Connecting Midland

The 2015 Midland Hike and Bike Trails Master Plan

MIDLAND

HALFF

April 2015

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The 2015 Hike and Bike Trails Master Plan




Draft for Review | April 2015

MIDLAND HALFF

April 21, 2015

Laurie Williams
Parks & Recreation Manager
City of Midland
2300 Butternut
Midland, Texas 79701

Reference: 2015 Hike and Bike Trails Master Plan for Midland

Dear Ms. Williams:

Halff Associates, Inc. is pleased to submit the Hike and Bike Trails Master Plan for Midland. This plan captures a vision of Midland as a vibrant, healthy city where its residents have many mobility options, one of which is a strong system of on- and off-street pedestrian and bicycle corridors.

The master plan's recommendations encompass a variety of different pedestrian and bicycle facility types, seeking first and foremost to create an interconnected system of continuous facilities that link all parts of the city. The ultimate goal of this master plan is to truly connect all of Midland.

Many of the recommendations in this master plan are immediate in nature and can be developed as quickly. Others can be developed as ongoing development occurs in all parts of the city. Longer term actions where funding sources need to be identified are shown to ensure that they are always considered in the city's planning for the future.

Ultimately, this master plan stresses what citizens of Midland desire from their pedestrian and bicycle network. A strong focus on improving both on- and off-street facilities can transform Midland and help make it one of the best places to live in West Texas. We greatly appreciate the opportunity to have worked with you, the City Council, city staff and the citizens of Midland.

Sincerely,

Halff Associates, Inc.

Jim Carrillo, FAICP, ASLA
Vice President/Director of Planning

Acknowledgements

The 2015 Hike and Bike Trails Master Plan for Midland was developed by the Midland Parks and Recreation Division with the technical assistance and design help of Halff Associates, Inc. A special thanks goes to the many residents, landowners, and community leaders for their insights, comments and support throughout this planning process.

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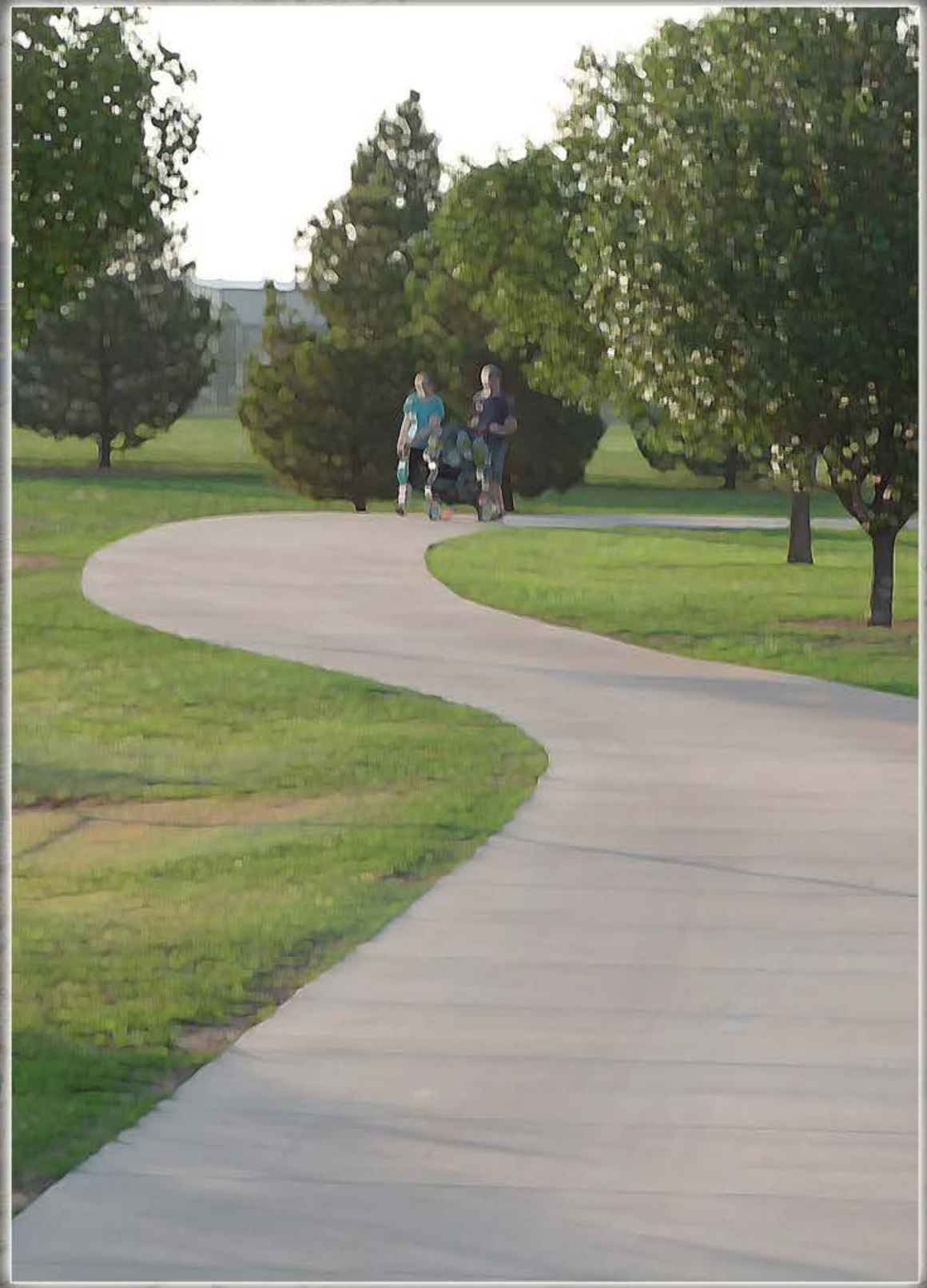
Chapter One

Introduction to Trails Planning



Why Plan for Hike and Bike Trails in Midland

21st century residents and the companies they work for are seeking more transportation choices, healthier lifestyles, and a greater connection to the outdoors. They want more compact cities where driving far isn't always required, where one can hop on a bicycle just as easily as one can get in a car. They want easy access to trails and bicycle facilities that take them to where the want to go. And they want to get there in as comfortable a manner as possible, not always having to fight traffic.

For many decades, trails have been one of the most popular recreation features that a community can offer. Lately trails have also become more than just recreation. A well planned and interconnected trails system can serve as an alternative mode of transportation. With the high price of gas, a new push to be more active, and people just wanting to avoid traffic congestion, trails can be an easy way for residents to commute to work or school as well as places to shop, restaurants, and other entertainment venues.

Because of the favorable weather in Texas the majority of the year, trails are often the most frequently requested recreation amenity. Trails offer many benefits to a community.

- Trails are popular because they offer something for everyone. The very young to the very old can all be active on trails. Youth and seniors often find themselves in a difficult situation living in an auto-centric society because of their inability to drive. The ability to walk or bike enhances their mobility and gives them a sense of independence, as well as a way to stay physically active.
- Trails provide access and opportunities to see beautiful, natural parts of the city. They provide opportunities to see other neighborhoods and newer parts of the city. Trails help preserve and enhance greenbelt areas, and they can even help beautify street corridors.
- Trails support economic development by creating attractive greenbelts that can revitalize areas and enhance neighborhoods. Trails provide access to local businesses, and provide tourism opportunities. A great system of places to walk and bike makes Midland an even more attractive place to live and invest in.
- Trails promote a healthy lifestyle by providing opportunities to engage in exercise whether by walking, running, biking or roller blading.
- Trails teach us about the history and culture of Midland by preserving key historical features and areas, as well as the landscape context around those areas.
- Trails enhance the transportation system in Midland by providing alternative ways to get to key destinations such as schools, libraries, parks, city hall, places of employment, restaurants and retail shopping areas. Many "local" trips, especially those under three miles in length, can easily be replaced by biking or walking if the appropriate facilities and connections are available, thus reducing vehicular congestion.
- Walking and biking make economical sense, and today's teens and millenials recognize that. Significant numbers of them are delaying learning to drive or even buying a car, choosing instead to carpool, use transit, walk or ride a bicycle. In 2011, only 67% of all 16 to 24 year olds in the U.S. were licensed to drive, the lowest that percentage has been since 1963. Also consider that car ownership is on average the second-highest household expense following the home mortgage or rent itself. The cost of owning a vehicle including insurance, maintenance and fuel adds up. The American Automobile Association estimates that the average American spends an estimated $8,776 per year to own and operate a car, while bicyclists typically spend less than $120 per year, and walking is free.
- Finally and most importantly, the development of a citywide trail system clearly speaks to Midland's commitment to establish a very high quality of life standard for its citizens. This commitment to quality tells everyone that Midland will always seek to be a premier place to live in and to do business.

The Purpose of a Citywide Hike and Bike Trails Master Plan

A citywide hike and bike trails plan provides the framework by which the City of Midland and the private sector can work together to jointly create beautiful and meaningful trail corridors and make informed decisions as to how to fund trail development in a satisfactory manner.

This long range plan envisions a system of trails that connects all of Midland by allowing residents to go from one end of the city to the other in a fun and healthy way. This plan will identify key trail corridors and on-street bicycle facilities and will guide the creation of a citywide network. A plan such as this will provide guidance on the preferred location for trail corridors and will help the city acquire lands for trail use.

This Trails Master Plan is intended to be flexible and remain a viable tool as Midland continues to grow and change. The plan will continue to serve for many years, but should be periodically updated to reflect current conditions within the city, the neighboring communities and the region as a whole.

Who Will Implement This Plan?

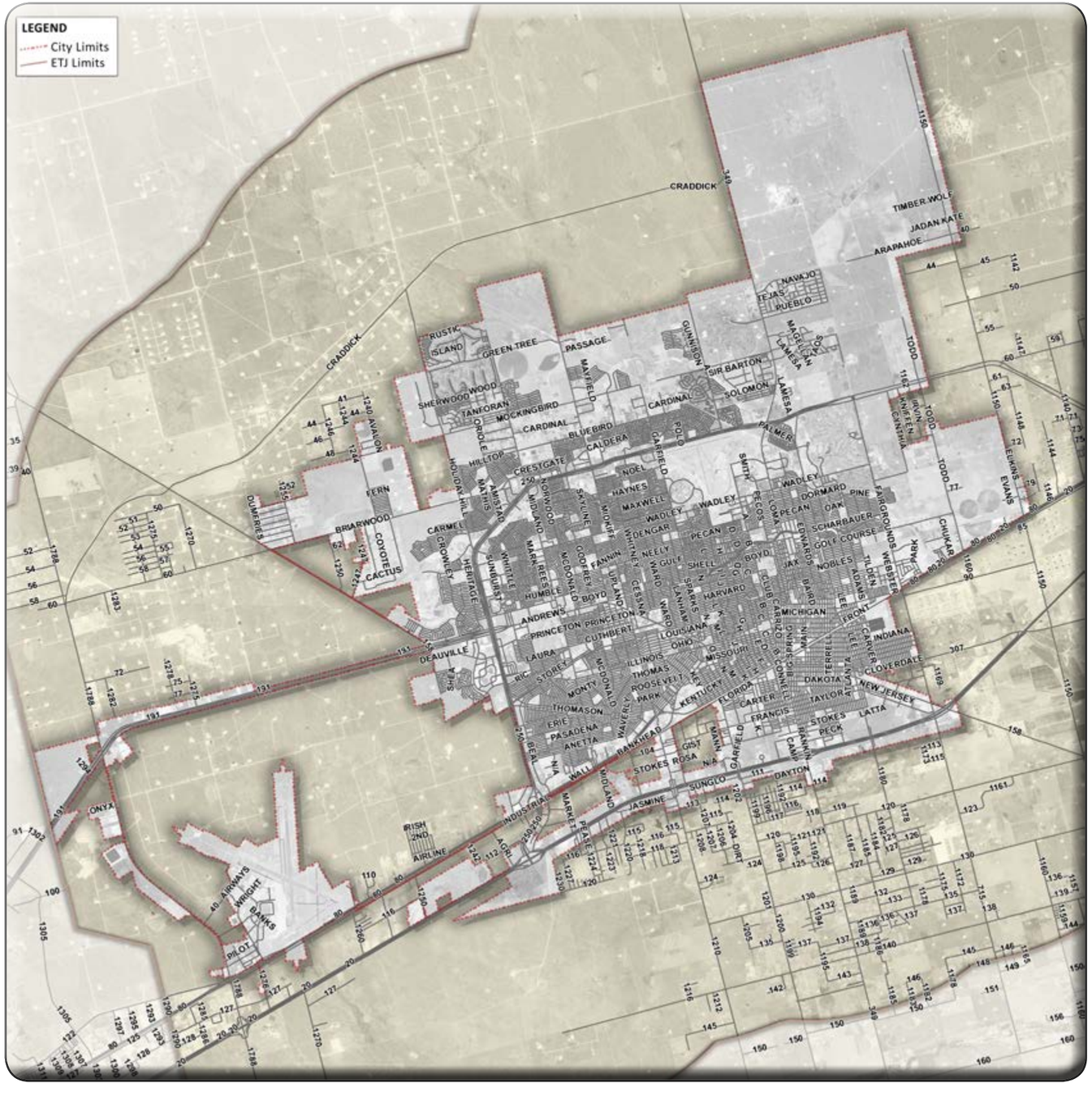
The implementation of the Trails Master Plan will be lead by the City of Midland and its Parks and Recreation Department. However, everyone in Midland has a vested interest in developing a citywide trail system. Other key implementers will include:

- All area governmental entities, including the City of Midland, Midland County, Midland ISD, and other entities such as TxDOT.
- Other departments within the City of Midland, including Transportation, Engineering, and Planning should work with the Parks and Recreation Department to implement components of the plan.
- Property owners, developers, commercial entities, and others in the business community in Midland.
- All citizens of Midland, no matter which part of the city they live in.
- Adjacent residents of Midland County to help encourage connections to nearby communities.

The Trails Master Plan includes the area of Midland's city limits and the nearby surrounding areas of Midland's extra territorial jurisdiction (ETJ).

This Hike and Bike Trails Master Plan follows the general guidelines for local area master plans established by the Texas Parks and Wildlife Department (TPWD). This document will be filed with the Texas Parks and Wildlife Department, and allows the city to better qualify for trail grant opportunities as they become available.

The timeframe for this plan is formulated to address the timeframe from 2015 through the year 2024. Periodic review is recommended to provide an opportunity for citizen feedback and to adjust for any major events or occurrences that may significantly alter the recommendations of this plan.



Steps in the Planning Process

This plan includes seven key sections that provide design guidance and a more detailed summary of the input that has been received. The seven key sections are:

- **Introduction** - This section gives an overview of the purpose and the need to plan for pedestrian and bicycle facilities, a review of the planning process, and a description of the vision and goals for walking and bicycling in Midland.
- **Background and current conditions for walking and bicycling in Midland** - This section reviews the existing conditions in Midland that may impact walking and bicycling.
- **Facility design standards** - This section presents the methodology for determining current and future pedestrian and bicycle facilities based on established standards.
- **Public Input** - This section sets up the planning framework and gives an overview of the public participation process.
- **On-Street Recommendations** - This section outlines the facility recommendations to develop a network of on-street facilities to meet the needs of bicyclists in the community.
- **Off-Street Recommendations** - This section gives recommendations to develop off-street facilities to meet the needs of pedestrians and bicyclists.
- **Implementation strategy** - This section focuses on developing a strategy to implement the Hike and Bike Trail Master Plan, including project prioritization, funding opportunities, and policy considerations.

Principles of the Trails Master Plan

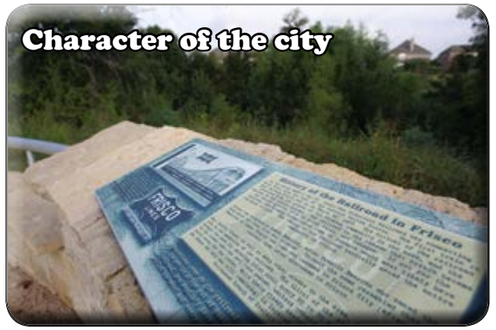
The system of trails, bicycle facilities, and pedestrian connections recommended in this master plan will allow the city to enhance not only recreation and transportation opportunities but also to influence the appearance of Midland. This plan is both visionary and practical. The visionary component foresees a network of beautiful corridors that seamlessly allow a user to easily go from one place in Midland to another by walking or bicycling. The practical side envisions connections to all neighborhoods via readily accessible, wide, safe, and attractive pathways.

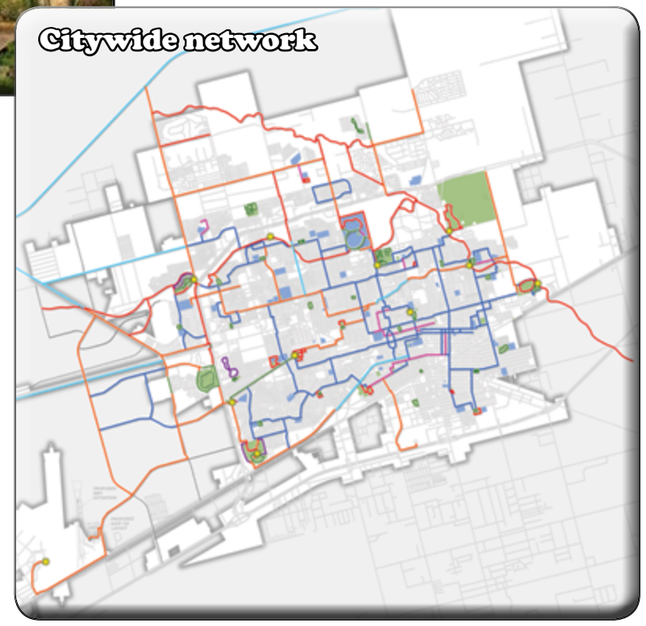
The following principles were developed through the master planning process, and serve to guide the alignment and layout of both the trails proposed in this document, as well as additional pathways proposed in the future.

- **Create a citywide network of trails** - The ultimate goal is to create an interconnected network that allows travel across all of Midland. Unconnected sections should be united into an overall system of continuous facilities. Facilities can be used for both transportation and recreation. The city should create facilities that can allow for commuting and short trips to schools, retail and civic destinations.
- **Promote a feeling of security** - Trails should provide smooth, walkable and rideable corridors that feel safe and are visible. Separation from vehicular traffic will be emphasized for on-street facilities as much as feasible. This may mean buffering or actual physical separation. Facilities that are comfortable for many levels of riding ability will be preferred over those that suit only expert riders.
- **Access** - Access to the trail system must be maximized as much as possible. This may range from simple sidewalk connections to the trails, to complete trailheads with parking and comfort features such as shade structures and restrooms. The city can encourage the use of the trail system by creating easy access. On-street facilities should be readily accessible from neighborhoods through quiet streets, sidewalks, and comfortable places to ride.
- **Trails should enhance Midland** - Trails should enhance the physical appearance of the city, whether through new pedestrian and bicycle features, landscaping added to the trail corridors, or simply by revealing natural areas not previously visible to the general public.
- **Provide a variety of facility types** - Provide facilities that are suitable for a variety of activities including walking, running, cycling, and in-line skating. Provide nature trail opportunities and mountain biking facilities where feasible.
- **Character of the City** - Trail segments should be designed so that they promote the physical and historical character of the City of Midland. They

should relate to adjacent neighborhoods. Trail corridors provide unique opportunities to learn about the history, culture, and accomplishments of Midland. Trails provide access to the natural habitat in the City, and should offer ample opportunities to learn about the environment. Include interpretive signs and features that provide opportunities for learning about Midland and its cultural and ecological heritage.

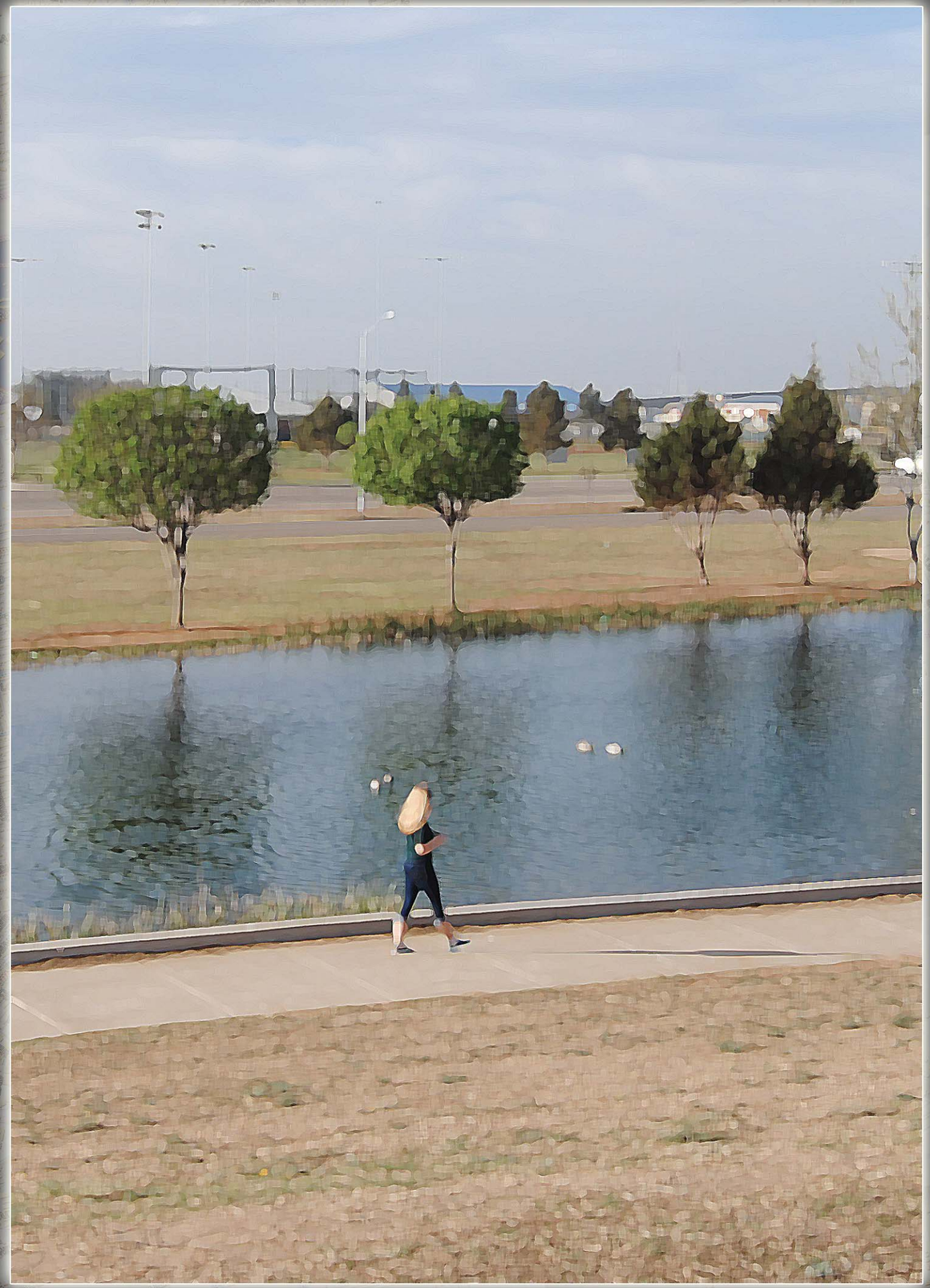
- **Connectivity** - Where possible, trails corridors and facilities should be designed so as to enhance linkages between parks, neighborhoods, schools, retail, and key civic and community destinations. The citywide trail system is proposed to connect to other surrounding communities.
- **Create partnerships with other entities** - Everyone in Midland will embrace the goals of this plan and strive to work together to make it become reality. Other jurisdictions, both public and private, will do their part to facilitate the creation of a great citywide network. Everyone will work to find solutions and eliminate barriers.





Chapter Two

Existing Conditions in Midland



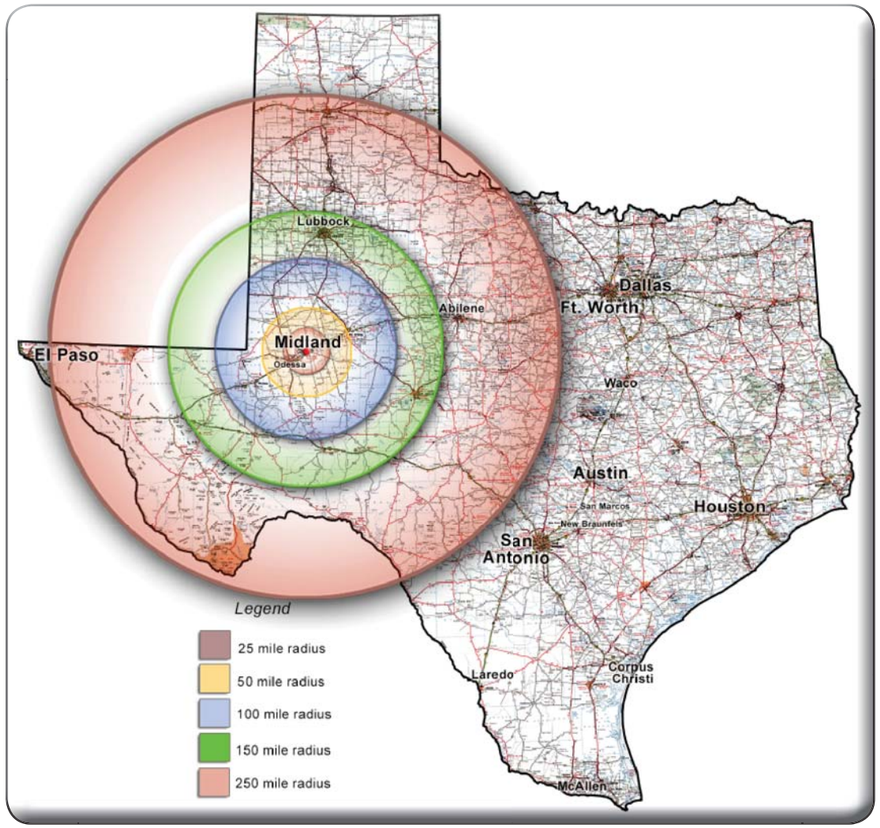
Planning for Today and Tomorrow

This master plan considers both the population of today and growth that is expected to occur in the future. It considers the current context of the city, looking at the many key destinations and attractions that should be accessible by the network. This plan should coordinate with other regional planning efforts in order to efficiently and effectively carry out the vision of the future of Midland.

This section reviews the existing conditions that relate to walking and bicycling in Midland, and any future changes that might benefit from improved walking and bicycling opportunities.

History and Regional Context of Midland

In 1881, the Texas and Pacific Railway was constructing a rail line between Dallas and El Paso. Half way between the two sites, they established a rail station called Midway. Over the next several years, many ranchers moved to the area. In 1884, the name of the town was changed to Midland in order to establish a post office (other towns in Texas were already named Midway at the time). By 1885, more than 100 families lived in and around Midland. Within five years it had an estimated population of 600 and had become one of the most important cattle shipping centers in the state. Midland was officially incorporated in 1906; however, after a lapse in the city's charter, it was incorporated again in 1911.



Because of severe drought, the population of Midland actually declined in the early part of the 20th century. However, by the 1920s, thousands of workers moved to the area because of the oil boom. The success was shorted lived, and once the Great Depression set in, more than one-third of Midland's workers were unemployed. Once the oil industry began to recover in the mid-1930s, so did the population of Midland. By 1940, the population was estimated to be over 9,000 residents.

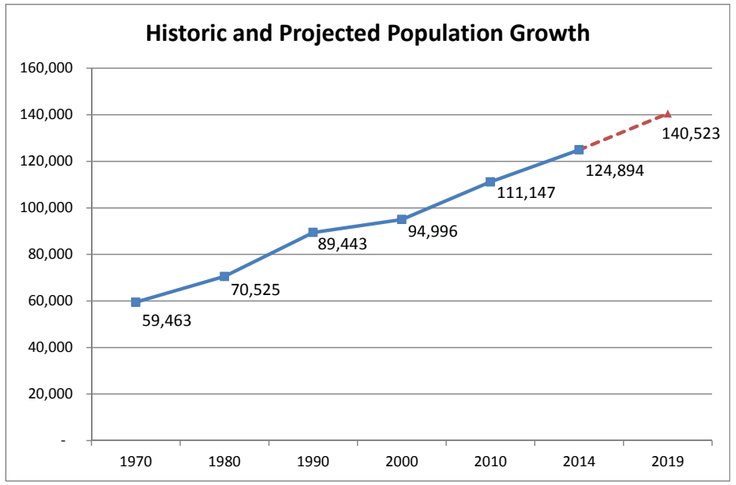
Midland is the county seat of Midland County. It is located along IH-20 in the Permian Basin in the western half of the state. It is 20 miles east of Odessa, 300 west of Fort Worth, 120 miles south of Lubbock, and 110 miles northwest of San Angelo. The city limits of Midland are approximately 71.5 square miles.

Midland is considered to have a semi-arid climate. The average high temperature during the summer months is around 94 degrees, and the average low temperature during the winter is around 30 degrees. There are an average of 52 days of rain per year. This mild climate with few rainy days provides favorable conditions for walking and bicycling throughout much of the year in Midland. The city's terrain is generally flat and is very conducive to easy bicycle riding.

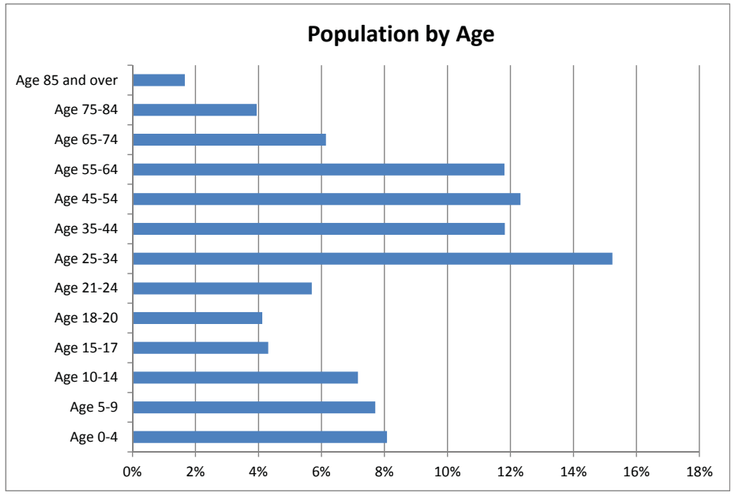
Midland's Growing Population

Midland's population growth has always been closely tied to the oil booms. The City of Midland experience a nearly 50% growth from 1970 to 1990. Then the population growth leveled off during the 1990s. However, since 2000, the population has grown again by over 30% and gained nearly 30,000 residents. According to the Midland Development Corporation, the city's estimated population for 2014 is 124,894 and the estimated population for the year 2019 is 140,523.

