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RED LINE TRAIL – WALNUT CREEK TRAIL TO BRAKER LN

CIP ID# 10796.018

PRELIMINARY ENGINEERING REPORT



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RED LINE TRAIL WALNUT CREEK TRAIL TO BRAKER LANE (North Austin)

Subproject ID Number: 10796.018

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EXECUTIVE SUMMARY

The purpose of this Preliminary Engineering Report (PER) is to gather all applicable data and provide an analysis and recommendation for a proposed alignment of the Red Line Trail - Northern Walnut Creek Trail (NWCT) to Braker Lane. The matrix and report has been submitted to the Community Services Division (CSD) of Department of Public Works at the City of Austin. The report accounts for the importance of the Urban Trails Program's goal to create an "all ages and abilities, all weather, connected trail network." This preliminary engineering report summarizes the alignment options and cost from which the recommendation has been determined. The City of Austin Public Works Department Community Services Division, The City of Austin Parks and Recreation Department (PARC), Gracywoods Neighborhood Association, Capital Metro, the City of Austin Watershed Protection Department (WPD), Austin Transportation Department (ATD), and the City of Austin Planning and Development Review Department have all been asked to provide input for possible Red Line Trail alignments for this phase.

The route for the proposed Red Line Trail - NWCT to Braker Lane is adjacent to the Capital MetroRail Red Line and extends from Braker Lane to MoPac Expressway at Park Bend Drive. This roughly 1.5 mile section of trail is located in the "Priority 5" quadrant, as identified by the June 2007 Capital Metro Rail-with-Trail Feasibility Study. The Red Line Trail is intended to be a key link to the existing City of Austin Walnut Creek Trail. It is proposed to connect at the underpass of MoPac Expressway at Park Bend Drive. Acquiring additional right-of-way from landowners adjacent to the MetroRail corridor is the matrix constraint that is heavily weighted in the PER trail matrix analysis.

The scope of the PER includes a verification and detailed inventory of the following: project objectives, scope, existing utilities, other improvements within the project area, possible trail creek crossing locations, and a benefit/cost analysis of different alignment options. The benefit/cost analysis of each alignment will include impacts to the floodplain for both the 25 year (4%) and 100 year (1%) ultimate City of Austin floodplains. Additionally, the fully developed 0.2% annual chance event was modeled as a representation of the future 1% annual chance event based on the pending adoption of Atlas 14 precipitation data. It also outlines impacts on the Critical Water Quality Zone (CWQZ), the Erosion Hazard Zone (EHZ), and known critical environmental feature setbacks. The analysis also evaluates topography constraints, public/neighborhood input, existing utilities, trees, and natural drainage patterns. The PER also discusses the type of crossings, research of surrounding existing improvements that impact alignment options, coordination of an environmental screening document and

Environmental Resource Inventory. The report summarizes permitting requirements, assessment of additional easement requirements, a recommendation for overall scope of proposed design and construction, preliminary opinion of probable construction cost, and proposed preliminary project schedule. For ease of evaluation, the alignment was split at 4 existing rail/road crossings (Sections 1-4) and the East and West options were compared. Aerial maps representing the sections can be found in **Appendix 2**.

Due to structure conflicts, environmental concerns, and the need to ensure an ADA accessible, multi-modal trail, the recommended route stays to the west of the MetroRail Red Line for the entire length of the proposed trail (Segments 1-4). The recommended trail route creates a shared-use, non-motorized path connecting neighborhoods, parks, and businesses and is highlighted in red on the map shown in **Appendix 19** along with a map of the existing, all ages, and abilities network of paths. The trail will serve as an amenity for the surrounding community so that nature can be enjoyed. The recommended route will provide a safe multi-modal route for travelling along the proposed project limits. A user's sense of safety while on urban trails is emphasized in the design goals. The result of the level-of-service analysis for both pedestrian and cyclist use supports this. The level-of-service analysis is discussed in **Section 7.3**. The user's sense of safety from vehicular traffic encourages use of the proposed urban trail. The level-of-service for the recommended route is greater in comparison to the other alignment options. The recommended route's construction cost is estimated at approximately **\$3,389,000.00**. Construction costs may vary depending on the final design and field conditions at the time of construction. The Opinion of Probable Construction Cost is provided in **Appendix 17**. The weighted alignment matrix that summarizes the alternate design parameters is provided in **Appendix 18** and indicated in **Figure 1** for convenience.

PARAMETER	ALIGNMENT ALTERNATIVES								Recommendation			
	SECTION 1		SECTION 2		SECTION 3		SECTION 4					
	EAST	West	EAST	West	EAST	West	EAST	West	S1	S2	S3	S4
Permitting Complexity ¹	1	1	3	2	4	3	5	4	W	W	W	W
Environmental Impact ²	-	-	2	2	2	0	1	3	-	-	W	E
Cost (Millions of Dollars)	\$0.34	\$0.33	\$0.78	\$0.65	\$0.71	\$0.59	\$1.24	\$1.06	W	W	W	W
Level of Service ³	A	A	A	A	A	A	A	A	-	-	-	-
ROW Acquisition ⁴	0.29	0.36	0.67	0.83	1.19	1.48	0.56	0.49	E	E	E	W
Public Input ⁵	-	-	-	-	-	-	-	-	-	-	-	-
Recommended Alignment Alternative									W	W	W	W

1. Permitting complexity is based on the number of rail crossings, water crossings, Capitol Metro easement permits, TXDOT review impacts for work along the MoPac ROW and **general permit** ineligibility. Lower Number is preferred.
2. Environmental Impact is based on the number of environmental constraints in each segment shown on the Environmental Constraints Map prepared by Baer Engineering, Inc. (**Appendix 8**), and Lower Number is preferred.
3. Level of Service (L.O.S.)-CSD definition stated in section 7.3 of the P.E.R.
4. ROW acquisition cost is preliminary only based on Travis Central Appraisal District (TCAD) Land Appraised Value in 2017 (to be determined by City of Austin Real Estates Services Office in design phase) Actual cost.
5. Public input did not provide preference for the side of the rail the trail should run.

Figure 1: Alternate Design Parameters Matrix

1 INTRODUCTION

1.1 Project Location

The proposed trail is located between Burnet Road to the west and Metric Boulevard to the east and spans from Braker Lane north to the MoPac Expressway at Park Bend Drive, as shown on **Figure 2**, where it will connect with the recently completed NWCT. The NWCT is a multi-use urban trail that is part of the city's overall urban trail network designed to connect all parts of the City from North Austin to the Lady Bird Johnson Wildflower Center and from Oak Hill to Manor. (Source: <https://communityimpact.com/austin/northwest-austin/city-county/2016/05/24/city-austin-celebrates-opening-northern-walnut-creek-trail/>)

The proposed trail is located within the Walnut Creek Watershed. Per the Austin Neighborhoods Council Sector Map, the Red Line Trail project is located within the North Central Sector. The specific neighborhood group whose boundaries overlap with the project location is the Gracywoods Neighborhood Association. A detailed map of Gracywoods Neighborhood Association can be found in **Appendix 1**.

