{2.5}$)	New standard: 9 µg/m^3 [old standard: 12 µg/m^3]	Annual	15 µg/m^3	Annual mean, averaged over 3 years
	35 µg/m^3	24-hour	Same as Primary	98th percentile, averaged over 3 years
Ozone (O_3)	0.070 ppm	8-hour	Same as Primary	Annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years
Sulfur dioxide (SO_2)	75 ppb (0.075 ppm)	1-hour (primary) 3-hours (secondary)	0.5 ppm	99th percentile of 1-hour daily maximum concentrations, averaged over 3 years
	None	3-hour	0.5 ppm (1300 g/m^3)	Not to exceed more than once per year

Source: EPA 2023.
µg/m^3 = micrograms per cubic meter; g/m^3 = grams per cubic meter; mg/m^3 = milligrams per cubic meter; ppb = parts per billion; ppm = parts per million

Through 2022, the design values for ozone were below the respective NAAQS (Capital Area Council of Governments [CAPCOG] 2024). This may have been due to the aggressive and ambitious emissions reduction policies in the Austin area, such as Austin Energy's commitment to producing renewable energy, fleet electrification, and vehicle emission standards. **Figure 4-32** shows the Austin MSA ozone design value trend from 2008 to 2022. The ozone design value consistently decreased and was below the 2015 8-hour ozone NAAQS until 2023. Based on the 2023 air quality monitoring values, the ozone design value exceeded the 2015 8-hour ozone standard, resulting in noncompliance with the ozone NAAQS. Although the 2023 design value exceeded the 8-hour ozone NAAQS, the Austin MSA is still designated as an attainment or unclassifiable area. CAPCOG is working with members of the Austin MSA to evaluate and implement emission reduction measures and achieve compliance with the 2015 8-hour ozone NAAQS.

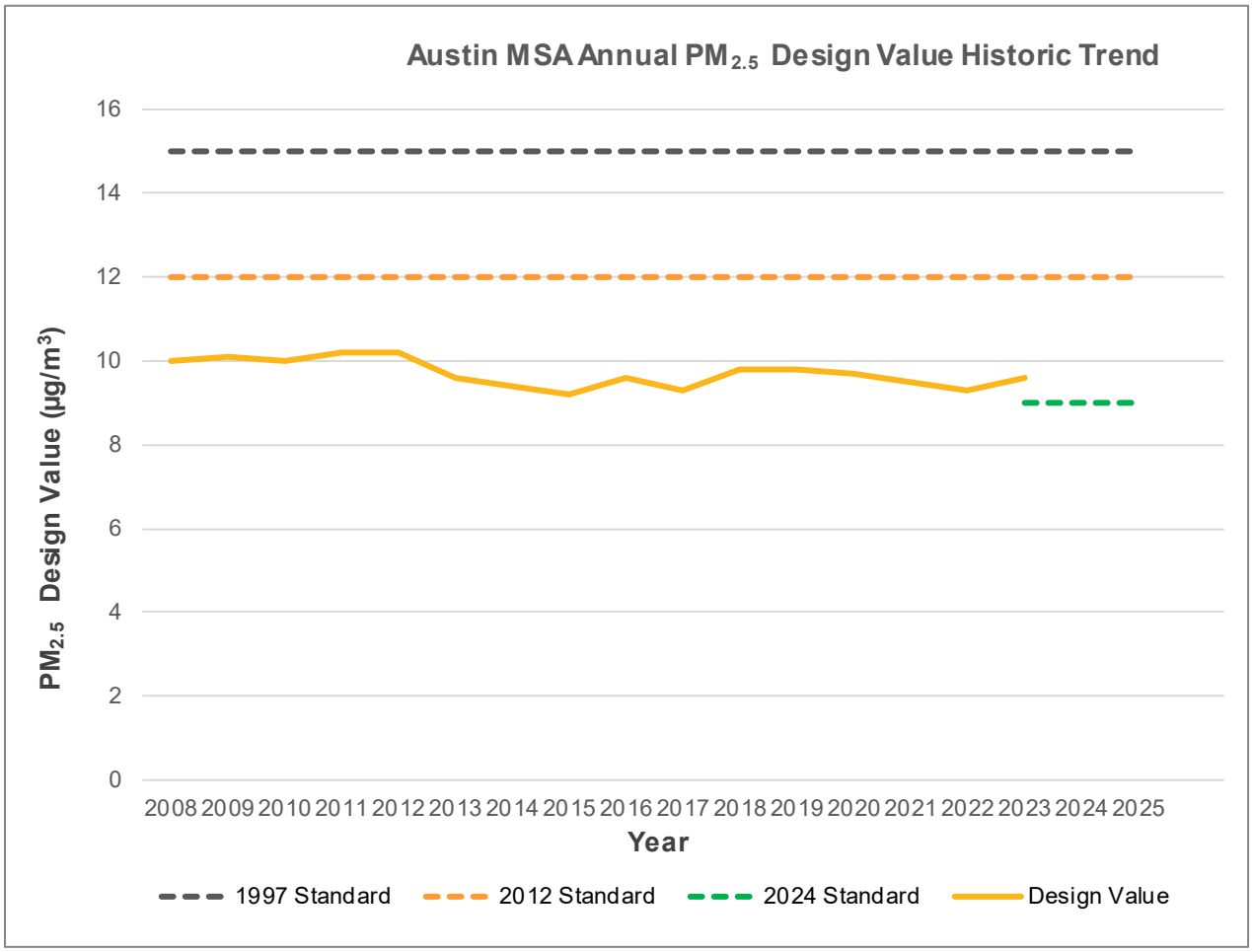
Figure 4-32: Change in Austin MSA Ozone Design Value Compared to NAAQS



Source: CAPCOG 2024.

As shown in **Figure 4-33,** the design values for all other criteria pollutants are well below the respective NAAQS for each of the pollutants (EPA 2024a). There are currently no standards or monitoring requirements for mobile source air toxics or GHG emissions. EPA forecasts continued reduction of air emissions as a result of their national control program and local, state, and national clean air initiatives (EPA 2024a).

Figure 4-33: Change in Austin MSA Annual $PM_{2.5}$ Design Value Compared to NAAQS



4.11.2 Environmental Consequences

Air emissions in the Central Texas region are from stationary point sources such as fossil fuel fired power plants, smelters, industrial boilers, petroleum refineries, boilers, and manufacturing facilities, and from non-point sources such as area, on-road mobile, non-road mobile, and biogenic sources.

- Area sources are small-scale industrial, commercial, and residential sources that generate emissions (TCEQ 2024). Examples of area sources are product storage and transport distribution, agriculture (e.g., crop burning), and waste management (e.g., landfills);
- On-road mobile sources consist of automobiles, trucks, motorcycles, and other motor vehicles traveling on public roadways (TCEQ 2024);
- Non-road mobile sources consist of vehicles that do not typically operate on roads or highways; these are often referred to as off-road or off-highway vehicles (TCEQ 2024). Examples of non-road mobile sources are agricultural equipment, construction

equipment, mining equipment, aircraft and airport equipment, locomotives, commercial marine vessels, and drilling rigs; and

- Biogenic sources include volatile organic compound emissions from crops, lawn grass, and trees as well as nitrogen oxides from soils. Plants are sources of volatile organic compounds such as isoprene, monoterpene, and alpha-pinene (TCEQ 2024).

4.11.2.1 No Build Alternative

Under the No Build Alternative, the Project would not be built and the miles traveled would increase because population and employment opportunities in the Austin MSA are projected to continue the historic growth trends. The Austin MSA has been the fastest-growing area in the country for the 12th consecutive year (City of Austin 2023f). As population and employment increase, the daily VMT measured by the TxDOT Austin District have also shown increases. This rapid population growth means more vehicles on Texas roads and consequently, increased congestion (TxDOT 2024). As population increases, the Federal Highway Administration forecasts that VMT will increase at an average annual rate of 0.6 percent between 2019 and 2049 (Federal Highway Administration 2023). Under the No Build Alternative, automobile VMT would be higher than the Build Alternative. According to TxDOT, the Austin region VMT would be expected to increase from approximately 62 million in 2022 to approximately 141 million, under the 2045 No Build Alternative (TxDOT 2022; CAMPO 2024b). The Austin region includes Travis, Burnet, Williamson, Hays, Bastrop, and Caldwell counties. **Table 4-16** shows the existing and No Build Alternative daily VMT in the Austin region, where the Project is located; data in **Table 4-16** is derived from TxDOT's Roadway Inventory annual report and CAMPO's travel demand model 2045 forecast.

In addition to providing the travel demand model, CAMPO's *2045 Regional Transportation Plan* (2024a) also includes public transit projects such as extending the CapMetro Rail Green Line, expanding the bus rapid transit coverage, adding new CapMetro Rapid routes, enhancing technology, and improving park-and-ride facilities. Specific effects on air quality from public transit projects and other transportation projects would be determined for each individual project. A detailed description of the No Build Alternative is included in Chapter 3, Transportation.

Table 4-16: Comparison of Austin Region's Existing and 2045 No Build VMT and Emissions

Parameter	Existing Conditions (based on TxDOT 2022 and CAMPO 2024b)	2045 No Build Alternative
Total daily VMT for Austin region	61,958,037.3	141,074,241.9
Annual volatile organic compounds emissions in pounds	9,722,072.8	22,136,499.4
Annual carbon monoxide (CO) in pounds	112,935,859.8	257,147,280.6
Annual nitrogen oxides (NO_x) in pounds	10,698,719.4	24,360,257.3
Annual total $PM_{2.5}$[a] in pounds	443,930.3	1,010,799.1

Sources: TxDOT 2022; CAMPO 2024b; Bureau of Transportation Statistics 2023; Federal Highway Administration's Infrastructure Carbon Estimator v2.1.3 (ICE); Argonne National Laboratory's Greenhouse Gases, Regulated Emissions, and Energy Use in Transportation (GREET) Model, 2021 release. See **DEIS Appendix F-1**.

Notes: Total daily VMT includes on-system and off-system car and truck VMT. Travis County daily VMT would be expected to increase from 31.3 million in 2022 to approximately 71.3 million in the 2045 No Build Alternative.
Calculations shown used the 2030 Average Emissions Per Vehicle: Gasoline and Diesel Fleet emission factors published by the Bureau of Transportation Statistics (2023). For volatile organic compounds, the emission factor is 0.219 grams per mile; for carbon monoxide, the emission factor is 2.544 grams per mile, for nitrogen oxides, the emission factor is 0.241 grams per mile; for $PM_{2.5}$, the emission factor is 0.01 grams per mile (Bureau of Transportation Statistics 2023).
Annualization factor = 325.
Volatile organic compound emission rates are equal to total hydrocarbons in Table 4-43 (Bureau of Transportation Statistics 2023); total hydrocarbons includes exhaust and evaporative emissions.
Calculation for daily pollutant reductions in pounds = Emission Factor in grams per mile x daily VMT x 0.002205 pounds/ per gram. Annual reduction in volatile organic compounds in pounds = 0.219 grams per mile x annual VMT x 0.002205 pounds per gram.
Annual No Build VMT = Total daily VMT x annualization factor.
Calculation for annual pollutant reduction in pounds = Emission Factor in grams per mile x Annual VMT x 0.002205 pounds/ per gram.