Midland also has a very diverse population in terms of age, with many young families with children. In fact, nearly 40% of population of Midland is between the ages 25 to 54. The availability of a well connected walking and bicycling network will appeal to these younger residents.



Source: 1970-2010 U.S. Census; 2014 Midland Development Corporation Estimated Population; 2019 Midland Development Corporation Projected Population



Source: 2014 Midland Development Corporation

Existing Trails in Midland

The majority of existing trails within the City of Midland are looped trails within parks. One signature trail is the utility corridor trail in the southwest portion of the city which extends from Thomason Drive to Lancaster Park at Godfrey Street.

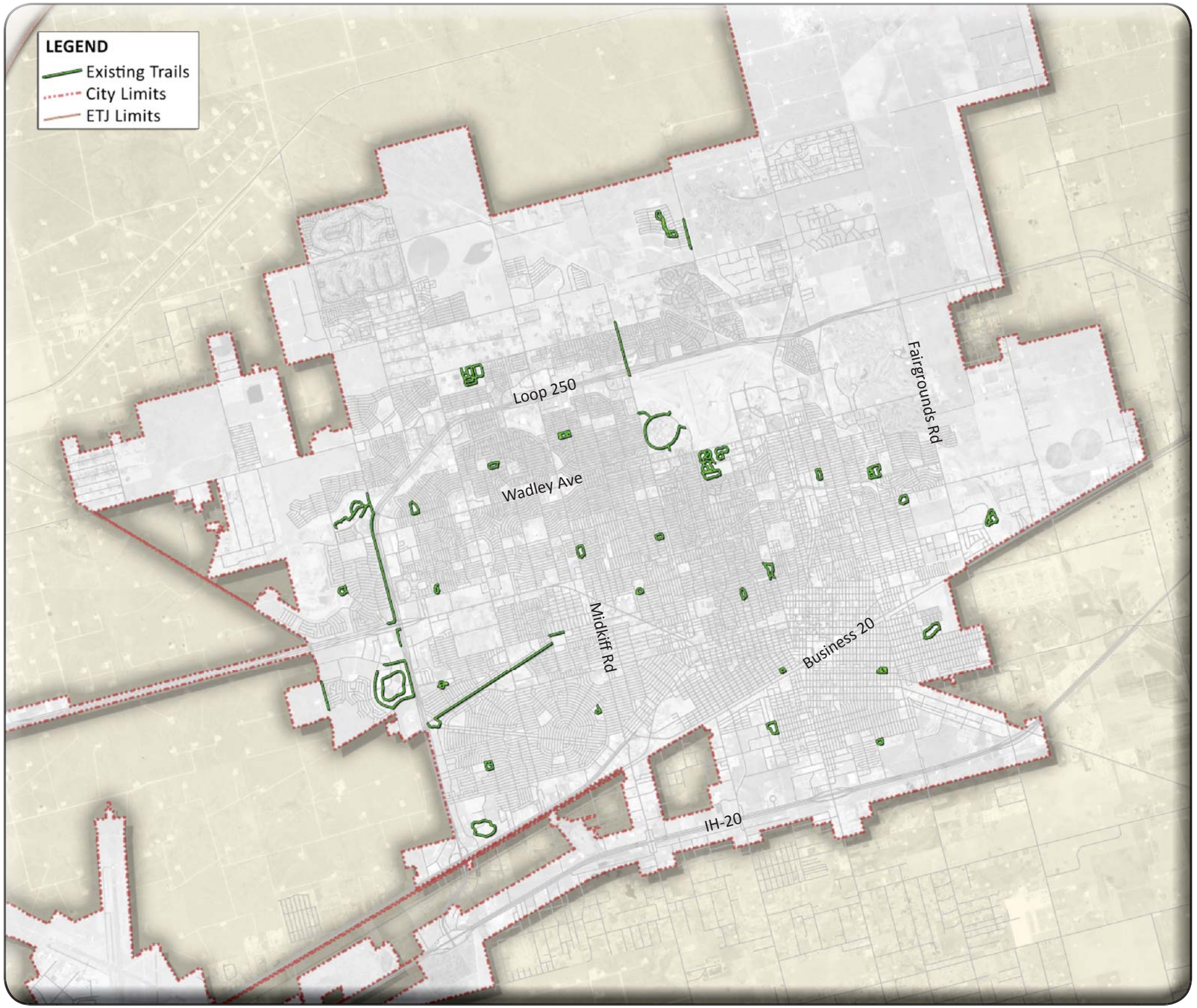
The map to the right shows the existing trails within the city. The total miles of existing trails are approximately 21 miles. That equates to approximately one mile of trail for every 5,950 residents in the city.

The city's Parks and Recreation Master Plan notes that hike and bike trails rated the number one item on the city's high priority list for recreational amenities. That master plan also recommended a target level of service for trails to be one mile for every 10,000 residents. This Hike and Bike Trails Master Plan recommends adjusting the target level of service to one mile for every 5,000 residents. This updated target level of service reflects the need within the community for a connected network of off-street and on-street pedestrian and bicycle facilities. The target level of service should be viewed as a performance goal and as a way to measure progress over previous years. It should not be viewed as the absolute final goal of the city. With this updated target level of service, the following amounts of trails would be desired as the population of Midland grows.

- Current 2014 need for 124,894 population: 25 miles (deficit of 4 miles)
- 2019 need for 140,523 population: 28 miles (deficit of 7 miles)

This master plan recommends the city construct an additional seven miles of linear trails within the next five to ten years, in addition to enhancing the on-street bicycle network.

Existing utility corridor trail



Designated Bike Routes

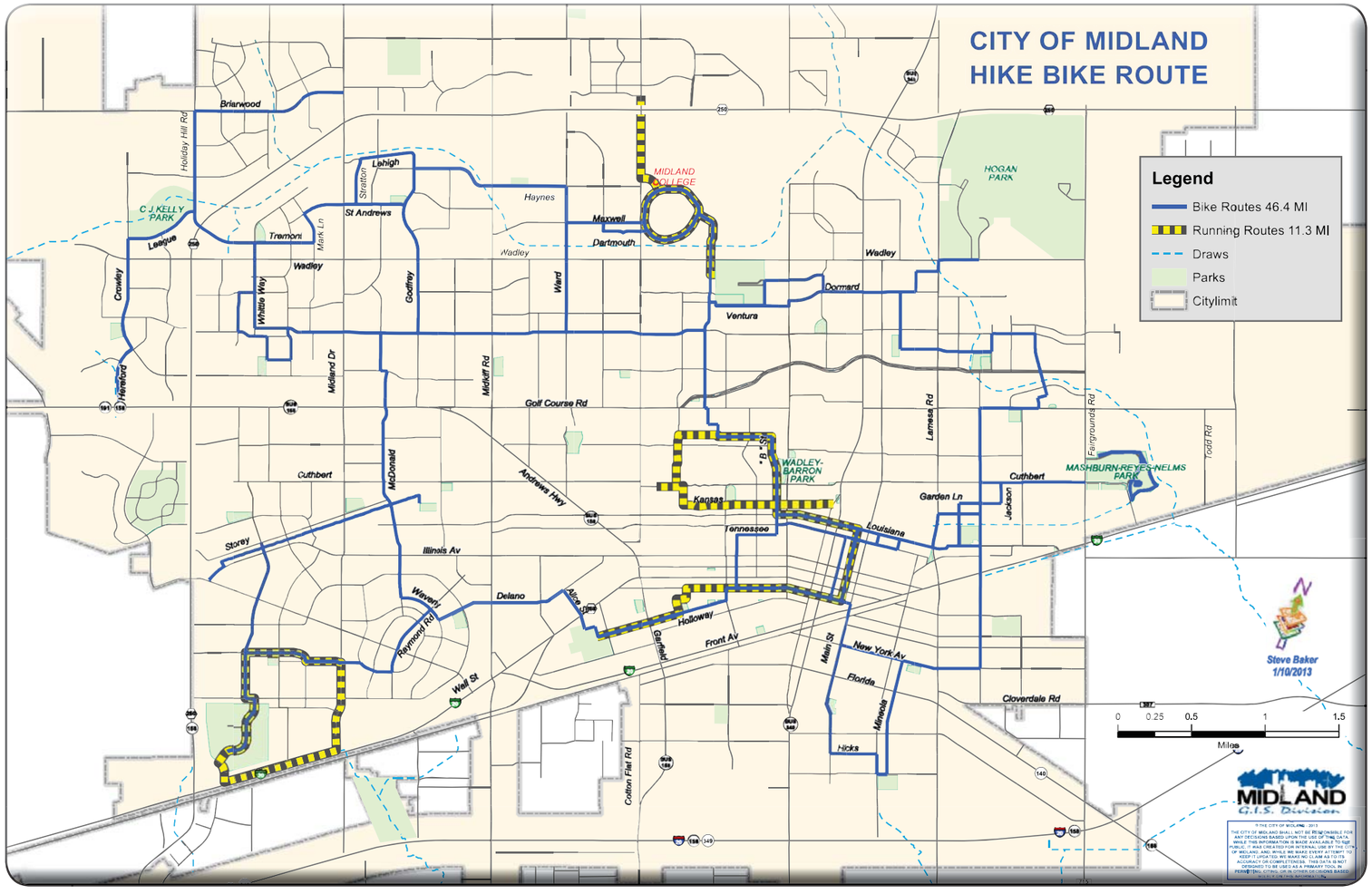
The City of Midland has designated certain streets as bike routes or running routes. Ideally these are streets that connect to key destinations such as downtown or Midland College, and are wider streets able to accommodate bicyclists and vehicles. The City of Midland has designated 46.4 miles of bike routes and 11.3 miles of running routes throughout the city.

This master plan recommends improvements to these streets to create separated on-street bicycle facilities that are safer and more bicycle friendly.

"BICYCLE FRIENDLY" MEANS

- Education and encouragement programs that teach motorists to share the road with bicyclists and bicyclists to ride with motorists.
- Evaluation and modification of roadway treatments for effectiveness in promoting bicycling.
- Evaluation and modification of roadway crossings to make them safer, especially at key intersections.
- Bicycle route signage that indicates distances to major destinations.
- Varying bicycle facilities per land use characteristics, right-of- way, traffic volume, speed and composition, on-street parking, and roadway grade.
- Design for level of experience: off-road multi-purpose trails or neighborhood streets for new/ young riders and on-road facilities for experienced riders.
- A network of bicycle facilities on designated arterial streets.
- Employee bicycle parking in a garage or other covered, safe area. Short-term bicycle parking located close to the front door.
- End-use facilities for bicyclists such as changing facilities and showers.
- Management of buildings and campuses in a style which promotes bicycling.

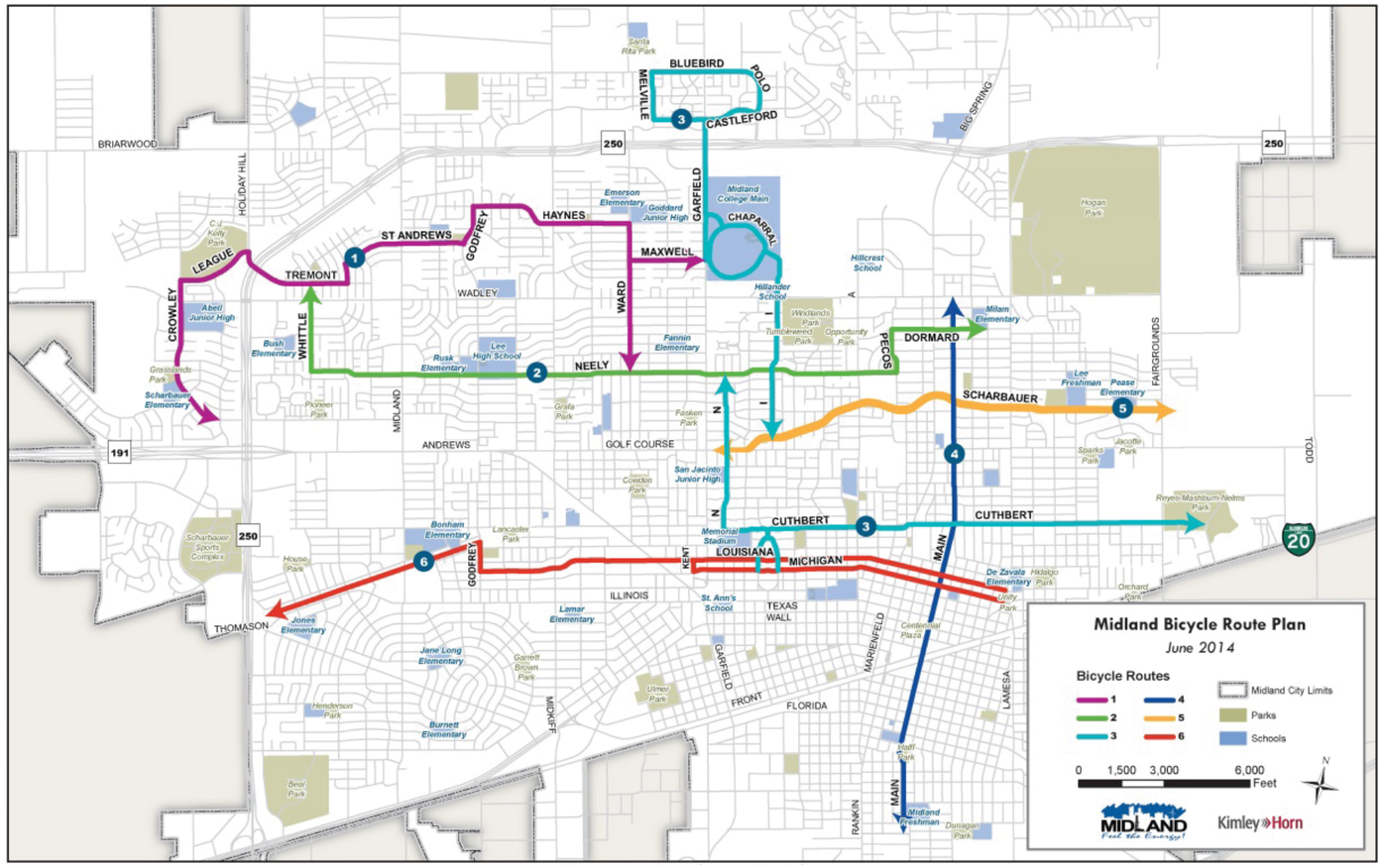
(Adapted from Mixed Use Matters, Envision Central Texas Oct. 2008, Page 18)



Designated bike routes and running routes. Image source: City of Midland

Ongoing Bicycle Planning Efforts

The City of Midland is also undergoing a citywide transportation planning effort which includes analyzing on-street bicycle routes. That planning process, being led by Kimley-Horn, further enhances the previously designated bicycle routes. These updated designated bike routes connect to major destinations such as downtown, Midland College and several parks and schools.



Ongoing bicycle planning study. Image source: City of Midland and Kimley-Horn

Key Destinations

An evaluation of where people are traveling between helps identify the key routes for trips, ultimately guiding the network of facilities and prioritization. Within Midland, typical trip destinations that are most likely to be accessed by walking or bicycling include schools, parks, downtown, libraries, Midland College, shopping centers, employment centers, and other civic buildings.

Residents of Midland played a significant role in identifying where they would like to walk and bike. Some of the key destinations identified are shown on the map on this page, as well as the travel time in minutes from those destinations when riding a bicycle or walking.

Key destinations in Midland include parks, downtown and Midland College

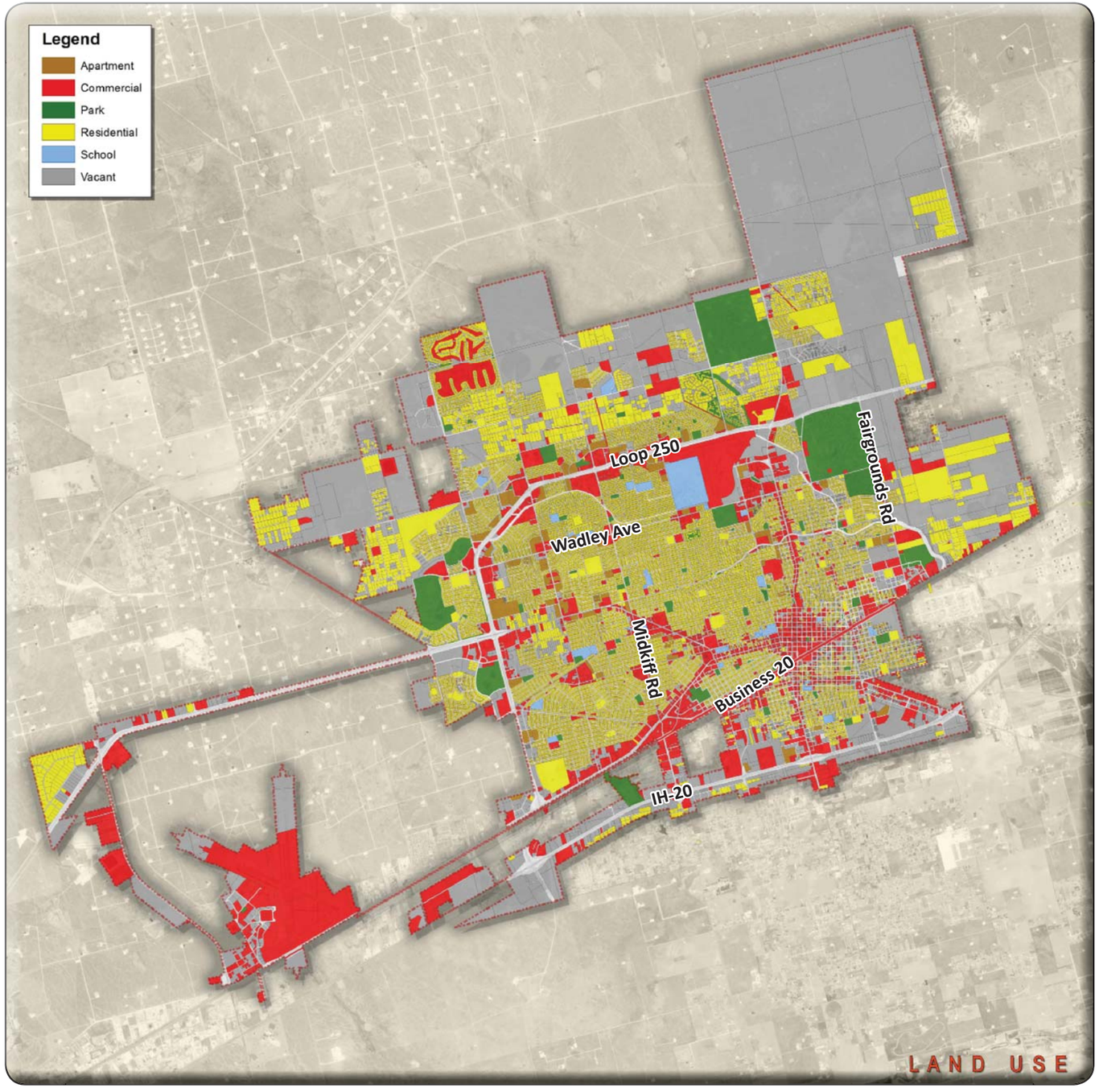
Existing Land Use and Development Patterns

Land use is a critical determinant of transportation. Not only does the transportation system make land accessible for development, but land use decisions such as type of land use and density can influence travel behaviors, and therefore the design of the transportation system.

Likewise, the pattern of development will influence travel patterns. The more land uses are separated - either by distance or by discontinuity of the transportation network, the more a person must be dependent on a vehicle to get from one place to another. On the other hand, land uses that are brought closer together and connected will enable walking and bicycling.

Midland is predominantly residential, with a mix of low-density, single-family housing and multi-family apartments. Commercial areas with retail and offices exist along the major arterials within the city. The areas on the north side of the city are largely still undeveloped. Outside of the city limits, large portions of land are industrial or have active oil and gas wells on them.

In order to realize the vision of the city being accessible by walking and bicycling, Midland needs to support the goals of improved transit options to reduce congestion, a healthy and active lifestyle for citizens, and an environmentally responsible community.



Chapter Three

Design Standards

Introduction to Standards

Hike and bike trails appeal to everyone. Whether young or old, active or wanting no more than a few minutes out in a beautiful area, all of us can find something to do on a trail. This plan recommends a variety of facility types in all areas of Midland so that everyone can easily access and use a trail or bicycle facility that appeals to them. This section lays the foundation for facility types to be built in Midland so that a clear picture of what the entire system will be like in the future can be created.

Trails and bicycle facilities proposed for Midland encompass several key types of facilities, each with its own size and character requirements. The proposed trail and bicycle network will link community destinations with an integrated network of facilities designed for users of all ages, skill levels and environments. To ensure that the overall system is consistent as it is developed over a number of years, this section provides general standards and guidelines for each major type of facility. These include:

- Facilities that can be used by both pedestrians and bicyclists such as trails and sidepaths.
- On-street facilities to be used by bicyclists such as bike lanes, buffered bike lanes, and cycle tracks.

When applying any of these standards or the recommendations of this plan, it should be noted that they are rudimentary in nature. More detailed design to adapt them to specific site conditions is needed prior to actual implementation.

They are intended to quickly help Midland staff and citizens evaluate where proposed locations for on- or off-street facilities are viable and worth considering. They also ensure continuity throughout the system, so that users know what to anticipate no matter where they go in the city.

Basis for Standards

Guidance in the placement and development of standards shown in this section comes from the 2012 Guide for the Development of Bicycle Facilities published by the American Association of State Highway and Transportation Officials (AASHTO), and from the 2011 Urban Bikeway Design Guide published by the National Association of City Transportation Officials (NACTO). In the future, Midland should follow any updates that are made to these standards. These standards have been developed and refined over a significant period of time and offer the most comprehensive safety standards. Where feasible, though, those standards should be exceeded. This is especially true for trails, signage, lighting, and traffic signals and detectors. In some specific cases, variations from AASHTO may be acceptable to respect the character or special conditions of an area. In those cases, appropriate engineering expertise is required to ensure that the best facility possible is being implemented.

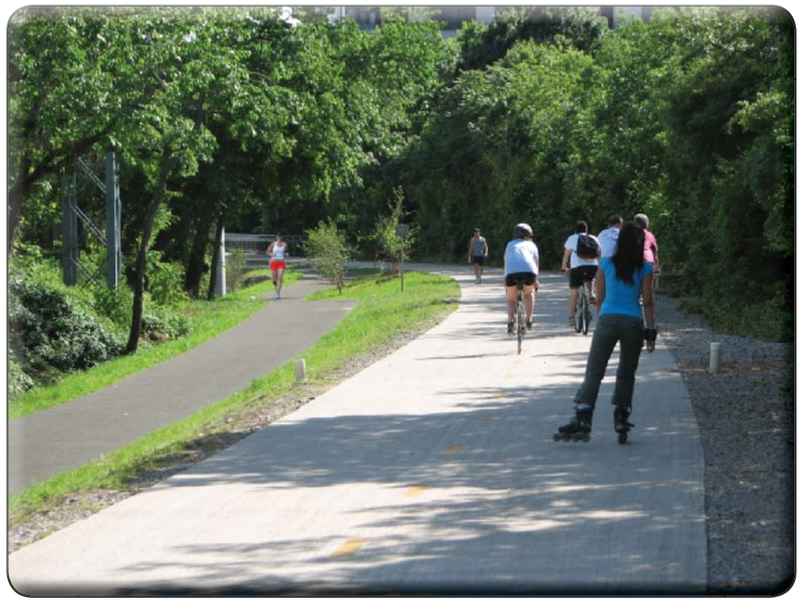
All off-street facilities and areas recommended in this plan that may be used by pedestrians are required to meet accessibility requirements put forth by the Texas Department of Licensing and Regulation (TDLR).

To facilitate the future development of Midland, it is recommended to develop customized design standards in written and graphic format and make these accessible to all applicable builders and developers. The illustrations that follow indicate typical preferred trail and bicycle facility section characteristics and clearances.

Multi-Use Trails/Shared Use Paths

These regional trails are intended to provide access from one part of the city to another. In essence, these trails become the "spine" system for the city, providing an easy route to travel longer distances. This connectivity typically makes them a high priority. Additionally, because they provide connectivity, multiple types of users are expected.

To accommodate the large volume and multiple users expected, multi-use trails are typically designed to accommodate two-way bicycle and pedestrian traffic, have their own right-of-way, and can accommodate maintenance and emergency vehicles. These trails are recommended to be at least 10' in width, but in some cases may be up to 12' in width where a significant volume of users is anticipated. These trails should be constructed using concrete or asphalt, but can also be a surface that provides a smooth surface, as long as it meets ADA requirements. To serve the multiple types of users, a popular option is to provide a soft-surface running trail along one side of the concrete trail (see picture below as an example of the Katy Trail in Dallas).



Access points to the trail should be located every 1/4 to 1/2 mile along the trail. Other facilities offered at or along a multi-use trail include parking, locator maps, water fountains, shade shelters, bicycle racks, and interpretive/historic signage. While vegetation is encouraged to enhance the trail experience, complete blocking out of the trail by vegetation from neighborhood view is discouraged. This results in a "tunnel" effect on the trail, creating the impression of decreased safety.

Placement - Multi-use trails should be placed a minimum of five feet (5') from adjacent obstructions. A minimum shoulder or clear area of two feet (2') is required.

Width - Because multi-use trails are intended to be used by bicycle riders and pedestrians as two way facilities, a minimum width of 10' is recommended. In constrained locations or along routes where a low volume of bicycle traffic and few pedestrians are anticipated, a width of 8' can be used for short distances, but is generally not preferred.

Vertical Clearance - A clear zone of at least 10' is preferred. In limited conditions, an absolute minimum distance of 8' may be considered for short distances, but should be clearly marked so it can be seen at night.

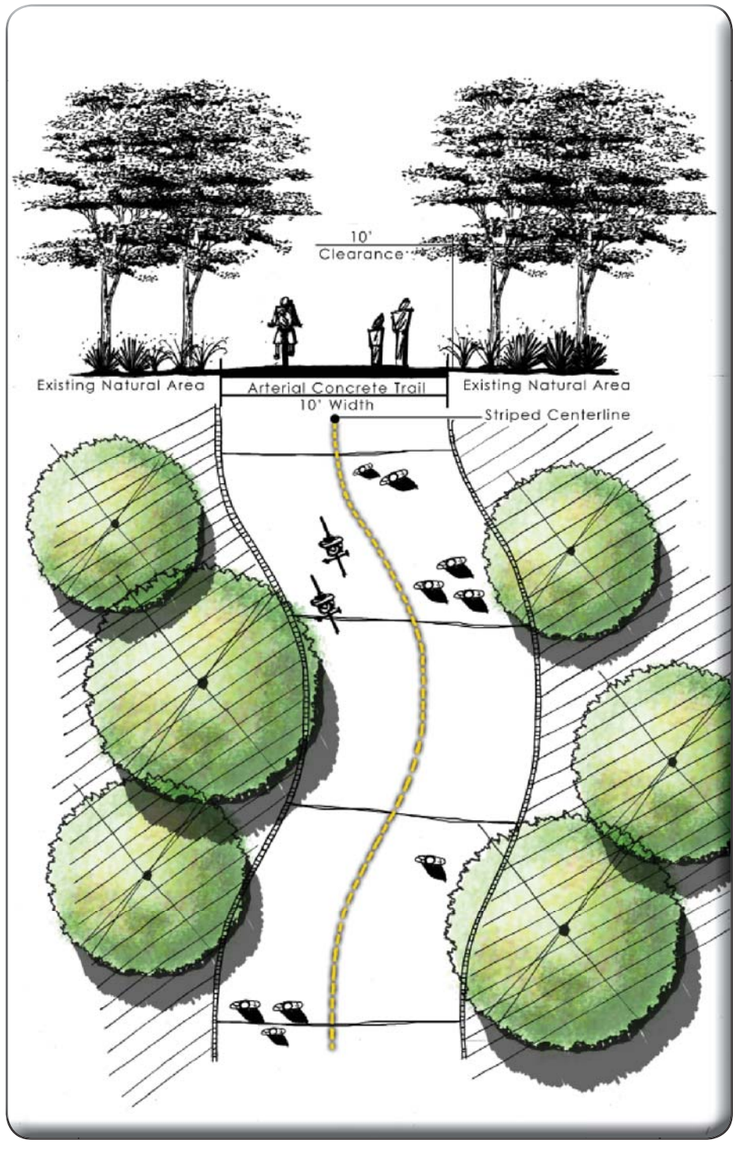
Curvature - Curves in the trail should be gentle and should follow minimums established for the design speed. Guidance for the design of horizontal and vertical curves provided in the 2012 AASHTO Guideline should be followed. These vary based on the design speed and gradient of the facility. Typically, in Midland most multi-use trails will be straight or have minimum curvature because of corridor width restrictions.

Corridor Width - The overall corridor width should be at least 20' wide to allow for a minimum of 5' of clearance between adjacent features and either side of the multi-use trail. The edge of the multi-use trail should be at least 2' away from adjacent trees or landscaping.

Pavement Thickness - Multi-use trails should have a minimum pavement thickness of 4" and should be reinforced with steel rebar. The exact design should conform to Midland design standards and consider the soil type and usage characteristics. In areas where uplifting by tree roots is anticipated, a thicker pavement depth of 6" or greater, root barriers and additional steel reinforcing are recommended to increase the durability of the trail. Where maintenance vehicles are anticipated to drive on the trail, thicker pavement and/or deeper edge footings should be considered.

