



**TO: Our Project Connect Partners and Stakeholders**

**FROM: John Rhone, ATP SVP LRT Project Integration**

**DATE: March 24, 2023**

**RE: The Utility Rules of Practice**

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Section 3.1 of the Joint Powers Agreement between Austin Transit Partnership (ATP), CapMetro, and the City of Austin committed the parties to working together to create a Utility Rules of Practice (UROP) for Project Connect. The purpose of the UROP is to “serve as the methodology for analyzing, reviewing, and approving potential utility conflicts for Project Connect.”

The attached UROP is intended to serve as an agreed best practice for utility relocations before, during, and after the construction of Project Connect, however the UROP may not cover all utility conflict scenarios. This agreement is a living document that will change over time as the projects develop over the years and the parties learn from and seek feedback from the communities and utilities affected by Project Connect.

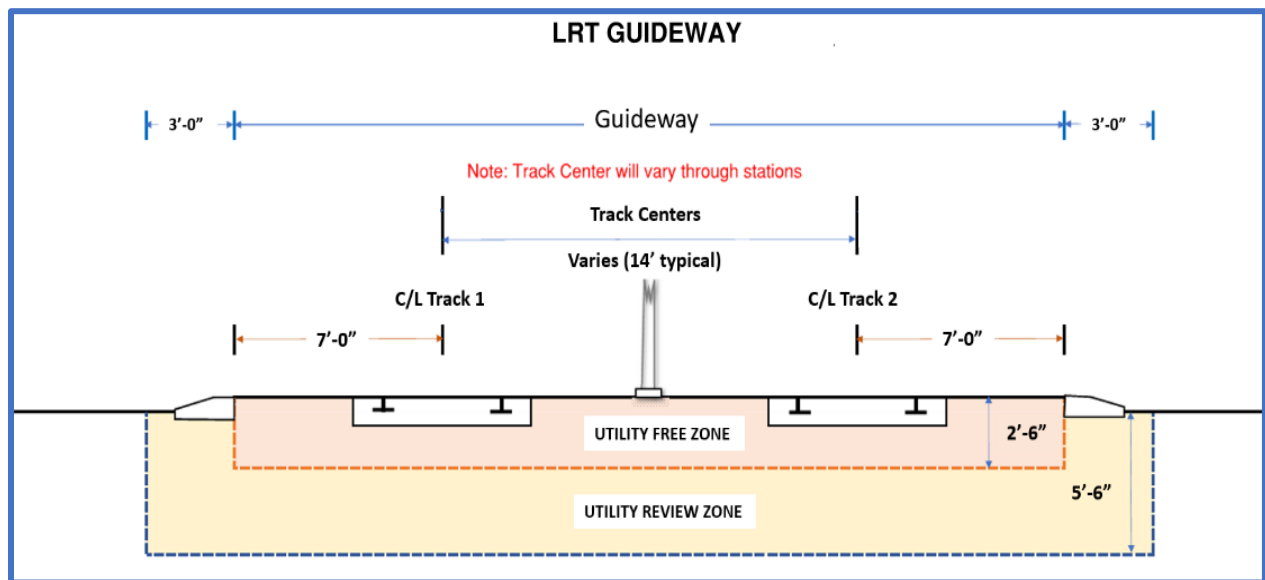
This document provides definitions of commonly used terms to assist with understanding utilities and their relationship to the Light Rail Transit (LRT) guideway. References to city and other agency standards are cited to provide guidance of relocated infrastructure. Upon completion of the LRT project, all city utility infrastructure would be owned and maintained by the City.

Typical sections of common guideway configurations (perpendicular crossings, parallel running, tunnel perpendicular crossings, tunnel parallel utilities and tunnel portal) are included in the document to illustrate the relationship between the LRT guideways and the City of Austin utilities. When reviewing or utilizing the Rules of Practice, it is important to note the following:

1. This document balances the ability for utility companies to maintain, repair, and upgrade their infrastructure with the potential complications that can arise from LRT operations.
2. The Rules of Practice represents design criteria providing a method for identifying and addressing conflicts and clearances between utilities and the LRT guideway.
3. The Rules of Practice identifies current City standards for design, material, inspection and testing for relocated utilities when in conflict with the LRT construction and operation.
4. The Rules of Practice identifies dimensions for the facilitation of typical construction and maintenance practices, including:
  - The ability for City of Austin utilities to maintain, repair, and upgrade their infrastructure, protecting their assets.
  - The potential complications for the City and operations of the LRT in the immediate vicinity of existing utility infrastructure.

5. The Rules of Practice covers commonly expected utility issues. In the event that a unique resolution becomes necessary for an unusual condition that is not specifically or adequately addressed in the Rules of Practice, these guidelines encourage and support a collaborative approach involving all affected parties.
6. The Rules of Practice discusses but does not establish financial responsibility for the cost of design and/or construction of utility improvements, relocations and/or betterments that may result from its implementation.
7. Private Utility companies operating in City right-of-way are covered under existing City Franchise Agreements. The intent of the Rules of Practice is to follow similar objectives identified in this document with private utility owners. A list of companies potentially affected by Project Connect is being developed and will be provided at a later date in this document. It is the expectation that existing franchise agreements that require the relocation of private utilities at their expense will be exercised by the City at the request of ATP.

### TYPICAL SECTION SCHEMATIC OF THE LRT GUIDEWAY



If you have any questions about the terms of this document, please contact John Rhone, SVP LRT Project Integration at [john.rhone@atptx.org](mailto:john.rhone@atptx.org).

# Utility Rules of Practice

## Light Rail Transit Program

January 23, 2023



# MEMORANDUM

**TO:** Lindsay Wood, Chief Engineering and Construction, Austin Transit Partnership  
Annick Beaudet, Mobility Officer, Project Connect Office, Management Services  
Department, City of Austin;  
Richard Mendoza, Interim Director, Austin Transportation Department; City of  
Austin  
Lisa Martin, Vice President, Austin Energy; City of Austin  
Shay Roalson, Director, Austin Water; City of Austin  
Jorge Morales, Director, Watershed Protection Department; City of Austin  
James Snow, Interim Director, Public Works Department; City of Austin  
Jacqueline Yaft, Executive Director, Aviation; City of Austin

**FROM:** Jennifer Golech, Deputy Mobility Officer, Project Connect Office;  
John Rhone, Deputy Program Officer, Austin Transit Partnership

**CC:** Gina Fiandaca, Assistant City Manager, Mobility;  
Rey Arellano, Assistant City Manager, Safety;  
Jacqueline Sargent, General Manager, Austin Energy  
Liane Conte, Chief of Staff, Project Connect Office;  
Anna Martin, Austin Transportation Department;  
Scott Bayer, Austin Energy;  
Morgan Byars, Watershed Protection Department;  
Ed Poppit, Public Works Department;  
Jennifer Williams, Aviation

**DATE:** January 23, 2023

**SUBJECT:** Project Connect Utility Rules of Practice (UROP)

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Voters in Austin approved Proposition A, a \$7.1 billion dollar investment in mass transportation in November 2020. The referendum marked a milestone in our city’s effort to implement a high-capacity transit solution. This solution is essential to achieving the goal of reducing “drive-alone to work” trips to 50% of all modes of transportation.

Austin City Council and CapMetro formed Austin Transit Partnership (ATP) as a local government corporation with the purpose of implementing voter mandated high-capacity transit solutions with funding from local taxes and federal matching financial support. A Joint Powers Agreement between Austin Transit Partnership and Capital Metropolitan Transportation Authority and the City of Austin was approved by each of the three entities that states:

*The Parties commit to working on the Utility Rules of Practice ("UROP") to serve as the methodology for analyzing, reviewing, and approving potential utility conflicts for Project Connect.*

As noted by The Eno Center for Transportation, a leading organization in transportation studies:

**Project Connect – Light Rail Transit Program**

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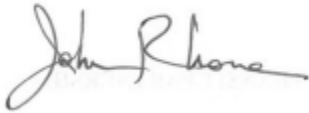
*Utility relocation is among the most complex elements of a transit project and is frequently cited as a major cost and timeline driver.*

Project Connect Office, the city’s liaison department, in coordination with ATP and the city utility departments developed the Utility Rules of Practice (UROP) as a methodology reviewing and approving utility conflicts along the proposed Blue Line and Orange Line alignments. The document is a comprehensive solution to the effort to relocate utilities for the purpose of implementing high-capacity transit.

To that end, we request the signatures of the applicable City of Austin department directors and Austin Transit Partnership’s Chief of Engineering and Construction as a commitment to use the UROP in the development, review, and approval of plans issued for construction by Austin Transit Partnership.




Jennifer Golech  
Deputy Mobility Officer, Project Connect Office, City of Austin



John Rhone  
Deputy Program Officer, Austin Transit Partnership

IN WITNESS WHEREOF, the Parties have caused this Agreement to be executed as of the date the signatures below.

**CITY OF AUSTIN**

DocuSigned by:  
  
By: DE183A3C6D81494... Date: 2/9/2023  
Annick Beaudet, Mobility Officer  
Project Connect Office

DocuSigned by:  
  
By: 6BB435D2F3BE476... Date: 2/7/2023  
Jacqueline Yaft, Executive Director  
Aviation

**Project Connect – Light Rail Transit Program**

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DocuSigned by:  
By: James Snow Date: 1/25/2023  
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James Snow, Director  
Public Works Department

DocuSigned by:  
By: Jorge Morales Date: 2/8/2023  
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Jorge Morales, Director  
Watershed Protection Department

DocuSigned by:  
By: Lisa L. Martin Date: 1/25/2023  
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Lisa Martin, Vice President  
Austin Energy

DocuSigned by:  
By: Richard Mendoza Date: 2/8/2023  
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Richard Mendoza, Director  
Austin Transportation Department

DocuSigned by:  
By: Shay Roalson Date: 2/8/2023  
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Shay Roalson, Director  
Austin Water

**AUSTIN TRANSIT PARTNERSHIP**

DocuSigned by:  
By: Lindsay Wood Date: 2/1/2023  
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Lindsay Wood, Chief of Engineering and Construction

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Appendix A: Sample Utility Conflict Matrix

# 1. Introduction

Capital Metropolitan Transportation Authority (CapMetro) began developing the Project Connect System Plan in 2016 to create a system of light rail transit (LRT) options along with enhancing and expanding existing services that will connect people, places, and opportunities in an efficient, affordable, and sustainable way. The Project Connect area includes the five-county metropolitan statistical area of Bastrop, Caldwell, Hays, Travis, and Williamson counties (Central Texas). In 2018, the CapMetro Board of Directors approved the Long-Term Vision Plan (2018), which identified several MetroRapid corridors for potential investment in LRT as a tool to address growth pressures, improve mobility, and connect Central Texans to their travel destinations. It has since been refined to reflect CapMetro's response to growth challenges. It is projected that the current Central Texas population of 2 million will double by 2040. In that same time, road capacity is expected to increase by only 15 percent. This growth will cause additional strain on the roadway network, result in increased travel times and travel costs, decrease mobility, hinder the region's economic health, and threaten air quality.

In 2019, the Austin City Council approved the Austin Strategic Mobility Plan (ASMP), which establishes a policy goal to quadruple the share of commuters who use transit by 2039. The Project Connect Vision Plan is included as an integral part of the ASMP and both initiatives provide a way forward for addressing future mobility challenges in the region. The first round of public engagement for this process ended on January 30, 2022. The second round of public engagement began on February 28 and closed on March 31, 2022. The final draft of the proposed ASMP Amendments was published on May 3, 2022. A Public Hearing at City Council was held on May 19, 2022, and City Council approved the amendments unanimously during the City Council meeting held on June 9, 2022.

The Vision Plan continued to be developed into the Project Connect System Plan which was adopted by CapMetro's Board of Directors in June 2020. The implementation of this System Plan was sectioned into phases with an initial investment of \$7.1 billion as the first phase. This initial investment was put before the voters in November 2020 as Proposition A on the City of Austin ballot and was subsequently approved, helping fund the \$7.1 billion Project Connect Program.

Austin Transit Partnership (ATP) is an independent organization formed by the City of Austin (City) and CapMetro to manage program funding and oversee design and construction for the projects included in Project Connect. ATP represents a strong partnership between CapMetro and the City and will focus on a broadly shared commitment to improving Austin and creating a more equitable place to live through improved transit options. Its purpose is to deliver the program with reliability, efficiency, and transparency.

The proposed Blue Line Corridor will connect Downtown Austin and Austin- Bergstrom International Airport (AUS). It will provide service from Republic Square east on 4th Street to the Convention Center, then across Lady Bird Lake and along East Riverside Drive to SH71 and AUS. The proposed Orange Line Corridor will connect North and South Austin running from Tech Ridge to Slaughter Lane Transit Centers, connecting the UT campus and downtown before crossing Lady Bird Lake and traveling along South Congress Avenue to Slaughter Lane. These are two corridors included in CapMetro's Vision Plan aimed at providing high-capacity transit (HCT).

Utility accommodation and potential relocation will be an important part of Project Connect design and future construction. Early coordination with the City of Austin utility departments and private utilities are paramount as utility conflicts are being identified. The engineering teams working on the Blue Line and Orange Line are actively collecting utility data using subsurface utility engineering (SUE) to accurately document the location of existing utilities so that as the design progresses, conflicts can be identified and resolved early in the process.

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Figure 1: Light Rail Transit System Plan & Project Limits



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### 1.1 Document Intentions

The Utility Rules of Practice (UROP) contains methodology for reviewing and approving potential utility conflicts along the proposed Blue Line and Orange Line alignments. It will document most of the common utility conflict situations, whether to relocate the utility or leave the utility in place. This document provides definitions of commonly used terms to assist with understanding utilities and their relationship to the LRT guideway. References to City and other agency standards are cited to provide guidance of relocated infrastructure. Upon completion of the project, all City utility infrastructure relocated or replaced as a result of construction will be owned and maintained by the City.

To familiarize City and ATP staff, typical sections of common guideway configurations (perpendicular crossings, parallel running, tunnel perpendicular crossings, tunnel parallel utilities and tunnel portal) are included in the document to illustrate the relationship between the LRT guideways and City utilities. The objective of the UROP is to address the following items:

1. The need to establish the design criteria is an important aspect to advance the LRT design elements. Ordinance No. 20211029-004 adopted on October 29, 2021 by the City of Austin, establishes the current guidance with respect to permitting and compliance with current Criteria Manuals. All document references and hyperlinks contained in the UROP shall refer to the versions of these documents based on this Ordinance.

Future revisions to LRT alignment, design criteria documents or code amendments will be amended into the UROP, as applicable. The City and ATP agree to work cooperatively in seeking modifications to these documents that benefit LRT construction. References and links cited in the UROP will provide active links to these documents.

2. Balance the ability of utility companies to maintain, repair, and upgrade their infrastructure with LRT operations.
3. Provide a methodology for identifying and addressing conflicts and clearances between utilities and the LRT guideway.
4. Reference current City documents identifying standards for design, material, inspection and testing for relocated utilities when in conflict with the LRT construction and operation.
5. Identify clearances for the facilitation of typical construction and maintenance practices.
  - a. City utility maintenance, repair, and upgrade of infrastructure, protecting their assets and the public's health and safety.
  - b. LRT operations in the immediate vicinity of utility infrastructure.
6. Cover commonly expected utility issues. In the event that a unique resolution becomes necessary for an unusual condition that is not specifically or adequately addressed in the UROP, affected parties will collaboratively resolve these situations on a case-by-case basis.
7. Private utility companies operating in City right-of-way are covered under existing City Franchise Agreements. The UROP is written specific to city-owned utilities. ATP will follow similar objectives identified in this document with private utility owners. A list of companies potentially affected by the LRT construction project is provided in this document. It is the expectation that existing franchise agreements and applicable city code sections requiring the relocation of private utilities at their expense will be exercised by the City at the request of ATP.