[a] Total $PM_{2.5}$ includes Exhaust $PM_{2.5}$, Brake Wear $PM_{2.5}$, and Tire Wear $PM_{2.5}$.

Historically, the Austin MSA has maintained compliance with all NAAQS. In May 2024, EPA implemented the final rule revising the $PM_{2.5}$ annual standard from 12.0 ug/m^3 to 9.0 ug/m^3. As a result, the Austin MSA air quality monitoring values recorded in 2023 were higher than this new $PM_{2.5}$ annual standard (see **DEIS Appendix F-1**). Although the 2023 $PM_{2.5}$ monitoring values exceed the 2024 $PM_{2.5}$ annual standard, the Austin MSA is still designated as an attainment or unclassifiable area (TCEQ 2024). CAPCOG is working with members of the Austin MSA to evaluate and implement fine particulate matter emission reduction measures and ensure compliance with the NAAQS in the short term and in the future. The Austin MSA is in compliance with the 24-hour $PM_{2.5}$ standard, 35 ug/m^3.

Through 2022, air pollution levels within the Austin MSA remained in compliance with the NAAQS, and the ozone design value below the 2015 8-hour ozone standard (see **Figure 4-30** above). However, in 2023, the ozone design value exceeded the 2015 8-hour ozone standard, resulting in noncompliance with the ozone NAAQS. While the 2023 design value exceeded the 8-hour ozone NAAQS, the Austin MSA is still designated as an attainment or unclassifiable area. CAPCOG is working with members of the Austin MSA to evaluate and implement emission reduction measures and achieve compliance with the 2015 8-hour ozone NAAQS. Design values for all other criteria air pollutants are well below the respective NAAQS for each of the pollutants.

Although there is limited available data, the recent exceedances in 2015 8-hour ozone and 2024 $PM_{2.5}$ annual NAAQS may represent a trend towards future exceedances or non-compliance with air quality regulations, especially when considering the projected regional growth in population, employment, and VMT. CAMPO is continuing to evaluate land use, multimodal transportation approaches, enhancements to the transit and bicycle/pedestrian network, Transportation Demand Management strategies, and other programs and activities to ensure that the region's air quality remains in compliance with NAAQS and maintains its attainment status.[3]

Climate-related changes resulting from air emissions are already observed and will increase in the future. According to the Texas State Climatologist, the projected average annual Texas surface temperature in 2036 is expected to be 3.0 degrees Fahrenheit (°F) warmer than the 1950–1999 average and 1.8°F warmer than the 1991–2020 average. By 2036, the number of 100°F days is expected to nearly double when compared to 2001–2020, with higher frequency of 100°F days in urban areas. Extreme monthly summertime temperatures may increase by about 1°F compared to the 1950–1999 average. The frequency of extreme weather events, more climate variability, and extreme monthly wintertime temperatures and are expected to increase by 6 percent to 10 percent relative to 1950–1999 and 2 percent to 3 percent relative to 2001–2020 (Office of the Texas State Climatologist 2021).

Minimum and maximum daily temperatures are projected to rise. Recent projections for Austin indicate a future with hotter summers, more frequent heatwaves, and fewer cold spells (UT-City Climate CoLab 2024). By the end of the century, summer maximum temperatures are projected to increase, with temperatures above 110°F becoming more frequent (City of Austin 2024b). Heatwaves, defined as three or more consecutive days with excessively hot weather are expected to also increase by the end of the century (UT-City Climate CoLab 2024). Fewer frost days and freeze spells are expected, with cold spells lasting about as long as usual. The number of frost days, when the minimum temperature drops below 32°F, is expected to

[3] Because the Study Area is designated as attainment for the 8-hour ozone standard, it is eligible to participate in EPA's 8-Hour Ozone Flex Program. The program is implemented through a voluntary intergovernmental agreement (Memorandum of Agreement) among EPA, TCEQ, and the local communities. The Austin-Round Rock 8-Hour Ozone Flex Memorandum of Agreement commits the Austin-Round Rock area to continuing the implementation of the Early Action Compact State Implementation Plan and voluntary emission reduction measures. There are no further State Implementation Plan requirements for the existing standard as long as the area continues to be in attainment for the standard (EPA 2008).

decrease significantly by the end of the century (UT-City Climate CoLab 2024). Extreme rainfall events, where more than 2 inches of rain falls in a day, are expected to occur slightly more often (UT-City Climate CoLab 2024). However, the total annual rainfall and the number of rainy days each year are projected to relatively stay the same (City of Austin 2024b).

4.11.2.2 Build Alternative and Design Options

Operational (Long-Term) Effects

Air quality effects associated with operation of the Project would be minimal and would be similar among the Build Alternative and the Design Options. Implementation of the Project would result in new transit riders as some automobile drivers switch to light rail. This would result in a decrease of VMT in Travis County and surrounding areas compared to the No Build Alternative. Project-related air emissions would result from activities such as transit VMT, operation of the OMF and MOW shops, and routine maintenance of the guideway, pavement, and vehicles. While the Project would generate emissions during construction, operations, and maintenance phases, the Project would also displace emissions by reducing automobile emissions due to transit's "ridership effect" (FTA 2024b). The Project is expected to reduce dependency on single-occupancy vehicles, slow down growth in VMT, and reduce the automobile VMT by approximately 20.14 million per year, as shown in **Table 4-17** and **Appendix F-1**.

Table 4-17: Calculation of Daily VMT Reduction for the Project

Category	2045 No Build Alternative	2045 Build Alternative
System Linked trips	109,200	121,700
System Unlinked trips	151,000	168,100
Project total trips	N/A	28,968
Change in passenger miles traveled	N/A	68,200
Average vehicle occupancy	N/A	1.1
Daily VMT	141,074,242	141,012,277
Annual VMT	45,849,126,614	45,828,989,988
Change in daily VMT	N/A	(61,965)
Change in annual VMT [a]	N/A	(20,138,625)

Sources: Simplified Trips-on-Project Software (STOPS) model, TxDOT Roadway Inventory Annual Report, and CAMPO Regional Travel Demand Model Scenarios
Note: Passenger miles traveled data were from the STOPS model; Average vehicle occupancy was from the 2045 CAMPO Regional Travel Demand Model.
VMT = vehicle miles traveled; N/A = not applicable
[a] Annualization VMT factor = 325 (from STOPS model)

The Project would be electrically powered with no direct operational emissions. However, there would be upstream emissions associated with the power plants and fuel sources used to generate electricity contributing to the electric grid. Austin Energy would supply the electricity to power the Project. In 2023, 70 percent of Austin Energy's portfolio was carbon-free energy. Austin Energy plans to phase out its single remaining coal-powered plant and move to 100 percent carbon-free generation by 2035 (Austin Energy 2023). In 2045, operations of the light rail would use 100 percent carbon free electricity from Austin Energy. Therefore, upstream emissions associated with the electricity powering the Project would be minimal.

The Austin MSA is designated as in attainment for all NAAQS. The Austin MSA has robust decarbonization strategies including cleaner vehicles, voluntary local emissions-reduction programs, carbon reduction projects, carbon removal, and relatively clean industries (City of Austin 2024b). As a result, levels of criteria pollutants, mobile source air toxics, and GHG emissions would be lower under the Build Alternative compared to the No Build Alternative; **Table 4-18** shows a comparison of the 2045 No Build Alternative and 2045 Build Alternative. Because the Austin MSA conforms to all NAAQS (i.e., is an attainment area), emissions modeling and regional hot spot analyses are not required to demonstrate conformity with the Clean Air Act.

Table 4-18: Comparison of the Austin Regions Estimated Emissions and Based on VMT Reduction Resulting from the Project

Parameter	Emission Factor (grams per mile)	Existing Conditions Emissions (pounds)	2045 No Build Emissions (pounds)	2045 Build Emissions (pounds)	Emission Reductions (i.e. Difference Between Build and No Build Emissions) (pounds)
Volatile organic compounds	0.219	9,722,072.8	22,136,499.4	22,126,776.2	(9,723.2)
Carbon monoxide (CO)	2.544	112,935,859.8	257,147,280.7	257,034,332.1	(112,948.6)
Nitrogen oxides (NO_x)	0.241	10,698,719.4	24,360,257.3	24,349,557.4	(10,699.9)
Total $PM_{2.5}$	0.010	443,930.3	1,010,799.1	1,010,355.1	(444.0)

Sources: STOPS model; TxDOT 2022; CAMPO 2024b.
Notes: Existing Daily VMT = 61.9 million; 2045 No Build VMT= 141.07 million; 2045 Build VMT= 141.01 million
Difference between 2045 Build VMT and 2045 No Build VMT = 61,965 daily VMT
Annualization factor = 325;
Annual VMT = Daily VMT x Annualization Factor
Pounds of pollutant Emissions = Emission factor (grams per mile) x VMT (miles) x 0.002205 (pounds per gram).

According to FTA, light rail transit projects with a high ridership effect, regardless of length, alignment, and number of stations, generally result in net reductions in annual GHG emissions over the minimum useful light rail lifespan of 50 years (FTA 2024b). Annual displaced GHG emissions due to light rail transit's "ridership effect" are greater than the GHG emissions from construction, maintenance, and vehicle operation phases for the light rail transit project. The Project is expected to have similar GHG emissions to those estimated for light rail in FTA's *Greenhouse Gas Emissions from Transit Projects: Programmatic Assessment* (FTA 2024b). **Table 4-19** shows a comparative summary of the Project and the sample projects used in the FTA GHG Programmatic Assessment (FTA 2024b). As shown in **Table 4-19**, sample light rail projects similar to the Project would result in net reduction in GHG emissions. FTA considers it practicable to assess the effects of GHG emissions and climate change for transit projects at a programmatic level by incorporating by reference the FTA GHG Programmatic Assessment analysis of upstream and downstream GHG emissions (FTA 2024b). Calculating Project-specific GHG emissions would be expected to provide only limited information beyond the information collected by FTA's programmatic analysis and has not been performed.