Pavement Type - Concrete is preferred for its long term durability, and a well designed and built trail may last for decades. However, runners and many bicycle riders prefer the smoothness and slightly higher level of "give" of asphalt. Asphalt may be somewhat less expensive initially, but deteriorates over time. If asphalt is used instead of concrete, periodic resurfacing and repair will be required.

Decomposed granite may be considered in some instances, particularly within parks to provide an alternative surface type which is softer and preferred by runners. However, decomposed granite will require more frequent maintenance than concrete and asphalt surfaces.



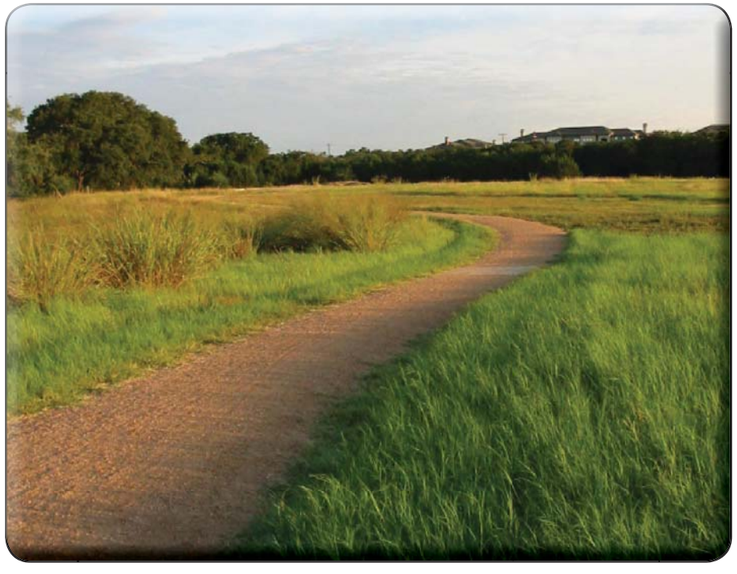
Schematic of a typical multi-use trail

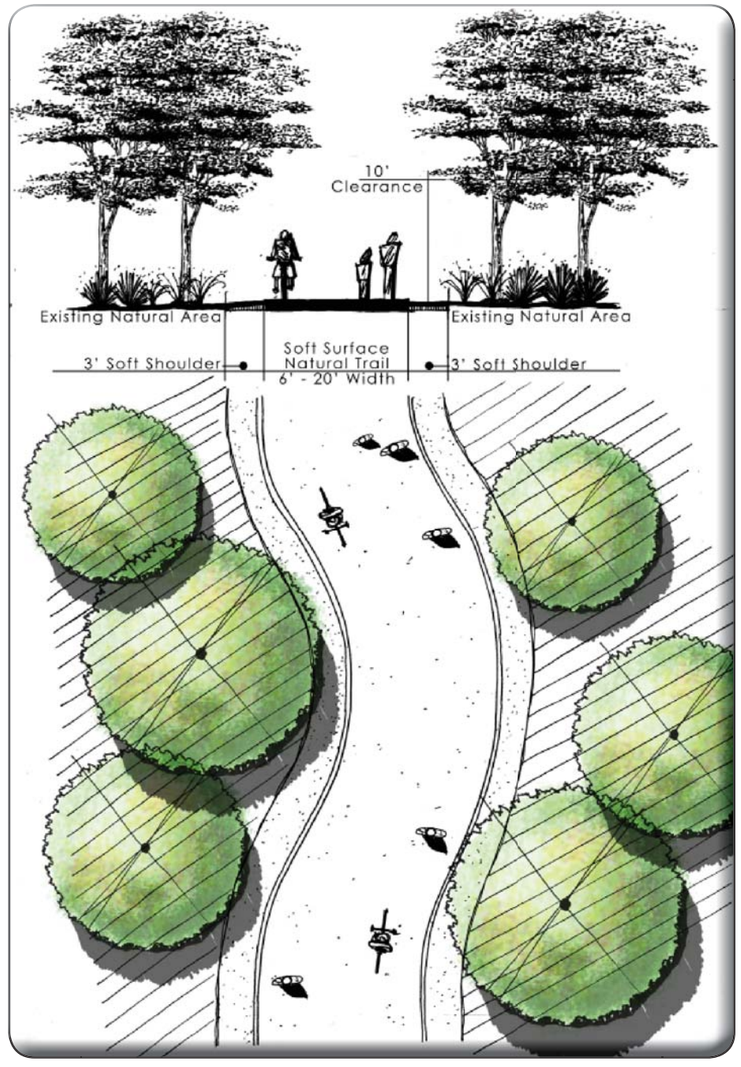
Multi-Use Trails at Intersections and Driveways - Each crossing should be carefully designed for safety. Crossings at intersections are preferred verses mid-block crossings. Where mid-block crossings are necessary, push button activated signals, flashing beacons or a High-Intensity Activated Crosswalk Beacon (known as a HAWK signal) should be included. Reductions in the amount of landscaping or trees at intersections to increase the visibility of the trail users may also be required.

Nature Trails

Natural trails are located mainly in rural or natural resources areas where the natural environment can be emphasized. The surface is typically a compacted earth surface or decomposed granite with obstructions such as roots, rocks, and understory vegetation cleared from the walking pathway. They should be at least 6' to 10' in width but in some cases may be 12' to 15' to allow for greater visibility within the understory. An additional 2' to 4' shoulder zone is desired on either side. Bridges and drainage crossings should be constructed using metal bridge structures, but with a rustic natural appearance if possible.

Potential natural corridors exist along the drainage corridors and draws in Midland. In some cases, these corridors may incorporate walking trails, but with only minimal improvements to address street crossings. Like natural corridor trails, trail surfaces should create an atmosphere that is compatible with the natural beauty of the corridor and that results in a very pleasant trail environment.





Schematic of a typical nature trail

Sidepaths

Often times the best trail corridors are adjacent to major collector or boulevard streets. Unlike sidewalks, these sidepaths are intended for use by both pedestrians and bicyclists and are wider, a minimum width of 8’ to 12’ is preferred. A surface of concrete is preferred for durability; however, crushed granite can also be used. Amenities are important to enhance the pedestrian environment along auto-centric streets. Amenities can include decorative light fixtures, landscaping and ground cover, and varying surface treatments at intersections and crosswalks. The overall parkway width should be at least 15’ to 20’, to allow for at least 5’ of clearance between the street curb and the walkway and another 4’ +/- between the walkway and the adjacent property line. In many cases additional width may be required to accommodate drainage or other utilities. The picture below shows a sidepath along a roadway. Sidepaths typically include landscaping that beautifies the road corridor such as a row of large, mature trees in this case. Access to the sidepaths should be adjacent to major arterials and collector streets as well as parks.

The most suitable type of street for a sidepath typically has very few driveways or side street intersections. Sidepaths are preferred by many Midland residents who desire bicycle facilities that are physically separated from motor vehicle traffic. These facilities are seen as a more comfortable place to ride instead of streets with high traffic volumes and speeds.

Sidepaths require special design considerations. Bicycle movements at intersections or driveways where motor vehicles are turning can be a concern since drivers may not anticipate bicyclists coming from either direction. Significant attention should be paid to the design of sidepath crossings of driveways, roadways or intersections. Special design features such as placing a pedestrian/rider stop sign along the sidepath at an intersection may be required. Recommended standards for sidepaths include the following:

Placement - Sidepaths should generally be placed a minimum of 5’ from the adjacent back of curb. Where feasible, a greater separation approaching 8’ to 10’ is preferred to provide an area for planting street trees. The edge of the sidepath should be at least 2’ away from adjacent trees or landscaping. A minimum of 2’ between the sidepath and the property line is recommended.

Width - Because sidepaths are intended to be used by bicycle riders and pedestrians as two-way facilities, a width of 10’ is preferred. In constrained locations or along routes where a low volume of bicycle traffic and few pedestrians are anticipated, a width of 8’ can be used for shorter distances but is generally not preferred. In areas where a higher amount of both pedestrians and bicyclists are anticipated, a width of 12’ should be considered.

Vertical Clearance - A vertical clear zone of 10’ is preferred. In limited conditions, an absolute minimum distance of 8’ may be considered for short distances, but should be clearly marked so it can be seen at night.

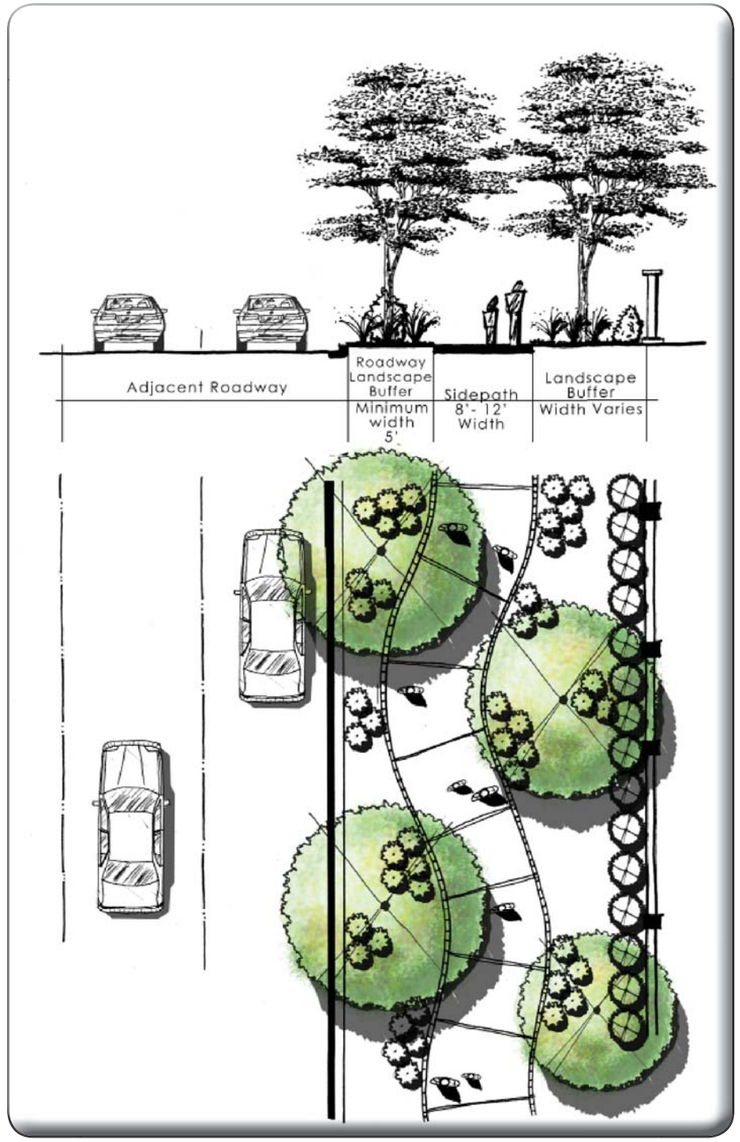
Curvature - Curves in the sidepath should be gentle and should follow minimums established for the design speed. Guidance for the design of horizontal and vertical curves provided in the 2012 AASHTO Guideline should be followed. These vary based on the design speed and gradient of the facility. Typically in Midland, most sidepaths will be straight or have minimum curvature because of corridor width restrictions.

Corridor Width - The overall corridor width should be at least 18’ to 20’ wide to allow for a minimum of 5’ of clearance between the street curb and the sidepath, and a minimum of 2’ to 4’ between the facility and fences, walls, or landscaping along the adjacent property line.

Pavement Type and Thickness - The design of sidepaths is similar to that of sidewalks. The concrete should be reinforced with steel rebar and should have perpendicular jointing to control cracking. In areas where uplifting by tree roots is anticipated, a thicker pavement depth of 6” or greater, root barriers and additional steel or mesh reinforcement are recommended to increase the durability of the sidepath.

Sidepaths at Intersections and Driveways - Intersections and driveways create conflict points between sidepath users and vehicles. As a separated facility, sidepaths can create a false sense of security, and pedestrians and bicyclists must be cautious when arriving at an intersection or crossing a driveway. Turning drivers may not see or expect the bicycle rider. At intersections, bicycle riders are expected to stop and check for vehicles that have the right of way (just as pedestrians do) but do not always do this. Therefore, each crossing of a roadway or driveway by a sidepath should be carefully designed and should include the current best practices for sidepaths.

The design should clearly indicate that both pedestrians and bicyclists should stop at the intersection and proceed only when clear. Treatments may include some of these techniques to alert users of an upcoming intersection, and to alert motor vehicles that bicyclists may be traveling through the intersection or across a driveway:



Schematic of a typical sidepath

- Deviation of the sidepath or other devices near an intersection to stop the user at the intersection
- Signage and paint to alert the user to stop and look
- Painted crossing areas, such as colored crosswalks
- Additional signage to alert motorists to the presence of crossing pedestrians and bicyclists
- Moving the vehicular stop bar location farther back from the intersection to allow for wider crossing areas
- Reduction or removal of landscaping or trees near intersections to increase the visibility of users
- At high volume intersections, give pedestrians and bicyclists their own crossing signal cycles separate from vehicles, or at a minimum a ten second leading pedestrian interval before the vehicular lights turn green
- The prohibition of right turn on red at these high volume intersections

Sidewalks

Sidewalks provide walking connections from neighborhoods to area destinations such as parks, schools and businesses. Sidewalks are intended for pedestrians and generally are not appropriate facilities for bicycle use, since pedestrians and bicyclists travel at different speeds and sidewalks are often too narrow to accommodate both users. The exception to this may be around schools where sidewalks are the only off-street option that is available for children.

The goal for any sidewalk in Midland should be to create as inviting a location as possible for walking. Sidewalks should provide a space where people want to walk and make logical connections to and from destinations. Planners and designers should ask how can we make this location be as attractive and accessible as possible for walking. Human comfort is important to the success of facilities and can be enhanced with provisions such as lighting, shade, greater separation from vehicular traffic, and attractive landscaping. Recommended standards for sidewalks are as follows:

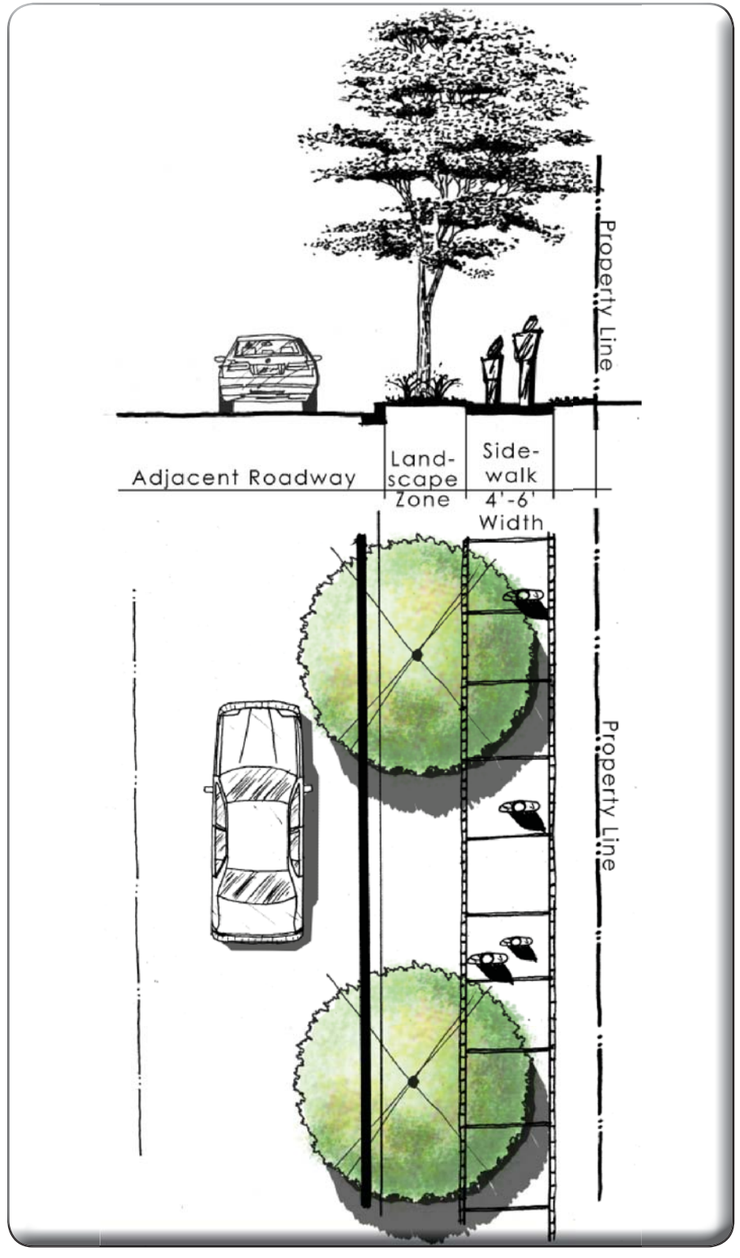
Placement - Sidewalks should always be placed a minimum of 4’ from the adjacent back of curb on suburban/neighborhood streets. Where feasible, an even greater separation approaching 8’ to 10’ is preferred to provide a protective buffer from adjacent vehicular traffic on the street. Sidewalks that abut the curb are only appropriate in urban areas such as downtown where adjacent vehicular speeds are lower and amenities for human comfort are provided.

Width - Along major streets in Midland and along neighborhood streets that provide a direct connection to a school, park or access point to a trail, the recommended minimum width of sidewalks is 6’. The 6’ width allows two adults to comfortably walk side-by-side. Within residential neighborhoods where less frequent walking or lower concentrations of pedestrian activity is anticipated, 5’ sidewalks can be used.

Vertical Clearance - A clear zone of at least 10’ between the ground level of the sidewalk and any overhead branches or other obstructions is recommended.

Pavement Type and Thickness - Sidewalks in Midland should continue to be built with concrete. The concrete should be reinforced with steel rebar. In new installations or areas where uplifting by tree roots is possible, a thicker pavement depth of 6” is recommended to increase the durability of the sidewalk. Root barriers are also recommended where new trees are planted adjacent to sidewalks.

Width of Replacement Walks - When replacing existing sidewalk segments, the new recommended sidewalk width of 6’ along major streets and 5’ for local streets should be used, except for areas without a clear stopping and starting point such as driveways or an intersection. While this may cause sections of variable sidewalk widths, it will ultimately result in a better system.



Schematic of a typical sidewalk

Bike Lanes

On-street bicycle facilities are designed for bicycles to operate like vehicles on the street. Bicyclists turn left and right in a manner similar to vehicles, and generally travel in the same direction as vehicles. On-street bicycle lanes can be implemented quickly and at a relatively low cost. While cyclists may bike on streets without any improvements, a number of treatments will increase safety and comfort of on-street biking for both cars and bicyclists. This section includes on-street treatments such as bike lanes, buffered bike lanes, and cycle tracks.

Bicycle lanes are designated by a lane stripe, pavement markings, and signage. Bicycle lane stripes are intended to promote the orderly flow of traffic by establishing specific lines of demarcation between areas reserved for bicycles and lanes to be occupied by motor vehicles. Typically, the solid stripe of the bike lane is either dropped or dashed prior to and through intersections, to allow for both bicyclist and motorist turning movements.

Bicycle Lane Widths - A bicycle lane width of 5’ is considered a minimum, and 6’ wide where feasible is preferred. The lane should be measured from the center of the bicycle lane stripe to the adjacent curb facing. Where slower vehicular speeds and no gutter occurs, a width of 4’ can be considered, but only for highly constrained areas and where no gutter drains or other obstacles occur. In Midland, a 4’ wide bicycle lane should rarely, if ever, be used.

The overall pavement width should continue to allow for a minimum 10’ wide motor vehicle lane width along roads with slower speeds and lower volumes of traffic (typically 30 mph or lower), and 11’ wide or more motor vehicle travel lanes on roadways with higher speeds. Along streets with parallel parking where a bicycle lane will be installed adjacent to on-street parking, a wider width of 6’ to 7’ should be considered to provide a greater buffer area where vehicle doors may open. The preferred configuration is a 7’ wide parking area and a 6’ wide bicycle lane.

Vertical Clearance - A clear zone of at least 10’ is required.

Bicycle Lane Striping - Bike lane striping should be 4” wide. For greater visibility on shaded streets, a pavement striping width of 6” should be considered. Bike lane symbol markings should be included, and spacing can vary from 100 linear feet in areas with significant driveway activity, to 250 to 400 linear feet in areas with longer distances between intersections or driveways.

Drainage Inlets and Utility Covers - Inlet grates with slots that are designed to be used by bicycles should be included on all roads in Midland in the future. Utility cover designs with grooves or stamped patterns that provide less slippery surfaces for bicycles should also be selected.

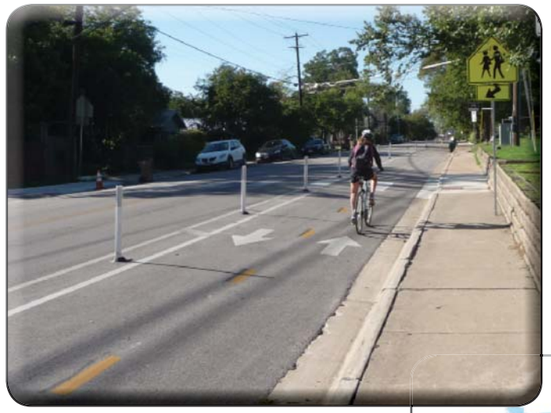
Schematic of a typical bike lane

Buffered Bike Lanes

A buffered bicycle lane, sometimes called a comfort lane, is defined as a bicycle lane that is paired with a designated buffer space separating the bicycle lane from the adjacent motor vehicle lane and/or parking lane (NACTO Guide 2011). The buffer typically consists of a double line zone with diagonal striping or chevrons.

Buffered Bicycle Lane Width - Along streets where the buffered bicycle lane is being added and is not replacing a travel lane, the buffer zone should be a minimum 2’ in width. A width of 3’ is the preferred width. The bicycle lane area should be a minimum of 5’ in width, but should not exceed 7’ wide. In instances where the buffered bicycle lane is replacing an existing travel lane, the buffer zone should be 5’ to 6’ in width, and the bicycle lane area should be 6’ to 7’ in width. The remaining vehicular lane can be increased in width, but this is not preferred since it may give motorists the perception that they can drive faster. Typically, the remaining vehicular lane(s) will be a comfortable 11’ to 12’ in width without the need for any additional widening.

Cycle Tracks



A cycle track is a bicycle lane that is physically separated from traffic with a row of parked cars, a raised curb, planters or some other physical separation. In addition, a cycle track is intended for use only by bicycles, and is separated from any adjacent sidewalks or trails intended for use by pedestrians.

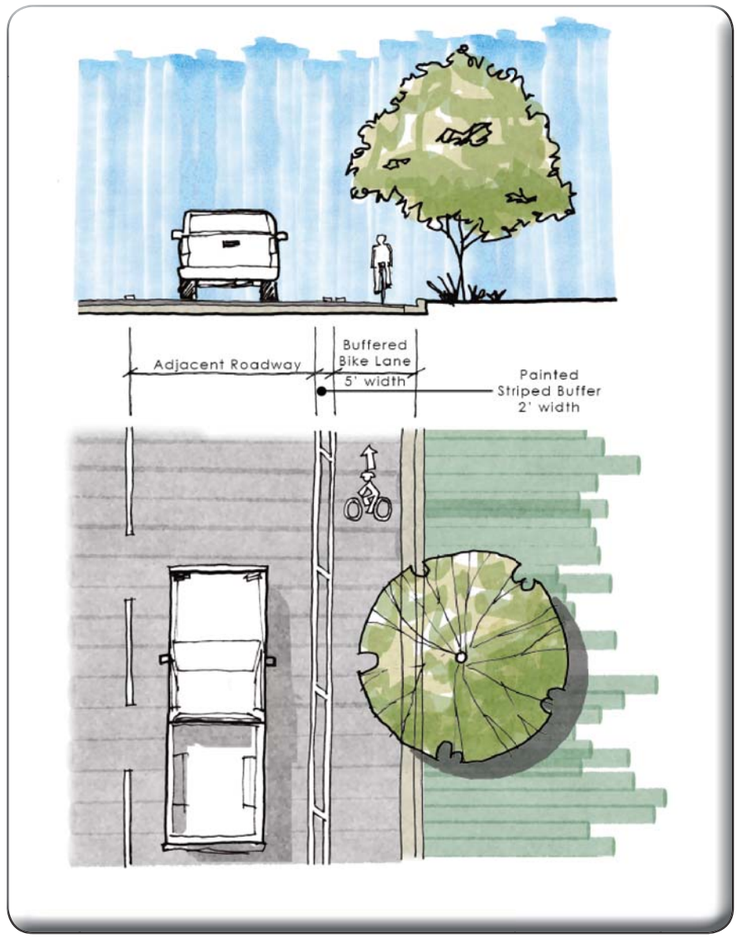
Buffered bicycle lanes are similar to a cycle track, except that, in the case of a cycle track, the painted buffer zone striping is replaced with a physical barrier. A cycle track can also accommodate two-way bicycle traffic. Cycle tracks provide a completely separate facility for bicycles, and they can be comfortably used by riders of all skill levels.

Three general methods of implementing cycle tracks exist. One is very similar to the buffered bicycle lane discussed previously but provides added protection with a physical barrier between bicycles and adjacent motorized traffic. Any street in Midland designated as a location for a buffered bicycle lane could ultimately be retrofitted as a cycle track in the future if deemed appropriate. They are particularly useful and desirable for roads with high volume traffic. The second type of cycle track requires the construction of a separate bicycle-only "track" in the parkway area. This provides a location for bicyclists and requires a separate sidewalk for pedestrians. The third type involves physically widening the street to essentially provide an area for the cycle track.

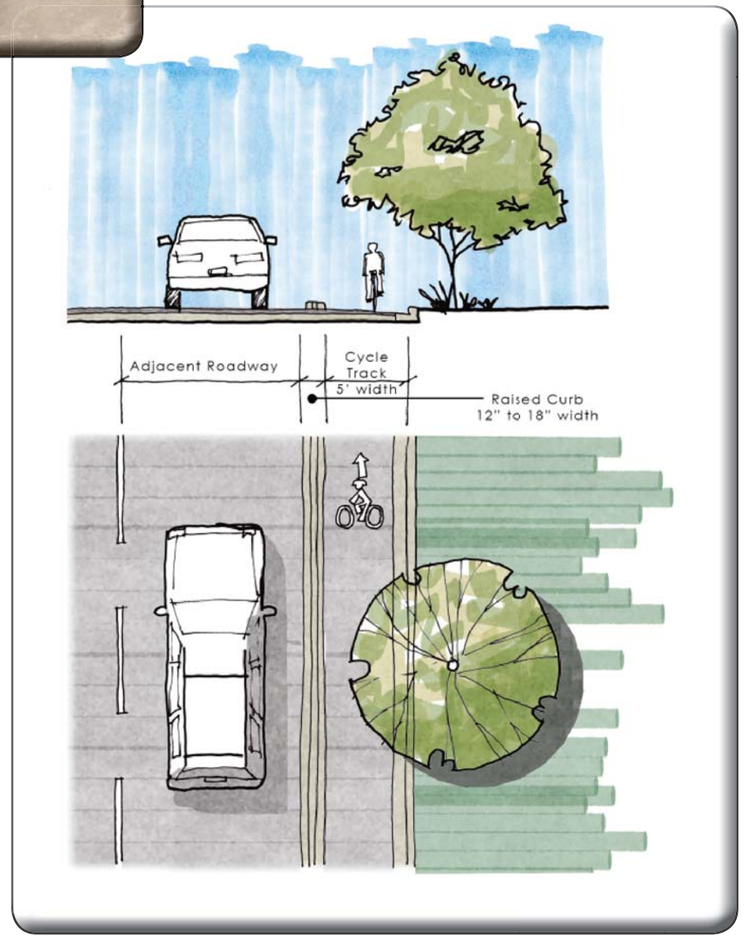
Standards for Cycle Tracks - One way cycle tracks should be a minimum of 5' in width, with a 6' wide travel lane preferred. For a two-way configuration, a minimum width of 8' is allowed, but a 10' to 12' width is preferred.

Preferred Type of Barrier - A raised concrete curb with a 12" to 18" width is the preferred barrier technique. In retrofit locations, the curb area may be doweled into the existing pavement. Street drainage needs should be considered when installing a cycle track, with periodic gaps or slots provided for local drainage.

Pavement Markings and Signage - Pavement markings and signs should follow the type and frequency recommended by AASHTO for use in bicycle lanes and buffered lanes. All signs should follow the standards set by the Manual on Uniform Traffic Control Devices (MUTCD).



Schematic of a typical buffered bike lane



Schematic of a typical cycle track

Other Types of Bicycle Facilities

The following is a summary of other types of bicycle facilities. While these facilities are not currently recommended for streets in Midland, they are available for use by the city in the future.

Bicycle Boulevard - These are streets where preference is given to bicyclists over cars. These streets are designed to effectively divert motorized traffic. Design elements could include diverters, reconfiguration of stop signs to favor the bicycle boulevard, traffic calming devices, shared lane markings, and crossing improvements at high traffic intersections. Motorized vehicle traffic still has access to the residences or businesses, but traffic control devices are used to control vehicle traffic speeds and access while supporting thru bicycle traffic.

Bikeway - This is a road or path way that is specifically designated for the exclusive use of bicycles. It does not necessarily have to be within the roadway.

Bicycle/Bus/Taxi Shared Lane - A travel lane that is restricted to the use of bicycles, buses, and/or taxis.

Climbing Bicycle Lane - A climbing bicycle lane is marked on one side of the road and benefits cyclists going up steep hills at slower speeds.

Wide Shoulder - A shoulder is a continuous portion of the roadway which can accommodate stopped vehicles, emergency vehicles and bicyclists. A shoulder can accommodate bicyclists if it is adequate in width and pavement surface as well as has few crossings or driveways. Texas legal code allows continuous use of the shoulder by bicycles, emergency vehicles, and maintenance crews.

A shoulder area should be at least 4’ in width along roadways with speeds under 45 miles per hour. Along roadways with speeds at or over 45 miles per hour, streets with high volumes of traffic, or streets with significant truck or bus traffic, a wider shoulder width of 6’ to 8’ is preferred.

