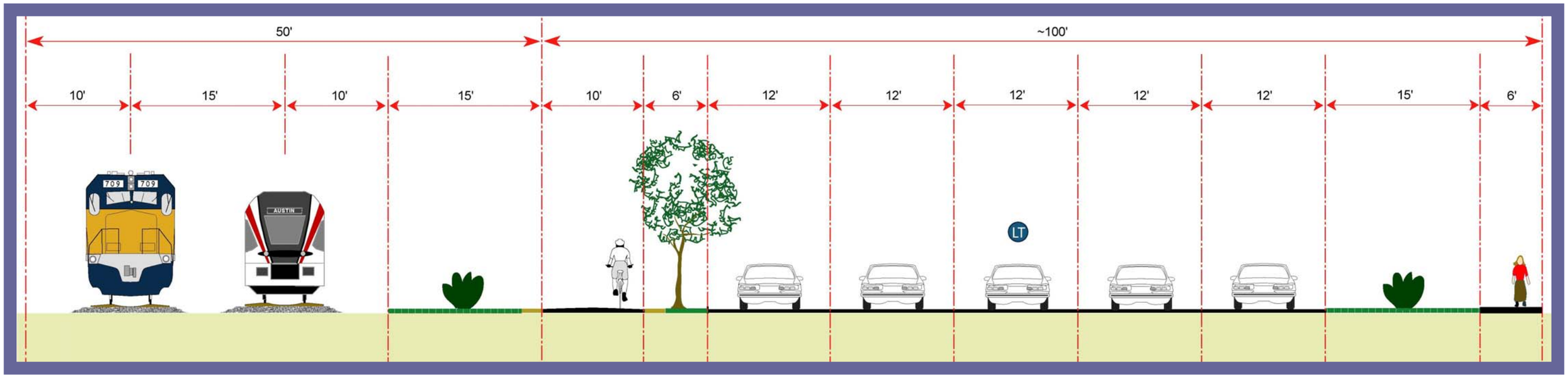
Capital Metro Rail-with-Trail Feasibility Study

Downtown Austin to Leander, Texas

June 12, 2007



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Randy Hume, Commuter Rail Project Office
Julie Martin, Community Involvement Team Coordinator
Bill LeJeune, Rail Operations Manager

Consultant Team

Lockwood, Andrews & Newnam, Inc.
Bowman-Melton Associates, Inc.
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Executive Summary

During Capital Metropolitan Transportation Authority's (Capital Metro's) 2004 All Systems Go public meetings, the Capital Metro service area communities encouraged the agency to begin planning for pedestrian and bicycle trails along its planned rail lines wherever possible. With this study, Capital Metro has begun planning for pedestrian and bicycle connections along the entire Austin to Leander rail corridor. Capital Metro has already committed over $7.2 million of its transit sales tax to trails development over the past six years.

The agency adopted safety guidelines for implementing trail connections along its corridors in September 2005. This 2006-07 feasibility study project utilized these guidelines as the criteria within which the railroad rights-of-way can be utilized for construction and operation of bicycle and pedestrian facilities.

For the development of this project, Capital Metro partnered with area stakeholders who provided valuable input, feedback and direction for this feasibility study along its MetroRail Commuter Line.

Input to this process has come from representatives of Capital Metro; the cities of Austin, Cedar Park and Leander; the Counties of Williamson and Travis; Texas Department of Transportation (TXDOT) and Capital Area Metropolitan Planning Organization (CAMPO); as well as cycling and pedestrian advocacy groups, civic leaders, neighborhood groups and owners of properties within the Transit Oriented Development-zoned properties along the MetroRail corridor.

After an initial stakeholder work group meeting and high-railer tour of the entire corridor in July 2006, to assess the levels of effort required (Task 1), a notice for the feasibility study to proceed (Task 2) was issued in August 2006. Task 2 included determining the amount of right-of-way available and potential costs for inclusion of connections to as many of the station platforms as feasible. These connections were to be focused on access from neighborhoods to employment, schools, parks and other civic destinations.

Stakeholder meetings were held in October and December of 2006, and again in late March of 2007. At each meeting, the working group demonstrated clearer and stronger support for creating as many feasible non-motorized connections to, from and/or within the corridor as possible. There was general agreement with the variety of connections identified; however, presentation of the initial technical prioritization of these led to additional feedback and reordering of the phase implementation based on stakeholder knowledge of emerging land developments.

In the spring of 2006, the adoption of special zoning by the cities of Leander and Austin established Transit Oriented Development Zones (TODs). These TOD districts have presented new opportunities to major landowners and developers, providing new synergy and energy to potential redevelopments within them. Late in the process, a new draft plan for North Burnet/Gateway area surfaced, adding urgency to reserving placeholders for future trail connections when that plan is adopted and advances toward more expedited implementation.

The study evaluated potential alignments, and developed concepts for 11 candidate projects. From south to north, these are:

1. **Downtown to Wilshire Boulevard (project corridor length: 5.03 mi.)**
2. **Wilshire Boulevard to Highland Mall Station (project corridor length: 2.77 mi.)**
3. **Highland Mall Station to Morrow Street (project corridor length: 1.45 mi.)**
4. **Morrow Street to Research Boulevard (project corridor length: 2.28 mi.)**
5. **Research Boulevard to Mo Pac at Park Bend (project corridor length: 3.41 mi.)**
6. **Mo Pac at Park Bend to Howard Lane (project corridor length: 3.37 mi.)**
7. **Howard Lane to FM 620 at Parmer Lane (project corridor length: 4.59 mi.)**
8. **FM 620 at Parmer Lane to the proposed Brushy Creek Trail (project corridor length: 3.10 mi.)**
9. **Brushy Creek (drainageway) to Brushy Creek Road (project corridor length: 2.42 mi.)**
10. **Brushy Creek Road to Crystal Falls Road (project corridor length: 3.95 mi.)**
11. **Crystal Falls Road to the Leander TOD Zone (project corridor length: 2.17 mi.)**

Priorities for implementation of these potential projects were established first using a scoring matrix to determine which projects are the most technically feasible to begin implementing, then adjusted based on input from Capital Metro staff and the Stakeholder Work Group. The final recommended implementation prioritization is described in detail in Chapter 3. Following is a synopsis of the study's conclusions:

The **1st priority** recommendation is project 2, from **Wilshire Boulevard to Highland Mall Station.** This pedestrian connection beneath the elevated deck of IH 35 is a key non-motorized link between the near-East Austin neighborhoods and the Highland Mall MetroRail station platform that will be situated west of IH 35 along Airport Boulevard. The Capital Metro agency staff have already applied for federal funding assistance for this connection of approximately 2.1 miles of multiuse trail linking to public transportation.

The **2nd priority** recommendation is project 1, from **Downtown Austin north to Wilshire Boulevard** just east of IH 35, a distance of approximately 5 miles utilizing 2.8 miles of on-street connections, and 2.3 miles of off-street trails, plus another 1.2 miles of accessible sidewalk improvements. Early in the process, the study confirmed that no space is available for pathway facilities within this length of railroad right-of-way;

however, the on-street and sidewalk connections to the Convention Center, Plaza Saltillo and Martin Luther King (MLK) Jr. stations utilize portions of the City of Austin's existing on-street bikeway system, including a segment of the already programmed Lance Armstrong Bikeway. Routes for bicyclists on neighborhood streets were identified along both sides of the MetroRail corridor in many areas. Improvements and widening of the Boggy Creek pedestrian path will accommodate an expanded variety of user types. The development of a contiguous connection through the MLK, Jr. TOD Zone via urban hardscape connections to the station platform is recommended. Further north, potential exists for Safe Routes to School (SR2S) program funding if the Austin ISD is receptive to accommodating right-of-way through its Maplewood Elementary School property.

The **3rd priority** for implementation is from **Highland Mall Station to Morrow Street**, project 3, which connects both the Highland Mall and North Lamar stations. Clearly, the intersection of Airport Boulevard and North Lamar will need to be realigned to ensure pedestrian safety. With adequate provision of right-of-way within and north of the TOD zoning surrounding the North Lamar Station, this 1.3 miles of off-street trail plus 1.6 miles of on-street bikeway connections will benefit residents and employers in the Crestview area neighborhoods, expanding the MetroRail non-motorized catchment area for both the Highland Mall and North Lamar platforms.

The **4th priority** for implementation, from **Morrow Street to Research Boulevard**, project 4, utilizes mostly on-street bikeway and sidewalk connections. This segment could be consolidated with the priority 3 implementation, or remain a stand alone project. This approximately 2.9 mile on-street bikeway and .9 mile of off-street trail connection will strengthen the multiuse trail in the previous project (number 3) that leads from Morrow Street south to the North Lamar platform, thereby further enhancing the North Lamar MetroRail non-motorized catchment area. Potential exists for SR2S program funding if the school district is willing to accommodate trail right-of-way through its Burnet Middle School property.

The **5th priority** for implementation, **Research Boulevard to Mo Pac at Park Bend**, project 5, became more urgent as plans surfaced for the North Burnet/Gateway Master Plan in early 2007. This approximately 3.1 mile off-street trail connection and .6 mile of on-street bikeways acknowledges the already programmed extension of Rundberg, and is consistent with the City of Austin's planned extension of the on-street bikeway north from Research Boulevard along Burnet Road. This segment is a key link to the City of Austin's already programmed Walnut Creek Trail. For this project to be successful, additional right-of-way from adjacent landowners abutting the MetroRail corridor will be necessary.

Implementation of the **6th priority**, from **FM 620 at Parmer Lane to the Brushy Creek (drainageway)**, project 8, makes a key connection to a future Williamson County trail project along Brushy Creek, portions of which are already in development. This approximately 3.7 mile multiuse trail segment begins at the north side of FM 620 at Parmer, and re-enters the MetroRail corridor from Parmer Lane and connects to both sides of the Lakeline Station and its surrounding TOD Zone.

The **7th priority** for implementation is project 11, from **Crystal Falls Road to the Leander TOD Zone.** This approximately 3.1 mile multiuse trail fits entirely within the Capital Metro railroad right-of-way, extending to approximately one mile north of the Leander MetroRail station, connecting to a planned Williamson County trail. Much like the redevelopments within the Austin TOD Zones, it is anticipated that additional pedestrian connections would be made from within this very large TOD Zone as development here occurs.

The **8th priority** for implementation is project 6, from **Mo Pac Freeway at Park Bend north to the intersection of Howard Lane** at the railroad tracks**.** This approximately 3.6 mile multiuse trail connection mostly utilizes the MetroRail right-of-way, and extends the multiuse trail resources available to future residents and businesses in the North Burnet/Gateway area, and from the City of Austin's already programmed Walnut Creek Trail. Park Bend to Waters Park is already a key bikeway underpass beneath the Mo Pac main lanes for area cyclists.

The **9th priority** for implementation is project 10, from **Brushy Creek Road to Crystal Falls Road**, a distance of approximately 3.9 miles, entirely within the MetroRail right-of-way. This multiuse trail project would further extend the non-motorized catchment area from the Leander station, and would add value of the proposed SH 183A hike/bike trail when it is funded.

The **10th priority** for implementation is project 9, from the **future Brushy Creek (drainageway) to Brushy Creek Road**. This approximately 2.4 mile trail utilizes the north/east side of tracks along the Capital Metro right-of-way the entire distance, except where it crosses the tracks at Brushy Creek Road and continues along the west side of the tracks for the remaining distance through Cedar Park and Leander.

The **11th** and final **priority** for implementation is project 7, from **Howard Lane to FM 620 at Parmer Lane**, a distance of approximately 4.5 miles of multiuse trail. The most challenging aspect of this connection is how it will cross the Union Pacific (UP) railroad right-of-way that intersects with the MetroRail right-of-way very near the newly-created intersection of the realigned McNeil Road. A historic U.S. Post Office is located near the existing at-grade crossing of the railroad tracks.

Fully implemented, this system of connecting trails, on-street bikeway connections and pedestrian pathways encompasses approximately 30.9 miles of paved multiuse trails, 1.7 miles of improved, more walkable and fully accessible sidewalks, and 8.4 miles of improved and well marked on-street bikeways. At an estimated cost of $54.3 million (not including the value of any right-of-ways), the fully built out non-motorized connections will make these MetroRail public transportation terminals truly intermodal.

In addition to evaluating and prioritizing the corridor into these segmented projects, guidelines for recommended trail design elements, including strategies and types of trail/roadway crossings, trailheads,

trail amenities, trail safety and security are described and illustrated in Chapter 4. The master plan-level order-of-magnitude estimates of potential costs for the design and construction of the candidate facilities are summarized in Chapter 5, and provided in detail in **Appendix E. Estimated Potential Project Costs**.

Implementation priorities as listed above, as well as specific alignments that were identified as feasible, may need further adjustment, based on future development patterns and timelines. In every case, the final planning should incorporate each developer's plans in the final designs.

A major factor in successful implementation will be the creation of partnerships with developers, businesses and friends groups, to champion and enhance each of these projects. This plan assumes that all of the developments within these TODs will include well considered pedestrian permeability throughout. In keeping with the focus of this plan, it is essential that the trail connections to and through the station areas are incorporated in the site planning and design phases of each development. This is key to addressing the kinds of non-motorized conflicts that are often encountered as a result of inadequate consideration.

Based on the successes elsewhere around the U.S. of integrating bicycle and pedestrian access to rail stations – together with nearby mixed use developments – potential value can be added along the entire corridor, with the inclusion of these projects linking pedestrians and bicyclists to the commuter rail system.

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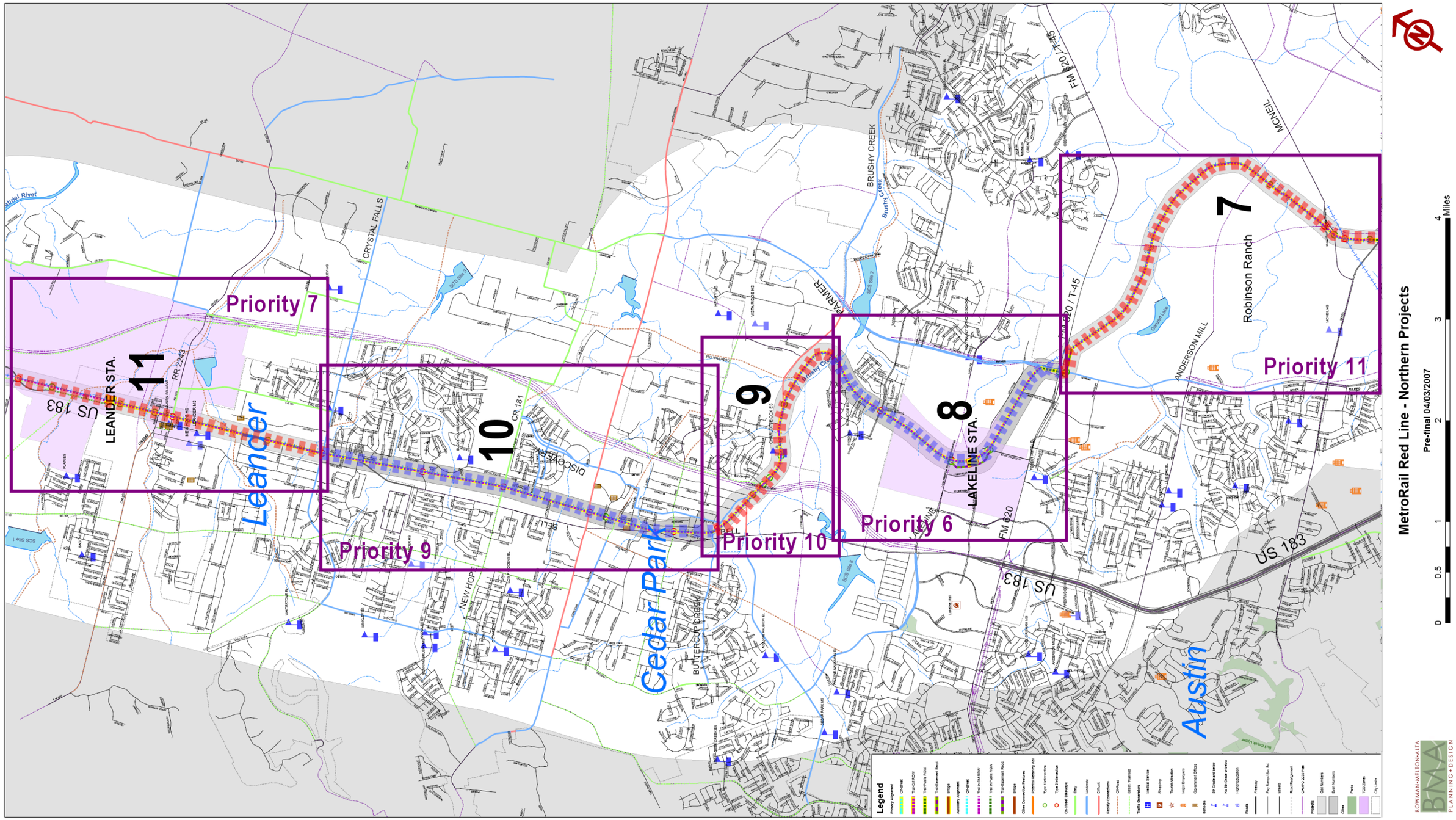
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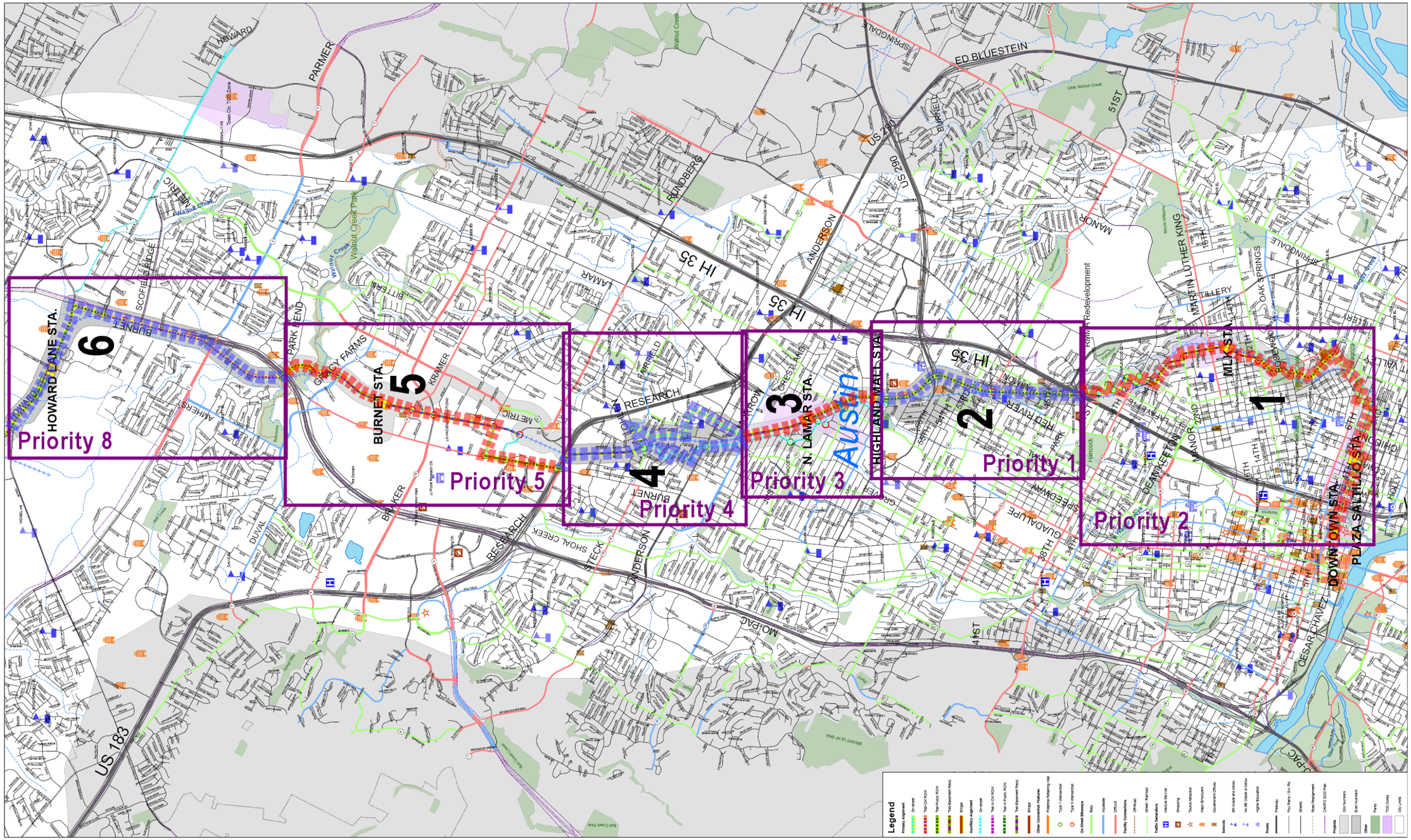
Leander
Cedar Park
Austin
US 183
FM 620 / T-45
CRYSTAL FALLS
BRUSHY CREEK
PARMER
MCNEIL
ANDERSON MILL
DISCOVERY
NEW HOPE
BUTTERCUP CREEK
Brushy Creek
Gattel Rivet
Legend
Miles
Pre-final 04/03/2007
MetroRail Red Line - Northern Projects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N. LAMAR STA.
MLK STA.
DOWNTOWN STA.
Austin
Legend
MetroRail Red Line - Southern Projects
Pre-final 04/03/2007
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Chapter 1. Study Area Overview: Introduction and Background

Existing Conditions

This study evaluated and identified feasible bicycle and pedestrian trail, sidewalk and on-street bikeway alignments – that serve adjacent neighborhoods and connect to Capital Metro *MetroRail* station platforms. These alignments have been prioritized, with public stakeholder input, into recommended connection projects. This study establishes an overall plan based on technical and stakeholder priorities, and includes estimated potential costs.

Capital Metro, according to its Five-Year Plan announced in 2004, intends to serve the evolving needs of the rapidly-changing area the agency serves. It expects to improve and expand transit services and infrastructure throughout the region, and address concerns and comments received during its public meetings. Among the Plan's key facility goals is a stated intent to offer "sufficient capacity for people and vehicles to support future rider growth."

During Capital Metro's 2004 All Systems Go open houses, workshops and briefings, the Capital Metro service area communities encouraged the agency to plan for pedestrian and bicycle trails along its rail lines. With this study, Capital Metro has coordinated this planning effort to identify potential pedestrian and bicycle connections along the entire Austin to Leander rail corridor.

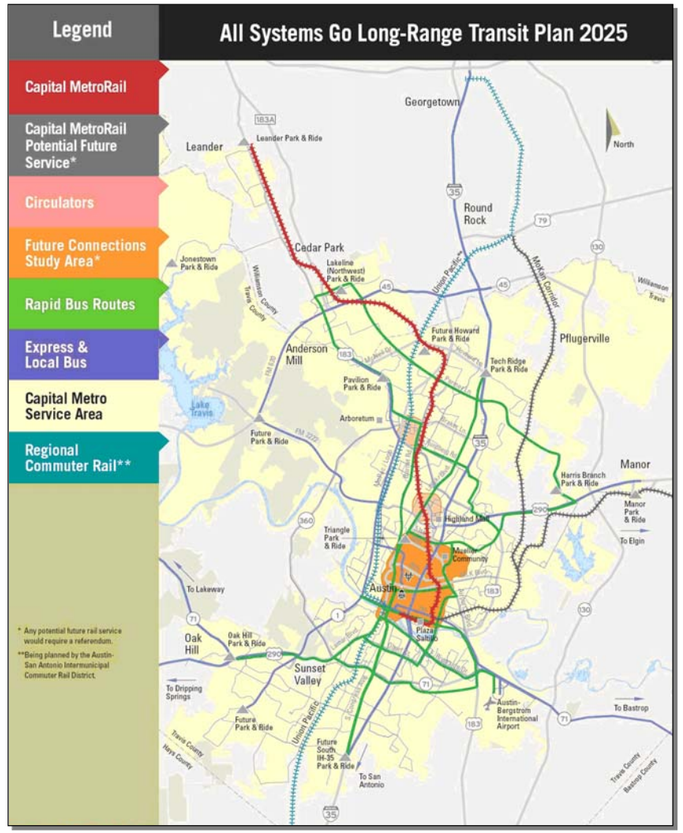
In September 2005, Capital Metro adopted its *Safety Guidelines For Recreational Trails Crossing and Adjacent to Passenger and Freight Lines*. The agency then established a Stakeholder Committee to help initiate this Feasibility Study as part of the development of the future Red Line from downtown Austin to Leander. Stakeholders have continued to provide guidance in determining routes and priorities throughout the Feasibility Study, the focus of which is to determine feasible bicycle and pedestrian trail alignments, and establish a set of prioritized connections to the Capital MetroRail Stations.

Other local efforts are also underway to plan for pedestrian and bicycle trails along other rail corridors within the Capital Metro service area. The Capital Area Metropolitan Planning Organization (CAMPO) has included an extensive matrix of planned bikeway and trail improvements in its *2030 Regional Bicycle System*, which were mapped and considered in the planning for this study.

CAMPO's *2030 Mobility Plan* includes eight bicycle and pedestrian planning policies that promote the provision of new bicycle and pedestrian facilities, connectivity, access to transit, enhanced bike/ped-friendly communities, and increased public awareness. An ad hoc committee of citizens and CAMPO member jurisdictions meets periodically to address regional bicycle and pedestrian planning issues. This CAMPO Bicycle & Pedestrian Subcommittee serves as a resource for bicycle and pedestrian coordination and information sharing. The regional planning authority includes "safe and convenient," "balance of mobility," and "choice of modes" in its vision statement of its *Mobility 2030 Transportation Plan*.

The City of Austin, through TxDOT, is conducting a design study for trail segments along Capital Metro's line to Manor and Giddings. TxDOT is also conducting a feasibility study within the MOKAN corridor to assess the potential for development of bicycle and pedestrian trails with future commuter rail.

Data collected and utilized for this study included aerial photographs and ESRI shape files for a 2 mile swath on each side of the railroad corridor indicating city limit boundaries, topographic contours, waterways, flood zones, major utility easements, streets, rail lines, planned rail stops, parcels, parks and green belts, bicycle and pedestrian trails, on-street bikeways, schools, major employers, major shopping areas, public attractions, government offices, future transportation plans and projects.



The MetroRail Red Line is scheduled to begin providing service from Downtown Austin to Leander in November 2008.

Projected Growth

The 500 square-mile Capital Metro service area includes Austin, Jonestown, Lago Vista, Leander, Manor, San Leanna, and portions of Travis and Williamson Counties. According to the U. S. Census Bureau, the combined population of Travis and Williamson Counties was 1,160,791 in 2003, over a nine percent growth increase in just three years. (Source: www.campotexas.org) Austin and the surrounding Central Texas region is experiencing rapid population growth. By the year 2010 Austin's population is projected to reach

800,000 according to the City's website. The combined population of the counties of Hays, Travis and Williamson is expected to increase to over 1.4 million by then.

Looking further out, the Greater Austin area's population is estimated to double in the next 25 years. The Austin to Leander MetroRail Red Line is one element of a long-range transit plan which includes Capital MetroRail, Capital MetroRapid, expanded Local and Express bus services, more Park and Ride locations and possible future rail services in Central Texas according to Capital Metro's All Systems Go! webpage.

Adjacent Land Uses

In the late 1990's, the Austin City Council adopted a *Smart Growth Initiative* to modernize Austin's long-range plan for growth. Its goal was to manage and direct growth so as to minimize damage to the environment and help build a more livable city. The principals of this initiative are consistent with the general policies of *Austin Tomorrow*, the city's comprehensive master plan for development, which discourages growth to the west to help protect Austin's water supply, and advocates growing the city's boundaries to the east, taking into account geographic and utility constraints.

The "Smart Growth" movement, in recent years, has since become a prominent national movement, as a way for cities to better manage and direct growth and redevelopment in ways that minimize environmental damage while creating more livable towns and cities. Smart Growth promotes a balanced, more livable mix of land uses and transportation that accommodates pedestrians, bicycles, transit and automobiles. The city established three major goals with its Smart Growth Initiative. They are 1) Determine how and where growth should occur, 2) Improve quality of life, and 3) Enhance the tax base.

Areas Supportive of Transit-Oriented Development

To foster and guide its growth, the city is applying principles found in the emerging models of Traditional Neighborhood Development (TND), and Transit-Oriented Development (TOD). TOD zones, also identified as Desired Development Zones (DDZs), provide unprecedented opportunities for creating higher density live/ work/ shop/ play communities. During 2006, both the City of Austin and the City of Leander adopted TOD ordinances establishing six areas in Austin and one in Leander:

- The Downtown TOD, bisected by the proposed Lance Armstrong Bikeway, continues to develop and is already well established and is reasonably pedestrian friendly.
- The streets within the Plaza Saltillo TOD are already well utilized by bicyclists for purposeful trips.
- The Martin Luther King, Jr. TOD encompasses the soon to be developed Featherlite tract, where site planning is currently underway.
- The Crestview TOD Zone includes a 75-acre "Crestview Station" mixed use development north of North Lamar Blvd. along the eastern boundary of the Red Line, on the former Huntsman Chemical site that has since been remediated. Plans scheduled for completion by fall of 2008 include approximately 75,000 square feet of retail and office space, 800 apartments and condominiums, and 500 single family dwellings.
- The Lakeline Mall area TOD has two major landowners currently developing designs.
- The Leander TOD zone surrounds the Leander Park & Ride located adjacent to US 183. This area where the Leander MetroRail station will be located is envisioned as a new downtown for the city of Leander.

In addition, the Burnet station, while not in a designated TOD zone, has potential to serve The Domain and Domain Crossing developments, which already offer entertainment destinations and high-end retail shops, restaurants and other attractions, plus the University of Texas J.J. Pickle Research Campus and the IBM campus. Topographic challenges will require extensive structural strategies to connect to the City of Austin's planned Walnut Creek Trail north of the Burnet station. Phase I of The Domain, which opened in March 2007, features 700,000 square feet of high-end and contemporary fashion and restaurant space, 85,000 square feet of office space, and 393 multifamily units. Phase II of the development will include over 3 million square feet of office space, over 4,000 residential units, 900,000 square feet of retail space and two hotels, according to a March 2007 press release from Nordstrom, Inc. The Howard Lane station is not within a TOD zone, but has potential to serve future major development on former Robinson Ranch lands.

Future Rail Operations

Current freight operations will generally continue throughout Capital Metro's 162-mile rail-road between Llano and Giddings. Capital MetroRail commuter rail service between Leander and Downtown Austin is scheduled to begin in 2008, initially every 30 minutes during the morning and evening rush hours as well as one midday round trip.

The estimated travel time for the 32-mile trip from Leander to downtown Austin is approximately 50 minutes. Trains will operate at speeds up to 60 miles per hour, slowing down through curves, while in narrower corridors, and through dense land uses. For

passing between freight and transit operations, the commuter trains will utilize track sidings added at platform stops, near major freight loading operations, and at other strategic passing points.

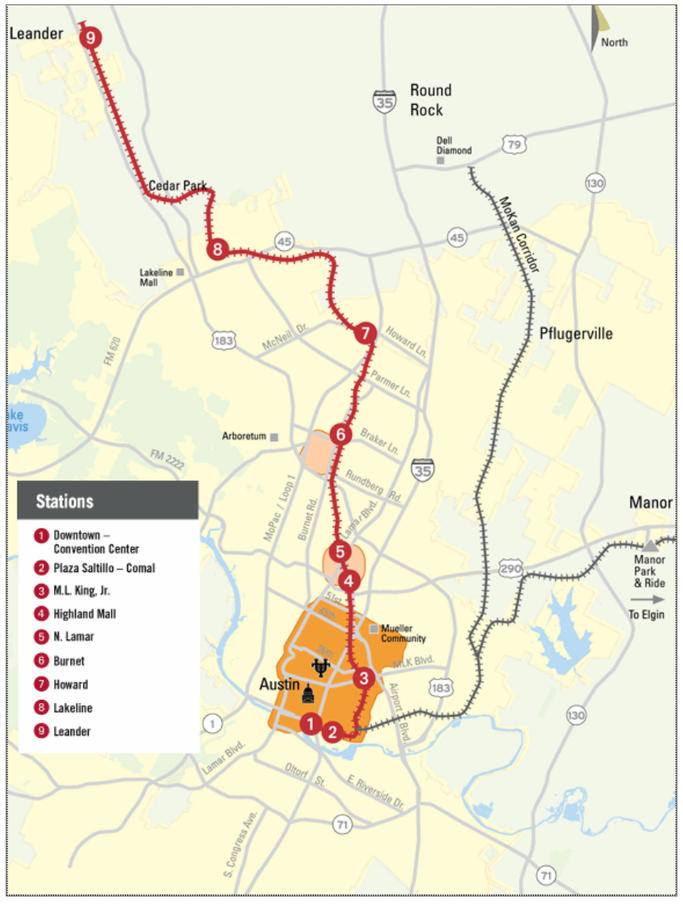
Full road crossing gate arms, called quad signal gates, are being installed on both sides of the tracks along with stationary horns at signalized railroad/roadway crossings. Non-motorized (trail-user) crossings of the railroad tracks will occur only at approved locations, almost always where roadways intersect the railroad tracks. It is assumed that wherever sidewalks do not currently exist along roadways leading to one of the primary rail-trail connections, they will be installed as part of the city's standard capital improvement project process.

Capital Metro already maintains the highest per capita ridership in Texas, with about 130,000 boardings daily. By 2025 it is estimated that Capital MetroRail will carry 17,000 riders per day along the Leander rail line. Trains will be "low-floor" vehicles, with bicycle racks located conveniently near the doors. The Capital MetroRail trains will be quieter than buses.

Only Howard Lane, Lakeline and Leander stations will offer automobile parking, while all others will have only drop off bays, or can be accessed by bus, on foot, or by bicycle.

The nine planned MetroRail Red Line stops include:

- Leander
- Lakeline
- Howard Lane
- Burnet
- North Lamar
- Highland Mall
- Martin Luther King, Jr.
- Plaza Saltillo – Comal
- Downtown.



Synopsis of Capital Metro Safety Guidelines

Capital Metro Safety Guidelines

In September 2005, Capital Metro adopted its *Safety Guidelines for Recreational Trails Crossing and Adjacent to Passenger and Freight Lines (Safety Guidelines)*, by railway condition types. These guidelines reflect those used in other parts of the U.S., and address trail setbacks and separation, trail width, and trail/rail crossings as summarized below.

RAILWAY CONDITION TYPES

Type I – Low Speed Rail in Urban Streets
- trains speeds at or below 20 MPH
- nearest obstacle at least 10' from track centerline
- bicycle paths most likely within adjacent street ROW.

Type II – Moderate Speed, Adjacent to Arterial Streets
- trains speeds between 20 and 45 MPH
- at least 10' clearance from track centerline to the nearest obstacle
- bicycle paths most likely within adjacent street ROW
- off-road paths located between street & tracks.

Type III – Moderate Speed Rail in Narrow ROW
- train speeds between 20 and 45 MPH
- bicycle paths most likely within adjacent street ROW
- ROW is typically 50' in width
- off-road paths located between street & tracks.

Type IV – High Speed Rail in Narrow ROW
- train speeds will be above 45 MPH where conditions permit
- off-road paths will not be allowed in the RR ROW unless 25' clearance is possible
- anticipate future double tracking or realignments

Type IV – High Speed Rail in wide ROW
- train speeds above 45 MPH
- a second railway track is planned generally to the east or north of the existing track
- bikeways should be located to the south or west of existing track
- inside edges of bikeways should be at least 35' from centerline where landscape buffer is provided the inside edge of bikeways can be 25' from centerline where a fence barrier is provided.

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Chapter 2. Public Input and Project Selection

Early in the project, an assessment was made of potential opportunities for, and constraints to creation of, a multiuse pathway system, or trail, along the Capital MetroRail Red Line corridor. Feasibility hinged on the connections being consistent with Capital Metro's adopted design guidelines and standards pertaining to trails along its active railways.

Various sources and public feedback guided the opportunities and constraints assessment, including field observations (including high-rail vehicle tours of the railroad corridor, with follow-up site visits), discussions with Capital Metro staff and stakeholders, detailed review of aerial photography and other available mapping data. Reviews were made of other relevant planning and design documents that were provided by the three cities and two counties through which the rail line passes. This chapter documents the public input process and addresses the overall trail opportunities and constraints that were identified. See **Appendix A. Opportunities and Constraints** for exhibits that highlight location-specific issues that were identified along the railroad corridor.

Public Input

Capital Metro partnered with area stakeholders by forming a Stakeholder Work Group to provide valuable input, feedback and direction to the feasibility study. After an initial meeting with this group (Task 1) in July 2006, to more thoroughly assess the levels of effort required for the study, followed by a high-railer tour of the entire corridor, a notice to proceed was issued in August 2006 for the feasibility study (Task 2). After most of the data for the study was assembled, a second high-railer tour of the alignment was conducted to more thoroughly assess the potential right-of-way available for inclusion of trails connecting to the planned station platforms. Follow up visits to areas along the corridor examined the potential for access to employment, schools, parks and other civic destinations in the event connections were feasible.

Additional stakeholder meetings were conducted in October and December of 2006, and again in March of 2007. At each of these sessions, the working group demonstrated clear support for creating as many non-motorized connections to and/or within the corridor as possible. There was general agreement among the group with the variety of connections identified; however, the initial prioritization of these was subsequently revised based on this additional working group feedback.

Connection Opportunities

This study identified opportunities for 30.9 miles of multiuse trails, 8.4 miles of on-street bikeways, and 1.7 miles of fully-accessible sidewalks. These links will provide key connections to major nearby destinations. Some connections identified in this study, to be feasible, will require acquisition of right-of-way or public use easements. Following is a summary of major opportunities identified during this study. See **Appendix A. Opportunities and Constraints Maps** for specific issues along the corridor.

Potential Connections to Commuter Rail Stations and Transit-Oriented Developments

Opportunities exist to provide direct trail connections to, and past, future commuter rail stations and surrounding TODs along the rail corridor. In some areas, these connections should be integrated as part of any developments, including future TODs near the MLK, Jr., North Lamar, Lakeline and Leander stations. Hardscapes could also be designed to lead bicyclists and pedestrians directly to and through the station areas. These opportunities exist at many of the planned station locations including M.L. King, Jr., North Lamar, Highland Mall, Howard Lane, and Leander. The final design of these connections through the station areas and TOD zones will need to address safe bicycle/ pedestrian accommodation, and properly address potential conflicts with other transportation users.

Potential Connections to Schools and Parks

Several schools and parks are located within close proximity of the Capital Metro railroad corridor. With the school district as a willing participant, trails could provide non-motorized student connections to Maplewood, Ridgetop and Charlotte Cox Elementary Schools, as well as Burnet Middle School. The trails could also provide non-motorized access to recreational destinations like Balcones or Walnut Creek Park.

Potential to Utilize Capital Metro Right-of-Way

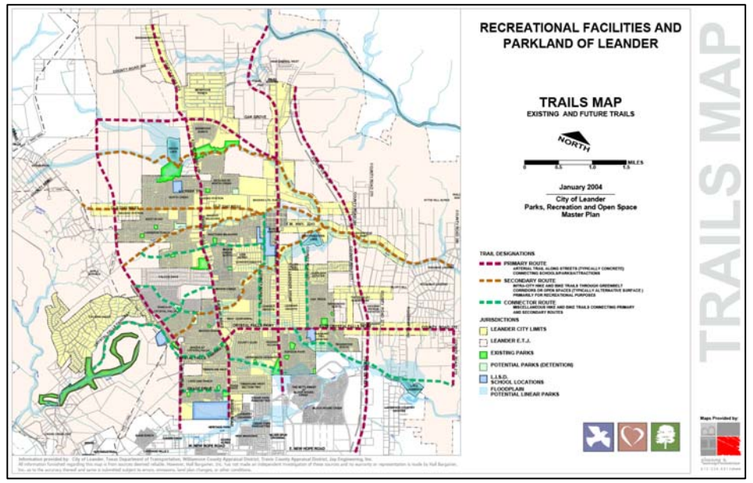
Depending on location, Capital Metro's right-of-way between Leander and Austin varies between 50 and 100 feet wide. Generally, most segments on the corridor's southern half are 50 feet wide while northern sections have a 100-foot right-of-way width. Capital Metro has expressed a strong willingness to accommodate connections from adjacent developments to its platforms where these connections are desired, but these decisions need first to be made by the owners of these properties.

Taking into account Capital Metro's trail setback standards and the agency's future railroad development plans, a trail can be built within the Capital Metro right-of-way in several locations. This is especially true in the corridor's northern sections that are characterized by relatively wide right-of-way widths and minimal existing adjacent development.

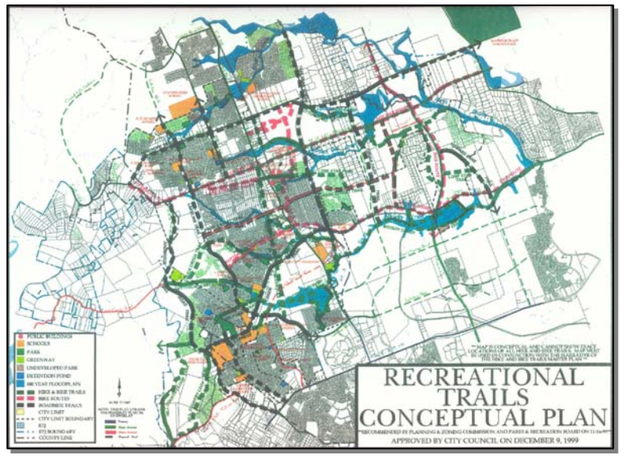
Potential Connections to (and Utilization of) Existing Trails and Other Bicycle/Pedestrian Facilities

Opportunities exist throughout the length of the railroad corridor to connect the trail with existing and planned bicycle/pedestrian facilities. City-designated bicycle routes intersect the railroad corridor in many locations, providing trail users with connections to outlying destinations.

Trails in each of the cities are planned and programmed in the vicinity of the railroad corridor, including a trail along Brushy Creek in Williamson County, and a trail following the future U.S. 183A toll road. Connections to these where appropriate were included in the mapping for this project.



The potential also exists to utilize existing trails along the railroad corridor, including the Boggy Creek Trail, as well as the already constructed bicycle/pedestrian bridges along Airport Boulevard. In addition to the City of Austin's planned and existing trail and on-street systems, both the cities of Cedar Park and Leander have conceptual plans for trails and on-street bikeway connections. Cedar Park's *Recreational Trails Conceptual Plan* was adopted in December of 1999, and Leander's *Trails Map* from its *Parks, Recreation and Open Space Master Plan* is dated January 2004.



Potential to Utilize Street Rights-of-Way

Street rights-of-way can be utilized in areas where physical constraints or other factors preclude trail development within the railroad right-of-way. Several major streets along the corridor (including segments of Airport Boulevard, Metric Boulevard, and Howard Lane) currently have sufficient right-of-way to accommodate a trail separated from the roadway. In other areas, trail connections could be achieved by utilizing low-volume residential streets (with pedestrians using sidewalks and bicyclists using the roadway).