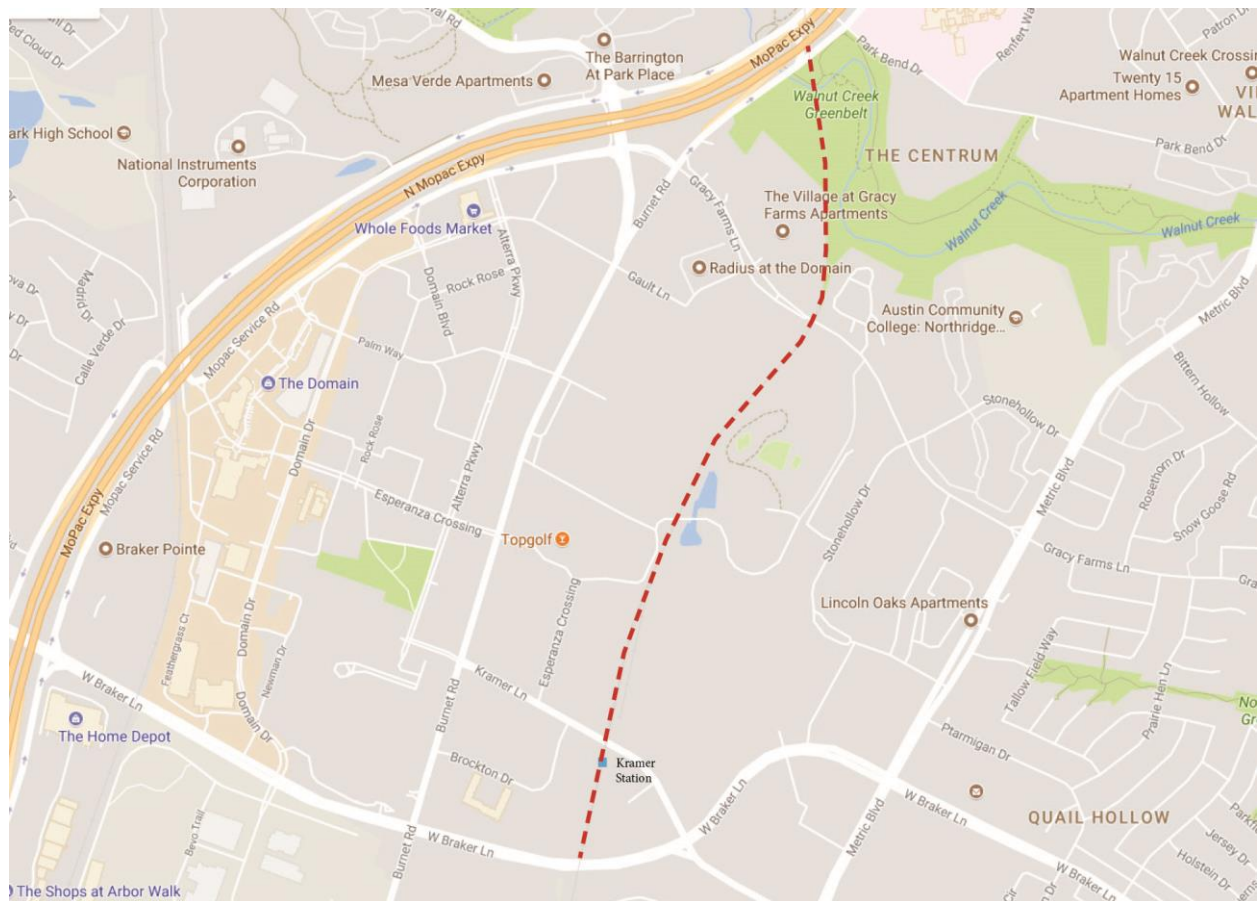


Figure 2: Location Map

1.2 Project Background

The Red Line Trail has been identified in both the 2007 Capital Metro Rails-with-Trails Feasibility Study and the 2014 City of Austin Urban Trails Master Plan as an important piece of the overall urban trail network. Both reports identify the Red Line Trail as connecting all parts of the City. It is further identified in Capital Metro's long-range transit plans as increasing corridor catchment area by providing more walkable and bikeable access to station platforms, as well as improving neighborhood access to open spaces, parks, and recreational opportunities through trails along active railways.

PWD's Engineering Services Division has been tasked with designing a "rails with trails" section of the Metro Rail Red Line Trail. Extending from Braker Lane to MoPac Expressway at Park Bend, this roughly 1.5 mile section of trail is located in the "Priority 5" quadrant, as identified in the June 2007 Capital Metro Rail-with-Trail Feasibility Study. The Red Line Trail is intended to be a key link to the already existing City of Austin Walnut Creek Trail. It was also included as part of the Tier One Urban Trails. A detailed public input process was utilized to inform and engage the citizens about the Austin Urban Trails Master Plan and Bicycle Master Plan update. Since both plans work together to create the overall Active Transportation Network, the public input process for both was combined and occurred simultaneously.

1.3 Project Scope and Objectives

The ultimate objective of the Red Line Trail project is to align with the Urban Trails Program's goal of creating an "all ages and abilities, all weather, connected trail network." Additionally, the Red Line Trail project will increase north-south connectivity by adding a multi-use trail that spans from Braker Lane north to the MoPac Expressway at Park Bend Drive and connecting to the recently completed North Walnut Creek Trail. Finally, the Red Line Trail's completion will satisfy the goal of both the 2007 Capital Metro Rail-with-Trail Feasibility Study and the 2014 City of Austin Urban Trails Master Plan of expanding the urban trail network.

To aid in the evaluation of possible routes, the trail was broken into four segments separated by possible crossing points. Each segment includes an east or west option. Project Scope Maps can be found in **Appendix 2** and below (see **Figures 3-7**: Overall Trail Corridor):

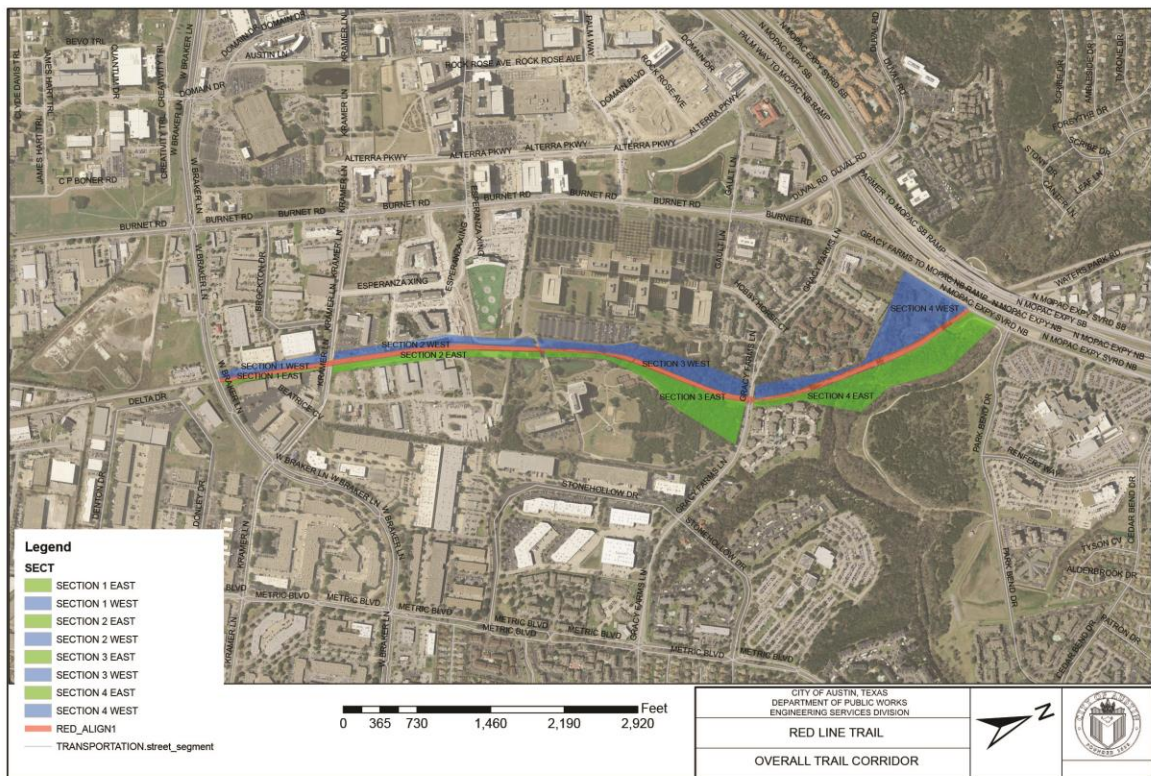


Figure 3: Overall Trail Corridor

Segment 1: Located between the intersection of Braker Lane and Capitol Metro MetroRail Red Line, immediately south of Kramer Station, and extending north to Kramer Lane.