Wide Curb Lane - These are the right-most thru traffic lanes that are greater than 14’ wide, measured from the lane stripe to the edge of the gutter pan. These lanes are used by both bicyclists and motorized vehicle traffic; however, they do not always have pavement markings. Typically, only more experienced riders will use this type of facility.

Shared Lane - Shared lanes are the right-most thru traffic lanes that are 14’ wide or less, measured from the lane stripe to the edge of the gutter pan. The lanes are used by both bicyclists and motorized vehicle traffic, and have pavement markings which indicate it is a shared lane. For motor vehicle operators, the marking indicates that a bicycle may be present. For the bicyclist, the shared lane marking indicates where on the road the bicyclist generally should travel (AASHTO 2012).

Other Types of Specialized Trails

The following types of specialized trails may also be provided in Midland as opportunities become available.

Mountain Biking Trails - Mountain biking trails are made of crushed rock or a more natural surface. Users of these trails prefer a more challenging terrain such as steep slopes and hills. Two mountain biking trails are currently being proposed in Midland. The first one is located east of Hwy 158 across from the Scharbauer Sports Complex. The second one is adjacent to CJ Kelly Park within the drainage area.

Equestrian Trails - Locations to ride horses are rare so close to cities and offer an opportunity for a unique recreational venue in Midland. Equestrian trails require additional clearance, and parking for trailers is required at the trailhead. A close permanent stabling operation could greatly increase the use of these trails.

Paddling Trails - Although opportunities are rare in Midland, paddling trails allow access to water features in a community. Canoes or kayaks could be an amenity for these paddling trails, and marker poles with information could be added to create interest. Boat launches will be necessary for paddling trails.

Tools for Installing/Improving Bicycle Facilities

In conjunction with installing bicycle facilities, road diets and lane diets are two techniques that can be utilized to install and/or improve bicycle facilities.

Road Diets

A road diet is a type of roadway conversion project where vehicle travel lanes are repurposed, and a portion of the roadway is converted for use as a bicycle lane. It is applied where there is excess road capacity but still preserves the level of service for cars. According to the Road Diet Handbook: Setting Trends for Livable Streets, "the resulting benefits [of a road diet] can include reduced vehicle speeds; improved mobility and access; reduced collisions and injuries; and improved livability and quality of life".[1]

Potential road diet conversion projects are evaluated on a case-by-case basis. Literature and case study research has established guidelines for selecting road diet conversion projects. These factors include the following:

- Streets with an average daily volume at or below 10,000 trips per day were considered as potential candidates for a road diet from four to two vehicular lanes.
- Where high peak hour volumes are anticipated, such as around schools or at signals, the impact of the lane reduction should be considered, and other treatments in that area may be preferred.

The typical application of a road diet in Midland occurs where a four-lane road is converted to one twelve-foot wide vehicle lane in each direction plus a buffered bike lane in each direction. The image to the right illustrates the application of a road diet.

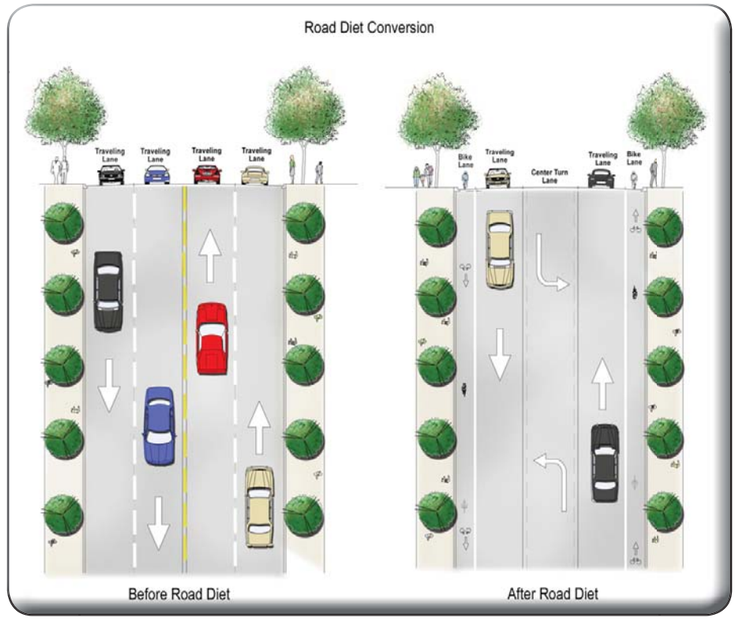
Lane Diets

Lane diets occur through the narrowing of existing lanes to provide sufficient pavement width to install bicycle lanes. Lane diets do not reduce the number of vehicle lanes and do not have an impact on vehicle level of service. Vehicle lanes should generally not be reduced to a width less than 10'.

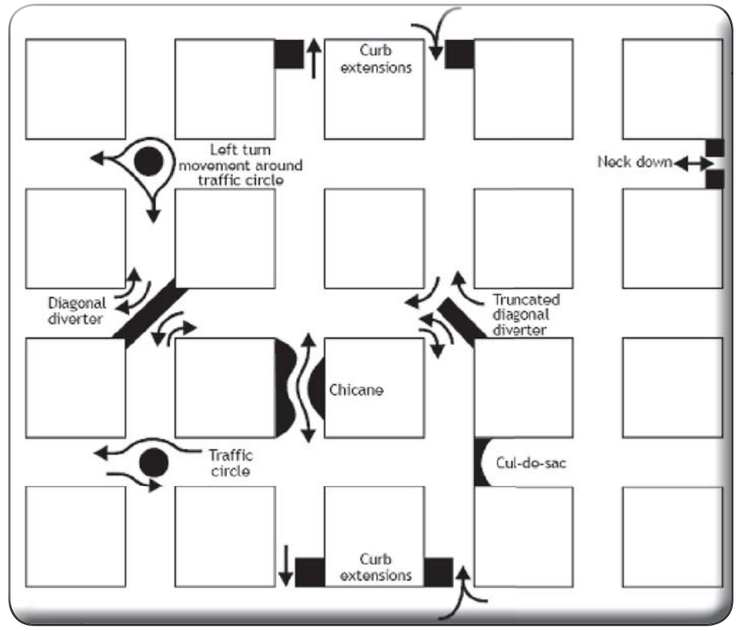
Design Tools for Pedestrian and Bicycle Friendly Neighborhood Streets

Many neighborhood streets can be great places to walk or ride a bicycle, and small improvements can help make these streets even more pedestrian and bike friendly. Most neighborhood streets in Midland have low traffic volumes and speeds at or under 30 miles per hour. As such, many should be excellent places to walk or ride under existing conditions. However, because many of these streets have a wide street pavement width with no markings, the actual speeds driven on some of these streets can exceed the 30 miles per hour limit.

1 *Jennifer Rosales, Road Diet Handbook: Setting Trends for Livable Cities (Parsons Brinckerhoff, 2009).*



Schematic illustration of a road diet



FHWA illustration of traffic calming devices. Source: FHWA, 2006, p. 325

Even cars travelling at 30 miles per hour can be daunting for less experienced bicycle riders traveling on the same street.

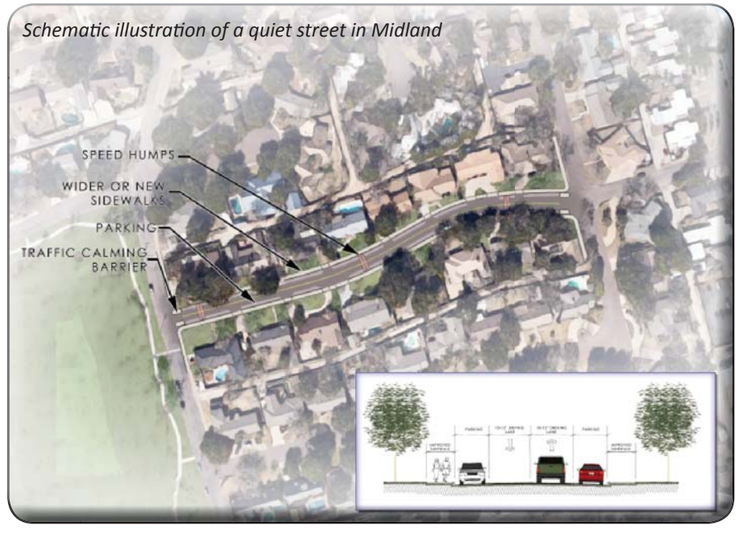
While this master plan did not identify specific locations where these techniques are needed, the city should consider their use if specific problem areas become apparent. The following categories of improvements can be implemented in both new and existing neighborhoods in Midland to make the streets better places for walking and biking. These improvements include:

Traffic Calming - When it is not possible to install a bicycle lane, traffic calming may improve the bicycling environment. Traffic calming devices reduce motorized vehicle speeds, improve the environment and livability of a street, and provide real and perceived safety improvements for pedestrians and bicyclists using a roadway.

A variety of traffic calming devices that are used by many Texas cities include: speed cushions, traffic circles, chicanes, semi-diverters, and curb extensions. The image to the right illustrates these and other traffic calming devices identified by the Federal Highway Administration (FHWA). One or more of these treatments might be considered on neighborhood collector streets with high traffic speeds.

Quiet Streets - The "Quiet Streets" movement in the United States started in the 1980s, and much like traffic calming and bicycle boulevards, aims to slow motorized traffic to 20 miles per hour or less to create pedestrian and bicycle-friendly neighborhood streets. Street narrowing, curb extensions, and other techniques are used to manage and slow traffic. Since these impact vehicular speed and access in a neighborhood, techniques to slow or "calm" neighborhood traffic should always be developed in close consultation with area residents.

Schematic illustration of a quiet street in Midland



Intersection Treatments

Intersections, driveways, and roadway crossings are locations with the highest potential for interaction between motorized vehicles, bicycle riders and pedestrians. Enhancing crossing locations is particularly important for bicycle riders on sidepaths or trails. Riders favor continued momentum, and since stopping requires additional effort to get moving again, they may be tempted to disobey traffic signals and signs.

Each crossing location requires its own specific design to take into account unique conditions of the area, including characteristics of both the motorized vehicles and the bicyclists and pedestrians travelling in the area. Note that improvement requirements at each intersection should be developed as each facility is designed and implemented. The following techniques represent some of the tools that can be used to improve these crossings.

- **Highly visible crosswalk markings** - Ladder style crosswalks have been shown to be more visible to approaching vehicles than standard two striped lines.
- **Median refuge** - On wider streets that take longer to cross on foot, a refuge provides a protected mid-crossing location. These are installed as part of curbed medians.
- **Raised crosswalks** - Typically used at mid-block crossing locations, raised crosswalks can enhance the visibility of pedestrians crossing a street and also help slow vehicle speeds when approaching the crossing.
- **Pedestrian crosswalk signals** - At intersections, timed pedestrian crosswalk signals help guide pedestrians crossing the street. At mid-block crossings, push button activated signals, flashing beacons or a High-Intensity Activated Crosswalk Beacon (known as a HAWK signal) should be installed.
- **Painted or paver crosswalks** - In areas with higher numbers of turning vehicles, further enhancement of the crossing area through the use of paint or highly visible pavers may be considered. In particular, this can be effective where sidepaths cross driveways into private businesses.
- **Access management** - Reducing the number of driveways or access points may help reduce the number of conflict points along on-street and off-street facilities.
- **Prohibit right turn on red** - At intersections with a higher frequency of pedestrian crossings and where traffic volumes permit, a right turn on red may be prohibited to provide additional safety for pedestrians.
- **Sidepath or trail "deviators" to slow sidepath or trail users at intersections** - The path deviates to focus the pedestrian's line of sight on approaching traffic, and to reduce the bicyclist's speed.
- **Pedestrian crossing warning signs** - Additional warning signs that follow the Manual on Uniform Traffic Control Devices (MUTCD) may be appropriate to further alert motorists to the presence of pedestrians or bicyclists.
- **Curb extensions** - At intersections, an outward extension of the pedestrian area may be installed to reduce the crossing distance to the opposite curb. These extensions also help reduce the speeds of motorized vehicles travelling through the intersection.
- **Reducing turning radii at intersections** - Smaller turning radii at intersections can reduce the speed of vehicles turning right at intersections, increasing reaction times and creating safer crossings for pedestrians.
- **Enhanced visibility by relocating landscaping or signs** - Especially in sidepath conditions, landscaping, signs and in some cases trees may be relocated or adjusted to increase visibility.
- **Enhanced painted symbols at intersection crossings** - Additional dashed bicycle lane striping and bicycle symbols may be used across intersections to guide bicycles and to further alert motorists as to the direction of bicycle traffic.
- **Transition from on-street to off-street facility** - In some instances, an on-street bicycle lane may need to transition to an off-street sidepath or trail. The use of a curb ramp can smooth that transition.
- **Green Lanes** - Green painted bicycle lanes can be used to mark bicycle lanes or mark the extension of a bicycle lane through intersections and other traffic conflict areas.

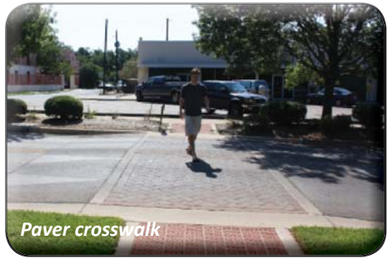
It is important to note that new technology and best practices related to bicycle and pedestrian facility design are evolving at a rapid pace. The city should continue to monitor the best practices and incorporate where appropriate in the future.


Crosswalk markings


Median refuge. Image source: PedBikeImages.org/Dan Burden


Raised crosswalk. Image source: PedBikeImages.org/Tom Harned


HAWK signal


Paver crosswalk


Trail deviator


Curb extension


Enhanced painted symbols


Transition from on-street to off-street


Green lanes

Bridges and Underpasses

Pedestrian bridges and underpasses provide access across barriers that would otherwise hinder connectivity of a trail system. Convenience is essential in designing and locating overpasses and underpasses. Pedestrians and bicyclists will seldom use a poorly located crossing.

Pedestrian bridges are needed to cross barriers such as drainage channels in various locations. Pre-fabricated bridges can span distances ranging from 100' to over 250'. Enhancements, such as decorative railings or upscale pedestrian lighting, should be included to fit the context of the area around the bridge.

From a user's perspective, bridges should preferably be the width of the trail, plus an additional 2' of clearance area on each side. At a minimum, bridge widths should be 12' wide for an 8' trail.

Any bridge that is specifically designated for bicycle traffic must have appropriate railings for bicyclists. Texas has adopted the AASHTO Bridge Design Specifications requirement that bridge railings designated for bicycle traffic should be a minimum of 54" high with the same restrictions on openings as for pedestrian railings. Pedestrian railing openings between horizontal or vertical members must be small enough that a 4-inch sphere cannot pass through them in the lower 27". For the portion of pedestrian railing that is higher than 27", openings may be spaced such that an 8-inch sphere cannot pass through them. Decking material should be firm and stable. Bridge approaches and span should not exceed 5% slope for ADA access.

Pedestrian bridges should be designed to accommodate the weight of maintenance vehicles. The bottom span should be above the 100- year floodplain, and the bridge should not constrict the floodway. Footings should be located on the outside of the stream channel at the top of the stream bank. All bridges and footings in the stream corridor will need to be designed by a registered geotechnical or structural engineer. Cost, design and environmental compatibility will dictate which structure type is best for the trail corridor.

Underpasses can provide a more direct route by going under instead of around a busy street or railroad. From the standpoint of a user, underpasses should be well lit, attractive and project a sense of security. The exit should be visible from the entrance area. A minimum height clearance of 10' is recommended. If enclosed, the underpass width should be at least 14' in width, and in some cases wider if the underpass exceeds 100' in length. If enclosed, gravity or pump systems to remove storm drainage should be provided.

In the future, all new or reconstructed vehicular bridges over key sidepath or trail corridors should be considered as possible candidates for an underpass. In some cases, this may mean making the roadway elevation higher than otherwise necessary, but the added convenience to pedestrians and bicyclists may increase the use of the pathway corridor.

Railroad Crossings

Existing railroad tracks in Midland parallel Business 20 and pass through downtown. The following considerations for pedestrian and bicycle crossings over railroad tracks are taken from suggestions from Union Pacific Railroad. Union Pacific Railroad preferences for the design of a pedestrian and bicycle rail crossing indicate that when a pedestrian facility crosses over railroad tracks, the facility should be located outside of the railroad gate arms that block vehicles in the roadway, since the gate arms are counter-weighted and can easily be manually raised by pedestrians if they passed under the gate. Additional pedestrian and bicycle enhancements at railroad crossings include the following:

- **Cross at a perpendicular angle to the tracks** - To reduce the potential for narrow bicycle or stroller wheels getting caught in the tracks, sidepaths and sidewalks crossing the tracks should do so at a 90 degree angle.
- **Concrete planking** - Concrete planking that meets the rail line owner's specifications should be installed. Union Pacific Railroad prefer that the planking for the road and the pedestrian facility be continuous, which allows for better drainage and prevents debris buildup that would occur in a "gap" between roadway and pedestrian planking.
- **Separate pedestrian crossing arms or gates** - Consideration could be given to installing separate pedestrian barrier gates or arms. However, Union Pacific Railroad indicates that a separate gate at sidewalks or sidepaths is generally unnecessary since pedestrians and bicyclists can go around the gates fairly easily.
- **Pedestrian level signals** - Visual signals such as flashers specifically designed to alert pedestrians should be considered. These enhance safety for users who are hearing is impaired, such as the deaf or individuals who are listening to headphones. Warning signs should be installed that direct pedestrians and other sidepath users to look both ways before crossing the tracks.
- **Fencing to divert and contain pedestrians and bicyclists crossing the tracks** - Fencing can be used to direct pedestrians to the correct crossing location, especially if separate pedestrian-sized gates or arms are used. The fencing can make it more difficult for impatient pedestrians to ignore the pedestrian arms and try to go around the arms.
- **Grade separated crossing** - In key crossing areas, the number of pedestrians and bicyclists crossing the roadway may ultimately warrant the installation of a grade separated crossing.

A combination of these treatments as well as others designed for a specific location may be considered. Each individual crossing should be separately designed to take into account the unique constraints of the area.

Examples of pedestrian warning signals at railroad crossings. Images source: Federal Railroad Administration

Examples of fencing at railroad crossings. Images source: Federal Railroad Administration

Potential Trail Users

Trails should be designed to accommodate a variety of users. Activity on a trail lends a sense of safety and comfort to a trail and encourages others who are not as active to use the trail. Users of trails may include:

- **Walkers seeking exercise and recreation** are typically relaxed, walking along a pleasant corridor. These users may include senior citizens, parents with children, or someone walking their dog. Walkers may occupy a significant portion of the trail due to walking side-by-side.
- **Joggers and runners** use trail corridors for exercise and activity. The higher speed of these users may conflict with slower users of the trails. Softer trail surfaces, such as decomposed granite, are preferred.
- **In-line skaters** require more space of the trail because of the swinging motion of their arms to increase momentum. Like joggers and runners, the speed of in-line skaters may conflict with slower users of the trails.
- **Recreational and inexperienced cyclists** use trails for exercise and activity. These users are interested in scenic appeal, connectivity of the trail system, and prefer more interesting trail alignments rather than trails that favor high speeds. This group may also include children going to school.
- **Mountain biking** users can travel on crushed rock or more natural trail surfaces and prefer trails with challenging terrain.
- **Higher speed, experienced cyclists and commuters** are typically more interested in higher speeds. These riders often favor roadways over off-street trails for the speed, as well as connectivity to employment centers among commuters. For off-street trails, alignments with shallower curves are favored by these users, and because of the higher speeds, increased trail widths are recommended to reduce conflicts with other trail users.

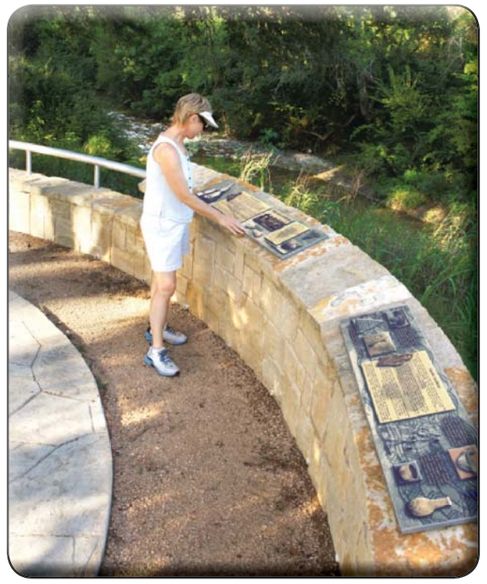





Trail Features and Amenities

In order for the trails system to be a successful community amenity, the trails should appeal to a wide variety of users. To achieve this, the trails should be designed to provide a high level of user conveniences. The demographics of the community include both elderly and young users. These groups will use the trail more often if amenities are provided. Recommended trail amenities include:

- **Water fountains** provide drinking water for people (and pets in some cases).
- **Bicycle parking racks** allow trail users to safely park their bikes if they wish to stop along the way, particularly at parks and other desirable destinations.
- **Interpretive installations and signs** can enhance the trail experience by providing information about the history of Midland. Installations can also discuss local ecology, environmental concerns, and other educational information.
- **Art installations** make a trail system uniquely distinct. Local artists can be commissioned to provide art for the trail system. Many trail art installations are functional as well as aesthetic, as they may provide places to sit and play on.
- **Restrooms** are appropriate at major trailheads or as previously existing in city parks along the trail route.
- **Pedestrian-scale lighting** improves safety and enables the trail to be used year-round. It also enhances the aesthetic beauty of the trail. Lighting fixtures should be consistent with other light fixtures in the city, possibly emulating a historic theme.
- **Trail furniture**, such as 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 simple (e.g. wood slats) or more ornate (e.g. stone, wrought iron, concrete).
- **Maps and directional signage** provide information so that users can navigate the trail system. A comprehensive signing system makes a trail system stand out. Information 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 the local citizens. The directional signage should impart a unique theme so trail users know which trail they are following and where it goes. The theme can be conveyed in a variety of ways: engraved stone, medallions, bollards, and mile markers. A central information installation at trailheads and major crossroads also helps users find their way and acknowledge the rules of the trail. They are also useful for interpretive education about plant and animal life, ecosystems, and local history.
- **Information kiosks** provide trail users with information and the rules and regulations of the trail. Often an overall trail system map is posted at a kiosk. Involving school children, university students and civic organizations in the research, design and construction of these kiosks would be an excellent community activity.
- **Trash receptacles and dog waste pick-up stations** are important trail features that can help keep the trails maintained. Periodic containers at access points should be provided. Additionally, dog waste pick-up bag dispensers should be placed at trailheads and key neighborhood access points along the route. Signs should be placed along the trail notifying dog owners to pick up after their dogs.



Wayfinding

Wayfinding includes any signage, pavement markings, or materials that trails users or bicyclists use to navigate the network, either along the route or in planning their route. Signage is a useful communication tool to help users navigate the network as well as bring awareness to motorists. Just as cars rely on notification of upcoming streets or exit ramps, so do pedestrians and bicyclists rely on being informed of routes. Wayfinding along the route includes directional signage to nearby destinations, or indication of a connection between the on- and off-street systems.

A comprehensive set of wayfinding signs should be developed to connect destinations in Midland and indicate to users that particular advantages exist to using certain routes compared with alternatives. Key destinations could include Midland College, Downtown, parks, schools, libraries, civic buildings, shopping centers, employment areas, and the Scharbauer Sports Complex.

Maps are important wayfinding tool, which can be provided to users, as well as posted at trailheads and destinations. Maps also have the potential to be widely distributed across the region, making them a valuable tool in helping people prepare their trip.

Wayfinding is also a critical component of detouring pedestrian and bicycle traffic. Just as cars are detoured during roadway construction, so must pedestrians and bicyclists be led through alternative routes when the normal route is inaccessible. Appropriate detour signage should be used where bicycle facilities merge with motor vehicle travel lanes. Roadway construction should include steps to prevent added risk to cyclists from debris and reduced roadway space through simple improvements to temporary construction closures. The Texas Manual on Unified Traffic Control Devices (TX-MUTCD) requires that bicycles be safely accommodated during temporary traffic control on bicycle routes.

Suggested ways to improve wayfinding throughout Midland can include the following.

- Establish design guidelines for a destination-oriented wayfinding system. Identify destinations and establish a consistent wayfinding signage program to implement throughout the city.
- Install information kiosks and network maps in key locations throughout the region. Kiosks would ideally be located at major destinations, trailheads, and other critical junctures in the network. These would include the downtown area, Midland College, employment areas, and other critical junctures in the network.
- Regularly update the trail and bicycle map and distribute.
- Establish guidelines for bicycle detours in the event of construction or street closures. Work with TXDOT and the city's Public Works Department to establish standards for roadway construction detours that do not obstruct bicycle facilities. In the event that a bicycle route is detoured, provide a bicycle detour along streets that are appropriate for bicyclists.

End of Trip Facilities

The availability of end-trip facilities has the power to influence an individual's decision of whether or not to commute by walking or bicycling. End-trip facilities such as bicycle parking and showers/changing facilities help make walking and bicycling a viable mode of transportation. End-trip facilities include not only bicycle parking, but shower and changing facilities, repair services, and other services that support the bicycle system and make bicycling more convenient. Even car-sharing and transit are important end-trip or mid-trip services that can support bicycle use. By providing a comprehensive system of end-trip services, bicycle use can be further promoted as a convenient way to travel.

Bicycle Parking - Bicycle parking is a key component to making a bicycle network functional. Every single roadway in the region could have an excellent bicycle facility, but nobody would use them without a safe place to secure their bicycle at their destination.

The majority of destinations in Midland do not have bicycle parking, and the buildings need to be retrofitted for bicycle parking. Cities across the nation proactively respond to the bicycle parking needs in their city by providing short-term bicycle parking in the public right-of-way, or to building and property owners who request bicycle parking. In order to increase the quantity and availability of bicycle parking throughout the city, the City of Midland and other entities should proactively respond to the bicycle parking needs of the city by assisting existing developments with installing bicycle parking.

Bicycle parking can generally be classified into two categories: short-term and long-term. Short-term parking is meant to accommodate visitors who are expected to need to store their bicycle for just a few hours. It is typically found at retail shops, public facilities, office buildings, or restaurants. The inverted "U" rack is the typical short-term bicycle parking facility. In general, though, bicycle racks should be able to secure the bike completely (not just one wheel) and be usable by bikes of a variety of sizes and types. An important element of short-term parking is the convenience and visibility of these racks.

Additionally, installing bicycle racks too close to other elements will make them unusable. Bicycle parking needs to be sited and installed in a clearly visible and accessible area that does not interfere with pedestrian traffic or street furniture. However, locating bicycle parking in areas with high pedestrian activity will certainly discourage would be thieves. Ideally, bicycle racks should be located within 50' of a building's main entrance.

Long-term parking is meant to accommodate bicyclists who are expected to park for a full day or overnight or longer. Users of long-term parking would accommodate such destinations as schools, employment centers, high-density residential areas, and the airport. Long-term parking would provide secure storage for the bike as well as for bicycle accessories. For long-term parking, the convenience factor of locating the long-term parking is not as important as the need for increased security and protection from theft and the weather. Examples of long term parking include enclosed areas inside buildings or parking garages or bicycle lockers. Additionally, many communities supporting the development of

Bicycle Parking Programs

There are various programs being used by cities across the country to provide bicycle parking. Several cities, including Portland, New York City, and Los Angeles, have bicycle parking programs that install short-term bicycle parking (Portland also does long-term) in the public right-of-way, such as sidewalks. They have developed location criteria and an application process for their programs.

Another example of a bicycle parking program is the City of Austin's Bicycle Parking Program, which provides short-term bicycle parking to private property owners. The program started as a grant to purchase inverted-U racks to give to commercial buildings that were built before the development code required bicycle parking. Since the start of the program in 1990s, the city has installed over 4,000 bicycle racks across Austin. In 2010, the program changed to a wholesale program where the city purchases the bicycle racks and makes them available for sale to the public.

Bicycle parking as public art

Long-term covered bicycle parking. Image source: PedBikeImages.org/Laura Sandt

Long-term bicycle locker parking. Image source: PedBikeImages.org/Rob Rae

"bike stations" at centrally located areas that provide not only long term parking, but other bike services such as rentals, bike service, and changing facilities.

Bicycle Parking as Public Art - Many cities are encouraging bicycle racks to be viewed as locations for public art. These serve to highlight the bicycle rack and encourage residents and visitors to ride more. Midland should consider implementing a bicycle rack public art program for installation throughout the city.

Shower and Changing Facilities - Because of the hot weather in Midland, shower and changing facilities can help make bicycling a feasible choice for getting to work by providing a place to clean up. Additionally, these facilities serve fitness-minded employees who can exercise during lunch hours. There are several methods among public agencies and private developments to incorporate shower and changing facilities, such as in City of Midland buildings, through changes in the development code, in coordination with gyms, or by attracting the development of a bikestation.

Through changes in the development code, new developments or significant building renovations can be encouraged to install shower and changing facilities through incentives, such as trade-offs with parking requirements. Moreover, the City of Midland can begin incorporate shower and changing facilities into their office buildings for city employees.

Gyms and fitness centers are an obvious facility for cleaning up after a bicycle ride. However, membership costs typically cover many more services than a bicyclist simply looking for a shower and place to change is willing to pay for. Area gyms and other fitness facilities may be willing to work with the city to create bicycle commuter memberships. For example, several gyms in downtown Seattle offer "shower-only" memberships at a discounted price.

Bikestations are another way of providing more than just shower and changing services to bicyclists. These facilities that are emerging on the West Coast, offer not only bicycle parking and changing facilities, but also provide maintenance services and bicycle rentals. Bikestations would be most ideally located in downtown, or dense areas where the dense employment and residential base would support the use of a bikestation.

Equipment Storage - Lockers or storage areas for helmets, baskets, bags and other equipment may be needed at schools or in places where employees do not have access to individual spaces. The City of Midland can help inform businesses, schools and other entities as to the need for equipment storage areas.