Potential to Utilize Existing Grade-Separated Crossings
Potentially difficult trail/ street crossings could be addressed in some areas by utilizing existing grade-separated railroad/ street crossings. Sufficient room exists to route a trail through existing grade-separated crossings in several locations, including where the railroad crosses Interstate 35, U.S. 183, and at Parmer Lane. Each location should be subjected to stringent review by a qualified traffic engineer.

Connection Constraints and Challenges

Several challenges exist for siting a trail along the Capital Metro railroad corridor. The corridor presents a variety of physical constraints, including topography and drainage issues in some areas, existing development directly adjacent to (and/ or within) the railroad right-of-way, and planned railroad sidings and/ or additional trackage in several locations. Other constraints include potentially difficult trail/ roadway crossings, and the potential need for property easements/ acquisitions. This section summarizes major constraints identified during the study process. Refer to the numbered segments in **Appendix A. Opportunities And Constraints Maps**, for location-specific issues.

Topography
This feasibility study included an assessment of topographic issues along the Capital Metro railroad corridor. Variations between the height of the railroad and adjacent lands constitute the major topography issue confronting trail development along this corridor. Other topographic issues include trail crossings over major roads and drainage-ways requiring major structures.

In several locations, the existing railroad is situated on a “plateau,” or berm, with adjacent lands sloping downward at varying grades. The potential drainage and erosion issues associated with these topographic variations could challenge trail development in these areas. In areas constrained by topographic issues, Capital Metro’s trail development guidelines require retaining walls, or slopes with a maximum 2:1 slope between the trail and railroad. Examples of these challenging topographic characteristics include areas along the corridor such as:

- Sections 3.1 and 3.2 (north of Anderson Lane)
- Section 3.2 (near Burnet Middle School)
- Section 3.3 (near the commuter rail maintenance facility)
- Section 3.4 (near Rutland Drive)
- Section 4.3 (north of Parmer Lane)

Other topography issues could also constrain trail development along the corridor. In Section 4.1 (near IBM), the relatively short distance between the railroad’s east side and adjacent wetlands is characterized by a steep slope. Consequently, a trail in this area could generate adverse wetland impacts if substantial cut-and-fill is utilized. In other areas (e.g., at Brushy Creek), large vertical clearances separate waterways and existing railroad overcrossings. Trail development in these areas would also need to overcome these topographic challenges.

Stormwater Management
This study included an assessment of drainageways along the corridor. In many cases, the topographic challenges described above could also present drainage-related challenges for trail development. In areas where substantial topographic variations exist on one or both sides of the railroad, the surrounding lands at lower elevations may act to collect stormwater runoff from the higher elevations. Stormwater runoff and drainage will need to be integrated with trail design where the trails are to be sited in these areas.

Open drainage ditches could also challenge trail development in areas further away from the railroad. In several areas along the corridor for instance, sufficient room exists to site a trail between the railroad and an adjacent parallel street, but in some cases, drainage ditches and culverts to collect and facilitate stormwater runoff from both the street and railroad exist in these areas.

Drainages issues could also pose challenges in other areas. For example, the wetlands mentioned earlier are located immediately adjacent to the railroad near IBM. Further north, the railroad passes over a large floodplain. Another example is where cross-drainage could challenge trail development in the vicinity of Anderson Lane.

Major Roadway / Trail Crossings
Potentially difficult trail/ roadway crossings exist at several locations throughout the corridor. Issues complicating trail/ roadway crossings include high vehicle speeds and volumes, wide streets, poor sight distance, and minimal treatments to facilitate safe and convenient bicycle/ pedestrian crossings. Potential problem areas include major thoroughfares like Airport Boulevard, Lamar Boulevard, Howard Lane, and frontage roads along U.S. 183, FM 620 and MoPac.

Need for Bridges
Minor, moderate or major bridge structures may be necessary to address some of the issues described above. Depending on length and other factors, bridge structures could substantially increase trail development costs.

Development Patterns Adjacent to the Railroad Right-of-Way
In many areas, lands adjacent to the railroad are fully-developed, leaving few opportunities to site a trail outside Capital Metro’s right-of-way. This is especially challenging in areas where Capital Metro’s right-of-way is only 50 feet wide and the required trail setbacks preclude trail development in the right-of-way In other areas, existing structures, fences and retaining walls encroach into Capital Metro’s right-of-way, which could further complicate trail development.

Land uses along the Capital Metro railroad corridor include single- and multiple-family residences, schools, parks, commercial and industrial developments. Generally, developed lands surround the railroad in the corridor's southern portions, while less-developed lands are more prominent to the north. Land development is planned in several locations, including future residential subdivisions, commercial businesses and mixed use areas including the TOD Zones.

Future Railroad Sidings and Additional Trackage
Railroad expansions, including sidings, additional mainline tracks and spur lines are planned throughout the corridor. While several corridor segments presently have a single track, Capital Metro intends to double-track the corridor in conjunction with the future commuter rail line. Future railroad sidings are also planned in several locations (e.g., near the M.L. King, Jr., Burnet, Lakeline and Leander stations, and in the area north of Howard Lane). Triple tracks are also planned in the area north of Howard Lane.

The feasibility of a trail along the railroad largely depends on specifically where additional tracks are laid. In general, multiple rail lines constrain trail development by leaving limited or no space within the rail right-of-way. Placing a new track adjacent to an existing track may provide an opportunity to site a trail on the opposite side (assuming the existing track is not moved), but only if the opposite side is suitable for a trail.

Variations in Required Trail Setbacks
Trail setbacks prescribed in Capital Metro's 2005 safety guidelines are based on several factors including train speed, curvature of rail, presence (or lack of) fencing and other elements. In several locations along the corridor, the required setbacks preclude trail development within the railroad right-of-way.

Trail Setbacks and Separation from Railroad
In areas without retaining walls separating the rail and trail, minimum horizontal "clear zones" between the rail centerline and the trail's inside edge range from 15 to 50 feet. Where retaining walls exist, the minimum clear zone is 12 feet, 8 inches. Depending on location, Capital Metro requires a continuous landscape hedge, fence or retaining wall to separate rail and trail traffic. Fences and retaining walls must be at least 4 feet tall. In areas constrained by topography, slopes between the rail and trail must not exceed a 2:1 ratio, and sufficient drainage must be provided.

Although several factors influence minimum trail setbacks from railroads, train speed plays a major role. To address crosswinds created by moving trains, setbacks are typically shorter in areas where trains travel at lower speeds (e.g., near stations or where trains travel along city streets), and are longer in higher-speed areas. In several locations, Capital Metro's existing setback requirements could preclude trail development within the railroad right-of-way, thereby impacting the feasibility of creating a trail. Setbacks however could be reduced through the use of other effective means to address train crosswinds while maintaining physical separation between trains and trail users. Potential treatments include higher barriers or less-porous barriers (e.g., walls) to deflect train crosswinds. Applying such treatments could allow some flexibility in setback requirements, and could enable more trail segments to be constructed within the rail right-of-way while maintaining rail and trail safety.

Trail Width
The Capital Metro *Safety Guidelines* prescribe a minimum 10-foot trail width, along with 2-foot shoulders on each side. This requirement reflects guidelines set forth by the American Association of State Highway and Transportation Officials (AASHTO) for shared use paths. To remain within the railroad right-of-way while meeting Capital Metro's setback requirements however, the trail would need to be 8 feet wide in some locations. Although this width would not meet Capital Metro's requirement, it would meet the AASHTO minimum width guideline for trails in constrained areas.

Trail/ Rail Crossings
Connections identified in this plan include at-grade crossings of the railroad *only* in locations where adjacent street crossings already exist (e.g., there are no mid-block crossings of the railroad or spur lines). The safety guidelines indicate that any trail crossing should be as nearly perpendicular to the tracks as possible. The guidelines do not permit crossings at less than a 45 degree angle.

Although perpendicular trail/rail crossings are the safest method for accommodating bicyclists and other "wheel" users in these locations, less than perpendicular crossings typically require a larger "footprint" to accommodate trail approaches and curves to allow traffic to align to a perpendicular crossing angle. (These can be problematic in physically-constrained areas). For crossings that are not perpendicular, American Association of State Highway Transportation Official's (AASHTO's) *Guide for the Development of Bicycle Facilities* recommends an additional paved shoulder (similar to the wide curves illustrated in Capital Metro's *Guidelines*) to enable a cyclist or wheelchair user to cross at a safe angle. Crossings between 45 and 90 degrees can safely accommodate "wheel" users if they are designed and signed properly.

Trail Development Prohibited on Some Capital Metro Properties
In some areas, such as the railroad work yard near Howard Lane, Capital Metro will not permit a trail to be sited within the railroad right-of-way. This could constrain trail development to on-street-only connections or along newly acquired rights-of-way, especially in areas with few alternative alignment options.

Private Property Easements/ Acquisitions Potentially Necessary in Some Areas
Many of the constraints identified above could generate the need for property easements or acquisitions in order to create a trail along the Capital Metro railroad corridor. Easements and acquisitions could complicate trail development by increasing implementation costs and potentially generating opposition among affected property owners.

Alignment Evaluation Process

The alignment evaluation process utilized a scoring process to evaluate each of the trail alignment options based on the criteria described below For preliminary screening, a system of "+", "o", and "-" was used. A "+" indicates favorable conditions, a "o" indicates mixed or neutral conditions, and a "-" indicates unfavorable conditions. It should be noted that multiple trail options were evaluated for some areas where several potential options exist. In other areas, it was determined that only one potential alignment would be feasible. See Appendix B. Trail Alignments Alternatives Evaluation Matrix for the results of this evaluation.

Evaluation Criteria

The Capital Metro Trail includes various potential trail alignments. The following evaluation criteria were used to screen the alignment alternatives. This screening process served as an initial step toward identifying a preferred trail alignment.

Safety
This criterion weighed several factors, including whether a potential on-street alignment shares the road with motor vehicle traffic, is located on a roadway shoulder, or is physically separated from the road altogether. This criterion also addresses the number of roadway crossings associated with a potential alignment. In cases where an alignment is located on a shoulder or on a shared roadway, the evaluation addressed the street's general characteristics (e.g., major streets with higher volumes and vehicle speeds versus local streets with lower volumes and vehicle speeds). Alignments providing a greater degree of safety for users received a higher evaluative score.

Community Connections/Directness of Route
Potential alignments were evaluated based on their ability to provide a direct route for the trail, as well as for connections to other facilities like City of Austin designated bicycle routes. Alignments were also evaluated based on their connections to neighborhoods, parks, schools, open spaces and future transit-oriented development areas. Higher scores were given to potential alignments providing more direct access through the study area and links to other important destinations listed above.

Utilizes Existing/Planned Bicycle Pedestrian Facilities
This criterion addresses whether a potential alignment utilizes existing and/ or planned bicycle/ pedestrian facilities. Facilities include off-street trails, bicycle lanes and sidewalks, and shared roadways (where pedestrians use sidewalks and cyclists share travel lanes with vehicles). The Austin Bicycle Plan identifies a list of "Priority 1" and "Priority 2" routes that were used as a reference. Generally, alignments utilizing existing and planned facilities suitable for bicycle/ pedestrian travel received higher evaluative scores.

Accommodates Multiple Users
This criterion refers to the ability of a potential alignment to safely and comfortably accommodate various types of trail users including bicyclists, walkers, joggers, in-line skaters, motorized and non-motorized wheelchair users, maintenance vehicles and security vehicles. Alignments serving a wider variety of trail users were given higher scores.

Aesthetics/Comfort
This criterion measures the quality of a potential alignment from the perspective of the trail user. It considers views, environmental aesthetics and characteristics such as noise and air quality. Alignments located away from roadways and those located near aesthetic features received a higher score than on-street alignments or those paralleling major roadways.

Environmental Impacts
Each potential alignment was evaluated based on background information gleaned from the December 2005 *Final Environmental Assessment for Transit Improvements in the Northwest Corridor* which identified no appreciable concern for potential environmental impacts within the actual rail corridor.

Candidate trail, bikeway and other connection projects were scored based on the extent the alignment might require vegetation removal, whether the alignment would pass through known wetland areas, and based on the number and significance of necessary watercourse crossings. This criterion also addressed whether an alignment might require substantial grading to overcome topographic issues. Alignments with fewer potential environmental impacts received higher evaluative scores.

Requires Structures
This criterion refers to the number of new structures (or modifications to existing structures) required for a trail alignment, including overcrossings and undercrossings. Structures include minor, moderate and major bridges (including cantilevered structures) passing over waterways, streets, highways and railroads. Alignments requiring fewer new structures or modifications to existing structures received higher scores.

Meets Capital Metro Safety Guidelines
This criterion addresses whether an alignment can be achieved while meeting the design guidelines set out in Capital Metro's *Safety Guidelines for Recreational Trails Crossing and Adjacent to Passenger and Freight Lines*. The document prescribes various guidelines addressing trail setbacks, trail/ railroad crossings, fencing and landscaping. Alignments received higher evaluative scores if they could meet these guidelines or avoid areas where the guidelines could not be met.

Private Property Impacts
This criterion accounts for lands where property easements or full property acquisitions would be required. Where private properties would be impacted, the perceived safety and security issues among property

owners were considered. Generally, alignments with minimal or no private property impacts received a higher score.

Ease of Implementation
This criterion measures the general difficulty of siting a trail alignment. The criterion takes into account issues like existing development, political issues, permitting requirements, and design and engineering issues (e.g., the need fencing or retaining walls, or trail switchbacks to meet ADA requirements on steep slopes).

Feedback from Stakeholder Work Group
After all other scorings and aspects of the project segments were developed, the Stakeholder Work Group provided the final input based on local familiarity and awareness of long-term issues regarding infrastructure planning. Slight reordering of the final implementation phases was based on this input.

Potential Project Benefits

The mixed use facilities such as those envisioned in this study will provide multiple positive benefits to the properties connecting to them. In addition to the now widely accepted health benefits of more active lifestyles, these connections will help increase the MetroRail's catchment area by providing more walkable, bikeable access to the station platforms. If more people choose using these facilities instead of driving, everyone in the region benefits. The resulting improved access to public open spaces and parks expands available park recreational resources in every residential neighborhood along the MetroRail Red Line corridor.

In addition, trips made by bicycling, walking or other non-motorized modes help reduce air pollution and traffic congestion. With MetroRail's commitment to accommodating bicycles on the trains, bike commuters will experience the convenience of intermodal travel, by having their bicycles available when de-boarding the trains at their destination station.

Chapter 3. Recommended Plan

This feasibility study is intended to provide a clearer direction for Capital Metro and the three cities and two counties through which this 32 mile MetroRail corridor runs. Stakeholder involvement made possible a higher level of evaluation of the needs and desires of all parties concerned. Specific project alignments should be viewed as flexible, and some modification can be expected during the next phases of design to accommodate the emerging objectives of nearby residents, businesses, developers and other interested organizations and agencies which border the MetroRail Red Line corridor.

System Overview

By fall of 2008, the MetroRail Red Line will begin its commuter rail operations, allowing commuters more predictable travel times from the 9 currently-planned rail station platforms between Leander and downtown Austin. Working with the Trail Alignments Alternatives Evaluation Matrix (Appendix B.), the variety of possible non-motorized connections was narrowed to a series of 11 capital projects, each when implemented as developments occur, can provide easier access to the MetroRail platforms, and when fully implemented provide the entire region with a higher level of bicycle and pedestrian permeability.

By providing these connecting trails, on-street bikeway connections and pedestrian pathways, these transportation terminals become truly intermodal. At an estimated cost of $54.3 million (not counting right-of-way costs), the fully built out non-motorized connections will consist of 30.9 miles of paved multiuse trails, 1.7 miles of additional needed sidewalks, and will utilize 8.4 miles or more of on-street bikeways.

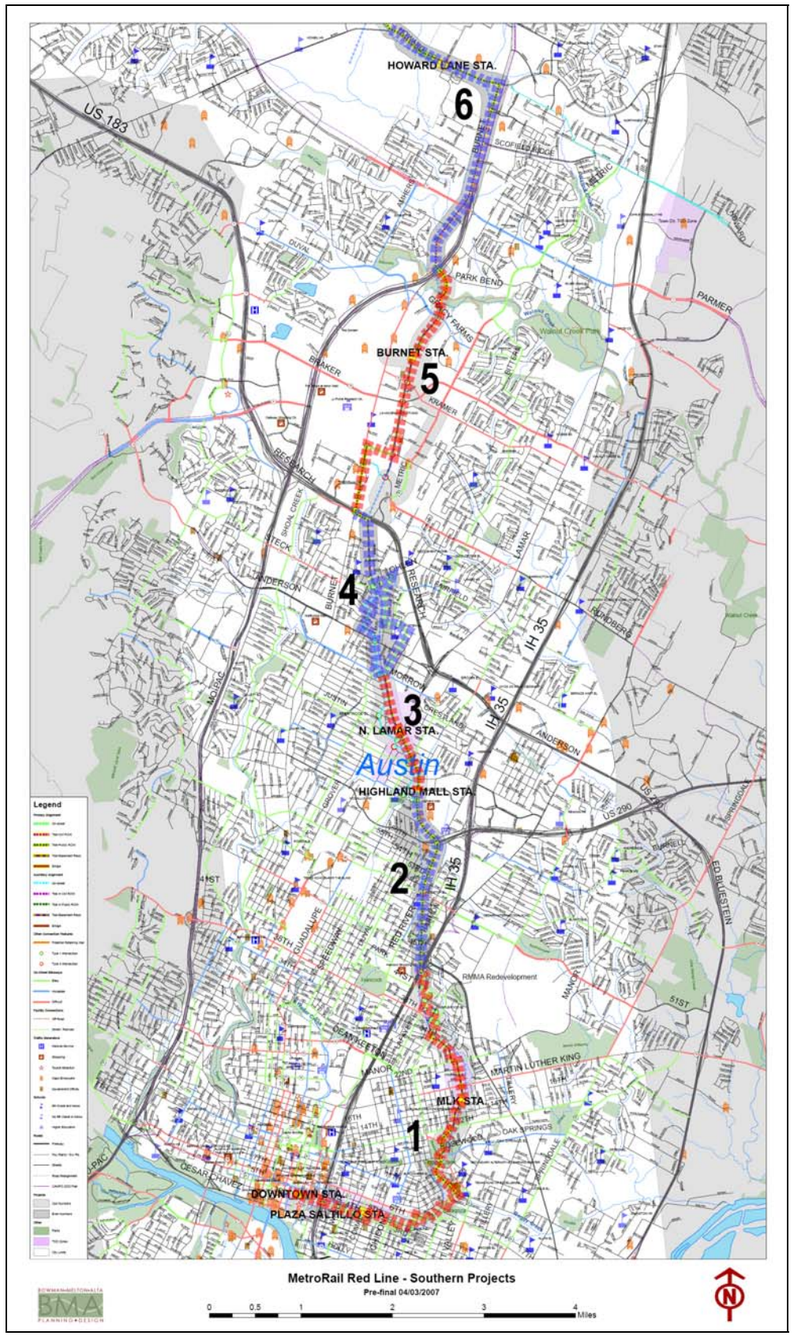
Development Strategies

With development of the 11 projects identified in this study, a new set of more sustainable land uses along both sides of much of the rail corridor becomes practical and functional. Major employers, schools, office and retail markets connected to the commuter rail system will become the major destinations these trail projects are developed to serve. Too, the greenbelt parks along the Red Line corridor will draw people from throughout the area to these now more accessible recreational destinations. This study identifies functional multi-use trails, walkways and on-street bikeways that provide access to the region's transportation system, enhancing connectivity throughout.

Linkage to existing and programmed trails outside the study area is achieved early in the plan and enhanced as development of subsequent projects occurs. This will transform areas that are currently practically impermeable via non-motorized mobility into connections that support 21st Century active lifestyles, and foster easier access to businesses, infill residences, new developments, and natural public open space.

Implementing these projects will require a range of strategies, including the creation of partnerships between Capital Metro, city departments, developers and property owners. Effort is justified to work with area land owners to assemble sufficient rights-of-way, and to dedicate adjacent space where necessary for the development of given pathways. It is essential to pursue a variety of funding opportunities to ensure adequate financing for operations and maintenance. The results of this study highlight the urgent need for cities to better plan for and create more accessible developments connected by public spaces. There is a real need to ensure that development codes and policies are supportive of the higher densities that help make public rail transit viable and successful.

Through development of the projects identified in this study, the Capital Metropolitan Transportation Authority and its member cities will have begun the long journey to create more sustainable urban districts with compatible land-use and transportation investments along much of its Red Line commuter rail corridor, thereby strengthening the emphasis on non-motorized access to the public transportation facilities and services Capital Metropolitan Transportation Authority has been established to provide.



Recommended Projects

The study outcome resulted in a selection of 11 identified potential projects. The distances shown are the approximate lengths of railroad corridor each project encompasses. They are:

1. Downtown to Wilshire Boulevard (4.5 mi.)

2. Wilshire Boulevard to Highland Mall Station (2.2 mi.)

3. Highland Mall Station to Morrow Street (1.3 mi.)

4. Morrow Street to Research Boulevard (1.8 mi.)

5. Research Boulevard to Mo Pac at Park Bend (2.8 mi.)

6. Mo Pac at Park Bend to Howard Lane (3.5 mi.)

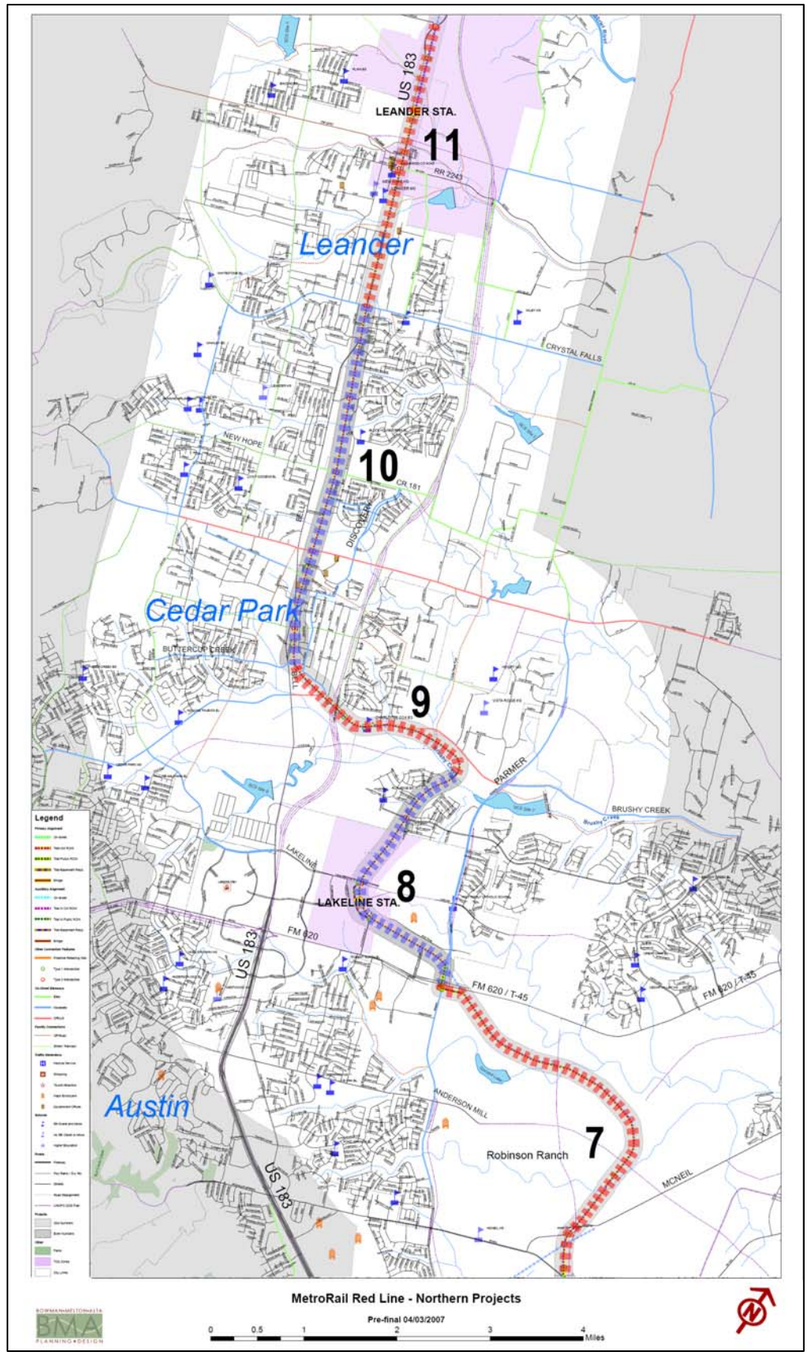
7. Howard Lane to FM 620 at Parmer Lane (4. mi.)

8. FM 620 at Parmer Lane to proposed Brushy Creek Trail (3.1 mi.)

9. Brushy Creek (drainageway) to Brushy Creek Road (2.4 mi.)

10. Brushy Creek Road to Crystal Falls Road (3.9 mi.)

11. Crystal Falls Road to the Leander TOD Zone (3.1 mi.)

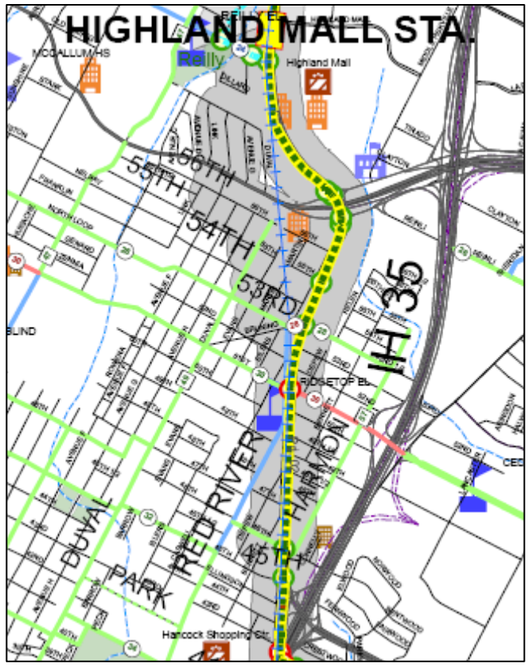


RECOMMENDED PLAN – IN ORDER OF PRIORITY

Priorities for implementation were determined first using a scoring matrix to determine which project segments are the most technically feasible to begin implementing. A draft of the outcomes from this process was presented to Capital Metro staff and the Stakeholder Work Group for additional input. Priorities were then adjusted as a result of this feedback, and the final recommended implementation prioritization is outlined in this document. See **Appendix D. Detailed Project Layouts** to review full size plan sheets for each proposed project.

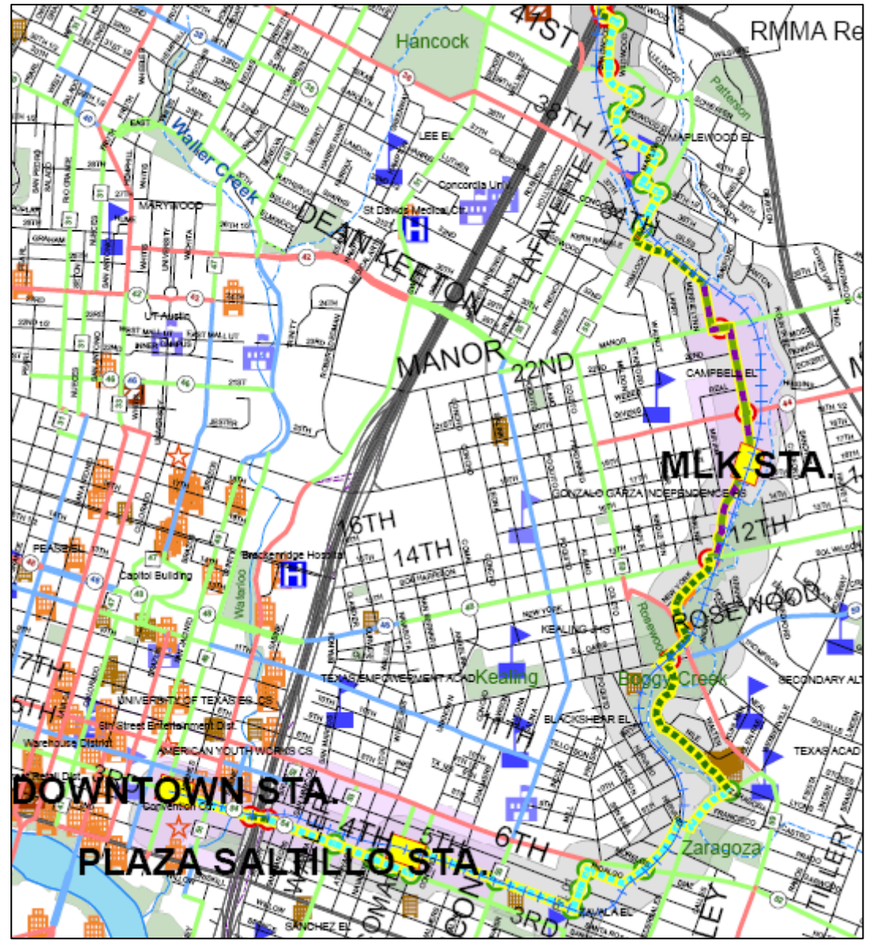
PRIORITY 1

The 1st priority recommendation is project 2, from **Wilshire Boulevard to Highland Mall Station.** This connection beneath the elevated deck of IH 35 is a key non-motorized link between the near-East Austin neighborhoods and the Highland Mall MetroRail station platform that will be situated west of IH 35 along Airport Boulevard. The Capital Metro agency staff has already applied for federal funding assistance for this connection of approximately 2.1 miles of multiuse trail and .3 miles of on-street bikeway to public transit. This project will require extensive interagency technical coordination at the crossing beneath IH-35.



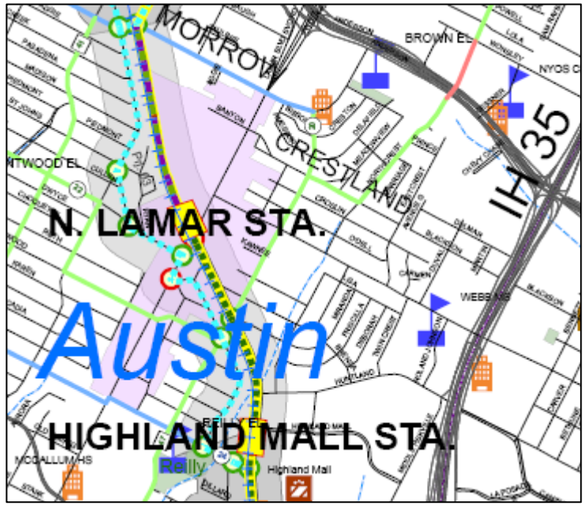
PRIORITY 2

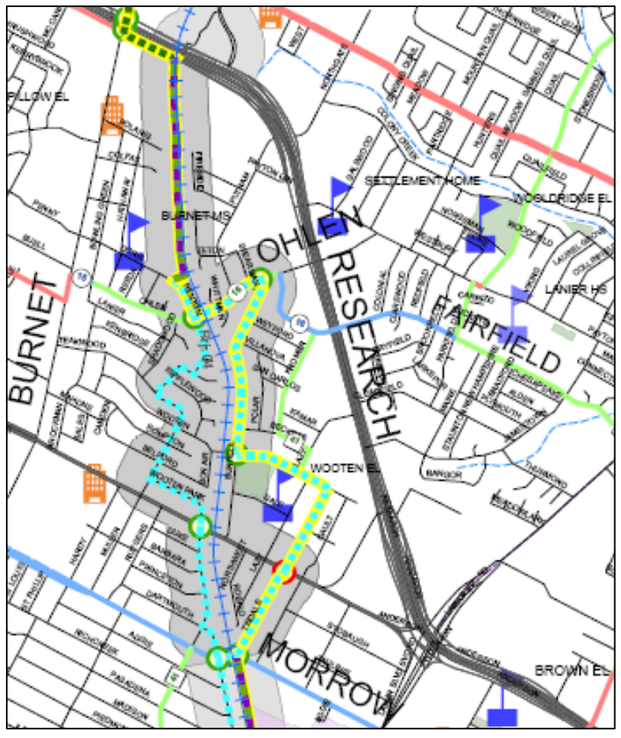
The 2nd priority recommendation is project number 1, from **Downtown Austin north to Wilshire Boulevard**, utilizing 2.8 miles of on-street bikeways, 1.2 miles of improved sidewalks, and 2.3 miles of off-street trails requiring up to 2.96 acres of additional rights-of-way within the MLK, Jr. TOD Zone. The on-street and sidewalk connections to the Convention Center, Plaza Saltillo and MLK, Jr. Stations utilize portions of the City of Austin's on-street bikeway system, including a segment of the already programmed Lance Armstrong Bikeway. Alternative access routes for bicyclists were identified along both sides of the MetroRail corridor. This segment utilizes an upgraded Boggy Creek Pedestrian Pathway, and recommends creation of a contiguous multiuse urban hardscape through the MLK, Jr. TOD Zone, connecting to the station platform there. The trail alignment along Alexander is flexible, so long as the crossings of major cross streets are properly signalized. Further north, potential exists for Safe Routes to School (SR2S) program funding if the Austin ISD is receptive to accommodating right-of-way through its Maplewood Elementary School property.



PRIORITY 3

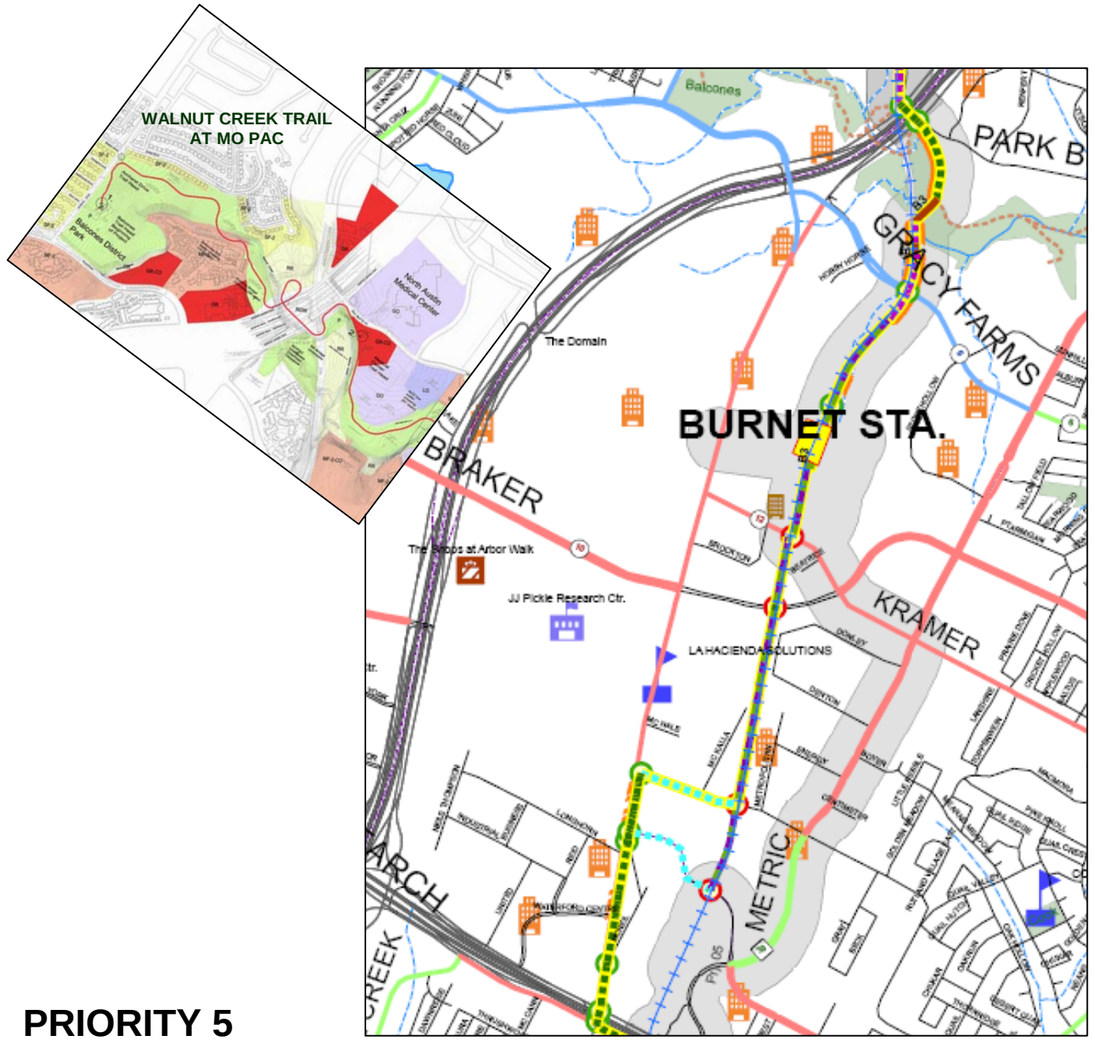
The 3rd priority for implementation, project number 3, is from **Highland Mall Station to Morrow Street**. With adequate provision of up to 2.04 acres of right-of-way within and north of the TOD zoning surrounding the North Lamar Station, this connection will benefit both residents and employers in the Crestview area neighborhoods, by expanding the MetroRail catchment area for the North Lamar platform by a distance of 1.3 miles of off-street trails and 1.6 miles of on-street bikeways. The intersection of Airport Boulevard and North Lamar should be realigned to enhance pedestrian and bicyclist safety at this crossing.





PRIORITY 4

The 4th priority for implementation, project 4, from **Morrow Street to Research Boulevard**, utilizes mostly on-street bikeway and sidewalk connections. This segment could be consolidated with the priority 3 implementation, or remain a stand alone project. This connection will strengthen the multiuse trail in the previous project that leads from Morrow Street south to the North Lamar platform, further enhancing the MetroRail catchment area there. Routing was revised during the planning process to utilize already programmed improvements along Burnet Road at Research Blvd. It includes .9 miles of off-street trails, 2.9 miles of on-street bikeways, plus .5 miles of improved sidewalks. Potential exists for SR2S program funding if the school district is willing to accommodate 1.94 acres of trail right-of-way through its Burnet Middle School property.



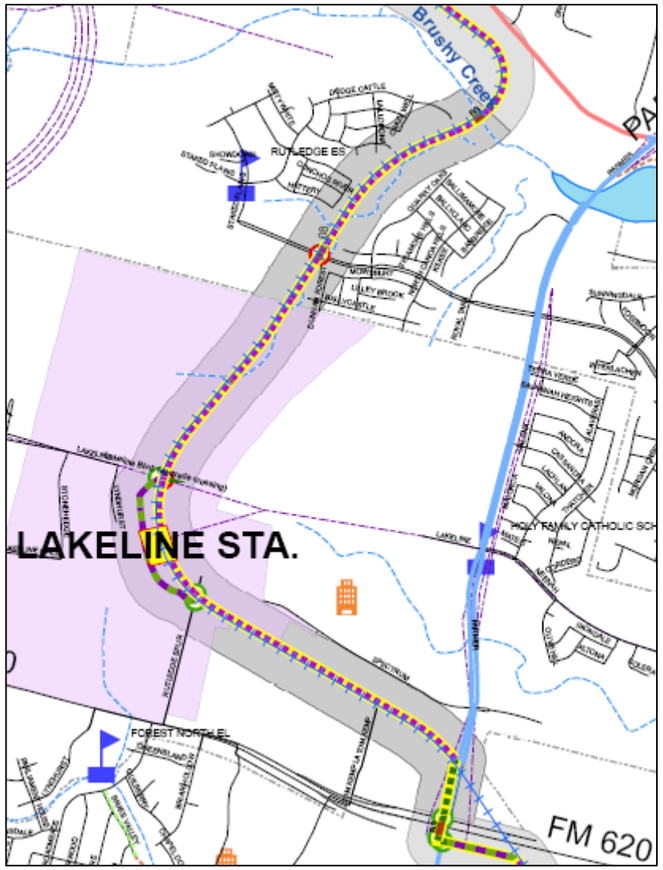
PRIORITY 5

The 5th priority for implementation, **Research Boulevard to Mo Pac at Park Bend**, project 5, became more urgent as plans surfaced for the North Burnet/Gateway Master Plan. These connections, 3.1 miles of off-street trails and .6 miles of on-street bikeway, acknowledge the already programmed extension of Rundberg, and is consistent with the City of Austin's planned extension of on-street bikeways north from Research Boulevard along Burnet Road, and the city's park department's soon to be designed Walnut Creek Trail. This segment is a key link to the City's already programmed Walnut Creek Trail. For this project to be successful, an additional 5.36 acres of right-of-way from landowners abutting the MetroRail corridor will be required. Connections to the Walnut Creek Trail underpass of Mo Pac Expressway (see inset map above) will extend the catchment potential for both projects 5 and 6.

PRIORITY 6

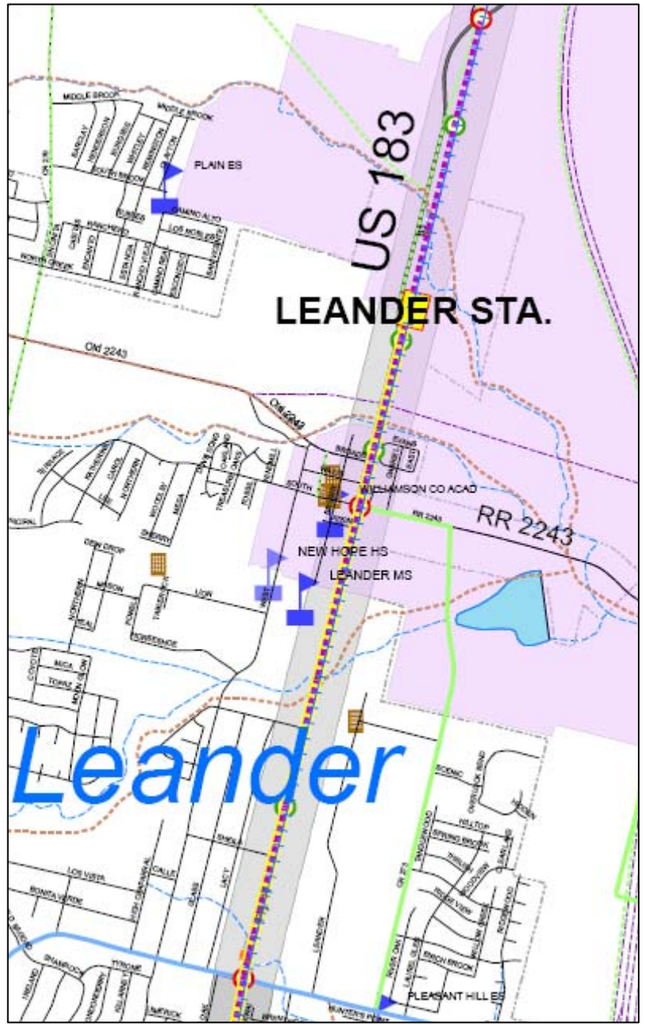
Implementation of the 6th priority, project number 8, from **FM 620 at Parmer Lane to the Brushy Creek Trail**, makes a key connection to a future Williamson County trail project along Brushy Creek. Portions of this facility are already in development.