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8. Facilities associated with the support of the LRT operations will be covered in separate documents and not specifically addressed in the UROP. It is noted that all new utilities needed to support the function of each facility will be designed and installed in accordance with City code.

The UROP document is not intended to supersede the City's established standards, codes, and criteria, nor the design, construction or operational documents that will be created as the project progresses through the various stages of design and construction. The design, construction and operational documents will be created in partnership and cooperation between ATP and the City utilities.

CapMetro, the City of Austin, Texas Department of Transportation, and Central Texas Regional Mobility Authority continue to progress critical projects in the region. All agencies will be communicating and cooperating with each other through various communication channels.

### 1.2 Assumptions & Definitions

Included in this section is a summary of general assumptions made during the formulation of the UROP. These assumptions are needed to establish a basis of understanding for some elements of the LRT Program.

#### 1.2.1 General

1. Soils: Individual soil conditions are not factored into the UROP. It should be noted that the clearances provided in the UROP are typical dimensions for the purpose of initial assessment. Adverse soil conditions may be encountered on the LRT corridors, and those conditions can result in the need for increased depths or the need for increased horizontal separation from the guideway. These clearances and the associated risks should be evaluated on a case-by-case basis during the project design by an engineer familiar with the utility and the associated soil conditions.
2. Corrosion: Specific industry-standard methods for addressing potential corrosion issues will be designed into the LRT system, including an insulating rubberized boot around the rails, insulation in various parts of the overhead and underground systems, and ground rods installed at all Overhead Contact System (OCS) poles. These methods are intended to mitigate the potential for stray currents emanating from the LRT. Stray currents are electric discharges released into the subgrade that have the potential to accelerate the rate of corrosion on ferrous materials in the subgrade, such as metal conduits and piping. Corrosion control, including cathodic protection, can be effectively used to mitigate corrosion concerns potentially resulting from stray currents emanating into the subgrade from the LRT.
3. Corrosion Control: Corrosion control refers to various steps that can be taken to protect and therefore lengthen the lifespan of metallic subsurface infrastructure from potential causes of corrosion, particularly pipes and conduit.

Common techniques of corrosion control include polywrap encasement and cathodic protection. Polywrap encasement is the installation of a polyethylene sleeve around metallic pipe, which protects the pipe from corrosion caused by surrounding soils and stray currents. Cathodic protection utilizes sacrificial anodes to pull electrical currents from utility piping, thereby reducing corrosion on the system. It is assumed that potential utilities affected by LRT do not have any cathodic protection in place, with the possible exception of existing larger natural gas infrastructure. The UROP highlights the issues pertaining to polywrap encasement, cathodic protection, and corrosion control in relation to a variety of conditions. Ductile iron carrier pipes and steel casing pipes are particularly susceptible to corrosion in this condition, while fiberglass

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and plastics are not. The impacts of those decisions, including potential long term maintenance programs that can accompany cathodic protection systems are considered. All metallic utility carrier and casing pipes shall be reviewed for the potential to corrode and, if necessary, designed with appropriate corrosion protection measures for internal and external corrosion in accord with latest industry standards, local, state, and federal rules, regulations, and laws.

Ultimately, corrosion control will be addressed in the LRT design by the project design team. Further consultation with individual utility agencies will be needed as the design progress.

4. **Utility (Utilities):** A utility is a service to the public such as power, telephone, communications, water, gas, oil, wastewater, reclaimed water, drainage, or irrigation.

Utility applies to all private lines as well as public, including electric power transmission, electrical power service, telephone, television coaxial cable, water, gas, petroleum products, chemicals, steam, wastewater, and similar lines. Such utilities may involve underground, surface appurtenances or overhead facilities either singularly or in combination.

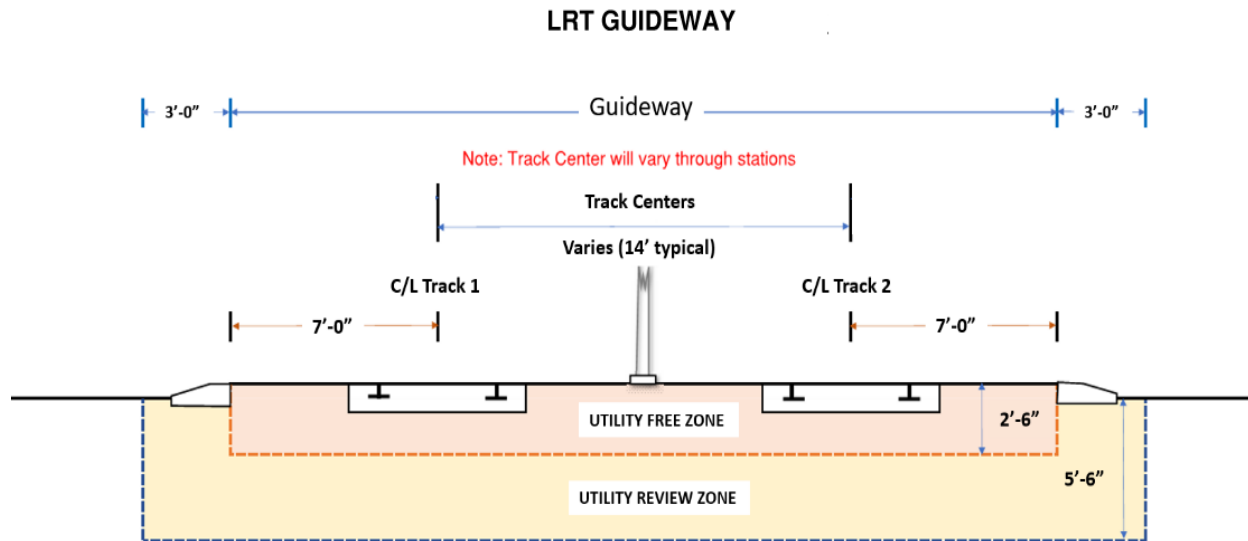
5. **Overhead Utility Conflicts:** LRT system elements such as vehicles and traction power distribution, have not yet been determined. The UROP will identify the need to follow Austin Energy Design Criteria required clearances for both transmission, distribution lines and any communication lines that have been allowed to use Austin Energy infrastructure.

### 1.2.2 Guideway

Design of the LRT guideway, and the integration of that slab into the surrounding roadway environment, is a critical component to the project and its impacts on utilities and other infrastructure. The approach of maintaining LRT service while installing or maintaining utilities under the guideway will typically require a detour of vehicular traffic, while the LRT service will continue to operate under most situations. If a utility needs to be replaced from underneath the guideway after construction has been completed and service has begun, coordination and cooperation between CapMetro and the utility owner will be required. ATP will develop an operations manual that will include common situations providing better definition of responsibilities.

1. **LRT Guideway (At Grade):** The LRT guideway consists of two parallel tracks serving bi-directional trains. The typical separation of the tracks is 14 feet from centerline of track to centerline of track. The embedded tracks are supported by concrete foundations directly under the tracks. The typical width of the LRT Guideway is 28'-0". See Figure 2 for typical LRT Guideway cross-section.

Figure 2: Typical LRT Guideway Cross-Section



2. **LRT Vehicle:** The width of the vehicle will be between 8 feet and 8 feet 6 inches. Depending on the selection of the vehicle, the dynamic envelope of the vehicle will range from 6 inches on tangent sections with slightly more while the vehicle is traveling in the curved portions of the alignment.
3. **LRT Operation:** The UROP is being established with the intent to minimize disruptions to the operational schedule of the LRT resulting from the performance of routine utility maintenance on the corridor. Routine utility maintenance would constitute any activities programmed and scheduled preemptively by the utility owner as opposed to unplanned emergency repair work. Emergency repair work will require cooperation and coordination between CapMetro and the affected utility owner. Operational protocols will be developed separately to address these types of situations.
4. **LRT Loading and Vibration:** LRT loading will not exceed 2.5MT (2,500kg) per meter of vehicle length. As such, the LRT loading, and vibration will not govern utility relocations and is accounted for in the designated zones of influence (Utility Free Zone plus Utility Review Zone described below). ***Loading and vibrations limits during construction will be defined in construction provision documents. ATP and the City will work together to develop language that protects existing infrastructure during construction.***

For all utilities that will be reconstructed and remain in the Utility Review Zone (URZ), described later in this document, the material, class, and thickness, including carrier pipes, conduits and casings shall be designed to withstand the full range of expected internal and external pressures and loads. Pipes that are relocated below or pipes that are already below the URZ may not be impacted by loading or vibrations. A condition assessment will be performed for the utilities that will remain below the guideway and are not impacted by construction. Condition assessment details will be reviewed by each utility and ATP. All pipes within the construction limits will be protected during construction for loading and vibration.

### 1.2.3 Definitions

1. **Betterment** – Improvements and/or upgrades to City infrastructure as part of the LRT project desired by the City that are not integral to the planned functioning of the project. Improvements

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that provide for greater capacity, capability, durability, efficiency, or function, to the existing utility system, except for meeting current state and local codes, are considered a betterment and not eligible for reimbursement from Federal Transit Administration.

2. Casing pipe (encasement pipe) – pipe used in underground construction to allow repair or replacement of utility lines without disruption to the LRT guideway structure. The utility line will be located within the casing pipe. Utility lines can be removed from casing pipes, which will support the soil and surrounding earth in case of a utility line failure. Casing pipes used for Austin Energy chilled water will be fully grouted.
3. Condition Assessment – an evaluation of an existing utility to determine the condition or state of the utility. Condition assessments can consist of, but are not limited to, evaluation of age, maintenance record, and physical inspection.
4. Finished grade – elevation of the ground surface, such as the top of road, guideway, or top of rail.
5. In-situ Wastewater Rehabilitation – repair of an existing wastewater line in place using trenchless technologies such as pipe lining or pipe bursting.
6. Offset Manhole – a concrete structure that allows access for maintenance and inspection that is set off the alignment of the pipe. Offset distance varies depending on the utility and utility maintenance needs. Offset manholes are not permitted on Austin Water and Austin Energy infrastructure regardless the amount of offset.
7. Manhole Frame and Cover – an access point to a below ground utility structure. This item governs construction of pre-cast and cast-in-place wastewater manholes, storm water manholes, storm water junction boxes and cast-in-place wastewater junction boxes, complete in place, including excavation, installation, backfilling and surface restoration; required items including rings, covers, coatings, and appurtenances; and incidental work such as pumping and drainage necessary to complete the work. Contractor-performed acceptance testing is required for wastewater manholes.
8. Manhole Riser/Cone Section – precast concrete sections that make up a typical manhole, the riser sections being stacked end to end—one on top of the other—to form the vertical circular part and the cone section being placed on the upper most riser section to transition to the smaller frame and cover at the surface.
9. Parallel Utility – a utility line running along the LRT alignment at a zero to five-degree angle, where a zero-degree angle is parallel to the guideway.
10. Perpendicular Utility – a utility line crossing the LRT alignment at an angle ranging from forty-five to ninety degrees across the proposed guideway, where a ninety-degree crossing is perpendicular to the guideway.
11. Pipe Joint – the point where two pipe sections join to each other, or a term used to refer to a full “joint”, or piece, of pipe, from end of pipe to end of pipe. Methods of pipe joining vary based on material of construction and expected operating pressure.
12. Pipe Fitting – an item connecting two pipe sections to provide a sealed joint, based on the specifications of the type of service and pipe material.



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13. Restrained waterline – a water line that is protected from unbalanced hydrostatic and hydrodynamic forces (generally called thrust forces). Typical forms of restraint include external joint restraint (such as mechanical joint or harness type devices), integral joint restraint (such as restrained joint pipe), bolt through restraint (such as “Foster Adapters”), or concrete thrust blocking.
14. Service Connection (Tap) – a typically small diameter water or reclaimed water service pipe or wastewater lateral providing service to a property from a water, reclaimed water, or wastewater main. Taps are typically installed perpendicular to the main utility line. Taps may also be referred to as water, reclaimed water, and wastewater services.
15. Reclaimed Water – treated effluent from a wastewater treatment plant that can be used for non-potable purposes, such as irrigation, cooling towers, and toilet flushing. Austin’s reclaimed water meets all state regulations for non-potable use.
16. Force main – a force main is a pressurized wastewater pipe that conveys wastewater under pressure from the discharge side of the pump. Lift stations collect wastewater and pump it from a lower to a higher elevation or across landscapes where deep excavation is not feasible.
17. Skewed utility – a utility line crossing the LRT alignment with an angle of intersection greater than five degrees and less than forty-five degrees, where a zero-degree crossing is parallel to the guideway.
18. Supported Trench Wall – the supported wall of a construction ditch or trench for the purpose of preventing the surrounding soil from sloughing into the trench. Trench boxes are commonly used for this purpose.
19. Utility Conflict Matrix (UCM) – a tool to organize, track and manage utility conflicts with detailed information such as utility material, owner, location and what the conflict is.
20. Utility Free Zone (UFZ) – for at grade section, the area bounded by boundaries 2.5’ below the surface of the guideway and the width of the guideway. For cut and cover tunnel section, area bounded between bottom of tunnel excavation, bottom of tunnel roof slab and permanent secant pile walls on both sides. Utilities within this zone shall be relocated outside the UFZ.
21. Utility Review Zone (URZ) – for at grade section, the area bounded by boundaries between 2.5’ and 5.5’ below the surface of the guideway and extended 10.0’ either side of the LRT track centerlines. For cut and cover tunnel section, area bounded between finished grade, the top of tunnel roof slab and temporary pile walls on both sides. Utilities within this zone will be reviewed based on utility relocation criteria.
22. Wastewater service crossing – any wastewater line that runs from a public wastewater main under the guideway to serve a single property. Services from the wastewater main to the City-owned cleanout at the property line are owned and maintained by the City.
23. Water service crossing – any waterline that runs from a public water main under the guideway to serve a single property. Services from the water main to the customer meter are owned and maintained by the City.

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### 1.3 Utility Evaluation Approach

Several factors will need to be considered when determining whether a utility is in conflict or not. Below are a few considerations to assist with the determination; however, this should not be viewed as an all-inclusive list. Certain situations will need to be reviewed on a case-by-case basis and covered under other sections of this document.

1. Can the utility in question remain below the guideway without being considered a conflict that requires action? Criteria has been established to relocate automatically when in the UFZ, to review when in close proximity to the guideway (i.e., in the URZ), and to remain when below the URZ, pending a review of condition. Utilities below the URZ may require protection in place, such as casing pipe.
2. If the existing utility can remain under the guideway, what is the a) age, b) size, c) depth, d) maintenance history, e) material, f) condition of the utility, and g) future demand on the utility? Evaluation of pipe condition to withstand construction activities over utilities will also be evaluated.
  - a. Pipes have a limited lifespan based on material properties and installation methods used, does the utility have sufficient remaining useful life to be retained in place?
  - b. Materials near the end of their expected life-span or prone to maintenance problems due to concerns raised by the utility or LRT may justify replacement of existing infrastructure.
  - c. Construction activities occurring over existing utilities can disrupt service and/or cause damage to the utility.
  - d. Pipes are generally sized to meet future demand but may be undersized when new projections are considered. Is the existing size of pipe adequate to meet the future needs of the area?
3. A Utility Conflict Matrix has been developed and is being utilized to track utility conflicts with the LRT guideway. The matrix will identify the owner, utility type, size, and length of impact. The UCM will be used to track all conflicts through resolution. The matrix is intended to be a living document that will be modified, as necessary, to track the various needs of the City and ATP.
4. All utility services must be maintained during construction. Temporary services must be in function if the main services are shut off during construction. These temporary services shall include water supply, wastewater bypass, gas, light, and power. Special Provisions will be written to requiring the construction contractor to install, operate, protect, and maintain the respective temporary services during the construction period until the permanent utility can be placed back into service.