Table 4-19: Comparison of the Project and FTA Report 0263 Light Rail Transit Scenario GHG Emissions Analysis Results

Project	Guideway Mileage			Number of Stations		Number of Parking Spaces		Annual Transit VMT	Annual Displaced VMT	Total Annual Emissions in $MTCO_2e$
	Above	Below	At-Grade	Above	At-Grade	Surface	Structure			
Austin Light Rail Phase 1 Project	**1.08**	**-**	**9.8**	**1**	**15**	**300**	**300**	**854,645**	**(20,138,625)**	**(Net Reduction)**
LRT 1	3	0.5	11	-	16	2,731	-	2,956,782	(30,273,965)	+ 941
LRT 2	3.63	0.02	4.16	-	3	550	2,650	2,900,000	(66,327,360)	(16,730)
LRT 3	4.1	-	4.4	-	4	250	1,250	6,400,000	(105,707,840)	(22,372)
LRT 4	1.07	-	11.58	-	11	240	1341	2,485,093	(46,585,483)	(9,438)
LRT 5	0	-	8	-	10	2,553	125	619,704	(1,569,477)	+2,652
LRT 6	0.48	-	1.12	-	3	-	257	179,744	(6,729,300)	(1,770)
LRT 7	3	0.5	11	-	16	1,847	640	3,235,204	(36,894,915)	(844)
LRT 8	1.02	-	3.68	-	7	180	-	1,021,545	(12,188,214)	(898)
LRT 9	4.04	0.04	6.85	-	9	650	520	2,770,880	(45,122,744)	(7,918)
LRT 10	0.3	-	2	-	3	75	2,025	662,712	(27,966,900)	(8,725)
LRT 11	0.7	0.6	9.7	-	21	-	-	2,821,918	(65,227,432)	(13,549)
LRT 12	0	1.9	0	3	-	-	-	2,003,400	(138,743,400)	(40,598)

Source: FTA 2024, Appendix B.
LRT = light rail transit; $MTCO_2e$ = metric tons of carbon dioxide equivalent; VMT = vehicle miles traveled

As shown in **Table 4-20**, due to the long-term reduction in VMT, GHG emissions are projected to decrease under the Project when compared to existing conditions and the No Build Alternative. Because there would be no long-term increases in GHG emissions, there would be no long-term GHG adverse effects; therefore, the Project would not further contribute to or exacerbate the effects[4] of climate change in the greater Austin area.

Table 4-20: Calculation of GHG Reductions for the Project, based on VMT Reduction

Scenario	Annual VMT Reduction	Upstream GHG Emissions in $MTCO_2e$	Downstream GHG Emissions IN $MTCO_2e$	Net GHG Emissions in $MTCO_2e$
2045 Build Alternative	20,138,625	3,103	(4,164)	(1,061)

Source: FTA Transit Greenhouse Gas Emissions Estimator
Notes: Detailed GHG emissions calculations are included in **Appendix F-1**.
GHG = greenhouse gases; CO_2e = carbon dioxide equivalent; CO_2 = carbon dioxide; CH_4 = methane; N_2O = nitrous oxide

The Project would not result in long-term GHG adverse effects; therefore, the Project would not further contribute to or exacerbate the effects[4] of climate change in the Austin area. ATP is developing strategies that address a changing climate in accordance with FTA guidance. The strategies would include design, asset management, maintenance, emergency response, and operational policies and guidance. CapMetro has existing procedures for emergency response, maintenance, asset management, and operation and maintenance of the transportation system, which consider several changing climate scenarios over time. The Project would incorporate green infrastructure to reduce stormwater runoff and flood potential, and shade trees to address the comfort of passengers waiting for the train if not prohibited by ROW constraints. Additional resiliency measures are being identified via sustainable design guidelines that are currently under development for the Project. Further climate change measures are discussed in **Chapter 5, Cumulative Effects**.

Construction-Related (Short-Term) Effects

Construction of the Project would involve activities that could affect air quality. These activities would include the construction of the guideway, stations, parking, OMF, catenary system, and paving of separated ROW. The level and duration of potential effects depend on the type of construction activity and the construction methods used, including best management practices to minimize effects. The temporary construction effects of the Project would include:

- direct emissions from construction equipment and vehicles at contractor staging and laydown areas and along access and haul routes;
- increased emissions from motor vehicles due to temporary decreased roadway capacity and detours on nearby roadways during construction; and

[4] It is important to note that the light rail system's electrical consumption may indirectly add GHG emissions related to upstream energy production outside the Study Area.

- fugitive dust, particulate matter, and other pollutant emissions from the use of heavy construction machinery, pavement removal, earthmoving, site grading, and station construction.

ATP would incorporate best management practices into construction contract documents and would monitor contractor compliance with the construction specifications as well as local and state regulations, including the Texas Low Emission Diesel Fuel Program for all diesel-fueled on-road motor vehicles and non-road construction equipment. As a result of these measures, construction-related air quality effects would be minimal. The best management practices include the following:

- **Dust Suppression Techniques.** Construction crews would cover and/or treat disturbed areas where practicable with dust suppression techniques, including, but not limited to, soil binders, sprinkling, watering, and/or chemical stabilizer/suppressants. This would also include effectively controlling fugitive dust emissions by the application of water, presoaking, or other dust suppression techniques during clearing, grubbing, scraping, excavation, grading, cut-and-fill, and demolition activities;
- **Materials Transport.** Construction crews would cover or effectively wet dry materials transported off site and within the construction site to limit visible dust emissions. Construction crews would also limit vehicle travel speeds to minimize dust generation and remove tracked-out soil on area roadways when it extends 50 feet or more from the construction site and at the end of each workday;
- **Construction Equipment.** Construction crews would limit idling of construction equipment when the equipment is inactive and would properly maintain construction equipment in accordance with the manufacturer's specifications. Contractors would be encouraged to use electric-powered equipment and low volatile organic compound equipment when available;
- **Ground-Disturbing Activities.** Construction crews would phase ground-disturbing activities to the greatest extent possible to reduce the number of disturbed surfaces at any one time; and
- **Traffic Management.** Construction crews would use proper traffic management during construction sequencing activities to mitigate traffic disruptions and potential adverse localized air quality effects. Traffic management activities may include providing traffic control, providing less congested routes for construction vehicles accessing the site, and restricting construction activities during hours of high traffic volumes on existing roadways. Contractors would be encouraged to use fugitive dust management, electric and zero emission vehicles and construction equipment, when they are available, cost-competitive, and meet operational needs.

4.11.3 Mitigation

The Project would not cause or contribute to any violation of the NAAQS; therefore, mitigation measures would not be warranted. As an integral component of the Project, ATP would include best management practices in construction contracts and would monitor contractor compliance during construction to minimize air emissions and dust.

4.12 Energy and Electromagnetic Fields

Operating a light rail system uses energy in the form of electricity but also reduces private VMT in a region, which reduces gasoline consumption. Electric and magnetic fields (EMFs) are created wherever electricity flows, surrounding power lines, electrical equipment, and devices. These fields can cause electromagnetic interference (EMI), which may disrupt or interfere with the operation of sensitive equipment, potentially leading to malfunctions.

ATP analyzed the Project's potential effects on energy use, EMFs, and EMI. The Study Area for analysis of energy demand is the Austin Energy Service Area, approximately 437 square miles of Travis and Williamson Counties and a small portion of Hays County. Because light rail vehicles rarely have an adverse effect on sensitive equipment from a distance greater than 100 feet, the Study Area for assessing EMI effects, referred to as the EMF/EMI Study Area, is defined as 500 feet from the centerline of the Build Alternative.

4.12.1 Affected Environment

In 2023, Austin Energy provided more than 14,000 gigawatt hours of electricity to more than 550,000 customers in Austin and parts of Travis and Williamson Counties (Austin Energy 2023). Overall, Austin comprises approximately half of the Austin Energy Service Area, and in 2023, 70 percent of Austin Energy's portfolio was carbon-free energy. Austin Energy plans to phase out its single remaining coal-powered plant and move to 100 percent carbon-free generation by 2035 (Austin Energy 2023).

The Project's EMF/EMI Study Area depends on the location of sensitive equipment related to the light rail line and the amount of electrical power the Project requires to accelerate or decelerate near sensitive facilities. Within the EMF/EMI Study Area, ATP identified four potential EMF/EMI sensitive receptors. Receptors that are assumed to contain equipment that would be sensitive to EMI within 500 feet of the Build Alternative alignment, and their potential concerns, are listed in **Table 4-21**.

Table 4-21: Potential EMF/EMI Sensitive Receptors

County	Sensitive Receptor Name	Type	Distance (feet)[1]	Potential Concerns
Travis	The University of Texas at Austin	School	100	Sensitive research equipment
Travis	Austin Fire Station No. 6	Fire	70	EMI with emergency equipment
Travis	The University of Texas Department of Radio-Television-Film and Department of Communications	School	60	Interference with communications equipment
Travis	Austin Fire Station 22	Fire	45	Interference with existing equipment

[1] Distance from the Project centerline

4.12.2 Environmental Consequences

4.12.2.1 No Build Alternative

Under the No Build Alternative, the Project would not be built. The No Build Alternative would create additional energy demands in the region because of population and employment growth, greater levels of congestion, and slower transit speeds. However, the increased energy demand that a light rail system and construction would place on the electrical grid under the Build Alternative would not occur with the No Build Alternative.

Under the No Build Alternative, ambient EMF conditions would be similar to the existing conditions in the EMF/EMI Study Area, although ambient EMF conditions would be expected to rise with increasing use of technology, population, and employment density.

4.12.2.2 Build Alternative and Design Options

Operational (Long-Term) Effects

The daily operation of the light rail infrastructure, including trains, stations, and associated facilities, would require additional energy inputs The operation of the light rail system would likely prompt a shift in transportation preferences for some commuters, diverting them from existing bus routes or private vehicles to the light rail.

The Build Alternative would introduce a new mode of transportation within the corridor, potentially stimulating surrounding growth that could lead to increased energy consumption. The potential increase in urban development and economic activity could lead to greater energy demand from various sectors, such as residential, commercial, and industrial. Overall, because the light rail system under all proposed Design Options would be of similar length and ridership, direct effects on energy and EMF/EMI would be similar for the operational effects of all Design Options.

Energy Requirements

The proposed traction power system design for the Build Alternative would include traction power substations ranging from 1.10 to 5 total megawatt capacity. Traction power substations are electrical substations that convert electric power to the appropriate voltage, current type, and frequency for use by light rail vehicles. The traction power substations would be spaced approximately 1 mile apart along the Project corridor.

According to the *Transportation Energy Data Book*: *Edition 40*, the average light rail vehicle energy demands per passenger mile is 1,307 British thermal units (BTU) (U.S. Department of Energy 2022). A passenger mile is not dependent on the number of passengers traveling on the system but represents the operation miles of the light rail network. To calculate the estimated energy demands of the Project, the average BTU per mile traveled was applied to the Project's length. The estimated energy consumption for the Project is approximately 12,809 BTU per passenger mile (U.S. Department of Energy 2022). The estimates for BTUs per passenger mile would be updated as design and anticipated energy demands are refined.

Austin Energy would provide the electricity to power the Project. The Project would not have a direct need for new energy production facilities or capacity-enhancing alterations at existing energy production facilities. The Project's estimated annual energy consumption when fully operational is expected to be in the range of 60 to 70 gigawatt hours, a small fraction of Austin Energy's portfolio (see **Appendix E-9**). Austin Energy's plans for 100 percent carbon-free electricity generation by the year 2035 would still be attainable with the Build Alternative's annual energy consumption; therefore, the operation of the Build Alternative would not conflict with those adopted plans.