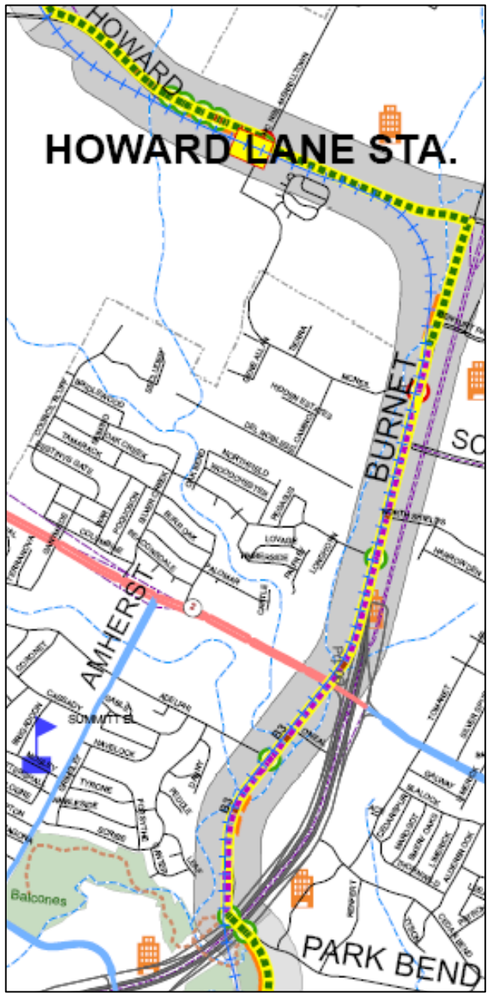
This approximately 3.7 mile multiuse trail segment begins at the north side of FM 620 at Parmer as a short sidepath, and within about a thousand feet, enters the MetroRail corridor and connects to the Lakeline Station and its surrounding TOD Zone via a very walkable urban hardscape. Similar urban hardscape connections along the west side of the railroad tracks between Rutledge Spur Road and the future extension of Lakeline Boulevard would be of mutual benefit, and would better serve future developments within the TOD Zone.



PRIORITY 7

The 7th priority for implementation is project number 11, from **Crystal Falls Road to the Leander TOD Zone.** This approximately 3.1 mile multiuse trail fits entirely within the Capital Metro railroad right-of-way, and extends to approximately one mile north of the Leander MetroRail station. Much like the Austin TOD Zones, it's anticipated that additional pedestrian connections would be made from within this very large TOD Zone as development occurs.



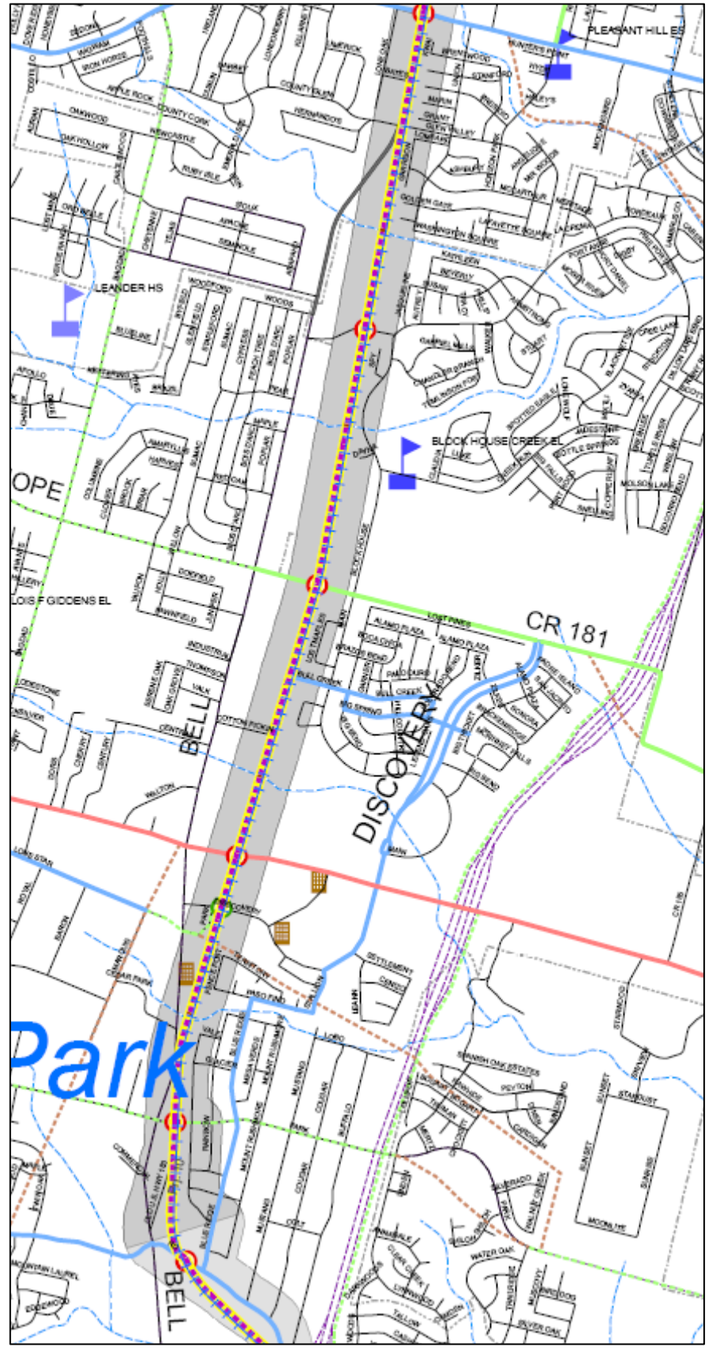


PRIORITY 8

The 8th priority for implementation is project number 6, from **Mo Pac Freeway at Park Bend north to the intersection of the RR tracks at Howard Lane.** This approximately 3.6 mile multiuse trail mostly utilizes the MetroRail right-of-way, and extends the multiuse trail resources to future residents and businesses in the North Burnet/Gateway area, and from the City of Austin's already programmed Walnut Creek Trail. Park Bend to Waters Park is already a key bikeway connection across Mo Pac for area cyclists.

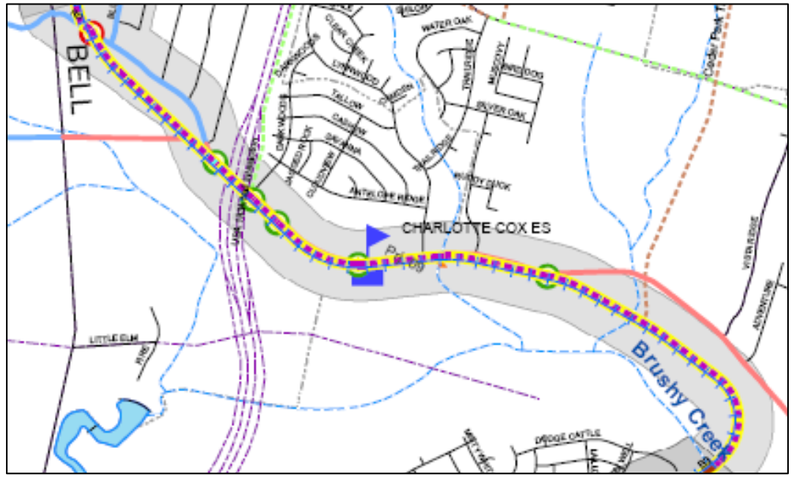
PRIORITY 9

The 9th priority for implementation is project number 10, from **Brushy Creek Road to Crystal Falls Road**, a distance of approximately 3.9 miles of multiuse trail entirely within the MetroRail right-of-way. This project will extend the catchment area from the Leander station, and would add value to the proposed SH 183A hike/bike trail in the eventuality it gets funded.



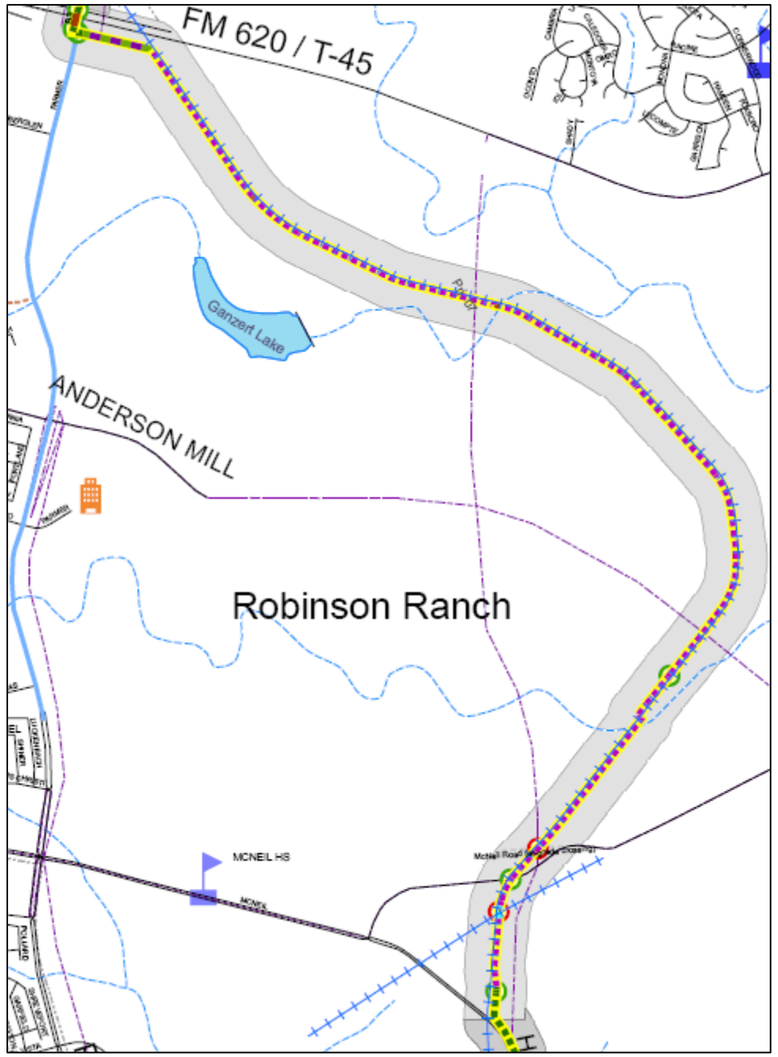
PRIORITY 10

The 10th priority for implementation is project number 9, from the **Brushy Creek (drainageway) to Brushy Creek Road**. This approximately 2.4 mile multiuse trail utilizes the north/east side of the tracks along the Capital Metro right-of-way up to Brushy Creek Road, connecting to the previously built trail that extends southward along the west side of the tracks from Crystal Falls Road. This trail will eventually connect the planned future extension of Williamson County's Brushy Creek trail to the planned SH 183A multiuse trail that will lead northward into Leander.



PRIORITY 11

The 11th and final priority for implementation is project number 7, from **Howard Lane to FM 620 at Parmer Lane**, a multiuse trail distance of approximately 4.5 miles. The most challenging aspect of this connection is how it will cross the Union Pacific (UP) railroad right-of-way that intersects with the MetroRail right-of-way very near the newly-created intersection of the realigned McNeil Road. A historic U.S. Post Office is located near the existing at-grade crossing of the railroad tracks. The ideal crossing of both the UP-owned railroad tracks and the new McNeil Road would be a major bridge structure. Consideration for this solution was dropped due to the major cost implications.



Needed Rights-of-Way

A multiuse trail is feasible portions of the corridor, but in some areas, not without acquiring additional right-of-way alongside or nearby the corridor. Approximately 14.52 acres of additional right-of-way will be required in order to accommodate the construction of these multiuse pathways – either adjacent to or extending from the main railroad corridor. Unique green/maroon dashed line symbols indicate on the maps the areas where these rights-of-way may be needed. The table below summarizes the acreages needed in each project to implement the recommended connections. For informational purposes, the potential market valuations are summarized in **Appendix F. Needed Rights-of-Way Valuations**.

POTENTIAL RIGHTS-OF-WAY OR PUBLIC USE EASEMENTS NEEDED			
PROJECT NUMBER	ASSOCIATED LOCATION	ESTIMATED ACREAGE NEEDED	IMPLEMENTATION PRIORITY
1	MLK, Jr. TOD Zone	2.96	2
3	N. Lamar Station Area Lions Club Ball Fields	2.04	3
4	Burnet Middle School	1.94	4
5	Burnet Station – north and south	5.36	5
7	FM 620 at Parmer	.67	11
8	Lakeline TOD Zone	1.56	6

Chapter 4. Facility Design Elements

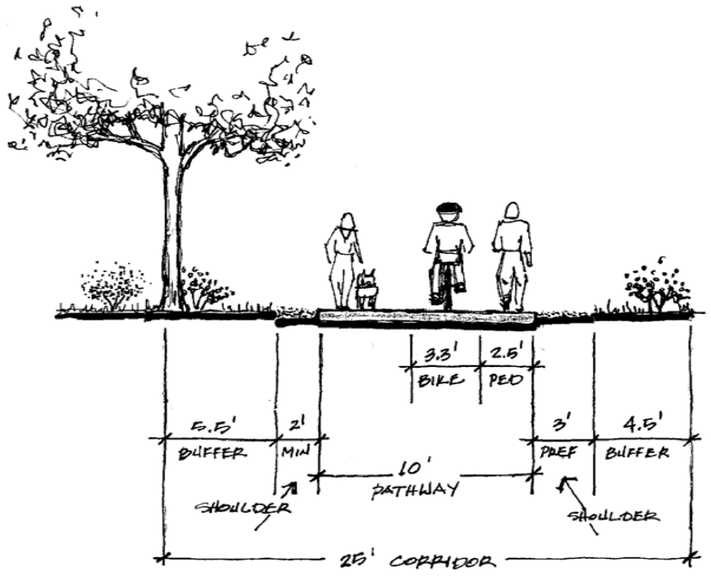
Overview

This chapter discusses recommended design strategies for these non-motorized connections. It begins with general design guidance and includes recommended planning and design treatments for addressing trail/ roadway crossings and trailheads along the trail corridor. This guidance isn't intended to supersede the *American Association of State Highway and Transportation Officials* (AASHTO) *Guide for the Development of Bicycle Facilities*, or the *Manual on Uniform Traffic Control Devices* (MUTCD) A discussion of recommended trail amenities follows, along with other design and programmatic strategies for maintaining trail safety and security.

Many on-street bikeways already exist in the Austin metropolitan area, and the City of Austin is currently in the process of updating its plan.

Trail Tread Width

To summarize the American Association of State Highway and Transportation Officials (AASHTO) guidelines for paved trails, multiuse trails are often intended for a variety of users from child cyclists to joggers with baby strollers. Suburban multiuse trail treads should be a minimum of 10 feet wide, and 12 feet (or more) if heavy, diverse traffic is anticipated. According to AASHTO guidance, trails 8 feet wide are generally not acceptable for multi-use designation, unless one-way. Under most conditions, the recommended paved width for a two-directional shared use path is 10 feet. In rare instances, a reduced width of 8 feet can be adequate. This reduced width should be used only where the following conditions prevail: (1) bicycle traffic is expected to be low, even on peak days or during peak hours, (2) pedestrian use of the facility is not expected to be more than occasional, (3) there will be good horizontal and vertical alignment providing safe and frequent passing opportunities, and (4) during normal maintenance activities the path will not be subjected to maintenance vehicle loading conditions that would cause pavement edge damage.



Under certain conditions it may be necessary or desirable to increase the width of a shared use path to 12 feet, or even 14 feet, due to substantial use by bicycles, joggers, skaters and pedestrians; use by large maintenance vehicles; and/or steep grades. Different types of non-motorized facilities call for different design requirements. Generally, recommended pavement widths are as follows:

- TWO-WAY MULTIUSE TRAILS 10-12'
- ONE-WAY MULTIUSE TRAILS OR "GREENWALKS" 8'

Along roadways, multi-use (hike and bike) paths should be at least 5 feet from the back of the curb, or a physical barrier will be needed between the path and the roadway, according to national, state and regional design guidelines.

Choice Of Surfaces

Choice of pavement relies in part on the soils beneath the trail. Actual soil types and drainage characteristics must be prime considerations as plans are developed for establishing a trail in any given corridor. Concrete pavement is by far the most durable surface, especially in areas that flood. While asphalt is less expensive to install, it costs more to maintain a smooth, even surface. Asphalt paving breaks down quickly if subjected to extended periods of wetness, or in the absence of heavy vehicles to keep it compacted. Concrete pavement endures best if at least 5-inches thick where no motorized traffic is expected, and 6-inches thick where the presence of heavier maintenance vehicles is regularly anticipated.

A minimum 2 foot shoulder on each side of the trail with a maximum slope of 1:6 (but preferably less than 2% cross-slope wherever possible) should be provided throughout the length if the trail tread width is less than 12 feet. Shoulders should be wider (up to 5 feet) if steeper side-slopes are present, or when crossing over culverts or large drain pipes, or if adjacent to a roadway.

Trail / Roadway Crossings

Like most trails in built urban areas, the Capital Metro Trail must cross roadways at certain points. While at-grade crossings create a potentially high level of conflict between trail users and motorists, well-designed crossings have not historically posed a safety problem, as evidenced by the thousands of successful trails around the United States with at-grade crossings. In most cases, pathway crossings can be properly designed at-grade to a reasonable degree of safety and meet existing traffic and safety standards.

Accessibility must be provided at all legal street crossings, whether or not a crosswalk is marked, according to noted bicycle planner Michael Ronkin, of the Association of Pedestrian and Bicycle Planners. ADA ramps are necessary to provide access to those who need them to cross the street. Although it is not recommended, if access is to be denied, the crossing must be closed with a barrier and a sign prohibiting the crossing.

Trail-roadway crossings should comply with the AASHTO Guide for the Development of Bicycle Facilities, the Manual on Uniform Traffic Control Devices, (MUTCD), Capital Metro's *Safety Guidelines for Recreational Trails Crossing and Adjacent to Passenger and Freight Lines*, and other pertinent State and local standards. Designing safe at-grade crossings is a key component of the safe implementation of this trail.

Evaluation of trail crossings involves analysis of vehicular and anticipated trail user traffic patterns, including vehicle speeds, traffic volumes (average daily traffic and peak hour traffic), street width, sight distance and trail user profile (age distribution, destinations served). This section identifies several trail-roadway crossing treatments that should be considered for the Capital Metro Trail.

Intersection Prototypes

The proposed intersection approach that follows is based on established standards, published technical reports,[1] and experiences from cities around the country.[2] At-grade trail-roadway crossings will fit into one of four basic categories:

- Type 1: Marked/Unsignalized, Type 1+: Marked/Enhanced
- Type 2: Route Users to Existing Intersection
- Type 3: Signalized/Controlled
- Type 4: Grade-separated crossings

[1] Federal Highway Administration (FHWA) Report, "Safety Effects of Marked vs. Unmarked Crosswalks at Uncontrolled Locations."

[2] In particular, the recommendations in this report are based in part on experiences in cities like Portland (OR), Seattle (WA), Tucson (AZ), and Sacramento (CA), among others.

Type 1: Marked / Unsignalized Crossings

A marked/unsignalized crossing (Type 1) consists of a crosswalk, signage, and often no other devices to slow or stop traffic. The approach to designing crossings at mid-block locations depends on an evaluation of vehicular traffic, line of sight, trail traffic, use patterns, vehicle speed, road type and width, and other safety issues such as proximity to schools. The following thresholds recommend where unsignalized crossings may be acceptable:

Maximum traffic volumes:

- ≤9,000-12,000 Average Daily Traffic (ADT) volumes
- Up to 15,000 ADT on two-lane roads, preferably with a median.
- Up to 12,000 ADT on four-lane roads with median.

Maximum travel speed:

- 35 MPH

Minimum line of sight:

- 25 MPH zone: 155 feet
- 35 MPH zone: 250 feet
- 45 MPH zone: 360 feet

If well-designed, crossings of multi-lane higher-volume arterials over 15,000 ADT may be unsignalized with features such as a combination of some or all of the following: excellent sight distance, sufficient crossing gaps (more than 60 per hour), median refuges, and/or active warning devices like flashing beacons or in-pavement flashers. These are referred to as "Type 1 Enhanced" (Type 1+). Such crossings would not be

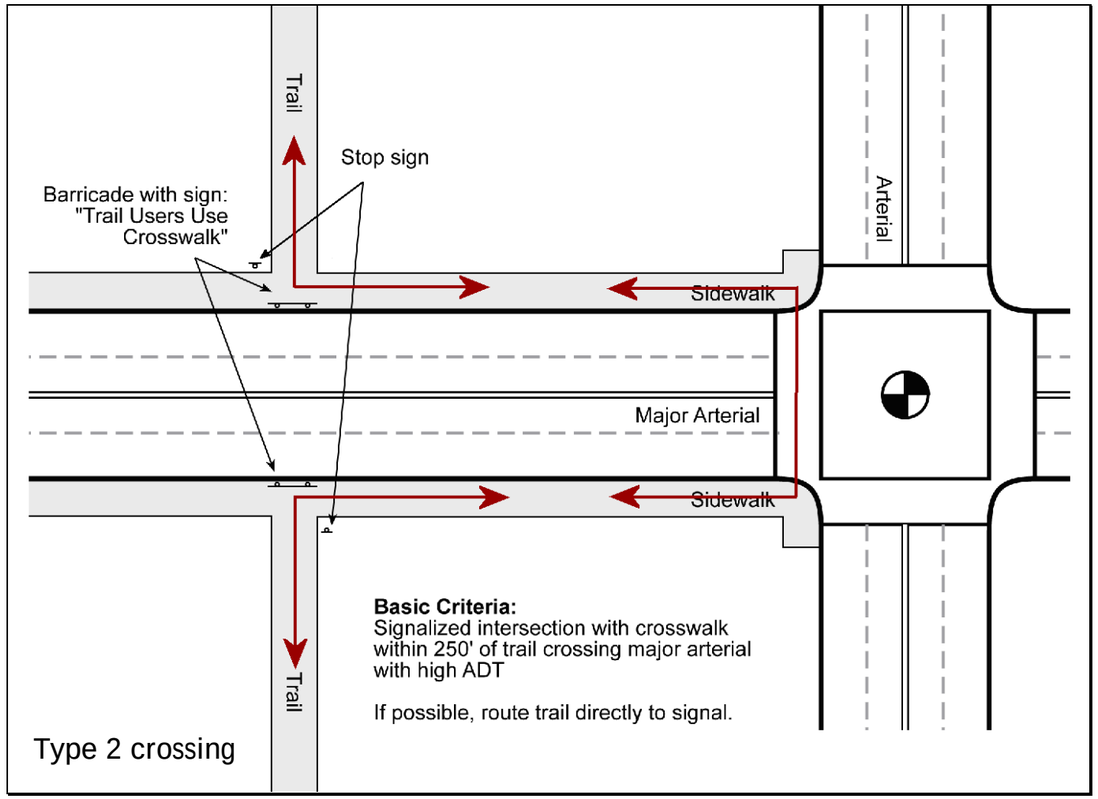
appropriate; however, if a significant number of school children used the trail. Furthermore, both existing and potential future trail usage volume should be taken into consideration.

On two-lane residential and collector roads below 15,000 ADT with average vehicle speeds of 35 miles per hour (MPH) or less, crosswalks and warning signs ("Trail Xing") should be provided to warn motorists, and stop signs and slowing techniques (bollards/geometry) should be used on the trail approach. Curves in trails that orient the trail user toward oncoming traffic are helpful in slowing trail users and making them aware of oncoming vehicles. Care should be taken to keep vegetation and other obstacles out of the sight line for motorists and trail users. Engineering judgment should be used to determine the appropriate level of traffic control and design.

On roadways with low to moderate traffic volumes (<12,000 ADT) and a need to control traffic speeds, a raised crosswalk may be the most appropriate crossing design to improve pedestrian visibility and safety. These crosswalks are raised 75 millimeters above the roadway pavement (similar to speed humps) to an elevation that matches the adjacent sidewalk. The top of the crosswalk is flat and typically made of asphalt, patterned concrete, or brick pavers. Brick or unit pavers should be discouraged because of potential problems related to pedestrians, bicycles, and ADA requirements for a continuous, smooth, vibration-free surface. Tactile treatments are needed at the sidewalk/street boundary so that visually impaired pedestrians can identify the edge of the street.

Type 2: Route Users to Existing Intersection

Crossings within 250 feet of an existing signalized intersection with pedestrian crosswalks are typically diverted to the signalized intersection for safety purposes. For this option to be effective, barriers and signing may be needed to direct trail users to the signalized crossings. In most cases, signal modifications would be made to add pedestrian detection and to comply with the Americans with Disabilities Act. It should be noted that the Capital Metro *Safety Guidelines* do not permit trail users to be diverted to a nearby intersection if they are required to cross the railroad to reach the intersection. In this case, trail users must be routed to an intersection on the "trail side" of the railroad or be accommodated through a mid-block crossing with enhanced treatments (discussed below).



Type 3: Signalized/Controlled Crossings

New signalized crossings may be recommended for crossings that meet pedestrian, school, or modified warrants, are located more than 250 feet from an existing signalized intersection and where 85th percentile travel speeds are 40 MPH and above and/or ADT levels exceed 15,000 vehicles. Each crossing, regardless of traffic speed or volume, requires additional review by a registered engineer to identify sight lines, potential impacts on traffic progression, timing with adjacent signals, capacity, and safety.

Trail signals are normally activated by push buttons, but also may be triggered by motion detectors. The maximum delay for activation of the signal should be two minutes, with minimum crossing times determined by the width of the street. The signals may rest on flashing yellow or green for motorists when not activated, and should be supplemented by standard advanced warning signs.

Various types of pedestrian signals exist and can be used at Type 3 crossings. On the pages that follow are some innovative approaches.

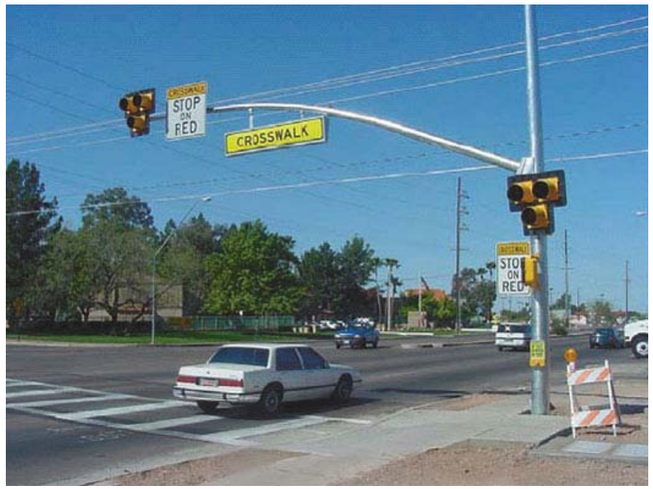
PELICAN Signals

A Pelican (**Pe**destrian **L**ight **C**ontrol **A**ctivated crossi**n**g) signal incorporates a standard red-yellow-green signal light that rests in green for vehicular traffic until a pedestrian wishes to cross and presses the button. The signal then changes to yellow, then red, while Walk is shown to the pedestrian. The signal can be installed as either a one-stage or two-stage signal, depending on the characteristics of the street. In a two-stage crossing, the pedestrian crosses first to a median island and is then channelized along the median to a second signalized crossing point. At that point, the pedestrian then activates a second crossing button and another crossing signal changes to red for the traffic while the pedestrian is given a Walk signal. The two crossings only delay the pedestrian minimally and allow the signal operation to fit into the arterial synchronization, thus reducing the potential for stops, delays, accidents, and air quality issues. A Pelican crossing is quite effective in providing a pedestrian crossing at mid-block locations when the technique can be integrated into the roadway design.

PUFFIN Signals

A Puffin (**P**edestrian **U**ser **F**riendly **In**telligent) crossing signal is an updated version of a Pelican crossing. The signal consists of traffic and pedestrian signals with push-button signals and infrared or pressure mat detectors. After a pedestrian pushes the button, a detector verifies the presence of the pedestrian at the curbside. This helps eliminate false signal calls associated with people who push the button and then decide not to cross. When the pedestrian is given the Walk signal, a separate motion detector extends the Walk interval (if needed) to ensure that slower pedestrians have time to cross safely. Conversely, the signal can also detect when the intersection is clear of pedestrians and return the green signal to vehicles, reducing vehicle delay at the light. Puffin signals are designed to be crossed in a single movement by the pedestrian, unlike the Pelican signal, which can be designed to cross in either one or two stages.

HAWK Signals

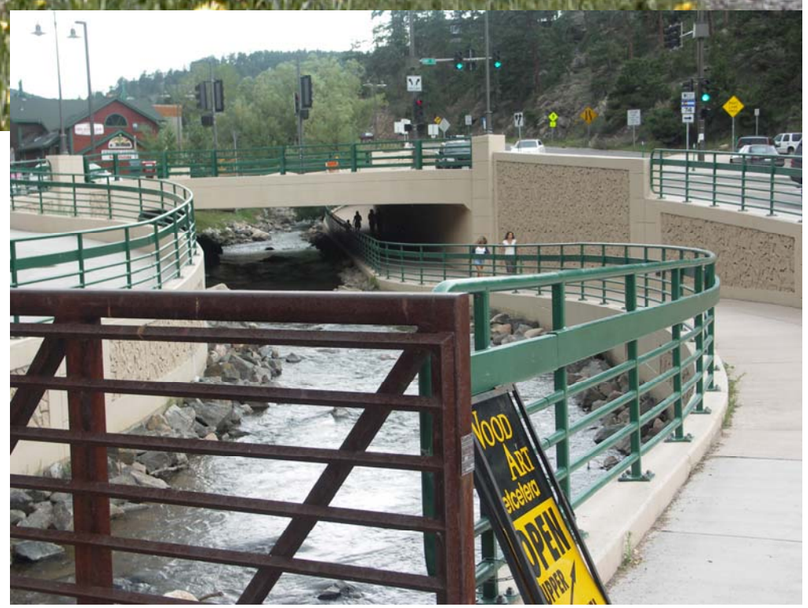


A Hawk (**H**igh-Intensity **A**ctivated Cross**w**al**k**) signal is a combination of a beacon flasher and traffic control signaling technique for marked crossings. The beacon signal consists of a traffic signal head with a red-yellow-red lens. The unit is normally off until activated by a pedestrian. When pedestrians wish to cross the street, they press a button and the signal begins with a flashing yellow indication to warn approaching drivers. A solid yellow, advising the drivers to prepare to stop, then follows the flashing yellow. The signal is then changed to a solid red, at which time the pedestrian is shown a Walk indicator. The beacon signal then converts to an alternating flashing red, allowing the drivers to proceed after stopping at the crosswalk, while the pedestrian is shown the flashing Don't Walk signal. The proposed Hawk pedestrian beacon would provide an alternative treatment for locations where traffic signal installation based on a pedestrian warrant is not justified, but treatments including typical markings, signs, and/or a warning beacon are considered insufficient. The use of pedestrian beacons could result in a reduction in the number of traffic control signals installed to assist pedestrians crossing activities. In January 2007, the National Committee Council of the MUTCD approved a new section for pedestrian beacons utilizing this technology.

Type 4: Grade-separated Crossings

Grade-separated crossings may be needed where ADT exceeds 25,000 vehicles, and 85th percentile speeds exceed 45 MPH. Safety is a major concern with both overcrossings and undercrossings. In both cases, trail users may be temporarily out of sight from public view and may have poor visibility themselves. Undercrossings, like parking garages, have the reputation of being places where crimes occur. Most crime on trails, however, appears to have more in common with the general crime rate of the community and is often inversely proportional with the overall levels of usage of the trail, rather than related to any specific design feature.

Design and operation measures can be employed that can address trail user concerns. For example, any major under-crossing should be designed to be spacious, well-lit, potentially equipped with emergency cell phones at each end, and should be completely visible through its entire length prior to entering.



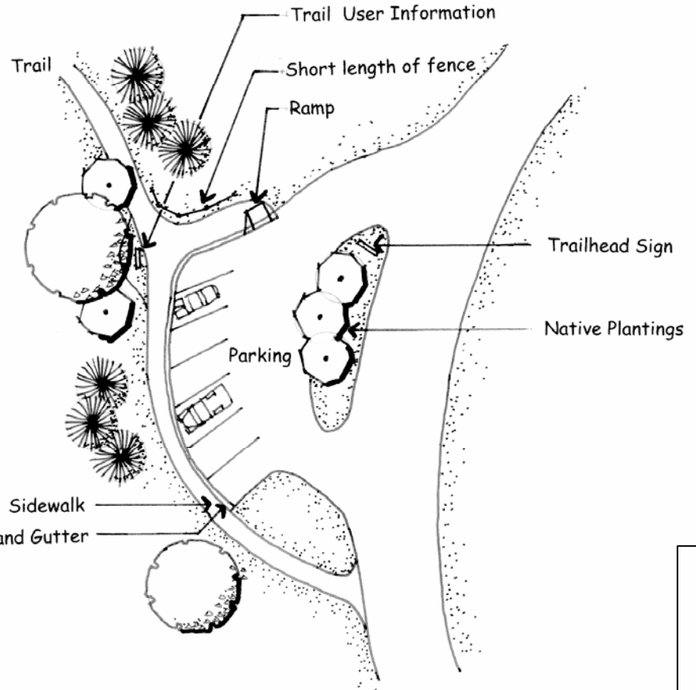
Other potential problems with undercrossings include conflicts with utilities, drainage, flood control, and maintenance requirements.

Overcrossings pose potential concerns about visual impact and functional appeal, as well as space requirements necessary to meet ADA guidelines for slope. Adding artistic architectural components to pedestrian overcrossings can serve to create dramatic gateway entrances.

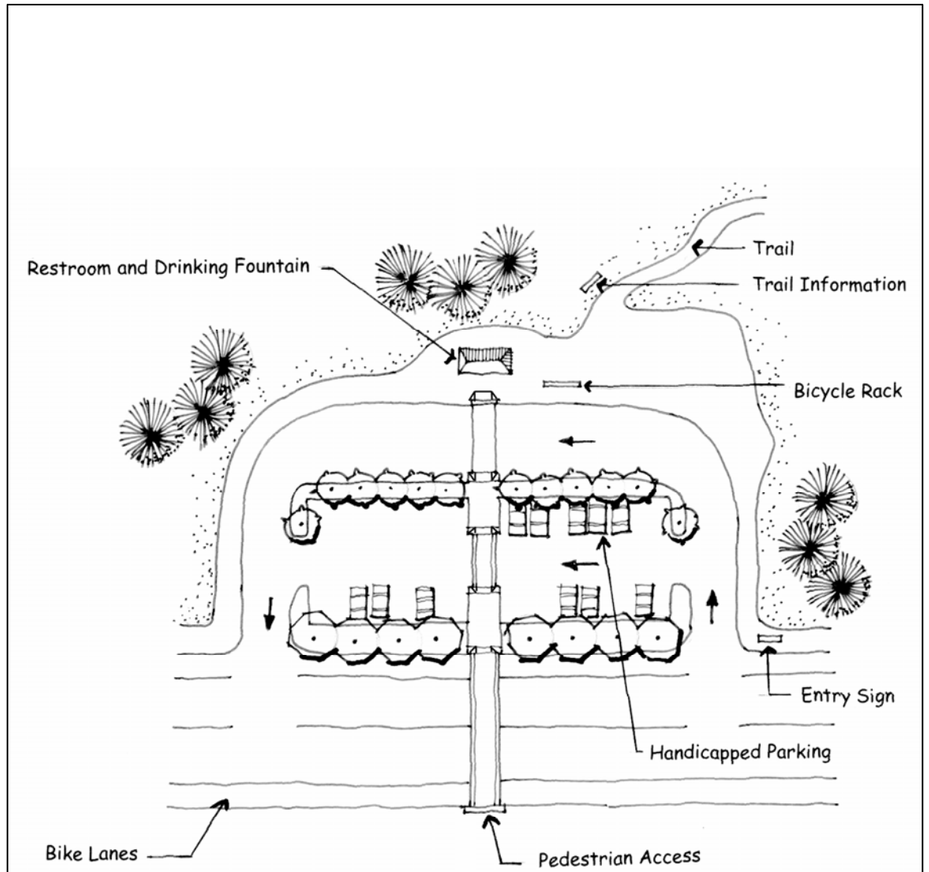
NOTE: Estimated potential costs for the Type 2 (enhanced crosswalk where traffic controls are already in place), the Type 3 (*Pelican*, *Puffin*, or *Hawk* configurations), and the Type 4 (grade separated bridge structures), are noted in the ArcView mapping data and included in the overall cost projections. Costs for the Type 1 crossings (route users to existing intersection) are included in the overall per-linear foot calculations.

Trailheads

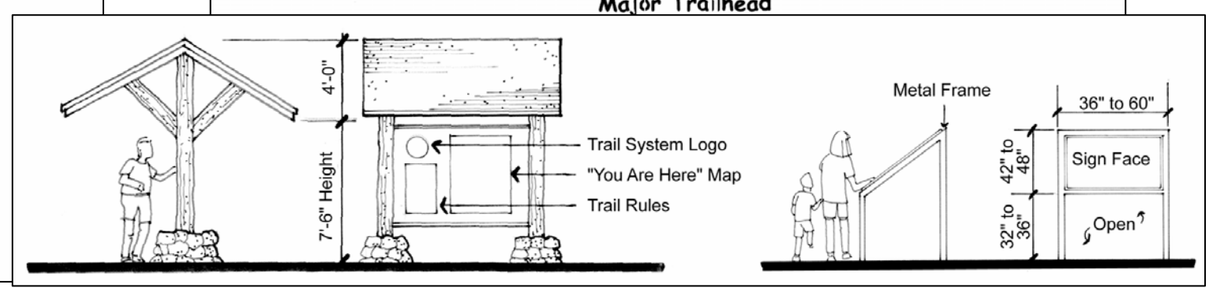
Good access to the trail system is a key element for its success. Trailheads (formalized parking areas) serve the local and regional population arriving to the pathway and trail system by car, transit, bicycle or other modes. Trailheads provide essential access to the trail system and include amenities like parking for vehicles and bicycles; restrooms (at major trailheads); and posted maps. A central information installation also helps users find their way and acknowledge the rules of the trail. These are also useful for interpretive education about plant and animal life, ecosystems and local history.



Trailhead with Small Parking Area



Major Trailhead



Trail Amenities

A variety of amenities can make a trail inviting to the user. The following table highlights some common items that help make trail systems stand out. Costs vary depending on the design and materials selected for each amenity.

TRAIL AMENITIES	
	**Interpretive Installations** Interpretive installations and signs can enhance the trail experience by providing information about the Capital Metro railroad corridor, for example – the spilled stones that were destined 100 years ago for the State Capital, but never made it because of a train derailment. Installations can also discuss local ecology, environmental concerns, and other educational information.
	**Water Fountains and Bicycle Parking** Water Fountains are essential for providing water for trail users (and their pets). Bicycle parking racks allow trail users to securely park their bicycles if they wish to stop along the way, particularly, particularly at parks and other desirable destinations.
	**Pedestrian-Scale Lighting and Furniture** Pedestrian-scale lighting improves safety and enables the trail to be used year-round. It also enhances the aesthetic of the trail. Lighting fixtures should be consistent with other light fixtures in the city, possibly emulating a historic theme. Providing benches at key rest areas and viewpoints encourages people of all ages to use the trail by ensuring that they have a place to rest along the way. Benches can be as simple as wood slats or more ornate, using stone, wrought iron, or concrete.
	Maps and Signage A comprehensive signing system makes a trail system stand out. Informational kiosks with maps at trailheads and other pedestrian generators can provide enough information for someone to use the trail system with little introduction – perfect for areas with high out-of-area visitation rates as well as local citizens.
	**Art Installations** Local artists can be commissioned to provide art for the trail system, making it uniquely distinct. Many trail art installations are functional as well as aesthetic, as they may provide places to sit and play.
	**Landscaping** Landscape features, including street trees or trees along trails, can enhance the visual environment and improve the trail user experience. Trees can also provide shade from heat and also provide protection from rain.
	**Restrooms** Restrooms benefit trail users, especially in more remote areas where other facilities do not exist. Restrooms can be sited at major trailheads or at other strategic locations along the trail system.

Trail Safety and Security

Various design and programmatic measures can be taken to address safety issues on a trail. The following table summarizes key safety issues and strategies for minimizing impacts.

Safety Recommendations	
Safety Issue	Recommended Improvements
Unwanted vehicle access on the trail	• Utilize landscaping to define the corridor edge and trail, including earth berms and large boulders. • Use bollards at intersections • Pass a motorized vehicle prohibited ordinance and sign the trail. • Create a Trail Watch program and encourage citizens to photograph report illegal vehicle use of the corridor. • Lay the trail out with curves that allow bike/ped passage, but are uncomfortably tight for automobile passage.
Privacy of adjacent property owners	• Encourage the use of neighborhood friendly fencing, planting of landscape buffers. • Clearly mark trail access points. • Post trail rules that encourage respect for private property. • Strategically placed lighting
Litter and dumping	• Post trail rules encouraging pack-it-in/pack-it-out etiquette. • Place garbage receptacles at trailheads. • Strategically-placed lighting, utilizing light shields to minimize unwanted light in adjacent homes. • Manage vegetation within the right-of-way to allow good visual surveillance of the trail from adjacent properties and from roadway/trail intersections. • Encourage local residents to report incidents as soon as they occur. • Remove dumpsites as soon as possible.
Trespassing	• Clearly distinguish public trail right-of-way from private property through the use of vegetative buffers and the use of good neighbor type fencing. • Post trail rules that encourage respect for private property.
Crime	• Manage corridor vegetation for easy trail visibility from adjacent streets,residences. • Select shrubs that grow below 3’ high and trees that branch out above 6’ high. • Place lights strategically and as necessary. • Place benches, amenities at high activity locations with good visual surveillance. • Provide mileage markers every ¼ mile and clear directional signage for orientation. • Create a “Trail Watch Program” involving local residents. • Proactive law enforcement. Utilize the corridor for mounted patrol training.
Private use of corridor	• Attempt to negotiate win/win solutions with property owners. • Eliminate where detrimental impact to trail cannot be reasonably ameliorated.
Local on-street parking	• Post local residential streets as parking for local residents only to discourage trail user parking. Place "no outlet" and "no parking" signs prior to trail access points.
Trailhead safety	• Clearly identify trailhead access areas.
Vandalism	• Select benches, bollards, signage and other site amenities that are durable, low maintenance and vandal resistant. • Respond through removal or replacement in rapid manner. • Keep a photo record of all vandalism and turn over to local law enforcement. • Encourage local residents to report vandalism. • Create a trail watch program; maintain good surveillance of the corridor. • Involve neighbors in trail projects to build a sense of ownership. • Place amenities (benches, etc.) in well used and highly visible areas.

Facility Operations and Maintenance

Community Involvement with Safety on the Trail
Creating a safe trail environment goes beyond design and law enforcement and involves the entire community. The most effective and most visible deterrent to illegal activity on the Capital Metro Trail will be the presence of legitimate trail users. Getting many "eyes on the corridor" is a key deterrent to undesirable activity. There are several components to accomplishing this as outlined below.