### 1.4 Skewed Utility Crossings

Skewed crossings are defined as any utility crossing with an angle of intersection greater than five degrees and less than forty-five degrees, where a zero-degree crossing is parallel to the guideway. Angles of intersection within this range cause an extended length of pipe to be located beneath the guideway. To minimize the length of pipe or conduit located beneath the guideway, the section of the pipe or conduit located beneath the guideway shall be reviewed on a case-by-case basis to determine if it can be relocated

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to allow for an angle of intersection ranging from forty-five to ninety degrees. For water main crossings, a forty-five-degree crossing will be considered to maximize the water main's hydraulic capacity while reducing the length of water main beneath the guideway. Further review of these instances will need to be discussed with Austin Water. Additional information regarding relocating skewed crossing utilities is covered under perpendicular crossings in Section 3.1.

To achieve an acceptable angle of intersection, the utility pipe may be modified per current City and industry standards to obtain the desired crossing angle. If bends are required to be installed on pressurized pipes, the bends will be installed 3 feet beyond the end of the casing pipe, or a minimum of 13 feet from the center of the nearest LRT track, whichever is the greater. For relocated water mains, they shall be properly restrained. For wastewater non-pressurized pipe, manholes will be used to transition the crossing under the guideway.

Skewed crossing will be reviewed if the crossing is impacted by LRT construction. ATP will reduce the crossing length in consultation with the utility owner. Skewed crossing not impacted by construction will be reviewed on a case by case basis to reduce the skewed length.

### **1.5 Condition Assessment**

A condition assessment is not needed at every conflict location, especially at locations where pipe relocation or modification is required. However, a condition assessment will be required for locations where existing city utility will remain under the guideway. ATP and City utility owners will develop condition assessment criteria jointly, to determine the feasibility of leaving utility infrastructure under the guideway.

Assessment tools include but are not limited to:

1. Initial assessment may include, but not limited to, records research to determine pipe material, size, and age of wastewater, water, reclaimed water, and stormwater infrastructure.
2. If additional assessment information is necessary, the condition of the existing utility may be reviewed via video inspection or other inspection means. These inspections will provide information on the physical condition of the existing utility in the proposed LRT corridor, as well as the number and location of service taps, if applicable.

### **1.6 Betterments**

Concurrent activities that are requested by the City that are not integral to the functioning of the LRT project will be considered a betterment request. Where utility relocations are required due to impacts from the LRT construction, ATP will prepare utility relocation designs that provide customer service equal to or better than offered by the existing utility. Due to the long-term nature of the Project Connect investment and the utility assets within the right of way, betterments requested by the City should be included in the project unless it can be clearly demonstrated that including such work will cause a significant impact to cost and/or schedule of the project. Betterment requests during the construction phase will be considered on a case-by-case basis based on the request's overall impact to the construction phasing and schedule. All betterment requests rejected by ATP will be identified in advance of necessary design deadlines allowing the requesting agency an opportunity to make any necessary adjustments prior to rejecting the betterment request outright.

Where an impacted City utility desires to upgrade the service capacity, capability, appearance, efficiency, or function of City services over that which currently exists and where the upgrade is not required by other City code and a conflict with the planned LRT project does not exist, the impacted utility shall

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include a “betterment” in the scope and plans issued for construction and the City will bear the cost beyond that necessitated by the LRT project construction or regulatory requirements. Where an impacted City utility desires to upgrade the service capacity, capability, appearance, efficiency, or function of City services over that which currently exists and a conflict with the planned LRT project does exist, the impacted utility shall include a “cost-sharing” in the scope and plans issued for construction and the City will bear its proportionate share of costs.

Meeting existing standards, code or criteria for utilities are not considered betterments. This may include upsizing where City of Austin Land Development Code and associated criteria manuals require upsizing or different types of materials and its applicability to these regulations for utilities directly impacted as a result of construction. Similarly, a replacement facility that serves the function but is not identical to the existing facility is not considered a betterment.

If ATP and the City concur with the betterment request, ATP will provide a scope, cost estimate and schedule that will include design and construction impacts for the City Department requesting the betterment to approve before implementing into the project. An Inter-Local Agreement (ILA) will be processed to account for the added project expenditures.

### 1.7 Abandoned, Retired, & Decommissioned Utilities

Existing abandoned and existing retired utilities shall be capped, plugged, filled, removed, or otherwise addressed in a manner deemed necessary by the owning utility to maintain the integrity of the City Right of Way. Removals or capped utilities must extend a minimum distance of 10 feet from the centerline of the nearest LRT track.

Proposed abandoned and proposed retired utilities shall be taken out of service using the utility owner and industry standard procedures. In determining whether to abandon or retire a facility in place rather than be removed during construction, the owning City department will consider such factors as: present or potential congestion of utility installations; railway construction or maintenance requirements; cost and difficulty of removal; impact to ATP facilities in the case of a utility collapse; whether or not the facilities contain any hazardous materials; the potential for the facilities to have to be removed by the City at some future date; and traffic and safety requirements. Utilities that require removal will be removed from underneath the guideway a minimum distance of 10 feet from the centerline of the nearest LRT track.

Utilities containing asbestos may be removed from beneath the guideway, regardless of depth. City, State, and Federal standards will be followed where abatement of asbestos containing utilities are removed. All work related to asbestos-cement pipe will comply with City utility standard practices and City and state criteria and code.

### 1.8 Utility Owners Within the Project Footprint

There are 33 private utility companies and 8 public utility departments as of 11/24/2021 as potentially being impacted by the LRT construction. Known companies are shown in Table 1 and Table 2, respectively. Existing franchise agreements and applicable city code sections will be reviewed for each private utility company with respect to relocation. The guiding principles of the UROP will be used in relocating private utilities.

**Table 1: Private Utility Companies Operating Facilities within the LRT Project Area**

Private Utility Companies
AboveNet Communications
Alpheus Communications, L.P., (El Paso Global Networks)

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<b>Private Utility Companies</b>
APOGEE (on UT campus)
AT&T Metro (Teleport Communications)
AT&T Long Haul (AT&T Fiber, Legacy T)
AT&T Texas (Previously SBC)
Atmos Energy
Charter Communications
ExteNet
CenturyLink (Level3, Lumen)
Crown Castle
Greater Austin Area Telecommunications Network (GAATN)
Grande Communications
Google Fiber
Kinder Morgan
Logix Communications FiberLight
Magellan
McLeod USA Telecommunications Qwest National Network Services
Tel West Network Services, LLC (TelePacific)
Phillips 66
SiEnergy
Sunoco
Texas Gas Service
Time Warner Cable
TW Telecommunications TxDOT - Maintenance University of Texas Information
Technology Services Verizon Business (MCI)
Verizon (Verizon Wireline, MCI Metro, MCI Communications, XO Communications)
University of Texas
Znet Limits
Bluebonnet Electric Cooperative
Enterprise Products
Zayo
Windstream

**Table 2: Public Utility Departments Impacted within the LRT Project Area**

<b>Public Utility Companies</b>
City - Austin Energy – including Transmission, Distribution, Downtown Network, District Energy and Cooling, Substations, Street Lights, and Pole Attachment Services.
City – Austin Water (AW)- including Water, Wastewater and Reclaimed Water Infrastructure and Services
City – Watershed Protection Department (WPD) – including gray infrastructure drainage, open channels (river, creeks, tributaries, concrete lined facilities), and Water Quality facilities.
City - Public Works Department (PW) - Street and Bridge
City - Austin Transportation Department (ATD) - Signal Operations Division
City – Austin-Bergstrom International Airport (AUS)
Capital Metropolitan Transportation Authority (CapMetro) - Railroad right-of-way
Lower Colorado River Authority (LCRA) – Electricity

**1.9 Procurement of Services (Design, Construction, Inspection)**

It is likely that most identified utilities that need to be relocated /replaced, will continue to be designed as part of the overall LRT design, with permit applications submitted to the City at various stages of the

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process. However, in the event that a standalone contract is needed, to expedite the procurement of consultant services for utility relocation activities, design, construction, and inspection services, the City utility departments at their request have the opportunity to utilize ATP contracts to perform needed work on their affected utilities. ATP will work directly with the requesting utility owner to conform to specific contracting requirements that they may have. City standards and criteria will be used in establishing these contracts.

It is anticipated that the ATP office will be coordinating the following activities:

### 1. Design Services

- a. An initial conceptual design of the relocated utilities consistent with City's design standards for water, reclaimed water, chilled water, wastewater, and stormwater facilities will be done by the Orange and Blue Line design consultants.
- b. Working with the City utilities, approved consultants can be retained to assist with the design of the relocated utilities. The City will participate as an equal partner on the selection committee for consulting design services.
- c. The designs shall meet or exceed the functional (size, slope, capacity) and operational (accessibility and maintenance worker safety) requirements of the original utility being replaced.
- d. ATP and the City shall jointly establish utility design standards and specifications for installation conditions unique to rail projects, including cathodic protection standards. Cathodic protection systems shall be maintained by ATP. Non-standard construction methods, technologies, and materials shall be reviewed and approved by the City's Public Works Department Quality Management Division.

### 2. Condition Assessments

- a. Condition assessments will be needed for those existing utilities that will remain under the LRT guideway. Utility department criteria will be used as a basis to determine what utilities will need to be replaced and those that can remain under the guideway. A condition assessment consultant shall be retained and funded by ATP to perform these services.

### 3. Installation Inspection

- a. It is anticipated that the City may be performing the following activities:
  - i. Removal, modification, and replacement of City utilities shall be inspected by representatives of the department owning the utility and by inspectors typically involved in capital improvement program construction work. The City shall be authorized to visit the construction as needed during working hours to inspect the work. ATP shall allow the City the same rights as ATP over management of the work and allow the City to stop utility replacement work if it is not progressing in accordance with City standards or requirements. Reimbursement of costs to perform these services will be agreed to by ATP and the City.

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### **1.10 Material**

The materials specified for utility facilities shall conform to City standards, codes, and requirements, as well as accepted practices and industry standards and shall be designed for long service life and to minimize utility servicing and maintenance. All material utilized on the LRT project will need to comply with Buy America provisions of CFR 635.410 as amended.

### **1.11 Design Variance**

ATP retains the right to request a waiver to City design requirements. All variances to design requirements must be documented and approved by the City prior to issuance of a permit for construction. In determining whether to grant a variance to design requirements, ATP and the City agree to consider all relevant factors, including but not limited to:

1. The UROP document does not waive or otherwise revise any variance approval process requirement that are set forth in the LDC.
2. The variance meets the intent of the design requirement and is equally protective of public health without resulting in a degradation of service.
3. There is exceptional or undue hardship on the applicant, or a physical impracticality.
4. A variance will not impair the railway operations, maintenance, or safety, nor otherwise conflict with the purposes of the Design Criteria.
5. A variance would not be detrimental to the public health, welfare, or safety of the public
6. The process for approval of variances and waivers to criteria shall be coordinated through the Project Connect Office. PCO staff will assist ATP in seeking amendments to City code, criteria and/or administrative processes needed to realize Project Connect implementation. The affected City Department retains the authority for the approval or denial of requested variances and waivers.

### **1.12 Record Drawings**

Record drawings of abandoned, retired, relocated, protected-in-place, adjusted, and modified utilities shall show the final location or modification of each utility as required in project specifications and will be provided to ATP by the contractor. Record drawings shall conform to City Departmental standards and be provided to City departments upon receipt by ATP.

### **1.13 Permitting**

ATP will follow the applicable permit application process for construction in place for the LRT project at the time of project submittal. Reviews will be conducted in accordance with existing code, criteria, and with the guidance of Utility Rules of Practice provisions.

## **2. City of Austin Utilities**

The City of Austin owns and maintains numerous utilities that provide essential services to the residents of Austin. Constructing the LRT system, as part of implementing Project Connect project, water, reclaimed water, wastewater, stormwater, chilled water, energy transmission, energy distribution,

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protection system communications, signal systems and street lighting will be impacted. The City's Project Connect Office is responsible for facilitating coordination between ATP and City utilities, to deliver the project in a timely manner.

Utility systems will be reviewed during the design phase to determine construction sequencing and/or phasing needed to maintain service levels to all customers during construction. Coordination between ATP and the utility owners will be needed during the design and construction phases of the project.

### **2.1 Austin Water (AW) – Water, Reclaimed Water, Wastewater Force Mains, & Pressurized Services**

Pressurized mains can represent a risk to the existing roadway and guideway, as failure of a pipeline could potentially undermine both. To help mitigate this risk, the UROP requires the following for pressurized mains that will remain under the guideway to protect both the LRT guideway and utility infrastructure:

- Protecting existing pressurized infrastructure during construction of the guideway
- Protecting existing pressurized infrastructure during any future guideway maintenance
- Minimizing conflicts between pressurized infrastructure access locations and LRT operations
- Eliminate access to pressurized facilities within the width of the URZ
- Relocate pressurized infrastructure below the URZ and provide a casing pipe to protect both guideway and pipeline
- Minimizing disruptions to LRT operations and protecting the LRT guideway and rail during future pressurized infrastructure maintenance
- Reference: [CHAPTER 25-9. - WATER AND WASTEWATER](#)

### **2.2 Austin Water (AW) – Gravity Wastewater & Services**

Wastewater mains can represent a risk to the existing roadway and guideway, as failure of a main could potentially undermine both. The depth and grade requirements of existing gravity wastewater mains, including interconnecting laterals and services, make the relocation of existing wastewater mains challenging. The UROP focuses on establishing evaluation criteria aimed at:

1. Protecting existing wastewater facilities in the vicinity of the guideway,
2. Eliminating access to wastewater facilities within the width of the URZ,
3. Reducing the need for wastewater relocations, as practical,
4. Minimizing disruptions to LRT operations and protecting the LRT guideway and rail during future wastewater infrastructure maintenance.

### **2.3 Austin Water (AW) - Utility Relocation Requirements**

The following information is intended to provide further context of the relationship the UROP has with design and construction documents related to AW utility infrastructure. AW will continue to have review and approval responsibilities for the design and construction of its infrastructure as it continues through the process.



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The City of Austin Utilities Criteria Manual provides guidelines and criteria for design, construction and coordination of water, wastewater, and reclaimed water facilities within and outside the City to the boundaries of the utility service areas and shall be the standard used for water, reclaimed water, and wastewater infrastructure design.

Reference - [UTILITIES CRITERIA MANUAL | Utilities Criteria Manual | Austin, TX | Municode Library](#)

### **2.3.1 Material Criteria**

Through previous investigation, testing and usage by AW, certain types, brands, and models of some products have established a satisfactory record for certain services. These products have been tabulated by manufacturer's names and identifying numbers on Standard Products Lists (SPL). Construction-related SPLs have been assembled into AW's "Standard Products List". The SPL should not be interpreted as being pre-approved lists of products meeting the requirements for a given construction project. However, products included in the lists shall not be substituted unless they are approved by the engineer of record and AW.

The purpose of the SPL's is to expedite review, by the engineer of record and, if necessary, the AW Standard Products Committee, of Contractor product submittals. The SPL current at the time of plan approval will govern. See Utility Criteria Manual Section 2.4.2 for details on AW Standard Product Approval Process.

Reference: <http://www.austintexas.gov/page/current-standard-products-lists>

Reference: [Utility Criteria Manual Section 2.9.2 for details on AW Pipe Design Criteria for Sizing and Materials.](#)

### **2.3.2 Design Criteria**

Per Texas Commission on Environmental Quality (TCEQ) criteria, established in Texas Administrative Code Title 30, including but not limited to Chapters 210, 217 and 290, the utility shall provide adequate service that is operable, maintainable, and shall protect public health and safety. Design requirements which are necessary and reasonable, may be established as a condition of service by the utility. The utility may also require necessary and reasonable design measures regarding constructability, when activities encroach on property rights, pose environmental risks, or conflict with another utility.