Energy Savings

The Austin MSA has been the fastest-growing area in the country for the 12th consecutive year (City of Austin 2023f). By 2045, Austin's population is projected to reach 1.3 million, an increase of approximately 39 percent when compared to 2020 population data. As population increases, VMT is projected to increase as well. However, the Build Alternative would result in a reduction of approximately 61,965 daily VMT and a net annual reduction in regional energy use. The annual change in VMT and expected reduction in annual energy consumption based on the decrease in automobile VMT, are shown in **Table 4-22**.

Table 4-22: Projected 2045 Annual VMT and Energy Use Reductions from the Build Alternative

Modes	Annual VMT Decrease	Energy Use Decrease (million BTU)
Automobile	20,138,625	-68,985

Sources: U.S. Department of Energy 2022; FTA 2023.

Electromagnetic Field / Electromagnetic Interference

The overhead catenary wires, also known as messenger wires (wires that provide direct power to the train), and the power transmission lines that provide power to the traction power substations along the proposed Project route would produce EMFs. EMFs would also be produced by the train cars themselves, both within and outside the cars, especially when they are moving. The electricity needed to operate the train cars flows from the overhead catenary wires to the traction motors and other electronic equipment. The power flows through the cables located either in the ceiling or under the floor of the cars. The amount of electricity flowing in these cables would vary depending on whether the train is accelerating, running at steady speed, decelerating, or is stopped. The electrical current would be highest when the train is accelerating. EMFs would be created whenever the train operates.

EMFs can cause a variety of effects to humans. Certain EMF combinations can cause shock and burn injuries through direct contact with energized components; others can interfere with the operation of electrical and magnetic devices, including heart pacemakers. Based on data available from similar rail systems, however, operation of the light rail is unlikely to generate health effects for riders or people along the tracks.

Because EMFs can cause EMI, which can cause disruptions and possible malfunctions in sensitive equipment, ATP would contact each of the sensitive facilities identified in the EMF/EMI Study Area if the Build Alternative is selected to determine the type and location of sensitive equipment in relation to the light rail line. If needed, ATP would perform modeling to identify existing levels of EMIs at these facilities and the potential EMI levels that would result from the Project to determine whether mitigation is warranted. EMI effects can be effectively mitigated by relocation of the sensitive equipment or by installing shielding to protect the equipment from EMI.

Additionally, where there are electric currents, it is possible that stray currents would occur when a portion of the electrical current finds an alternative conducting path, such as metal, water, or a buried pipe or cable. Over time, a stray current can cause corrosion, which in turn can cause pipes to leak or wires to break. ATP would minimize or avoid the potential for stray currents by selecting best management practices in control measures for stray currents.

Construction-Related (Short-Term) Effects

Construction of the Build Alternative and all Design Options would temporarily increase energy consumption. However, this effect would occur only during the Project's construction phase. Total estimated energy consumption during construction is 517,178 million BTUs (FTA 2022). Calculations take into consideration mode of transport; length of track; construction of parking lots, facilities, and stations; and the energy required to manufacture construction materials. Additionally, the completed Project would ultimately decrease energy use and highway VMT in the region, as shown in **Table 4-22**.

Construction would result in negligible EMF/EMI effects because construction equipment generates low levels of EMFs and EMI. The only EMI that could be generated during construction activity would be occasional licensed radio transmissions between construction vehicles.

4.12.3 Mitigation

The Project would not have an adverse effect on energy demand; as a result, no mitigation related to energy consumption is required. During final design, as part of the Preferred Alternative, ATP would contact each of the sensitive facilities identified in the EMF/EMI Study Area to determine the type and location of sensitive equipment in relation to the light rail line. If needed, ATP would perform modeling to identify existing levels of EMIs at these facilities and the potential level of EMI that would result from the Project to determine whether mitigation is warranted. EMI effects can be effectively mitigated by relocating of the sensitive equipment or by installing shielding to protect the equipment from EMI. During final design, ATP would develop and implement standard design control measures in consultation with utility owners to mitigate the potential of stray currents.

4.13 Soils and Geologic Resources

Soil and geologic conditions are investigated prior to the construction of a project to identify geologic hazard areas such as areas at risk for erosion, steep slopes, landslides, and seismic hazards. Geologic hazards could affect a light rail project's construction and operation.

ATP identified critical environmental features as defined by the City, mapped soil units, and soil properties within the Study Area. The Study Area for the soils and geologic resources assessment is the limits of Project construction.

4.13.1 Affected Environment

4.13.1.1 Soils

The Study Area, which is the limits of Project construction, contains 305 acres of developed land, of which 63.5 percent is highly disturbed, altered, or covered urban landscape. Native soil units (36.5 percent) and water composes the (1.0 percent) comprise the remaining area. Generally, soils in the Study Area are well drained, have low to moderate erosion potential, have variable shrink-swell potential ranging from low to very high, and have medium to high plasticity. All of these characteristics are influenced by soil sediment size and composition and thus are strongly correlated with clay content. The clay content of native soils in the Study Area ranges from 16 to 55 percent, and most clay-rich units are found in the eastern portion of the Study Area, where farmland is most commonly found. According to available aerial imagery, areas identified as farmlands are generally developed for residential and commercial use. No portion is currently in use for agriculture.

4.13.1.2 Geology

Physiographic Setting

The Project is located along the Balcones Fault Zone that forms the boundary of the Edwards Plateau and Blackland Prairies physiographic regions of Texas. The Balcones Fault Zone also forms the Balcones Escarpment, which is a highly eroded region bordering the Edwards Plateau on the south and west. The region is typified by higher elevations to the north and west, generally sloping to the southeast. Topography within the Study Area is gently undulating to rolling with surface elevation decreasing toward Lady Bird Lake and the Colorado River below Longhorn Dam / Lady Bird Lake. The Study Area does not pass over portions of the Edwards Plateau with hydrogeological connections to the Edwards or Trinity Aquifers, but both aquifers occur under the portions of the Project. The highly karstified limestone units associated with the Edwards Aquifer recharge zone are generally found outcropping 1 to 2 miles west of the Study Area.

Mapped Surface Geology

The geologic formations occurring within the Study Area are composed mostly of Cretaceous rocks with Quaternary alluvium deposits overlying areas along surface drainages. The limestone bedrock in the Study Area developed from the accumulation of thick sequences of marine sediments deposited in a lagoon environment on the San Marcos Platform protected by a barrier reef during the Cretaceous period about 100 million years ago (Rose 1972). Several units are mapped at the surface of the Study Area including Austin Chalk, which is a relatively

dense and competent limestone, with minimal karst development expected in the Study Area. Underlying layers, namely the Eagle Ford Formation, Del Rio Clay, and Georgetown Formations, are recognized as upper confining units of the Edwards Aquifer and reduce potential for groundwater contamination from infiltrating surface waters.

Karst Geology

The Study Area is located within an expansive karst landscape that extends south from Dallas to San Antonio and west toward Del Rio, Texas. It contains thick-bedded to massive Cretaceous limestones and some dolomite beds from the Edwards Group and Glen Rose, Buda, Georgetown, Austin, and Anacacho Formations. Faults are generally downthrown toward the Gulf of Mexico (Rose 1972). Karst is a type of geological formation where the dissolving of the bedrock has created sinkholes, sinking streams, caves, springs, voids, and other characteristic features. Karst is associated with soluble rock types such as limestone, marble, and gypsum. In general, a typical karst landscape forms when much of the water falling on the surface interacts with and enters the subsurface through cracks, fractures, and holes that have been dissolved into the bedrock. After traveling underground, sometimes for long distances, this water is then discharged from springs, many of which are cave entrances.

The Edwards and Trinity Aquifers, which are situated near the Study Area, are karst aquifers that exhibit high porosity and permeability. The karst geology allows for the transmission of large volumes of water into the aquifer, which means that during rainfall events the aquifer is able to recharge quickly (Edwards Aquifer Authority 2023). The Study Area is located over confined portions of both the Edwards and Trinity Aquifers, where the Edwards overlies the Trinity; thus, this assessment focuses primarily on characterizing potential effects on the Edwards Aquifer. The Study Area is located near, but outside of (beyond 150 feet), Edwards Aquifer regulatory zones. Additional information regarding karstic geology and groundwater is included in Section 4.14, Water Resources.

Critical Environmental Features

The Study Area potentially contains critical environmental features along Lady Bird Lake and its tributaries. According to the City, bluffs and rimrocks are located along the south bank of Lady Bird Lake below I-35 near the proposed Travis Heights Station. Point recharge features such as caves and sinkholes are not common in the geologic units mapped in the Study Area and are not likely to be encountered during Project construction. Springs and seeps can be found in cutbanks of creeks in the Study Area; however, the location and flow rate of springs is dependent on recharge and is seasonally variable. Wetlands identified by the City are located along the banks of Waller Creek and Country Club Creek and along the south bank of Lady Bird Lake between South Congress Avenue and South Pleasant Valley Road (City of Austin 2023g). An additional spring/seep is located south of 38th Street within 150 feet of, but outside of, the Study Area. Additional information regarding critical environmental features is provided in Section 4.14, Water Resources.

4.13.1.3 Seismicity

The Balcones Fault Zone consists of a series of normal faults with hanging walls generally down dropping to the southeast toward the Gulf of Mexico, with significant displacement ranging from approximately 100 feet to more than 500 feet (Collins 1995). Numerous smaller-scale faults occur with displacement less than 100 feet. Regional faulting is typically oriented at 50 to 60 degrees in the Austin area. There are four mapped faults crossing the Study Area. Movement along the Balcones Fault Zone may have caused two small earthquakes in the last 130 years (1893 and 1902); however, no movement has occurred in recorded history (UT, Bureau of Economic Geology 2021). The annual probability for seismic hazards or earthquakes to occur within or surrounding the Study Area is very low. Construction-related seismicity effects are not anticipated as a result of the Project construction.

4.13.2 Environmental Consequences

4.13.2.1 No Build Alternative

Under the No Build Alternative, the Project would not be constructed. Soils and geology would be affected by improvements under the No Build Alternative and addressed by each individual project.

4.13.2.2 Build Alternative and Design Options

Specific soil and geologic conditions may contribute to potential effects on the Project. While the soil characteristics vary along the entire Project alignment, there may be differences in soil type or geological formation in the location of the Design Options. Construction effects on geologic resources would be similar in portions of the Project alignment that would be constructed at-grade or on bridge, but construction effects may be different for the Design Options depending on the ultimate location, design, and construction methods for the options. Due to the very low probability of earthquakes, seismic hazards in relation to the Project are not anticipated.

Operational (Long-Term) Effects

Soils

The effects of soil conditions are considered in the design of the Project infrastructure needed to operate the light rail, and unstable soils, highly expansive soils, low soil bearing strength, and slope failures are addressed. Unstable soils could affect operations due to potential slope failures, embankment collapse, and/or structural issues (e.g., as a result of exposure to groundwater creep or heavy precipitation events). These risks are typically higher near water resources and in areas containing loose or soft deposits of sand, silts, and clays.