Segment 2: Located between the intersection of Kramer Lane and Capitol Metro MetroRail Red Line, and extending north to an IBM private road that crosses Capitol Metro MetroRail Red Line.

Segment 3: Located between the intersection of IBM's private road and the MetroRail Red Line, and extending north to the Gracy Farms Lane and the MetroRail Red Line.

Segment 4: The final segment, is located between Gracy Farms Lane and North Waller Creek Trail near MoPac Expressway at Park Bend Drive.



Figure 4: Segment 1 (Braker Lane to Kramer Lane)

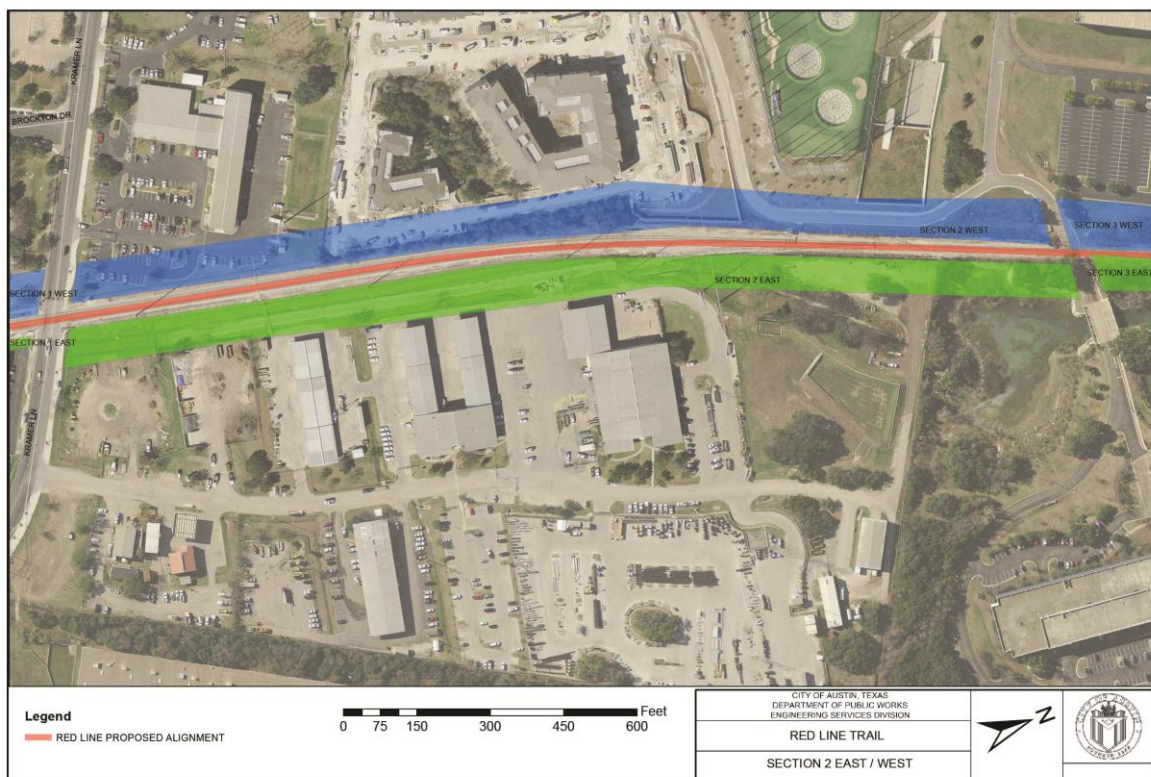


Figure 5: Segment 2 (Kramer Lane to IBM Private Road)

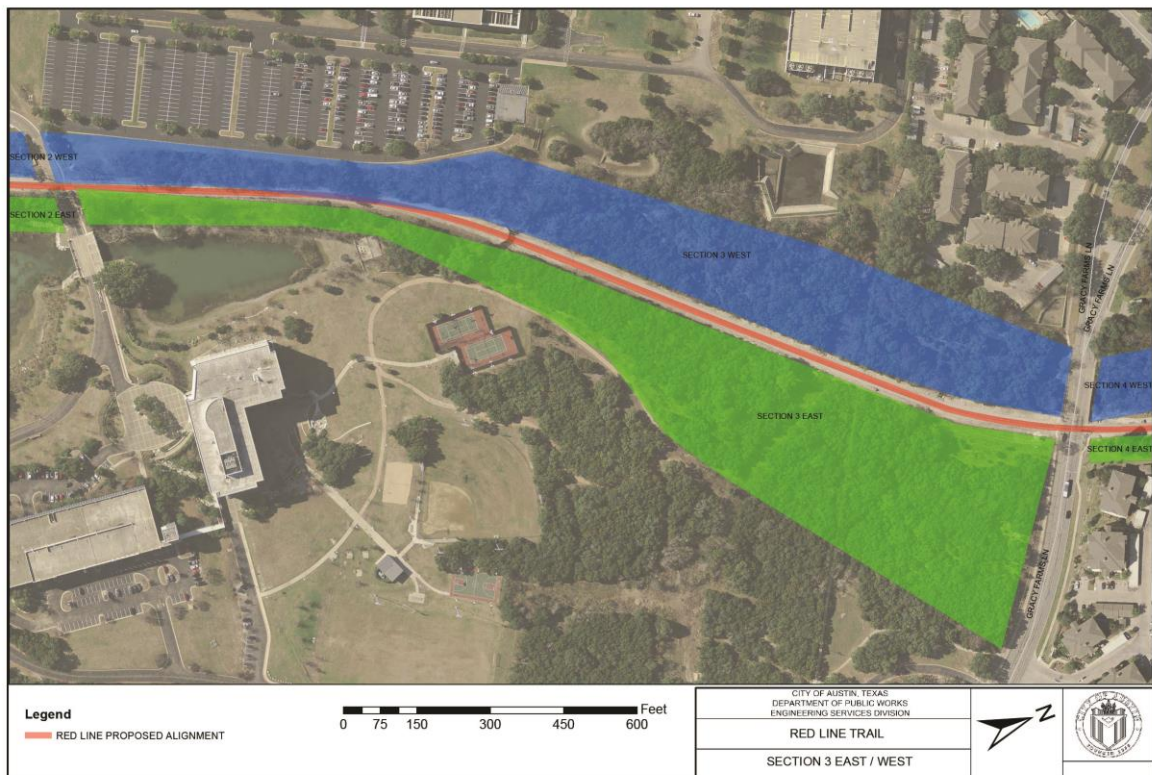
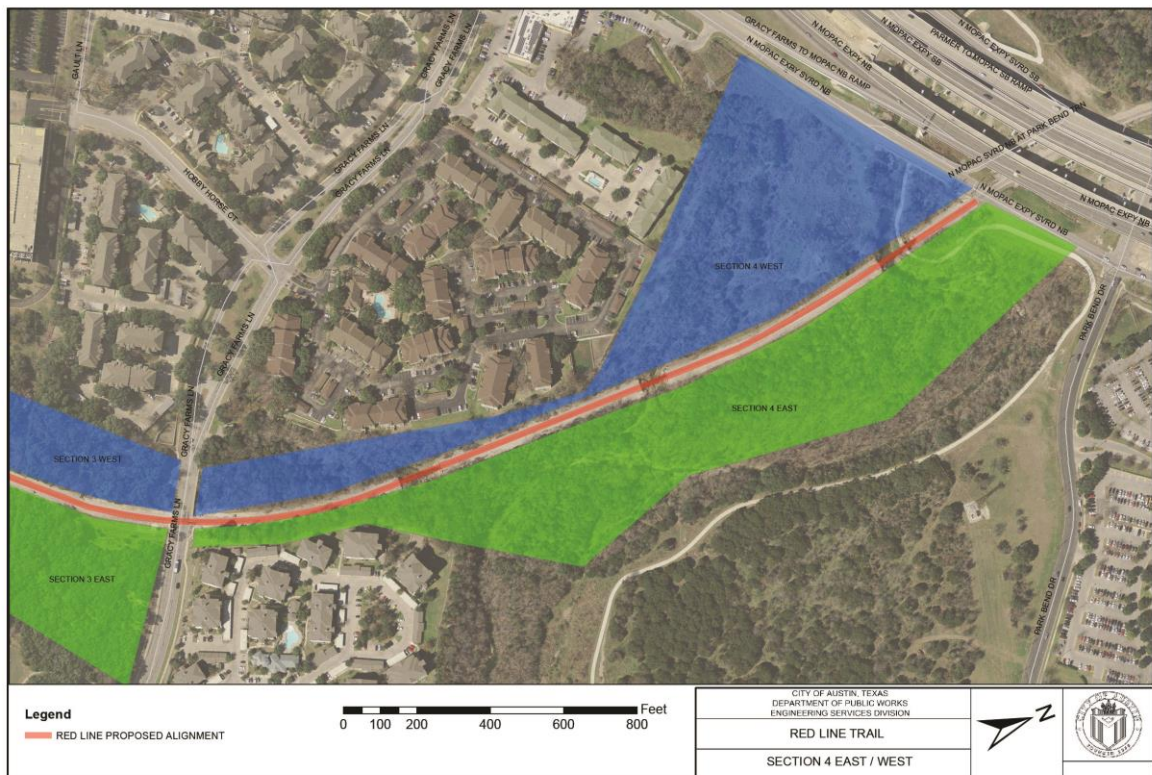