All drawings for such facilities shall be prepared by or under the supervision of a Professional Engineer licensed by the State of Texas.

See Utility Criteria Manual (link above) Section 2.3 for details on AW design requirements.

All projects are required to be designed in accordance with Standard Specifications Manual. All variations are subject to the approval of AW.

Reference: [Standard Specifications Manual | Austin, TX | Municode Library](#)

### **2.3.3 Installation Criteria**

Construction plans for AW facilities shall be submitted electronically using the City's Austin Build & Connect Portal ([Interactive Development Review Permitting and Inspection | AustinTexas.gov - The Official Website of the City of Austin](#)).

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Reference: [Utility Criteria Manual Section 2.5.0 for details on City of Austin Construction Plan information and submittal requirements.](#)

### **2.3.4 Inspection Criteria**

ATP will work with the AW to determine AW inspection needs on the project. If inspection is needed / required all requests will follow standards for such services.

Reference: [Utility Criteria Manual Section 2.6.0 for details on City of Austin Construction Inspection and City Acceptance.](#)

### **2.3.5 City Acceptance**

To obtain final City acceptance of a project, Reference: [Standard Specifications Manual Section 1806S – Final Acceptance 9-26-12.](#)

Reference: [Utility Criteria Manual Section 2.6.0 for details on City of Austin Construction Inspection and City Acceptance.](#)

### **2.3.6 Record Drawings**

The Engineer of Record shall submit record drawings and intersection field sketches, to AW showing all accepted corrections and modifications to the originally approved drawings. Record drawings for water, reclaimed water, and wastewater construction shall consist of a complete set of drawings. *Record drawings shall comply with Section 2.5.1. under Austin Construction Plan Information and Submittal Requirements.*

Reference: [Utility Criteria Manual Section 2.5.0 for details on City of Austin Construction Plan Information and Submittal Requirements.](#)

## **2.4 City - Watershed Protection Department (WPD) - Storm Water**

Storm water infrastructure includes the following primary asset classes: storm drain system (drainage pipes, inlets, manholes and outfalls), open drainage channels (including creeks) and stormwater control measures (i.e., flood detention and water quality ponds). Failure of stormwater infrastructure in the existing roadway, guideway, and adjacent right-of-way can result in an increased risk to flooding, impact storm water quality in the receiving watershed and surrounding community. Failure of components of the storm drain system can result in increased flooding with potential for increased risk for the loss of life and property damage. In addition to impacts of flooding, subsurface voids (i.e., sink holes) can develop which endanger the structural integrity of roadways, sidewalks, and nearby structures. The depth of a utility below the ground surface can affect the short-term level of risk to the physical stability of surface features, whereas a storm drain failure impact to flooding is less dependent on the depth of the utility. The ability to inspect stormwater infrastructure to verify physical condition can inform the likelihood of failure (LOF) of the asset and assist in the evaluation of their suitability for being located under the guideway. Hydraulic models also allow the evaluation of the capacity of the system to meet current standards and reduce the risk of flooding that may impact the operation of the LRT and associated roadway improvements.

This section addresses storm water infrastructure and the potential for conflicts and opportunities along the LRT corridor. The UROP focuses on:

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- Protecting existing storm water infrastructure during construction of the guideway,
- Protecting existing storm water infrastructure during any future guideway maintenance,
- Minimizing conflicts between storm water access locations and LRT operations, and
- Minimizing disruptions to LRT operations and protecting the LRT guideway and rail during future storm water maintenance.
- System replacements, relocation and upgrades required to reduce the risk of structural surface impacts and flooding to the LRT and its operations.
- Avoidance of adverse (floodplain and environment) impact due to construction associated with the LRT
- Consideration of regulatory requirements to meet current standards associated with the LRT development project.
- Reference: [CHAPTER 25-7. - DRAINAGE](#)

### 2.4.1 WPD Utility Relocation Requirements

The following information is intended to provide further context of the relationship the UROP has with design and construction documents related to WPD utility infrastructure. The WPD will continue to have review and approval responsibilities for the design and construction of its infrastructure as it continues through the process.

The City of Austin Drainage Criteria, Environmental Criteria, Utilities Criteria, Transportation Criteria Manuals, Land Development Code for Drainage (LDC 25-7) and Environment (25-8) provide requirements for design, construction and associated impacts and coordination of stormwater facilities within the City of Austin and outside the City to the boundaries of the utility service areas.

Reference: [City of Austin CODE and CRITERIA MANUALS - Municode Library](#)

1. [Drainage Criteria Manual](#)
2. [Environmental Criteria Manual](#)
3. [Land Development Code – Drainage 25-7](#)
4. [Land Development Code – Environment 25-8](#)

#### 2.4.1.1 Material Criteria

All drainage system components that are within public right-of-way or public drainage easements provides the City the right to maintain these systems. Infrastructure shall be manufactured and installed in compliance with the [City of Austin Standard Specifications](#) and [Standards](#) and all portions of the [City of Austin's Drainage Criteria Manual](#), [Environmental Criteria Manual](#) and applicable sections of the [Utilities Criteria Manual](#) and [Transportation Criteria Manual](#) published by the City of Austin, unless:

- Those components are located solely on private property,
- That private property consists solely of the property being developed and
- Those components are privately maintained.

#### 2.4.1.2 Design Criteria

The City of Austin's Drainage Criteria Manual (DCM) provides standards for the evaluation and design of stormwater infrastructure. The DCM also defines the drainage policy associated with development and

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construction projects. This includes practices that regulate how storm water runoff is managed on a developed site including linear transportation projects, bridges/culverts capacity requirements and requirement that no development will result in additional adverse flooding, erosion, or water quality impacts on other property in accordance with Chapters 25-7 and 25-8 of the Land Development Code. Specific sections of the DCM and ECM of interest for transportation projects include, but not limited to:

1. DCM Section 1.2.0 for general details on City of Austin drainage design requirements.
2. DCM Section 3 provides requirements for hydraulic design of streets.
3. DCM Section 4.1.0 lists the requirements used in the design of inlets to be located in streets.
4. DCM Section 5.2.0 lists the guidelines of storm drain systems located in public right of way or public drainage easements to promote proper operation of these systems and to minimize maintenance requirements.
5. DCM Section 6.4.1 and 6.4.2 in the Drainage Criteria Manual lists the key parameters for design of open channels.
6. DCM Section 7 list requirement for the hydraulic design of bridges and culverts (not including structural design).
7. DCM Section 8 list requirements to design of flood detention ponds and participation in the Regional Stormwater Management Program (RSMP).
8. ECM Section 1 (1.4, 1.6, 1.9) and DCM Section 1.2.4 list requirements for post-construction stormwater quality management due to development and construction activities.

### **2.4.1.3 General Guidance for Design of Stormwater Infrastructure**

This section provides additional guidance on criteria of interest for storm water infrastructure associated with the LRT project.

1. As required by the City of Austin Drainage Criteria and Land Development Code Atlas 14 hydrology or identified surrogates such as 500-yr FEMA existing conditions floodplain = COA 100-yr fully developed where updated floodplain models are not available will be used to analyze the existing and proposed conditions for the LRT project.

2. Impacted storm drain pipes are the following:

Pipes within the UFZ will be relocated and sized to meet code. Pipes in the URZ where the guideway is above the storm drainage pipe will be Class IV RCP or higher. Pipes that do not meet this requirement will be replaced and sized to meet code. Pipes and inlets that accept drainage from Project Connect will be sized to meet drainage criteria within the limits of construction (LOC) of the project. Construction of a new manhole to end upsizing will be considered on a case-by-case basis.

3. Non-Impacted storm drains are the following:

Pipes outside the URZ that do not accept runoff from the project LOC and are not physically affected by construction are considered non-impacted. All non-impacted existing storm drainage pipes that will remain under the guideway will have a condition assessment done. Pipes in poor

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condition will be replaced by the project, ATP considers the replacement as a betterment. Pipes in good condition, can be left in place at the discretion of WPD. Pipes identified to be replaced will be designed and constructed by ATP as a betterment. Cost associated with this work will be paid by the city.

4. All pipes discharging into a public drain system shall have a minimum diameter of 18 inches and shall be constructed of reinforced concrete per COA standards. In all cases, ease of maintenance and/or repair will be reviewed to confirm ability to maintain the infrastructure.

**2.4.1.4 Culverts & Bridges**

Culverts and bridges within City of Austin right-of-way are under the operation of the COA Public Works Department (APWD) Street and Bridge Operations Division (SBO). SBO provides oversight for the structural functionality of these structures and will review the evaluation of structural competence to meet current standard for vehicular and LRT operations. WPD provides operational and maintenance services to sustain the conveyance of storm water through the structures to ensure they meet their intended level of service for hydraulic performance. WPD's primary function is to inspect for debris and blockages and remove them as needed to ensure the structures perform to their intended capacity. WPD also evaluates the hydraulic performance of City maintained structures and rates them based on the understood risk due to floodwater depths and velocities overtopping the roadway. For the LRT project culvert and bridge crossings, ATP will analyze for hydraulic capacity using City of Austin Drainage Criteria for fully developed land use conditions to determine whether it would meet LDC and DCM requirements for new construction.

Where the existing capacity is sufficient to meet DCM for new development, at a minimum the proposed impact that the LRT design will have on the floodplain and/or drainage system at the crossing (upstream and downstream) will be mitigated. The investment of providing new infrastructure for these crossings and potential cost sharing is being reviewed and documented under a separate process. For specific locations impacted please refer to the Orange and Blue Line designs.

**2.4.1.5 Tunnel (Direct Bore)**

Utility impacts are expected to be minimized at the surface of bored sections of the rail alignment, however where utilities are in conflict in shallower boring transition areas from at-grade to tunnel (i.e., portals) and where deeper utilities intersect the tunnel elevation, relocations may be required. Where conflicts do not exist, no action is anticipated at the surface related to storm drain design. National Pollutant Discharge Elimination System (NPDES) and TPDES requirements will be followed.

**2.4.1.6 Tunnel (Cut & Cover) & Station Areas (Cut & Cover)**

In the cut and cover areas, storm drain pipes will be reviewed to determine suitability to remain in service by suspending them in the construction areas. For the components of the storm drain system that are not able to be left in service during construction, a temporary system will be used to convey storm water during construction. Once the tunnel area is complete and backfilling operations can begin, storm drain system components will be reconstructed.

**1. CONVEYANCE**

Impacted storm drain pipes will be replaced with new pipes of the same diameter or to minimum standards, whichever is greater. Where there is a conflict with the station platform(s) below the surface, storm drain pipe will be upsized to meet code within the footprint of the platform.

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**2. WATER QUALITY**

Temporary construction impacts are not considered in water quality calculations. Any cut and cover related to utility work that does not increase impervious cover or change drainage patterns will be considered temporary construction. Temporary construction does not require water quality per 25-8-211. And therefore, the review of this work is not considered new or redevelopment for the purposes of water quality compliance.

Water drainage within the LRT tunnel system will be treated for water quality before being discharged to a storm drain system or other water body.

**3. CLEAR LANE WIDTH**

For cut and cover segments, the existing impervious cover will not increase nor are drainage patterns expected to change. Existing flooding that does not allow for a clear lane width to be maintained is not expected to change as a result of the temporary nature of this work. Therefore, the review of this work is not considered new or redevelopment for the purposes of clear lane width.

**2.4.1.7 Street Running (At grade, tunnel portals & aerial retained sections)**

Street Running segments include at grade sections where the LRT tracks are embedded in the street cross-section, tunnel portal sections where the LRT tracks are either coming in or out of the tunnel area and are open to the surface and the third area is where the LRT tracks are either coming in or out of an aerial portion where the LRT tracks are supported by retaining wall sections. All storm drain pipes will be reviewed to determine impacts caused by construction or need to convey new drainage away from the guideway.

**1. CONVEYANCE**

- a. Existing perpendicular storm drain pipes under the guideway and impacted by LRT construction (including physical construction impacts, surcharge loadings and maintenance access), will be replaced to meet LDC/DCM for conveyance.
- b. Existing parallel storm drain infrastructure below the horizontal extents of the URZ that conflict with the guideway and/or have access within the guideway will be relocated outside of the guideway. Relocated pipes will be reconstructed and upsized to meet LDC/DCM for conveyance.
- c. ATP will be responsible for mitigating impacts from the increase in stormwater runoff from the new impervious surface created by the construction project.
- d. Deep parallel storm tunnels will be assessed on a case-by-case basis to evaluate whether they should be left in place with the concurrence from WPD depending on access needs, structural resilience, maintenance access and feasibility of relocation.
- e. Where existing catch basin laterals and trunk lines outside the limits of the guideway can be retained to accommodate the drainage needs associated with the LRT project, they will be reviewed on a case-by-case basis to accept the drainage from the contributing project drainage areas including new increases in impervious surface because of the construction

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project. Infrastructure not impacted or utilized by the project construction and not identified by ATP as a needed benefit for the long-term project operations of the LRT, additional deficiencies in the lateral or trunk line system to meet the current criteria for new construction may be considered as a betterment and will require cost participation.

- f. New catch basin laterals and trunk lines required for the LRT project will be designed per current City standards. Connections will be made to existing structures using accepted DCM criteria and City standards.

**2. WATER QUALITY**

- a. ATP agrees that water quality is needed as part of the Street Running portion of the LRT project.
- b. LDC 25-8-211 requires water quality controls for new or redeveloped impervious cover > 8000 SF. ATP and the City agree to work cooperatively to seek a systematic approach to water quality and jointly pursue a LDC amendment as needed. ATP will review options available through City regulations which may include payment-in-lieu or other exceptions where applicable once the responsibility of the LRT construction impact has been determined.
- c. Urban Payment In Lieu is established but does not guarantee ATP can use this option in all locations. A Water Quality Plan and Tech Memo will need to be prepared for each permit / applicable locations to determine feasibility of water quality infrastructure. WPD will review for compliance and recommendation to use “Payment In Lieu.”
- d. A code amendment for “Suburban” Payment In Lieu was approved in May 2022 through CPO actions. The Suburban Payment In Lieu does not guarantee ATP can use this option in all locations. A Water Quality Plan and Tech Memo will need to be prepared for each permit / applicable locations to determine feasibility of water quality infrastructure. WPD will review for compliance and recommendation to use “Payment In Lieu.”

**3. CLEAR LANE WIDTH**

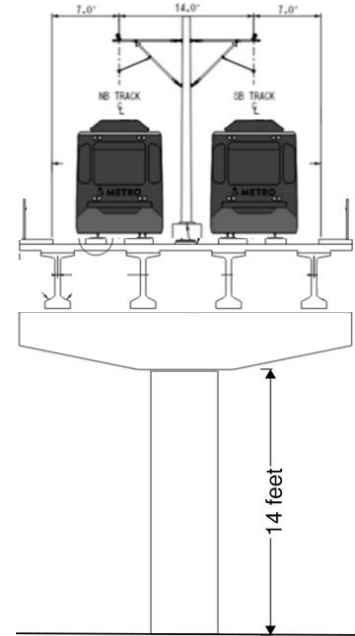
- a. Clear lane of travel concurrence is needed for Emergency Response Services. This will be reviewed on a case-by-case basis. Where existing conditions are out of compliance with the clear lane of travel and LRT construction does not make the situation worse; concurrence to retain existing non-compliance conditions will be obtained from Emergency Services reviewers. Watershed Protection will acquiesce to Emergency Service with that determination.
- b. Design calculations will be needed for level of impact at specific locations.