Provide good access to the trail
Access ranges from providing conveniently located trailheads along the trail, to encouraging the construction of sidewalks to accommodate access from private developments adjacent to the trail. Access points should be inviting and signed so as to welcome the public onto the trail.

Good visibility from adjacent neighbors
Neighbors adjacent to the trail can potentially provide 24-hour surveillance of the trail and can become Capital Metro's biggest ally. Though some screening and setback of the trail is needed for privacy of adjacent neighbors, complete blocking out of the trail from neighborhood view should be discouraged. This eliminates the potential of neighbors' "eyes on the trail," and could result in a "tunnel effect" on the trail.

High level of maintenance
A well-maintained trail sends a message that the community cares about the public space. This message alone will discourage undesirable activity along the trail.

Programmed events
Community events along the trail have potential to help increase public awareness and thereby attract more people to using the trail. Neighboring businesses and residents can help organize numerous public events along the trail which will increase support for the trail. Events might include a day-long trail clean up or a series of short interpretive walks led by long time residents or a park naturalist, or a running event.

Community projects
The support generated by community groups could be further capitalized by involving neighbors and friends of the trail in a community project. Ideas for community projects include volunteer planting events, art projects, interpretive research projects. These community projects are the strongest means of creating a sense of neighborhood ownership, a strong deterrent to undesirable activity along the trail.

Adopt-a-Trail Program
Nearby businesses, community institutions, and residential neighbors often see the benefit of their involvement in the trail development and maintenance. Businesses and developers may view the trail as an integral piece of their site planning and be willing to take on some level of responsibility for the trail. Creation of an adopt-a-trail program should be explored to capitalize on this opportunity and build civic pride.

Trail Watch Program
Partnering with local and county law enforcement, a trail watch program provides an opportunity for local residents to become actively involved in crime prevention along the Capital Metro Trail. Similar to Neighborhood Watch programs, residents are brought together to get to know their neighbors, and are educated on how to recognize and report suspicious activity.

Maintenance Guidelines
Proper maintenance of the trail is a critical element of providing a safe and user-friendly system. The following table summarizes a recommended maintenance schedule for the Capital Metro Trail. These guidelines address maintenance of the trail's off-street segments. On-street segments should be maintained according to the standards of the responsible jurisdiction.

Maintenance Task	Frequency
Inspections	Seasonal – at both beginning and end of summer
Signage replacement	1-3 years
Site furnishings; replace damaged components	As needed
Fencing repair	Inspect monthly for holes and damage, repair immediately
Pavement markings replacement	1-3 years
Pavement sweeping/blowing	As needed; before high use season
Pavement sealing; pothole repair	5-15 years
Lighting repair	Annually
Introduced tree and shrub plantings, trimming	1-3 years
Shrub/tree irrigation for introduced planting areas	Weekly during summer months until plants are established
Shoulder plant trimming (weeds, trees, branches)	Twice a year; middle of growing season
Major damage response (fallen trees, washouts, flooding)	Schedule based on priorities
Culvert inspection	Before rainy season; after major storms
Maintaining culvert inlets	Inspect before onset of wet season
Waterbar maintenance (earthen trails)	Annually
Trash disposal	Weekly during high use; twice monthly during low use
Litter pick-up	Weekly during high use; twice monthly during low use
Graffiti removal	Weekly; as needed

Chapter 5. Implementation Time Line and Cost

Options for implementation were evaluated and are summarized in **Appendix B, Trail Alignments Alternatives Evaluation Matrix**. The prioritization of these was further refined based on feedback from the Stakeholder Work Group, which met several times during the duration of the project. The connection options included in this final report reflect only those considered to be the most appropriate of those at the time they were studied. Phasing of these eleven candidate projects was also decided based on several iterations of feedback from this work group.

Initially it was thought this would be a 20-year plan. However it is clear that the agency and its member entities are eager to implement projects on a faster timetable. Details on the final recommended sequencing are included on the locator maps following the **Executive Summary** on pages 8 and 9. The table below attempts to stage these in manageable groupings based on the priorities that were established.

IMPLEMENTATION TIME LINE (PHASING SCHEDULE)

Project # (Priority)	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
1		(2) Downtown to Wilshire Blvd											
2	(1) Wilshire Blvd to Highland Mall												
3		(3) Highland Mall to Morrow Street											
4				(4) Morrow St. to Research Blvd									
5				(5) Research Blvd to Mo Pac									
6								(8) Mo Pac to Howard Lane					
7											(11) Howard Ln to FM 620		
8					(6) FM 620 to Brushy Creek Trail								
9										(10) Brushy Crk Trail to Brushy Crk Rd			
10									(9) Brushy Crk Rd to Crystal Falls Rd				
11						(7) Crystal Falls Rd to Leander TOD							

Planning Level Unit Cost Estimates

Order-of-magnitude cost estimates were then developed to help identify potential cost estimates for each of the eleven prioritized projects. The table below lists the baseline cost estimates identified by the study team. These were extrapolated and tabulated into groupings based on the various section types determined to be most appropriate along each corridor segment. The totals of these were then projected out based on the lengths of the different segment types to determine the order-of-magnitude estimates of potential cost for each.

See **Appendix C. Table of Estimates of Potential Costs by Section Type** for the detailed estimates determined by section type. A summary of these cost basis is included in the following Table of Potential Planning-Level Unit Costs.

Table of Potential Planning-Level Unit Costs

Item/Activity	Unit Cost
Trail Construction	
Clearing and demolition for trail	$0.40/SF
Rough grading for trail	$0.25/SF
Concrete trail – 6” thickness	$6.90/SF
Compacted DG shoulder – decomposed granite	$2.22/SF
Landscape areas/planter strips (≤8’ wide)	$4/SF
Landscape areas/planter strips (>8’ wide)	$1.75/SF
Soil preparation (landscape areas)	$0.25/SF
Finish grading (landscape areas)	$0.25/SF
Temporary irrigation (landscape areas)	$0.95/SF
Trench drain (drainage)	$12/LF
Culvert (drainage)	$1/LF
Fencing - 4’ high vinyl coated chain link	$24/LF
Fencing – vertical iron bar	$50/LF
Trail signing and striping (directional and regulatory)	$0.57/LF
Bridge Structures	
Minor bridge span – 10’ width (up to 30 LF)	$1,000 LF
Moderate bridge span 12’ width (>30 but <60 LF)	$1,500 LF
Major bridge span/signature bridge 14’ width (>60’+ and/or multiple spans)	$2,000 LF
Trail/Roadway Crossings	
Type 1 trail/roadway crossing: Marked/Unsignalized Crossing	$5,000 each
Type 2 trail/roadway crossing: Route Users to Existing Intersection	included in sect. lengths
Type 3 trail/roadway crossing: Signalized/Controlled Crossings (“Pelican,” “Puffin” or “Hawk”)	$120,000 each
Type 4 trail/roadway crossing: Grade Separated Structure	incl. as “Major Bridge”
Street Improvements	
Sidewalk (6’ concrete, both sides of street, includes rough grading and clearing/demolition)	$63/LF
Curb (one side of street)	$11/LF
Shared roadway (includes directional and regulatory bikeway signing)	$0.95/LF
Asphalt street (6” thick, includes rough grading, clearing, demolition - applies to “Section H” only)	$4.55/SF
Painted stripe separating motorists and trail users (applies to “Section H” only)	$0.30/LF
Allowances	
Mobilization	8% of project cost
Engineering	20% of project cost
Contingency	20% of project cost
Trail Amenities (included separately in the final estimates)	
Pedestrian Scale Lighting – nominal 22’ +/- height, 80’ spacing, assumes 66 lights per mile	$237,600/mile
Drinking fountains - point of connection about every 3 miles along trail	$4,500 each
Benches - estimated one per half-mile of trail	$2,800 each
Information system - interpretive signs/stations – one about every 5 miles	$ .40/LF

Potential Funding Sources

Funds are available from a variety of federal programs, generally administered by the Texas Department of Transportation. Programs such as Safe Routes to Schools or 402 Safety Funds are two of the more applicable sources. The Capital Area Metropolitan Planning Organization (CAMPO) has established a set-aside for pedestrian and bicycle facilities. Other sources might include local funds, such as bond or other or programs instituted by the Cities of Austin, Leander or Cedar Park, or from Travis or Williamson Counties. Capital Metro has committed over $7.2 million of its transit sales tax to trails development over the past six years as of November 2006.

U.S Department of Transportation/ Federal Highway Administration

- The *Transportation, Community, and System Preservation (TCSP) Program* provides funding for a comprehensive initiative including planning grants, implementation grants, and research to investigate and address the relationships between transportation, community, and system preservation and to identify private sector-based initiatives. This program offers discretionary grants to plan and implement improvements to the efficiency of the transportation system, reduce environmental impacts of transportation, reduce the need for costly future public infrastructure investments, ensure efficient access to jobs, services and centers of trade, and examine development patterns and identify strategies to encourage private sector development patterns which achieve these goals. Funding authorized for the TCSP Program is $61.25 million per year for FY 2006 through 2009.
- *Statewide Transportation Enhancement Program (STEP)* includes a provision for pedestrian and bicycle facilities and is administered by the TXDOT under SAFETEA-LU. *In late 2006, TXDOT rescinded the STEP program.* The purpose of this program is to help diversify travel modes, increase community benefits, strengthen State and Local partnerships and promote citizen involvement in transportation decisions.
- *Safe Routes to School Program* designed to enable and encourage children including those with disabilities to walk and bicycle to school. Infrastructure funds will be used for planning, design and construction of infrastructure related projects to improve walking, biking, sidewalk improvements, traffic calming, speed reduction, pedestrian and bicycle improvements, on-street bicycle facilities, off-street bicycle and pedestrian facilities, bicycle parking, or traffic diversion near schools. Non-infrastructure projects will be used for walking, bicycling activities, public awareness campaigns, traffic education and enforcement.
- *Recreational Trails Program* is a program under U.S Department of Transportation's Federal Highway Administration (FHWA). Nearly $50 million is available annually, of which FHWA uses 1.5 percent of funds for administration, research and technical assistance. Funds from this program are to be used to develop and maintain recreational trails and trail related facilities for motorized and non-motorized uses. Types of projects eligible include: Maintenance and restoration of existing trails, development and rehabilitation of trail facilities, purchase and lease of trail construction and maintenance equipment, construction of new trails, acquisition of easements or property for trails, educational programs to promote safety and environmental protection. Thirty percent of the funds in this program is for non-motorized uses. Another 30 percent is earmarked for motorized uses, and 40 percent of the total can be used for either type of uses. Recreational Trails Program funds cannot be used for and projects involving eminent domain, or to facilitate motorized access to existing non-motorized trails States will make grants to private organizations. Some in-kind materials and services may be credited toward the project match. The project costs are reimbursed or capital loans may also be provided.
- *Railway/Highway Crossing Program* funds activities for safety improvements projects to eliminate hazards at railway/highway grade crossings. Eligible project types include elimination of hazards at railway-highway crossings, crossing protection devices, upgrading existing devices, railroad crossing closures, and pedestrian crossing improvements for high priority projects.

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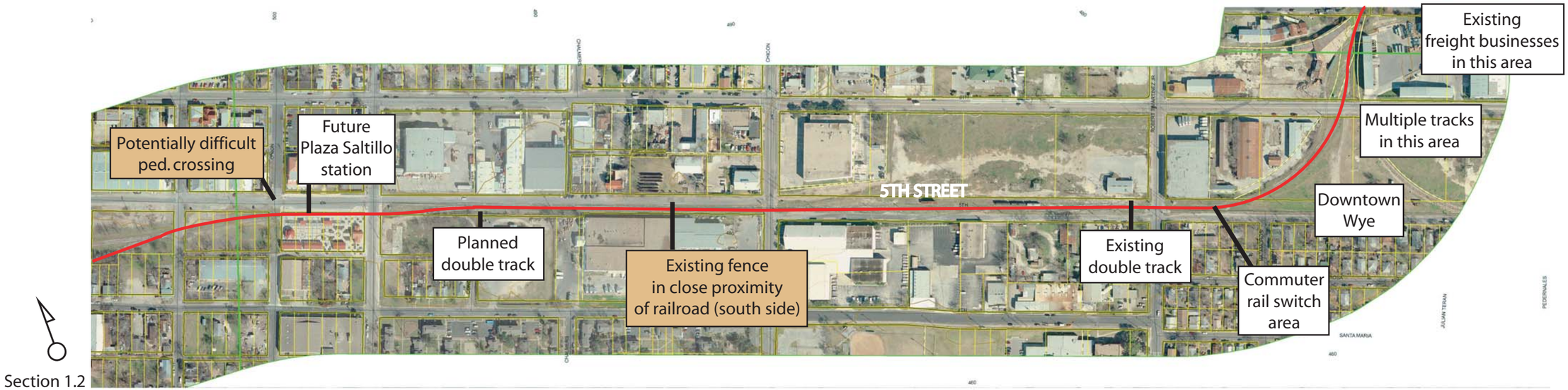
CAPITAL METRO RAIL-WITH-TRAIL FEASIBILITY STUDY

Opportunities and Constraints Analysis

Downtown to Leander Segment - Sections 1.1 and 1.2

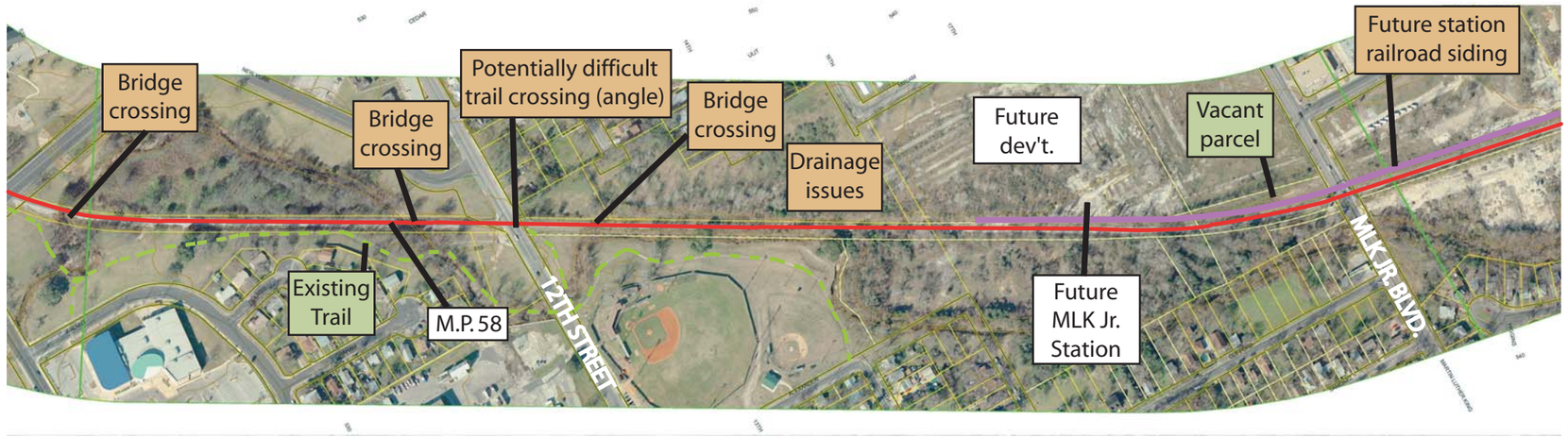


CAPITAL METRO RAIL-WITH-TRAIL FEASIBILITY STUDY

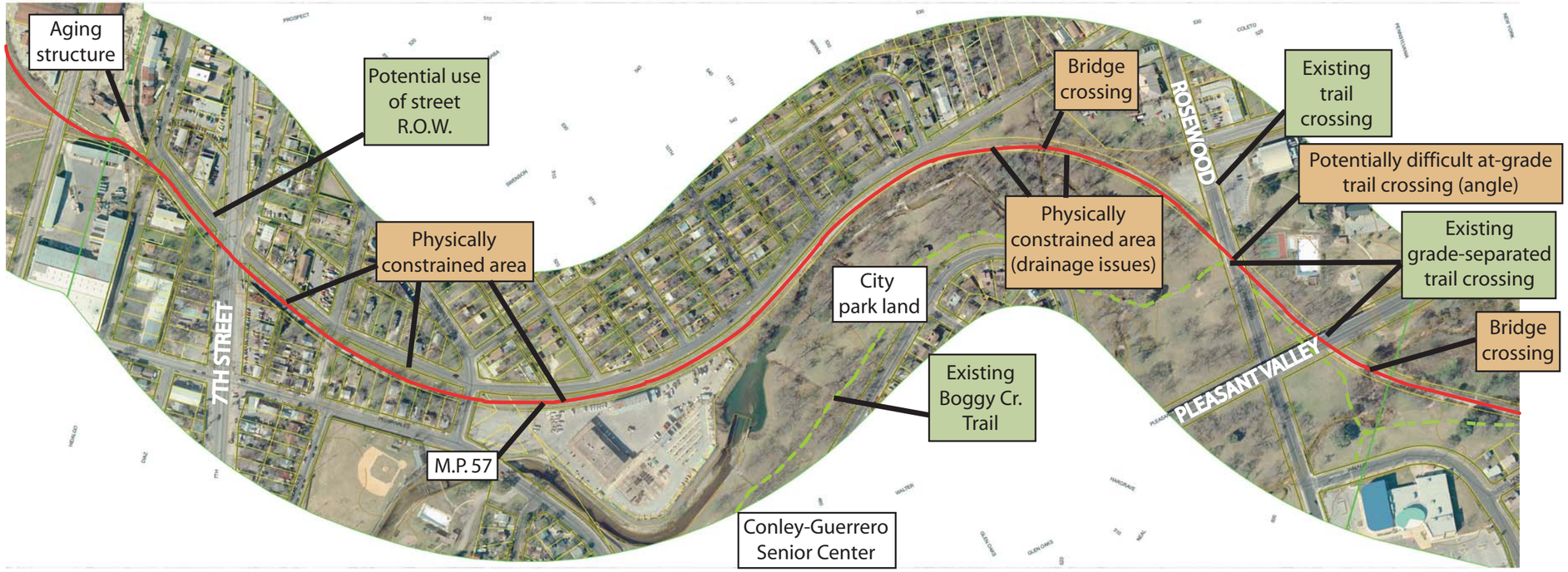
Opportunities and Constraints Analysis

Downtown to Leander Segment - Sections 1.3 and 1.4

Section 1.4



Section 1.3



LEGEND

- Opportunities
- Constraints
- Other notes/ observations
- Railroad
- Parcels
- Matchline

0 250 500 1,000 1,500 2,000 Feet

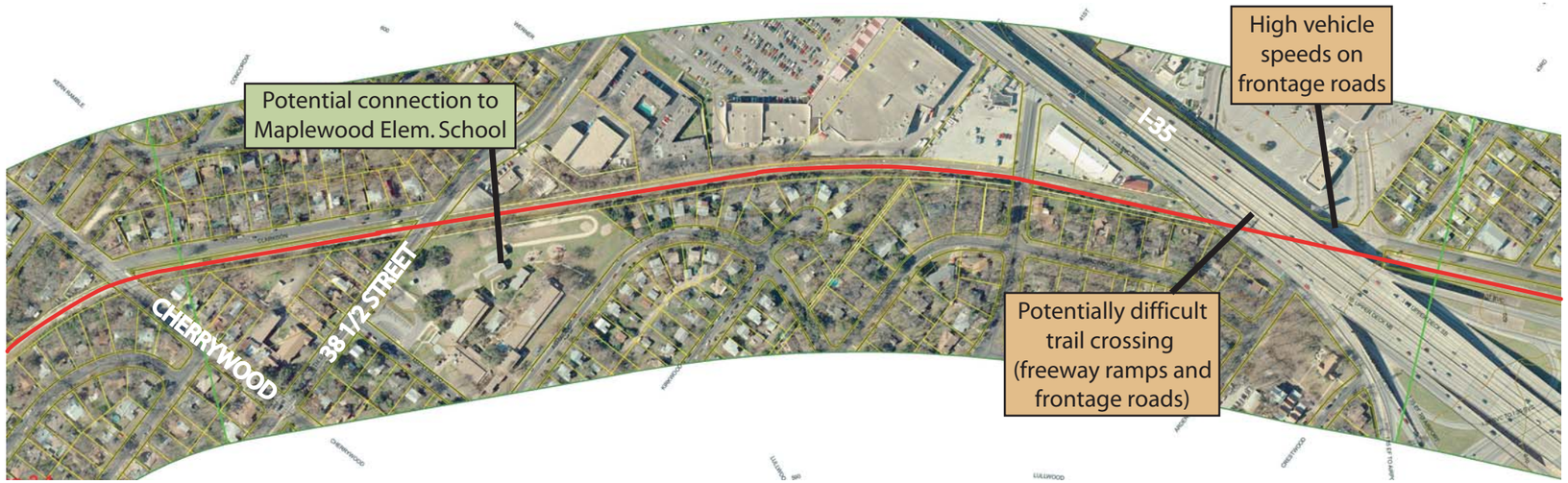
CAPITAL METRO

BOWMAN•MELTON•ALTA BMA PLANNING+DESIGN

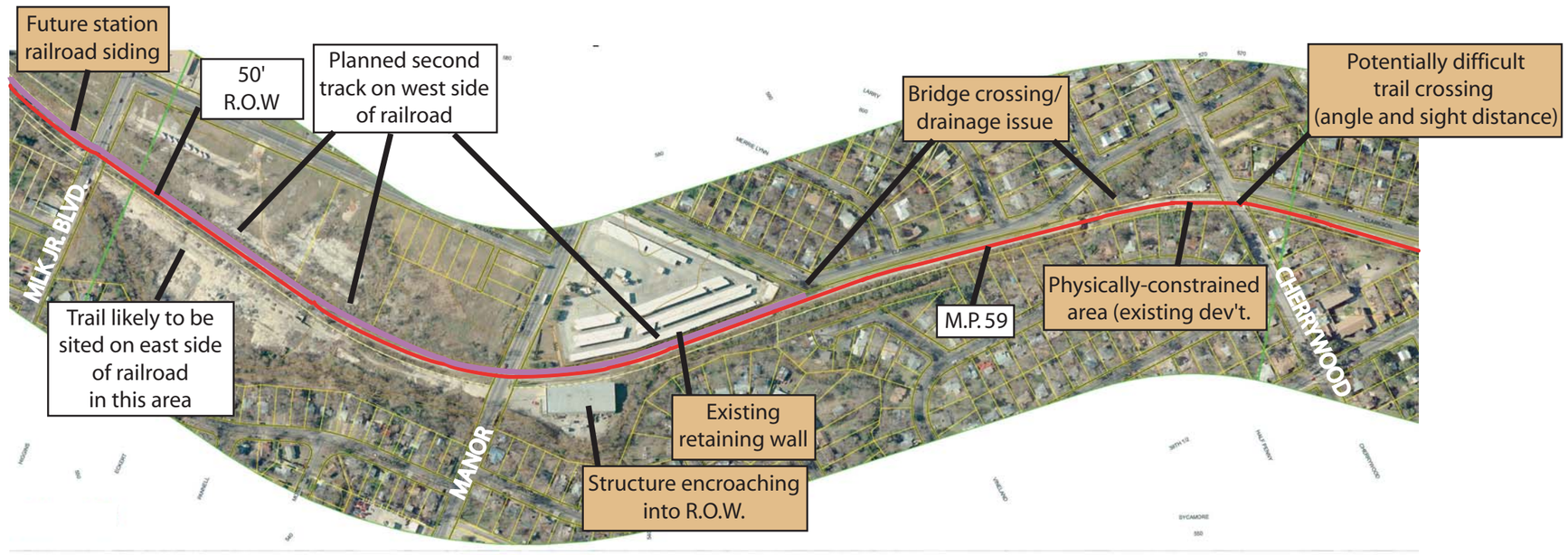
CAPITAL METRO RAIL-WITH-TRAIL FEASIBILITY STUDY

Opportunities and Constraints Analysis

Downtown to Leander Segment - Sections 1.5 and 2.1



Section 2.1



Section 1.5

LEGEND

- Opportunities
- Constraints
- Other notes/ observations
- Railroad
- Parcels
- Matchline

0 250 500 1,000 1,500 2,000 Feet

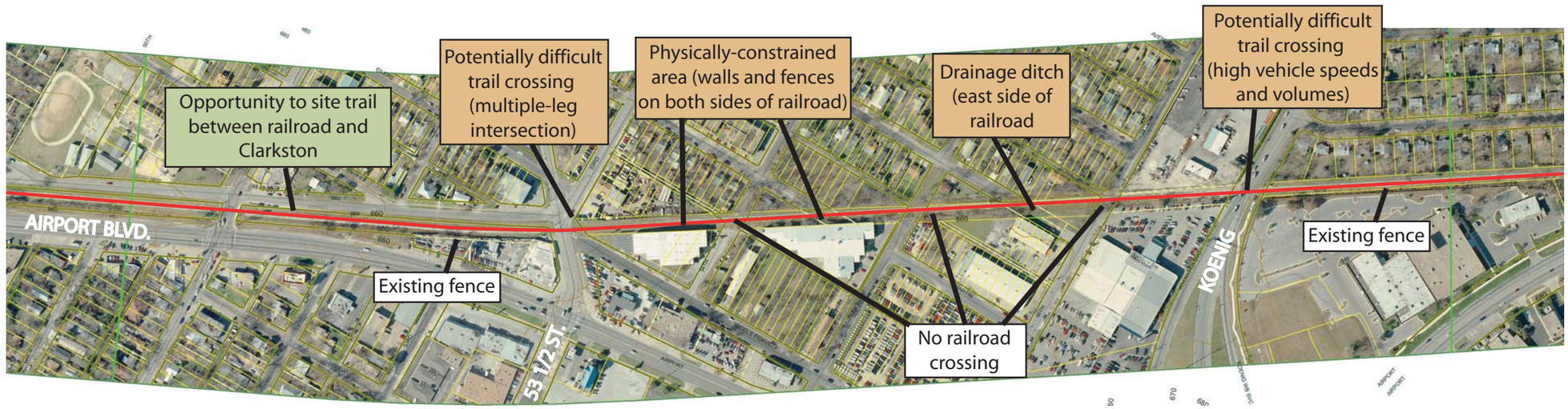
CAPITAL METRO

BOWMAN•MELTON•ALTA BMA PLANNING+DESIGN

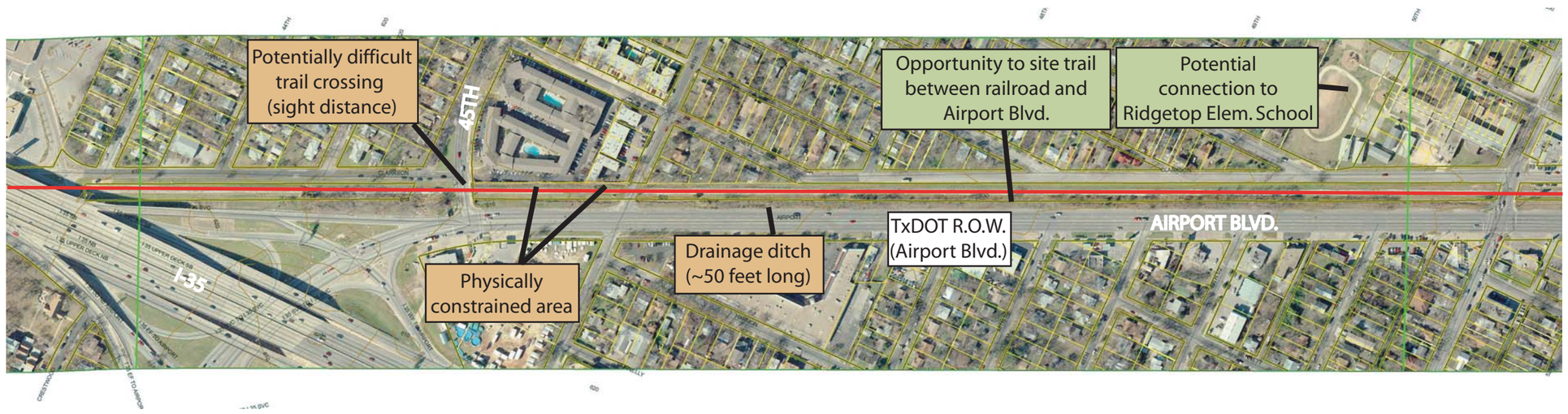
CAPITAL METRO RAIL-WITH-TRAIL FEASIBILITY STUDY

Opportunities and Constraints Analysis

Downtown to Leander Segment - Sections 2.2 and 2.3



Section 2.3



Section 2.2

LEGEND

- Opportunities
- Constraints
- Other notes/ observations
- Railroad
- Parcels
- Matchline

0 250 500 1,000 1,500 2,000 Feet

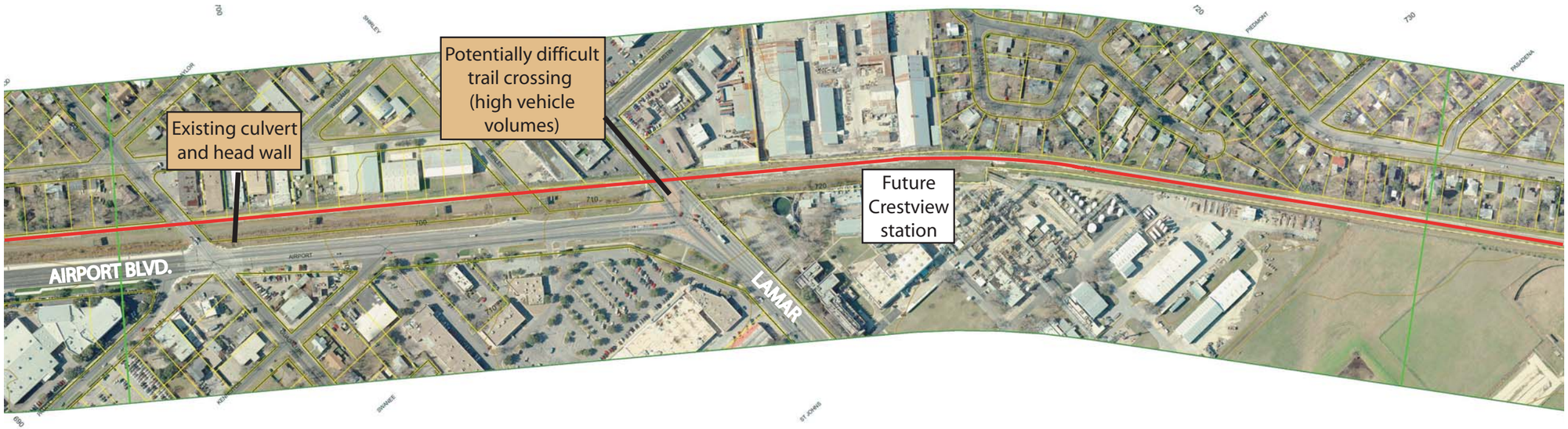
CAPITAL METRO

BOWMAN•MELTON•ALTA BMA PLANNING•DESIGN

CAPITAL METRO RAIL-WITH-TRAIL FEASIBILITY STUDY

Opportunities and Constraints Analysis

Downtown to Leander Segment - Sections 2.4 and 2.5



Section 2.5

Section 2.4

LEGEND

- Opportunities
- Constraints
- Other notes/ observations
- Railroad
- Parcels
- Matchline

0 250 500 1,000 1,500 2,000 Feet

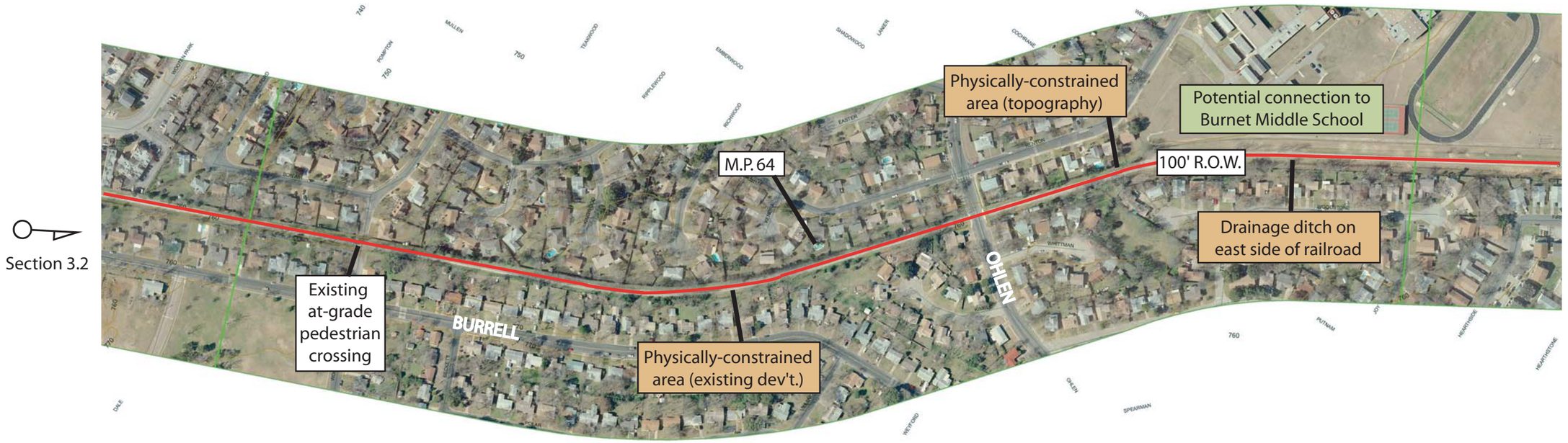
CAPITAL METRO

BOWMAN•MELTON•ALTA BMA PLANNING+DESIGN

CAPITAL METRO RAIL-WITH-TRAIL FEASIBILITY STUDY

Opportunities and Constraints Analysis

Downtown to Leander Segment - Sections 3.1 and 3.2

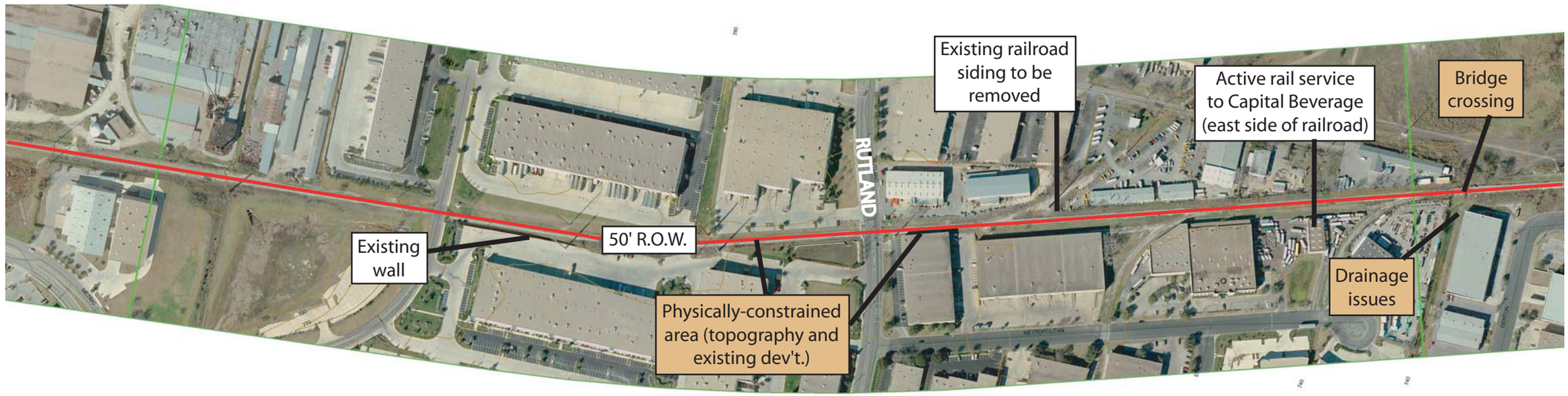


CAPITAL METRO RAIL-WITH-TRAIL FEASIBILITY STUDY

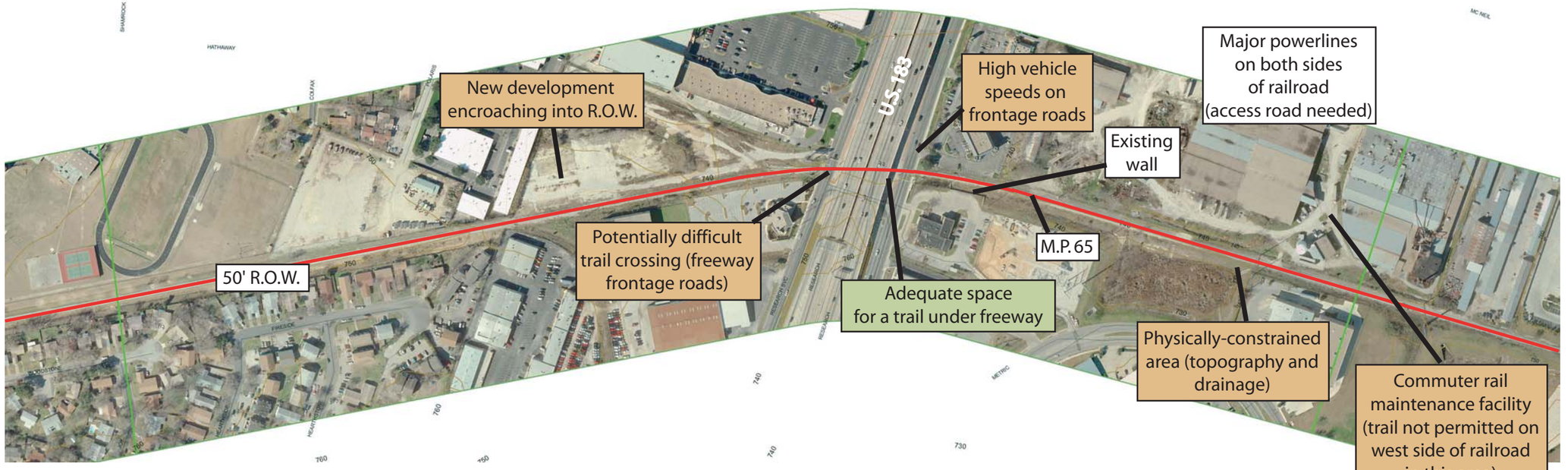
Opportunities and Constraints Analysis

Downtown to Leander Segment - Sections 3.3 and 3.4

Section 3.4



Section 3.3



LEGEND

- Opportunities
- Constraints
- Other notes/ observations
- Railroad
- Parcels
- Matchline

0 250 500 1,000 1,500 2,000 Feet

CAPITAL METRO

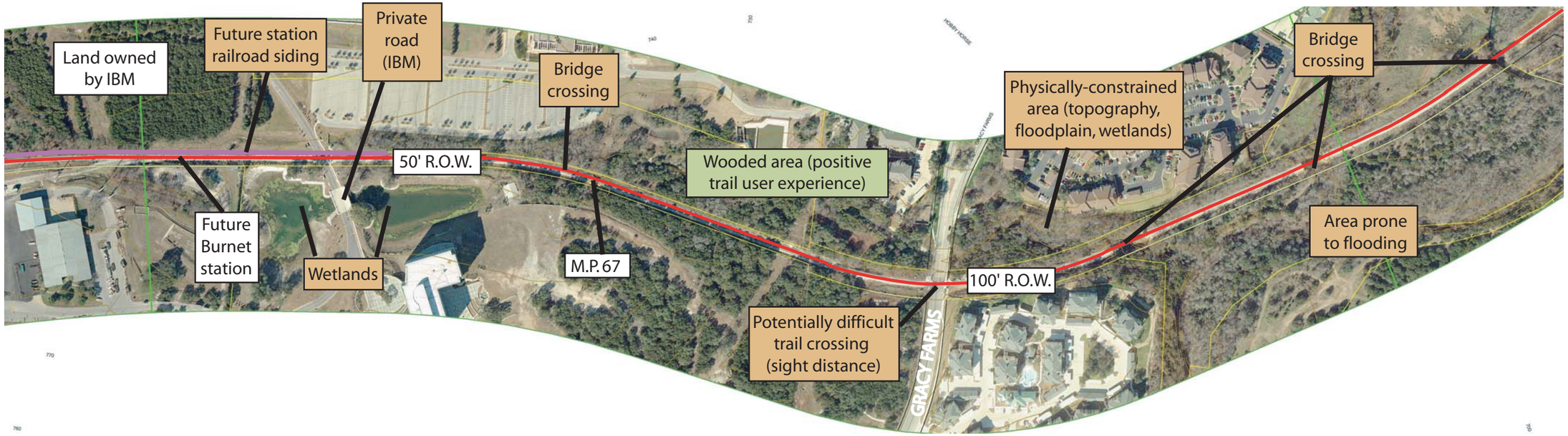
BOWMAN•MELTON•ALTA BMA PLANNING•DESIGN

CAPITAL METRO RAIL-WITH-TRAIL FEASIBILITY STUDY

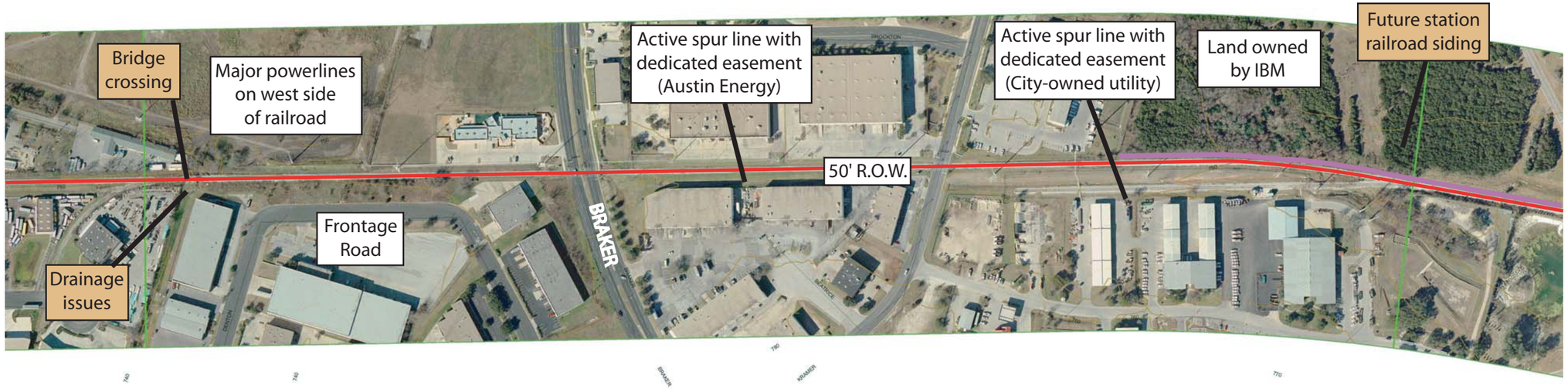
Opportunities and Constraints Analysis

Downtown to Leander Segment - Sections 3.5 and 4.1

Section 4.1



Section 3.5



LEGEND

- Opportunities
- Constraints
- Other notes/ observations
- Railroad
- Parcels
- Matchline

0 250 500 1,000 1,500 2,000 Feet

CAPITAL METRO

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CAPITAL METRO RAIL-WITH-TRAIL FEASIBILITY STUDY

Opportunities and Constraints Analysis

Downtown to Leander Segment - Sections 4.2 and 4.3

Section 4.3

Bridge crossing

Potential connection to Balcones Park

WATERS PARK ROAD

PARMER

Potential grade-separated trail crossing

Bridge crossing

Physically-constrained area (topography and drainage issues)

LOOP 1 (MOPAC)

Potential to site trail between freeway and railroad

100' R.O.W.