Figure 6: Segment 3 (IBM Private Road to Gracy Farms Lane)



1.4 Related Studies

Capital Metro has provided a report of preliminary schematic designs and cost estimates for future bike and pedestrian paths that includes a segment from Braker Lane to Kramer Lane. The route analyzed was for Segment 1 Option 2. The schematics can be found in **Appendix 3**.

The City of Austin has contracted with Baer Engineering and Miller-Gray Engineering, LLC. as sub consultants of Heil Lee Associates, to prepare a combined Environmental Site Assessment and Environmental Resource Inventory in the form of an Environmental Constraints Map and Report discussed in **Section 4.2** and a hydrologic and hydraulic analysis discussed in **Section 5.0**, respectively, for the proposed Red Line Trail project in North Austin. The individual reports can be found in **Appendix 8 and 9**.

2 EXISTING CONDITIONS

2.1 Field Visits

Numerous site visits were made in an effort to establish an optimal trail route, including verifying topography and accessibility for the proposed trail. Copies of field reports and associated photos from the site visits can be found in **Appendix 4**.

2.2 Topography Conditions

The general project area is located within the City of Austin. The project is located on MAPSCO grids 465 Z and V and 495 H and D. The southern two-thirds of the project length is located along public (COA) property and private (apartment/condo) properties. The northern third of the project length is located along parkland. Based on City of Austin LIDAR maps, the average slope for the project along the MetroRail Red Line, based on City of Austin LIDAR maps, is approximately 1% with a high point at Braker Lane and the low point at MoPac Expressway. However, the intervening topography to the east and west of the rail has a much greater variation that will significantly affect possible trail routes. Our slope evaluation, from start to end was divided into four sections. Section one spans from Braker Lane to Kramer Lane. Section two spans from Kramer lane to IBM's inner-loop road adjacent to Top Golf. Section three spans from IBM's inner-loop road to Gracy Farms Lane. Section four is the final

span of the trail and runs from Gracy Farms Lane to the trail's terminus at MoPac Expressway at Park Bend Drive.

Section one of the Red Line Trail runs along a mostly industrial area and includes Capital Metro's existing Kramer Lane transit station. There is little vegetation or tree canopy on either the east or west of the tracks. The railroad tracks are only slightly elevated along this portion of the trail with a grade of approximately 0.5% spanning from Braker Lane to Kramer Lane. There is an existing pedestrian crossing 60 feet south of Kramer lane, for passengers to transfer from the northbound and southbound platforms. There are also two additional pedestrian crossings on the north and south sides of Kramer Lane.

Section two of the Red Line Trail runs along a mostly industrial, City of Austin Fleet Services facility to the east and an Austin Energy facility to the west. However, approximately two-thirds of the western border of the MetroRail Red Line is adjacent to multi-family residential apartments and Top Golf sports bar. There is little vegetation or tree canopy on either the east or west of the tracks, with the exception of increased tree canopy, adjacent to the multi-family development. The railroad tracks are only slightly elevated along this portion of the trail with a grade of approximately 1% spanning from Kramer Lane to IBM's inner-loop road adjacent to Top Golf. There is an existing pedestrian, railroad track, crossing 60 feet south of Kramer lane, for crossing from Austin Energy to Fleet Services. There is a 36 inch drainage culvert, approximately 1,200 feet north of Kramer Lane that would require a crossing structure. Additionally, there is an existing service rail on the Fleet Services property adjacent (east) to the MetroRail Red Line that already has a crossing.

Section three of the MetroRail Red Line changes significantly as it moves into dense, heavily canopied terrain. The proposed trail route is located west of the tracks where the terrain is consistently flat from IBM's inner-loop road to Gracy Farms Lane with minimal grade change from track to proposed trail. There is one elevated track crossing in this section, which is only at an approximate 2% grade. The grades adjacent to Gracy Farms Lane change significantly as the creek drops under the roadway. The proposed trail route has an uphill grade change of approximately 12% south of Gracy Farms Lane and re-enters the creek zone at an approximate 8% grade to the north of Gracy Farms Lane.

The dense, heavily canopied terrain continues along Section four, from Gracy Farms Lane to MoPac Expressway at Park Bend Drive. There are three elevated track crossings on the MetroRail Red Line with

approximate grade changes of 13%, 9%, and 4% respectively and reflect the greater distance from track to trail. The trail route to the west through this area is aligned to cross tributaries and stay on flatter terrain further from the track center line. The topography to the east of the railroad tracks is significantly more extreme due to numerous tributaries of Walnut Creek and Little Walnut Creek. This results in greater cross slopes and more possible water crossings for the trail.

A topographic map can be found in **Appendix 5**.

2.3 Adjacent Land Use

The adjacent land use along the proposed Red Line Trail ranges from commercial, industrial, and office uses in the southern portions along sections 1 and 2, transitioning from commercial to multi-family in section 3, to multi-family residential with some retail, parkland, and adjacent medical district near section 4. IBM's side of the tracks is interspersed with numerous existing, informal trails on relatively flat terrain. Every time a field visit has been made, numerous employees were noted outside enjoying a break or their lunch hour, supporting our initial thought that IBM could likely be amenable to a multi-use trail running along their property edge. At the IBM inner-loop road, there is very easy access for the trail to continue along the IBM property edge. Three large pecan trees are a picturesque backdrop to this potential trail entrance point. There are multiple homeless camps in the wooded regions north of the IBM campus in section 3, as well as in the woods east and west of the MetroRail Red Line in section 4 adjacent to the condominiums and apartments.