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### 2.4.1.8 Elevated on Bridge Structure

Storm drain pipes systems located under the elevated portion of the LRT project are potentially impacted in several ways. The existing street drainage system may be impacted due to location of the elevated guideway and future access to these facilities. A review of the available clearance will be needed on a case-by-case basis. When the elevation is below 14 feet and where there is concurrence that storm drains are suitable to remain in place, special precautions are needed to confirm the ability of maintaining access with construction equipment. In this critical clearance area, all crossings will need to be reviewed regardless of size. Areas that have greater than 14 feet vertical clearance will still need to be reviewed based on the existing drain pipe size and clearances. Aerial Running system that are 14 feet vertical clearance or less above the ground surface and the where the storm drain is to remain in place, WPD and ATP will prepare Operation and Maintenance manuals /agreements needed for future operations and utility maintenance.

Another potential impact is the associated drainage that is carried on the guideway itself.



#### 1. CONVEYANCE

- a. Storm drain pipes impacted by bridge construction, (i.e., pier or footing placement) will be replaced to meet current standards for conveyance. ATP will be responsible for reconstruction of existing pipe and upsizing to meet current standards for new development when impacted by bridge construction to the nearest existing structure or to a new structure within the project limits.
- b. The increase in drainage from the elevated guideway will be addressed by ATP. Storm drainage pipes accepting this drainage will be upsized to meet code within the LOC.
- c. Storm drainage pipes not impacted by the aerial guideway will not be upsized for existing conveyance needs. A review of the street reconstruction in the elevated section area will be needed to determine any associated code requirements.
- d. Open conveyance systems accepting drainage will be reviewed on a case-by-case basis.

#### 2. WATER QUALITY

- a. Water quality will be required on the drainage coming from the elevated guideway. Water quality calculations will use the current formula used in the Land Development Code for water runoff.
- b. Water quality in the pavement section associated with the elevated guideway will be reviewed on a case-by-case basis to determine if any associated code requirements are met (i.e., repaving the street an impacting less than 18 inches from the surface).

#### 3. CLEAR LANE WIDTH

- a. While it is not anticipated that the elevated guideway section will increase flooding, a review of increase flows into any existing storm drain system will be required as part of



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the hydraulic analysis of the LRT project. Increased runoff caused by the elevated guideway will be mitigated to alleviate the flooding caused by this increase. A review of downstream infrastructure may be needed to eliminate flooding caused by the LRT construction.

- b. In situations where flooding is occurring under the existing conditions, a clear lane of travel concurrence is needed for Emergency Response Services. This will be reviewed on a case-by-case basis. Where existing conditions are out of compliance with the clear lane of travel and the LRT construction does not make the situation worse; concurrence to retain existing non-compliance conditions will be obtained from Emergency Services reviewers. Watershed Protection will acquiesce to Emergency Service with that determination.

**2.4.1.9 Installation Criteria**

Installation of all stormwater infrastructure will follow the Austin, Texas – Drainage Criteria Manual, City Standards, and specifications and /or best practices where applicable. Construction plans for WPD infrastructure shall be submitted electronically to the department prior to construction and record drawings provided during project close-out.

**2.4.1.10 Inspection Criteria**

It is recommended that accurate location and elevation data for all utilities located under the guideways be maintained for future reference. It is anticipated that future installation of services crossing under the guideway will be installed by directional boring methods. To assist with future installations in avoiding impacts to the existing guideway and utilities retained under the slab, documentation of vertical locations will be required to identify a “clear zone” under the slab.

ATP will work with the WPD to determine WPD inspection needs on the project. If inspection is needed and/or required all requests will follow standards for such services.

Reference: [Utility Criteria Manual Section 2.6.0 for details on City of Austin Construction Inspection and City Acceptance.](#)

**2.4.1.11 City Acceptance**

To obtain final City acceptance of a project, see the [Standard Specifications Manual Section 1806S – Final Acceptance 9-26-12.](#)

**2.4.1.12 Record Drawings**

The Engineer of Record shall submit record drawings and intersection field sketches, to WPD showing all accepted corrections and modifications to the originally approved drawings. Record drawings for storm water shall consist of a complete set of drawings. *Record drawings shall comply with Section 2.5.1. under Austin Construction Plan Information and Submittal Requirements.*

Reference: [Utility Criteria Manual Section 2.5.0 for details on City of Austin Construction Plan Information and Submittal Requirements.](#)

## 2.5 Austin Energy

Austin Energy’s mission is, “To safely deliver clean, affordable, reliable energy and excellent customer service.” In this context “safely” applies to the Field Operations personnel who operate and maintain our system and the public who live and work around our assets.

## 2.6 Austin Energy Underground (Street Lights, Distribution, & Transmission)

Electric utility infrastructure is critical to the public’s safety and well-being of the residents of Austin. As such, keeping all utilities maintained during and after construction is an important goal of ATP. Design, construction, and operation documentation will be needed as the design progresses and more details are known. ATP and AE will work cooperatively on those documents to safeguard the public’s trust with both agencies.

Electric utilities are considered to be in conflict with the LRT guideway if it falls within the defined UFZ. All utilities located in this defined area will need to be relocated either below or outside of the UFZ. If an electric utility is located outside of the UFZ, the utility will need to be reviewed to determine if it is in conflict and needs to be relocated or if it can remain in place. If the utility is located outside of UFZ and still beneath the guideway, the following items should be considered:

1. Direct excavation access to dry public utilities under the guideway shall not be permitted.
2. Maintenance on underground utility systems will be restricted to outside of the URZ.
3. All emergency situations will be addressed in the Design and Construction documents during construction and in the LRT operations policies once the LRT lines become operational in coordination with Austin Energy.

The development of the UROP focuses on:

- Protecting existing electric utilities during construction of the LRT system.
- Eliminating conflicts between electric utility access locations and LRT operations.
- Placing future electric utilities in a location that does not conflict with guideway locations.

### 2.6.1 Utility Relocation Requirements

1. Clearance Criteria. Clearances for conduits, cables and other underground facilities are needed to protect the electrical infrastructure from other utilities and accidental damage because of proximity to the ground surface. Austin Energy has established standard clearance from gas lines, fuel lines and steam lines. As part of the UROP, minimum clearances will be adhered to, to protect both Austin Energy infrastructure and LRT.

See Utility Criteria Manual Section-1 for Austin Energy Design Criteria here - [Mini TOC: SECTION 1 - AUSTIN ENERGY DESIGN CRITERIA | Utilities Criteria Manual | Austin, TX | Municode Library](#)

2. Installation of Overhead Contact System (OCS) pole foundations can negatively impact existing street lighting circuits and other private utility underground cables behind the curb line. Careful location of OCS poles in coordination with selective relocation of subsurface cables will be done to mitigate this conflict.

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3. The Austin Energy vaults that connect the various large power duct banks in downtown Austin represent significant infrastructure. The potential relocation of one large vault could result in the relocation of hundreds of feet of large duct bank systems. To mitigate this potentially significant cost, efforts will be made to retain these vaults in place by modifying the vault access manhole location to maintain clearance from the guideway. The LRT guideway track slab may need to be designed to structurally span over these vaults. It is anticipated that this “bridging” requirement will be assessed on a case-by-case basis in the design process in consultation with AE. A safety evaluation will be performed on each potential modification to vault access. The vaults are considered “confined spaces” with energized high voltage cables present. Austin Energy retains the final decision as to the safety of a proposed modified access and shall review and approve the design and inspection of the modification to the vault access.

### 2.7 Austin Energy Overhead (Distribution and Street Lights)

Overhead utilities such as power lines and streetlights require standardized specifications for proper installation and operations. The UROP references the City of Austin Design Criteria for these items.

National Electrical Safety Code (NESC) establishes the minimum design requirements regarding the design and installation of communication cables and other facilities on, underneath, or, in proximity to electric infrastructure. Austin Energy's design standards may nonetheless exceed those of the NESC - in any given instance the more stringent of the two requirements shall apply unless a specific variance has been granted by Austin Energy in writing.

See Utility Criteria Manual Section-1 for Austin Energy Design Criteria here - [Mini TOC: SECTION 1 - AUSTIN ENERGY DESIGN CRITERIA | Utilities Criteria Manual | Austin, TX | Municode Library](#) and Utility Criteria Manual Section-6 for Austin Energy Pole Attachments here - [SECTION 6 - AUSTIN ENERGY POLE ATTACHMENTS | Utilities Criteria Manual | Austin, TX | Municode Library](#)

#### 2.7.1 Overhead Contact System (OCS)

1. The LRT may require an OCS to provide power to the transit vehicle.
2. Clearances between the OCS and any other overhead utility are strictly governed by the latest version of the National Electrical Safety Code (NESC).

#### 2.7.2 Distribution Engineering (overhead electric, 12.47 kV typ. on wood poles typ.)

Distribution has similar requirements (*to Transmission*), Austin Energy Design Guidelines that outline clearances from conductor at rest with maximum sag from the rail car (assumed to be 20' tall) and clearances from the track itself will be adhered to. See Utility Criteria Manual for details on design criteria (link above).

Questions or concerns about clearances should be directed to Austin Energy. For conflict resolution, software modeling of the line will need to be done by Austin Energy or a model from the design engineer shall be provided to them for review and approval.

#### 2.7.3 Street Lighting

Design standards will follow the latest edition of TxMUTCD, PROWAG, and NESC. Further design criteria for lighting will be developed between ATP and AE as final design progresses.

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ATP will be responsible for the design of all lighting infrastructure impacted as a result of Project Connect. Lighting and associated infrastructure should be situated so as not to infringe on the clearance envelope around the OCS and LRT vehicle. Infrastructure that cannot be located outside the clearance envelope will be identified and ATP will work with AE to develop operation and maintenance language to address these situations.

**2.8 Austin Energy Transmission Engineering (overhead electric, 69kV & 138kV)**

For overhead transmission lines, all clearances will need to follow Austin Energy Design Criteria Guidelines. Any variances from these clearances will need to be approved by Austin Energy.

It should be noted that some of the Austin Energy overhead system do carry telecommunication lines. ATP will coordinate with Austin Energy to identify clearance conflicts that might exist and to cooperatively work together to mitigate these types of conflict.

**2.9 Austin Energy (District Energy & Cooling)**

District energy and cooling meets customers' heating/ventilation/air-conditioning (HVAC) and other requirements through a network of underground equipment (including pipes and fiber conduit) serving multiple buildings in a particular service area. A district cooling plant distributes chilled water to customers' buildings through a set of heat exchangers in the customer's mechanical room. District energy facilities provide electricity or steam to customers. Austin Energy owns and operates district cooling facilities in the Central Business Zoning District, and the North Burnet/Gateway (NBG) Zoning District and district energy and district cooling facilities in the Mueller Planned Unit Development area. Austin Energy may expand into additional areas to meet customer demand. District energy and cooling provide benefits to developers, building owners, building occupants, and the general public by reducing initial capital investment costs for development, lowering operational expenses, increasing building space for other uses, and reducing environmental impacts by shifting electricity usage to times when renewable resources are available.

**2.9.1 Utility Appurtenances**

Relocated chilled waterlines shall be installed per AE chilled water requirements, with fused or mechanically restrained joint pipe and consideration of placing the watermain in casing pipe will be done on a case-by-case basis. The casing pipe shall be installed to the maximum extent possible for the section of pipe located beneath the guideway. The casing pipe for AE chilled water will be grouted per their specifications.

Valves and other appurtenances located beneath the guideway shall be relocated outside of the proposed casing. Operators shall not manipulate valves for chilled water pipes. All modifications will require hot taps and/or line stops. Chilled water service cannot be shut down for any modifications. Accessible emergency shutoff valves, where warranted by local jurisdictions or utility owners, shall be located on each side of the crossing, outside of the guideway a minimum distance of 10 feet from the centerline of the nearest LRT track.

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### 2.9.2 Utility Relocation Requirements

#### 2.9.2.1 Material & Installation Criteria

Furnishing and installation of all AE materials for constructing pipe mains, service connections, temporary service lines and including all applicable work such as excavating, bedding, jointing, backfilling materials, tests, concrete trench cap, concrete cap and encasement, etc., prescribed under this item will be done in accordance with the provisions of the [AE Design Criteria Manual](#) and [City of Austin Utility Criteria Manual](#).

All products installed as part of chilled water system shall be in confirmed with AE. All modifications to the chilled water system will need to occur between mid-November and end of February or agreed upon dates by AE. There can only be one modification of AE chilled water lines done at any one time.

Modifications of chilled water systems are required to be built in accordance with Standard Specifications Manual, which include other requirements not addressed here. All variations are subject to the approval of Austin Energy (AE). *For all requirements see Standard Specifications Manual here - [Standard Specifications Manual | Austin, TX | Municode Library](#)*

#### 2.9.2.2 Design Criteria

All piping/fiber conduit modifications will adhere to the Austin Energy District Energy and Cooling Special Specifications previous sent to ATP. If relocations are required easement acquisitions will need to be addressed if moving into private property.

ATP will be responsible for the design of all impacted AE chilled water infrastructure as a result of Project Connect.

Relocated chilled water systems will require a hydraulic study to be coordinated with Austin Energy. The replacement and relocation will only be permitted upon written approval by AE DEC.

ATP will be responsible for the construction of all impacted AE chilled water infrastructure as a result of the LRT project.

#### 2.9.2.3 Design “Supporting Construction Documents”

If exposing AE pipe, vaults, valves, fiber conduits and any other appurtenance of AE chilled water transmission lines, all listed are to be supported per best practice standards for weight, size, and type. Support mechanism shall be submitted to and reviewed by AE DEC before implementation for each crossing.

AE DEC shall have access to all AE vaults and valves at all times unless otherwise approved in writing. Each valve and vault will be approved individually.

#### 2.9.2.4 Inspection Criteria

ATP will work with the AE to determine AW inspection needs on the project. If inspection is needed / required all requests will follow standards for such services. An AE inspector must always be onsite for any installations and relocations impacting their utilities.

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### 2.9.2.5 Record Drawings

The Engineer of Record shall submit record drawings and intersection field sketches, to AE showing all accepted corrections and modifications to the originally approved drawings. Record drawings for AE infrastructure shall consist of a complete set of drawings. *Record drawings shall comply with Section 2.5.1. under Austin Construction Plan Information and Submittal Requirements.*

Reference: [Utility Criteria Manual Section 2.5.0 for details on City of Austin Construction Plan Information and Submittal Requirements.](#)

## 2.10 Traffic Signals

Traffic signals and associated communication infrastructure within the City right-of-way are owned and operated by the Austin Transportation Department Arterial Management Division (ATD-Signals). Traffic signals within TxDOT right-of-way are typically owned by TxDOT and operated by the City of Austin under maintenance agreement. Overhead and underground traffic signal infrastructure requires standardized specifications for proper installation and operations. The UROP references the City of Austin Design Criteria for these items.

### 2.10.1 Design Criteria

All traffic signal infrastructure shall meet the minimum requirements in effect established by the Standard Specifications Manual, Standards Manual (details), Utility Criteria Manual (UCM), and Transportation Criteria Manual (TCM) unless specifically approved otherwise by ATD-Signals Division. Additional design criteria for the placement of traffic signal equipment include the latest edition of the TxMUTCD and PROWAG. The National Electrical Safety Code (NESC) establishes the minimum design requirements regarding the design and installation of communication cables and other facilities on, underneath, or, in proximity to electric infrastructure. Further design criteria for traffic signal crossings will be developed between ATP, ATD, and TxDOT where applicable, as final design progresses.

ATP will be responsible for the design of all traffic signal infrastructure impacted as a result of Project Connect. Traffic signals and associated infrastructure should be situated so as not to infringe on the clearance envelope around the OCS and LRT vehicle. Infrastructure that cannot be located outside the clearance envelope will be identified and ATP will work with ATD- Signal Division to develop operation and maintenance language to address these situations.

### 2.10.2 Inspection Criteria

ATP will work with ATD -Signals Division to determine inspection needs on the project. If inspection is needed / required, all requests will follow standards for such services. An ATD-Signals Inspector must always be onsite for any installations and relocations impacting their utilities.