M.P. 69

Equestrian crossing

Section 4.2

Potentially difficult trail crossing (freeway frontage roads)

Drainage issues under freeway

Creek

Bridge crossing

Area prone to flooding

Future trail planned along MoPac

Fill area

Existing trail network west of railroad

M.P. 68

Bridge crossing

Potential connection to Balcones Park

Potential on-street trail alignment (Waters Park Rd.)

WATERS PARK ROAD

Bridge crossing

LEGEND

- Opportunities
- Constraints
- Other notes/ observations
- Railroad
- Parcels
- Matchline

0 250 500 1,000 1,500 2,000 Feet

CAPITAL METRO

BOWMAN•MELTON•ALTA BMA PLANNING+DESIGN

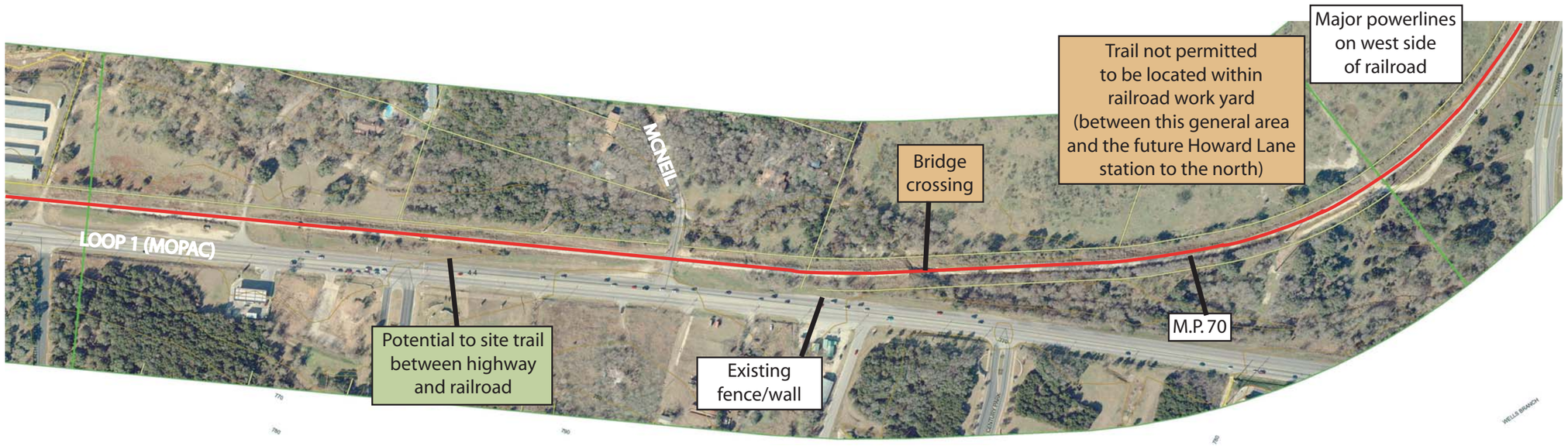
CAPITAL METRO RAIL-WITH-TRAIL FEASIBILITY STUDY

Opportunities and Constraints Analysis

Downtown to Leander Segment - Sections 4.4 and 4.5

Section 4.5

Section 4.4



LEGEND

- Opportunities
- Constraints
- Other notes/ observations
- Railroad
- Parcels
- Matchline

0 250 500 1,000 1,500 2,000 Feet

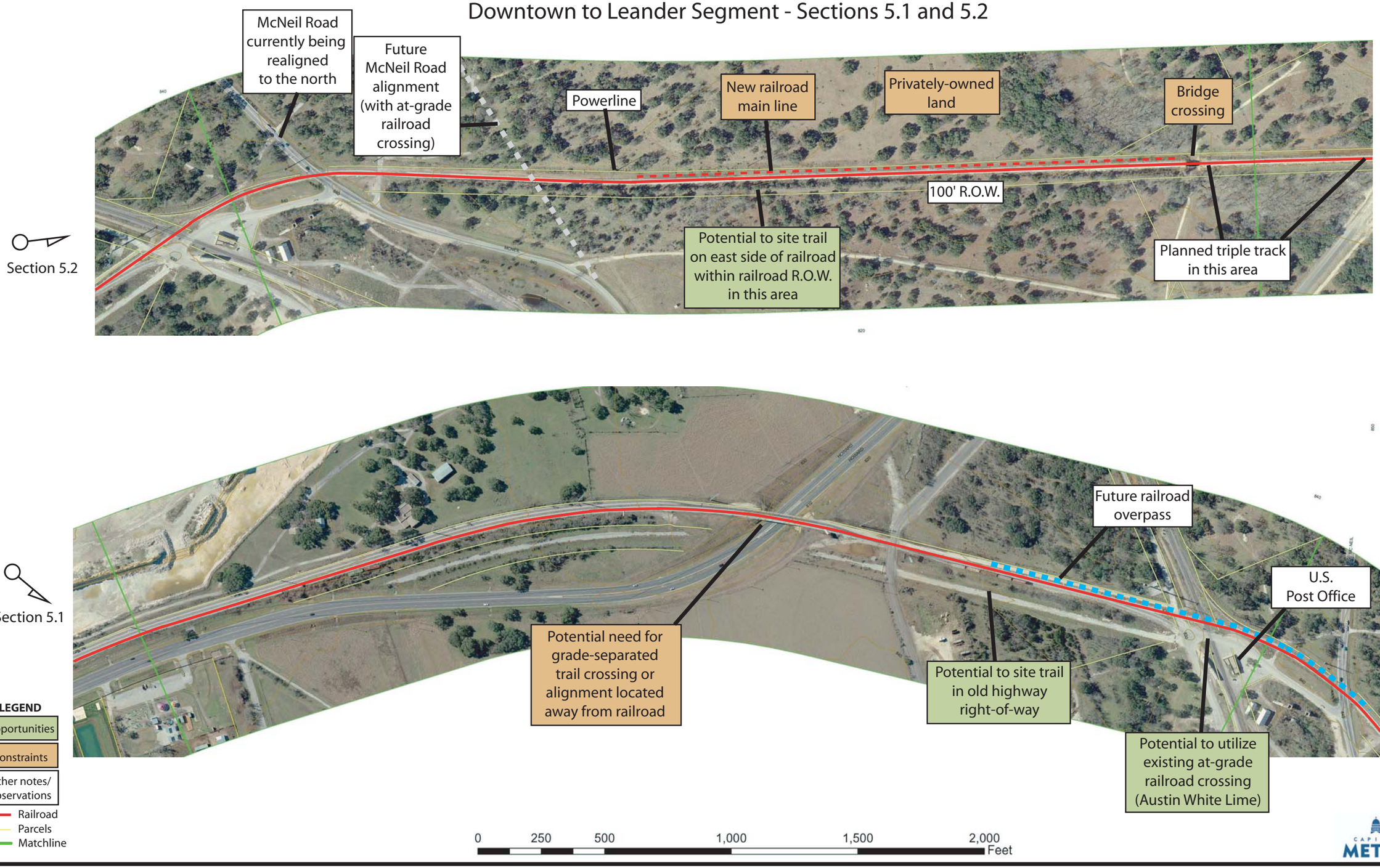
CAPITAL METRO

BOWMAN•MELTON•ALTA BMA PLANNING+DESIGN

CAPITAL METRO RAIL-WITH-TRAIL FEASIBILITY STUDY

Opportunities and Constraints Analysis

Downtown to Leander Segment - Sections 5.1 and 5.2

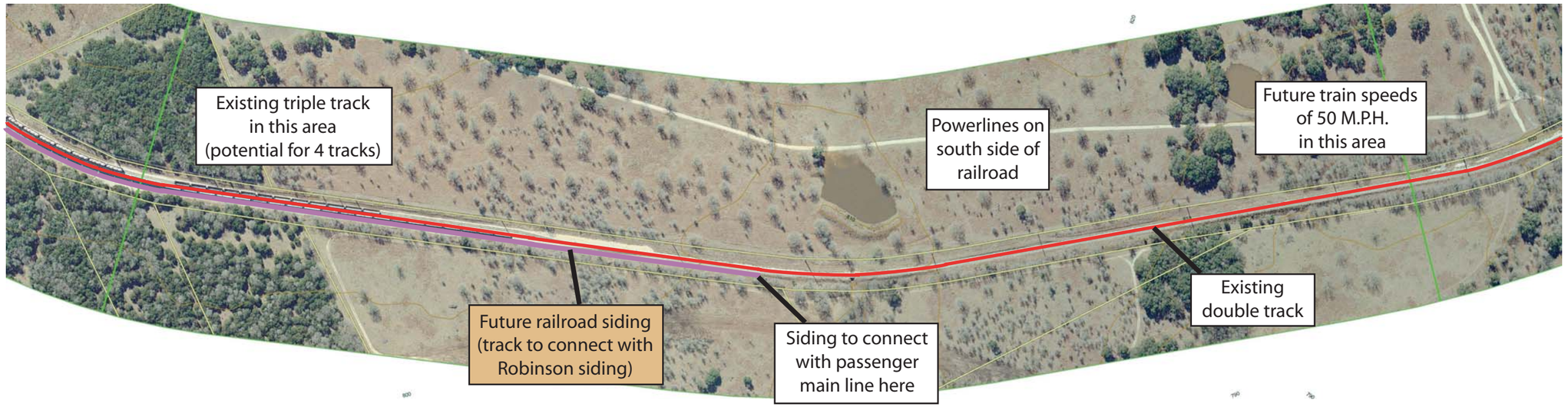


CAPITAL METRO RAIL-WITH-TRAIL FEASIBILITY STUDY

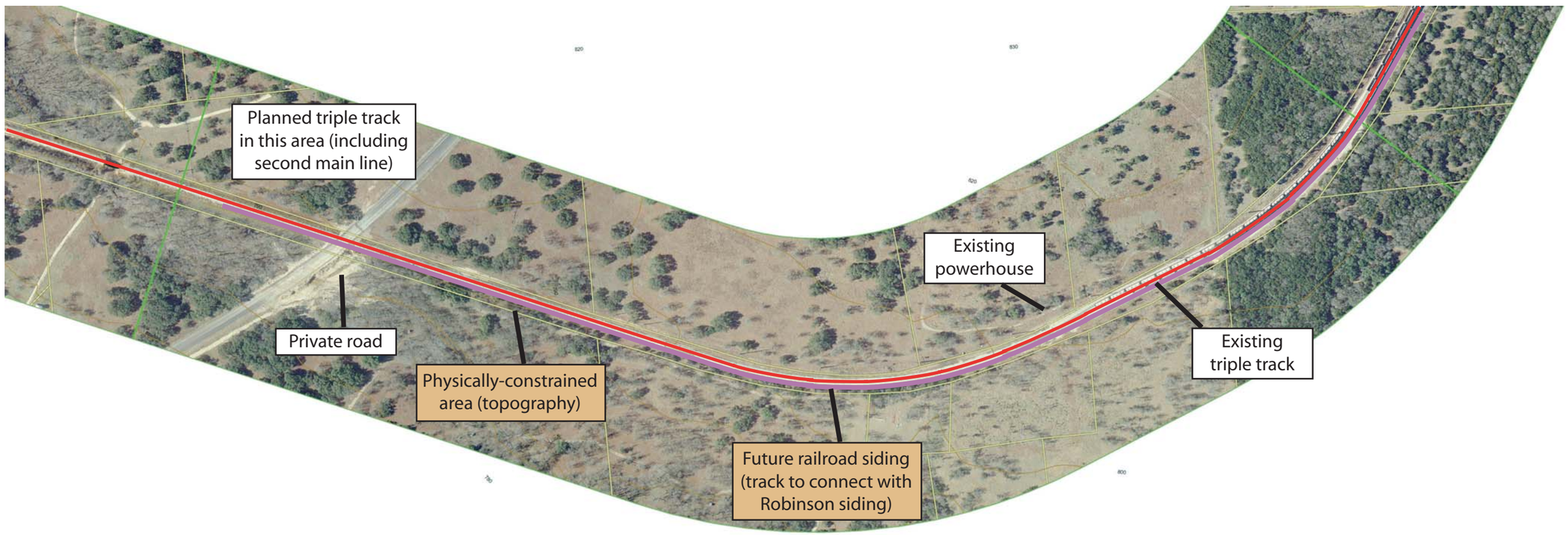
Opportunities and Constraints Analysis

Downtown to Leander Segment - Sections 5.3 and 5.4

Section 5.4



Section 5.3



LEGEND

- Opportunities
- Constraints
- Other notes/ observations
- Railroad
- Parcels
- Matchline

0 250 500 1,000 1,500 2,000 Feet

CAPITAL METRO

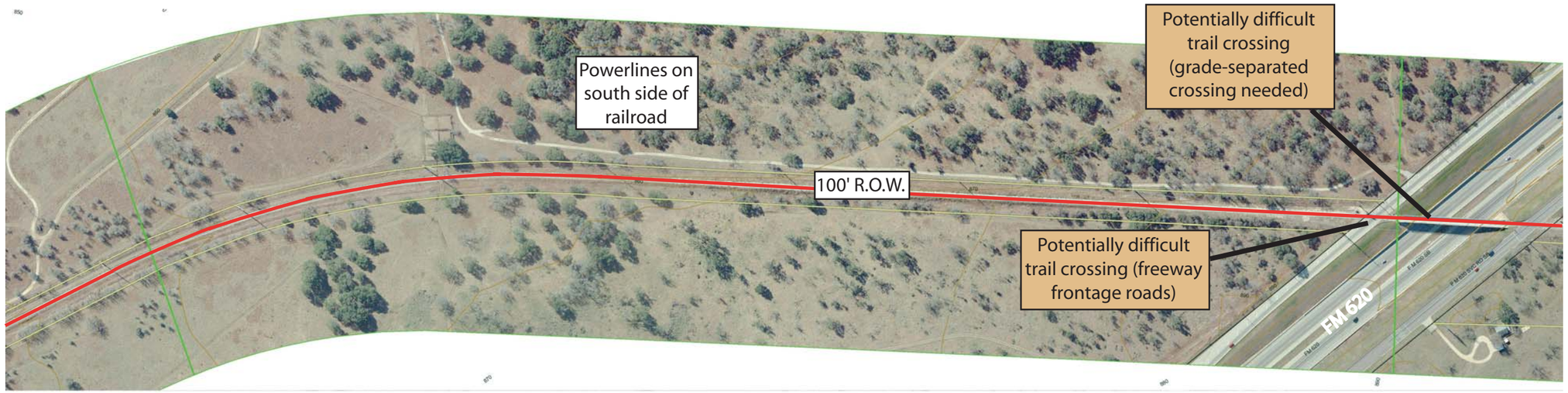
BOWMAN•MELTON•ALTA BMA PLANNING+DESIGN

CAPITAL METRO RAIL-WITH-TRAIL FEASIBILITY STUDY

Opportunities and Constraints Analysis

Downtown to Leander Segment - Sections 5.5 and 6.1

Section 6.1



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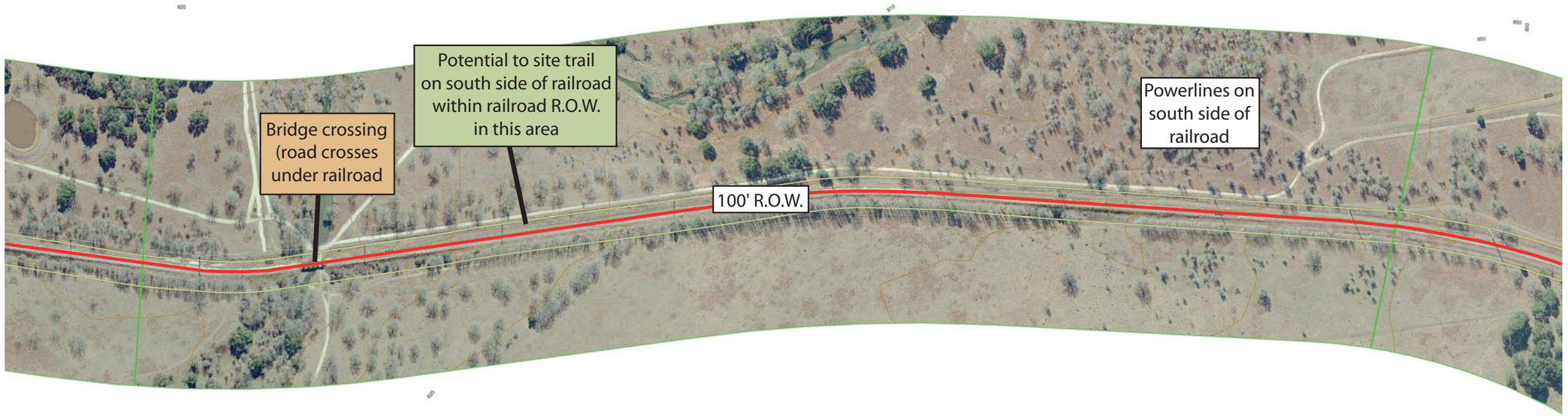


LEGEND

- Opportunities
- Constraints
- Other notes/ observations
- Railroad
- Parcels
- Matchline

0 250 500 1,000 1,500 2,000 Feet

CAPITAL METRO

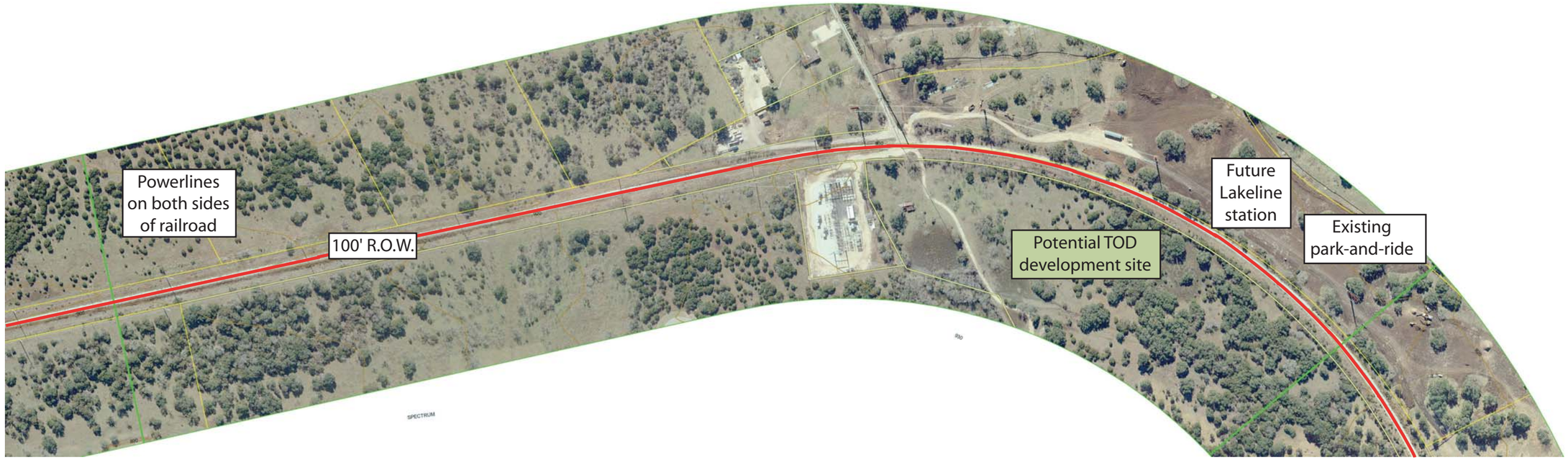
BOWMAN•MELTON•ALTA BMA PLANNING•DESIGN

CAPITAL METRO RAIL-WITH-TRAIL FEASIBILITY STUDY

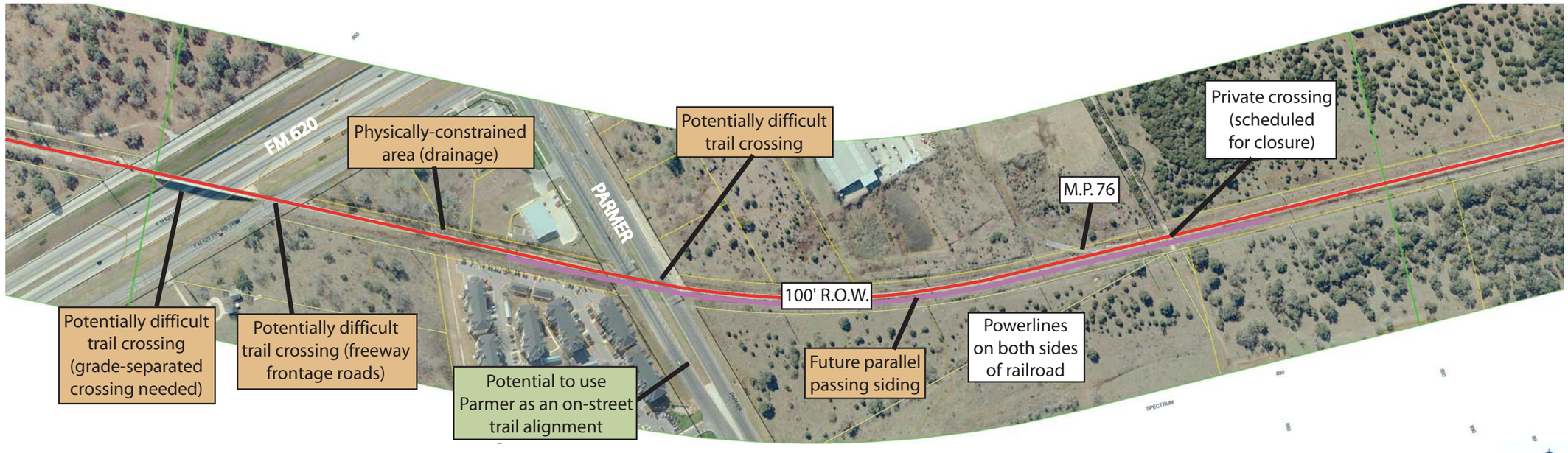
Opportunities and Constraints Analysis

Downtown to Leander Segment - Sections 6.2 and 6.3

Section 6.3



Section 6.2



LEGEND

- Opportunities
- Constraints
- Other notes/ observations
- Railroad
- Parcels
- Matchline

0 250 500 1,000 1,500 2,000 Feet

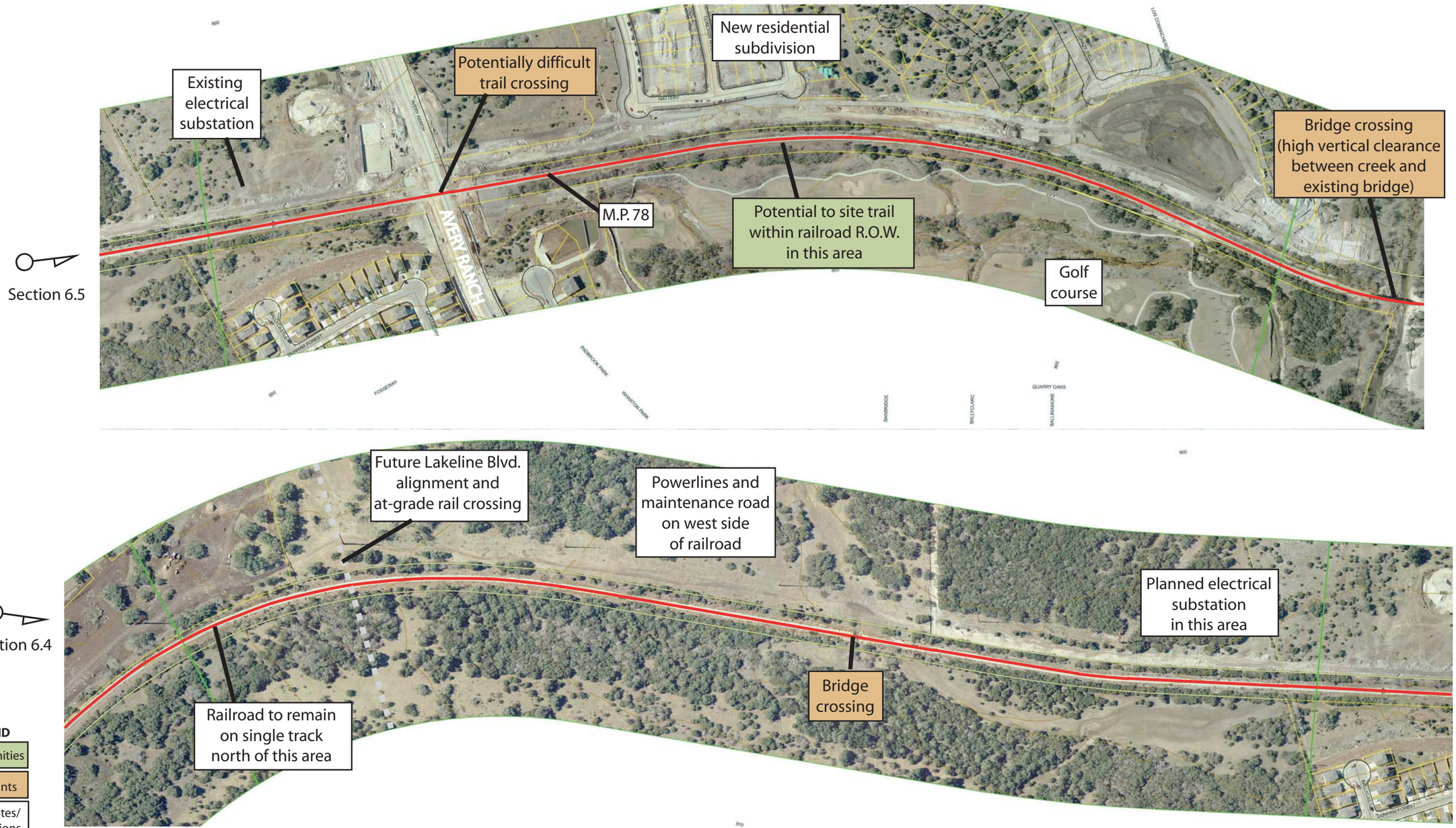
CAPITAL METRO

BOWMAN•MELTON•ALTA BMA PLANNING•DESIGN

CAPITAL METRO RAIL-WITH-TRAIL FEASIBILITY STUDY

Opportunities and Constraints Analysis

Downtown to Leander Segment - Sections 6.4 and 6.5



CAPITAL METRO RAIL-WITH-TRAIL FEASIBILITY STUDY

Opportunities and Constraints Analysis

Downtown to Leander Segment - Section 7.1

LEGEND

- Opportunities
- Constraints
- Other notes/ observations
- Railroad
- Parcels
- Matchline

0 250 500 1,000 1,500 2,000 Feet

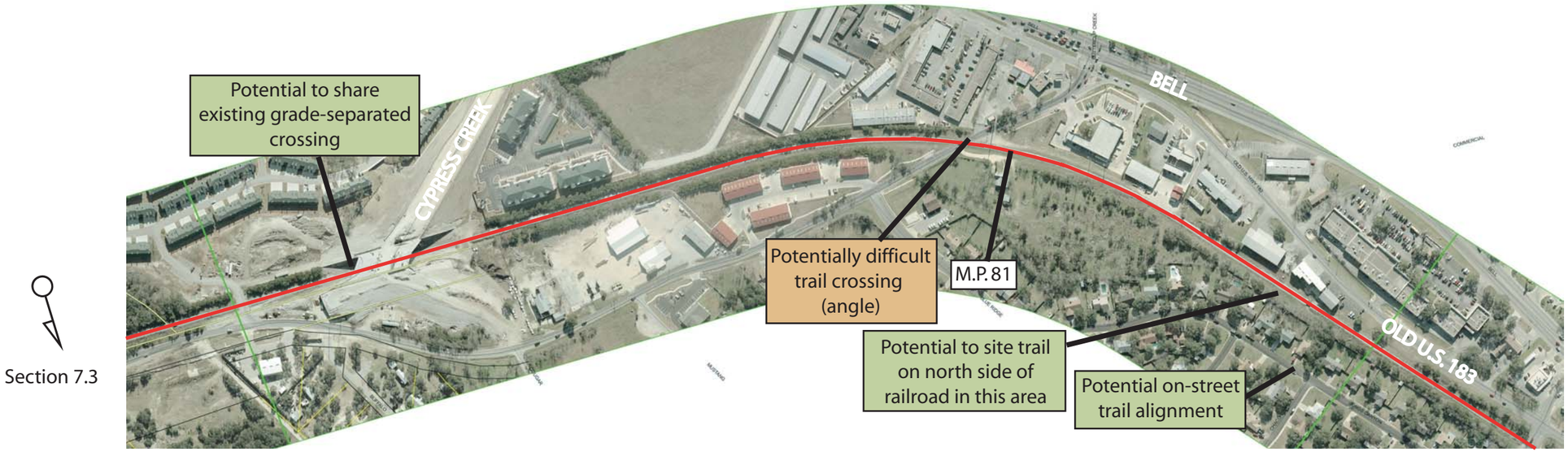
CAPITAL METRO

BOWMAN•MELTON•ALTA BMA PLANNING•DESIGN

CAPITAL METRO RAIL-WITH-TRAIL FEASIBILITY STUDY

Opportunities and Constraints Analysis

Downtown to Leander Segment - Sections 7.2 and 7.3



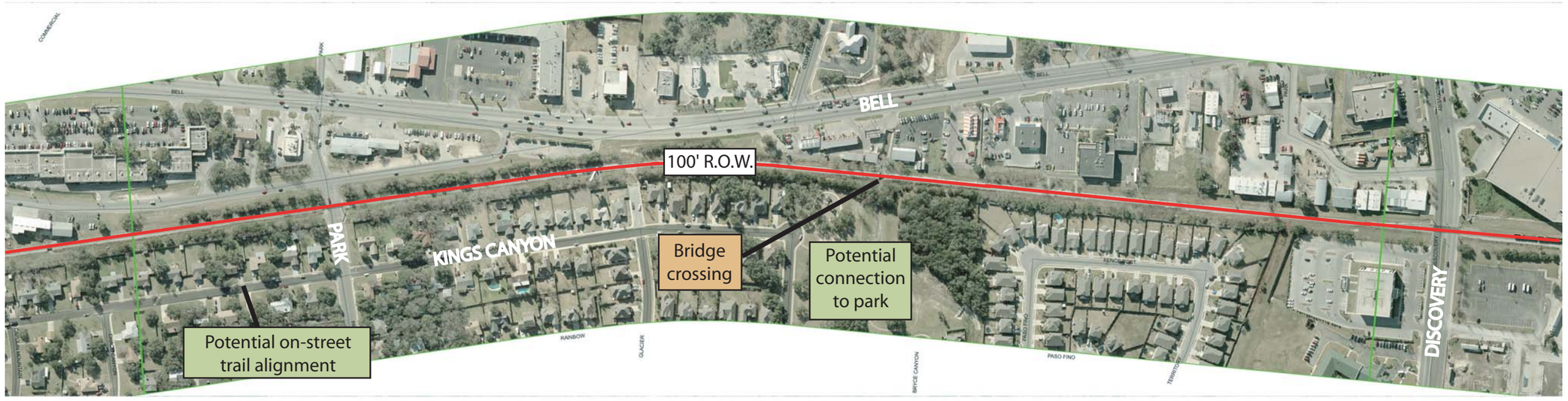
CAPITAL METRO RAIL-WITH-TRAIL FEASIBILITY STUDY

Opportunities and Constraints Analysis

Downtown to Leander Segment - Sections 7.4 and 7.5

Section 7.5

Section 7.4



LEGEND

- Opportunities
- Constraints
- Other notes/ observations
- Railroad
- Parcels
- Matchline

0 250 500 1,000 1,500 2,000 Feet

CAPITAL METRO

BOWMAN•MELTON•ALTA BMA PLANNING+DESIGN

CAPITAL METRO RAIL-WITH-TRAIL FEASIBILITY STUDY

Opportunities and Constraints Analysis

Downtown to Leander Segment - Sections 8.1 and 8.2

Section 8.2

Section 8.1

LEGEND

- Opportunities
- Constraints
- Other notes/ observations
- Railroad
- Parcels
- Matchline

0 250 500 1,000 1,500 2,000 Feet

CAPITAL METRO

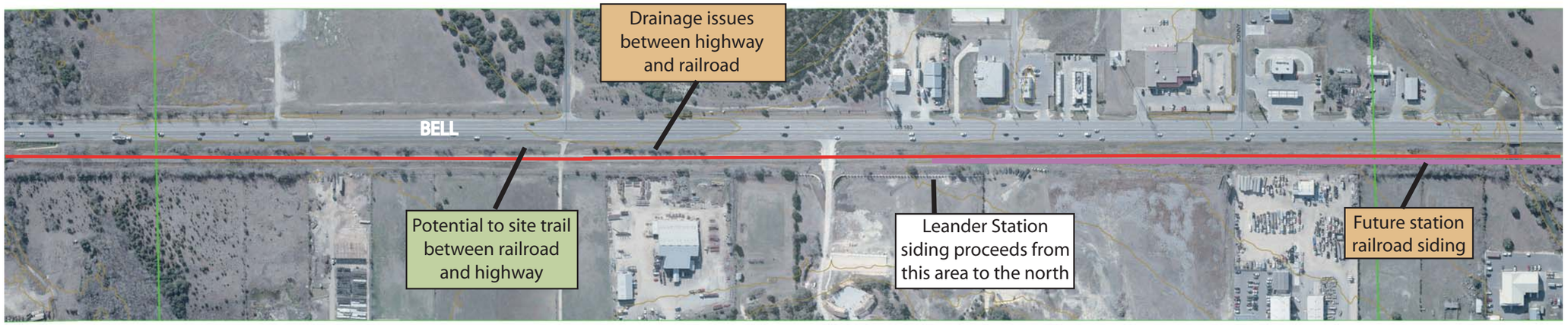
BOWMAN•MELTON•ALTA BMA PLANNING•DESIGN

CAPITAL METRO RAIL-WITH-TRAIL FEASIBILITY STUDY

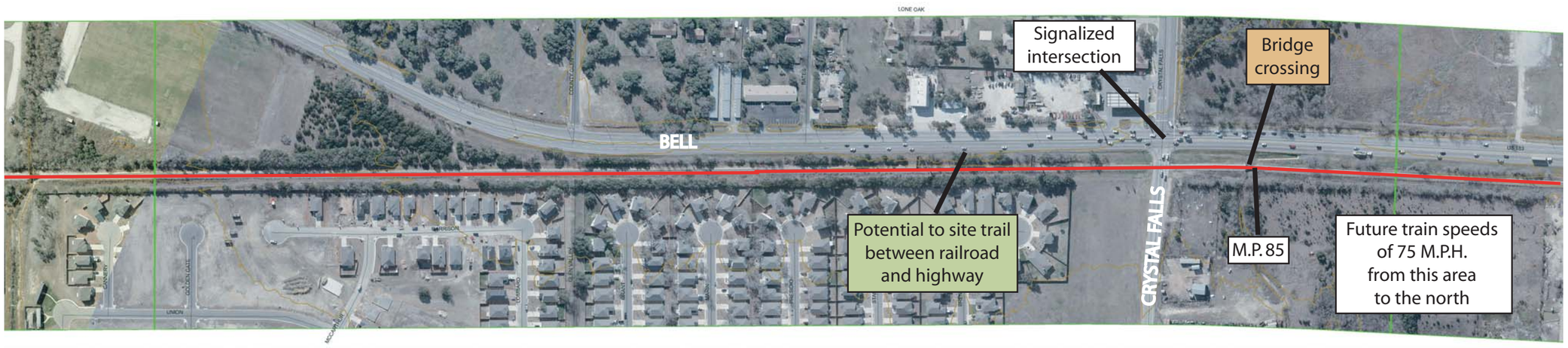
Opportunities and Constraints Analysis

Downtown to Leander Segment - Sections 8.3 and 8.4

Section 8.4



Section 8.3



LEGEND

- Opportunities
- Constraints
- Other notes/ observations
- Railroad
- Parcels
- Matchline

0 250 500 1,000 1,500 2,000 Feet

CAPITAL METRO

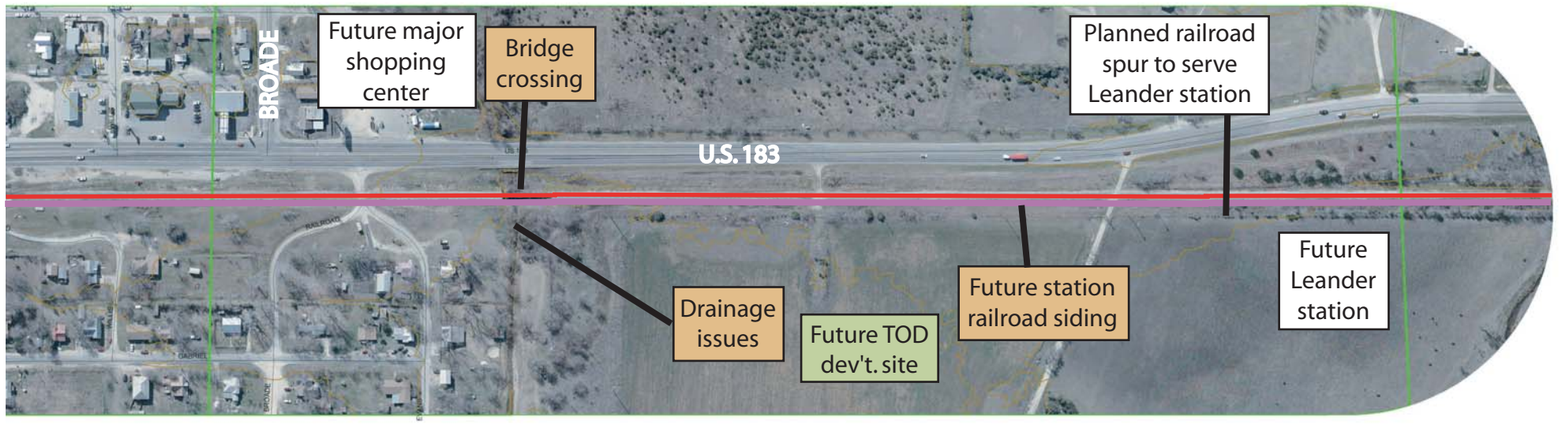
BOWMAN•MELTON•ALTA BMA PLANNING•DESIGN

CAPITAL METRO RAIL-WITH-TRAIL FEASIBILITY STUDY

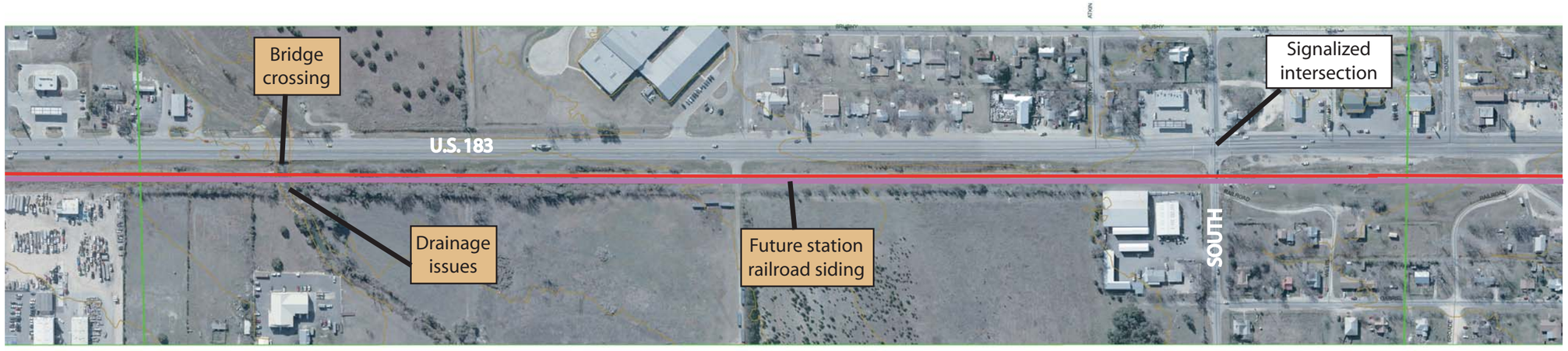
Opportunities and Constraints Analysis

Downtown to Leander Segment - Sections 8.5 and 8.6

Section 8.6



Section 8.5



LEGEND

- Opportunities
- Constraints
- Other notes/ observations
- Railroad
- Parcels
- Matchline

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CRITERIA & PROCESS FOR EVALUATING POTENTIAL ALIGNMENTS

Introduction

This *Trail Alignments Alternatives Evaluation Matrix* presents the criteria and process for evaluating potential alignments for the Capital Metro Trail. The process begins with determining and finalizing the evaluation criteria, then using the outcome of this process for screening the alignments. The summary table at the end of this matrix presents the recommended alignment cross sections from the planning team.

Evaluation Criteria

The Capital Metro rail corridor includes a variety of potential trail alignments. The evaluation criteria were used to screen the alignment alternatives, and the screening process served as an initial step toward identifying preferred connection alignments.

Safety
This criterion includes several factors, including whether a potential alignment shares the road with vehicle traffic, is located on a roadway shoulder, or is physically separated from the road altogether. This criterion also addresses the number of roadway crossings associated with a potential alignment. In cases where an alignment is located on a shoulder or on a shared roadway, the evaluation addressed the street's general characteristics (e.g., major streets with higher volumes and vehicle speeds versus local streets with lower volumes and vehicle speeds). Potential alignments providing a greater degree of safety for trail users received a higher evaluative score.

Community Connections/Directness of Route
Potential alignments were evaluated based on their ability to provide a direct route for the trail, as well as for connections to other facilities like City of Austin designated bicycle routes. Alignments were also evaluated based on their connections to neighborhoods, parks, schools, open spaces and future transit-oriented development areas. Higher scores were given to potential alignments providing more direct access through the study area and links to other important destinations listed above.

Utilizes Existing/Planned Bicycle Pedestrian Facilities
This criterion addresses whether a potential alignment utilizes existing and/or planned bicycle/pedestrian facilities. Facilities include off-street trails, bicycle lanes and sidewalks, and shared roadways (where pedestrians use sidewalks and cyclists share travel lanes with vehicles). The Austin Bicycle Plan identifies a list of "Priority 1" and "Priority 2" routes that were used as a reference. Generally, alignments utilizing existing and planned facilities suitable for bicycle/pedestrian travel received higher evaluative scores.

Accommodates Multiple Users
This criterion refers to the ability of a potential alignment to safely and comfortably accommodate various types of trail users including bicyclists, walkers, joggers, in-line skaters, motorized and non-motorized wheelchair users, maintenance vehicles and security vehicles. Alignments serving a wider variety of trail users were given higher scores.