Suggestions for providing end of trip facilities include the following:

- Establish a Bicycle Parking Program to quickly provide bicycle parking at existing destinations throughout the city. With relatively little investment, a bicycle parking program is an expedient way to provide needed bicycle parking. Various programs have been implemented by cities across the country, ranging from providing bicycle parking in the public right-of-way to providing bicycle parking to private building owners either free or at wholesale pricing. Since Midland has a significant need for bicycle parking, a combination of these programs is recommended.
- Provide development incentives to provide end-trip facilities. These incentives can also be extended to existing developments who retrofit their buildings for end-trip facilities such as showers and changing areas.
- Provide long-term bicycle parking at regional destinations throughout the city. Many regional destinations such as downtown, Midland College and the airport to name a few, are areas where long-term parking is needed for bicyclists who expect to park for a full day, overnight, or longer. Study the demand for long-term parking at these regional destinations, and based on findings, provide long-term bicycle parking. With installation of long-term bicycle parking, it is recommended that bike lockers utilize a universal reservation or payment system.
- Ensure provision of bicycle parking at special events throughout the city. Accommodating bicyclists at special events can relieve traffic congestion as well as signal the city's commitment to supporting alternative transportation.
- Provide long-term parking and shower and changing facilities at public facilities and office buildings. In order to encourage private property owners and developers to provide end-trip facilities such as long-term parking and shower and changing facilities, public agencies like the City of Midland, TXDOT, and Midland County need to step up and set an example by taking the initiative to provide these facilities in their own buildings and facilities for their employees.
- Explore the feasibility of a "bikestation" in downtown or at Midland College. A "bikestation" could be a great way to provide services to bicyclists in Midland while also bring attention to the opportunity for bicycling in the region. The ideal location for a bikestation would be a dense area with a significant employment and residential base to support the services of a bikestation, such as downtown or Midland College. Study the feasibility for a bikestation in these areas.

Trailheads

The walking and bicycling system should be accessible and highly visible, so that visitors and residents in Midland know that a first class network is available and inviting. In conjunction with other trail amenities, a series of trailheads should be developed throughout the city.

Trailheads should provide entrance features, some shade, drinking fountains, bicycle parking, benches for resting, and kiosks with maps and other information. In some cases, trailheads should also provide limited parking so that residents can drive to the trailhead, but ideally they should be located so that residents can walk or bike to the trailhead. Secondary kiosks at key locations such as libraries, Midland College, City Hall, and downtown should be incorporated to provide a comprehensive map of all area facilities.

Trailheads throughout the city should be included where appropriate with major trail construction projects. Trailhead locations along a route should be identified with signs, and shown on any future pedestrian/bicycle facility map developed by the city. Trailheads should be placed at the start or terminus of a trail, at intersections with other trails, or at key access points from area neighborhoods. A very high level of accessibility is desired for trail corridors. More access points increase a sense of security, since they encourage ready use of the trail by area residents. Access points should be as little as 1/8th of a mile apart for neighborhood trails, and typically no more than a 1/4 mile to a 1/2 mile for regional trails. The map on the following page shows the proposed locations for trailheads in Midland.

Two types of neighborhood trail access points include:

- Access from adjacent neighborhood streets
- Access from specific trailheads in parks

A well used trailhead will most likely be at parks. Typical trailhead features can include:

- Parking for 10+/- cars
- Small shade pavilion
- Drinking fountain
- Optional safety call box
- Kiosk with trail map and information
- Bicycle parking
- Optional fitness stations or warm-up stations
- Landscaping
- Major trail identification sign
- Optional restrooms (in park locations)

Examples of trailheads throughout Texas

Potential trailhead design concepts for Midland

Loop 250

Wadley Ave

Midkiff Rd

Fairgrounds Rd

Business 20

IH-20

PROPOSED RWY EXTENTION

PROPOSED EAST GA LAYOUT

LEGEND

POTENTIAL TRAILHEADS

Chapter Four

Public Input Regarding Trails

The Need for Public Input

Public input is a critical component of any planning process. A long range plan such as this must represent the long range goals of the citizens and residents who are going to fund the planned facilities, support them, and ultimately use them.

The City of Midland has a commitment to include citizen feedback in its planning and design processes. Because of the widespread interest in trails and bicycle facilities in all parts of the city, the public input process is a way for residents to give their feedback, opinions, and ideas. The public input process included three major levels:

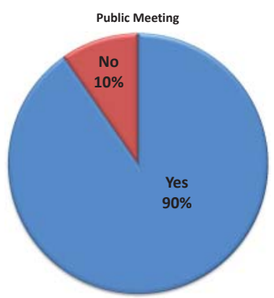
- An online survey available to all residents of the City.
- Two public meetings to discuss potential corridors and citizens' concerns.
- Review of the plan's progress with the Parks and Recreation Advisory Board.

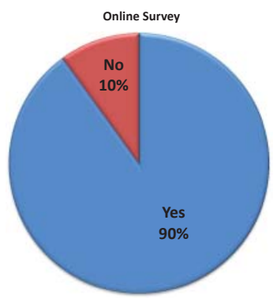
The questions asked during the online survey were also asked at the public meetings in the form of a questionnaire. The results from the online survey and the public meetings can then be compared to give a more accurate account of residents' desires and concerns regarding trails and bicycle facilities in Midland. The results from the surveys are discussed on the following pages.

Survey Results

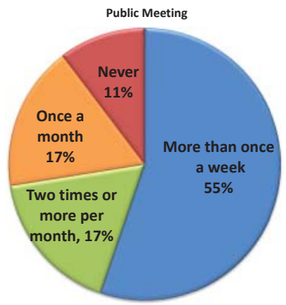
The first citywide public meeting was held on May 19, 2014 and was attended by approximately 50 residents +/-. Of those who attended the public meeting, 31 residents responded to the survey questionnaire. An additional 30 residents of Midland completed the online version of the survey.

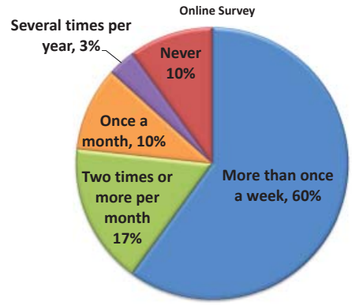
Current Trail Usage - Survey participants were asked whether or not they have used a trail or bicycle facility in Midland within the past 12 months. This helps establish a general understanding of how popular and well used the trail in Midland currently are among residents. 90% of those of took the online survey and 90% who attended the public meeting have utilized a trail or bicycle facility within the past year.



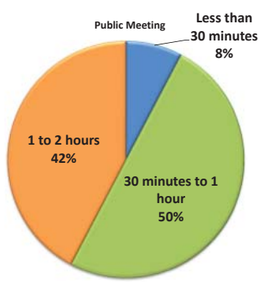


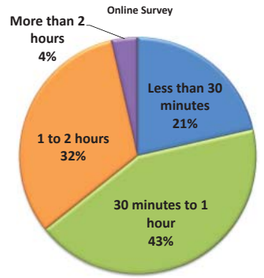
How Often Do You Use Trails - Those who responded to the survey use trails very frequently. 55% of those who attended the public meeting and 60% of those who took the online survey indicated that they use trails more than once a week. Furthermore, 89% of those who attended the public meeting and 87% of those who took the online survey noted that they use a trail at least once a month or more.



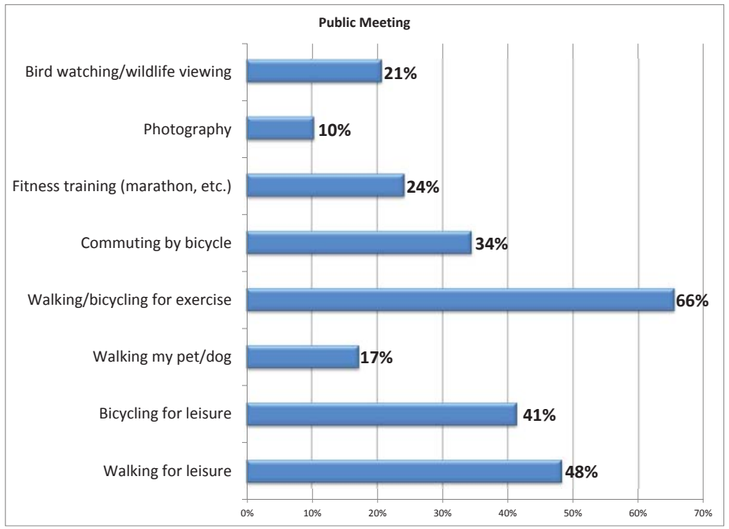


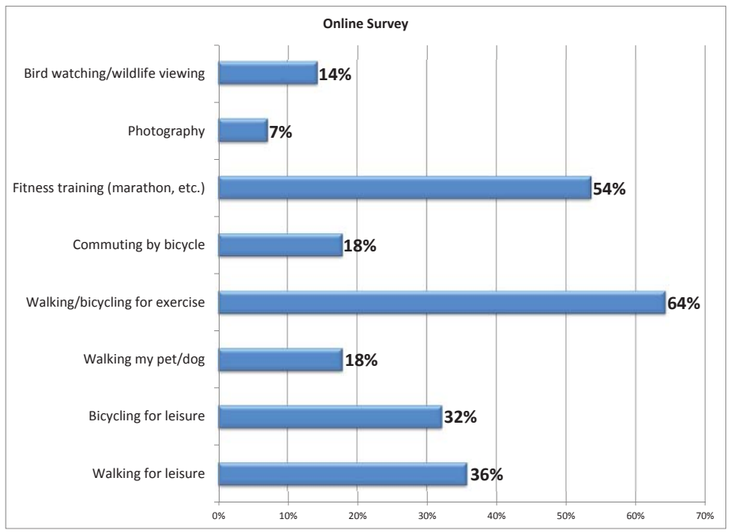
Time Spent on Trails - The largest portion of the survey respondents spend approximately 30 minutes to 1 hour on a trail (50% for those who attended the public meeting, and 43% for those who took the online survey. Many residents commented during the public input process that they wanted more than just a looped trail within a park. The amount of time that users spend on a trail supports the idea of having trails that connect over long distances to different destinations in the city.





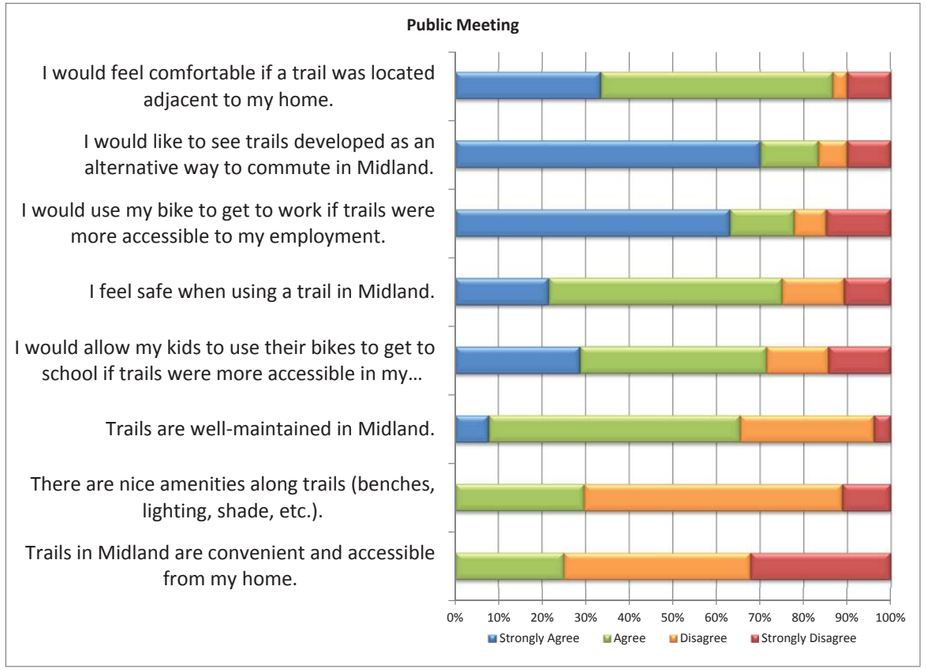
Activities Along Trail - Survey respondents were also asked what type of activities they participate in while utilizing a trail. The most common activity for both surveys was walking/bicycling for exercise (66% for the public meeting and 64% for the online survey). For those who attended the public meeting, other common activities were walking for leisure (48%) and bicycling for leisure (41%). For those who completed the online version of the survey, other common activities were fitness training (54%) and walking for leisure (36%).

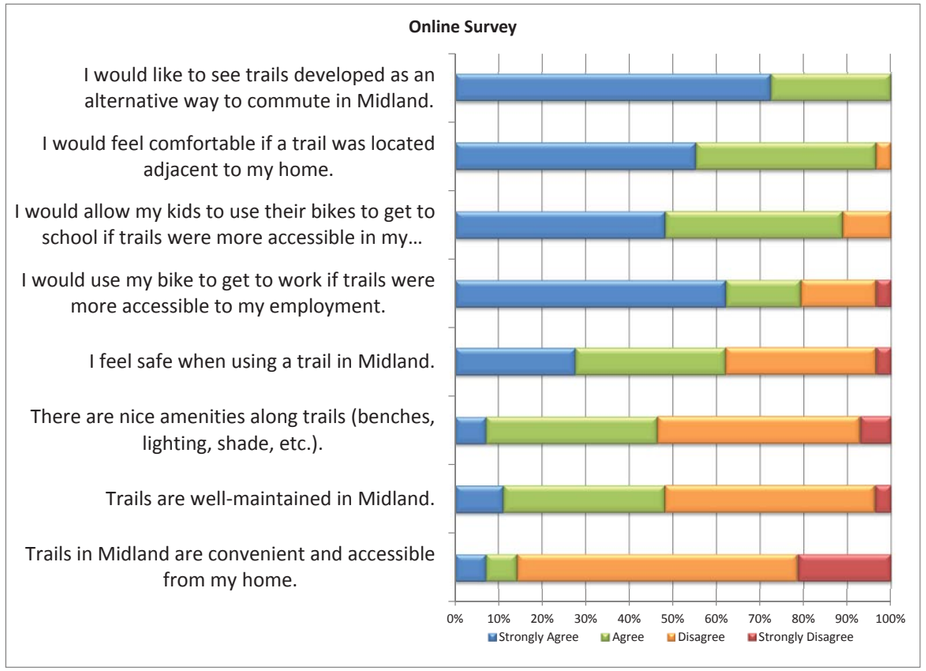




Trail Statements - Survey respondents were given a list of different statements related to trails in Midland. They were asked how strongly they agree or disagree with each statement. For those who attended the public meeting, 87% indicated they would feel comfortable if a trail was located adjacent to their home. 83% agreed that they would like to see trails developed as an alternative way to commute in Midland. 78% agreed that they would use their bike to get to work if trails were more accessible to their employment. Only 25% felt that trails in Midland are convenient and accessible to their home.

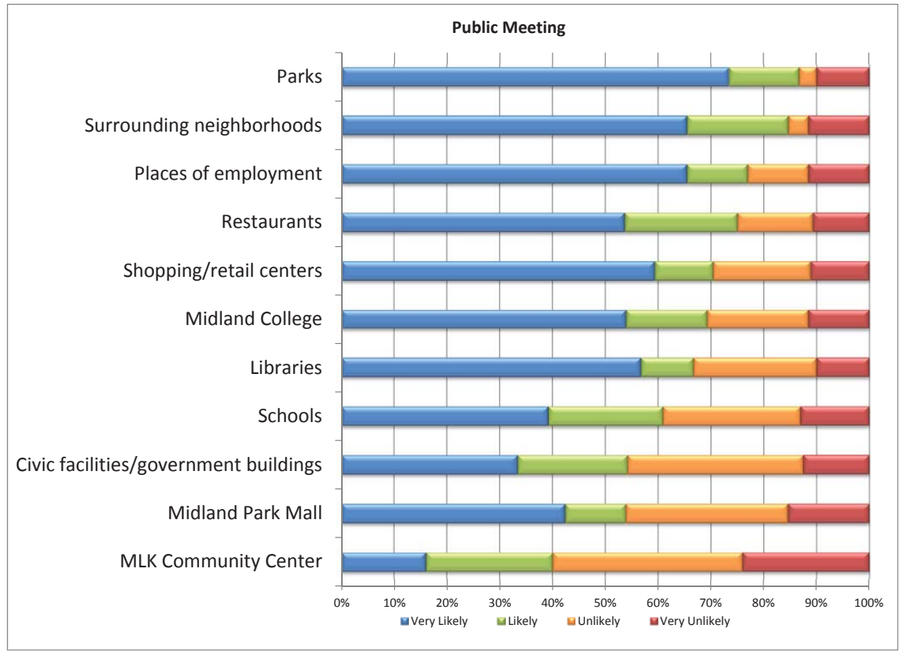
For those who completed the online survey, 100% either agreed or strongly agreed that they would like to see trials developed as an alternative way to commute in Midland. 97% agreed that they would feel comfortable if a trail was located adjacent to their home. 89% agreed that they would allow their kids to use bikes to get to school if trails were more accessible in their neighborhood. Only 14% of those who participated in the online survey felt that trails in Midland are convenient and accessible to their home.

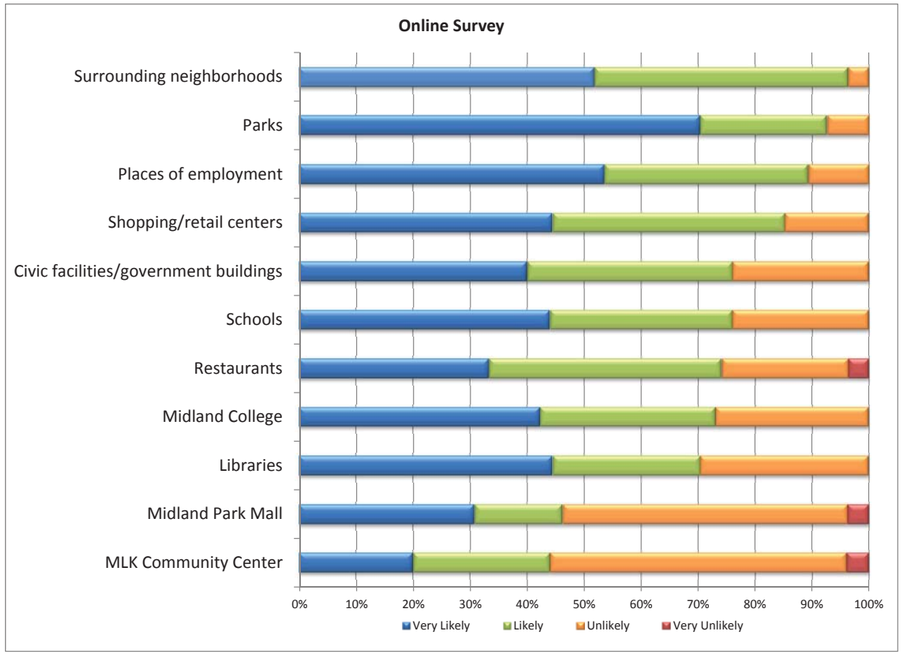




Connecting to Destinations - The survey participants were given a list of potential destinations within the City of Midland. They were asked how much more likely or unlikely would they be to ride a bicycle or walk to those destinations if trails connected their neighborhood to them. The results are shown in the graphs to the right. For those who attended the public meeting, 87% indicated they would likely walk or ride a bicycle to a park, and 85% said they would likely walk or ride a bicycle to surrounding neighborhoods.

For those to completed the online survey, 96% indicated they would likely walk or ride a bicycle to surrounding neighborhoods, and 93% would likely walk or ride a bicycle to parks if trails connected from their neighborhood. 89% would also likely walk or ride a bicycle to their place of employment if trails connected from their neighborhood.

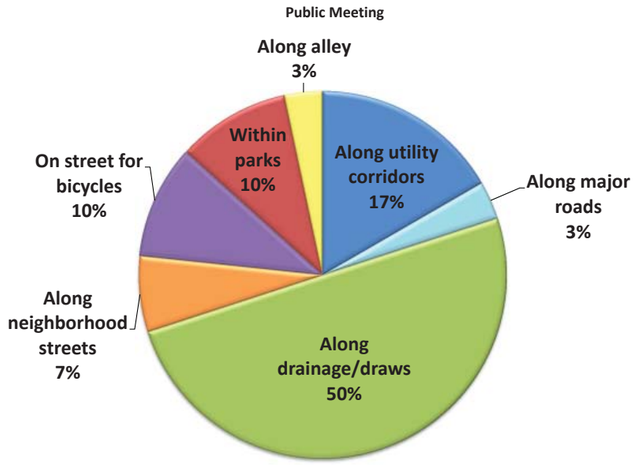


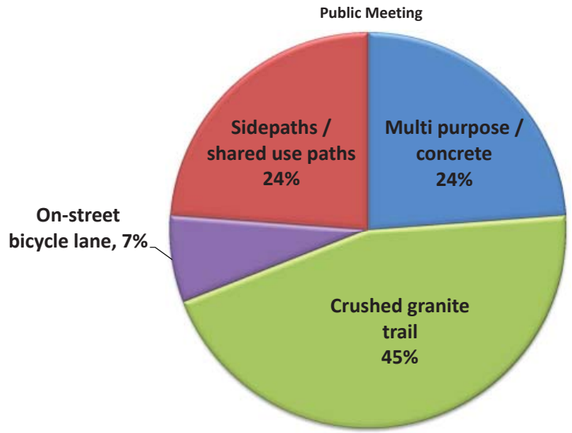


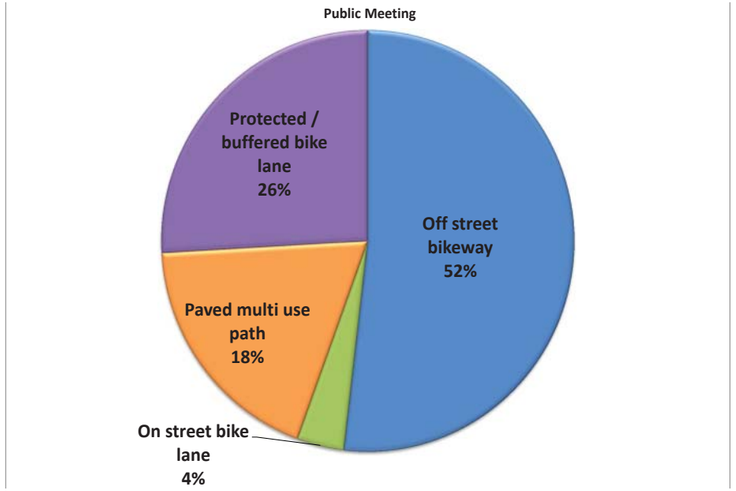
Where Should Trails Go - A visual preference survey was used asking survey respondents where they prefer trails to go in Midland. Images showing each of the potential locations were used, and respondents were asked to select their number one choice. Along drainage and draws was the number one response for both the public meeting attendees (50%) and those who completed the online survey (39%). The second most popular choice was along utility corridors, 17% for those who attended the public meeting and 22% for those who completed the online survey.

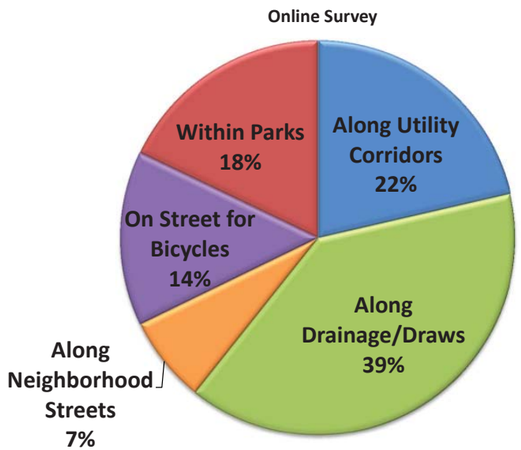
Types of Trails - The visual preference portion of the survey also showed pictures of different types of trails. Survey respondents were asked which type they prefer using. The most common response was crushed granite with 45% of those who attended the public meeting and 31% of those who completed the online survey indicating this was their top preference. Survey respondents also preferred multi-purpose/concrete and sidepaths/shared use paths which are typically adjacent to a road.

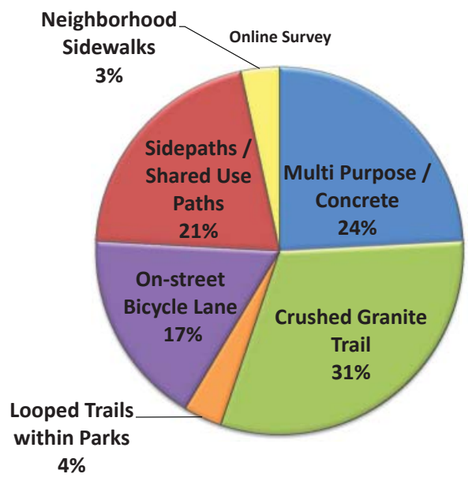
Types of Bicycle Facilities - Survey respondents were also asked a similar visual preference question regarding different types of bicycle facilities. The majority of people who attended the public meeting (52%) preferred using an off-street bikeway. For those who completed the online survey, the most common response was a protected/buffered bike lane with 35% indicating this was their preferred choice. 28% preferred a paved multi-use path (such as a trail), and 24% preferred an off-street bikeway.

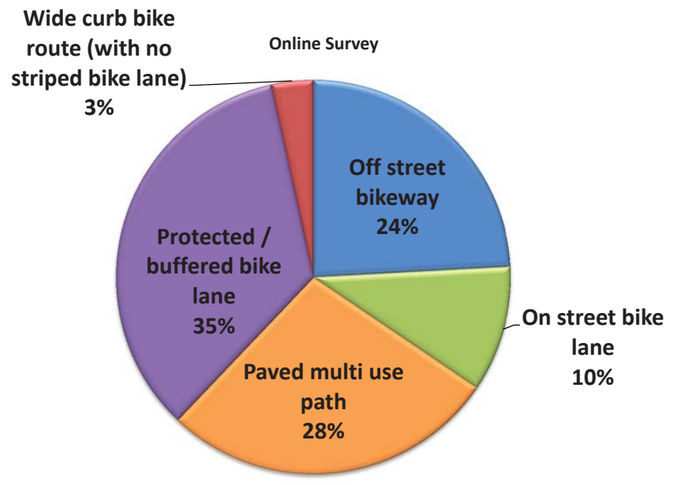






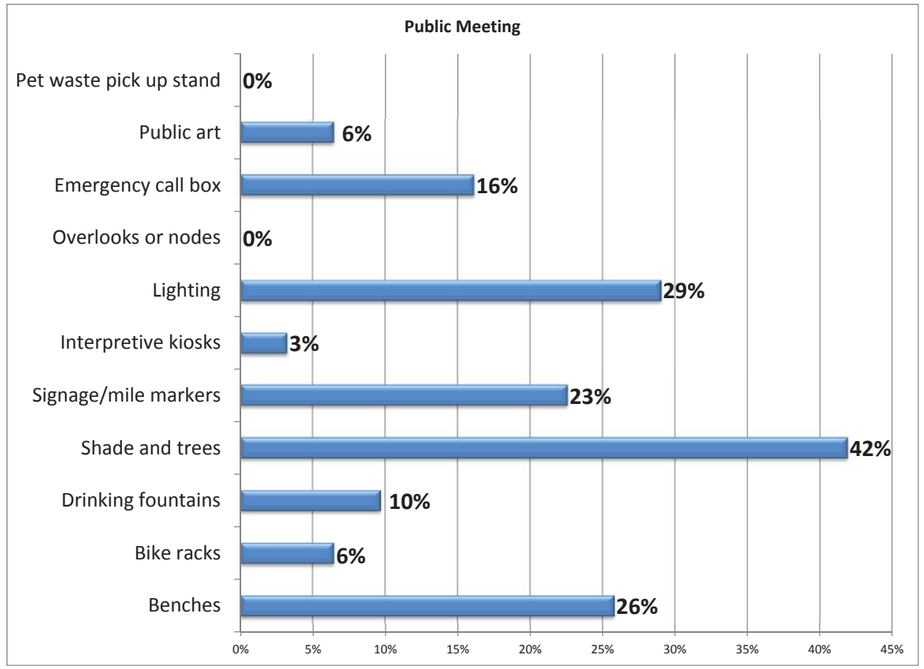


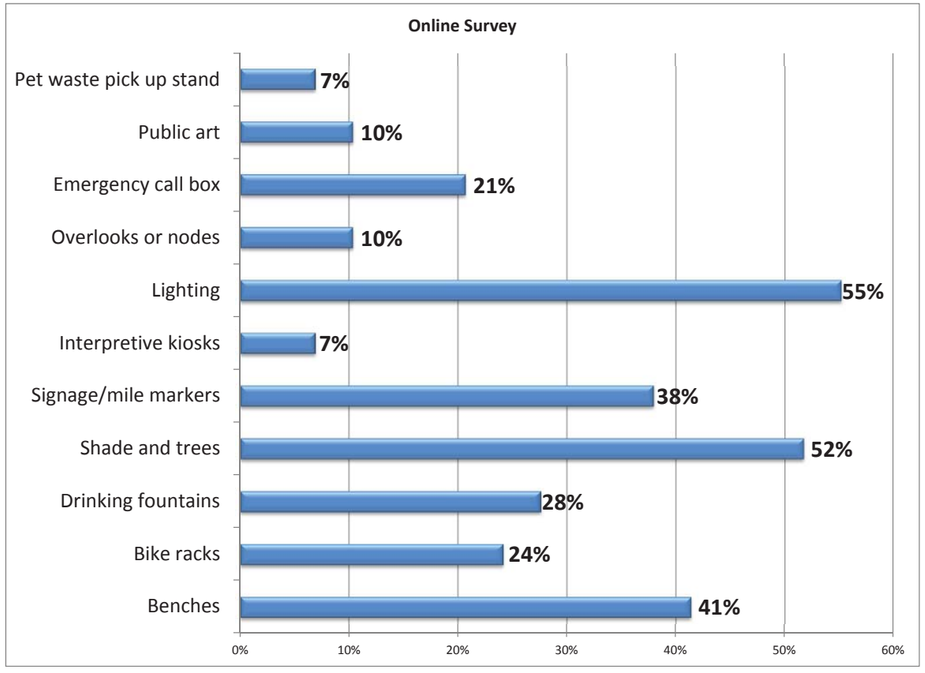




Trail Amenities - The final question in the visual preference section of the survey showed different types of amenities that could be placed along trails. Survey respondents were asked to select which top two amenities they would like to see along trails in Midland. For those who attended the public meeting, the most popular amenity was shade and trees with 42% of the participants selecting this amenity. The other top amenities were lighting (29%) and benches (26%).