### 2.10.3 Record Drawings

The Engineer of Record shall submit record drawings and intersection field sketches, to ATD showing all accepted corrections and modifications to the originally approved drawings. Record drawings for ATD infrastructure shall consist of a complete set of drawings. *Record drawings shall comply with Section 2.5.1. under Austin Construction Plan Information and Submittal Requirements.*

## **2.11 Public Works Technical Approach**

### **2.11.1 General Guidance**

The following guidance is the recommended technical approach for Streets, Bridges, Culverts, Retaining Walls, Sidewalks, Ramps, and Trails related to utility construction from the Public Works Department.

### **2.11.2 Analysis & Evaluation**

Analyze and evaluate existing conditions of Public Works infrastructure for the LRT project using the latest guidance in codes, guides, and criteria from the City of Austin, TxDOT, AASHTO, FHWA, ACI, and other applicable industry standards for each type of infrastructure temporarily impacted by utility relocation.

### **2.11.3 Installation, Restoration, & Repair**

All installation, restoration, and repair of Public Works infrastructure including but not limited to streets, bridges, culverts, retaining walls, sidewalks, ramps, and trails must follow City of Austin Standards, Specifications, Details, and Criteria.

### **2.11.4 Temporary Surface Infrastructure**

Due to the extended timeframe of the LRT project, it is likely that portions of surface restorations after utility relocations and adjustments will be of a temporary nature. Most of the existing pavements along the proposed routes are currently asphalt (flexible) pavements and will probably be repaired and restored in kind during this utility relocation phase of construction.

Although concrete outside bus lanes will likely be selected for the permanent pavement solution, asphaltic pavement may be used for temporary pavements. This interim solution of using an asphaltic (flexible) pavement will be acceptable for all lanes including bus lanes where utilities may be relocated years in advance of the guideway construction.

Any temporary infrastructure must be designed adequately to withstand traffic and use over the expected construction period including normal public use, anticipated excess loadings from construction activities, and construction and detoured traffic. The design period (life) and design capacity shall also consider a modest margin of overdesign for delays and unanticipated traffic or loadings respectively.

### **2.11.5 Design Criteria**

#### **2.11.5.1 General**

All Public Works infrastructure shall meet the minimum requirements in affect established in the Standard Specifications Manual, Standards Manual (details), Utility Criteria Manual (UCM), and Transportation Criteria Manual (TCM) unless specifically approved otherwise by Public Works for temporary construction as a result of utility relocation.

#### **2.11.5.2 Pavements**

Pavements temporarily affected by utility relocations and adjustments shall be restored per the UCM standard criteria. All utility plans shall include, at a minimum, the Street & Bridge Standard Surface

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Restoration Plan Notes (included herein); applicable Standard Details 1100S-2, 1100S-3, 1100S-5, and 1100S-7; and a pavement restoration plan.

Any new or temporary pavements that will not be simply restored per the utility repair standards above must be designed per the new TCM Section 14: Pavement Design and Appendix B: Pavement Design Guidelines.

**2.11.5.3 Sidewalks & Ramps**

Sidewalks and ramps impacted by utility relocation must provide an ADA appropriate, temporary accessible path and/or detour per Local, State, and Federal requirements throughout the utility relocation and full construction period.

**2.11.6 Inspection Criteria**

Inspection and testing of all surface infrastructure shall be in accordance with the appropriate sections of the Standard Specifications Manual.

**2.11.6.1 Standard Restoration Plan Notes**

The version of the standard surface restoration notes below shall be placed on all utility relocation plans that affect any Public Works infrastructure.

The notes provided below were last updated on 06/30/2021.

**2.12 Street & Bridge Standard Surface Restoration Notes****2.12.1 Street Repair Notes (UCM 5.9)****1. Trench Repair:**

Use the appropriate 1100s series details for trench repairs: 1100s-2 (flexible base with an asphalt surface), 1100s-3 (concrete or asphalt overlaid concrete), and 1100s-5 (full depth asphalt streets). CLSM shall be substituted for backfill and flexible base replacement per the detail notes.

**2. Surface Restoration:**

Surface pavement restoration is required when cuts 1) occur within the DAPCZ, 2) occur within protected street segments, or 3) are over 300 linear feet in length. Use detail 1100s-7 for determining areas requiring surface removal and replacement. The replacement asphaltic concrete surface layer thickness shall be a minimum 2 inches HMAC Type D for local or residential streets and a minimum 3 inches HMAC Type C for collector or arterial streets (see item 340s, section 340s.4).

**3. Concrete and Composite Pavements:**

In concrete streets, actual restoration limits are determined by joint locations. In composite pavements constructed of concrete with a HMAC overlay, use 1100s-3 for trench repair (using class 360s concrete) and 1100s-7 for area of asphalt surface restoration.



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**2.12.2 Sidewalk Repair Notes (UCM 5.10):**

Damaged concrete sidewalk shall be removed and replaced in full sections (joint to joint).

In areas with sidewalk pavers, contractor to carefully remove, store and replace pavers to match existing conditions or better.

**2.12.3 Hand Holes and Pull Boxes, Etc.**

Avoid placing vaults, hand holes, etc. Within sidewalks. If unavoidable, place them out of the primary ADA route. Add applicable ae approved details and specify appropriate load ratings and ADA requirements including a slip resistant lid and the ability to be placed flush with the surrounding walking surface cross slope.

**2.12.4 Street and Bridge Special Note**

All damage caused directly or indirectly to the street surface, sidewalk, driveway, curb & gutter, or subsurface outside of the pavement cut area shall be regarded as a part of the street cut repair. This includes any scrapes, gouges, cuts, cracking, depressions, and/or any other damage caused by the contractor during the execution of the work. These repair areas will be included in the total area of restoration. These areas shall be saw cut in straight, neat lines parallel to the excavation or utility trench for trench repair. For lane restoration the cuts shall be perpendicular to lane or lanes affected and full lane width restored for the damaged area. For concrete paving repair joint to joint. Following existing or modified joint pattern. Remove to the next existing joint for sidewalks and curb & gutter. All such repairs shall be at the contractor's expense and shall meet all city testing requirements, standards, and specifications.

**2.13 Austin Bergstrom International Airport (AUS)**

1. The City of Austin owns and operates AUS in accordance with local and national standards (COA, TSA, FAA, etc.). These standards are sometimes different from local standards and will take precedent over this rule of practice in the event of a conflict.
2. Drainage and Water quality is managed on site using a series of onsite infrastructure and through regional management approaches. All designs, construction, and/or impervious cover, on all AUS property, will need to follow this approach. Any impacts to current or approved plans for storm water infrastructure on AUS property will be the responsibility of ATP to mitigate.
3. Management of utilities is done through a utility corridor management program. All water, wastewater, and dry utilities, that are maintained by the utility owner, are placed inside a utility corridor managed by AUS. Any conflicts as a result of the LRT construction to these utilities will need to be mitigated in accordance with that utility's standards and agreements.

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### 3. Utility Relocation Typical Sections

As part of the UROP, utility conflicts will be highlighted using various typical sections found in the LRT project design for underground utilities that are: 1) perpendicular crossing (including skewed crossing criteria), 2) parallel running under the guideway, 3) cut and cover tunnel section, and 4) tunnel portal (also referred to as U Section).

**Note: All utilities will need to be relocated outside of the UFZ.**

1. Austin Energy Transmission and Distribution overhead systems are not covered in the typical sections in Section 3. All required clearance will be achieved through the design. If a variance is needed, AE and ATP agree to work cooperatively to reach resolution on the issue. All relocation of these utilities will follow the Utility Criteria Manual Section-1 for Austin Energy Design Criteria here - [Mini TOC: SECTION 1 - AUSTIN ENERGY DESIGN CRITERIA | Utilities Criteria Manual | Austin, TX | Municode Library](#) and Utility Criteria Manual Section-6 for Austin Energy Pole Attachments here - [SECTION 6 - AUSTIN ENERGY POLE ATTACHMENTS | Utilities Criteria Manual | Austin, TX | Municode Library](#).
2. Elevated guideway sections are not covered in the typical sections in Section 3. Situations where footings and associated infrastructure to support the guideway impact existing utilities will be managed in the design process and will be mitigated on a case-by-case basis. ATP and the affected utility owners agree to work cooperatively to resolve utility conflicts.
3. See Section 2.4.1.2 Stormwater Design Criteria for Conveyance, Flooding and Water Quality participation from ATP.

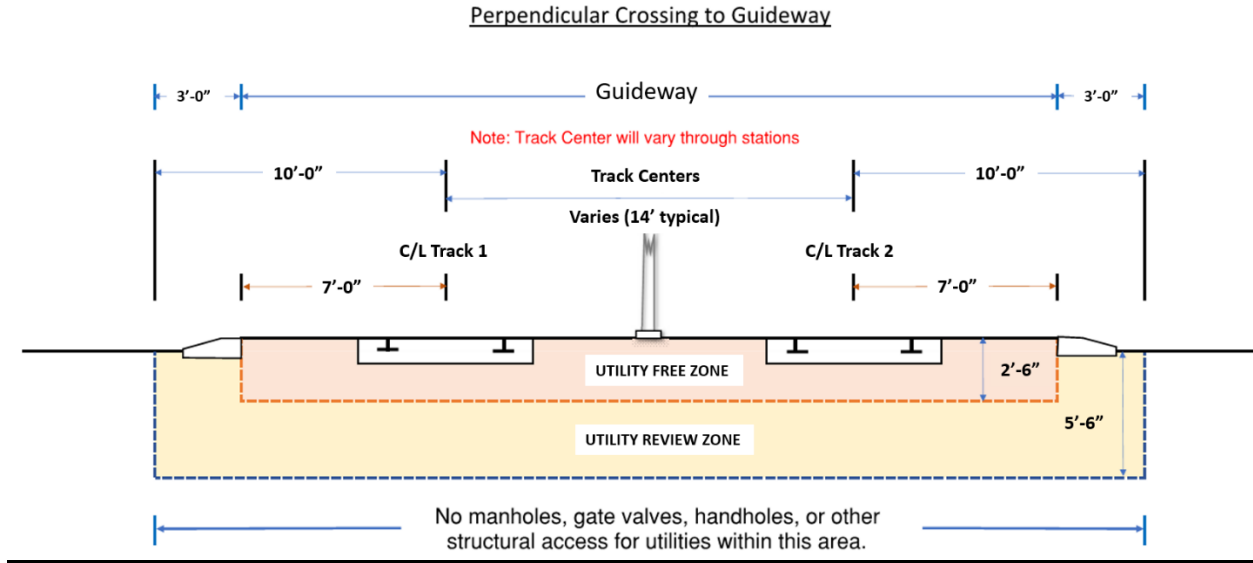
#### 3.1 Perpendicular & Skewed Crossings (Underground)

Perpendicular crossings are defined as any utility crossing ranging from forty-five to ninety degrees across the LRT guideway, where a ninety-degree crossing is perpendicular to the LRT guideway. A skewed crossing is defined as a crossing of the guideway anywhere from six degrees to forty-four degrees. It is the intent of the UROP to shorten all crossings that are skewed to a minimum of forty-five degrees to a desirable ninety degrees which would provide the shortest crossing of the guideway. All skewed crossings will be reviewed with the utility owner prior to making any final decisions on relocation of the utility.

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**Figure 3: Perpendicular Crossing to Guideway**



### 3.1.1 Wastewater

1. All existing perpendicular gravity wastewater mains that will remain in the URZ or below the URZ will have a condition assessment (criteria agreed to by ATP and AW) to evaluate structural integrity of the pipe.
2. Existing perpendicular gravity wastewater mains that will remain in the URZ and agreed to be in good condition will be evaluated for suitability for encasement with a split casing. Suitable pipes include PVC pipe less than 24-inches in diameter and less than 20-years old. Other installations will be reviewed by ATP and AW on a case-by-case basis for suitability. Pipes not deemed suitable will be replaced and placed into a continuous casing pipe. Consideration of betterments or cost-sharing will be reviewed on a case-by-case basis for these situations.

The end of the casing pipe will be extended to a minimum distance of 10 feet from the center line of the nearest LRT track. Situations where large pipes and infrastructure are being encased, the end of the casing pipe will be reviewed by ATP and AW to determine the appropriate termination of the casing pipe.

3. A special detail for split casing will be developed by ATP and reviewed and approved by AW during final design. The detail will address end seals, allowable casing pipe joint deflection, sealing casing pipe joints, poly-wrapping casing pipe, and joint restraint installation for carrier pipe.
4. All existing perpendicular gravity wastewater mains that will remain below the URZ and agreed to be in good condition, with access (manhole) within the guideway will have the access relocated outside the guideway to a minimum distance of 10 feet with a desired distance of 13 feet from the center line of the nearest LRT track. The existing mains will be replaced and placed into a continuous casing pipe. If only a portion of the pipe requires reconstruction to make the new connections, the remaining existing pipe may be left in place and casing pipe will not be used.

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5. All existing perpendicular gravity wastewater mains that will remain below the URZ and agreed to be in good condition, where access locations are outside of the guideway a minimum distance of 10 feet from the center line of the nearest LRT track, will remain in place with no further action needed. Situations where large pipes and access are located between 10 feet and 13 feet from the center line of the nearest LRT track will be reviewed by ATP and AW on a case-by-case basis for relocation.

This is applicable to PVC pipe; other pipe materials will be reviewed on a case-by-case basis. Where suitable, gravity wastewater mains may be lined using in situ technologies to allow the pipe to remain in place without a casing pipe.

6. Written agreement between ATP and the City will be developed prior to construction that details how AW will access pipes that remain under the guideway and are not encased in the event of a failure.
7. All existing perpendicular gravity wastewater mains that will remain under the guideway at any depth agreed to be in poor condition or of a material that is no longer approved by AW will be replaced and placed into a continuous casing pipe. The end of the casing pipe will be extended to a minimum distance of 10 feet from the center line of the nearest LRT track. Situations where large pipes and infrastructure are being encased, the end of the casing pipe will be reviewed by ATP and the City to determine the appropriate termination of the casing pipe. Consideration of betterments will be reviewed on a case-by-case basis for these situations.
8. All new metal casing pipe installed by open cut will be double-wrapped in 8 mil poly-wrap for corrosion control. If desired in addition to double poly-wrap, cathodic protection may be installed. A written agreement will be developed prior to construction to define where cathodic protection is installed and ATP's responsibilities for maintenance and reporting.
9. All new lift stations and force mains proposed for replacement of a gravity wastewater line will be reviewed by AW on a case-by case basis. ATP will prepare an evaluation that addresses feasibility and constructability of both a gravity solution as well as a pumped solution. Alternative assessment criteria will include constructability, capital cost, and 30-year life cycle operating cost. New lift stations will include odor control. New force main piping material will be polyethylene.
10. Offset manholes will not be used on AW infrastructure.
11. All wastewater crossings that cross the guideway on a skew and in conflict with the LRT construction will be reviewed to reduce the skew angle on a case-by-case basis. Skewed crossings will be allowed if the wastewater system is in good condition and access locations are outside the URZ width.

**3.1.2 Stormwater**

1. All storm drain pipes that will remain in the URZ will be Class IV or better. If the existing pipe is less than Class IV it will be replaced and upsized to meet LDC for conveyance to a logical termination point with a minimum Class IV pipe.
2. All manholes or other access to stormwater systems shall be located a minimum distance of 10 feet from the centerline of the nearest LRT track. Situations where large pipes and access are located between 10 feet and 15 feet from the center line of the nearest LRT track will be reviewed by ATP and WPD on a case-by-case basis for relocation.