Soils with high shrink-swell potential tend to shrink during dry conditions and expand when wet. The frequency of shrink-swell cycles is expected to increase over time due to more intense extreme weather events, such as prolonged droughts and floods, which are becoming more common in the region (Nielsen-Gammon et al. 2024). This concern is greatest for the at-grade alignment along East Riverside Drive where these soils exist. Loads associated with at-grade construction may not be sufficient to handle the shrink-swell variability of those soils, resulting in movement of structures or track sections if design measures, such as minimizing moisture content changes or soil improvement, are not incorporated.

In areas where the Project would occur along slopes that vary in height and steepness, there is a potential for localized slope failures with the risk increasing as the slope's steepness and height increases. Slope failures may occur as a result of instable cut or fill slopes, particularly at retaining structures or near water resource crossings. Slope failures could also cause increased load to structures or blockage in the pathway of the slope failure.

These risk factors would be reduced with the incorporation of best management practices to the maximum extent practicable (see Section 4.13.3, Mitigation). During final design, the dominant soil characteristic and the potential for erosion and shrink-swell would be fully evaluated through pre-construction site inspections.

Geology

The alignment would follow local topography, where practicable, in order to minimize earthwork. The Project's operation would not affect geologic formations. Operational effects on geologic formations are not anticipated as a result of the Project.

Construction-Related (Short-Term) Effects

Soils

Project construction would include vegetation removal, excavation at varying depths, and cutting into embankments. Soil erosion could occur in areas that are graded or where vegetation removal is required until these areas are permanently stabilized through measures such as revegetation or the addition of ground covering. During construction, these areas would require soil stabilization and erosion control practices such as silt fence and erosion control matting. In areas where construction activities would occur along slopes of varying height and steepness, the risk of localized slope failures increases as the slope height and steepness increase. The risk for slope failures or collapse of retaining structures would increase during heavy precipitation events, particularly in areas outside of the existing roadway, and near water resources and other areas containing loose or soft deposits of sand, silts, and clays. Slope failures could also cause increased load on adjacent structures or cause blockages in the pathway of the slope failure. In addition to slope failures, settlement could occur during construction if underlying materials become compressed under the weight of newly placed fill material. This is more likely to occur in areas of soft deposits of silty or clay soils that have not been previously compressed by loads of similar size.

These risk factors would be reduced with the incorporation of best management practices such as avoiding deep slopes to the maximum extent practicable and stockpiling topsoil for reclamation. Additional information regarding erosion, including areas mapped by the City as Erosion Hazard Zones, is provided in Section 4.14, Water Resources.

Geology

During Project construction, ground-disturbing activities such as cutting and grading, and the installation of bridge piers and foundation elements, would affect geology. Because the Project is located within the Balcones Fault Zone karst region, there is a high potential to encounter karst features and mesocavernous voids during construction. Prior to construction, a survey would be performed to identify karst features, including those that may be considered critical

environmental features, and avoidance measures would be incorporated into final design to the extent possible. In addition, there is a potential for the unanticipated discovery of concealed karst features (voids) during construction, particularly in areas requiring below-grade activities, such as cutting or trenching. Trenching or excavation below 5 feet into native bedrock within or near City-regulated zones or aquifer verification zones may require daily trench inspections. If voids are discovered during construction, they may become contaminated with hazardous materials, sediment runoff, and/or other non-native materials. In addition, exposing a previously concealed karst feature to external environmental conditions can alter its ambient conditions and microclimate, including changes in humidity, temperature, and airflow. The discovery of voids can result in a direct connection to shallow groundwater, which would increase the potential for contamination. While the Study Area is not located within a regulated zone of the Edwards Aquifer, there is potential for groundwater connectivity with nearby springs.

The potential for adverse effects on soils and geological conditions in the Study Area are addressed through best management practices and standard engineering design practices. **Table 4-23** summarizes the compliance measures that ATP would implement to avoid adverse effects soils and geology.

Table 4-23: Soils and Geologic Resources Compliance Measures

Compliance Measure	Description
Void Mitigation	ATP would coordinate with TCEQ and the City to determine whether a void mitigation plan is required. If required, the plan would include void discovery protocols, mitigation, and protection measures for potential features within or near TCEQ- and City-regulated zones and aquifer verification zones. The plan would also identify whether daily trench inspections would be warranted. TCEQ and the City would approve the void mitigation plan prior to construction. If a previously concealed karst feature is discovered during construction, TCEQ's and the City's Environmental Inspector would be notified for further investigation. All work would be suspended near the void, and temporary best management practices, such as silt fence, sandbag berms, and covering the void to prevent contamination or changes in ambient conditions, would be installed to protect the feature. Final permanent measures would depend on the type and characteristics of the feature and would be designed and implemented following investigation and regulatory approval. Potential permanent measures may include filling the feature with concrete, a combination of rock and concrete, or other compact backfill materials to help ensure stabilization.

Compliance Measure	Description
Karst Feature and Critical Environmental Features Survey	Prior to construction, ATP would complete a karst feature and Environmental Resource Inventory, including a critical environmental features survey, for the Project. Intensive investigations of potential karst features and critical environmental features to determine recharge potential or other characteristics must be reviewed and approved by the City's Watershed Protection Department. If a critical environmental feature is identified, a protective buffer would be determined in coordination with the City's Watershed Protection Department (see **Appendix F-4** for additional information on this compliance measure).
Erodibility, Shrink-Swell Potential, and Settlement	During final design, ATP would incorporate stabilization techniques and best management practices, such as matting and revegetation, into the design of the Project to improve unstable and settlement-prone soils to minimize and mitigate the hazards of soil conditions throughout the Project as a result of erodibility, shrink-swell potential, settlement, and slope failures.
Pre-construction Site Inspection	During final design, ATP would conduct site-specific geotechnical inspections and slope monitoring of the Project to identify concerns and determine whether unstable locations are in need of improvement, and site stabilization measures would be incorporated in the final design.

4.13.3 Mitigation

No adverse effects on soils or geological conditions are expected to result from the Project; therefore, no mitigation is required.

4.14 Water Resources

Water resources include surface waters, water quality, stormwater, safe drinking water, groundwater, and floodplains. Although these systems are typically substantially altered in urban environments, they contain important aquatic habitats and physical features that provide food, protection, and breeding habitat for aquatic and terrestrial organisms. These systems are also essential for providing clean water for human consumption, recreation, and other beneficial uses.

ATP analyzed the Project's potential to adversely affect water resources in the Study Area and has evaluated construction methods to reduce Project-related effects on water resources during construction. The Project's direct effects on water resources are assessed within the limits of Project construction, and indirect effects on nearby waterbodies are evaluated.

4.14.1 Affected Environment

Water resources within the Study Area include surface waters, water quality, stormwater, safe drinking water, groundwater, and floodplains. Surface waters associated with the Colorado River Basin (i.e., Austin-Travis Lakes subbasin; Town Lake-Colorado River and Carson Creek-

Colorado River subwatersheds) include Blunn Creek, Lady Bird Lake, East Bouldin Creek, Country Club Creek, Carson Creek, and multiple unnamed tributaries to these creeks and the Colorado River (U.S. Geological Survey 2023). In addition, 10 wetland resources (riverine, lake, and freshwater habitats) and 2 hydric soils were identified within the Study Area (U.S. Department of Agriculture Natural Resources Conservation Service 2023).

Within 5 miles of the Study Area, TCEQ has designated five stream segments as Section 303(d) impaired waters. These stream segments include Walnut Creek, Spicewood Tributary to Shoal Creek, Waller Creek, and Taylor Slough South, which are designated for bacteria (recreation use), and Bull Creek, which is designated for depressed dissolved oxygen (TCEQ 2020). The entire Study Area is within the City's Municipal Separate Storm Sewer System (MS4), with existing stormwater management structures located throughout the Project route. Two public supply water wells and 11 other groundwater wells were identified within 0.25 mile of the Project; none of these wells are located within the Study Area (TCEQ 2021; Texas Water Development Board 2021). Groundwater resources are associated with the Edwards Aquifer, which underlies portions of the Study Area; the aquifer is managed by the Barton Springs Edwards Aquifer Conservation District on the south side of Lady Bird Lake near the Project. In addition, three springs and one seep were identified within 0.25 mile of the Project, although none of these are within the Study Area (City of Austin 2023h). The Study Area transects 16.24 acres of the 100-year floodplain and 17.25 acres of the 500-year floodplain that are associated with the Colorado River and its tributaries.

4.14.2 Environmental Consequences

4.14.2.1 No Build Alternative

Under the No Build Alternative, the Project would not be built. As documented in Section 4.2, Land Use and Zoning, a consequence of the No Build Alternative would be that a lower density of residential and commercial development would occur at key points along the light rail alignment because the higher density, transit-oriented development planned around light rail might not occur or occur in less dense development patterns. By not building the Project, some portion of new development would likely occur on the urban fringe rather than in the existing urban centers that would be served by the Project. This type of development in less developed areas would result in an increase in impervious area and an associated increase in stormwater runoff in the urban fringe. Stormwater facilities associated with new development in the urban fringe area would reduce potential effects on local streams; however, during the summer they could reduce stream flows, which could degrade water quality.

4.14.2.2 Build Alternative and Design Options

Operational (Long-Term) Effects

Surface Waters

Twelve stream resources, ten wetland resources (riverine, lake, and freshwater emergent habitats), and two hydric soils were identified within the Study Area. Operational effects on these stream and wetland resources are anticipated to be limited to maintenance of bridges, culverts, and other stormwater management structures and ongoing vegetation maintenance within the permanent ROW. Additional operational effects would include potential mobilization of

contaminants and spillages associated with the operation and maintenance of machinery and equipment used for maintenance of the infrastructure.

The Project's preliminary design has been developed to minimize potential wetland effects and will be further analyzed as Project design is advanced. In order to provide a comparison of the Build Alternative and Design Options, the conceptual designs of the Build Alternative and Design Options were used to calculate the area of the bridge that would span the waterbody. According to National Wetlands Inventory data, waters of the U.S. include the lake (3.060 acres), riverine (1.121 acres), and freshwater emergent (0.09 acre) habitats. The Lady Bird Lake Bridge Extension, Travis Heights Station, Grove Station Design Options would marginally reduce the span of riverine wetland habitats. Otherwise, there would be no difference among the Design Options.

As indicated in Section 4.13, Soils and Geologic Resources, prior to construction, ATP would conduct a survey to identify critical environmental features within 150 feet of the Study Area, as required by the City's Land Development Code. Additional types of critical environmental features (rimrock, bluff, recharge features) are discussed in Section 4.13. ATP would comply with critical environmental feature protection requirements for all identified Wetland Critical Environmental Features as defined by the City's Land Development Code Section 25-8-281 or 30-5-281; Land Development Code Section 25-8-282 or 30-5-282; and Environmental Criteria Manual Section 1.10. The location and delineation of these wetlands would be verified by Watershed Protection Department staff.