For the respondents of the online survey, the top ranked amenities were similar to the ones from the public meeting. The number one amenity was lighting (55%). Other popular amenities were shade and trees (52%) and benches (41%).





Additional Comments - Many additional comments were received during the public meeting and from respondents of the online survey. Below is a summary of the comments received from Midland residents.

- Thank you so much for your consideration!
- Thank you for soliciting input. I love riding, but continue to find roads and drivers to be very dangerous. Providing marked bike lanes would go a long way to providing legitimacy for riders. Drivers often feel bikes should just be on sidewalks or in neighborhoods. I would love to be able to use my bike for more commuting and believe there are many others who would like to do the same.
- We need this!
- In Midland a multi-use bike and run/walk trail would make the most sense to me. Also a designated bike lane/routes through town on the roads would be very helpful and cost effective. If the trails could get you around town while connecting some of the major parks and shopping centers that would be great.
- The best biking trail would be a protected lane between Midland and Odessa. Serious bikers do not want to start and stop on their routes.
- We are so far behind the rest of the country in providing trails. Midland has the money to support it now!
- Streets with no marked bike lane are not bike lanes. It's completely ridiculous that Big Spring is considered a bike path. The marked bike lanes on Louisiana, etc. are overgrown. The routes going east are poorly marked. Look at Tulsa to see quality bike paths; separate from runners/walkers.
- Need a sidewalk or bike path from Loop 250 to MC along east side of Garfield. Need MISD to include bike safety in PE classes. Need MPD or Parks Dept. to have more Bicycle Rodeos. Like Complete Streets initiative.
- I like pavement, but I think crushed granite might be cheaper, and just as effective. I actually don't know how to pull it all off, but thanks for considering and asking citizen's opinions. It would be very neat to have trails.
- With the exception of "downtown" any bike lane/trail that protects bikers from drivers would benefit me greatly.
- Have not used trails (cycling mainly) because you can't get anywhere on them.
- Midland needs this to promote health and wellness for all of the community! It would be long lasting.
- I would like to see additional single track trails alongside paved trails where appropriate. Plainview, TX has a remarkable, excellent example of such. It

is somewhat inconvenient to travel to Odessa for mountain-style riding.

- Shade is important along the trails. Bike racks at destinations spots are also important. Bike lanes on the draws are a great idea. Would be nice if these could be lightly lighted (along the alley wall about half way up).
- I'm a runner and I just want a longer place to run. Some place safe and well-lit. I run a lot at Midland College, but I hate doing loops. I'd rather have some place to run 4-6 miles (even out and back) but without having to do multiple laps that get boring and tedious. Also I'm extremely nervous running or riding my bike on Midland streets, with all the bad drivers we have in town. Even using the bike land at Midland College make me nervous when running because I've almost been hit a few times by motorists.
- I would like more long distance bike trails.
- Midland doesn't have neighborhood parks (smaller parks). Most must be accessed by car. The big parks are great with new homes being built the yards are postcard size/kids must play in street. 0 parks + 0 yards = kids not getting exercise.
- I'm glad and happy that we live here.
- Thanks for sponsoring this event. Kudos for pursuing this.
- So supportive of this! Excited to get it complete!
- Include paths with road widening projects and require new subdivision platting to dedicated routes and trails to schools, retail areas, and access to public transportation/major roadways.
- Husband commutes by bicycle when possible.
- Trails around Nueva Vista and Hogan Park GL.
- I have used trails in Richardson and Dallas. Very happy with how those are located but that was one kind. I would love a trail now that would take us to the library. Also would love it to be wide enough for runners and cyclists.
- I strongly disagree with the idea of a trail connectivity system. Midlanders will not use these trails, expect for leisure or exercise, due to heat, cold, wind and other inclement weather. The money should be used for more important issues like 1st responders, water, infrastructure. Midland is not ready for a citywide greenbelt. I've lived in big cities and they aren't used.
- We need more parks, and increased bus service

Open House/Public Meeting

As mentioned previously, the first public meeting was held on May 19, 2014. Approximately 50 +/- residents attended the meeting. The initial public meeting was intended to get feedback from the residents on where they like to currently walk or ride a bicycle. Large maps of the city were displayed, and residents were asked to draw their preferred routes on the maps. This helped identify potential corridors for trails and bicycle facilities.

A second public meeting was held on November 20, 2014. The purpose of the second public meeting was to display the final recommendations of the trails plan, and to receive any feedback from the residents of Midland. Approximately 20 residents attended the meeting. Overall, the residents were supportive of the plan and the recommendations. Their top concerns were addressing traffic issues and providing long bike routes for fitness training. Traffic is a major concern to bicyclists and pedestrians in Midland. Many of the people driving on the roadways in Midland are from out of town and are thought of as aggressive drivers. The view is many oil field workers drive big trucks very fast and do not always respect the other users. The residents at the public meeting agreed that better enforcement of traffic and vehicular laws is necessary to ensure a safe pedestrian and bicycle network for all residents throughout Midland.

Chapter Five

Recommendations

Creating a Citywide Network

Opportunities to create a citywide network of great walking and bicycle riding facilities existing throughout in Midland. At a neighborhood level, area developments have initiated sidewalks along many streets. Right of way areas along some major streets can provide wide corridors for walking and riding. Other opportunities exist along draws, drainage corridors and power line corridors.

Recommended Facilities

Some potential facilities can be implemented relatively easily and at a moderate cost. Others are more extensive and will take longer to implement. Collectively, these recommendations can transform Midland into one of the most exemplary pedestrian and bicycle networks in the west Texas region.

This section summarizes both on-street and off-street recommendations that have a citywide and neighborhood benefit. The map to the right illustrates all recommendations for the entire city. Tables with detailed information regarding each segment follow the map and written descriptions of key corridors are included at the end of this section.

Each recommendation should be further engineered, and may require more specific solutions for intersections or other key areas. Area property owners should be involved in the more detailed design process so that specific concerns can be addressed.

This section summarizes recommendations for each facility type, including:

Off-street facilities for both pedestrians and bicyclists
- Trails
- Sidepaths

Off-street facilities for pedestrians only
- Sidewalk (pedestrian) improvements

On-street bicycle facilities
- Bike lanes
- Buffered bike lanes and cycle track opportunities

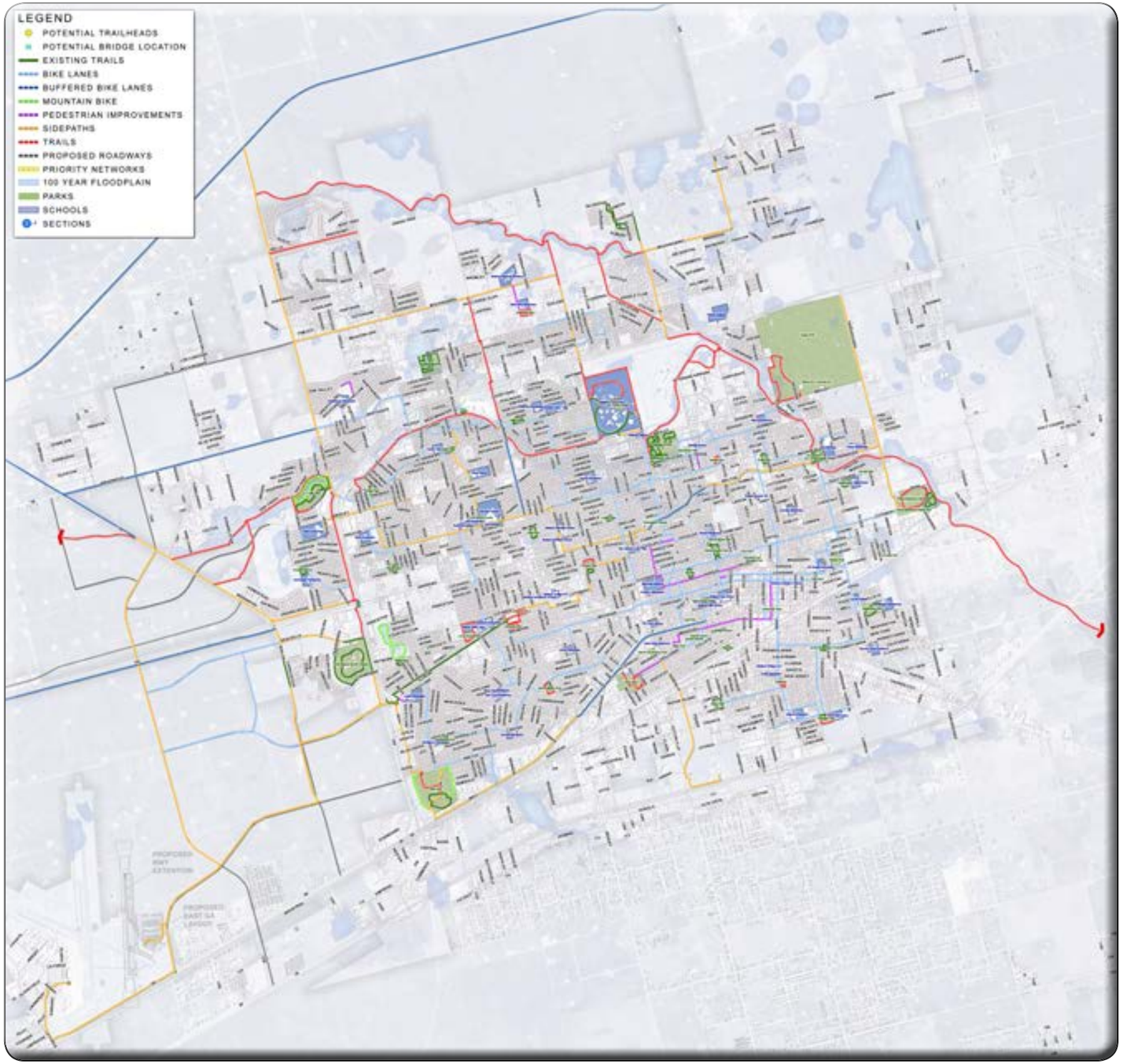


Table 5.1 Proposed Trails				
Name	**From**	**To**	**Length (in l.f.)**	**Priority**
158 Trail Extension	West Midland	West of CR 1250	4,420	Long Term
Airpark Drainage Trail	Foundation Blvd.	Big Spring St.	10,990	High
Airpark Trail	A St.	Big Spring St.	3,250	High
Beal Park Trail	Inside Beal Park	Inside Beal Park	2,440	High
CJ Kelly Park to 158	Hwy. 158	Crowley Blvd.	8,320	High
CJ Kelly Park	Within CJ Kelly Park	Within CJ Kelly Park	6,370	Long Term
Cowden Park	Within Cowden Park	Within Cowden Park	1,770	High
Doug Russell Perimeter	Within Doug Russel Park	Within Doug Russel Park	3,930	Long Term
Dunagan Park Trail	Within Dunagan Park	Within Dunagan Park	1,870	Long Term
Fairgrounds Perimeter	Within Reyes Mashburn Nelms Park	Within Reyes Mashburn Nelms Park	4,420	Long Term
Garfield St.	Loop 250	Chaparral Cir.	2,230	High
Garrett Brown Park	Within Garrett Brown Park	Within Garrett Brown Park	1,640	Long Term
Green Tree to Saddle Club Trail	Holiday Hill	A St.	10,880	Long Term
Greentree Blvd.	Holiday Hill	Midland Dr.	5,350	Long Term
Halff Park Trail	Within Halff Park	Within Halff Park	1,000	Long Term
Hogan Park Alternate	Within Hogan Park	Within Hogan Park	3,130	Long Term
Hogan Park Perimeter	Within Hogan Park	Within Hogan Park	16,390	Long Term
Jal Draw Crossing	Midland Park Mall	Jal Draw	210	Long Term
Jal Draw	Tremont Ave.	Haynes Ave.	11,370	High
Jal Draw	Midkiff Rd.	Chaparral Cir.	6,710	Long Term
Lancaster Park Perimeter	Within Lancaster Park	Within Lancaster Park	6,270	Long Term
Loop 250	Holiday Hill	Wadley Ave.	1,660	High
Loop 250	Wadley Ave.	Andrews Hwy.	5,410	High
Loop 250	Andrews Hwy.	Scharbauer Sports Complex	2,730	Long Term
Midkiff Rd.	Mockingbird Ln.	Moss Ave.	7,660	High
Midland College Perimeter 1	Garfield St.	Foundation Blvd.	5,320	High
Midland College Perimeter 2	Siesta Ln.	Woodland Community Theater Sidepath	3,310	Long Term
Midland Draw	Big Spring St.	Lamesa Rd.	5,220	High
Mockingbird Drainage	Green Tree to Saddle Club Trail	A St.	5,430	Long Term
N Garfield St. Extension	Green Tree to Saddle Club Trail	Texland Cir.	1,080	High
Northern Easement	West of Midkiff Rd.	Garfield St.	8,900	Long Term
Nueva Vista GC Trail	Hwy. 158	CJ Kelly Park Trail Connection	5,210	Long Term
Santa Rita Park	Whitman Dr.	Santa Rita Park	2,110	Long Term
Scharbauer Drainage Extension	Scharbauer Dr.	City Limits	22,090	High
Sidwell Park Trail	Within Sidwell Park Trail	Within Sidwell Park Trail	1,360	Long Term
Sun Garden Village Drainage	Wadley Ave.	Magnolia Ave.	4,110	High
Tumbleweed Park Trail	Wadley Ave.	Ventura Dr.	1,500	Long Term
Ulmer Park Trail	Within Ulmer Park	Within Ulmer Park	3,360	Long Term

Table 5.2 Proposed Sidepaths

Name	From	To	Length (in l.f.)	Priority
Airport Connection	Midland Airport Route	Midland Airport	2,400	Long Term
Andrews Hwy.	Hwy. 158	Loop 250	4,630	Long Term
Beal to Westridge	Loop 250	Beal Park	5,430	High
Beal Park	Anetta Dr.	Wall St.	3,730	High
Cowden Park to Golf Course Rd.	Maberry St.	Golf Course Rd.	3,940	High
Deauville Blvd.	Avalon Dr.	Scharbauer Sports Complex	4,240	Long Term
Essex Park Connection	Jal Draw	Essex Park	700	Long Term
Fairgrounds Rd.	Loop 250	Cuthbert Ave.	13,120	High
Farm Rd. 1369	Green Tree to Saddle Club Trail	Mockingbird Ln.	8,920	High
Foundation Blvd.	Chaparral Cir.	Wadley Ave.	1,330	High
Future West Road	Hwy. 158	Midland Airport Route	20,500	Long Term
Garfield St.	Holloway Ave.	Petroleum Museum	10,270	Long Term
Godfrey St.	St. Andrews Dr.	Neely Ave.	4,740	High
Godfrey St. North	Haynes Ave.	St. Andrews Dr.	1,390	High
Golf Course Rd.	Northrup Dr.	Scharbauer Dr.	5,160	Long Term
Holiday Hill	Mockingbird Ln.	Loop 250	9,670	High
Hwy. 158	West of CR 1250	Deauville Blvd.	10,940	High
Jal Draw Crossing	Haynes Ave.	Reo Dr.	960	Long Term
Lancaster to Cowden Park	Lancaster Park	Cowden Park	5,850	High
Legend Park Connection	Deauville Blvd.	Hall of Fame Blvd.	2,670	High
Midland Airport Route	Hall of Fame Blvd.	Midland Airport	34,790	High
Mockingbird Ln.	Holiday Hill	Garfield St.	15,970	High
Mockingbird Ln.	A St.	SH 349	5,440	High
Mockingbird Ln.	Garfield St.	A St.	6,040	High
N A st.	Mockingbird Ln.	Loop 250	5,360	High
N Farm Rd. 1369	Craddick Hwy.	Green Tree to Saddle Club Trail	2,930	Long Term
N Garfield St.	Texland Cir.	Loop 250	4,800	High
Neely Ave.	Whittle Way	Northrup Dr.	10,230	High
Northrup Dr.	Neely Ave.	Golf Course Rd.	2,730	Long Term
Scharbauer Dr.	A St.	MLK Park	7,910	High
Scharbauer Dr. East	Pease Elementary	Fairgrounds Rd.	1,560	Long Term
Scharbauer Sports Underpass	Scharbauer Sports Complex	Loop 250	2,480	High
SH 349	Arapahoe Rd.	Mockingbird Ln.	4,600	High
Thomason Dr. Extension	Midland Airport Route	Loop 250	5,350	High
W Wadley Ave.	Abell Junior High	Mark Ln.	6,040	Long Term
Wall St.	Beal Pkwy.	Midkiff Rd.	10,470	High
Whittle Way	Wadley Ave.	Neely Ave.	2,430	High
Woodland Community Theater	Woodland Community Theater	Foundation Blvd.	1,300	Long Term

Table 5.3 Proposed Pedestrian Sidewalk Improvements				
Name	**From**	**To**	**Length (in l.f.)**	**Priority**
A St.	Dormard Ave.	Neely Ave.	1,170	Long Term
Douglas Ave.	L St.	H St.	1,430	Long Term
Greathouse Elem	Oak Valley Dr.	Mathis St.	2,530	Long Term
Holloway Ave.	Ulmer Park	Missouri Ave.	4,330	High
House Park	Illinois Ave.	Shadylane Dr.	520	Long Term
Houston Elementary	N St.	Kansas Ave.	1,730	Long Term
L St.	Douglas Ave.	Cuthbert Ave.	1,870	Long Term
Loraine St.	Michigan Ave.	Missouri Ave.	2,290	High
Missouri Ave.	K St.	Main St.	5,970	High
Scharbauer Dr.	MLK Park	Pease Elementary	1,970	Long Term
W Kansas Ave.	K St.	Marienfeld St.	5,370	Long Term
W Louisiana Ave.	B St.	A St.	390	Long Term
Whitman Dr.	Mockingbird Ln.	Santa Rita Park	1,580	Long Term

Table 5.4 Proposed Mountain Biking Trails				
Name	**From**	**To**	**Length (in l.f.)**	**Priority**
Beal Park MB1	Inside Beal Park Westside	Inside Beal Park Westside	2,750	Long Term
Beal Park MB2	Inside Beal Park Eastside	Inside Beal Park Eastside	2,550	Long Term
CJ Kelly Park	Inside CJ Kelly Park	Inside CJ Kelly Park	5,760	Long Term
House Park	North of House Park	North of House Park	6,160	Long Term

Table 5.5 Proposed Bike Lanes

Name	From	To	Length (in l.f.)	Priority
Anetta Dr.	Reeves Cir.	Midland Dr.	4,270	Long Term
Avondale Dr.	Leddy Dr.	Delano Ave.	2,220	Long Term
B St.	Douglas Ave.	Tennessee Ave.	3,550	Long Term
Baird St.	Louisiana Ave.	Michigan Ave.	400	Long Term
Benton St.	Oak Ave.	Golf Course Rd.	2,980	Long Term
Bentwood Dr.	Existing Powerline Trail	Anetta Dr.	5,570	Long Term
Briarwood Ave.	Holiday Hill	Midland Dr.	5,500	Long Term
Broadway St.	Community Ln.	Wall St.	6,790	High
Crestview Rd.	Michigan Ave.	Delano Ave.	2,690	Long Term
Crowley Blvd.	Highland Blvd.	Hereford Blvd.	2,320	Long Term
Crowley Blvd.	CR 60	Pedernales Dr.	2,800	High
Cuthbert Ave.	Jackson St.	Fairgrounds Rd.	2,970	Long Term
Deauville Extension	Future West Road	Avalon Dr.	8,480	Long Term
Delano Ave.	Waverly Dr.	Ulmer Park	7,120	Long Term
Dengar Ave.	Windlands Park	Dormard Ave.	3,650	Long Term
Devonian Dr.	Versailles Dr.	Raymond Rd.	1,250	High
Douglas Ave.	H St.	B St.	1,940	Long Term
E Louisiana Ave.	A St.	Carver St.	7,150	High
E Michigan Ave.	B St.	Fort Worth St.	4,840	Long Term
E Michigan Ave.	Fort Worth St.	Mineola St.	1,190	Long Term
E Neely Ave.	I St.	Pecos St.	4,440	Long Term
Edwards St.	Lamesa Rd.	Dormard Ave.	2,050	Long Term
Future west area road	Deauville Extension	Thomason Dr. Extension	4,810	Long Term
Garden Ln.	Tyler St.	Jackson St.	1,520	Long Term
Golf Course Rd.	Carver St.	Benton St.	2,110	Long Term
Graceland Dr.	Bentwood Dr.	Meadow Dr.	2,330	Long Term
Haynes Ave.	Jal Draw	Godfrey St.	1,880	Long Term
Hereford Blvd.	Crowley Blvd.	Andrews Hwy.	2,020	Long Term
Hicks Ave.	Main St.	Mineola St.	2,760	High
Holloway Ave.	L St.	Missouri Ave.	2,200	Long Term
I St.	Scharbauer Dr.	Douglas Ave.	1,880	High
Jackson St.	Cuthbert Ave.	Garden Ln.	760	Long Term
Kiwanis Park	Godfrey St.	Ward St.	5,780	High
Lehigh Dr.	Haynes Ave.	St. Andrews Dr.	4,140	Long Term
Louisiana Ave.	Andrews Hwy.	B St.	6,730	Long Term
Magnolia Ave.	Edwards St.	Benton St.	5,530	Long Term

Table 5.5 Proposed Bike Lanes				
Name	**From**	**To**	**Length (in l.f.)**	**Priority**
Main St.	Washington Ave.	Stokes Ave.	5,460	High
Main St.	Tennessee Ave.	Front St.	2,150	High
Mathis St.	Woodhollow Dr.	Briarwood Ave.	790	Long Term
McDonald St.	Neely Ave.	Avondale Dr.	9,940	High
Michigan Ave.	Lancaster Park	Crestview Rd.	3,390	High
Midland Dr. Hwy Crossing	Briarwood Ave.	Midland Draw	2,270	Long Term
Midland High School	B St.	Missouri Ave.	3,330	Long Term
Mineola St.	New York Ave.	Gist Ave.	4,140	High
N Carver St.	Golf Course Rd.	New York Ave.	9,360	High
N Carver St.	Scharbauer Drainage Extension	Golf Course Rd.	900	High
N Colorado St.	Louisiana Ave.	Missouri Ave.	2,670	Long Term
N Garfield St.	Maxwell Dr.	Jal Draw	820	Long Term
N Lamesa Rd.	Walnut Ln.	Lousiana Ave.	1,200	Long Term
N Loraine St.	Louisiana Ave.	Michigan Ave.	390	High
N Tyler St.	Garden Ln.	Orchard Ln.	1,530	Long Term
Neely Ave.	Northrup Dr.	I St.	5,990	High
New York Ave.	Main St.	Carver St.	5,080	High
Nobles Ave.	Fairgrounds Rd.	San Andres Dr.	3,790	Long Term
North Main St.	Wadley Ave.	Louisiana Ave.	9,810	Long Term
Pioneer Park	Preston Dr.	Neely Ave.	5,930	Long Term
Polo/Castleford/Bluebird	Melville Dr.	Castleford Rd.	6,870	High
Raymond Rd.	Avondale Dr.	Canyon Dr.	2,720	High
Reyes-Mashburn-Nelms Park	Within Reyes-Mashburn-Nelms Park	Within Reyes-Mashburn-Nelms Park	2,420	Long Term
S Midland Dr.	Versailles Dr.	Wall St.	3,160	High
Scharbauer Dr.	Golf Course Rd.	A St.	4,240	High
Shandon/Barber	Lamesa Rd.	Dormard Ave.	1,550	Long Term
Thomason Dr. Extension	Future West Road	Midland Airport Route	8,460	Long Term
Versailles Dr.	Meadow Dr.	Devonian Dr.	1,960	High
W Dormard Ave.	I St.	Pecos St.	4,600	Long Term
W Michigan Ave.	Kent St.	B St.	5,380	Long Term
W Michigan Ave.	Midkiff Rd.	Kent St.	4,910	Long Term
Walnut Ln.	Lamesa Rd.	Tyler St.	790	Long Term
Ward St.	Haynes Dr.	Wadley Ave.	2,620	High
West Broadway	Storey Ave.	Ohio Ave.	2,150	Long Term
Whittle Way	Tremont Ave.	Wadley Ave.	610	High

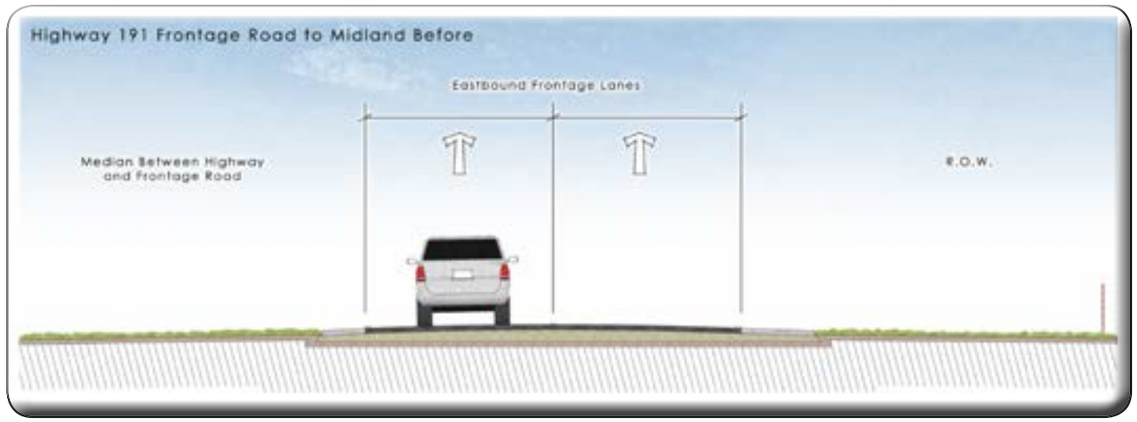
Table 5.6 Proposed Buffered Bike Lanes				
Name	**From**	**To**	**Length (in l.f.)**	**Priority**
158 Extension	Craddick Hwy.	West of CR 1250	14,260	Long Term
County Rd. 60	Hwy. 158	Holiday Hill	15,340	Long Term
Craddick Hwy.	Hwy. 158	FM 349	56,750	Long Term
Crowley Blvd.	Hereford Blvd.	Loop 250	2,260	Long Term
Crowley Blvd.	Pedernales Dr.	Highland Blvd.	3,570	High
Hwy. 191 to Odessa	FM 1788	Avalon Dr.	27,480	Long Term
League Dr.	Crowley Blvd.	Holiday Hill Rd.	2,750	Long Term
Main St.	Front St.	Washington Ave.	930	High
N Midkiff Rd.	Moss Ave.	Neely Ave.	5,820	Long Term
Wall St.	Midkiff Rd.	F St.	9,840	High

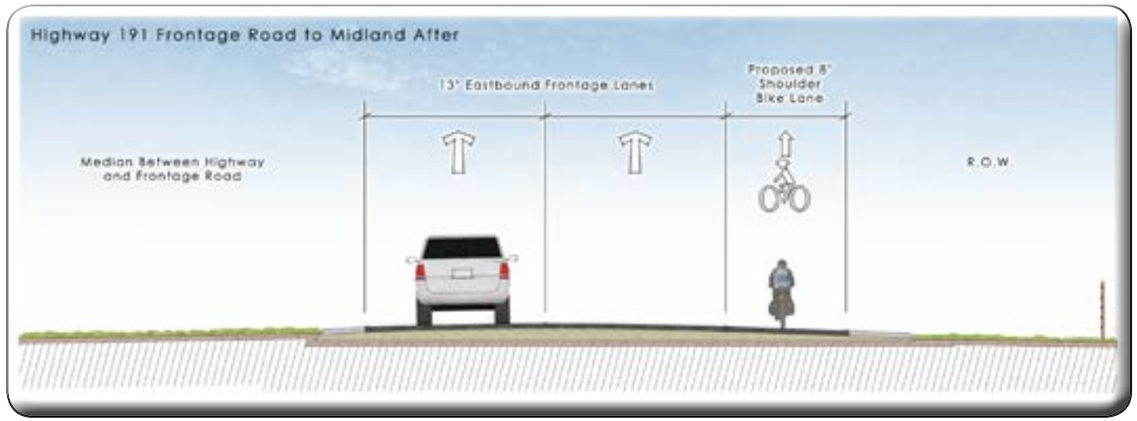
Table 5.7 Proposed Sharrows				
Name	**From**	**To**	**Length (in l.f.)**	**Priority**
Anetta Dr.	Midland Dr.	Waverly Dr.	2,520	Long Term
Castleford/Melville	Bluebird Ln.	Garfield St.	3,470	High
Cuthbert East	B St.	Jackson St.	8,150	Long Term
Dentcrest	Mark Ln.	Tremont Ave.	1,370	Long Term
I St.	Wadley Ave.	Scharbauer Dr.	5,030	High
Kent St.	Louisiana Ave.	Michigan Ave.	430	Long Term
Louisiana Ave.	Godfrey St.	Andrews Hwy.	6,180	Long Term
Main St.	Louisiana Ave.	Tennessee Ave.	730	High
Maxwell Dr.	Ward St.	Garfield St.	2,670	Long Term
N St.	Neely Ave.	Cuthbert Ave.	5,490	Long Term
Pecos St.	Dormard Ave.	Neely Ave.	1,530	Long Term
St. Andrews Dr.	Mark Ln.	Godfrey St.	3,680	Long Term
Tradewinds Blvd.	Legends Blvd.	Thomason Dr.	3,140	Long Term
Tremont Ave.	Loop 250	Dentcrest Dr.	3,210	High
W Cuthbert Ave.	K St.	B St.	3,310	Long Term
W Dormard Ave.	Pecos St.	Barber St.	3,210	Long Term
Ward St.	Wadley Ave.	Neely Ave.	2,610	High

Key Corridors

More than 175 segments are contained in this master plan. The following pages describe many of the key corridors using detailed trail plates, cross section schematics and before/after illustrations.