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3. All existing perpendicular storm drain pipes that are: 1) non-impacted by LRT, 2) will remain below the URZ, 3) agreed to be in good condition, and 4) with access locations outside of the guideway a minimum distance of 10 feet from the center line of the nearest LRT track, will remain in place with no further action needed. Unless otherwise required by code or specified herein as “impacted storm drain pipes” (see section 2.4.1.3) indicating upgrade to provided, additional upsizing to meet existing conveyance issues will be considered a betterment.
4. All existing stormwater pipes that cross the guideway on a skew and in conflict with the LRT construction will be reviewed to reduce the skew angle on a case by case basis. Skewed crossings will be allowed if the stormwater system is in good condition and access locations are outside the URZ width.

**3.1.3 Pressurized Water Systems (Potable, Cooling, Reclaimed, Chilled Water, & Force Main)**

1. All existing perpendicular pressurized water mains located in either the UFZ or URZ will be replaced and relocated below the URZ. In addition, the section of new pipe that remains below the URZ will be placed into a solid continuous casing pipe. The end of the casing pipe will be extended to a minimum distance of 10 feet from the center line of the nearest LRT track. Situations where large pipes and infrastructure are being relocated, the end of the casing pipe will be reviewed by ATP and the City to determine the appropriate termination of the casing pipe. The new pipe will connect to a new gate-valve located outside a minimum distance of 13 feet or more, from the center line of the nearest LRT track, and/ or connected to an existing gate-valve or shutoff valve based on its location. All new valves must be accessible by a vehicle for valve exercising and maintenance.
2. All existing perpendicular pressurized mains below the URZ will have a condition assessment (criteria agreed to by ATP and the City) to evaluate structural integrity of the pipe. Pipes agreed to be in good condition will be evaluated for suitability for encasement with split casing. Suitable pipes include ductile iron or PVC pipe less than 24-inches in diameter. A determination of age for specific material will be evaluated as part of the condition assessment. Other installations will be reviewed by ATP and AW on a case-by-case basis. The end of the casing pipe will be extended to a minimum distance of 10 feet from the center line of the nearest LRT track.
3. A special detail for split casing will be developed by ATP and reviewed and approved by AW during final design. The detail will address end seals, allowable casing pipe joint deflection, sealing casing pipe joints, poly-wrapping casing pipe, and joint restraint installation for carrier pipe.
4. All existing perpendicular pressurized mains that are rated in poor condition after the condition assessment or of a material that is no longer approved by AW or AE will be replaced and placed into a continuous casing pipe. The end of the casing pipe will be extended to a minimum distance of 10 feet from the center line of the nearest LRT track. Consideration of betterments will be reviewed on a case-by-case basis for these situations.
5. All new metal piping and all new metal casing pipe installed by open cut shall be double-wrapped in 8 mil poly-wrap for corrosion control. If desired, in addition to double poly-wrap, cathodic protection may be installed. A written agreement will be developed prior to construction to define where cathodic protection will be installed and ATP's responsibilities for maintenance and reporting.
6. All pressurized water crossings that cross the guideway on a skew and in conflict with the LRT construction will be reviewed to reduce the skew angle. Skewed crossings will be allowed if the

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pressurized water system is in good condition, the system is located below the URZ, and access locations are outside the URZ width.

7. If bends are installed in the waterline, the casing pipe will extend from as close as practical (allowing space for end seal and workspace) from bend to bend beneath the guideway. The casing pipe shall be a minimum of 3 feet away from the bend.

**3.1.4 Electrical Underground (Street Lights, Electric Distribution, & Traffic Signal)**

1. All pipe and conduit crossings shall be located below the UFZ
2. All manholes, handholes or other access to electric systems shall be located outside of the width of the URZ.
3. Traffic signal conduit and manholes/handholes may be located inside UFZ when it's not feasible to locate them outside of UFZ. Where feasible, manholes/handholes shall be located a minimum distance of 10 ft from nearest track center.
4. Pipe and conduit crossings can remain in the URZ. Those systems that remain in the URZ will have a condition assessment to determine replacement or not.
5. All pipe and conduits that cross the guideway on a skew and in conflict with the LRT construction will be reviewed to reduce the skew angle. Skewed crossings will be allowed if the pipe and conduit is in good condition and access locations are outside the URZ width.

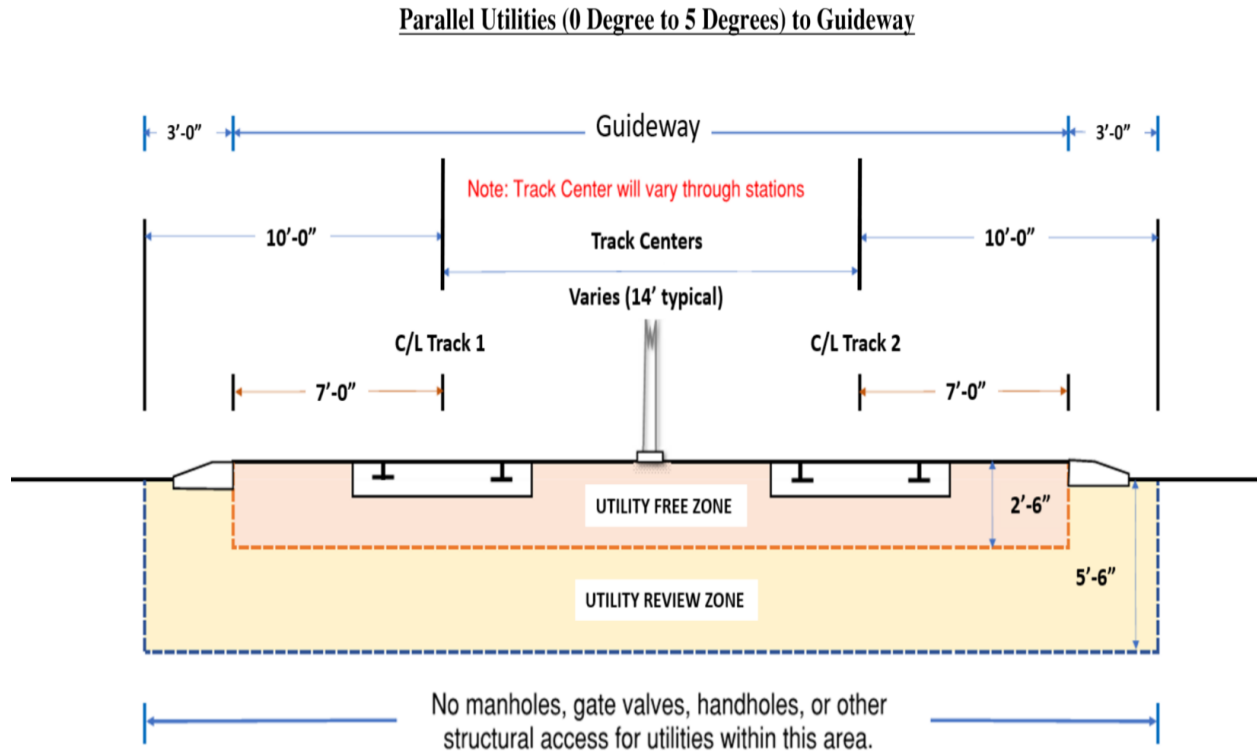
**3.2 Parallel & Longitudinal (Underground)**

1. Parallel utilities are defined as any utility parallel to the LRT guideway at a zero to five-degree angle, where a zero-degree angle is parallel to the LRT guideway. In most instances utilities running parallel to the guideway and within the URZ will likely need all or a portion of the system to be relocated due to the access locations falling within the URZ. A review of the systems will need to be done on a case-by-case basis to determine the most cost-effective solution with respect to relocation.

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**Figure 4: Parallel & Longitudinal Crossing to Guideway**



### 3.2.1 Wastewater

1. All existing parallel gravity wastewater mains under the guideway regardless of depth with access within the URZ will be relocated with a new pipe meeting the current standards outside the guideway a minimum distance of 13 feet from the center line of the nearest LRT track. No casing pipe will be required for the new relocated parallel pipe.
2. Larger existing parallel gravity wastewater mains (generally 24 inches or larger) that are located between 10 feet and 13 feet from the center line of the nearest LRT track will be reviewed by ATP and AW on a case-by-case basis for relocation.
3. Manholes located between 10 feet and 13 feet from the center line of the nearest LRT track will be reviewed on a case-by-case basis for relocation because of size and depth.
4. All wastewater force mains fall under pressurized lines. See Section 3.2.3 for details.

### 3.2.2 Stormwater

1. All existing parallel storm drain pipes located under the guideway with access within the guideway width, will be relocated with a new pipe meeting the current standards outside the guideway, a minimum of 10 feet from the center line of the nearest LRT track with a desired 15 feet. Deep storm drain facilities will be reviewed on a case-by-case basis. No casing pipe will be required for the new relocated parallel pipe.

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2. Larger existing parallel storm drain pipes (24 inches or larger) that are located between 10 feet and 13 feet from the center line of the nearest LRT track will be reviewed by ATP and WPD on a case-by-case basis for relocation.

**3.2.3 Pressurized Water Systems (Potable, Cooling, Reclaimed, Chilled Water, & Force Main)**

1. All existing parallel pressurized mains located under the guideway regardless of depth, with access within the guideway width, will be relocated with a new pipe meeting the current standards outside the guideway, a minimum of 13' from the center line of the nearest LRT track. No casing pipe will be required for the new relocated parallel pipe.
2. Larger existing parallel pressurized mains (24 inches or larger) that are located between 10 feet and 13 feet from the center line of the nearest LRT track will be reviewed by ATP and AW on a case-by-case basis for relocation.

**3.2.4 Electrical Underground (Street Lights, Electric Distribution, & Traffic Signal)**

1. All AE manholes, handholes or other access to electric systems shall be located a minimum distance of 10 feet from the center line of the nearest LRT track.
2. Traffic signal conduit and manholes/handholes may be located inside UFZ when it's not feasible to locate them outside of UFZ. Where feasible, manholes/handholes shall be located 10 ft from nearest track center.
3. Portions of parallel running conduit or pipe can remain in the URZ if access locations are a minimum distance of 10 feet from the centerline of the nearest LRT track. Those systems that remain in the URZ will have a condition assessment to evaluate structural integrity of the conduit or pipe.

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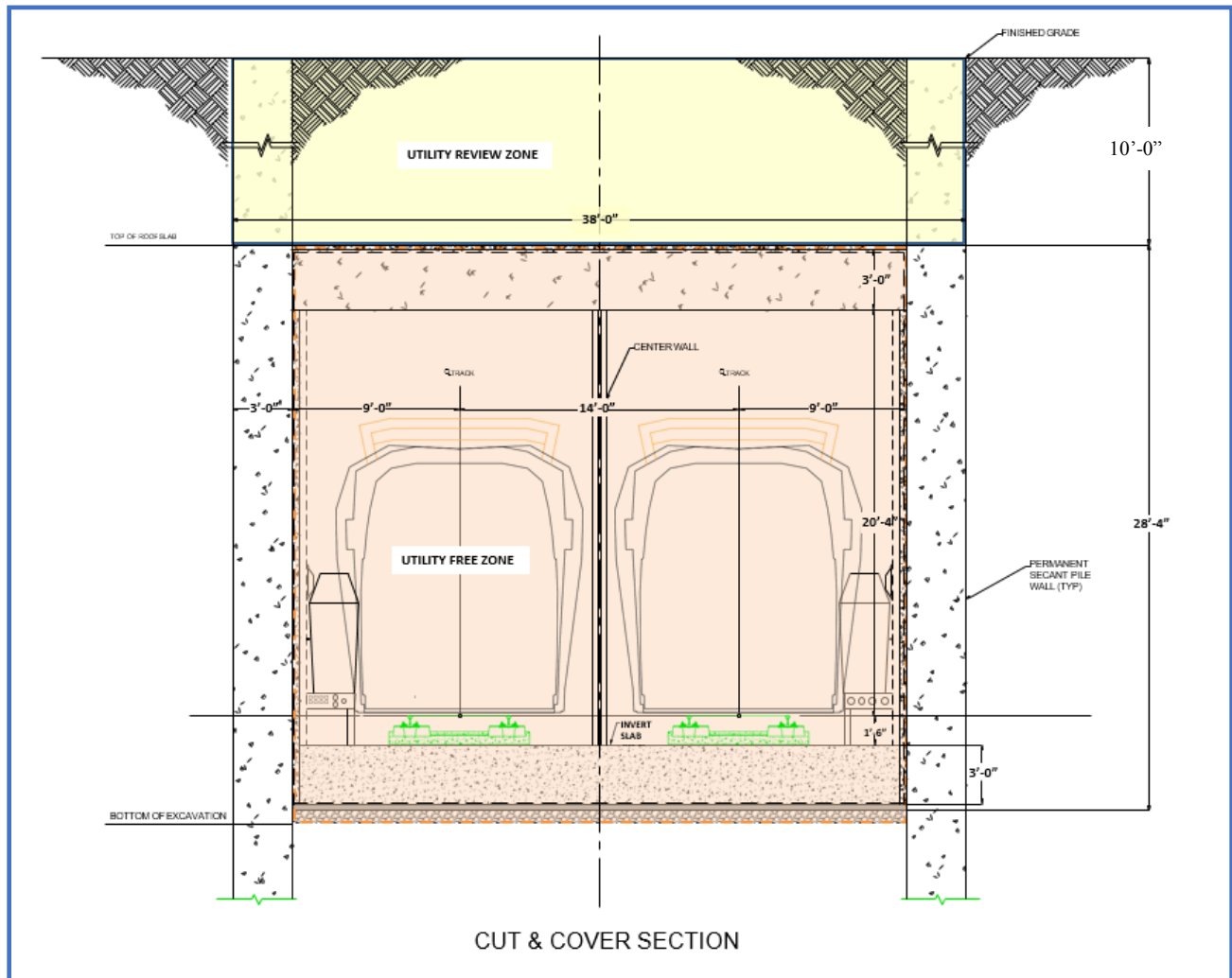
## Project Connect – Light Rail Transit Program

### 3.3 Tunnel

The LRT project will have two tunnel systems to serve the Orange Line and Blue Line LRT. The UROP will identify UFZs and URZs. Depending on the depth of cover, most utilities will be impacted as part of the cut and cover construction of the tunnels. Whether as part of the design because of the identification of a conflict or during construction to support the utilities in place, the cut and cover tunnel portion of the UROP will focus on relocating utilities outside of the tunnel footprint, if possible. The directional bored tunnel does not anticipate any utility conflict therefore no typical cross-section is presented in the UROP document.

In addition to the cut and cover segments of the tunnel construction, a portion of the Orange Line will be done with a directional boring machine at depths typically greater than 25 feet. While this portion of the project does not anticipate utility impacts, there is a large wastewater pipe in close proximity of the boring operations that will require additional attention during construction. A condition assessment may be needed to assess the structural integrity of this deep structure.

**Figure 5: Tunnel Cut & Cover Cross-Section**



**Project Connect – Light Rail Transit Program**

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**3.3.1 Tunnels – Cut & Cover (General)**

1. All utilities within the UFZ (within tunnel structure or pedestrian concourse) will need to be relocated.
2. Relocation outside of the corridor should be considered for situations such as:
  - a. Pressurized mains with high flow rates and/or high pressures that present a high risk if a pipe failure occurs.
  - b. Pipes carrying toxic or hazardous fluids that present a high risk if a pipe failure occurs.
  - c. High-voltage utilities
3. The UFZ zone for the tunnel includes both the tunnel section for the LRT trains and in areas where a pedestrian concourse is planned (not shown above).
4. All impacted utilities will need to be reviewed on a case-by-case basis when located in the URZ to determine if they can be protected in place, replaced within the URZ, or relocated outside of the URZ.
5. Utilities with manholes will be reviewed for temporary construction with full replacement back in the corridor after cut and cover operations are completed.
6. The temporary structural traffic plate will allow for many utilities to be supported in place. A case-by-case assessment will be done for utilities that can be supported in place. Utility materials unsuitable for supporting in place and/or no longer approved for use by the City utility will be replaced and either relocated or supported in place.
7. All pipes of material not currently approved by the City will be replaced as part of the project. Betterment and cost-sharing consideration will be reviewed on a case-by-case basis.
8. To preserve the structural integrity of the wall system used during the cut and cover construction, all perpendicular/ skewed utility crossings within the URZ will be reviewed based on the pipe size and number of utility crossings in the area.
9. All skewed utility crossings within the tunnel cut and cover area will be reviewed to reduce the skew angle.
10. The need for corrosion control will be reviewed on a case-by-case basis. Cathodic protection will be maintained and monitored by ATP.
11. All wastewater force mains fall under pressurized lines. See appropriate sections for details.