Water Quality

Transit operations would have potential temporary and permanent effects on water quality including impaired stream segments, although additional Project details would be necessary for a complete evaluation of effects. When design has advanced, ATP would coordinate with the U.S. Army Corps of Engineers to determine whether a Nationwide Permit or an Individual Permit is required. Prior to construction and concurrent with the Section 404 process, ATP would complete a Tier II Certification Questionnaire and Alternatives Analysis Checklist for review by TCEQ to obtain Section 401 Water Quality Certification. The Project would follow local water quality requirements provided in Land Development Code Chapter 258, including installation of stormwater control measures, as well as Environmental Criteria Manual Section 1.6 (Design Guidelines for Water Quality Controls) and Environmental Criteria Manual Section 1.9 (Need for Water Quality Controls).

Stormwater

The Project is designed with the goals of maintaining drainage patterns; ensuring that on-site runoff would be captured, detained, and conveyed; mitigating any potential effects on flooding upstream and downstream; and minimizing potential contamination to surface water, safe drinking water, and groundwater.

The addition of new public transportation infrastructure, including ROW, stormwater management structures, OMF, stations, and park-and-rides, would result in a minor increase in the amount of impervious surface beyond existing conditions. This increase may influence

surface water flow and slightly slow the rate at which surface water recharges into groundwater. Additionally, it could increase the risk of surface water capturing contaminants and pollutants and carrying them to other surface waters or groundwater. Placement of bridge support structures and other fill may also alter drainage patterns and further affect water resources. Potential long-term effects on stormwater from operation and maintenance of the Project would include increased runoff because of the new impervious areas and the potential for surface pollutants (such as oil and debris) to run off into nearby waterbodies. However, the overall increase in impervious cover is expected to be by less than 2 percent because most of the Project area is impervious. Stormwater runoff may experience a slightly longer flow path and/or may be temporarily stored prior to being discharged into streams, but the use of bridges, culvert crossings, and other stormwater management structures would generally allow flow to maintain its pre-construction path. A reclaimed water system would be implemented to further reduce Project-related effects. Both redeveloped and new impervious cover areas would require compliance with City's water quality protection measures (Land Development Code Chapter 25-8) to minimize stormwater runoff effects associated with the Project. Further analysis will be conducted to determine effects when Project designs have progressed.

Safe Drinking Water

It is not anticipated the project would result in effects on surface waters that provide most of Austin's drinking water. As a result, operational effects on primary sources of safe drinking water or the public water supply are not anticipated.

Groundwater

The Project is not anticipated to have a short- or long-term increase in water demand or to increase the groundwater drawdown. Operational activities, such as fueling and maintenance, would require the use of potential hazardous substances and petroleum products. Groundwater contamination could occur if hazardous substances or petroleum products are spilled and subsequently leach into the groundwater through the ground. Contamination would be more likely in areas of porous soils and shallow groundwater or aquifer outcrops. Groundwater wells could also provide a direct route for spills to access groundwater. The minor increase in impervious cover may slow the groundwater recharge rate; however, the rate of recharge would not affect groundwater quality.

By implementing hazardous materials best management practices and implementing water quality best management practices, potential effects on groundwater quality would be mitigated.

Potential effects on karst regions and mitigation measures for karst features are discussed in Section 4.13, Soils and Geologic Resources, and in Section 4.15, Threatened and Endangered Species.

Floodplains

The Build Alternative would affect the 100-year (16.2 acres) and 500-year (17.2 acres) floodplains. Based on the early conceptual designs, the Lady Bird Lake Bridge Extension Design Option would reduce the effect in the 500-year floodplain to 15.6 acres, and the Grove

Station Design Option would reduce the effect in the 100-year floodplain to 15.9 acres. Any other differences among the options would be negligible.

Operational activities would not modify or otherwise affect the function of floodplains. The Project design incorporates swales, vegetative strips, and soil stabilization measures in combination with detention ponds to reduce peak flow rates in compliance with current applicable floodplain requirements. ATP would follow the latest Federal Highway Administration Hydrologic Engineering Center 20 and Hydrologic Engineering Center 18 procedures and guidance found in the TxDOT *Hydraulic Design Manual* (TxDOT 2019) to maintain stable stream channels and protect existing and planned infrastructure. These procedures apply to hydraulic structures, outfalls, intakes, bridges, rail crossings of roads regulated by the Federal Highway Administration and TxDOT, and rail crossings over waterbodies. ATP would evaluate compliance with local floodplain modification requirements implemented by the City's Watershed Protection Department and would incorporate appropriate measures as necessary during final design.

Construction-Related (Short-Term) Effects

Surface Waters

During construction of the Project, effects on surface waters, including streams, waterbodies, and wetlands, are anticipated to be minor. Temporary effects would include grading and temporary fill from construction access, staging, and laydown areas. These effects will be quantified when the Project design and construction methods are further developed and permit applications are prepared. Effects on waters of the U.S. during construction would require permits and approvals from the U.S. Army Corps of Engineers and TCEQ that would include requirements to avoid, minimize, and mitigate effects.

The Project includes constructing new structures and widening existing structures, including bridges and culverts. At crossings where existing culverts are present, effects within the footprint of the existing structure are assumed to be temporary because the feature is considered previously altered within those limits and would be replaced in kind. Effects associated with proposed fill outside of the existing structure for widening the culvert or riprap placement are assumed to be permanent. Effects on waters of the U.S. during construction would require permits and approvals from the U.S. Army Corps of Engineers and TCEQ that would include requirements to avoid, minimize, and mitigate these effects.

Water Quality

Construction of the Project would result in temporary effects on water quality. Potential effects on water quality would consist of altering the concentration of substances within a waterbody; causing a waterbody to no longer meet a designated use, such as recreation and the ability to support aquatic life; or further degrading an already impaired waterbody. Threatened and impaired waters are close to or already exceed water quality standards for one or more pollutants; a smaller increase of pollutants may affect the ability of the water to meet its designated use than a waterbody where pollutant concentration is historically low. **Table 4-24** includes the impaired waters that are within 5 miles and within or upstream/downstream of the Project alignment. None of the impaired waters identified are within the Study Area.

Table 4-24: Impaired Waters within 5 miles of the Project

Stream Segment Name	Stream Segment ID	Category/Impairment	Gradient Relative to Project
Walnut Creek	1428B	4a - Bacteria in water (Recreation Use)	Upstream
Bull Creek	1403A	5c - Depressed dissolved oxygen in water	Upstream
Spicewood Tributary to Shoal Creek	1403J	4a - Bacteria in water (Recreation Use)	Upstream
Waller Creek	1429C	5c - Bacteria in water (Recreation Use)	Upstream/ Downstream
Taylor Slough South	1403K	4a - Bacteria in water (Recreation Use)	Upstream

Source: TCEQ 2020.

TCEQ has developed Total Maximum Daily Load implementation plans for waterbodies impaired with bacteria within and surrounding the Project (TCEQ 2009, 2015). Stormwater runoff mitigation measures are outlined in Total Maximum Daily Load implementation plans for these waterbodies and are summarized in Section 4.14.3, Mitigation (TCEQ 2009, 2015).

Stormwater

Construction of the Project would involve ground disturbances, such as excavation and grading, which are anticipated to contribute to short-term effects from erosion and sedimentation; therefore, the volume of sediment in stormwater could increase. Soils may be previously contaminated with petroleum derivatives from vehicles or contaminated sites. Sedimentation and stormwater runoff from construction may result in total suspended solids such as rock, soil, and debris fragments entering downstream water resources. These total suspended solids may also contain bacteria, nutrients, particles, and other constituents attached to sediment or carried separately by stormwater that contribute to pollutant loading. Increased pollutant loading in runoff may affect surface water, water quality, safe drinking water, and groundwater (described under Operational [Long-Term] Effects, above). Erosion and sedimentation best management practices, Stormwater Pollution Prevention Plan controls, and other requirements such as Stormwater permitting and inspections, would be implemented to avoid and minimize effects on stormwater.

Safe Drinking Water

Potential permanent physical effects could occur on groundwater wells, including public water system wells, where construction of the Project would overlap the location of the wells. There are two public supply wells within 0.25 mile of the Build Alternative. Both wells are upgradient from the Project (State Well IDs 5842909 and 5842917) (Texas Water Development Board 2021). Based on available data, no public supply wells are located within the Study Area. Indirect effects on the wells may occur from the infiltration of contamination or pollutants into the

groundwater via downgradient wells. These effects are further discussed in the Groundwater section and **Table 4-25**.

Increased water demand would occur for the duration of construction. Water would be used for construction activities such as dust suppression and mixing concrete. Potable and non-potable water for construction would be supplied from existing surface or groundwater supply systems. Therefore, water demand during construction would not be anticipated to require construction or expansion of a water treatment facility or expanded water entitlements.

Groundwater

Sedimentation and runoff from construction of the Project could result in potential temporary effects on groundwater quality due to runoff entering groundwater wells and public supply wells, which is a more direct pathway for runoff to flow to groundwater. Thirteen groundwater wells are located within 0.25 mile of the Project. Ten of these groundwater wells within 0.25 mile are downgradient of the Project, as shown in **Table 4-25**.

Table 4-25: Groundwater Wells

State Well Number	System/Owner Name	Well Type	Well Depth (feet)	Gradient
5843401	North Austin State Hospital	Plugged or Destroyed	635	Upgradient
5843707	State of Texas	Plugged or Destroyed	545	Downgradient
5843702	State of Texas	Unused	543	Downgradient
5843706	Austin City Library	Unused	530	Downgradient
5843703	Driskill Hotel	Unused	495	Downgradient
5843704	F.B. Perry	Unused	485	Downgradient
5843708	Southern Pacific Transportation Co.	Unused	467	Downgradient
5842909	City of Austin	Public Supply	452	Upgradient
5842917	City of Austin	Public Supply	450	Upgradient
5842927	Texas Water Development Board; Texas School for the Deaf	Unused	500	Downgradient
5842929	Texas Water Development Board; Texas School for the Deaf	Unused	500	Downgradient
5851103	Norwood Estate City of Austin	Unused	475	Downgradient
5851101	Q.C. Boatman	Irrigation	740	Downgradient

Sources: TCEQ 2021; Texas Water Development Board 2021.

Potential effects would include the introduction of contaminants from stormwater runoff. Hazardous materials, such as petroleum and oil products used for fueling and maintenance of construction equipment, could also affect groundwater quality if spilled near waterbodies or wellheads, potentially leaching through soil into groundwater.

The wells within 0.25 mile would not be directly affected but may be indirectly affected by stormwater runoff. These effects would be minimized through the implementation of best management practices as described in Section 4.14.3, Mitigation. No springs are located within the Study Area, although one is located within 150 feet near Guadalupe and West 35th Streets. There are two additional springs and one seep within 0.25 mile of the Study Area. No direct effects on these springs are anticipated because they are outside the Build Alternative. Indirect effects may occur from stormwater runoff. Best management practices would be implemented to minimize and mitigate these effects (see Section 4.14.3, Mitigation).