With the exception of wooded buffer zones adjacent to the Red Line Trail, all of the adjacent property is already developed. However, during a July 2017 meeting with Capital Metro , we were informed of Brandywine's Broadmoor Campus Master Plan. The Master Plan will redevelop the existing IBM campus into a mixed-use campus with apartments, condos/townhouses, hotel, and office/retail space. Capital Metro is planning a new transit station for this location and removing the existing Kramer Station. A subsequent meeting with Capital Metro , Brandywine, and Design Workshop resulted in a favorable consensus between all parties to see how the proposed Red Line Trail can be incorporated into the Broadmoor Campus Master Plan. The inclusion of the Red Line Trail in the Broadmoor Campus Master Plan has potential for strengthening the presence of the Red Line Trail not only as an urban multi-use trail but also as an important part of a larger transportation and connectivity hub.

3 UTILITY COORDINATION, PROPOSED UTILITY PROJECTS, AND EASEMENTS

Austin water mains, wastewater mains, storm water sewer systems, electric transmission lines, and natural gas lines information is available through the City of Austin's GIS information. These utilities and possible conflicts with the Red Line Trail routes are shown in **Appendix 6**.

3.1 Existing Utilities and Proposed Projects

On January 24th, 2019, Engineering Services Division (ESD) submitted 30% preliminary schematics containing alignment, proposed trail cross-section, and proposed water crossing locations to the Austin Utility Location Coordination Committee (AULCC) to receive existing utility information within the project location area. The 30% preliminary schematics can be found in **Appendix 7**. The submittal to AULCC allows the utility providers an opportunity to determine if any necessary upgrades or improvements to their facilities, in the area of the project limits. On January 24th, 2019, the AULCC met at the One Texas Center to transfer information on existing utilities to ESD. A summary of the responses, copy of email correspondence, and utility responses from agencies and utilities notified of the project are available in **Appendix 6**.

3.1.1 Austin Water Utility Water Facilities

Provided system maps and indicated that both a 12" water main and the 24" waste water main were in the project vicinity and that the alignments needed to be indicated on construction plans.

3.1.2 Public Works Street & Bridge Division

Indicated project was clear and that there were no planned improvements in the area.

3.1.3 Texas Gas Service

Indicated the project was clear and that there were no conflicts or infrastructure along the proposed route.

3.1.4 Austin Energy (AE)

AE indicated that there were overhead lines in the area and provided GIS information but that there were no apparent conflicts with their infrastructure.

3.1.5 Watershed Engineering Division (WED)

Indicated project was clear and that there were no planned improvements in the project area. WED provided GIS information from storm viewer.

3.1.6 ATT Utilities

Indicated project was clear and that there were no planned improvements in the area. However, they requested that utilities along the roadway, especially Brush Country Rd, be potholed. Their infrastructure in the area is so old, it may only have 12" of cover and if plans to grade for the trail were anticipated, field locating their lines would be necessary. – Call locate.

4 PERMITTING REQUIREMENTS

4.1 Summary of Permitting Requirements

The following sections summarize the permit requirements for the Red Line Trail project. These are the known permits required at the time of preparing the PER. There may be other permits required if new scope is added or if any findings are made during the design or construction process.

4.1.1 City of Austin

The project may qualify to be constructed under the General Permit Requirements. The process could take 3 to 6 months for approval and depends on public input. Multi-use trails constructed in City Right-of-Way (ROW) are subject to Sections 25-8-261 and 262 of the City Land Development Code. Based on the Watershed Protection Ordinance Phase One that is effective as of October 2013, the majority of the proposed trail alignments will require an administrative variance. The administrative variance will be for the location of the trail being within the 150 foot offset from the centerline of the major waterways (Little Walnut Creek and Walnut Creek) – development within the Critical Water Quality Zone. The process is administrative and will be processed by the reviewer at the time of permitting (per code City of Austin Land Development Code Section 25-8-42(B)(1)(d)).

There are also some alternatives that would require obtaining additional easements from property owners. The City of Austin process in obtaining easements takes on average 1 ½ year and is handled by the Office of Real Estate Services. Easement field note preparation by a registered surveyor would also be required

4.1.2 Right of Way Acquisition

A significant portion of the trail route will require the adoption of easements on private property and Capital Metropolitan Right of Way. A preliminary map of proposed easements can be found in **Appendix 7**.

4.1.3 State Permitting Requirements

The project is located within the Edwards Aquifer Transition Zone and is not subject to permitting under the Edwards Aquifer rules. The total disturbed area for this project is anticipated to be in excess of 5 acres, and a Storm Water Pollution Prevention Plan (SWPPP) will be required to be submitted to the Texas Commission on Environmental Quality (TCEQ).

4.1.4 Federal Permitting Requirements

The proposed trail alignment will cross Little Walnut Creek and Walnut Creek, as well as a number of tributaries of these creeks. The number of crossings depends on the trail alignment alternative that is selected. The crossing will be subject to the Clean Water Act Section 404.(f) (2), *“Any discharge of dredged or fill material into the navigable waters incidental to any activity having as its purpose bringing an area of the navigable waters into a use to which it was not previously subject, where the flow or circulation of navigable waters may be impaired or the reach of such waters be reduced, shall be required to have a permit under this section. The U.S. Corps of Engineers typically requires a permit for construction within bodies of water (i.e., creeks, rivers and lakes), also known as waters of the United States (US).”*

A Nationwide Permit (NWP) - Linear Transportation Projects. *“Activities required for the construction, expansion, modification, or improvement of linear transportation projects (e.g., roads, highways, railways, trails, airport runways, and taxiways) in waters of the United States. For linear transportation projects in non-tidal waters, the discharge cannot cause the loss of greater than 1/2-acre of waters of the United States. For linear transportation projects in tidal waters, the discharge cannot cause the loss of greater than 1/3-acre of waters of the United States. Any stream channel modification, including bank stabilization, is limited to the minimum necessary to construct or protect the linear transportation project; such modifications must be in the immediate vicinity of the project. This NWP also authorizes temporary structures, fills, and work necessary to construct the linear transportation project. Appropriate measures must be taken to maintain normal downstream flows and minimize flooding to the maximum extent practicable, when temporary structures, work, and discharges, including*

cofferdams, are necessary for construction activities, access fills, or dewatering of construction sites. Temporary fills must consist of materials, and be placed in a manner, that will not be eroded by expected high flows. Temporary fills must be removed in their entirety and the affected areas returned to pre-construction elevations. The areas affected by temporary fills must be re-vegetated, as appropriate. This NWP cannot be used to authorize non-linear features commonly associated with transportation projects, such as vehicle maintenance or storage buildings, parking lots, train stations, or aircraft hangars. Notification: The permittee must submit a pre-construction notification to the district engineer prior to commencing the activity if: (1) the loss of waters of the United States exceeds 1/10-acre; or (2) there is a discharge in a special aquatic site, including wetlands. (See general condition 31.) (Sections 10 and 404) Note: Some discharges for the construction of farm roads or forest roads, or temporary roads for moving mining equipment, may qualify for an exemption under Section 404(f) of the Clean Water Act (see 33 CFR 323.4)."