Highway 191 Frontage Road - The existing frontage road of Highway 191 is already being used by cyclists to train long distances. Many competitive cyclists will ride to Odessa and back along this road because it is one of the few places for long distance riding in the area. Improvements to this road will greatly increase the safety and level of comfortable for bicycling on this road, both for cyclists and motor vehicles. It is recommended that the city, in conjunction with TxDOT, widen and pave the shoulder area of this road to be eight feet in width in order to provide an adequate bicycle facility.

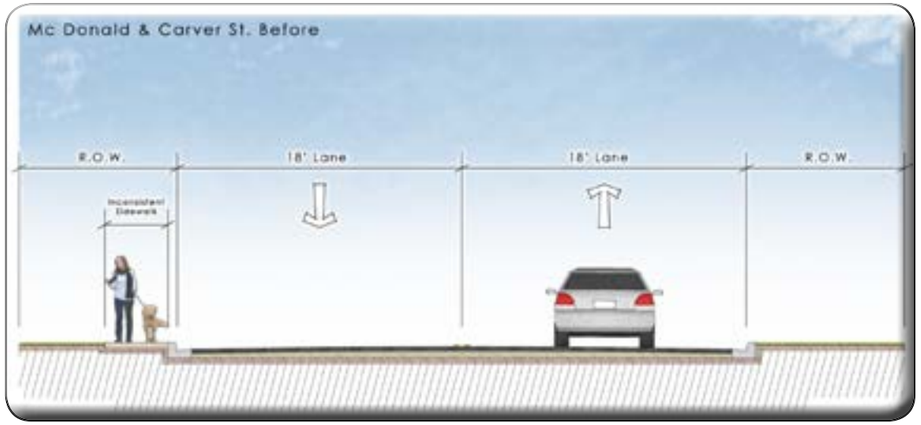


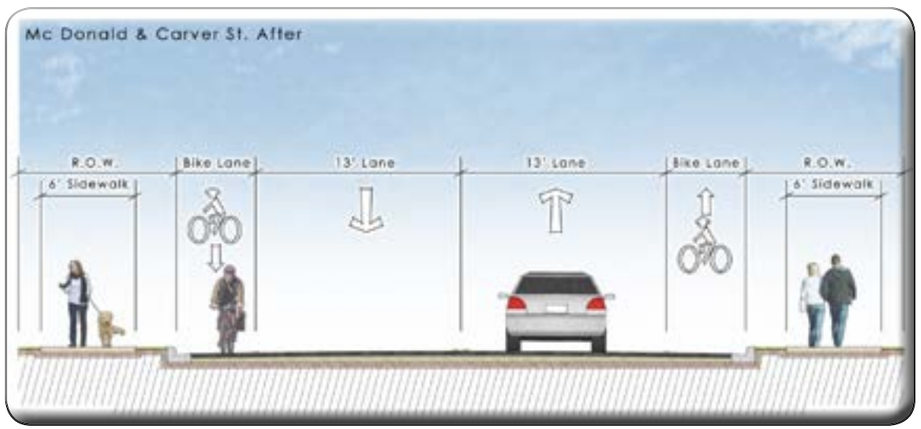


McDonald Street - A bike lane is proposed along McDonald Street from Neely Avenue to Avondale Drive. A lane diet is recommended to add the bike lane facility. The existing vehicle travel lanes are 18' wide in both directions. The lane diet proposes reducing the vehicle lanes to 13' then adding a 5' bike lane.

It is also recommended that the sidewalks be improved to fill in the gaps and create a 6' continuous pedestrian sidewalk along both sides of the roadway.

This scenario could be replicated throughout different neighborhoods in Midland where it is recommended to add a bike lane.





Beal Park to Existing Power Line Trail - The existing trail along the power line corridor in the western portion of the city is one of the premier trails in Midland. Connecting Beal Park to this trail will create a network for the western portion of the city. A sidepath is proposed along Beal Parkway as that road is expanded and developed. The sidepath will then have to cross Thomason Drive to connect to the existing trail.

BEAL PARK

LOCATION MAP

LEGEND

- POTENTIAL TRAILHEADS
- EXISTING TRAILS
- PROPOSED BIKE LANES
- PROPOSED BUFFERED BIKE LANES
- PROPOSED MOUNTAIN BIKE TRAILS
- PROPOSED PEDESTRIAN IMPROVEMENTS
- PROPOSED SIDEPATHS
- PROPOSED SHARROWS
- PROPOSED TRAILS
- PROPOSED ROADWAYS
- 100 YEAR FLOODPLAIN
- PARKS
- SCHOOLS

HALFF

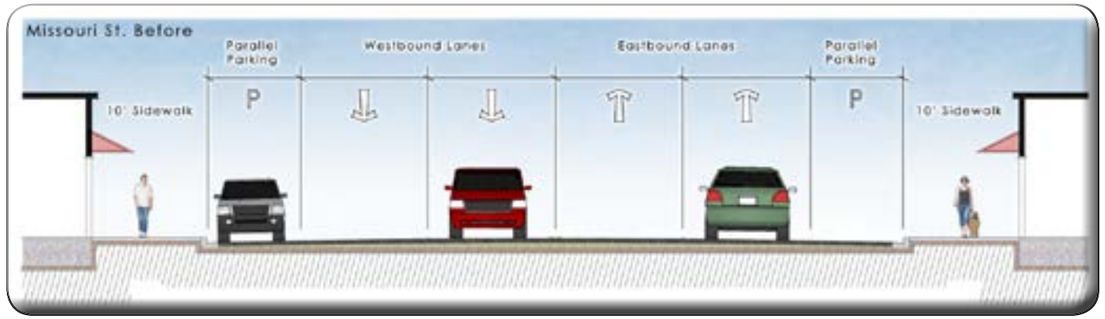
0 250 500 1,000 1,500 2,000 Feet

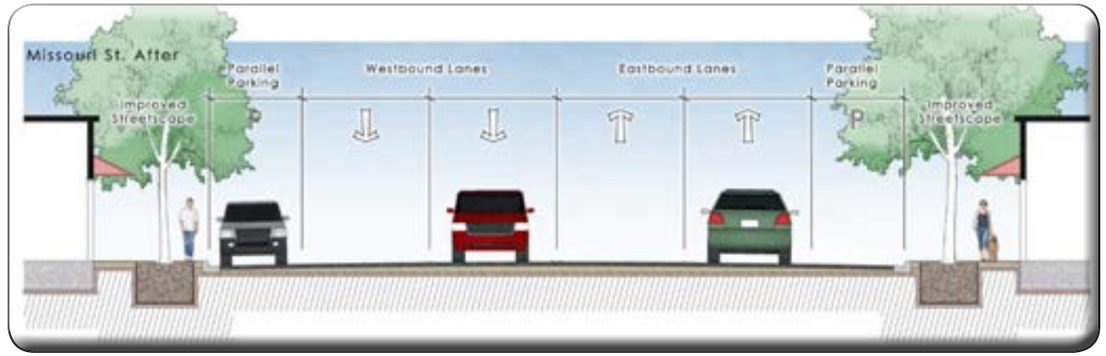
N

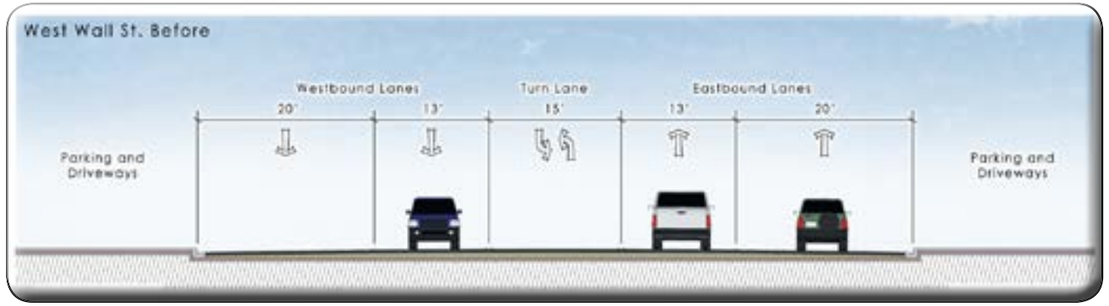
Downtown - The downtown area is one of the key destinations in Midland. Connecting to downtown with a series of pedestrian and bicycle facilities is needed. Several streets within the downtown area are being proposed with improvements to improve the overall usefulness as pedestrian and bicycle corridors.

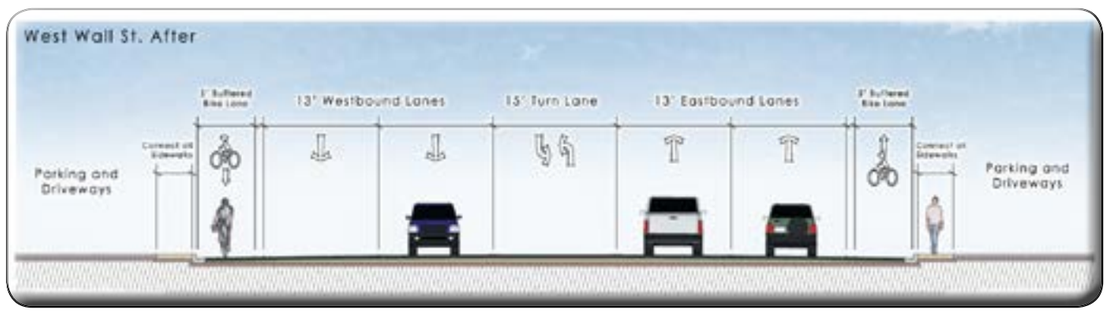
Pedestrian sidewalk improvements are proposed along Holloway and Missouri. The before/after cross section to the top right illustrates the proposed pedestrian improvements to Missouri Street.

A buffered bike lane is proposed along Wall Street leading into the downtown area. The buffered bike lane would reduce the outside travel lane from 20' to 13' for vehicles, allowing the additional width to be converted into a 5' bike lane with a 2' striped buffer. A before/after illustration is shown on the bottom right.









DOWNTOWN

HALFF

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

N

LEGEND

- POTENTIAL TRAILHEADS
- EXISTING TRAILS
- PROPOSED BIKE LANES
- PROPOSED BUFFERED BIKE LANES
- PROPOSED MOUNTAIN BIKE TRAILS
- PROPOSED PEDESTRIAN IMPROVEMENTS
- PROPOSED SIDEPATHS
- PROPOSED SHARROWS
- PROPOSED TRAILS
- PROPOSED ROADWAYS
- 100 YEAR FLOODPLAIN
- PARKS
- SCHOOLS

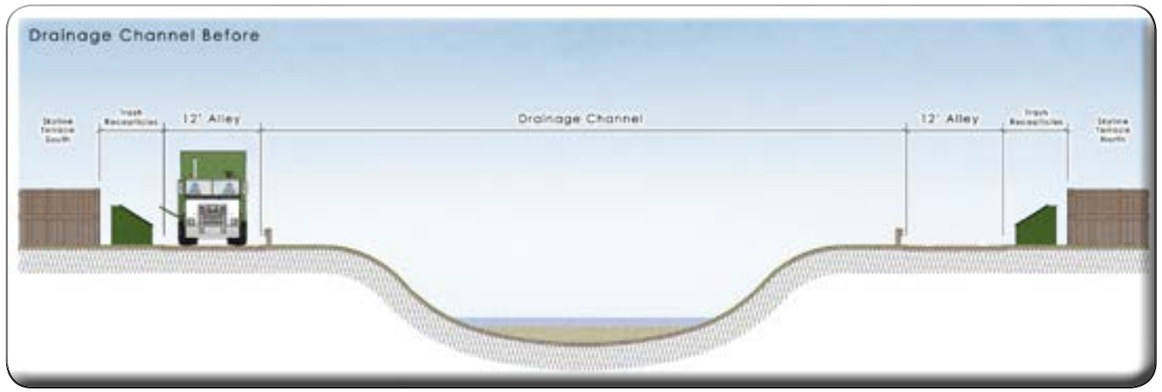
LOCATION MAP

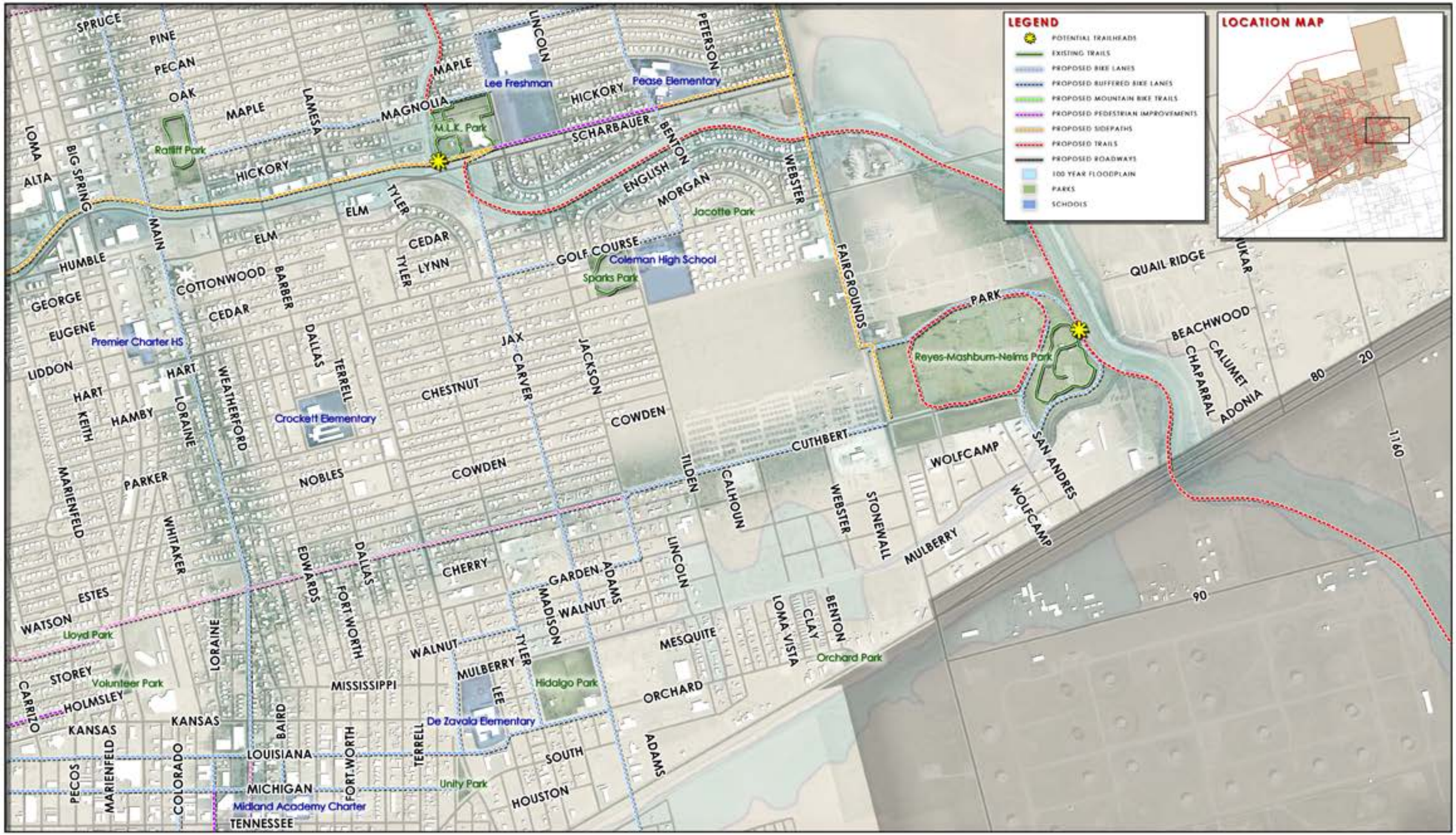
Volunteer Park
Hidalgo Park
De Zavala Elementary
Hill Park
Memorial Stadium
Houston Elementary
Midland Academy Charter
Unity Park
Midland High School
MHS Tennis Facility
Centennial Plaza
Carver Center
Washington Elementary
Washington Park
Crier Park
St. Ann's School
College Avenue
Indiana Islands
West Early Childhood
Haley Park
Dennis the Menace Park
Elkin Park
James M. Bradford Park
Bunche Early Childhood
Midland College CLC
South Elementary
Ulmer Park
Taylor Park
Halff Park
Dunagan Park

SPARKS, BEDFORD, COUNTRY CLUB, CUTHBERT, STOREY, KANSAS, MOGFORD, GARFIELD, BROADWAY, EAST BROADWAY, MICHIGAN, SAN ANGELO, PECOS, LORAINE, LOUISIANA, ORCHARD, SOUTH ADAMS, MADISON, HOUSTON, DAVIS, INDUSTRIAL, JESSE, TEXAS, WILLEYS, CALHOUN, AINSLEE, KENT, TENNESSEE, OHIO, ILLINOIS, CARRIZO, MARIENFELD, COLORADO, BAIRD, WEATHERFORD, FORT WORTH, DALLAS, WALL, CARVER, TILDEN, ANDREWS, SUNSET, SECOR, DODSON, META, PLAZA, CIRCLE, MITCHELL, ROOSEVELT, FRANKLIN, DELANO, GOSSETT, INDIANA, KENTUCKY, WASHINGTON, BIG SPRING, MISSOURI, MARSHALL, INDIANA, KENTUCKY, LEE, TYLER, WASHINGTON, JACKSON, LINCOLN, NEW YORK, PENNSYLVANIA, CALIFORNIA, ATLANTA, CLOVERDALE, ELIZABETH, BRUNSON, HOLLOWAY, COLLEGE, ALICE MANN, KEY, CLARK, CARLTON, BURLESON, BALDWIN, GARFIELD, WASHINGTON, FRONT, MORAN, CONNELL, DAKOTA, NEW JERSEY, FLORIDA, GOODE, JOHNSTON, PRATT, MCKENZIE, CAMP, RHODE ISLAND, BELMONT, COLORADO, GRIFFIN, COLLINS, CONNELL, RANKIN, TAYLOR, LORAINE, FRANCIS, MAIN, HICKS, CARTER, COTTON FLAT, MCGARVEY, MANN, KEY, COLLEGE

East Midland - When Midland Draw passes through the eastern portion of the city, especially east of Fairgrounds Road, it is mainly undeveloped and unconstrained. A trail is proposed along the draw to connect to Reyes-Mashburn-Nelms Park and a proposed trailhead location.

East of Fairgrounds Road, Midland Draw is more developed and constrained between houses. A trail is proposed to parallel the existing alley on the south side of the draw. The trail will have to be engineered onto the top of the draw without impacting the flow of rainfall.





HALFF

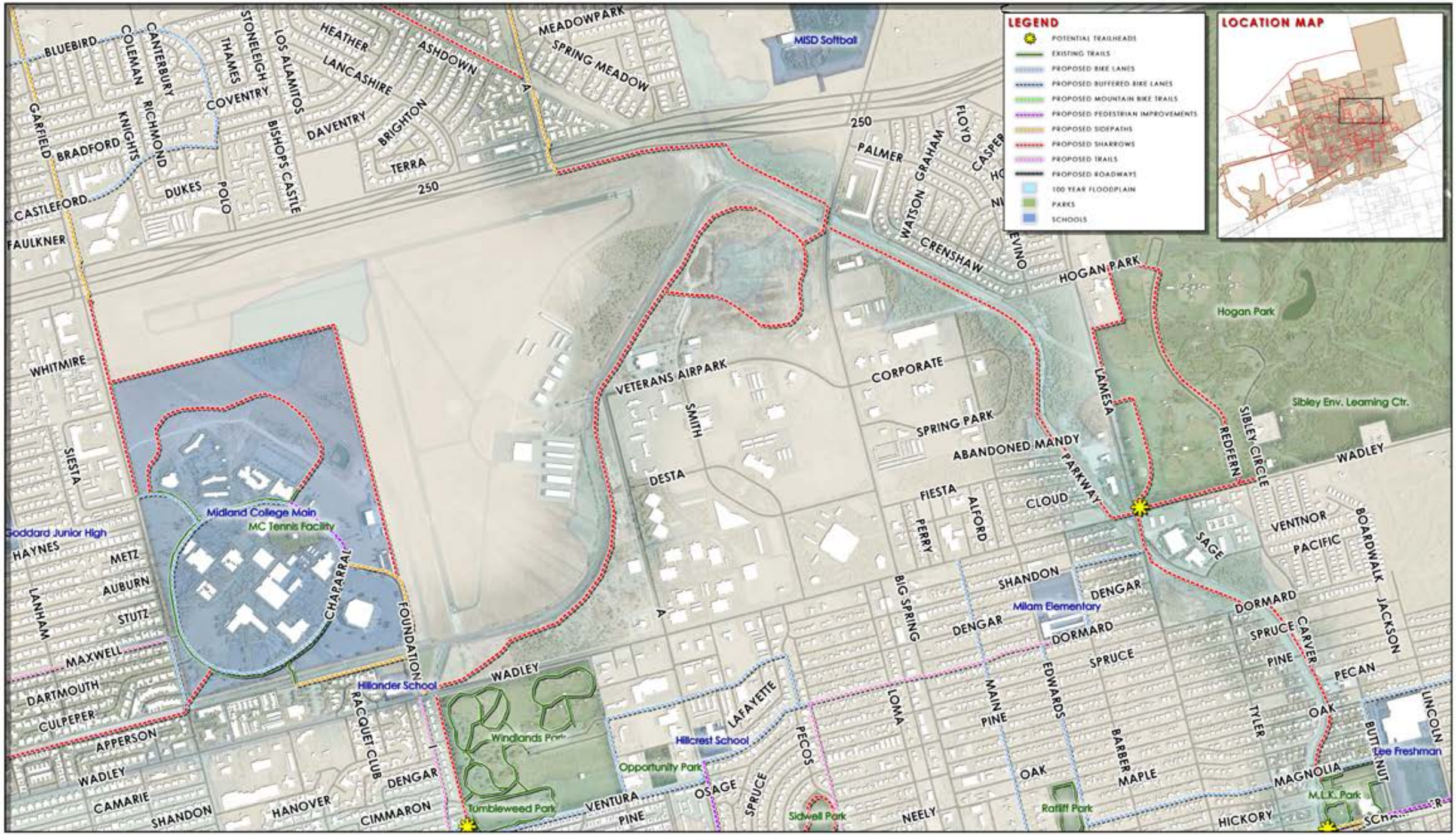
EAST

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

N

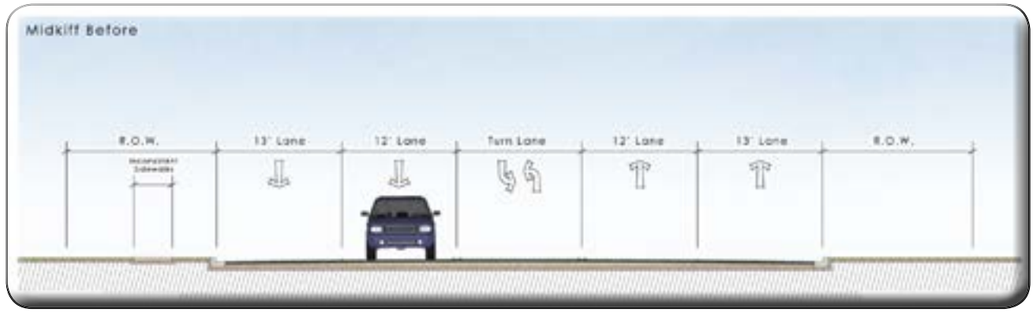
Midland College and Airpark Trail - Improved facilities are recommended around Midland College in order to make it easier to walk or bicycle to this popular destination. Trails are recommended surrounding the property, as well as a bike lane within the internal loop around the college.

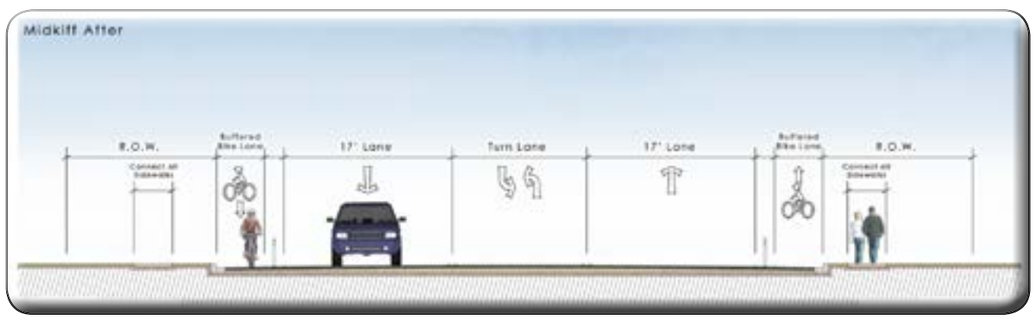
The Midland Airpark Trail is a key facility that is recommended along the southeast perimeter of the airport property. It connects to the proposed trail along Midland Draw which will connect to Hogan Park. It also connects to the neighborhoods north of Loop 250 by crossing under the highway at North A Street. Improved pedestrian facilities such as signaled crosswalks and advanced warning signs are needed when the trail crosses the frontage roads of Loop 250.


LEGEND
POTENTIAL TRAILHEADS
EXISTING TRAILS
PROPOSED BIKE LANES
PROPOSED BUFFERED BIKE LANES
PROPOSED MOUNTAIN BIKE TRAILS
PROPOSED PEDESTRIAN IMPROVEMENTS
PROPOSED SIDEPATHS
PROPOSED SHARROWS
PROPOSED TRAILS
PROPOSED ROADWAYS
100 YEAR FLOODPLAIN
PARKS
SCHOOLS
LOCATION MAP
MISD Softball
BLUEBIRD
COLEMAN
CANTERBURY
THAMES
STONELEIGH
LOS ALAMITOS
HEATHER
LANCASHIRE
ASHDOWN
MEADOWPARK
SPRING MEADOW
GARFIELD
BRADFORD
KNIGHTS
RICHMOND
COVENTRY
BISHOPS CASTLE
DAVENTRY
BRIGHTON
TERRA
250
CASTLEFORD
DUKES
POLO
FAULKNER
PALMER
WATSON
GRAHAM
FLOYD
CRENSHAW
EVINO
HOGAN PARK
Hogan Park
WHITMIRE
VETERANS AIRPARK
SMITH
CORPORATE
SPRING PARK
ABANDONED MANDY
LAMESA
REDFERN
SIBLEY CIRCLE
Sibley Env. Learning Ctr.
WADLEY
DESTA
FIESTA
ALFORD
PERRY
CLOUD
PARKWAY
SAGE
VENTNOR
PACIFIC
BOARDWALK
JACKSON
SIESTA
Midland College Main
MC Tennis Facility
Goddard Junior High
HAYNES
METZ
AUBURN
STUTZ
LANHAM
CHAPARRAL
FOUNDATION
SHANDON
DENGAR
Milam Elementary
DORMARD
SPRUCE
CARVER
PINE
PECAN
LINCOLN
BUTTNUT
Lee Freshman
BIG SPRING
MAXWELL
DARTMOUTH
CULPEPER
APPERSON
CAMARIE
HANOVER
SHANDON
CIMMARON
RACQUET CLUB
Hillander School
WADLEY
Windlands Park
Tumbleweed Park
LAFAYETTE
Hillcrest School
Opportunity Park
PECOS
OSAGE
SPRUCE
VENTURA
PINE
LOMA
MAIN
EDWARDS
BARBER
MAPLE
OAK
TYLER
MAGNOLIA
HICKORY
NEELY
Sidwell Park
Ratliff Park
M.L.K. Park
HALFF
MIDLAND COLLEGE & AIRPARK
0 250 500 1,000 1,500 2,000
Feet
N

Midland Draw - Midland Draw is one of the few opportunities within the city to provide a premier off-street trail facility. The trail is proposed along the south side of the draw to connect the neighborhoods and Home Depot shopping center (see before/after image to the top). A pedestrian bridge is also recommended to connect the trail to Midland Park Mall. East of Midkiff Road, the trail is proposed to run along the northern side of the draw. Then east of Ward Street, the trail crosses again to the south side of the draw and utilizes the alley (see before/after image to the bottom right).

A road diet is proposed along Midkiff Road from Moss Avenue to Neely Avenue in order to add a buffered bike lane. The roadway would be converted from a 13' and 12' vehicle travel lane to one 17' vehicle travel lane with a 5' bike lane and a 3' painted striped buffer zone (see before/after cross section schematic below).