Any construction below the ground surface would locally disturb the uppermost soil layer into which rainwater infiltration occurs. The addition of impervious cover, both temporary and permanent, would alter the infiltration rate into the subsurface within the Project. Construction could also encounter groundwater. If groundwater is encountered, it is typically removed and disposed. As discussed in the Section 4.7, Hazardous Materials, best management practices would be implemented in areas where construction activities would encounter known or suspected contaminated soil or groundwater to prevent or minimize potential hazardous materials spills and contain areas of known contamination, including both soil and groundwater. Construction activities near utility corridors near leaking petroleum storage tank sites or dry cleaner facilities may have a higher potential to encounter contaminated materials.

By implementing best management practices and mitigation for temporary and permanent erosion, sediment, and water quality controls, the pathway for contamination to reach groundwater would be reduced.

Floodplains

ATP would ensure compliance with applicable Federal Emergency Management Agency regulations, including Executive Order 11988 (Floodplain Management), and the Flood Risk Management Standard. Prior to construction, ATP would obtain a Floodplain Development Permit from the Federal Emergency Management Agency and the local floodplain administrator, the City's Watershed Protection Department, for effects within Federal Emergency Management Agency floodplain boundaries. Adherence to local City floodplain modification requirements will be required. Incorporation of green infrastructure would reduce runoff and risk of flooding and would promote groundwater recharge.

During construction, adverse effects on floodplains, defined as a rise in floodplain elevation, would be minimized through the implementation of mitigation measures detailed in **Appendix F-4**. Therefore, significant encroachment of a regulatory floodplain during construction would not occur.

4.14.3 Mitigation

As an integral component of the Project, ATP would mitigate the potential for adverse effects on water resources through the use of best management practices. Measures to avoid, minimize, and mitigate adverse effects as part of the Preferred Alternative would be developed in coordination with the U.S. Army Corps of Engineers, TCEQ, and the City's Watershed Protection Department. Several proposed mitigation measures identified throughout Section 4.14, Water Resources, would be included as part of the Project Mitigation Management Plan.

4.15 Threatened and Endangered Species

Threatened and endangered species are protected by local, state, and federal regulations that govern activities that have the potential to affect them and their habitat. Habitat types include vegetation, wetlands and wetland buffers, and aquatic habitats.

ATP analyzed the Project's potential effects on rare, threatened, and endangered species and has analyzed construction methods to minimize Project-related effects during construction, and also to conserve, enhance, or restore functional landscapes and biodiversity where possible, including protected heritage trees. The Study Area for the rare, threatened, and endangered species assessment is the limits of Project construction for the Build Alternative and all Design Options.

4.15.1 Affected Environment

The rare, threatened, and endangered species evaluated within the Study Area include vegetation, protected species, their habitats, and habitat corridors. The Study Area occurs within the Texas Blackland Prairies Ecoregion and is bordered by the Edwards Plateau and Post Oak Savannah Ecoregions. The uniqueness of this confluence of ecoregions includes a vast shift in wildlife and vegetation throughout the Austin area. The Edwards Plateau is a karst ecosystem to the west of the Study Area and is characterized by limestone bedrock covered by thin soils, karst features such as sink holes, caves, and springs, and unique biology both on the surface and subterranean.

According to the Texas Parks and Wildlife Department's Ecological Mapping Systems of Texas (EMST), approximately 83 percent of the Study Area is urbanized and is identified as having either urban high intensity or urban low intensity vegetation types (Texas Parks and Wildlife Department 2014). A tree survey identified 245 protected trees and 211 heritage trees within the Study Area. In addition, 43 non-native/invasive species and 5 unknown species were identified. There are 1,380 trees that are species listed in Appendix F of the City's Environmental Criteria Manual and 228 that are non-Appendix F (listed) species. In total, there were 2,112 trees surveyed in the Study Area.

Various groundwater and surface water features are present within the Study Area, including the Edwards Aquifer, as modeled by the Texas Water Development Board (2024); Lady Bird Lake; various named creeks; and unnamed streams and drainage swales. In addition, springs

and potential recharge features (caves and sinks) were identified in the surrounding area, but none were identified within the Study Area.

Common wildlife species without any formal regulatory protections are present within the Study Area. Wildlife corridors are present within the Study Area along Blunn Creek, Carson Creek, Country Club Creek and associated tributaries, Lady Bird Lake, East Bouldin Creek, and associated greenbelts.

Twenty-five federally and/or state-listed threatened, endangered, proposed threatened, proposed endangered, and candidate species were identified by the U.S. Fish and Wildlife Service as having the potential to occur in the Study Area and identified by the Texas Parks and Wildlife Department as having the potential to occur in Travis County. Protected species identified as potentially occurring in the Study Area include the monarch butterfly (*Danaus plexippus*), a candidate species for federal listing; the tricolored bat (*Perimyotis subflavus*), a proposed endangered species; migratory birds; and bald eagles (*Haliaeetus leucocephalus*). Additionally, the following species of greatest conservation need have suitable habitat within the Study Area: Woodhouse's toad (*Anaxyrus woodhousii*), American eel (*Anguilla rostrata*), Guadalupe bass (*Micropterus treculii*), silverband shiner (*Notropis shumardi*), Texas shiner (*Notropis amabilis*), a caddisfly (*Xiphocentron messapus*), big brown bat (*Eptesicus fuscus*), cave myotis bat (*Myotis velifer*), eastern spotted skunk (*Spilogale putorius*), hoary bat (*Lasiurus cinereus*), long-tailed weasel (*Mustela frenata*), swamp rabbit (*Sylvilagus aquaticus*), eastern box turtle (*Terrapene carolina*), plateau spot-tailed earless lizard (*Holbrookia lacerata*), Texas garter snake (*Thamnophis sirtalis annectens*), Texas map turtle (*Graptemys versa*), western box turtle (*Terrapene ornata*), Correll's false dragon-head (*Physostegia correllii*), glandular gay-feather (*Liatris glandulosa*), low spurge (*Euphorbia peplidion*), Texas milkvetch (*Astragalus reflexus*), and tree dodder (*Cuscuta exaltata*). The Study Area occurs within migration corridors for the Central North American Flyway for birds as well as for bat migrations and pollinator migrations. Critical habitat would not be affected by the Project.

The Study Area includes Karst Zone 3b, although there is a low probability of occurrence of protected karst invertebrates in these mapped areas, and is not located in a karst fauna region. While it may be unlikely to encounter karst invertebrate species within the Study Area, there is still potential to encounter karst features during construction.

4.15.2 Environmental Consequences

4.15.2.1 No Build Alternative

Under the No Build Alternative, the Project would not be built and there would be no effects on rare, threatened and endangered species and their habitat from the Project.

As documented in Section 4.2, Land Use and Zoning, a consequence of the No Build Alternative would be that a lower density of residential and commercial development would occur at key points along the light rail alignment because the higher density, transit-oriented development planned around light rail might not occur or occur in less dense development patterns. By not building the Project, some portion of this development would likely occur on the urban fringe rather than in the existing urban centers that would be served by the Project. This

type of development in less developed areas would result in an increase in potential habitat disturbance, displacement and/or take of common wildlife or protected species, and dissection of habitat corridors.

4.15.2.2 Build Alternative and Design Options

The Build Alternative and all Design Options would have similar effects on natural resources (with the exception of trees, as detailed below).

Operational (Long-Term) Effects

The following sections describe potential operational effects on vegetation, wildlife, protected species, and critical habitat because of the Build Alternative.

Vegetation

Operational effects on vegetation and on protected and heritage trees would be limited to ongoing vegetation maintenance within the permanent ROW. Maintenance activities would include mowing and tree branch trimming or removal. Implementing a sustainable, native landscape with environmentally friendly infrastructure can have restorative effects on the Study Area. Potential long-term effects on protected plants, including those with potentially suitable habitat within the Study Area (see below for additional information), would be similar to those for vegetation in general. No additional effects on vegetation are anticipated as a result of the operation of the Project. Most effects on vegetation and on protected and heritage trees would be associated with construction-related (short-term) effects.

Wildlife

Post-construction operational effects are anticipated to be minor on wildlife in the immediate vicinity of the Project. ATP designed the Project to use existing ROW and bridges to the extent possible to avoid and minimize effects on wildlife. New bridges are proposed across Lady Bird Lake and East Bouldin Creek as are replacements of existing bridges and culverts along the Study Area at named and unnamed streams. Few riparian habitats or green spaces typically occupied by wildlife are present within the Study Area, and these would not be affected by the Build Alternative. The currently developed nature of the Study Area has likely already displaced sensitive species from the Study Area. Common wildlife species within the Study Area are currently exposed to existing vehicular traffic and other human disturbance regularly. Wildlife could be struck or displaced by rail vehicles during operation of the Build Alternative, but populations of wildlife species currently nesting, foraging, or otherwise occupying these areas have likely acclimated to human-induced disturbance.

However, wildlife may be directly affected by displacement due to permanent habitat conversion within the Study Area. Birds may experience the loss of nesting, foraging, and cover habitats that could affect fecundity and survival. Wildlife occupying the Study Area would be pushed into adjacent habitats where they would be forced to compete with existing populations for food and shelter. Mammal and bird species with larger home ranges or species that migrate could be affected by habitat fragmentation and the increased risk of wildlife/vehicle collisions.

In areas where habitat would be affected along existing or proposed ROW, similar habitats are available in adjacent areas. The removal of existing habitat, even in the form of small

landscapes, could affect biodiversity within the Study Area. Small fauna such as lizards and beneficial insects and other invertebrates (e.g., pollinators, prey, decomposers) can be found within small landscapes in urban settings. Implementing a sustainable, native landscape can potentially improve habitat from existing conditions by providing additional habitat and protection for wildlife within the Study Area.

Permanent effects would occur from the placement of new bridge support structures across Lady Bird Lake. The Mexican free-tailed bat (*Tadarida brasiliensis*) colony at Ann W. Richards Congress Avenue Bridge may be affected by the long-term operation of the Project. This colony is the largest urban bat colony in the world, provides ecotourism opportunities, and is important to the ecology and agriculture of the area by contributing to pollination, seed dispersal, and insect predation. The proposed new bridge across Lady Bird Lake would be within the current flightpath of the bats because it would be approximately 27 feet over the lake's surface elevation, the typical height of a foraging path, approximately 0.25 mile downstream of the Ann W. Richards Congress Avenue Bridge. The foraging habits of the bats may be impeded by the new bridge, collisions with and noise/vibrations from railway traffic, changes in riparian vegetation, and lighting. Lighting effects would be minimized as described in Section 4.15.3, Mitigation. Additionally, the new bridge could potentially serve as new roosting habitat if the bridge is constructed using bat-friendly designs. Final design of the bridge will consider the potential to support the health of local bat colonies and minimize the potential for adverse impacts on bats roosting under the Congress Street bridge.