4.2 Environmental Resource Inventory

In order to minimize impacts to biological and cultural resources and minimize pedestrian exposure to hazardous materials, the City of Austin has contracted with Baer Engineering, as a sub consultant of Heil Lee Associates, to prepare a combined Environmental Site Assessment and Environmental Resource Inventory in the form of an Environmental Constraints Map and Report for the proposed Red Line Trail project in North Austin. The full report can be found in **Appendix 8**.

The Environmental Constraints Map and Report provides a list and description of spills, historical events, and/or other environmental issues that have the potential to impact construction of the project. The constraints encountered in the vicinity of the proposed trail route include:

- *Petroleum Storage Tanks*
- *Leaking Petroleum Storage Tank and Industrial Hazardous Waste Site*
- *Industrial Hazardous Waste Site*
- *Wetland Critical Environmental Feature*
- *Erosion Hazard Zones*
- *COA Critical Water Quality Zones*
- *Wetland Critical Environmental Features*
- *City of Austin Fully Developed Floodplain*
- *Wetland Critical Environmental Features*
- *Federal Emergency Management Agency 100-Year Floodplain*

- COA Parkland

5 ENGINEERING ANALYSIS

5.1 Road Crossings

Within the limits of the Red Line Trail route, there are three (3) road crossings. One is an existing crossing located at Kramer Lane adjacent to Kramer Station. The second is proposed at the private road through the IBM campus where it crosses the MetroRail Red Line, and the third is near the intersection of Gracy Farms Lane and the MetroRail Red Line.

The existing crossing at Kramer Lane is signed but not signaled. Increased traffic due to the proposed trail will likely necessitate installation of a Pedestrian Hybrid Beacon crossing at each location.

5.2 Creek/Water Crossings

Based on field observations, there are five (5) feasible water crossings associated with the proposed trail alignment. Two (2) are storm water drainage crossings, and three (3) are creek crossings of Little Walnut Creek or its tributaries. Because of permitting issues, efforts to minimize the construction footprint, and future maintenance of any crossings, the number of creek crossings is to be minimized.

The proposed drainage crossings will be traversed with culverts. All proposed creek crossings are to be bridge crossings, due to the steep grades at these locations. The bridge crossings would span the creeks and avoid the significant trees. The width of the culverts and bridges will be a minimum of 15 feet wide, but may be 16-18 feet wide to reduce impacts on traffic on the crossings.

The trail and the crossings are subject to the City of Austin Land Development Code Chapter 25-8-262 (C) which states “In all watersheds, multi-use trails may cross a critical water quality zone of any waterway.” Creek/Water Crossings are identified on the maps provided in **Appendix 9**.

5.3 Floodplain

The current effective floodplain depicted on City of Austin Geographic Information Systems (GIS) reflects the study prepared by Gebhard Sarma Group, Inc., dated November 1996 in conjunction with the City of Austin Watershed Protection Department (WPD). It is important to note that this information is not the official model as indicated by the WPD. The official model must be requested from the Federal Emergency Management Agency (FEMA) Regional Office.

For preliminary purposes, the model information parameters provide by WPD were utilized for this report. The WPD disclaimer still applies: *“This hydrologic or hydraulic model information is made available by the City of Austin as a service to the community, but is not intended to be used without independent engineering judgment as to its applicability to a particular scenario. The City of Austin makes no warranties, expressed or implied, concerning the accuracy, completeness, reliability, or suitability of the information provided. A Texas Licensed Professional Engineer must certify any results developed through the use of this model information that are submitted to the City as part of the land development review and permit approval process.”*

The 100-year floodplain reflected on the City of Austin’s GIS does fall within reason of the model floodplain elevation results. The Watershed Master Plans Walnut Creek and model result table is provided in Appendix 8. Four of the proposed crossings are not covered in the existing watershed models. As such, The City of Austin has contracted with Miller-Gray Engineering, LLC. as a sub consultant of Heil Lee Associates, to analyze the floodplain in the vicinity of the proposed crossings. The results of this study are referenced in **Section 5.2**. The full study titled *“Hydrologic and Hydraulic Analysis for Preliminary Engineering Report Red Line Trail Walnut Creek Trail to Braker Lane”* can be found in **Appendix 9**.

5.4 Critical Water Quality Zone

In all watersheds, multi-use trails, including hard-surfaced trails, may cross a Critical Water Quality Zone of any waterway (ECM – 1.5.3). A hard-surfaced trail is allowed within the CWQZ if it is located outside of the erosion hazard zone, is a maximum of 12 FT wide, and is located not less than 25 FT from the centerline of the waterway in an urban watershed.

As per Section 25-8-261 (B)(3)(d) in the Land Development Code, proposed trail alignment cannot be located less than 25 FT from the centerline of the creek if within an urban watershed. The proposed Red Line Trail Alternatives are located within an urban watershed and the proposed alignments are located over 25 FT from the creek centerline except at the creek crossings identified in **Appendix 9**. As part of the design phase of the Red Line Trail project, administrative variances will be requested for each crossing, and for the overall trail width of 15 feet.

5.5 Erosion Hazard Zone

The City of Austin defines the Erosion Hazard Zone (EHZ) as “an area where stream channel erosion is likely to result in damage to or loss of property, buildings, infrastructure, utilities or other valued resources.” Since this project is partially located adjacent to a waterway, an erosion hazard analysis is required.

Construction within the EHZ will require armoring to prevent erosion. The erosion hazard review zone is established for Walnut Creek, Little Walnut Creek, and a number of unnamed tributaries of each, adjacent to the waterways about 100 FT from the creek centerline as per the City of Austin GIS data. Erosion Hazard Zones are identified in **Appendix 12**.

5.6 Tree Impacts

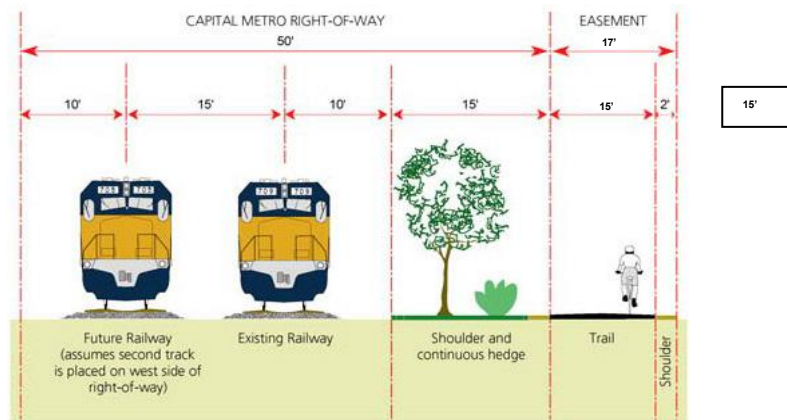
Based on site walk observations, there will be minimal impact to trees along the Red Line Trail. The section from Braker Lane up to the inner loop road at IBM is mostly un-vegetated where the trail is proposed. From IBM’s campus to the trail’s terminus at MoPac Expressway, the proposed trail is located where the urban forest is generally equally populated and dense. Moving the trail slightly to accommodate grade or other site considerations should not change the overall tree impact. As such, the final trail placement will not impact trees more or less than any alternates that are being considered at this stage. Given adequate easements, it should be possible to align the trail such that the majority of the protected trees can be avoided. A map of tree canopy can be found in **Appendix 13**.

Protected trees are considered those with a diameter of nineteen (19) inches or greater.