Aesthetics/Comfort
This criterion measures the quality of a potential alignment from the perspective of the trail user. It considers views, environmental aesthetics and characteristics such as noise and air quality. Alignments located away from roadways and those located near aesthetic features received a higher score than on-street alignments or those paralleling major roadways.

Environmental Impacts
Each potential alignment was evaluated based on potential environmental impacts including whether the alignment would require vegetation removal, whether the alignment would pass through known wetland areas, and based on the number of necessary waterway crossings. This criterion also addresses whether an alignment would require substantial grading to overcome topographic issues. Alignments with fewer potential environmental impacts received higher evaluative scores.

Requires Structures
This criterion refers to the number of new structures (or modifications to existing structures) required for a trail alignment, including overcrossings and undercrossings. Structures include minor, moderate and major bridges (including cantilevered structures) passing over waterways, streets, highways and railroads. Alignments requiring fewer new structures or modifications to existing structures received higher scores.

Meets Capital Metro Safety Guidelines
This criterion addresses whether an alignment can be achieved while meeting the design guidelines set out in Capital Metro's *Safety Guidelines for Recreational Trails Crossing and Adjacent to Passenger and Freight Lines*. The document prescribes various guidelines addressing trail setbacks, trail/railroad crossings, fencing and landscaping. Alignments received higher evaluative scores if they could meet these guidelines or avoid areas where the guidelines could not be met.

Private Property Impacts
This criterion accounts for lands where property easements or full property acquisitions would be required. Where private properties would be impacted, the perceived safety and security issues among property owners were considered. Generally, alignments with minimal or no private property impacts received a higher score.

Ease of Implementation
This criterion measures the general difficulty of siting a trail alignment. The criterion takes into account issues like existing development, political issues, permitting requirements, and design and engineering issues (e.g., the need fencing or retaining walls, or trail switchbacks to meet ADA requirements on steep slopes).

Alignments Evaluation

The following table summarizes the evaluation scoring process for each trail alignment option based on the evaluation criteria described above. For preliminary screening, a system of "+", "o", and "-" was used. A "+" indicates favorable conditions, a "o" indicates mixed or neutral conditions, and a "-" indicates unfavorable conditions. It should be noted that multiple trail options were evaluated for some areas where several potential options exist. In other areas, it was determined that only one potential alignment would be feasible. For areas with multiple trail alignment options, the description of the preferred alignment is highlighted in bold lettering.

Alignment Alternatives			Evaluation Criteria									
Section #	Alignment Description	Facility Type	Safety	Community Connections/ Directness of Route	Utilizes Existing/ Planned Bike/Ped Facilities	Accommodates Multiple Users	Aesthetics/ Comfort	Environmental Impacts	Requires Structures	Meets Capital Metro Safety Guidelines	Private Property Impacts	Ease of Implementation
1.1	Travels along 4th (via shared roadway); passes through Capital Metro R.O.W. (via off-street trail)	Off- and on-street	o	+	o	o	o	o	o	+	+	o
1.2	Travels along 5th and on Robert Martinez Jr. (via shared roadways)	On-street	-	o	+	-	-	+	+	+	+	o
1.3	*Option 1:* Travels on Hidalgo, Northwestern, Rosewood, and Walnut (via shared roadways)	On-street	-	+	+	-	-	+	+	+	+	+
	Option 2: Travels on Hidalgo, Northwestern, Coronado, Pedernales (via shared roadways), and on existing Boggy Creek Trail	Off- and on-street	o	+	+	o	+	+	+	+	+	o
1.4	Travels on existing Boggy Creek Trail; 12th (via existing bicycle lanes), and through potential TOD development area and private properties near MLK station (via off-street trail on west side of railroad)	Off- and on-street	+	+	o	o	+	o	o	+	-	o
1.5	*Option 1:* Travels through potential TOD development area and private properties near MLK station (via off-street trail on west side of railroad); and on Clarkson and Cherrywood (via shared roadways)	Off- and on-street	o	+	o	o	o	o	+	+	-	o
	Option 2: Travels through potential TOD development area and private properties (via off-street trail) near MLK station (west side of railroad); and parallels Clarkson and Cherrywood (via off-street trail within street R.O.W.)	Off-street	+	+	-	+	+	-	-	+	-	-
	Option 3: Travels through potential TOD development area and private properties near MLK station (via off-street trail on west side of railroad); on MLK (via shared roadway); through private properties (via off-street trail on east side of railroad); and on Vineland, Giles, Cherrywood, and 38th (via shared roadways)	Off- and on-street	o	+	o	o	+	o	+	+	-	-
2.1	*Option 1:* Travels on Clarkson (via shared roadway); passes through private properties (via off-street trail on west side of railroad); travels on 41st, Bradwood, and Ardenwood (via shared roadways)	Off- and on-street	o	o	o	o	o	o	+	+	-	-
	Option 2: Parallels Clarkson (via off-street trail within street R.O.W.); passes through private properties (via off-street trail on west side of railroad); travels on 41st, Bradwood, and Ardenwood (via shared roadways)	Off- and on-street	+	o	o	o	+	o	+	+	-	o
	Option 3: Travels on Cherrywood (via shared roadway); on 38 ½ St. (via planned bicycle lanes); through the Maplewood Elementary School property (via off-street trail); travels on Ashwood, Wrightwood, Bradwood and Ardenwood (via shared roadways)	Off- and on-street	+	+	o	o	+	o	+	+	-	o
	Option 4: Travels on Cherrywood (via shared roadway); on 38 ½ St. (via planned bicycle lanes); and on Maplewood, Ashwood, Wrightwood, Bradwood and Ardenwood (via shared roadways)	On-street	o	o	+	-	o	+	+	+	+	+
2.2	***Option 1:*** Parallels Airport Blvd. (via off-street trail within street R.O.W.)	Off-street	+	+	+	+	-	o	o	+	+	+
	Option 2: Parallels Airport Blvd. (via off-street trail within street R.O.W.); travels on 46th, Bennett, and Clarkson (via shared roadways)	Off- and on-street	o	+	+	o	o	+	+	+	+	+
2.3	*Option 1:* Parallels Airport Blvd. (via off-street trail within street R.O.W.)	Off-street	-	o	o	+	-	o	+	+	+	o
	Option 2: Parallels Airport Blvd. (via off-street trail within street R.O.W.); travels on 53rd (via planned bicycle lanes); and on Martin, 54th, Evans, 55th, Duval, 56th, and Avenue "F" (via shared roadways)	Off- and on-street	o	o	+	o	o	o	+	+	+	o

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	Option 3: Travels on Clarkson (via shared roadway); on 53rd (via planned bicycle lanes); and on Martin, 54th, Evans, 55th, Duval, 56th, and Avenue "F" (via shared roadways)	On-street	o	o	+	-	o	+	+	+	+	+
2.4	*Option 1:* Parallels Airport Blvd. (via off-street trail within street R.O.W.)	Off-street	+	+	-	+	-	+	+	+	+	+
	Option 2: Travels on Skyview (via shared roadways); through private properties (via off-street trail on west side of railroad); on Dillard (via shared roadway); on Denson (via planned bicycle lanes); and on Chesterfield and Canion (via shared roadways)	Off- and on-street	+	o	o	o	o	+	+	+	-	-
	Option 3: Travels on Skyview (via shared roadway); through private properties (via off-street trail on west side of railroad); on Dillard (via shared roadway); on Denson (via planed bicycle lanes); passes through Highland Mall Station area and through private property (via off-street trail); travels on Chesterfield, and Canion (via shared roadways)	Off- and on-street	+	+	o	o	+	+	+	+	-	-
	Option 4: Travels on Skyview (via shared roadway); through private properties (via off-street trail on west side of railroad); on Dillard (via shared roadway); on Denson (via planned bicycle lanes); parallels Airport Blvd. (via off-street trail within street R.O.W.)	Off- and on-street	+	+	o	+	o	+	+	+	-	-
2.5	***Option 1:*** Parallels Airport Blvd. and Lamar (via off-street trails within street R.O.W.); passes through TOD development area near Crestview Station (via off-street trail); travels on existing internal streets within TOD development area (via shared roadways); and through an existing park (via off-street trail)	Off- and on-street	o	+	-	+	+	o	o	+	-	o
	Option 2: Travels on Canion, Wallingford Bend, Lamar, Pegram, Reese, and Grover (via shared roadways)	On-street	-	o	o	-	-	+	+	+	+	o
3.1	***Option 1:*** Passes through an existing park (via off-street trail); travels on Tisdale (via shared roadway); on Anderson (via planned bicycle lanes); and on Burrell (via shared roadway)	Off- and on-street	o	+	o	o	o	+	+	+	-	o
	Option 2: Travels on Grover, Woodrow, Wooten Park, Mullen, Belford, and Bonair (via shared roadways)	On-street	o	o	+	-	o	+	+	+	+	+
3.2	***Option 1:*** Travels on Burrell (via shared roadway); on Ohlen (via existing bicycle lanes); on Renton (via shared roadway), and passes through Burnet Middle School property (via off-street trail)	Off- and on-street	o	+	o	o	o	+	+	+	-	o
	Option 2: Travels on Bonair, Ripplewood, Emberwood, Richwood, Renton (via shared roadways); and passes through Burnet Middle School property (via off-street trail)	Off- and on-street	+	o	o	o	o	+	+	+	-	o
3.3	*Option 1:* Passes through private properties (via off-street trail on west side of railroad); parallels east side of U.S. 183 frontage road (via off-street trail); parallels Metric south of Rundberg (via off-street trail within street R.O.W.)	Off- and on-street	o	o	-	o	-	+	+	+	-	-
	Option 2: Passes through private properties (via off-street trail on west side of railroad); passes through public R.O.W. west of Metric (via off-street trail); parallels Metric south of Rundberg (via off-street trail within street R.O.W.)	Off- and on-street	+	+	-	o	o	+	+	+	-	-
	Option 3: Passes through private properties (via off-street trail on west side of railroad); passes through public R.O.W. west of Metric (via off-street trail); passes through private properties (via off-street trail on east side of railroad); parallels Rundberg west of Metric (via off-street trail within street R.O.W.)	Off- and on-street	+	-	-	o	o	-	+	+	-	-
3.4	Travels on Metric between Rundberg and Rutland (via existing bicycle lanes); on Metric between Rutland and Kramer (via planned bicycle lanes)	On-street	-	+	+	-	-	+	+	+	+	o

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3.5	***Option 1:*** Travels on Metric north of Rutland (via planned bicycle lanes); on Kramer (via planned bicycle lanes); on internal street (via shared roadway on east of railroad); passes through private properties (via off-street trail east side of railroad)	Off- and on-street	-	+	o	o	-	o	+	+	o	o
	Option 2: Travels on Metric north of Rutland (via planned bicycle lanes); on Kramer (via planned bicycle lanes); passes through private properties (via off-street trail on east side of railroad)	Off- and on-street	o	+	o	o	o	o	+	-	-	-
	Option 3: Travels on Metric north of Rutland (via planned bicycle lanes); on Kramer and Burnet (via planned bicycle lanes); on future street near IBM (via shared roadway); passes through private property (via off-street trail on west side of railroad)	Off- and on-street	-	-	o	o	-	o	+	-	-	-
4.1	Passes through private property (via off-street trail on east side of railroad); passes through Capital Metro R.O.W. (via off-street trail on east side of railroad)	Off-street	+	+	-	+	+	-	-	+	-	-
4.2	Passes through Capital Metro R.O.W. (via off-street trail on east side of railroad); parallels segments of MoPac and Park Bend (via off-street trails within street R.O.W.); passes through Capital Metro R.O.W. (via off-street trail on east side of railroad)	Off-street	o	+	+	+	o	-	-	+	+	o
4.3	Passes through Capital Metro R.O.W. (via off-street trail on east side of railroad)	Off-street	+	+	+	+	o	-	o	+	+	o
4.4	***Option 1:*** Passes through Capital Metro R.O.W. (via off-street trail on east side of railroad) and parallels railroad on curve	Off-street	+	+	o	+	o	-	o	+	+	o
	Option 2: Passes through Capital Metro R.O.W. (via off-street trail on east side of railroad); follows west side of Burnet (via off-street trail within street R.O.W.); follows south side of Howard (via off-street trail within street R.O.W.)	Off-street	+	o	-	+	-	o	o	+	+	o
	Option 3: Passes through Capital Metro R.O.W. (via off-street trail on east side of railroad); follows west side of Burnet (via off-street trail within street R.O.W.); follows north side of Howard (via off-street trail within street R.O.W.)	Off-street	o	o	-	+	-	o	o	+	+	+
4.5	***Option 1:*** Follows south side of Howard (via off-street trail within street R.O.W.)	Off-street	+	+	-	+	-	+	+	+	+	o
	Option 2: Follows north side of Howard (via off-street trail within street R.O.W.)	Off-street	o	o	-	+	-	+	+	+	+	+
5.1	***Option 1:*** Follows south side of Howard (via off-street trail within street R.O.W.); crosses over Howard via new grade-separated crossing; passes through Capital Metro R.O.W. (via off-street trail on east side of railroad); crosses railroad at existing at-grade crossing near Austin White Lime	Off-street	+	+	-	+	+	o	-	+	+	-
	Option 2: Follows north side of Howard (via off-street trail within street R.O.W.); passes through Capital Metro R.O.W. (via off-street trail on east side of railroad); crosses railroad at existing at-grade crossing near Austin White Lime	Off-street	o	o	-	+	o	o	+	+	+	o
5.2	Passes through Capital Metro R.O.W. (via off-street trail on east side of railroad); utilizes existing grade-separated crossing; passes through Capital Metro R.O.W. (via off-street trail on west side of railroad)	Off-street	o	+	-	+	+	o	+	+	+	+
5.3	Passes through Capital Metro R.O.W. (via off-street trail on west side of railroad)	Off-street	+	+	-	+	+	o	+	+	+	+
5.4	Passes through Capital Metro R.O.W. (via off-street trail on south side of railroad)	Off-street	+	+	-	+	+	o	+	+	+	+
5.5	Passes through Capital Metro R.O.W. (via off-street trail on south side of railroad)	Off-street	+	+	-	+	+	+	o	+	+	+

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6.1	Passes through Capital Metro R.O.W. (via off-street trail on south side of railroad)	Off-street	+	+	-	+	+	+	+	+	+	+
6.2	***Option 1:*** Crosses FM 620 via a cantilevered bridge; passes through Capital Metro R.O.W. (via off-street trail on south side of railroad); crosses Parmer via an at-grade crossing; passes through Capital Metro R.O.W. (via off-street trail on south side of railroad)	Off-street	+	+	-	+	o	+	-	+	+	-
	Option 2: Crosses FM 620 via a cantilevered bridge; passes through Capital Metro R.O.W. (via off-street trail on south side of railroad); crosses Parmer via an at-grade crossing; passes through Capital Metro R.O.W. (via off-street trail on north side of railroad)	Off-street	+	+	-	+	o	+	-	-	+	-
	Option 3: Passes through private property along FM 620 frontage road (via off-street trail); parallels east side of Parmer (via off-street trail within street R.O.W.); crosses Parmer via an at-grade crossing; passes through Capital Metro R.O.W. (via off-street trail on south side of railroad)	Off-street	-	o	-	+	-	o	+	+	-	o
	Option 4: Passes through private property along FM 620 frontage road (via off-street trail); parallels west side of Parmer (via off-street trail within street R.O.W.); crosses Parmer via an at-grade crossing; passes through Capital Metro R.O.W. (via off-street trail on south side of railroad)	Off-street	-	o	-	+	-	o	+	+	-	o
	Option 5: Passes through private property along FM 620 frontage road (via off-street trail); parallels east side of Parmer (via off-street trail within street R.O.W.); crosses Parmer via an at-grade crossing; passes through Capital Metro R.O.W. (via off-street trail on north side of railroad)	Off-street	-	o	-	+	-	o	+	-	-	o
	Option 6: Passes through private property along FM 620 frontage road (via off-street trail); parallels west side of Parmer (via off-street trail within street R.O.W.); crosses Parmer via an at-grade crossing; passes through Capital Metro R.O.W. (via off-street trail on north side of railroad)	Off-street	-	o	-	+	-	o	+	-	-	o
6.3	*Option 1:* Passes through Capital Metro R.O.W. (via off-street trail on south side of railroad), and passes through Lakeline Station and potential TOD development area (via off-street trail)	Off-street	+	+	-	+	o	+	+	+	+	o
	Option 2: Passes through Capital Metro R.O.W. (via off-street trail on north side of railroad) and passes through potential TOD development area (via off-street trail)	Off-street	+	o	-	+	+	+	+	-	+	+
6.4	***Option 1:*** Passes through Capital Metro R.O.W. (via off-street trail on east side of railroad)	Off-street	+	+	-	+	+	o	o	-	+	+
	Option 2: Passes through Capital Metro R.O.W. (via off-street trail on west side of railroad)	Off-street	+	o	-	+	+	o	o	+	+	+
6.5	***Option 1:*** Passes through Capital Metro R.O.W. (via off-street trail on east side of railroad)	Off-street	o	+	-	+	+	o	+	-	+	+
	Option 2: Passes through Capital Metro R.O.W. (via off-street trail on via off-street trail on west side of railroad)	Off-street	o	o	-	+	+	o	+	+	+	+
7.1	*Option 1:* Passes through Capital Metro R.O.W. (via off-street trail on east/north side of railroad)	Off-street	+	+	-	+	+	-	-	-	+	o
	Option 2: Passes through Capital Metro R.O.W. (via off-street trail on west/south side of railroad)	Off-street	+	+	-	+	+	-	-	+	+	o
7.2	*Option 1:* Passes through Capital Metro R.O.W. (via off-street trail on north side of railroad)	Off-street	+	o	-	+	-	-	o	-	+	+
	Option 2: Passes through Capital Metro R.O.W. (via off-street trail on south side of railroad)	Off-street	+	+	-	+	-	-	o	+	+	+
7.3	*Option 1:* Passes through Capital Metro R.O.W. (via off-street trail	Off- and	o	o	o	o	o	o	+	+	+	o

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	on south side of railroad); travels on Brushy Creek Rd. east of Darkwood (via shared roadway); travels on Blue Ridge, and Kings Canyon (via shared roadways)	on-street										
	Option 2: Passes through Capital Metro R.O.W. (via off-street trail on south side of railroad); travels on Brushy Creek Rd. east of Darkwood (via shared roadway); travels on Old U.S. 183 (via shared roadway); passes through Capital Metro R.O.W. (via off-street trail on west side of railroad)	Off- and on-street	o	+	o	o	o	o	+	+	+	o
	Option 3: Passes through Capital Metro R.O.W. (via off-street trail on north side of railroad); travels on Brushy Creek Rd. east of Darkwood (via shared roadway); travels on Blue Ridge, and Kings Canyon (via shared roadway)	Off- and on-street	o	o	o	o	o	o	+	o	+	o
	Option 4: Passes through Capital Metro R.O.W. (via off-street trail on north side of railroad); travels on Brushy Creek Rd. east of Darkwood (via shared roadway); travels on Old U.S. 183 (via shared roadway); passes through Capital Metro R.O.W. (via off-street trail on west side of railroad)	Off- and on-street	o	+	o	o	o	o	+	o	+	o
7.4	*Option 1:* Travels on Kings Canyon (via shared roadway); passes through existing park (via off-street trail); passes through Capital Metro R.O.W. (via off-street trail on west side of railroad)	Off- and on-street	o	+	o	o	o	-	o	o	+	o
	Option 2: Passes through Capital Metro R.O.W. (via off-street trail on west side of railroad)	Off- and on-street	+	+	-	o	o	o	o	+	+	o
7.5	Passes through Capital Metro R.O.W. (via off-street trail on west side of railroad)	Off-street	o	+	-	+	o	o	o	+	+	o
8.1	Passes through Capital Metro R.O.W. (via off-street trail on west side of railroad)	Off-street	+	+	-	+	+	-	o	+	+	+
8.2	Passes through Capital Metro R.O.W. (via off-street trail on west side of railroad)	Off-street	+	o	-	+	+	-	-	+	+	+
8.3	Passes through Capital Metro R.O.W. (via off-street trail on west side of railroad)	Off-street	o	+	-	+	o	o	o	+	+	+
8.4	Passes through Capital Metro R.O.W. (via off-street trail on west side of railroad)	Off-street	+	+	-	+	-	o	+	+	+	+
8.5	Passes through Capital Metro R.O.W. (via off-street trail on west side of railroad)	Off-street	+	+	-	+	-	o	o	+	+	+
8.6	Passes through Capital Metro R.O.W. (via off-street trail on west side of railroad)	Off-street	+	o	-	+	-	o	o	+	+	+

Note: "Shared Roadways" include sidewalks for pedestrians and shared vehicle/bicycle lanes for cyclists. Routes utilizing bicycle lanes would also utilize sidewalks for pedestrians.

Recommended Alignment Cross-Sections

Section	Alignment Option	Railway Condition Type(s)	Recommended Cross-section(s)
1.1	N/A	I	• A (on 4th) • E (in TOD area)
1.2	N/A	I	• B (on 5th) • D (on Robert Martinez)
1.3	Option 2	III	• D (on Hidalgo, Northwestern, Coronado, Pedernales) • E (on Boggy Cr. Trail)
1.4	N/A	III	• E (on off-street trail near TOD area and MLK station); bicycle lanes provided on 12th
1.5	Option 2	III	• E (on off-street trail near TOD area and MLK station, and on off-street trail along Clarkson and Cherrywood)
2.1	Option 4	III	• D (on Cherrywood, Maplewood, Ashwood, Wrightwood, Bradwood and Ardenwood); bicycle lanes provided on 38 ½
2.2	Option 1	II	• C (entire segment)
2.3	Option 2	II	• C (on off-street trail paralleling Airport Blvd.) • D (on Martin, 54th, Evans, 55th, Duval, 56th, and Avenue “F”); bicycle lanes provided on 53rd
2.4	Option 4	II	• C (on off-street trail paralleling Airport Blvd. north of Denson) • D (on Skyview and Dillard); bicycle lanes provided on Denson • E (on off-street trail through private properties)
2.5	Option 1	II	• C (on off-street trail paralleling Airport Blvd.) • D (on internal TOD streets) • E (on off-street trail through park)
3.1	Option 1	III	• D (on Tisdale, Anderson, and Burrell) • E (on off-street trail through park)
3.2	Option 1	III	• D (on Burrell and Renton); bicycle lanes provided on Ohlen • F (on off-street trail near Burnet Middle School)
3.3	Option 2	III	• F (on off-street trail within private properties south of U.S. 183) • H (in public ROW between U.S. 183 frontage road and Metric) • G (on off-street trail paralleling Metric south of Rundberg)
3.4	N/A	III	• Bicycle lanes provided on Metric
3.5	Option 1	III	• D (on internal street north of Kramer); bicycle lanes provided on Metric and Kramer • E (on off-street trail)
4.1	N/A	III (south of Gracy Farms) IV (north of Gracy Farms	• I (on off-street trail south of Gracy Farms) • J (on off-street trail north of Gracy Farms)
4.2	N/A	IV	• J (on off-street trails paralleling railroad)
4.3	N/A	II	• J (entire segment)
4.4	Option 1	II	• J (entire segment)
4.5	Option 1	II	• K (entire segment)
5.1	Option 1		• K (on off-street trail paralleling Howard) • J (on off-street trail paralleling railroad)
5.2	N/A	II	• J (between Howard and trail/rail crossing at north end of Section 5.2) • L (north of trail/rail crossing at north end of Section 5.2)
5.3	N/A	V	• L (entire segment)
5.4	N/A	V	• L (in triple track area) • M (in double track area)
5.5	N/A	V	• M (entire segment)
6.1	N/A	V	• M (entire segment)
6.2	Option 1	V	• M (entire segment)
6.3	Option 2	V	• M (entire segment)
6.4	Option 1	V	• M (entire segment)
6.5	Option 1	V	• M (entire segment)
7.1	Option 2	V	• M (entire segment)
7.2	Option 2	V	• M (entire segment)
7.3	Option 2	V	• D (along Brushy Creek Rd., Old U.S. 183) • M (off-street trails paralleling railroad)
7.4	Option 2	V	• M (entire segment)
7.5	N/A	V	• M (entire segment)
8.1	N/A	V	• M (entire segment)
8.2	N/A	V	• M (entire segment)
8.3	N/A	V	• M (entire segment)
8.4	N/A	V	• M (entire segment)
8.5	N/A	V	• M (entire segment)
8.6	N/A	V	• M (entire segment)

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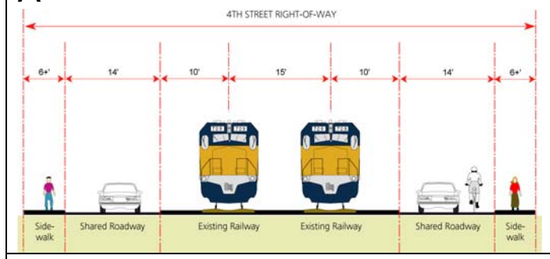
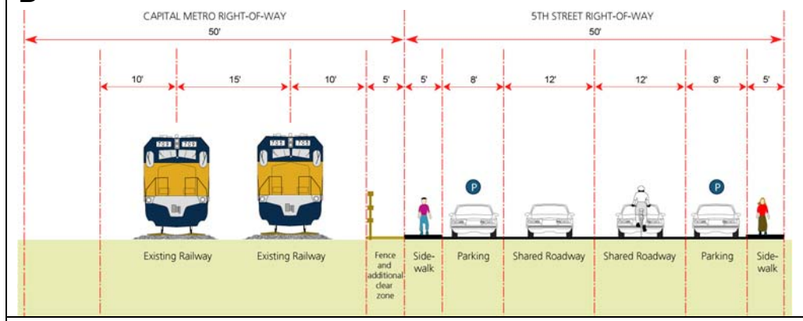
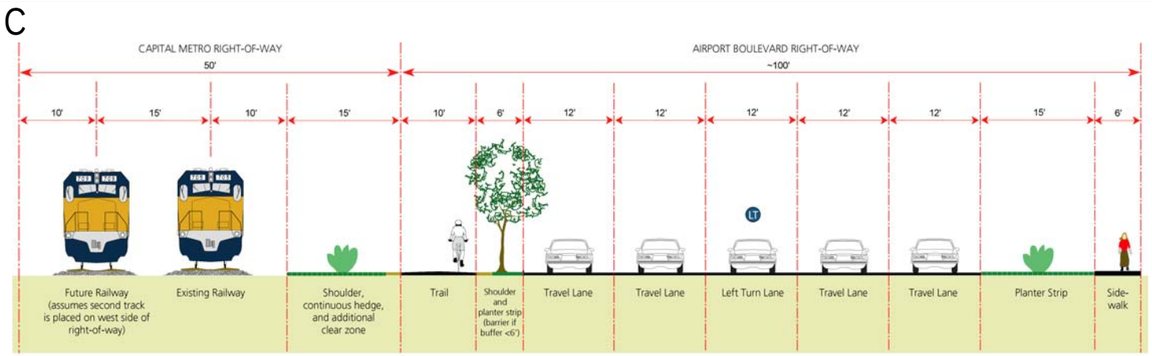
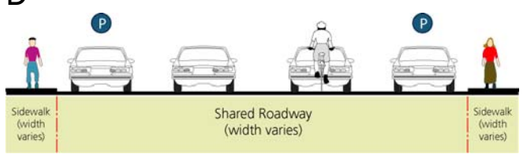
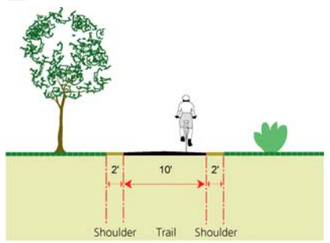
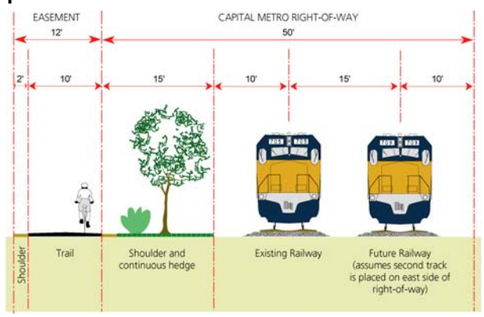
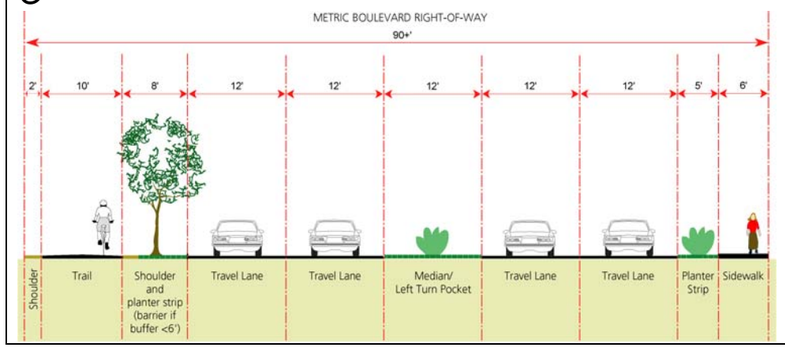
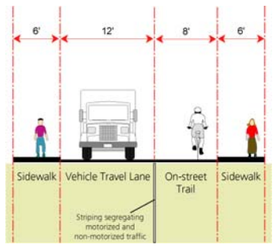
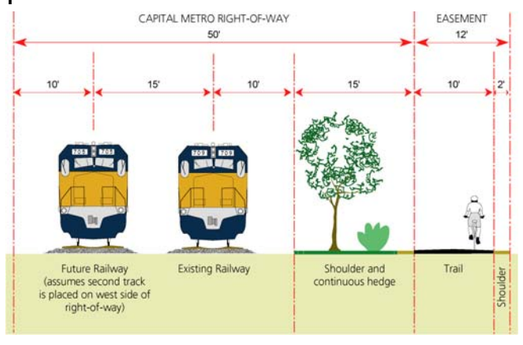
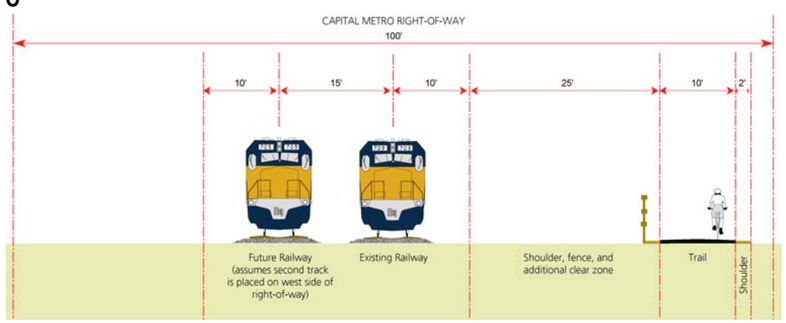
Table 1. Order of Magnitude Planning Level Unit Cost Estimates

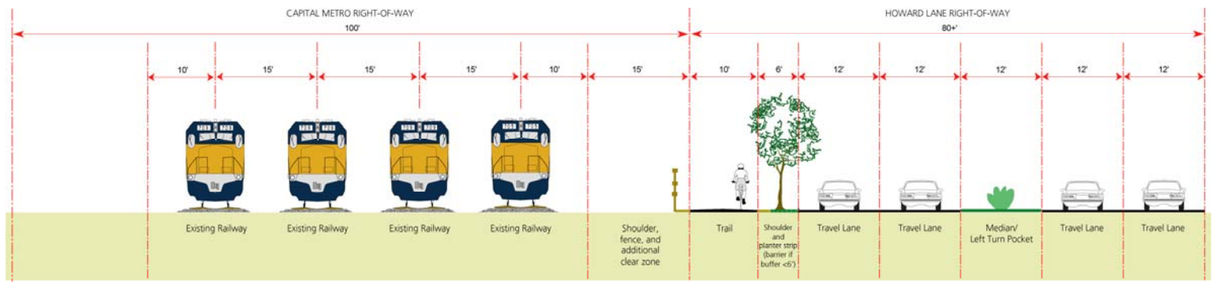
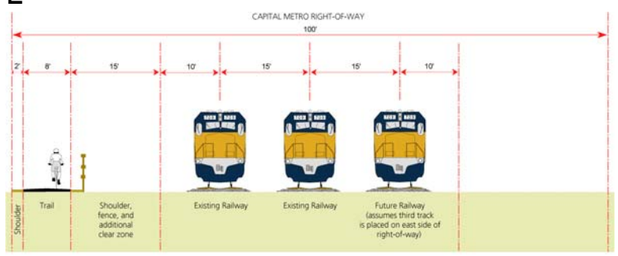
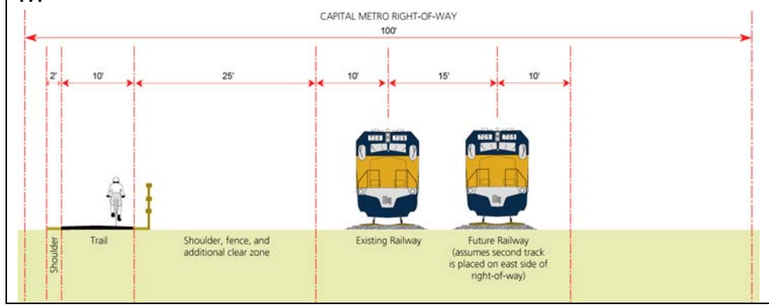
Item/Activity	Unit Cost
Trail Construction	
Clearing and demolition for trail	$0.40/SF
Rough grading for trail	$0.25/SF
Concrete trail – 6" thickness	$6.90/SF
Compacted DG shoulder – decomposed granite	$2.22/SF
Landscape areas/planter strips (<8' wide)	$4/SF
Landscape areas/planter strips (>8' wide)	$1.75/SF
Soil preparation (landscape areas)	$0.25/SF
Finish grading (landscape areas)	$0.25/SF
Temporary irrigation (landscape areas)	$0.95/SF
Trench drain (drainage)	$12/LF
Culvert (drainage)	$1/LF
Fencing - 4' high vinyl coated chain link	$24/LF
Fencing – vertical iron bar	$50/LF
Trail signing and striping (directional and regulatory)	$0.57/LF
Bridge Structures	
Minor bridge span – 10' width (up to 30 LF)	$1,000 LF
Moderate bridge span 12' width (>30 but <60 LF)	$1,500 LF
Major bridge span/signature bridge 14' width (>60'+ and/or multiple spans)	$2,000 LF
Trail/Roadway Crossings	
Type 1 trail/roadway crossing: Marked/Unsignalized Crossing	$5,000 each
Type 2 trail/roadway crossing: Route Users to Existing Intersection	$15,000 each
Type 3 trail/roadway crossing: Signalized/Controlled Crossings ("Pelican," "Puffin" or "Hawk")	$120,000 each
Type 4 trail/roadway crossing: Grade Separated Structure	See "Major Bridge Structure"
Street Improvements	
Sidewalk (concrete, 6' wide, both sides of street, includes rough grading and clearing/demolition)	$63/LF
Curb (one side of street)	$11/LF
Shared roadway (includes directional and regulatory bikeway signing)	$0.95/LF
Asphalt street (6" thick, cost includes rough grading and clearing/demolition, applies to "Section H" only)	$4.55/SF
Striping separating motorists and trail users (applies to "Section H" only)	$0.30/LF
Allowances	
Mobilization	8% of original project cost
Engineering	20% of original project cost
Contingency	20% of original project cost
Trail Amenities	
Pedestrian Scale Lighting - ~22' height (80' spacing, assumes 66 lights per mile)	$237,600/mile
Drinking fountains (point of connection about every 3 miles along trail)	$4,500 each
Benches (one per half-mile of trail)	$2,800 each
Information system (interpretive signs/stations – one about every 5 miles)	$ .40/LF

Table 2. Planning Level Cost Estimates by Trail Cross-Section Type

Trail Cross-Section Type	Total Cost	Items/Activities Included	Comments
A 	$0.95/LF	• Shared roadway ancillary markings only	• Assumes roadway and sidewalk construction/ reconstruction (and associated costs) are integrated with railroad reconstruction
B 	$46.20/LF	• Landscape area/planter strip on north side of 5th Street (5' wide) • Soil preparation (landscape area) • Finish grading (landscape area) • Temporary irrigation (landscape area) • Fencing (4' high, chain link) • Shared roadway	• Costs developed for area between proposed fence and existing sidewalk on north side of 5th Street • Assumes utilization of existing street and sidewalk; drainage accommodated by existing curbs on 5th Street
C 	$146.67/LF	• Clearing and demolition for trail • Rough grading for trail • Concrete trail (10' wide) • Gravel shoulder (2' wide, both sides of trail) • Landscape area/planter strip (4' wide) between trail and Airport Blvd. • Landscape area (13' wide) between trail shoulder and railroad clear zone • Soil preparation (landscape areas) • Finish grading (landscape areas) • Temporary irrigation (landscape areas) • Trench drain (drainage) between trail and railroad • Trail signing and striping (directional and regulatory) • Curb along west side of Airport Blvd.	• Costs developed for area between west side of Airport Blvd. and western edge of landscape area adjacent to railroad track • Assumes curb would be constructed on west side of Airport Blvd.

D 	$0.95/LF	• Shared roadway	• N/A
E 	$60.27/LF	• Clearing and demolition for trail • Rough grading for trail • Concrete trail (10' wide) • Gravel shoulder (2' wide, both sides of trail) • Trail signing and striping (directional and regulatory)	• Costs developed for trail and shoulders; does not include drainage or landscaping
F 	$113.87/LF	• Clearing and demolition for trail • Rough grading for trail • Concrete trail (10' wide) • Gravel shoulder (2' wide, both sides of trail) • Landscape area (13' wide) between trail shoulder and railroad clear zone • Soil preparation (landscape area) • Finish grading (landscape area) • Temporary irrigation (landscape area) • Trench drain (drainage) between trail and railroad •Trail signing and striping (directional and regulatory)	• Costs developed for area between (and including) trail and landscape area adjacent to railroad
G 	$90.47/LF	• Clearing and demolition for trail • Rough grading for trail • Concrete trail (10' wide) • Gravel shoulder (2' wide, both sides of trail) • Landscape area/planter strip (6' wide) between trail and Metric Blvd. • Soil preparation (landscape area) • Finish grading (landscape area) • Temporary irrigation (landscape area) • Trail signing and striping (directional and regulatory)	• Costs developed for area between west side of Metric Blvd. and west shoulder of trail • Assumes drainage accommodated by existing curb on Metric Blvd.