Protected Species and Critical Habitat

Karst species and *Eurycea* salamanders likely would not be affected by the long-term operational activities of the Project. However, while much of the Study Area is located out of mapped karst zones, contamination of karst habitat or groundwater could still occur if hazardous substances or petroleum products are spilled and subsequently leach into the subsurface or aquifer via overland flow or subterranean conduits. Operational activities, such as fueling and maintenance, would require the use of potential hazardous substances and petroleum products. Contamination would be more likely in areas of porous soils, exposed bedrock, or karst features with surface expression. However, stormwater runoff, particularly from large rain events, can transport these hazardous materials far from the Study Area potentially to waterways or into karst features that reach the aquifer. Previously unknown karst features could be uncovered during construction activities, which could result in exposed, subterranean conduits for sediment or contaminant mobilization and subsequent effects on karst invertebrates. While ATP anticipates that operational activities would not adversely affect karst invertebrates, additional project details and field investigation efforts would be necessary to fully evaluate the Study Area for potential Project-related effects on karst invertebrates. Implementing hazardous materials and water quality best management practices would mitigate these potential effects.

Potentially suitable habitat for the monarch butterfly may be present throughout the Study Area where milkweeds and nectar plants are present, and for the tricolored bat where mature trees with leaf clusters, Spanish moss (*Tillandsia usneoides*), peeling bark, and/or tree snags are present. Most effects on vegetation providing habitat for monarch butterflies or tricolored bats would occur in previously developed landscapes, which compose approximately 98 percent of

the Study Area. Operational effects on the monarch butterfly and tricolored bats would be limited to ongoing vegetation maintenance (mowing and tree branch trimming or removal) within the permanent ROW. Species of Greatest Conservation Need would be affected similarly to wildlife.

Operational effects on mollusks, bracted twistflower (*Streptanthus bracteatus*), and critical habitat is not anticipated because critical habitat and these species are not present within or immediately downstream of the Study Area. Suitable nesting habitat for the bald eagle was identified within the Study Area along Lady Bird Lake; however, this species is not known to nest in this area, though they have been seen upstream of Lady Bird Lake on Lake Austin. No permanent or temporary effects on the bald eagle are anticipated from the Build Alternative. Operational effects on bald eagles or migratory birds would primarily be limited to ongoing vegetation maintenance within the permanent ROW.

While it is anticipated that short term activities would not adversely affect such Balcones Canyonland Conservation Plan species of concern, additional project details and field investigation efforts would be necessary to fully evaluate the Study Area for potential Project-related effects. In addition, potential long-term effects on protected plants within the Study Area, including Correll's false dragonhead, low spurge, glandular gay-feather, Texas milkvetch, and tree dodder, would be similar to those for vegetation in general.

Construction-Related (Short-Term) Effects

Construction effects on rare, threatened, and endangered species resources would be similar in portions of the Project alignment that would be constructed at-grade or on bridge. The following sections describe the potential construction-related effects on vegetation, wildlife, protected species, and critical habitat because of the Build Alternative and Design Options.

Vegetation

Short-term, construction-related effects on vegetation from the Project would be minimal and include dust accumulation, stormwater runoff, and erosion from active construction sites that could inhibit natural plant processes. These effects would be indirect and temporary. In vegetated areas, existing native and landscaped vegetation would be expected to return to pre-construction conditions or improved conditions after the Project is completed.

Permanent effects from the construction of the Project would involve vegetation removal; ground clearing; placement of fill material; and construction of culverts, bridges, embankments, stations, the OMF, park-and-rides, and associated light rail transit facilities. These activities could potentially result in disturbance and modification of existing plant species composition. In some cases, vegetation would be permanently modified while in other cases vegetation would revert back to pre-construction conditions or improved conditions with planning. Until ground-disturbing activities are completed and ground stabilization occurs, the potential would exist for increased sediment transport during precipitation events and an increased potential for the introduction or spread of non-native and invasive plant species. Construction equipment often transports soil and seeds from one jobsite to another and could be another source of non-native and invasive plant species.

In addition, some trees considered protected or heritage by the City would be removed during clearing activities. Based on an assessment of trees conducted in February 2024, 245 protected trees and 211 heritage trees (excluding dead/dying trees) were identified within the Study Area. As described in **Appendix F-4,** ATP developed a percentage-based preservation matrix to assess the likelihood of preserving existing trees in-place in the extended Study Area. The decision matrix analyzes trees based on four factors: health, species, program effect, and utility effect. ATP implemented a conservative approach for each tree assessed. For example, if a tree is considered 60 percent preservable, it must, at a minimum, meet all criteria within the matrix at that level. If a tree meets only three of the four matrix categories and is rated lower in one, it is assigned the lowest percent of in-place preservability. Of the 245 protected trees, 62 (including dead or dying trees) were assessed as having a 0 percent probability of preservability. Similarly, of the 211 heritage trees, 30 (including dead or dying tress) were assessed as having a 0 percent probability of preservability.

The Project is being designed to avoid removing or affecting protected and heritage trees where feasible, and each tree will be evaluated to determine potential for avoidance during future design phases. Design revisions could minimize and avoid effects. The Wooldridge Square Station, Cesar Chavez Station, and Center-Running Bike/Pedestrian and Shade Tree Facilities on East Riverside Design Options would result in no additional tree effects. The Lady Bird Lake Bridge Extension, Travis Heights Station, and Grove Station Design Options may avoid up to 26, 6, and 7 protected or heritage trees, respectively.

In addition, potential short-term effects on protected plants, including those with potentially suitable habitat within the Study Area (see below for additional information), would be similar to those for vegetation in general.

Wildlife

Temporary, construction-related effects on wildlife from the Project would include dust, noise, lights, vibration, and fencing from active construction sites and equipment, as well as potential effects on water quality from construction site stormwater discharge. The effects of construction noise (e.g., equipment involved in site preparation, grading, and earthwork; and the installation of the rail tracks, bridges, and other infrastructure) on wildlife would be limited to the immediate area of the construction site. Wildlife species within the Study Area are currently exposed to noise and vibration from existing roadways and development; therefore, temporary effects on these wildlife species because of the Project would be negligible.

Bridge pier placement would affect aquatic species through temporary effects from sediment disturbance. Fish in the Study Area may also experience harassment effects (in the form of disturbance of normal behavior or activities) as a result of temporary construction effects. The use of cofferdams and dewatering, if required, could strand fish and other aquatic species.

The Ann W. Richards Congress Avenue Bridge provides suitable roosting habitat for the Mexican free-tailed bat as both a summer maternal colony of up to 1.5 million bats and an overwintering population of a much smaller size. The colony already experiences substantial noise related to vehicular traffic and music festivals. These noise activities have not deterred the maternal colony from roosting or emerging; however, noise activities could delay the emergence

of the bat colony or affect their echolocation and thus behavior (Zara Environmental LLC 2023). Temporary construction lighting could affect the bats' emergence from or return flights to Ann W. Richards Congress Avenue Bridge. Siting of the new bridge is approximately 0.25 mile downstream from the Ann W. Richards Congress Avenue Bridge. The bats' typical foraging path and flight path may be impeded by construction activities.

Trees are proposed to be removed within the Study Area for certain elements of the Project. Wildlife and insects regularly use trees for habitat, foraging, and nesting. Removal of trees would permanently remove this habitat from the Project ROW unless replaced. Removed trees are proposed to be replaced per the City's Tree Ordinance, but replacement trees would be of a smaller size than the trees to be removed and would require many years to reach the size of the original trees. Further evaluation of tree data would be necessary to fully evaluate Project-related effects associated with tree removal.

Effects on wildlife corridors and aquatic species at surface water crossings including creeks, drainages, and unnamed tributaries, would be expected to occur. Temporary effects would include impediments to movement due to construction fencing and grading and temporary fill from construction access, staging, and laydown areas. At crossings where existing culverts are present, effects within the footprint of the existing structure would be temporary. The feature would be replaced in kind, but any wildlife using culverts as habitat would be temporarily displaced. Effects outside of the existing structure for widening of culverts or stabilizing of creek banks are assumed to be permanent and may increase potential habitat or wildlife corridors available to certain species while removing potential habitat for others.

Protected Species and Critical Habitat

Karst species and *Eurycea* salamanders likely would not be affected by the Project's short-term construction-related activities. While no karst features have been recorded within the Study Area, karst features may still be encountered during ground-disturbing activities, such as excavating and grading bedrock. If karst features are encountered during construction, it could expose karst invertebrates in climate-stable subterranean environments to the surface climate (i.e., unstable temperature and humidity) and could expose newly exposed potential karst invertebrate species habitat to construction debris and stormflow. Water in karst aquifers generally flows in a specific direction, but localized flowpaths can move in any direction due to the complexity of mesocavernous voids within the bedrock. This means that stormwater, construction runoff, or construction debris including soil, dust, and tailings could enter into a newly exposed karst feature and travel to karst zones 1 or 2, which may have a greater likelihood of being inhabited by protected karst invertebrate species.

Contamination of karst habitat or groundwater could occur if hazardous substances or petroleum products are spilled and subsequently leach into the subsurface or aquifer. Stormwater runoff particularly from large rain events could transport these hazardous materials or construction materials far from the Study Area potentially reaching waterways or karst features that connect to the aquifer. Implementing hazardous materials and water quality best management practices would mitigate these potential effects.

Short-term effects on the monarch butterfly would be limited to vegetation removal (i.e., permanent removal of areas supporting nectar, host, or otherwise desirable plant species). Short-term effects on tricolored bats would be limited to vegetation removal (tree removal and tree branch trimming or removal) and disturbance to potentially occupied structures (i.e., bridges and culverts) within the permanent ROW. Species of Greatest Conservation Need would be affected in manners similar to those on wildlife. Any temporarily effected areas would be restored to pre-construction conditions.

Migratory bird effects would primarily be associated with temporary disturbance during construction and habitat (vegetation) removal. There are no anticipated short-term effects on mollusks, bracted twistflower, bald eagles, or critical habitat.

In addition, potential short-term effects on protected plants within the Study Area, including Correll's false dragonhead, low spurge, glandular gay-feather, Texas milkvetch, and tree dodder, would be similar to those for vegetation in general.

4.15.3 Mitigation

No adverse effects are expected to occur on rare, threatened, or endangered species as a result of Project construction and operation.

As an integral component of the Project, during construction, activities that result in high decibel noise would be avoided between November and February, and nighttime construction would be restricted to the extent practical. If nighttime construction is necessary, lighting would be only as bright as necessary to comply with Occupational Safety and Health Administration requirements and lights would be shielded away from the bat roosting area.

As part of the Preferred Alternative, ATP would mitigate the loss of trees through coordination with the City Arborist and compliance with the City's tree protection and replacement requirements. The design of bridge would incorporate consideration of lighting to avoid or minimize impacts on bats and birds during both construction and operations, and to support the health of the bat colony at the Ann W. Richards Congress Bridge.