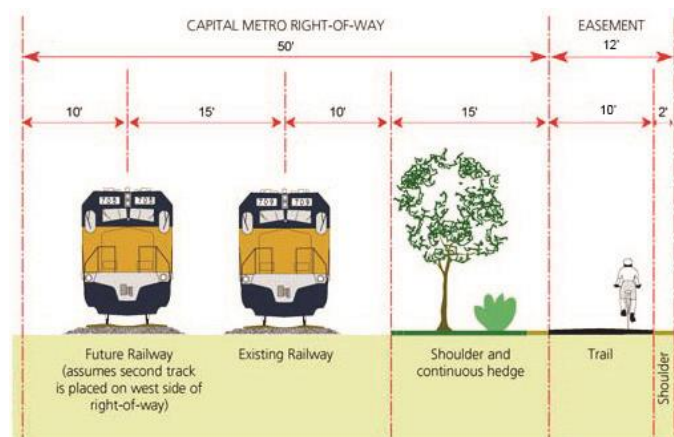
The field reconnaissance of trees was visual observations only. A certified tree survey will need to be completed prior to designing the proposed trail for the chosen alignment. Alignment shifts due to field tree survey should be minimal in order to avoid impacts to trees.

5.7 Trail Proposed Cross Section

The preferred trail width for the proposed Red Line Trail is 15 feet. This width is based on the most recent design methodology adopted by the City of Austin, Capital Metropolitan Transportation Authority and the Texas Department of Transportation. The recommended width consists of two five-foot wide bicycle lanes in opposite directions, and one 5-foot path for pedestrians and ADA access. Standard city urban trail details can be found in **Appendix 14**. Examples of preferred trail dimensions and minimum trail dimensions are shown in **Figures 8 and 9**.



Preferred Trail Dimensions (NTS)



Minimum Trail Dimensions (NTS)

Figures 8 and 9: Preferred Trail Dimensions/Minimum Trail Dimensions

5.8 Public-Trail Interface

Though the proposed Red Line Trail is part of the City of Austin's Urban Trail Master Plan and increases the community's connectivity to surrounding neighborhoods, parks, and businesses, some of the alternative alignments may pose some public concerns. As of the final Public Outreach meeting for the Red Line Trail, there has been no negative public input concerning the proposed route.

6 PUBLIC INPUT

6.1 History

PWD's Engineering Services Division has been tasked with designing a "rails with trails" section of the Metro Rail Red Line Trail. Extending from Braker Lane to MoPac Expressway at Park Bend, this roughly 1.5 mile section of trail is located in the "Priority 5" quadrant, as identified in the June 2007 Capital Metro Rail-with-Trail Feasibility Study. The Red Line Trail is intended to be a

key link to the existing City of Austin Walnut Creek Trail. It was also included as part of the Tier One Urban Trails. A detailed public input process was utilized to inform and engage the citizens about the Austin Urban Trails Master Plan and Bicycle Master Plan update. Since both plans work together to create the overall Active Transportation Network, the public input process for both was combined and occurred simultaneously.

6.2 Goals for the Red Line Trail

The Community Services Division of the City of Austin's Public Works Department has been chartered with fostering the development of the urban trail program. Their mission is stated as follows:

"An Urban Trail is defined as: 'A citywide network of non-motorized, multi-use pathways that are used by bicyclists, walkers, and runners for both transportation and recreation purposes.'"

The benefits of Urban Trails include:

- ◆ Provide economic benefits to the City: the cost of constructing roadways is 50 times greater than the cost of constructing cycle tracks, and 12 times greater than the cost of constructing Urban Trails,
- ◆ Help everyone save money: the cost of owning a vehicle is nearly 73 times greater than the cost of owning a bicycle,
- ◆ Support a healthy lifestyle by giving people the opportunity to be physically active, which in turn can reduce their risk of heart disease, obesity, depression, diabetes, and other health problems,
- ◆ Help reduce traffic congestion by having fewer vehicles on the road,
- ◆ Help reduce pollution,
- ◆ Increase safety by providing protected pedestrian and bicycle infrastructure,
- ◆ Enhance accessibility and mobility by providing more transportation options,
- ◆ Increase urban accessibility for people of all ages, from 8 to 80,
- ◆ Provide opportunities for social interaction and community engagement,
- ◆ Increase access to nature,
- ◆ Help stimulate economic growth by attracting businesses and residential development, and
- ◆ Encourage bicycle ridership and walking.

The goals expressed the Urban Trails Master plan reflect the desires of the citizens, elected and appointed officials, and the staff of the City of Austin, and build upon the vision established by the City's Comprehensive Plan. They are expressed as follows:

- Goal #1: Provide easy access to Urban Trails for both transportation and recreation users from all parts of the City.
- Goal #2: Link all Urban Trails to the on-street bicycle and sidewalk network around them.
- Goal #3: Ensure that all Urban Trails are adequately sized to accommodate both recreation and transportation uses.
- Goal #4: Incorporate trail amenities and features that transform them from a paved surface into unique greenways that reflect the City around them.
- Goal #5: Provide adequate funding and resources to maintain and operate Urban Trails in Austin.
- Goal #6: Ensure that all Urban Trails are context-sensitive and environmentally sustainable as well as preserve and improve upon wildlife habitat.

6.3 Trail Level of Service

The proposed trail is part of a multi-modal, non-motorized transportation network. As departments of transportation look to the future, all modes of transportation must be considered/analyzed. As such, the industry standard in evaluating the various modes of transportation is Level of Service (LOS). Though level of service in the past has been primarily for motor vehicle traffic speed and delay, LOS indicators for non-motorized modes have been developed. The 2010 Highway Capacity Manual created urban Level of Service for both walking and cycling. Since then, the LOS for both have been refined. Some of those references can be found at the Victoria Transportation Policy Institute <http://www.vtpi.org/tdm/tdm129.htm>.

Typically when evaluating trail alternatives, each route is drastically different, and the level of service for each route can be significant in determining the optimal route. However, in the case of Red Line Trail, each of the proposed route alternatives closely follows the MetroRail Red Line, resulting in statistically identical levels of service with the west side of the track being slightly better because of existing and proposed bus and rail stops. The following parameters are weighted heavily as indicators for preserving the health, safety, and welfare of the public:

Network continuity, network quality, road crossings, traffic protection, congestion and user conflicts, topography, sense of security, weather protection, cleanliness, attractiveness, and marketing of the facilities.

Tables 5, 6, and 7 will be used from the Victoria Transportation Institute (Dixon 1996) to compile a level of service for the proposed route.

Table 5 Pedestrian Level-of-Service

	Pedestrian	Points	Red Line Trail
Facility (Max Value = 10)	Not continuous or non-existent	0	0
	Continuous on one side	4	0
	Continuous on both sides	6	6
	Min. 1.53 m (5') wide & barrier free	2	2
	Sidewalk width >1.53 (5')	1	1
	Off-street/parallel alternative facility	1	1
Conflicts (Max Value = 10)	Driveways & sidestreets ¹	1	3
	Ped. Signal delay 40 sec. or less	0.5	0
	Reduced turn conflict implementation	0.5	
	Crossing width 18.3 m (60') or less	0.5	.5
	Posted speed starts at 30 mph along route ²	5	0
	Medians present	1	1
Amenities (Max Value = 2)	Buffer not less than 1m (3'5")	1	1
	Benches or pedestrian scale lighting	0.5	.5
	Shade trees	0.5	.5
Motor Vehicle LOS (Max. value = 2)	LOS = E, F, or 6+ travel lanes ³	0	0
	LOS = D, & < 6 travel lanes	1	0
	LOS = A, B, C, & < 6 travel lanes	2	0
	No Motor Vehicle Lane Adjacent	3	3
Maintenance (Max. value = 2)	Major or frequent problems	-1	0
	Minor or infrequent problems	0	0
	No problems	2	2
TDM/Multi Modal (Max. value = 1) ⁴	No support (no existing network in place)	0	0
	Support exists	1	0
Total			21.5
LEVEL-OF-SERVICE			A

1. There are no adjacent vehicular travel lanes. As such optimum conditions were chosen for these values.

Shaded areas are those indicators that are either common to all alternates or where the level of design would render them subjective.