H 	$176.30/LF	• Asphalt street (6" thick, including clearing/demolition and rough grading) • Curb (both sides of street) • Sidewalk (concrete, 6' wide, both sides of street, including clearing/demolition and rough grading) • Striping separating motorists and trail users	• Assumes new internal roadway is constructed to serve adjacent properties; trail users and vehicles separated by striping • Costs do not include drainage
I 	$113.87/LF	• Clearing and demolition for trail • Rough grading for trail • Concrete trail (10' wide) • Gravel shoulder (2' wide, both sides of trail) • Landscape area (13' wide) between trail shoulder and railroad clear zone • Soil preparation (landscape area) • Finish grading (landscape area) • Temporary irrigation (landscape area) • Trench drain (drainage) between trail and railroad • Trail signing and striping (directional and regulatory)	• Costs developed for area between (and including) trail and landscape area adjacent to railroad
J 	$90.27/LF	• Clearing and demolition for trail • Rough grading for trail • Concrete trail (10' wide) • Gravel shoulder (2' wide, both sides of trail) • Trench drain (drainage) between trail and railroad • Fencing (4' high, chain link) • Trail signing and striping (directional and regulatory)	• Costs developed for area including fencing, trail and trail shoulders

K 	$83.07/LF	• Clearing and demolition for trail • Rough grading for trail • Concrete trail (10' wide) • Gravel shoulder (2' wide, both sides of trail) • Landscape area/planter strip (4' wide) between trail and Howard Lane • Soil preparation (landscape area) • Finish grading (landscape area) • Temporary irrigation (landscape area) • Fencing (4' high, chain link) • Culvert between trail and Howard Lane • Trail signing and striping (directional and regulatory)	• Costs developed for area between south side of Howard Lane and fence on south side of trail • Assumes culverts would be installed in existing swale between trail and Howard Lane (at driveway crossings) to accommodate drainage
L 	$79.77/LF	• Clearing and demolition for trail • Rough grading for trail • Concrete trail (8' wide) • Gravel shoulder (2' wide, both sides of trail) • Trench drain (drainage) between trail and railroad • Fencing (4' high, chain link) • Trail signing and striping (directional and regulatory)	• Costs developed for area including fencing, trail and trail shoulders
M 	$90.27/LF	• Clearing and demolition for trail • Rough grading for trail • Concrete trail (10' wide) • Gravel shoulder (2' wide, both sides of trail) • Trench drain (drainage) between trail and railroad • Fencing (4' high chain link) • Trail signing and striping (directional and regulatory)	• Costs developed for area including fencing, trail and trail shoulders

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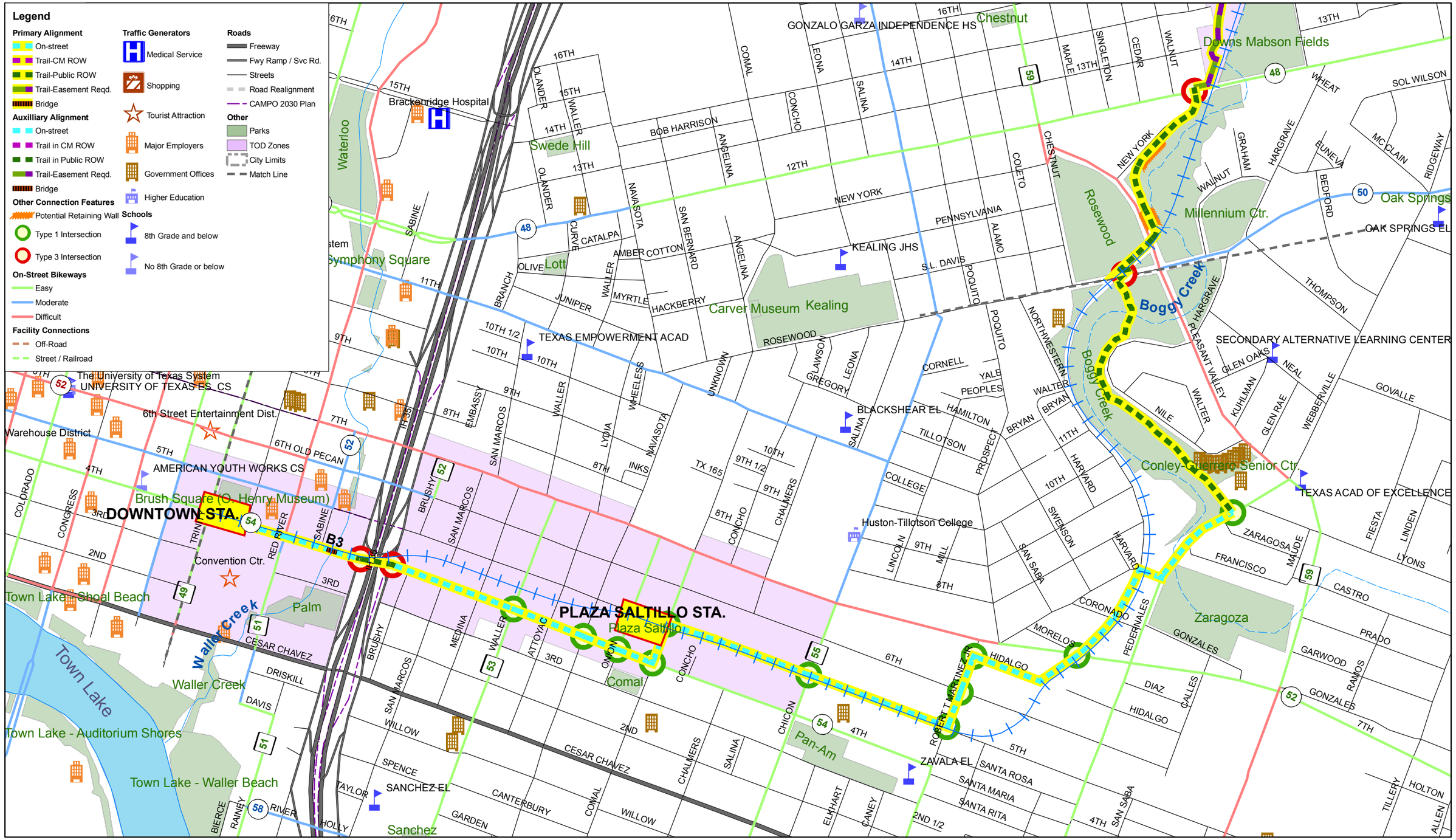
TRAIL FEASIBILITY STUDY

Appendix D. Detailed Project Layouts - South through North



MetroRail Red Line
Project 1, Downtown to South of Wilshire Blvd.
Map 1 of 2

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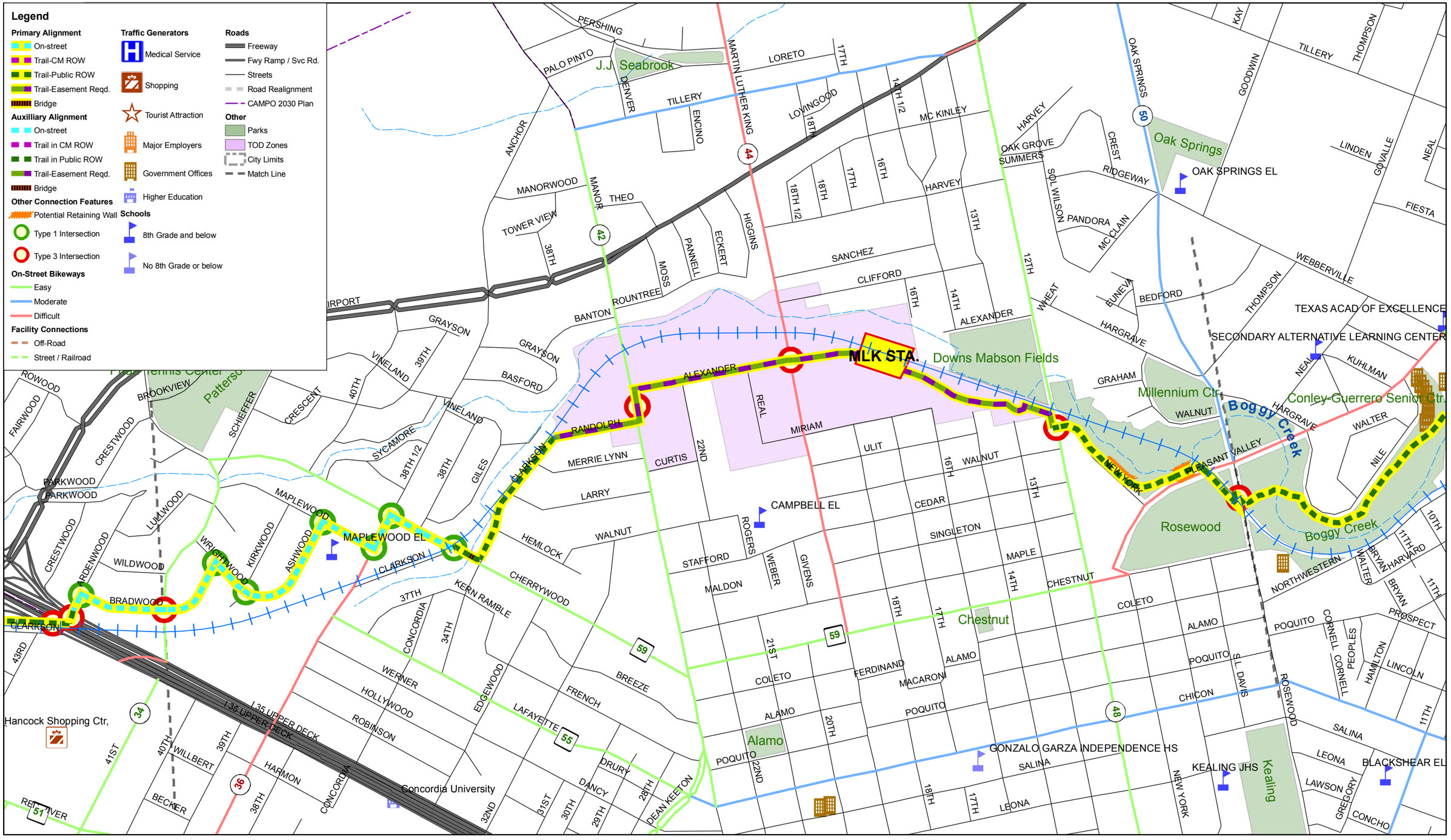

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MetroRail Red Line
Project 1, Downtown to South of Wilshire Blvd.
Map 2 of 2

0 0.05 0.1 0.2 0.3 0.4 0.5 Miles

MetroRail Red Line
Project 2, South of Wilshire Blvd. to Highland Mall Station
Map 1 of 1

0 0.05 0.1 0.2 0.3 0.4 0.5 Miles

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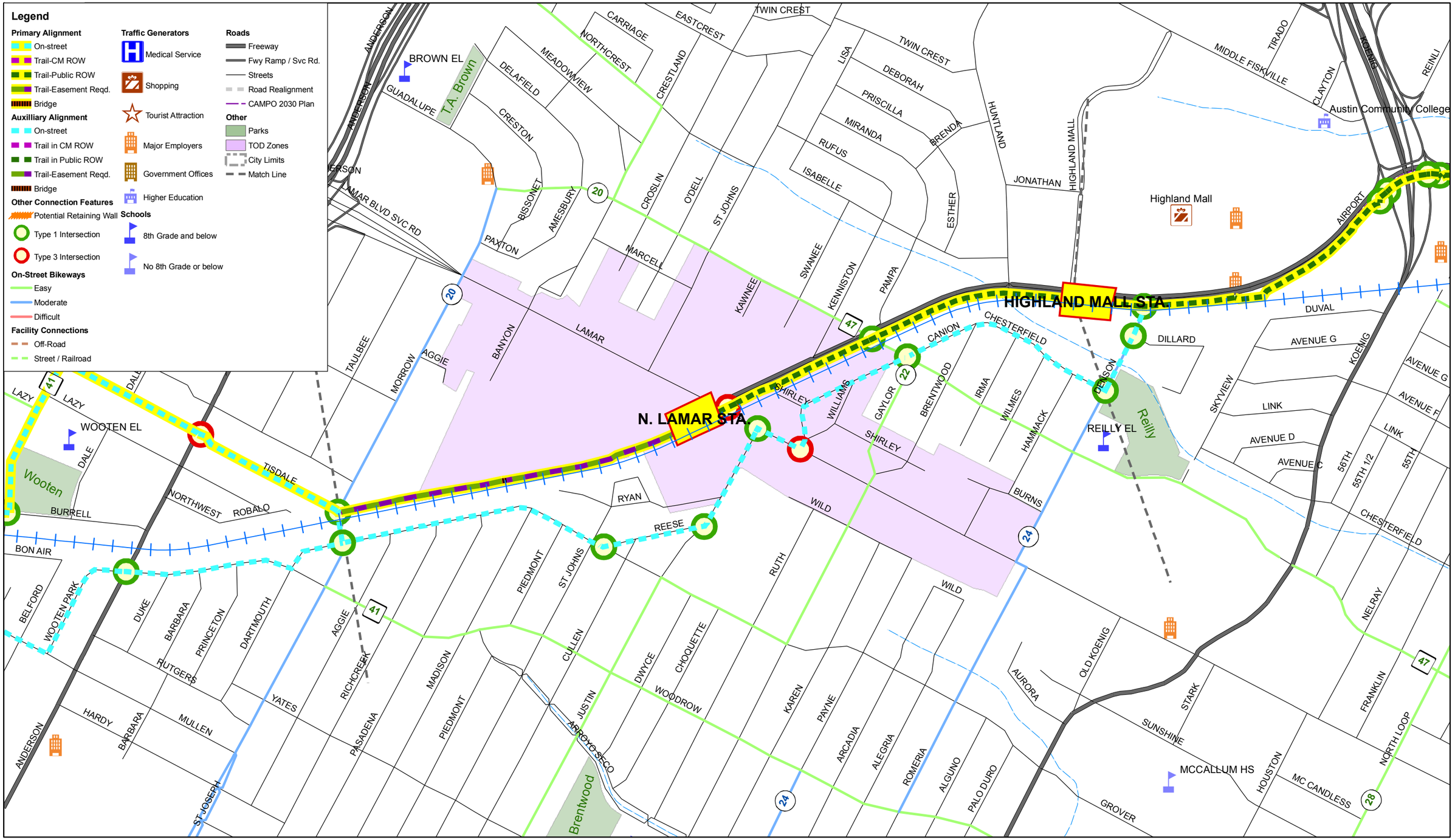

MetroRail Red Line
Project 3, Highland Mall to North of Morrow Street
Map 1 of 1

0 0.05 0.1 0.2 0.3 0.4 0.5 Miles

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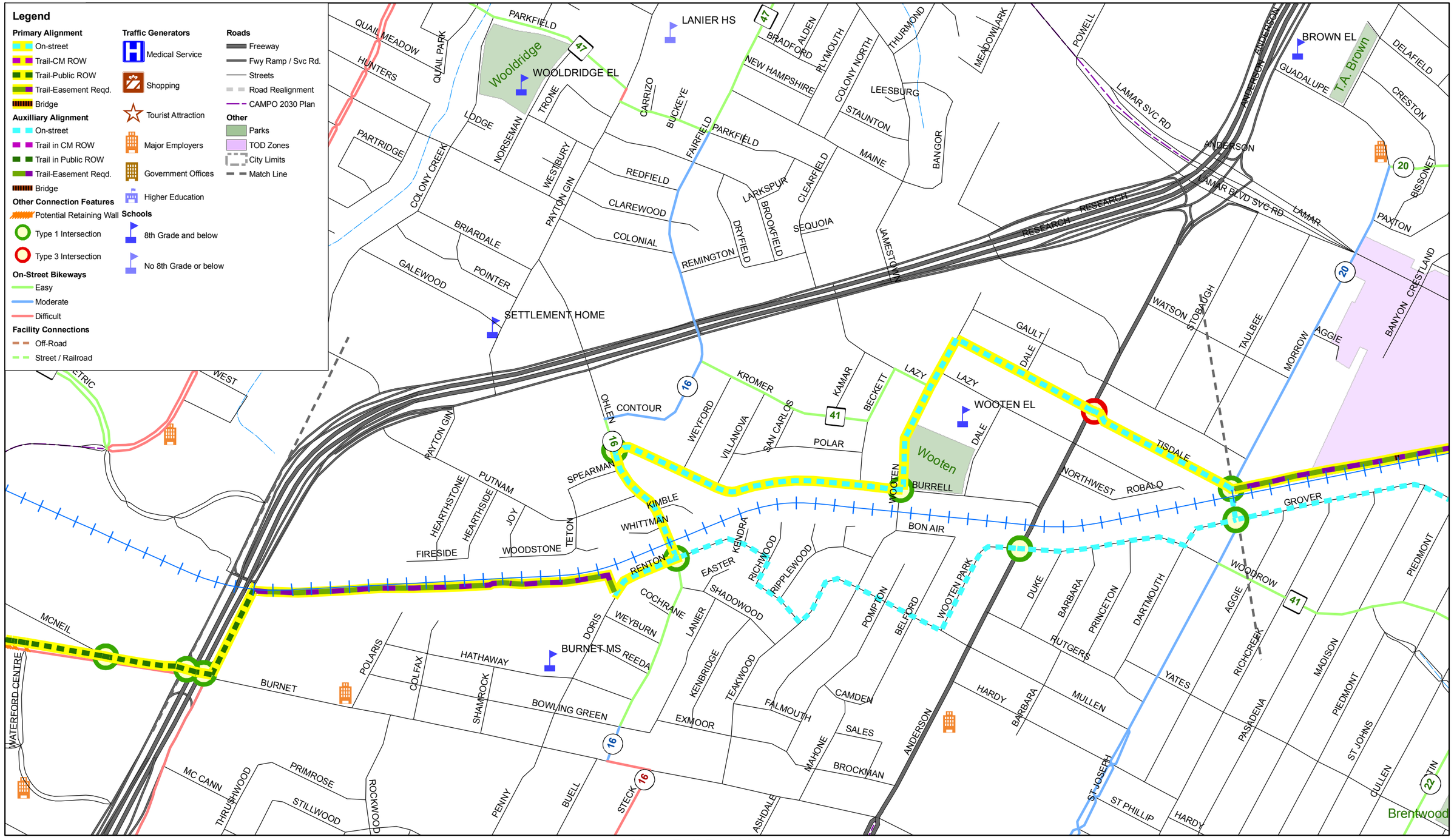
TRAIL FEASIBILITY STUDY

Appendix D. Detailed Project Layouts - South through North



MetroRail Red Line
Project 4, North of Morrow Street to North of Research Blvd.
Map 1 of 1

0 0.05 0.1 0.2 0.3 0.4 0.5 Miles

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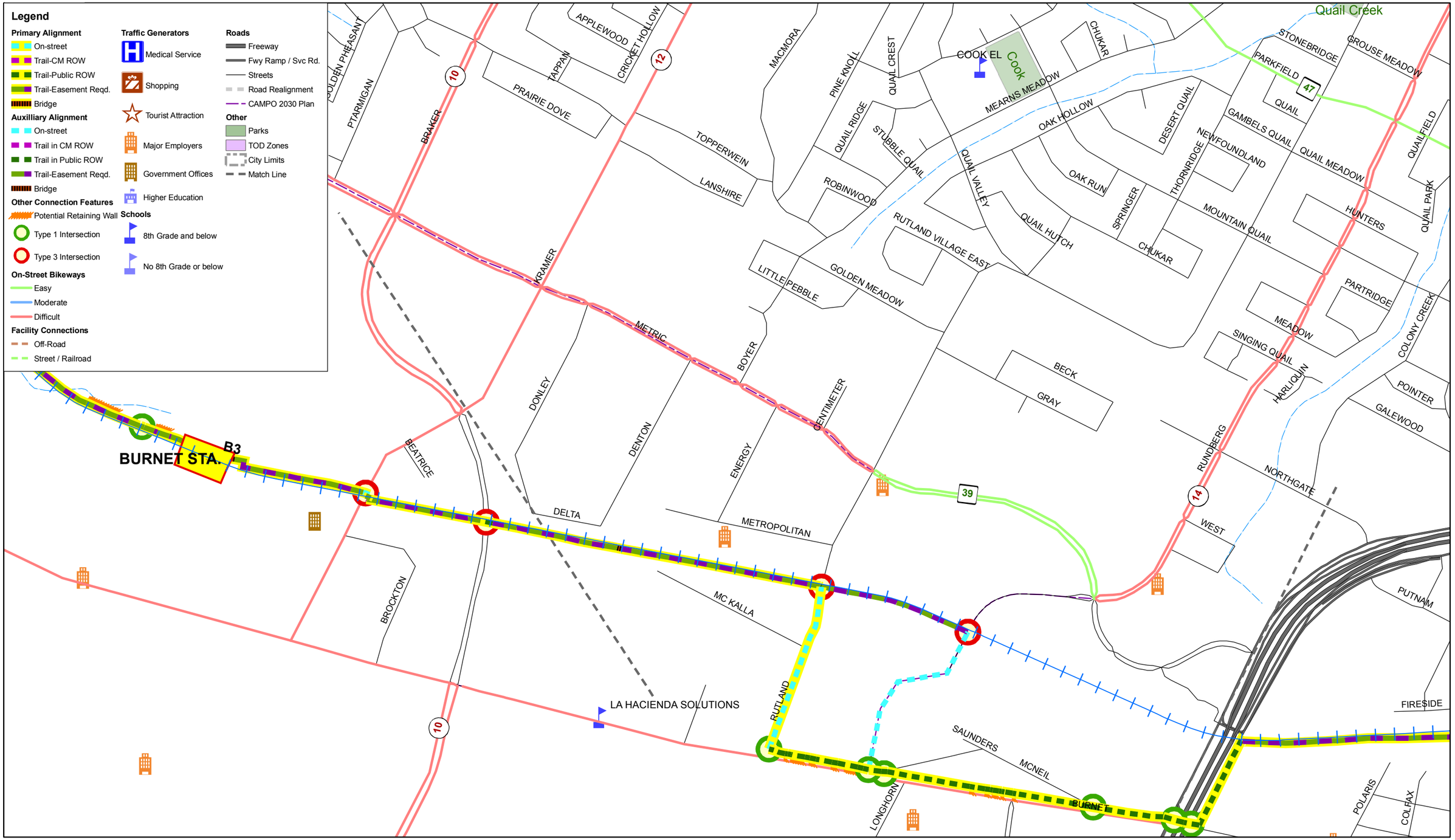
TRAIL FEASIBILITY STUDY

Appendix D. Detailed Project Layouts - South through North



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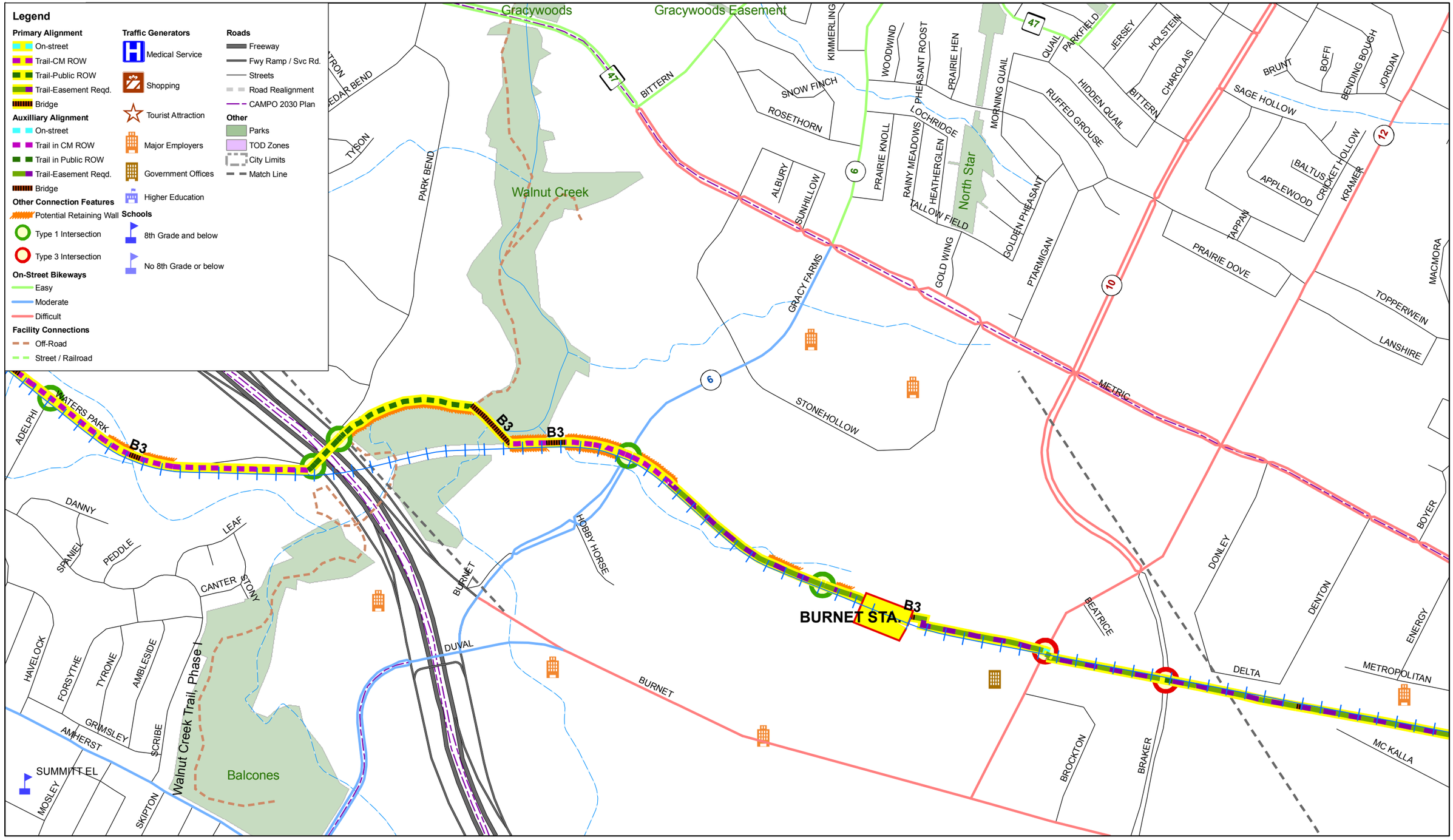
MetroRail Red Line
Project 5, North of Research Blvd. to South of Mo Pac at Park Bend
Map 1 of 2

0 0.05 0.1 0.2 0.3 0.4 0.5 Miles



MetroRail Red Line
Project 5, North of Research Blvd. to South of Mo Pac at Park Bend
Map 2 of 2

0 0.05 0.1 0.2 0.3 0.4 0.5 Miles

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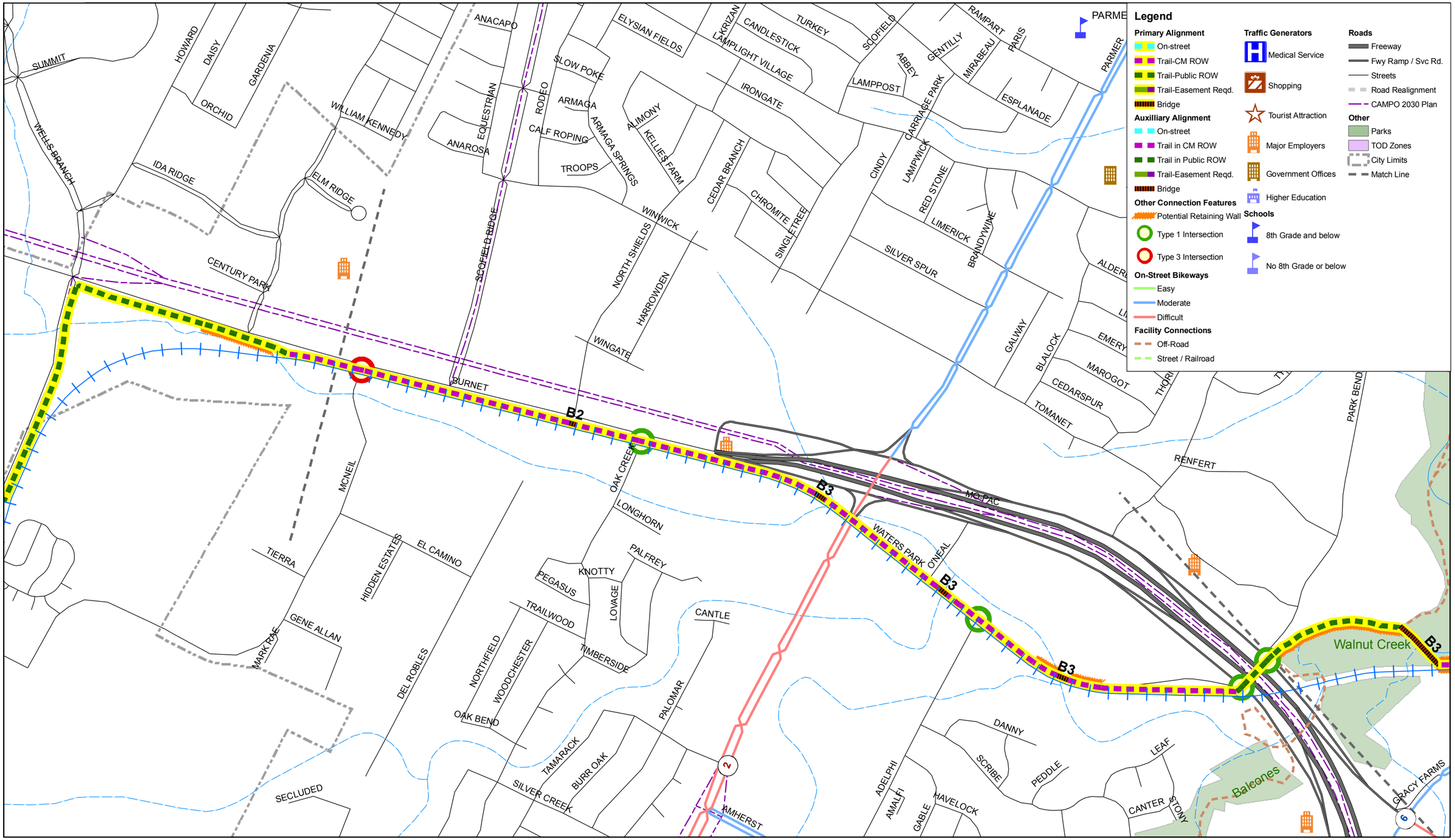

MetroRail Red Line
Project 6, South of Mo Pac at Park to RR crossing of Howard Ln.
Map 1 of 2

0 0.05 0.1 0.2 0.3 0.4 0.5 Miles

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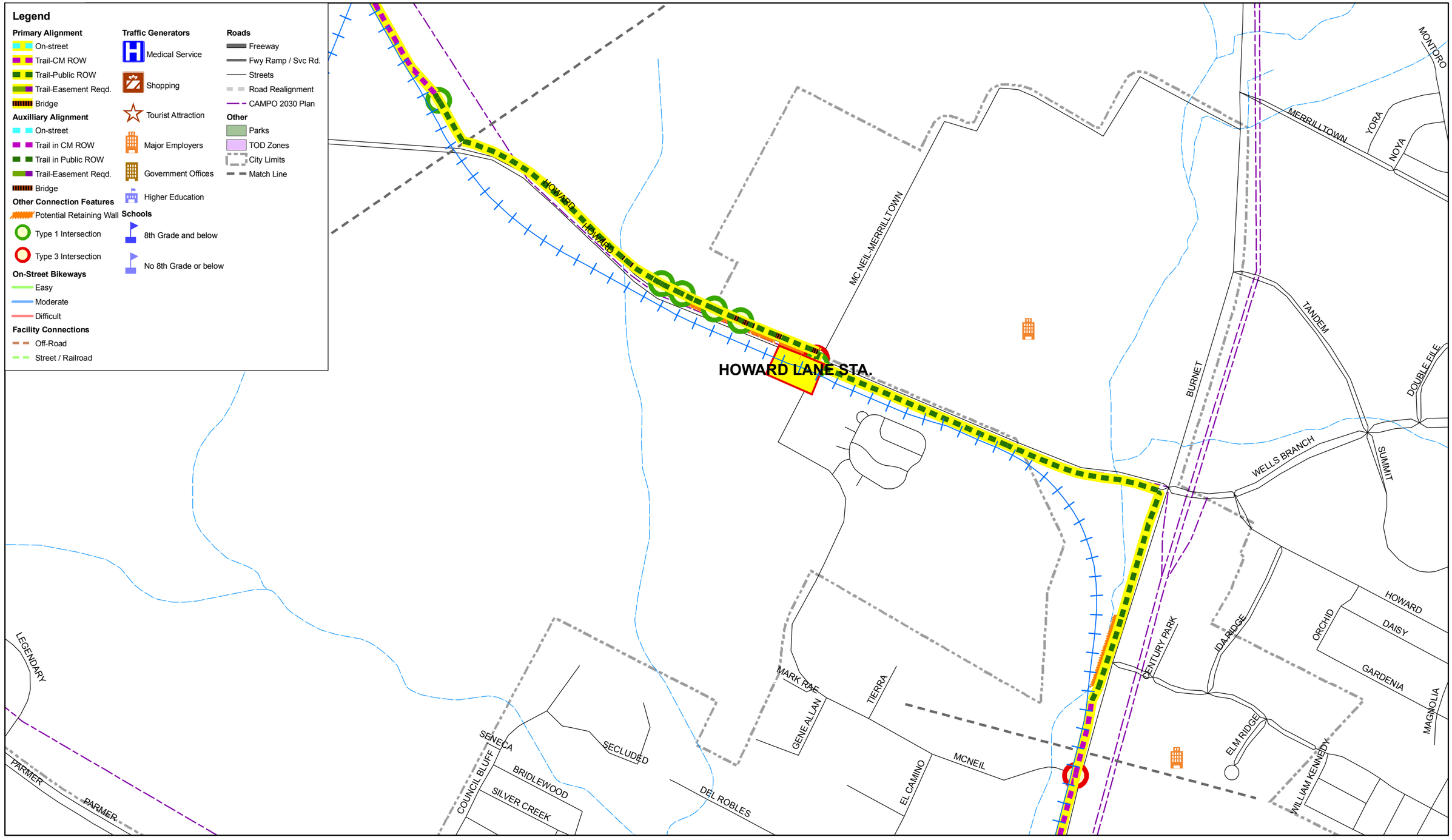

MetroRail Red Line
Project 6, South of Mo Pac at Park to RR crossing of Howard Ln.
Map 2 of 2

0 0.05 0.1 0.2 0.3 0.4 0.5 Miles

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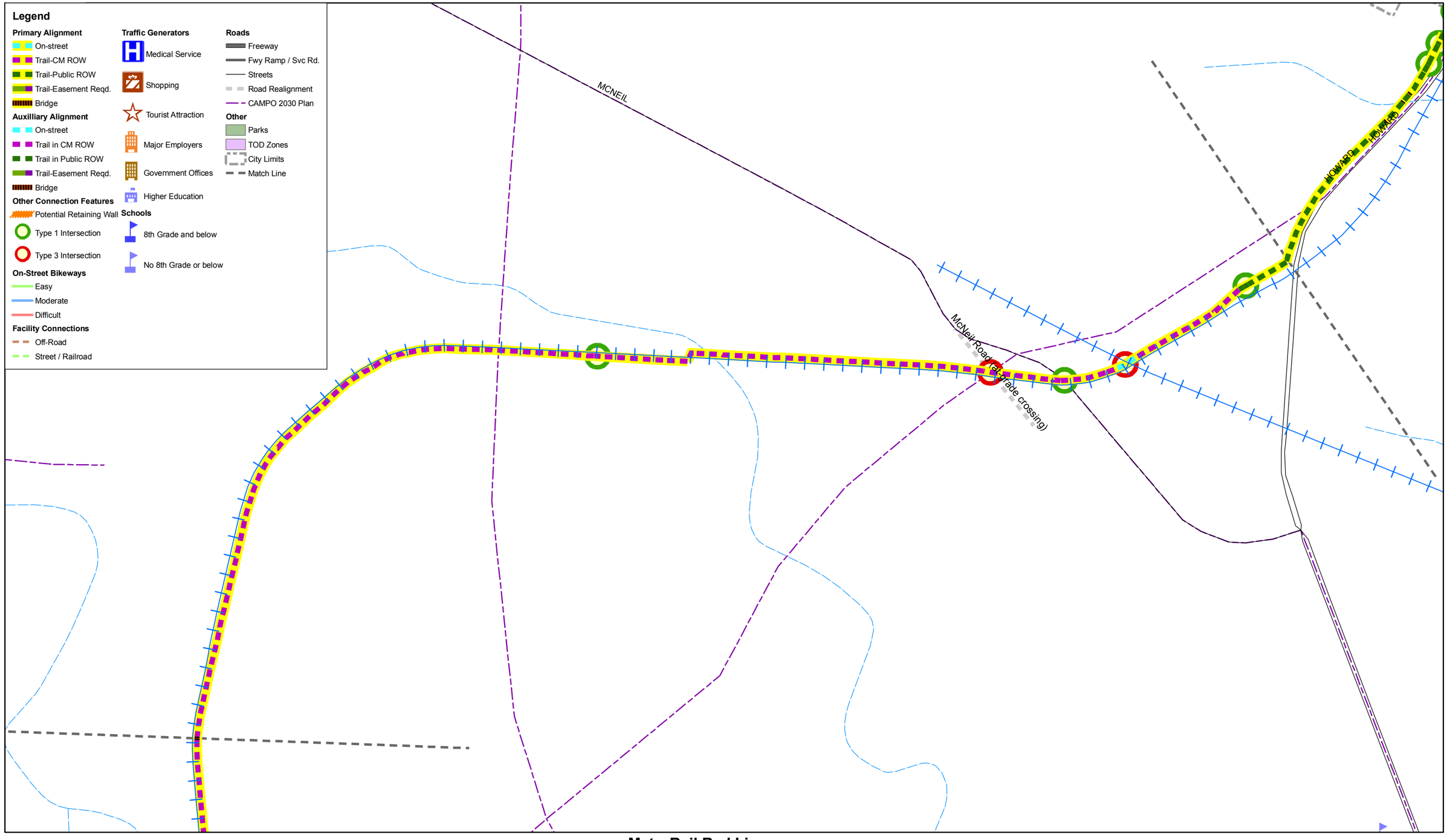

MetroRail Red Line
Project 7, RR crossing of Howard Ln. to North of FM 620 at Parmer Ln.
Map 1 of 2

0 0.05 0.1 0.2 0.3 0.4 0.5 Miles

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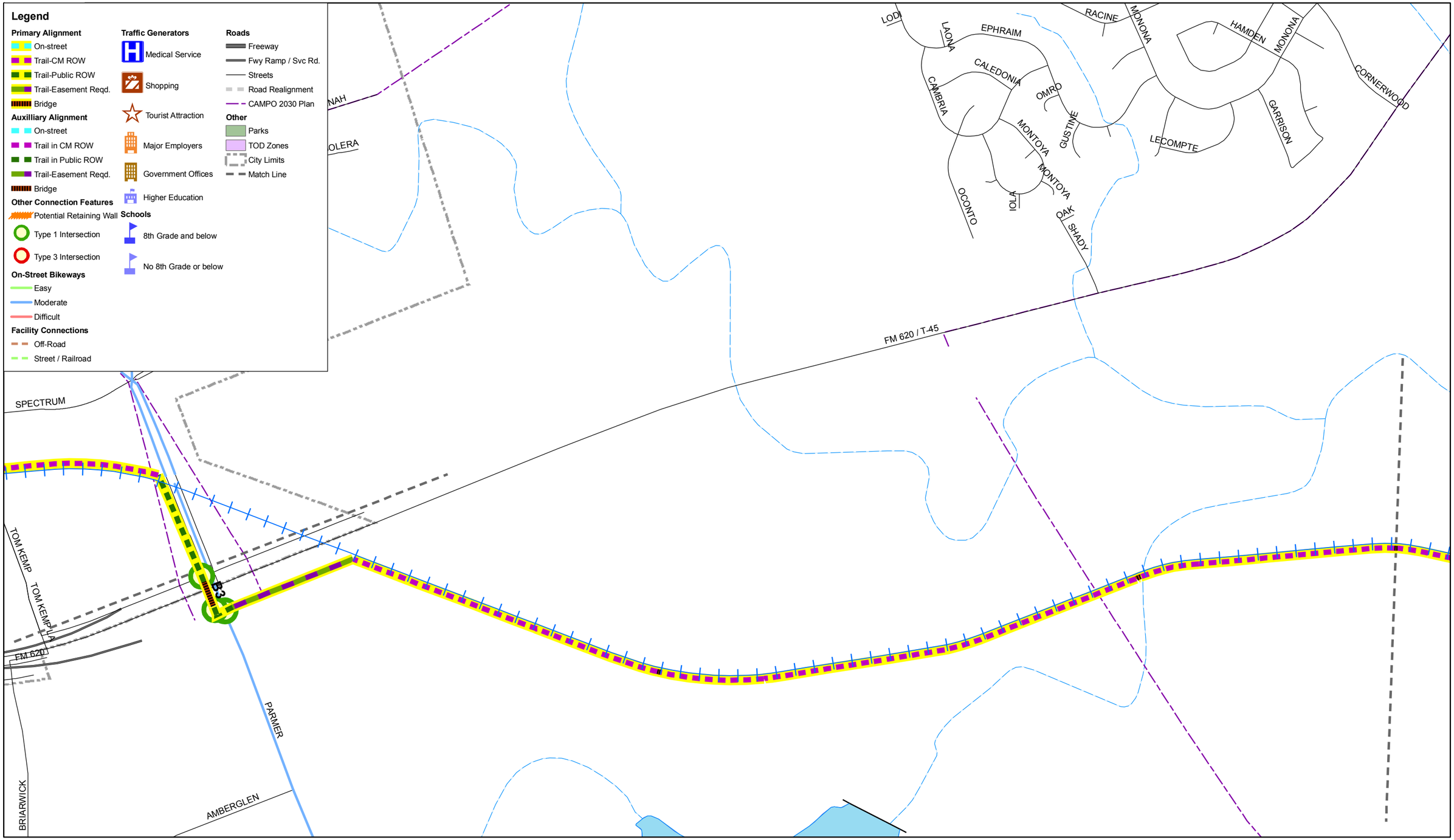

MetroRail Red Line
Project 7, RR crossing of Howard Ln. to North of FM 620 at Parmer Ln.
Map 2 of 2

0 0.05 0.1 0.2 0.3 0.4 0.5 Miles

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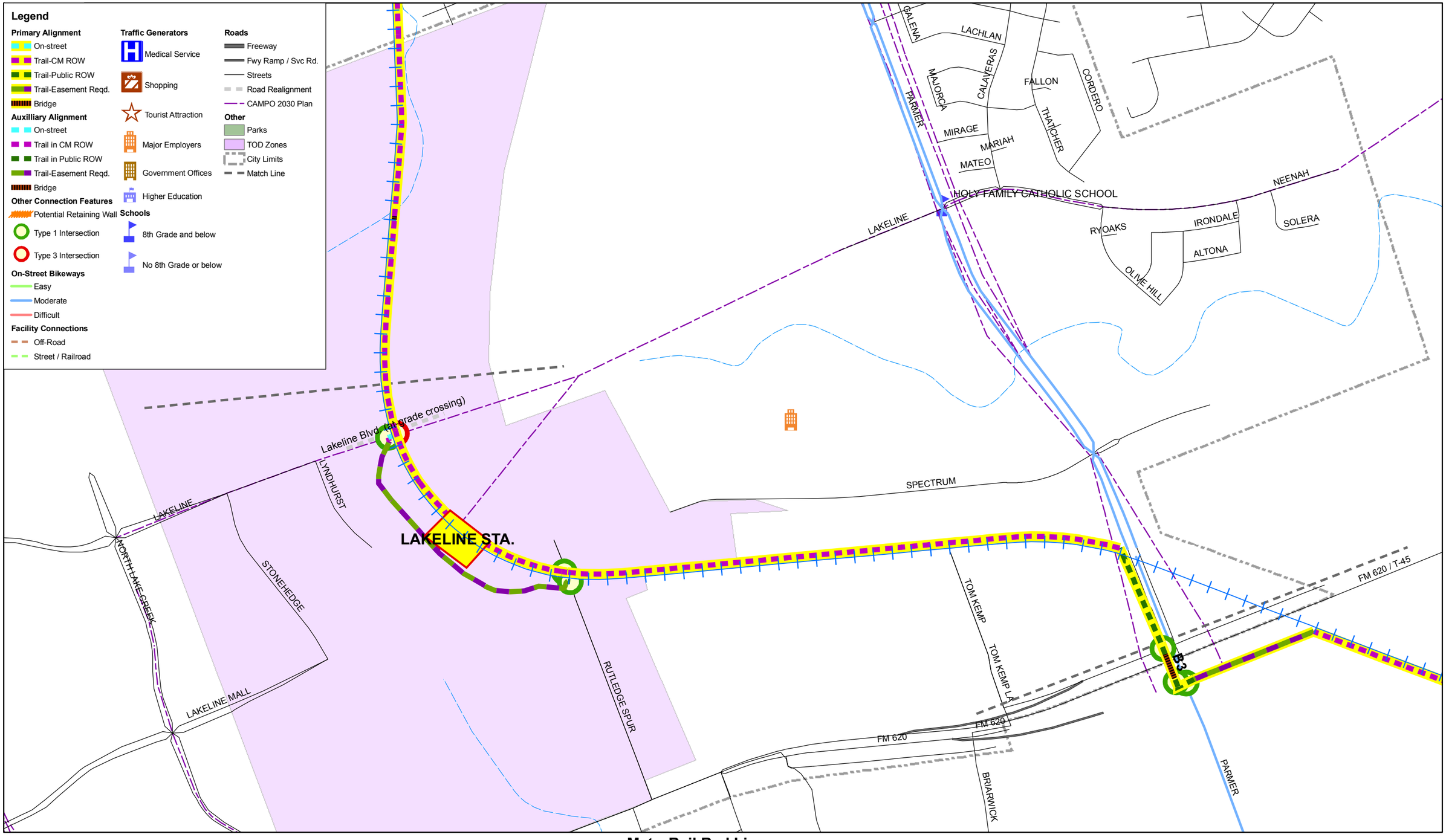

MetroRail Red Line
Project 8, North of FM 620 at Parmer Ln. to North of Brushy Creek
Map 1 of 2