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**3.3.2 Tunnel Perpendicular & Skewed Crossings****3.3.2.1 Wastewater**

1. All existing wastewater systems that will remain in the URZ will have a condition assessment to evaluate the structural integrity of the system.
2. All existing wastewater systems remaining in the URZ, in poor condition, shall be replaced with material meeting current AW standards. A temporary connection will be made, maintaining service levels during construction. Consideration of betterments will be reviewed on a case-by-case basis for these situations.
3. All existing wastewater systems remaining in the URZ, in good condition, shall be protected in place, if possible, until after tunnel cut and cover operations allow.
4. All existing wastewater systems that can't be protected in place shall be replaced with material meeting current AW standards. A temporary connection will be made, maintaining service levels during construction.
5. Determination of the need for encasement pipe will be made on a case-by-case basis. Casing pipes may be needed to pass the pipe through the wall structure. Determination will be made during the design process.

**3.3.2.2 Stormwater**

1. All existing storm drain systems that will remain in the URZ during tunnel construction will have a condition assessment to evaluate the structural integrity of the system.
2. All existing storm drain systems remaining in the URZ, in poor condition, shall be replaced with material meeting current WPD standards. A temporary connection will be made, maintaining service levels during construction.
3. All existing stormwater systems remaining in the URZ, in good condition, shall be protected in place, if possible, until after tunnel cut and cover operations allow.
4. All existing stormwater systems that can't be protected in place shall be replaced with a new pipe to the original size or to a minimum size and material in compliance with the DCM. A temporary connection will be made, maintaining service levels during construction. Where the completed project does not prohibit WPD's ability to access, maintain, repair/rehabilitate the storm drain system, upsizing will not be required.

**3.3.2.3 Pressurized Water Systems (Potable, Cooling, Reclaimed, Chilled Water, & Force Main)**

1. All existing pressurized water systems that will remain in the URZ will have a condition assessment to evaluate the structural integrity of the system.
2. All existing pressurized water systems remaining in the URZ, in poor condition, shall be replaced with material meeting current AW and/or AE standards. A temporary connection will be made, maintaining service levels during construction. Consideration of betterments will be reviewed on a case-by-case basis for these situations.

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3. All existing pressurized water systems remaining in the URZ, in good condition, shall be protected in place, if possible, until after tunnel cut and cover operations allow.
4. All pressurized water systems that cannot be protected in place shall be replaced with material meeting current AW and/or AE standards. A temporary connection will be made, maintaining service levels during construction.
5. All new pressurized water systems will be located in the URZ above the tunnel or pedestrian concourse.

**3.3.2.4 Electrical Underground (Street Lights, Electric Distribution, & Traffic Signal)**

1. All pipe and conduit crossings remaining in the URZ shall be protected during or replaced after tunnel construction.
2. Determination of the need for encasement pipe will be made on a case-by-case basis. Casing pipes may be needed to pass the pipe through the wall structure. Determination will be made during the design process. All encasement pipes shall be constructed per City of Austin Standard Specification Manual. See link here - [| Standard Specifications Manual | Austin, TX | Municode Library](#).

**3.3.3 Tunnel Parallel & Longitudinal****3.3.3.1 Wastewater**

1. All existing wastewater systems that will remain in the URZ will have a condition assessment to evaluate the structural integrity of the system.
2. All existing wastewater systems remaining in the URZ, in poor condition, shall be replaced with material meeting current AW standards. A temporary connection will be made, maintaining service levels during construction. Consideration of betterments will be reviewed on a case-by-case basis for these situations.
3. All existing wastewater systems remaining in the URZ, in good condition, shall be protected in place, if possible, until after tunnel cut and cover operations are completed.
4. All existing wastewater mains that can't be protected in place shall be replaced with material meeting current AW standards. A temporary connection will be made, maintaining service levels during construction.

**3.3.3.2 Stormwater**

1. All existing storm drain systems that will remain in the URZ during tunnel construction will have a condition assessment to evaluate the structural integrity of the system.
2. All existing stormwater systems remaining in the URZ, in poor condition, shall be replaced with material meeting current WPD standards. A temporary connection will be made, maintaining service levels during construction. Consideration of betterments will be reviewed on a case-by-case basis for these situations. Unless otherwise required by code or as specified as being "impacted storm drain pipes, additional upsizing needed for existing conveyance needs will be considered a betterment.

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3. All existing stormwater systems remaining in the URZ, in good condition, shall be protected in place, if possible, until after tunnel cut and cover operations are completed.
4. All existing stormwater systems that can't be protected in place shall be replaced with a new pipe to the original size or to a minimum size and material in compliance with the DCM. A temporary connection will be made, maintaining service levels during construction. Where the completed project does not prohibit WPD's ability to access, maintain, repair/rehabilitate the storm drain system, upsizing will not be required.

**3.3.3.3 Pressurized Water Systems (Potable, Cooling, Reclaimed, Chilled Water, & Force Main)**

1. All existing pressurized water systems that will remain in the URZ will have a condition assessment to evaluate the structural integrity of the system.
2. All existing pressurized water systems remaining in the URZ, in poor condition, shall be replaced with material meeting current AW and/or AE standards. A temporary connection will be made, maintaining service levels during construction. Consideration of betterments will be reviewed on a case-by-case basis for these situations.
3. All existing pressurized water systems remaining in the URZ, in good condition, shall be protected in place, if possible, until after tunnel cut and cover operations are completed.
4. All existing pressurized water systems that can't be protected in place shall be replaced with material meeting current AW and/or AE standards. A temporary connection will be made, maintaining service levels during construction.
5. All new pressurized water systems will be located in the URZ above the tunnel or pedestrian concourse.

**3.3.3.4 Electrical ~ Dry (Street Lights, Underground Electric Distribution, & Traffic Signal)**

1. All existing pipe and conduit systems remaining in the URZ, in good condition, shall be protected in place, if possible, until after tunnel cut and cover operations are completed.
2. All existing pipe and conduit systems that can't be protected in place shall be replaced with material meeting current AE standards. A temporary connection will be made, maintaining service levels during construction.

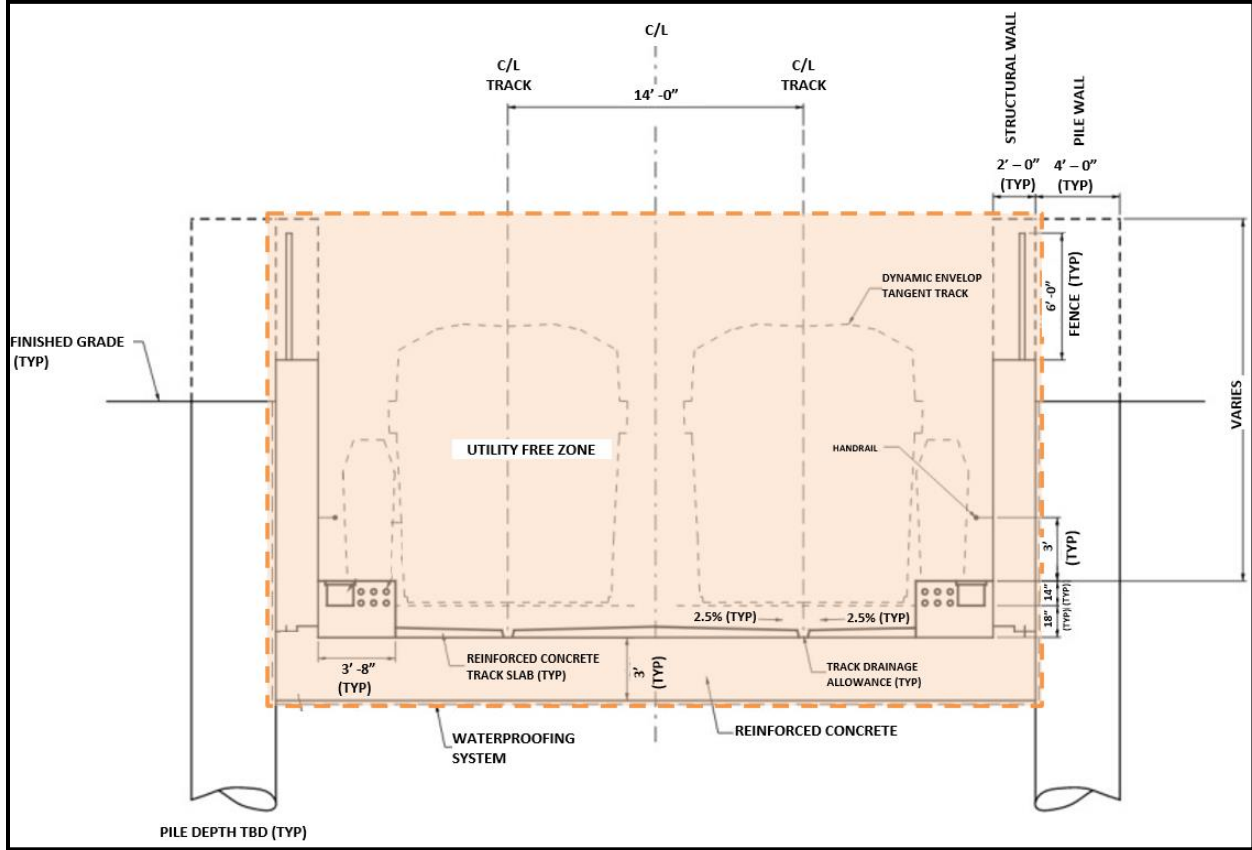
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### 3.3.4 Tunnel Portal

*NOTE: All utilities will likely need to be relocated in these sections. Utility conflicts will need to be reviewed on a case-by-case basis.*

Figure 6: Tunnel Portal Cross-Section



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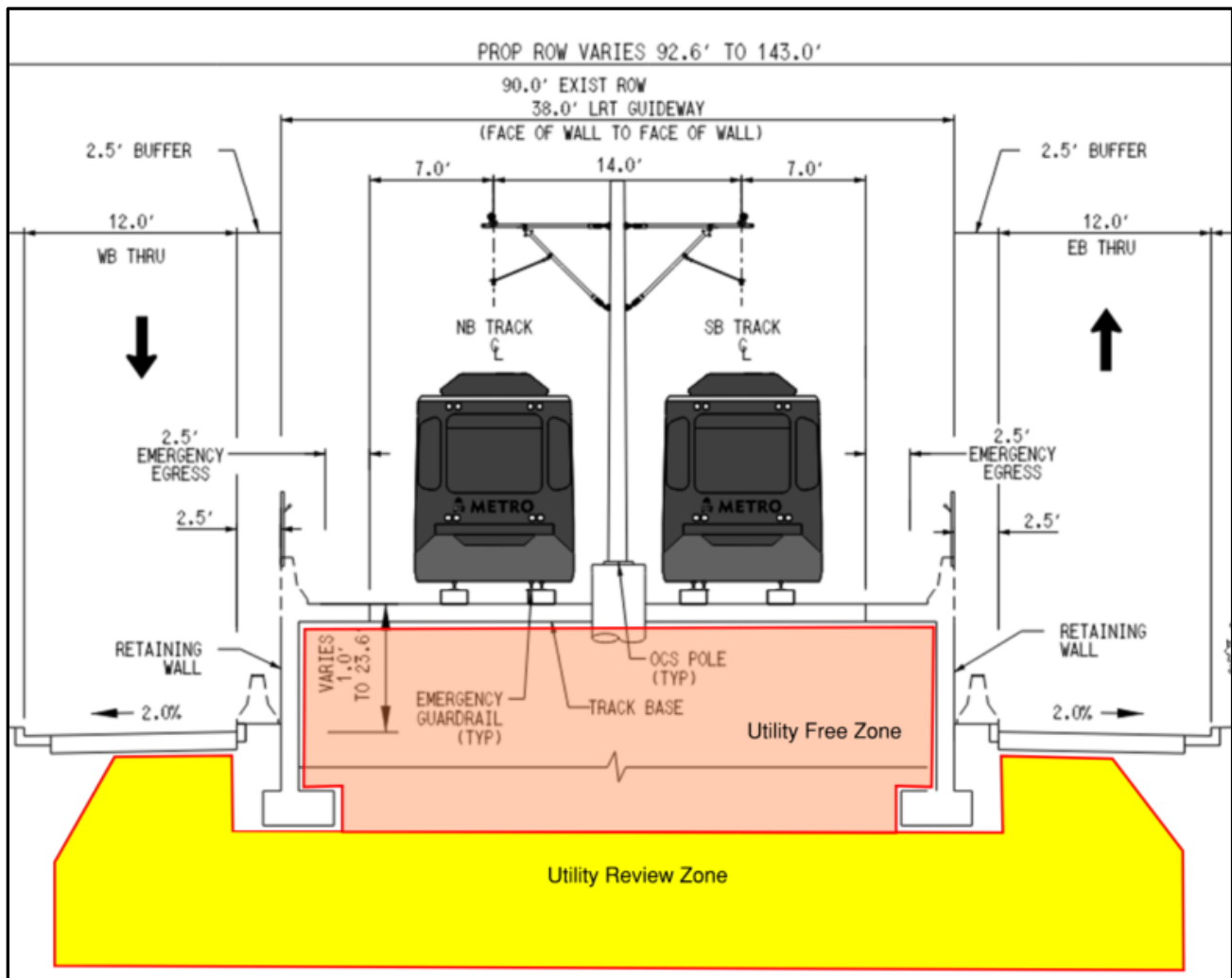
## Project Connect – Light Rail Transit Program

### 3.4 Retaining Wall

Structures that are constructed within the right-of-way or in easements will present challenges for utilities adjacent to those structures. Design of structures to be constructed in the right-of-way and in easements is governed by Section 13 of the Transportation Criteria Manual. The impacts of constructing retaining walls, bridges, and certain drainage structures adjacent to utilities will be reviewed on a case-by-case basis.

**NOTE:** All parallel utilities located under the guideway will need to be relocated in these sections. Perpendicular utility crossings under the retaining wall section will be reviewed on a case-by-case basis to determine if they need to be relocated. Utility Review Zone is defined by the retaining wall design. Parallel utilities outside the retaining wall section will be reviewed on a case-by-case basis depending on the retaining wall design.

Figure 7: Retaining Wall Cross-Section



# **APPENDIX A**



Sample Utility Conflict Matrix

ProjectConnect - 30% Utility Conflict Matrix																	
UTILITY FACILITY CODE	PLAN SHEET NO.	FACILITY INFO		FACILITY OWNER	CONFLICT LOCATION						UTILITY ORIENTATION	Current SUE Quality Level	RECORD INFO (Y / N)	REASON FOR CONFLICT	PROTECT IN PLACE OR RELOCATE	COMMENTS	
		Size / Material	Description / Age / Condition		Roadway / Alignment	Length	Begin Station	Offset	LT / RT	End Station							Offset
SEGMENT [ 1 ] N. Lamar Blvd.		FROM: Meadowlark Street (OL NB 717-90)		TO: Tech Ridge Station (OL NB 1005+00)													

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