Table 6 **Bicycle Level-of-Service**

	Bicycle	Points	Red Line Trail
Facility (max. value = 10)	Outside lane 3.66 m (12')	0	0
	Outside lane 3.66-4.27m (12-14')	5	0
	Outside lane >4.27m (14')	6	6 ¹
	Off-street/parallel alternative facility	4	4
Conflicts (max. value = 10)	Driveways & sidestreets ¹	6	6 ¹
	Barrier free	0.5	.5
	No on-street parking	2	2 ¹
	Medians present	0.5	.5
	Unrestricted sight distance	0.5	.5
	Intersection Implementation	0.5	.5
Speed Differential (Max. value = 4)	>48 KPH (>30 MPH)	0	
	40-48 KPH (25-30 MPH)	1	
	24-30 KPH (15-20 MPH)	2	2 ¹
Motor Vehicle LOS (Max. value = 2)	LOS = E, F, or 6+ travel lanes ³	0	
	LOS = D, & < 6 travel lanes	1	
	LOS = A, B, C, & < 6 travel lanes	2	2 ¹
Maintenance (Max. value = 2)	Major or frequent problems	-1	0
	Minor or infrequent problems	0	0
	No problems	2	2
TDM/Multi Modal (Max. value = 1)	No support (no existing network in place)	0	0
	Support exists	1	0
Total			26
LEVEL-OF-SERVICE			A

1. There are no adjacent vehicular travel lanes. As such optimum conditions were chosen for these values.

	Shaded areas are those indicators that are either common to all alternates or where the level of design would render them subjective.
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Table 7 Level of Service Ratings

LOS	Points
A	>17
B	>14-17
C	>11-14
D	>7-11
E	>3-7
F	3 or less.

6.4 Public Meeting

As criteria of the Urban Trail Master Plan requirements for a Preliminary Engineering Report, public meetings are required in order to present trail alternatives and obtain public input. On December 13, 2017, a meeting was held at the Whole Foods Domain to present trail options to the public. During the presentation, citizens asked questions about the current Red Line Trail segment under study, about the City of Austin Urban Trail Program as a whole, and provided suggestions for additions to the program. A compilation of the meeting comments was prepared by the Community Services Division. A follow up meeting was held on February 20, 2019. The compiled information includes all comments and can be obtained from CSD. The summary of comments is provided in **Appendix 15**.

There are studies that have been commissioned across the United States that evaluate trail implementation. With increase in use by fellow neighbors, studies have indicated a reduction in crime along urban trails (Tracy, Morris 1998; Macy, Alexander, Macdonald, Ford 1995; Blanton 2000). Without the ability of motorized vehicle use on the trail, theft is also reduced.

With the additional mobility network via a trail, national trends have shown to increase property values (Racca, Dhanju 2006; Macy, Alexander, Macdonald, Ford 1995; Blanton 2000).

1. Tracy, Tammy ; Morris, Hugh, January 1998, Rails-Trails and Safe Communities

http://www.railstotrails.org/resources/documents/resource_docs/Safe%20Communities_F_lr.pdf

2. Greer, Donald L., June 2000, Omaha Recreational Trails: Their Effect on Property Values and Public Safety

<http://www.unomaha.edu/recadmin/trails/omahatrails.pdf>

3. Racca, David P.; Dhanju, Amardeep, November 2006, Project Report for Property Value/Desirability Effect of Bike Paths Adjacent to Residential Areas <http://128.175.63.72/projects/DOCUMENTS/bikepathfinal.pdf>

4. Macy, Sydney Shafroth; Alexander, Leslie T.; Macdonald, Stuart H.; Ford, Chris, March 1995 The Effect of Greenways on Property Values and Public Safety <https://www.broward.org/Greenways/Documents/coloradostudy.pdf>

5. Blanton, Whit, 2000, A Study of trail impacts on property values, noise and crime <http://www.townbranch.org/info/2004/06/10/what-impact-do-trails-have-on-neighbors-and-the-local-community/>

7 RECOMMENDATIONS

7.1 Proposed Improvements

The proposed alignment for the Red Line Trail runs to the west of the MetroRail Red Line for a number of reasons. Along Segment 1, the primary obstacle is the existing MetroRail Station, which includes rail stop infrastructure on both sides of the track. Additionally, the east side has a bicycle storage structure as well as sidewalks that would need to be demolished, relocated, or a combination of both. While more than half of the eastern side of Segment 2 has the ideal geometry for the proposed trail, the last half includes an oblique rail crossing, after which, it narrows significantly, has a drop-off of more than 15 feet, and consists of rim-rock over an already impacted water quality pond. The western side of Segment 2, while narrowing significantly due to adjacent retaining walls and isolated wetlands, is more navigable and will result in simpler, less expensive construction. Segment 3 is located between the Charles Schwab campus to the east and the IBM Campus (Future Broadmoor Development) to the west. While both sides contain densely wooded paths and unnamed tributaries that will need to be crossed, nearly half of the eastern stretch is adjacent to either an existing, impacted water quality pond or marshy wetlands, requiring significant bridging to navigate. Consequently, the western stretch was chosen along with Segment 3. The final segment (Segment 4) along the MetroRail Red Line is largely undeveloped parkland with numerous seeps, creeks, and rim-rock deposits. Both sides of the rail consist of significant, repeated elevation changes that can largely be avoided by following a path that hugs The Village at Gracy Farms Apartments to the west. This will minimize the number of crossings and limit the topographic changes to manageable, ADA qualifying slopes.

The preferred route emphasizes the Urban Trail program's goal of creating an "all ages and abilities, all weather, connected" trail network. The recommended route creates a shared use, non-motorized path connecting neighborhoods, parks, and businesses. The trail will serve as an amenity for the surrounding community so that nature can be enjoyed. The recommended route will provide a safer route for joggers, walkers, cyclists, and users with disabilities alike. A user's sense of safety while using this urban trail is emphasized with this alternate. Safety and operational hours can be increased through the installation of trail lighting. Trail lighting that is well placed, properly installed and frequently maintained can improve visibility, increase overall trail access and convenience, and give trail users a

sense of security while passing through at night. Examples of Trail Lighting alternatives can be found in **Appendix 16**.

The level of service for the recommended route is greater in comparison to existing alternatives, consisting primarily of existing indirect travel through adjacent neighborhoods along limited bike lanes and sidewalks along nearby roadways.

7.2 Opinion of Probable Construction Costs

The recommended route's construction cost is estimated at approximately **\$3,218,000.00**. The estimate is based on average City of Austin bid prices between 2015 and 2018 and conceptual design. Construction costs may vary depending on the final design and field conditions at the time of construction. The Opinion of Probable Construction Cost is provided in **Appendix 17**. The quantities for the recommended proposed trail alignment have been estimated using GIS / LIDAR information. The estimated construction costs are preliminary and are based on proposed trail alignments at the preliminary review stage. The level of accuracy will increase as the design moves forward and topographic surveys become available.

7.3 Preliminary Schedule

The Schedule reflects

Project Phase	Duration	Start	Finish
Design Phase	18 Months*	March 2019	Sept. 2020
Land/ Easement Acquisition (Concurrent)	2 Years	Sept. 2019	Sept. 2021
Bid /Award Phase	6-12 Months	Sept. 2020	Sept. 2021
Construction Phase	12-18 Months	Sept. 2021	Early to Mid 2023