0 0.05 0.1 0.2 0.3 0.4 0.5 Miles

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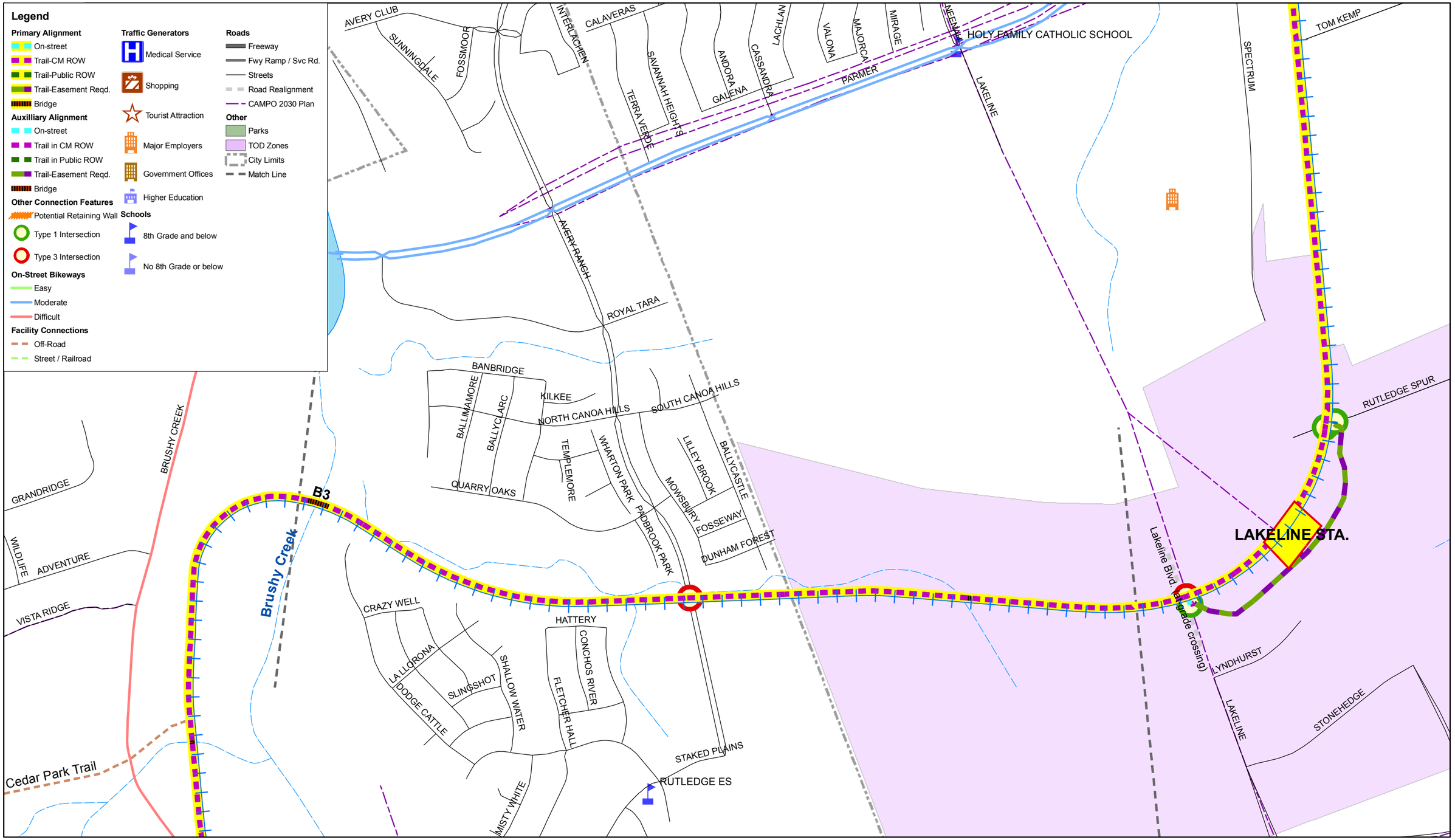

MetroRail Red Line
Project 8, North of FM 620 at Parmer Ln. to North of Brushy Creek
Map 2 of 2

0 0.05 0.1 0.2 0.3 0.4 0.5 Miles

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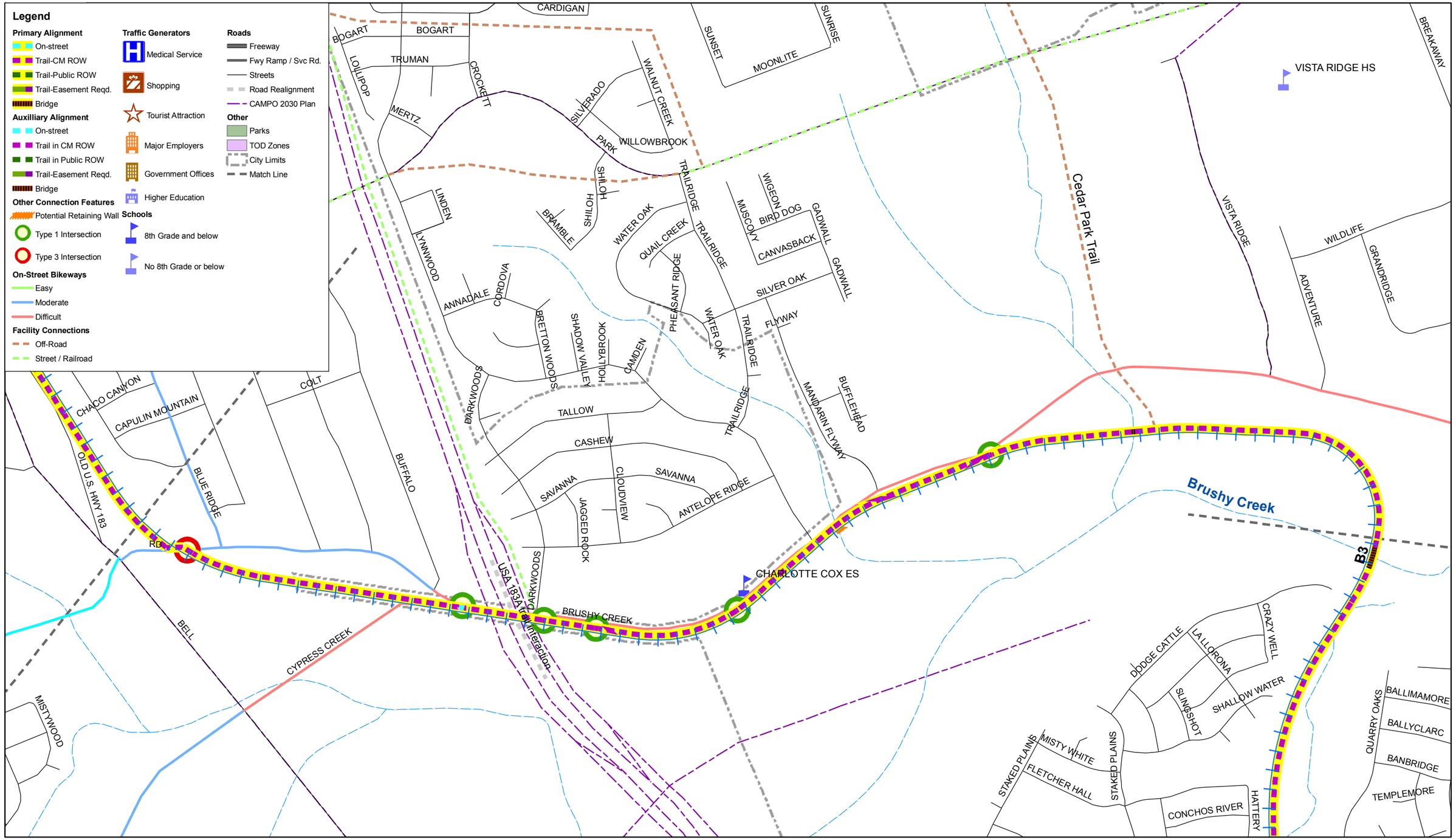
TRAIL FEASIBILITY STUDY

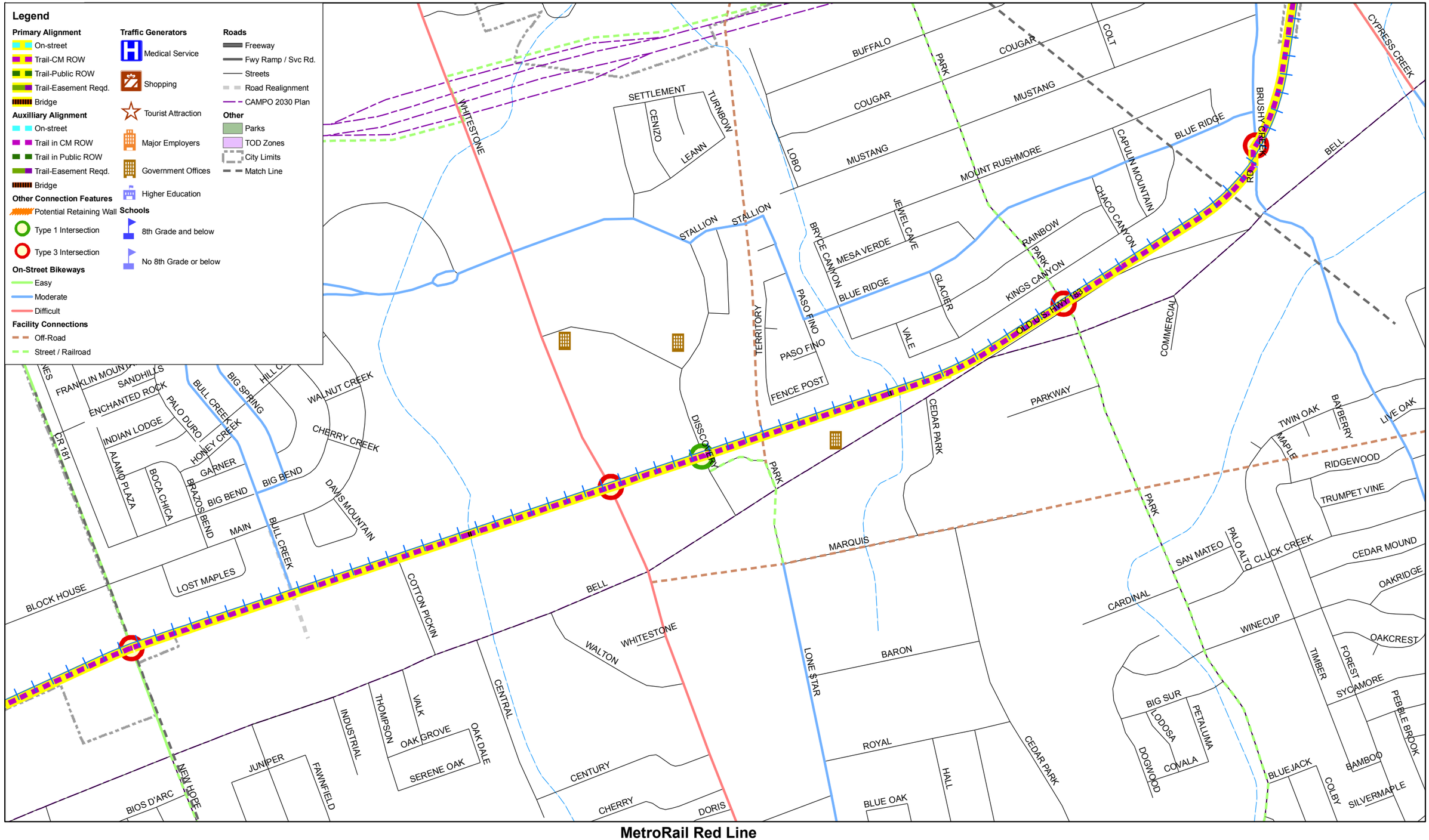
Appendix D. Detailed Project Layouts - South through North



MetroRail Red Line
Project 9, North of Brushy Creek to North of Brushy Creek Rd.
Map 1 of 1

0 0.05 0.1 0.2 0.3 0.4 0.5 Miles

04/03/2007



MetroRail Red Line
Project 10, North of Brushy Creek Rd. to South of Crystal Falls Road
Map 1 of 2

0 0.05 0.1 0.2 0.3 0.4 0.5 Miles

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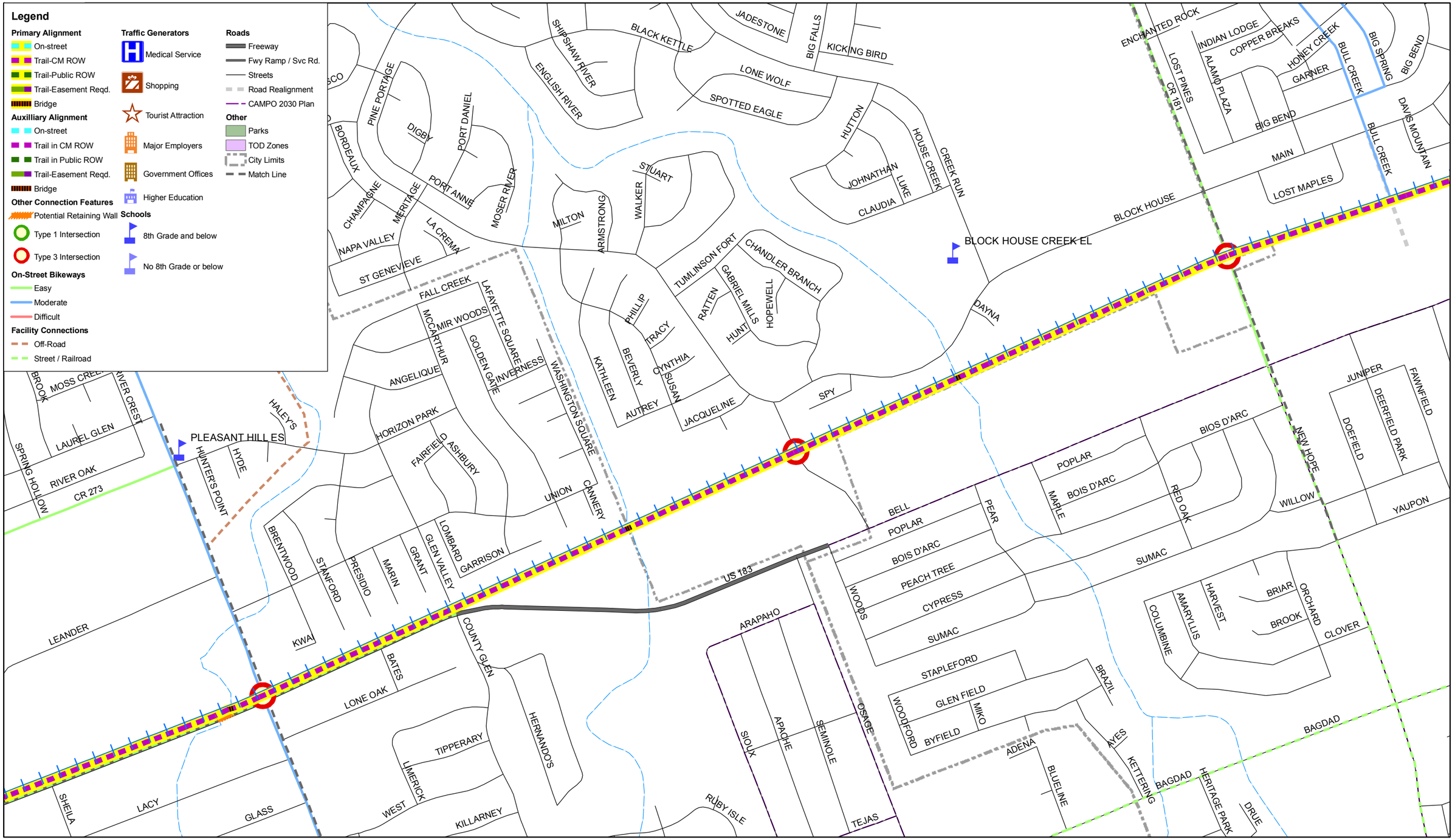
Lockwood, Andrews & Newnam, Inc. A LEO A DALY COMPANY



MetroRail Red Line
Project 10, North of Brushy Creek Rd. to South of Crystal Falls Road
Map 2 of 2

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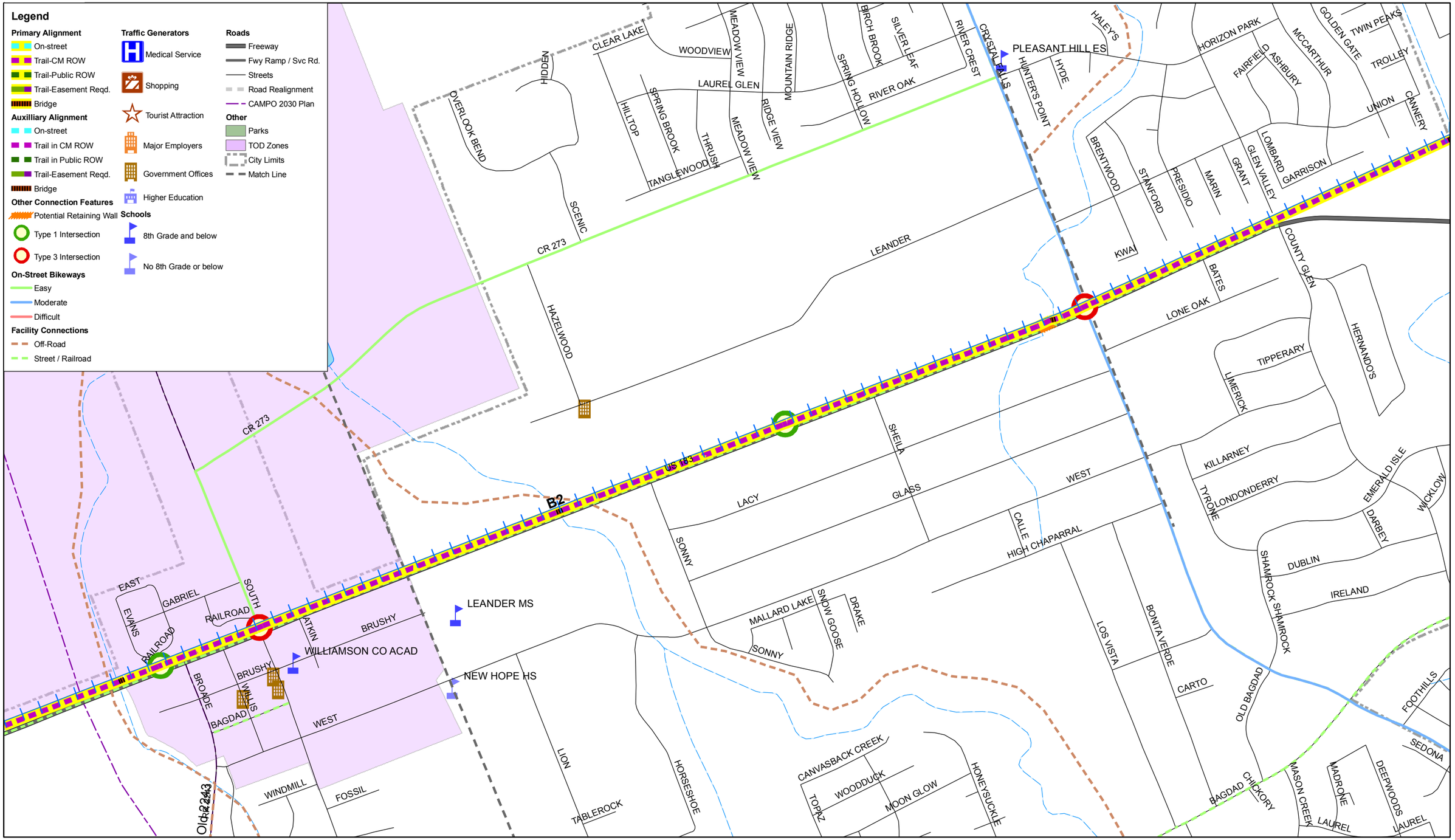
Lockwood, Andrews & Newnam, Inc. A LEO A DALY COMPANY



MetroRail Red Line
Project 11, South of Crystal Falls Road to Leander TOD Station Area Access
Map 1 of 2

0 0.05 0.1 0.2 0.3 0.4 0.5 Miles

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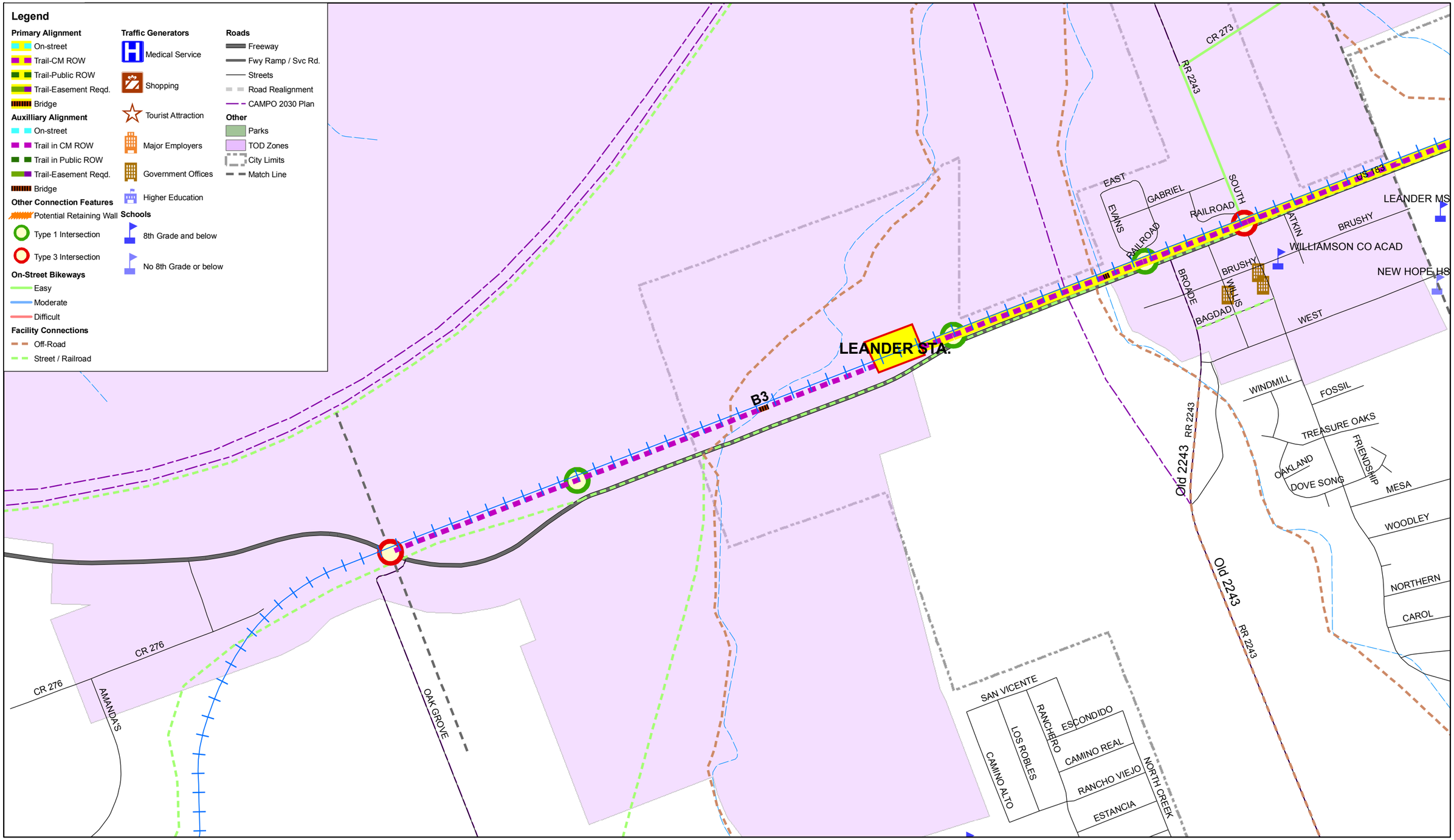

MetroRail Red Line
Project 11, South of Crystal Falls Road to Leander TOD Station Area Access
Map 2 of 2

0 0.05 0.1 0.2 0.3 0.4 0.5 Miles

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Lockwood, Andrews & Newnam, Inc. A LEO A DALY COMPANY

Project Priority:	2		1		3		4		5		8		11		6		10		9		7		
Project Number (S to N):	1		2		3		4		5		6		7		8		9		10		11		
Project Description:	Downtown to Wilshire Blvd.		Wilshire Blvd. to Highland Mall Sta.		Highland Mall Sta. to Morrow Street		Morrow Street to Research Blvd.		Research Blvd. to Mo Pac at Park Bend		Mo Pac at Park Bend to Howard Ln.		Howard Ln. to FM 620 at Parmer Ln.		FM 620 at Parmer Ln. to Brushy Creek		Brushy Creek to Brushy Creek Rd.		Brushy Creek Rd. to Crystal Falls Rd.		Leander TOD Sta. Area Access		Leander Line Total	
Item (Unit)	Units	$	Units	1	Units	$	Units	$	Units	$	Units	$	Units	$	Units	$	Units	$	Units	$	Units	$	Units	$
1. Potential ROW Needed (Acres)	2.959	644,444	-	-	2.036	886,978	1.938	928,687	4.561	1,883,816	-	-	0.673	380,960	-	-	-	-	-	-	-	-	12.167	4,724,884
2. Engineering / Environmental - 20%		593,862		512,596		217,116		193,135		1,041,104		880,509		710,708		518,222		343,852		636,264		385,365		6,032,732
3. Construction																								
Pathways (LF)																								
Section Type A - On-Street Connections	3,179	473,526	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3,179	473,526
Section Type B - On-Street Connections	2,679	139,966	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2,679	139,966
Section Type D - On-Street Connections	8,500	8,075	967	919	35	34	8,885	8,440	1,607	1,526	-	-	216	205	-	-	45	43	-	-	-	-	20,255	19,242
Sub-total - On-Street	14,358	621,567	967	919	35	34	8,885	8,440	1,607	1,526	-	-	216	205	-	-	45	43	-	-	-	-	26,113	632,734
Section Type C - Trail within Public ROW	-	-	11,214	1,923,409	3,435	589,166	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	14,649	2,512,575
Section Type E - Public or ROW Required	12,161	1,033,066	-	-	3,506	297,794	-	-	6,904	586,471	437	37,112	2,025	172,014	940	79,816	-	-	-	-	-	-	25,971	2,206,273
Section Type F - Additonal ROW Required	-	-	-	-	-	-	3,377	468,328	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3,377	468,328
Section Type G - Trail within Public ROW	-	-	-	-	-	-	-	-	-	-	3,445	405,504	-	-	-	-	-	-	-	-	-	-	3,445	405,504
Section Type H - Trail within Public ROW	-	-	-	-	-	-	1,213	213,906	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,213	213,906
Section Type I - Additonal ROW Required	-	-	-	-	-	-	-	-	2,312	320,616	-	-	-	-	-	-	-	-	-	-	-	-	2,312	320,616
Section Type J - Trail within CMTA ROW	-	-	-	-	-	-	-	-	1,375	166,251	8,957	1,083,395	5,103	617,165	-	-	-	-	-	-	-	-	15,435	1,866,811
Section Type K - Trail within Public ROW	-	-	-	-	-	-	-	-	3,636	479,242	5,558	732,472	-	-	-	-	-	-	-	-	-	-	9,194	1,211,714
Section Type L - Trail within CMTA ROW	-	-	-	-	-	-	-	-	-	-	-	-	6,508	688,910	-	-	-	-	-	-	-	-	6,508	688,910
Section Type M - Trail within CMTA ROW	-	-	-	-	-	-	-	-	-	-	-	-	9,994	1,208,783	15,272	1,847,098	12,480	1,509,446	20,429	2,470,852	11,357	1,373,656	69,532	8,409,835
Sub-total - Off-Street	12,161	1,033,066	11,214	1,923,409	6,940	886,960	4,590	682,234	14,227	1,552,580	18,397	2,258,483	23,630	2,686,872	16,211	1,926,914	12,480	1,509,446	20,429	2,470,852	11,357	1,373,656	151,636	18,304,472
Bridge Type 1 - Up to 30' L, 10' or wider	31	30,664	-	-	-	-	-	-	-	-	206	205,759	48	47,928	29	28,988	27	27,163	60	60,243	-	-	401	400,745
Bridge Type 2 - More than 30' up to 60' L	-	-	59	88,654	42	63,586	-	-	37	55,144	112	167,856	43	64,697	-	-	-	-	97	145,223	160	239,804	550	824,964
Bridge Type 3 - More than 60' L	101	202,325	-	-	-	-	-	-	749	1,498,272	326	652,333	237	473,840	190	380,207	-	-	-	-	-	-	1,603	3,206,977
Sub-total - Bridges	132	232,989	59	88,654	42	63,586	-	-	786	1,553,416	644	1,025,948	328	586,465	219	409,195	27	27,163	157	205,466	160	239,804	2,554	4,432,686
Sub-total - Pathways	26,651	1,887,622	12,240	2,012,982	7,018	950,580	13,475	690,674	16,619	3,107,522	19,041	3,284,431	24,174	3,273,542	16,430	2,336,109	12,552	1,536,652	20,586	2,676,318	11,517	1,613,460	180,303	23,369,892
Retaining Walls - nominal 4' H (LF)	658	246,686	-	-	-	-	-	-	4,528	1,697,999	2,515	943,116	-	-	-	-	87	32,606	-	-	129	48,363	7,917	2,968,769
Intersection Treatment - Major (Count)	6	750,000	4	500,000	1	125,000	2	250,000	3	375,000	1	125,000	2	250,000	2	250,000	1	125,000	4	500,000	2	250,000	28	3,500,000
Intersection Treatment - Minor (Count)	17	85,000	10	50,000	2	10,000	5	25,000	5	25,000	10	50,000	6	30,000	1	5,000	5	25,000	1	5,000	3	15,000	65	325,000
Sub-total - Pathways, Ret. Wall & Intersections		2,969,308		2,562,982		1,085,580		965,674		5,205,521		4,402,547		3,553,542		2,591,109		1,719,258		3,181,318		1,926,823		30,163,661
Mobilization - 8%		237,545		205,039		86,846		77,254		416,442		352,204		284,283		207,289		137,541		254,505		154,146		2,413,093
Contingency - 20%		593,862		512,596		217,116		193,135		1,041,104		880,509		710,708		518,222		343,852		636,264		385,365		6,032,732
Sub-total - Construction Cost		3,800,715		3,280,617		1,389,542		1,236,063		6,663,067		5,635,260		4,548,534		3,316,620		2,200,650		4,072,087		2,466,333		38,609,487
4. Trail Amenities (Off-Street Only)																								
Pedestrian Scale Lighting		547,240		504,625		312,322		206,566		640,195		827,868		1,063,349		729,502		561,596		919,292		511,075		6,823,631
Other Amenities																								
Drinking Fountains		3,454		3,185		1,971		1,304		4,040		5,225		6,711		4,604		3,544		5,802		3,225		43,065
Benches		12,891		11,887		7,357		4,866		15,080		19,501		25,048		17,184		13,229		21,654		12,039		160,734
Interpretive Signs / Stations		4,864		4,486		2,776		1,836		5,691		7,359		9,452		6,484		4,992		8,171		4,543		60,655
Sub-total - Other Amenities		21,209		19,557		12,104		8,006		24,811		32,084		41,211		28,272		21,765		35,628		19,807		264,454
Sub-total - Trail Amenities		568,449		524,182		324,426		214,571		665,006		859,953		1,104,560		757,774		583,361		954,920		530,882		7,088,085
Sub-total - Trail Cost (2,3,4)		4,963,025		4,317,396		1,931,085		1,643,769		8,369,178		7,375,722		6,363,802		4,592,615		3,127,862		5,663,270		3,382,580		51,730,304
Total		5,607,469		4,317,396		2,818,063		2,572,456		10,252,994		7,375,722		6,744,762		4,592,615		3,127,862		5,663,270		3,382,580		56,455,188

Project Priority:	2		1		3		4		5		8		11		6		10		9		7		
Project Number (S to N):	1		2		3		4		5		6		7		8		9		10		11		
Project Description:	Downtown to Wilshire Blvd.		Wilshire Blvd. to Highland Mall Sta.		Highland Mall Sta. to Morrow Street		Morrow Street to Research Blvd.		Research Blvd. to Mo Pac at Park Bend		Mo Pac at Park Bend to Howard Ln.		Howard Ln. to FM 620 at Parmer Ln.		FM 620 at Parmer Ln. to Brushy Creek		Brushy Creek to Brushy Creek Rd.		Brushy Creek Rd. to Crystal Falls Rd.		Leander TOD Sta. Area Access		Leander Line Total	
Item (Unit)	Units	$	Units	1	Units	$	Units	$	Units	$	Units	$	Units	$	Units	$	Units	$	Units	$	Units	$	Units	$
1. Potential ROW Needed (Acres)	-	-	-	-	-	-	-	-	0.799	382,764	-	-	-	-	1.558	882,119	-	-	-	-	-	-	2.357	1,264,883
2. Engineering / Environmental - 20%		3,486		2,164		31,628		2,259		49,974		-		-		50,823		-		-		151,065		291,398
3. Construction																								
Pathways (LF)																								
Section Type A - On-Street Connections	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Section Type B - On-Street Connections	334	17,428	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	334	17,428
Section Type D - On-Street Connections	-	-	861	819	8,569	8,139	6,624	6,293	1,719	1,633	-	-	-	-	-	-	-	-	-	-	-	-	17,773	16,884
Sub-total - On-Street	334	17,428	861	819	8,569	8,139	6,624	6,293	1,719	1,633	-	-	-	-	-	-	-	-	-	-	-	-	18,106	34,312
Section Type C - Trail within Public ROW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Section Type E - Public or ROW Required	-	-	-	-	-	-	-	-	1,392	118,239	-	-	-	-	2,821	239,682	-	-	-	-	-	-	4,213	357,921
Section Type F - Additonal ROW Required	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Section Type G - Trail within Public ROW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Section Type H - Trail within Public ROW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Section Type I - Additonal ROW Required	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Section Type J - Trail within CMTA ROW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Section Type K - Trail within Public ROW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Section Type L - Trail within CMTA ROW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Section Type M - Trail within CMTA ROW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	37	4,432	-	-	-	-	4,686	566,729	4,722	571,161
Sub-total - Off-Street	-	-	-	-	-	-	-	-	1,392	118,239	-	-	-	-	2,858	244,114	-	-	-	-	4,686	566,729	8,936	929,082
Bridge Type 1 - Up to 30' L, 10' or wider	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bridge Type 2 - More than 30' up to 60' L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bridge Type 3 - More than 60' L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	92	183,595	92	183,595
Sub-total - Bridges	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	92	183,595	92	183,595
Sub-total - Pathways	334	17,428	861	819	8,569	8,139	6,624	6,293	3,110	119,872	-	-	-	-	2,858	244,114	-	-	-	-	4,777	750,324	27,134	1,146,989
Retaining Walls - nominal 4' H (LF)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Intersection Treatment - Major (Count)	-	-	-	-	1	125,000	-	-	1	125,000	-	-	-	-	-	-	-	-	-	-	-	-	2	250,000
Intersection Treatment - Minor (Count)	-	-	2	10,000	5	25,000	1	5,000	1	5,000	-	-	-	-	2	10,000	-	-	-	-	1	5,000	12	60,000
Sub-total - Pathways, Ret. Wall & Intersections		17,428		10,819		158,139		11,293		249,872		-		-		254,114		-		-		755,324		1,456,989
Mobilization - 8%		1,394		866		12,651		903		19,990		-		-		20,329		-		-		60,426		116,559
Contingency - 20%		3,486		2,164		31,628		2,259		49,974		-		-		50,823		-		-		151,065		291,398
Sub-total - Construction Cost		22,308		13,848		202,418		14,455		319,836		-		-		325,266		-		-		966,815		1,864,946
4. Trail Amenities (Off-Street Only)																								
Pedestrian Scale Lighting		-		-		-		-		62,634		-		-		128,614		-		-		210,854		402,103
Other Amenities																								
Drinking Fountains		-		-		-		-		395		-		-		812		-		-		1,331		2,538
Benches		-		-		-		-		1,475		-		-		3,030		-		-		4,967		9,472
Interpretive Signs / Stations		-		-		-		-		557		-		-		1,143		-		-		1,874		3,574
Sub-total - Other Amenities		-		-		-		-		2,427		-		-		4,985		-		-		8,172		15,584
Sub-total - Trail Amenities		-		-		-		-		65,062		-		-		133,599		-		-		219,026		417,687
Sub-total - Trail Cost (2,3,4)		25,793		16,012		234,046		16,714		434,872		-		-		509,688		-		-		1,336,906		2,574,030
Total		25,793		16,012		234,046		16,714		817,636		-		-		1,391,807		-		-		1,336,906		3,838,913

Project Priority:	2		1		3		4		5		8		11		6		10		9		7		
Project Number (S to N):	1		2		3		4		5		6		7		8		9		10		11		
Project Description:	Downtown to Wilshire Blvd.		Wilshire Blvd. to Highland Mall Sta.		Highland Mall Sta. to Morrow Street		Morrow Street to Research Blvd.		Research Blvd. to Mo Pac at Park Bend		Mo Pac at Park Bend to Howard Ln.		Howard Ln. to FM 620 at Parmer Ln.		FM 620 at Parmer Ln. to Brushy Creek		Brushy Creek to Brushy Creek Rd.		Brushy Creek Rd. to Crystal Falls Rd.		Leander TOD Sta. Area Access		Leander Line Total	
Item (Unit)	Units	$	Units	1	Units	$	Units	$	Units	$	Units	$	Units	$	Units	$	Units	$	Units	$	Units	$	Units	$
1. Potential ROW Needed (Acres)	2.959	644,444	-	-	2.036	886,978	1.938	928,687	5.360	2,266,580	-	-	0.673	380,960	1.558	882,119	-	-	-	-	-	-	14.524	5,989,767
2. Engineering / Environmental - 20%		597,347		514,760		248,744		195,393		1,091,079		880,509		710,708		569,045		343,852		636,264		536,429		6,324,130
3. Construction																								
Pathways (LF)																								
Section Type A - On-Street Connections	3,179	473,526	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3,179	473,526
Section Type B - On-Street Connections	3,012	157,394	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3,012	157,394
Section Type D - On-Street Connections	8,500	8,075	1,828	1,738	8,604	8,173	15,509	14,733	3,325	3,159	-	-	216	205	-	-	45	43	-	-	-	-	38,028	36,126
Sub-total - On-Street	14,691	638,995	1,828	1,738	8,604	8,173	15,509	14,733	3,325	3,159	-	-	216	205	-	-	45	43	-	-	-	-	44,219	667,046
Section Type C - Trail within Public ROW	-	-	11,214	1,923,409	3,435	589,166	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	14,649	2,512,575
Section Type E - Public or ROW Required	12,161	1,033,066	-	-	3,506	297,794	-	-	8,296	704,710	437	37,112	2,025	172,014	3,761	319,498	-	-	-	-	-	-	30,185	2,564,194
Section Type F - Additonal ROW Required	-	-	-	-	-	-	3,377	468,328	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3,377	468,328
Section Type G - Trail within Public ROW	-	-	-	-	-	-	-	-	-	-	3,445	405,504	-	-	-	-	-	-	-	-	-	-	3,445	405,504
Section Type H - Trail within Public ROW	-	-	-	-	-	-	1,213	213,906	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,213	213,906
Section Type I - Additonal ROW Required	-	-	-	-	-	-	-	-	2,312	320,616	-	-	-	-	-	-	-	-	-	-	-	-	2,312	320,616
Section Type J - Trail within CMTA ROW	-	-	-	-	-	-	-	-	1,375	166,251	8,957	1,083,395	5,103	617,165	-	-	-	-	-	-	-	-	15,435	1,866,811
Section Type K - Trail within Public ROW	-	-	-	-	-	-	-	-	3,636	479,242	5,558	732,472	-	-	-	-	-	-	-	-	-	-	9,194	1,211,714
Section Type L - Trail within CMTA ROW	-	-	-	-	-	-	-	-	-	-	-	-	6,508	688,910	-	-	-	-	-	-	-	-	6,508	688,910
Section Type M - Trail within CMTA ROW	-	-	-	-	-	-	-	-	-	-	-	-	9,994	1,208,783	15,308	1,851,530	12,480	1,509,446	20,429	2,470,852	16,043	1,940,385	74,254	8,980,996
Sub-total - Off-Street	12,161	1,033,066	11,214	1,923,409	6,940	886,960	4,590	682,234	15,618	1,670,819	18,397	2,258,483	23,630	2,686,872	19,069	2,171,028	12,480	1,509,446	20,429	2,470,852	16,043	1,940,385	160,572	19,233,554
Bridge Type 1 - Up to 30' L, 10' or wider	31	30,664	-	-	-	-	-	-	-	-	206	205,759	48	47,928	29	28,988	27	27,163	60	60,243	-	-	401	400,745
Bridge Type 2 - More than 30' up to 60' L	-	-	59	88,654	42	63,586	-	-	37	55,144	112	167,856	43	64,697	-	-	-	-	97	145,223	160	239,804	550	824,964
Bridge Type 3 - More than 60' L	101	202,325	-	-	-	-	-	-	749	1,498,272	326	652,333	237	473,840	190	380,207	-	-	-	-	92	183,595	1,695	3,390,572
Sub-total - Bridges	132	232,989	59	88,654	42	63,586	-	-	786	1,553,416	644	1,025,948	328	586,465	219	409,195	27	27,163	157	205,466	252	423,399	2,646	4,616,281
Sub-total - Pathways	26,984	1,905,050	13,101	2,013,801	15,587	958,719	20,099	696,967	19,730	3,227,394	19,041	3,284,431	24,174	3,273,542	19,288	2,580,223	12,552	1,536,652	20,586	2,676,318	16,295	2,363,784	207,437	24,516,881
Retaining Walls - nominal 4' H (LF)	658	246,686	-	-	-	-	-	-	4,528	1,697,999	2,515	943,116	-	-	-	-	87	32,606	-	-	129	48,363	7,917	2,968,769
Intersection Treatment - Major (Count)	6	750,000	4	500,000	2	250,000	2	250,000	4	500,000	1	125,000	2	250,000	2	250,000	1	125,000	4	500,000	2	250,000	30	3,750,000
Intersection Treatment - Minor (Count)	17	85,000	12	60,000	7	35,000	6	30,000	6	30,000	10	50,000	6	30,000	3	15,000	5	25,000	1	5,000	4	20,000	77	385,000
Sub-total - Pathways, Ret. Wall & Intersections		2,986,736		2,573,801		1,243,719		976,967		5,455,393		4,402,547		3,553,542		2,845,223		1,719,258		3,181,318		2,682,147		31,620,650
Mobilization - 8%		238,939		205,904		99,498		78,157		436,431		352,204		284,283		227,618		137,541		254,505		214,572		2,529,652
Contingency - 20%		597,347		514,760		248,744		195,393		1,091,079		880,509		710,708		569,045		343,852		636,264		536,429		6,324,130
Sub-total - Construction Cost		3,823,022		3,294,465		1,591,960		1,250,518		6,982,904		5,635,260		4,548,534		3,641,885		2,200,650		4,072,087		3,433,148		40,474,433
4. Trail Amenities (Off-Street Only)																								
Pedestrian Scale Lighting		547,240		504,625		312,322		206,566		702,829		827,868		1,063,349		858,116		561,596		919,292		721,929		7,225,734
Other Amenities																								
Drinking Fountains		3,454		3,185		1,971		1,304		4,436		5,225		6,711		5,416		3,544		5,802		4,556		45,602
Benches		12,891		11,887		7,357		4,866		16,556		19,501		25,048		20,213		13,229		21,654		17,005		170,206
Interpretive Signs / Stations		4,864		4,486		2,776		1,836		6,247		7,359		9,452		7,628		4,992		8,171		6,417		64,229
Sub-total - Other Amenities		21,209		19,557		12,104		8,006		27,239		32,084		41,211		33,257		21,765		35,628		27,979		280,037
Sub-total - Trail Amenities		568,449		524,182		324,426		214,571		730,068		859,953		1,104,560		891,373		583,361		954,920		749,908		7,505,772
Sub-total - Trail Cost (2,3,4)		4,988,818		4,333,408		2,165,131		1,660,482		8,804,050		7,375,722		6,363,802		5,102,303		3,127,862		5,663,270		4,719,485		54,304,334
Total		5,633,262		4,333,408		3,052,108		2,589,170		11,070,630		7,375,722		6,744,762		5,984,422		3,127,862		5,663,270		4,719,485		60,294,101

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