MIDLAND DRAW

HALFF

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

N

LEGEND

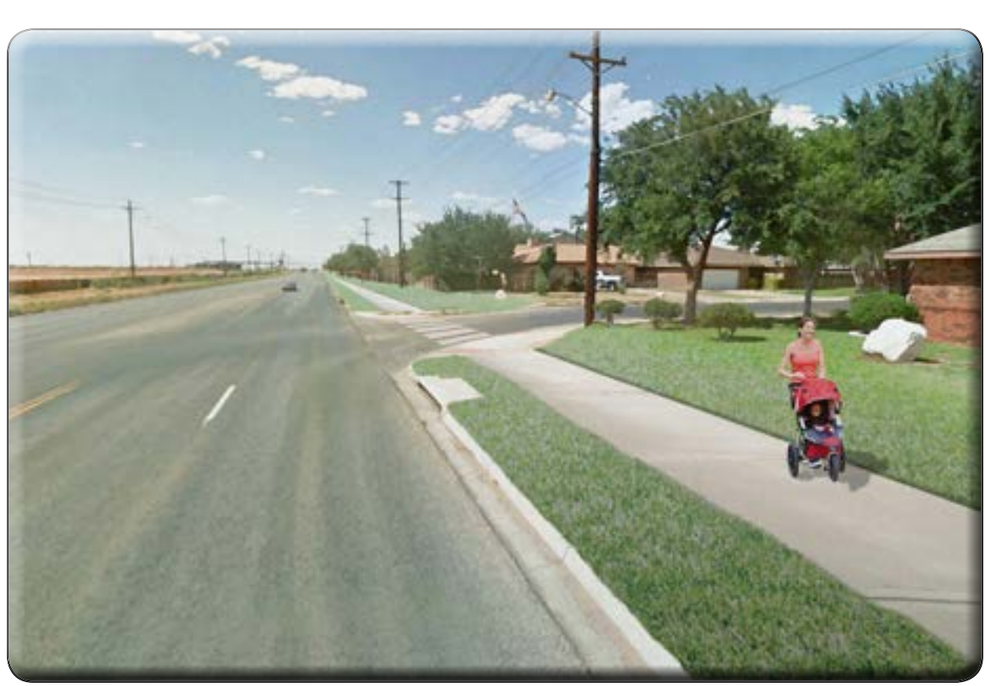
- POTENTIAL TRAILHEADS
- EXISTING TRAILS
- PROPOSED BIKE LANES
- PROPOSED BUFFERED BIKE LANES
- PROPOSED MOUNTAIN BIKE TRAILS
- PROPOSED PEDESTRIAN IMPROVEMENTS
- PROPOSED SIDEPATHS
- PROPOSED SHARROWS
- PROPOSED TRAILS
- PROPOSED ROADWAYS
- 100 YEAR FLOODPLAIN
- PARKS
- SCHOOLS

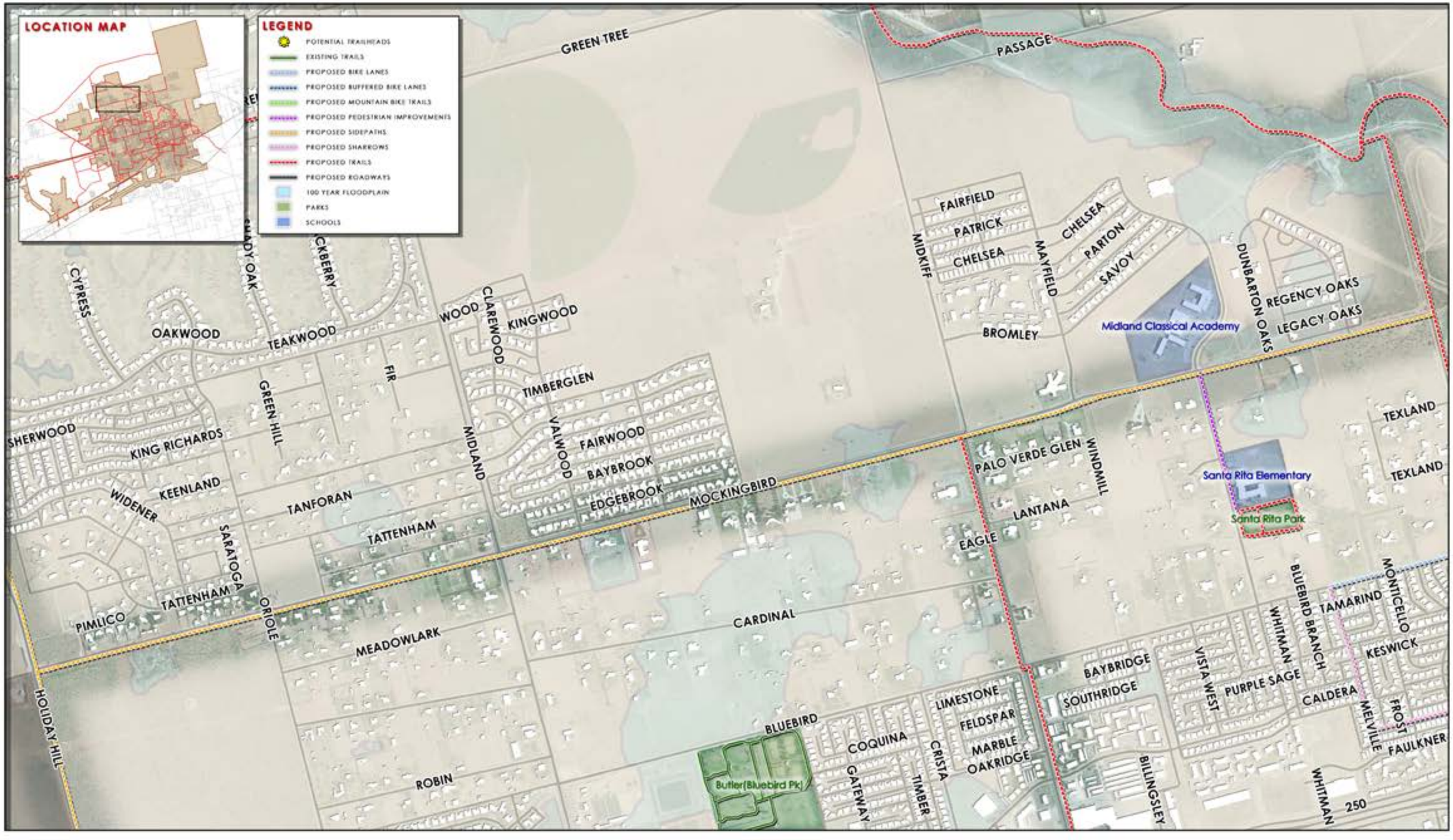
LOCATION MAP

Greathouse Elementary
Emerson Elementary
Goddard Junior High
Midland College
Kiwanis Park
Parker Elementary
Trinity Park
Trinity School
Lee High School
LHS Tennis Facility
Lee Vocational
Rusk Elementary
Lee Parking
Fannin Elementary
Essex Park
Bush Elementary

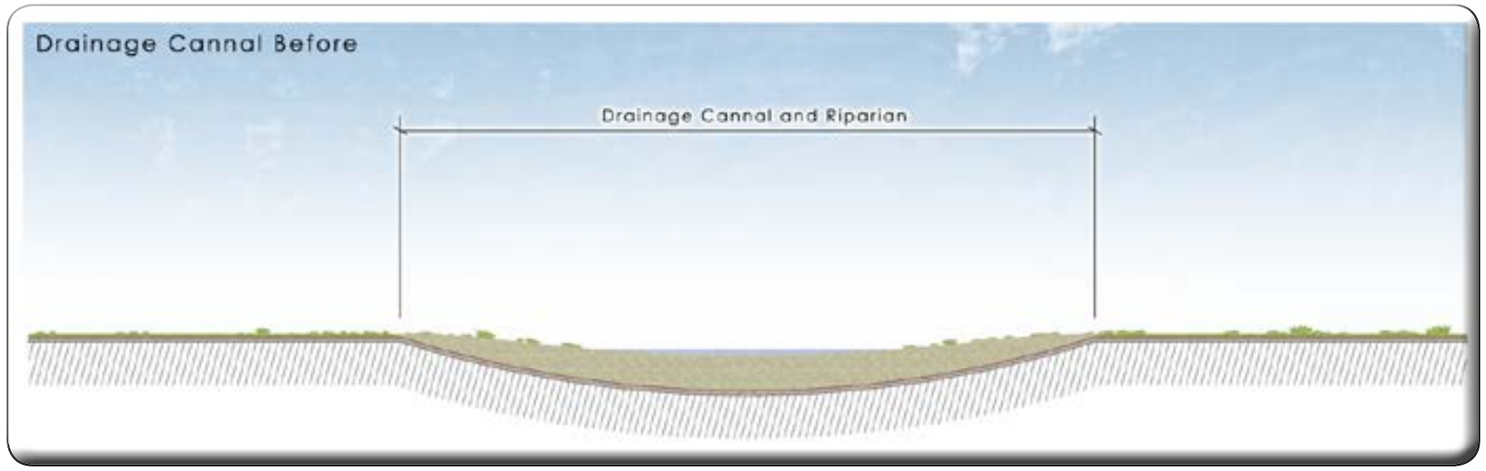
ORIOLE
ROSEWOOD
NORTHCREST
CRESTRIDGE
CRESTGATE
CRESTWOOD
CRESTWAY
FIELDER
CALDERA
BRIARWOOD
YEARWOOD
PORTICO
NORTHGATE
MATHIS
BELTON
CONCHO
CANADIAN
NORTHBROOK
AMISTAD
BRAZOS
SPENCE
RIO GRANDE
LIVINGSTON
250
HENRY KOONTZ
RALEIGH
NAVARRO
LEHIGH
NORWOOD
FARGO
WESTMINSTER
BOULDER
READING
DUNKIRK
COMPTON
DYER
HAYNES
ARROYO
VALLEY
DAWN
MEADOWRIDGE
SKYLINE
TRINITY MEADOWS
NORTHFIELD
WOODHAVEN
QUAIL RUN
ANGELINA
STRATTON
FAIRBANKS
ST ANDREWS
GLENEAGLES
RADCLIFF
WEDGWOOD
STELLAR
GREENBRIAR
TRINITY
CHOATE
WINDSOR
PROVIDENCE
MIDKIFF
APPERSON
CORD
REO
COURTYARD
TEALWOOD
NORTHTOWN
GODDARD
MOSS
METZ
AUBURN
STUTZ
WHITNEY
MARMON
DURANT
MAXWELL
CHATHAM
FAIRFAX
DARTMOUTH
CULPEPER
GARFIELD
LANHAM
INWOOD
BELFIELD
MARINOR
LINDA
WARD
EXETER
ANDOVER
NOEL
EMERSON
SIESTA
FLARE
CAMARIE
SHANDON
DENGAR
CIMMARON
FRONTIER
MABEL
TERRACE
FANNIN
MOORD
FAIRHAVEN
CRESTMONT
EDGEMONT
OAKMONT
SPRINGMONT
TREMONT
SAGEMONT
ROSEMONT
PINEMONT
CLAREMONT
CANEMONT
FAIRGATE
MIDLAND
MAMIES
NELSON
FERNCLIFF
TRINITY HIGHSKY
JORDAN
HYDE PARK
IMPERIAL
SHANDON
STEWART
TARLETON
GODFREY
REBEL
AURORA
SUNCREST
MCDONALD
IMPERIAL
DENGAR
LA SALLE
REES
WADLEY
MARK
RUIDOSO
ASPEN
DENTCREST
ELMA
WHITTLE
SUNBURST
SUNMORE
PRESTON
PHILLIP
CINDY
WYDEWOOD
FREDNA
SEABOARD
STANOLIND
ALICIA
TERRACE
NEELY

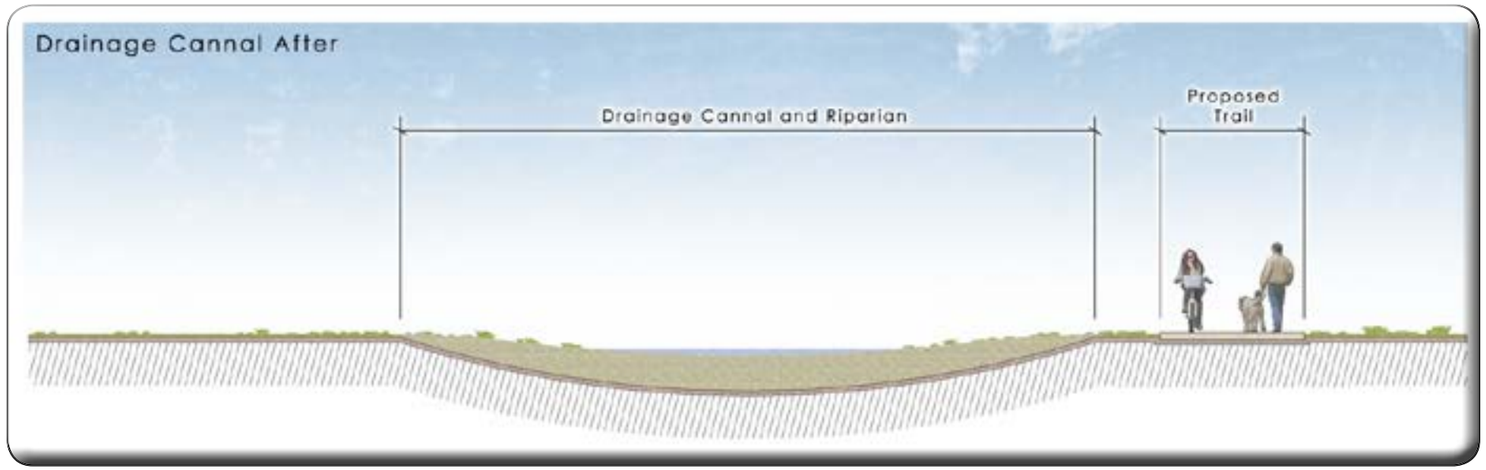
Mockingbird Lane - The northern portion of Midland is still largely undeveloped with wide roadways. Sidepaths are recommended in this area to connect the existing neighborhoods with schools, parks and future development. The before/after illustration to the right shows a sidepath being added along Holiday Hill Road, and a similar design is recommended for Mockingbird Lane.

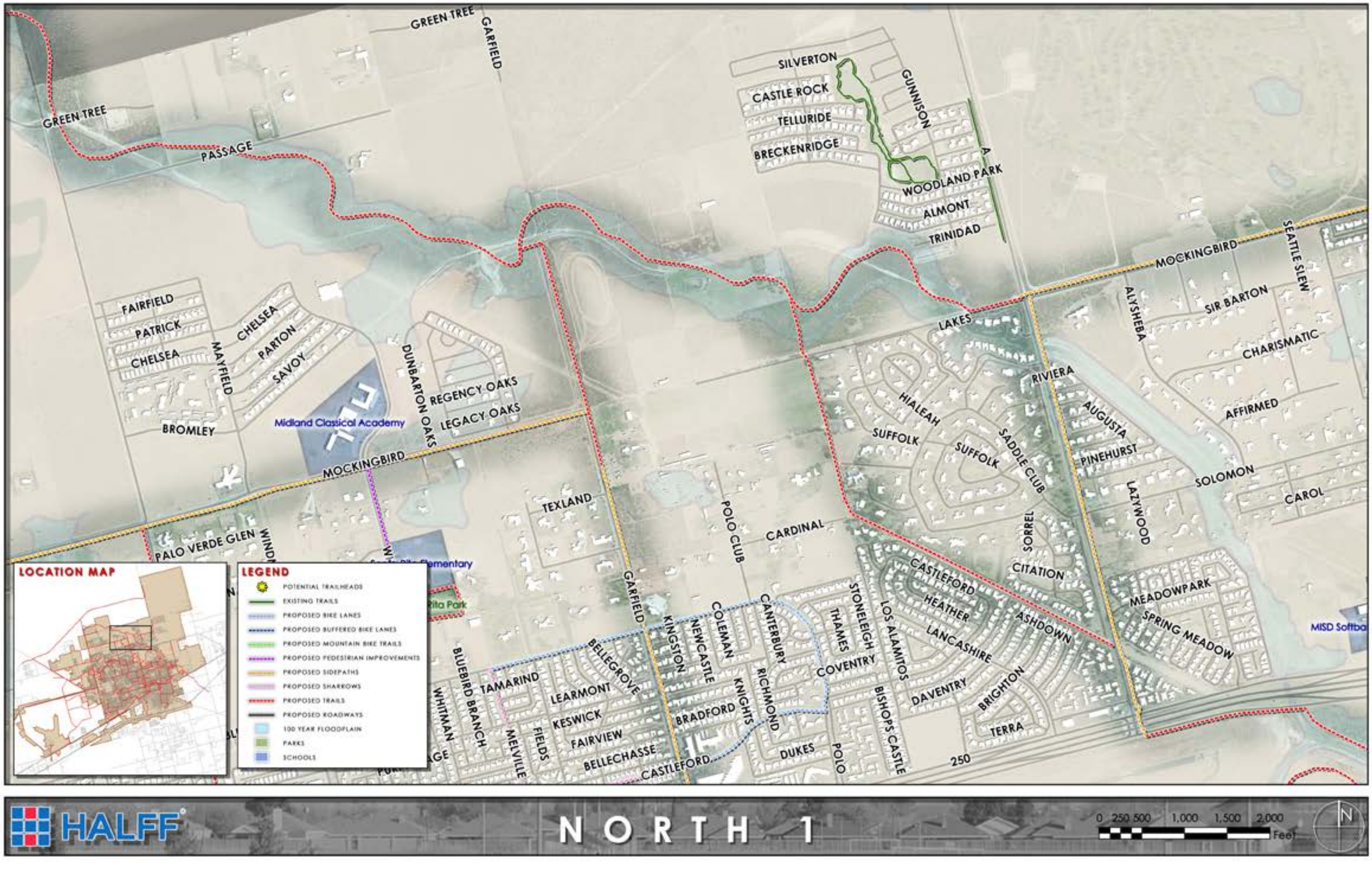



LOCATION MAP
LEGEND
POTENTIAL TRAILHEADS
EXISTING TRAILS
PROPOSED BIKE LANES
PROPOSED BUFFERED BIKE LANES
PROPOSED MOUNTAIN BIKE TRAILS
PROPOSED PEDESTRIAN IMPROVEMENTS
PROPOSED SIDEPATHS
PROPOSED SHARROWS
PROPOSED TRAILS
PROPOSED ROADWAYS
100 YEAR FLOODPLAIN
PARKS
SCHOOLS
GREEN TREE
PASSAGE
FAIRFIELD
PATRICK
CHELSEA
MIDKIFF
MAYFIELD
CHELSEA
PARTON
SAVOY
BROMLEY
DUNBARTON OAKS
REGENCY OAKS
LEGACY OAKS
Midland Classical Academy
TEXLAND
TEXLAND
Santa Rita Elementary
Santa Rita Park
CYPRESS
OAKWOOD
TEAKWOOD
SHADY OAK
BLACKBERRY
WOOD
CLAREWOOD
KINGWOOD
TIMBERGLEN
FIR
GREEN HILL
MIDLAND
VALWOOD
FAIRWOOD
BAYBROOK
EDGEBROOK
MOCKINGBIRD
SHERWOOD
KING RICHARDS
KEENLAND
WIDENER
TANFORAN
TATTENHAM
SARATOGA
TATTENHAM
PIMLICO
ORIOLE
MEADOWLARK
CARDINAL
ROBIN
HOLIDAY HILL
PALO VERDE GLEN
WINDMILL
LANTANA
EAGLE
BLUEBIRD
Butler(Bluebird Pk)
COQUINA
GATEWAY
CRISTA
TIMBER
LIMESTONE
FELDSPAR
MARBLE
OAKRIDGE
BAYBRIDGE
SOUTHRIDGE
BILLINGSLEY
VISTA WEST
PURPLE SAGE
WHITMAN
BLUEBIRD BRANCH
CALDERA
TAMARIND
MONTICELLO
KESWICK
MELVILLE
FROST
FAULKNER
WHITMAN
250
HALFF
MOCKINGBIRD LANE
0 250 500 1,000 1,500 2,000
Feet
N

North Midland - A trail is proposed along the drainage and floodplain corridor in the northern portion of Midland. This trail is proposed to connect the northern neighborhoods to the Airpark Trail near Midland College.

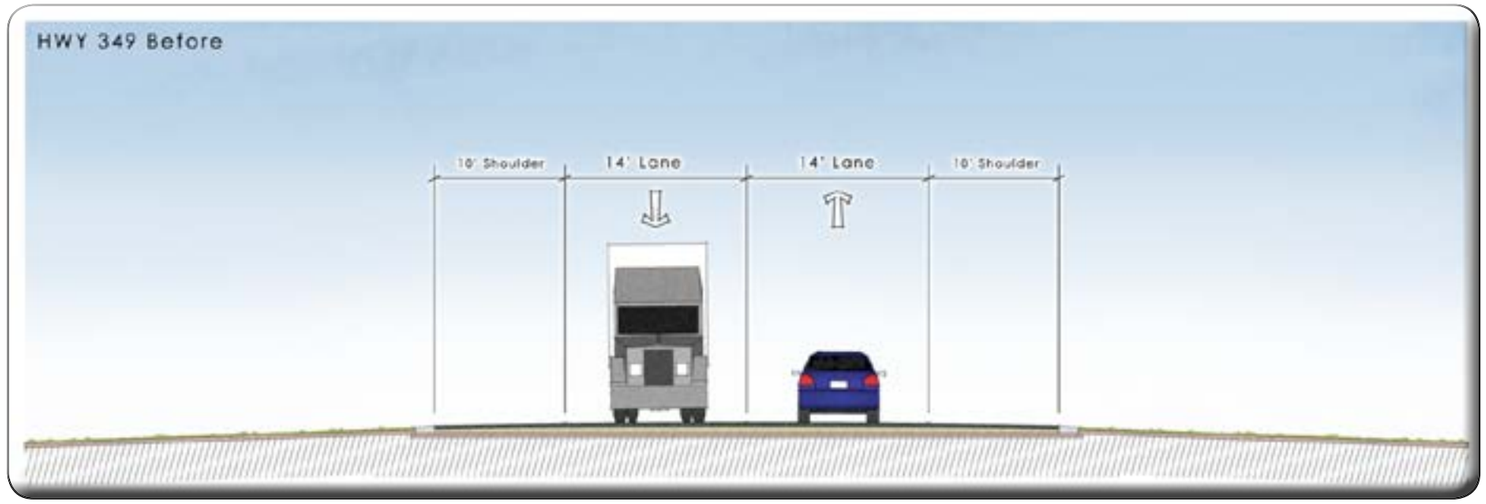


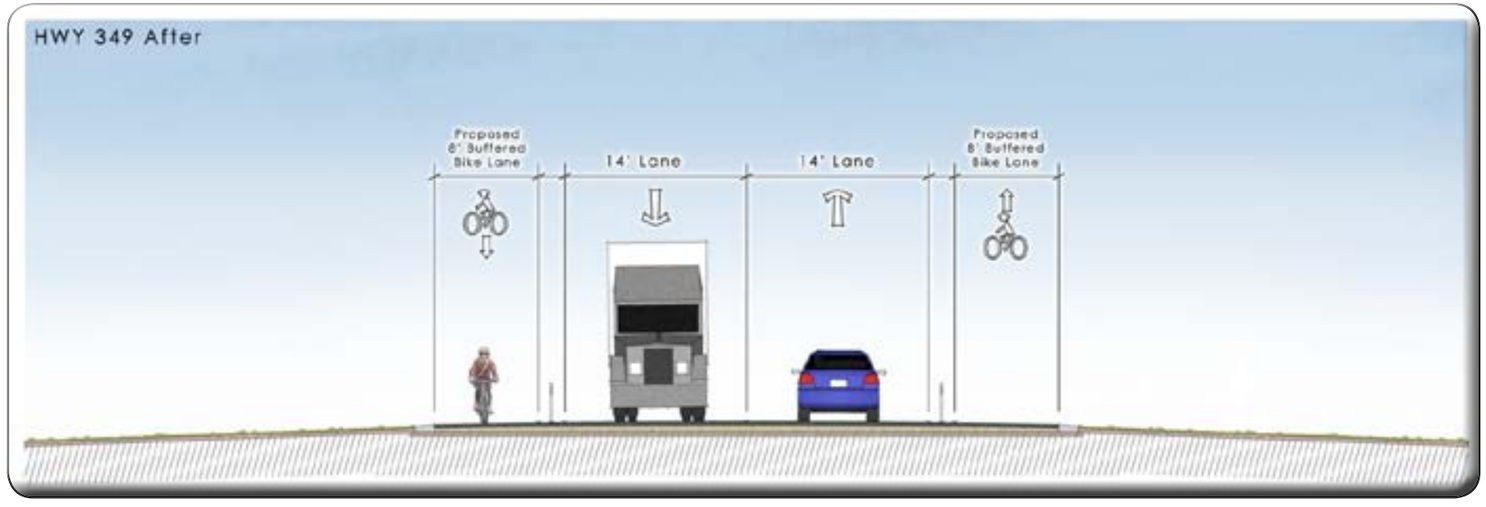


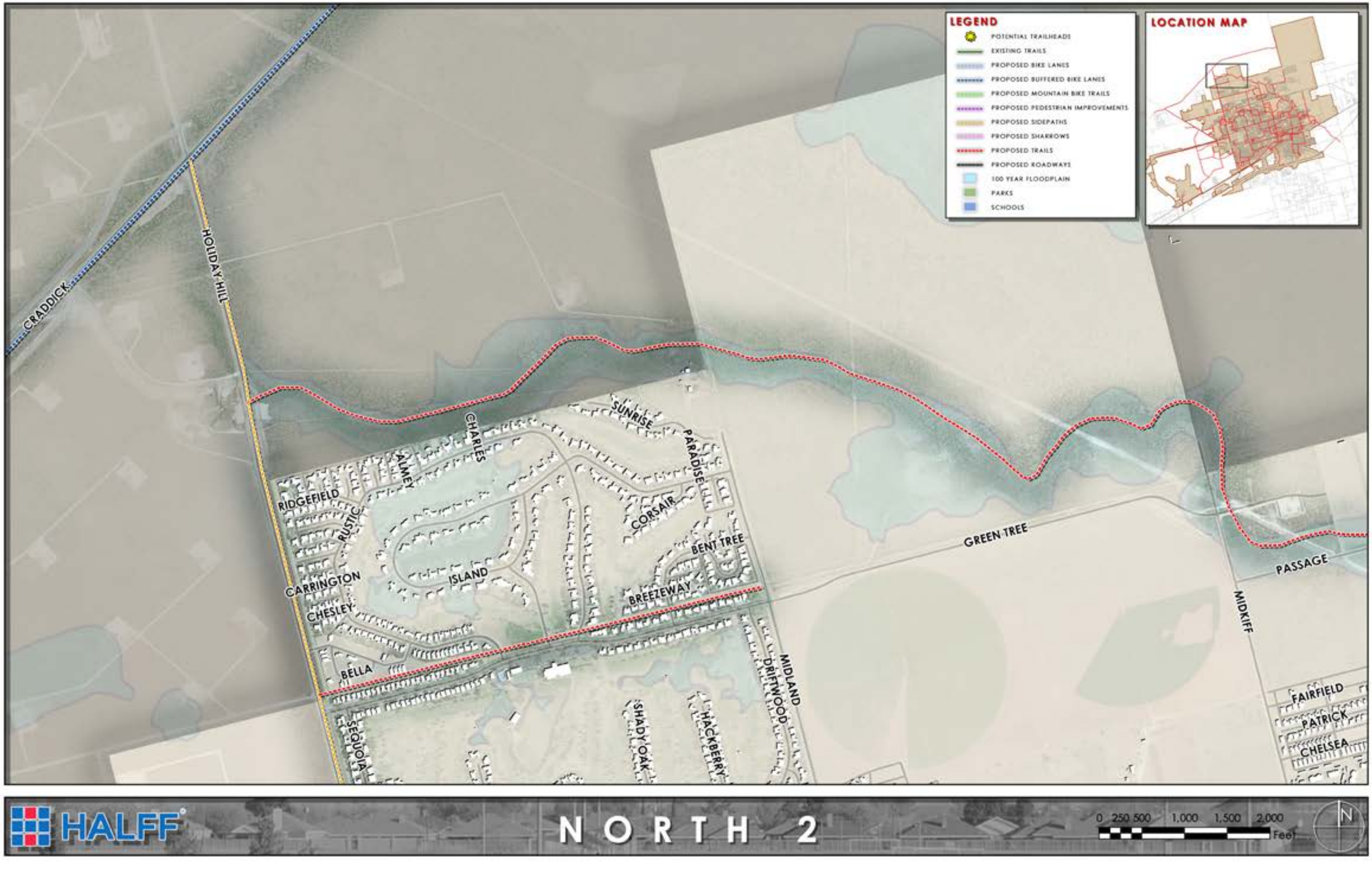

GREEN TREE
GARFIELD
GREEN TREE
PASSAGE
SILVERTON
CASTLE ROCK
TELLURIDE
BRECKENRIDGE
GUNNISON
WOODLAND PARK
ALMONT
TRINIDAD
MOCKINGBIRD
SEATTLE SLEW
ALYSHEBA
SIR BARTON
CHARISMATIC
AFFIRMED
FAIRFIELD
PATRICK
CHELSEA
MAYFIELD
CHELSEA
PARTON
SAVOY
DUNBARTON OAKS
REGENCY OAKS
LEGACY OAKS
BROMLEY
Midland Classical Academy
LAKES
RIVIERA
HIALEAH
SUFFOLK
SUFFOLK
SADDLE CLUB
AUGUSTA
PINEHURST
SOLOMON
CAROL
LAZYWOOD
MOCKINGBIRD
PALO VERDE GLEN
TEXLAND
POLO CLUB
CARDINAL
SORREL
CITATION
CASTLEFORD
HEATHER
LANCASHIRE
ASHDOWN
MEADOWPARK
SPRING MEADOW
MISD Softba
GARFIELD
KINGSTON
NEWCASTLE
COLEMAN
CANTERBURY
RICHMOND
KNIGHTS
BRADFORD
STONELEIGH
THAMES
COVENTRY
LOS ALAMITOS
BISHOPS CASTLE
DAVENTRY
BRIGHTON
TERRA
DUKES
POLO
CASTLEFORD
BELLEGROVE
TAMARIND
LEARMONT
KESWICK
FAIRVIEW
BELLECHASSE
BLUEBIRD BRANCH
MELVILLE
FIELDS
WHITMAN
250
LOCATION MAP
LEGEND
POTENTIAL TRAILHEADS
EXISTING TRAILS
PROPOSED BIKE LANES
PROPOSED BUFFERED BIKE LANES
PROPOSED MOUNTAIN BIKE TRAILS
PROPOSED PEDESTRIAN IMPROVEMENTS
PROPOSED SIDEPATHS
PROPOSED SHARROWS
PROPOSED TRAILS
PROPOSED ROADWAYS
100 YEAR FLOODPLAIN
PARKS
SCHOOLS
HALFF
NORTH 1
0 250 500 1,000 1,500 2,000
Feet
N

Far North Midland and Highway 349 - The proposed northern trail is expected to connect to the proposed sidepath along Holiday Hill Road.

A buffered bike lane is proposed along Highway 349 by utilizing the existing shoulder. This is another premier route for long distance cyclists, and connects to Midland International Airport. The current roadway configuration has a 14' vehicle travel lane with a 10' shoulder. It is proposed that the vehicle travel lanes remain the same, and the shoulder area be converted into an 8' buffered bike lane with a 2' striped buffer area.

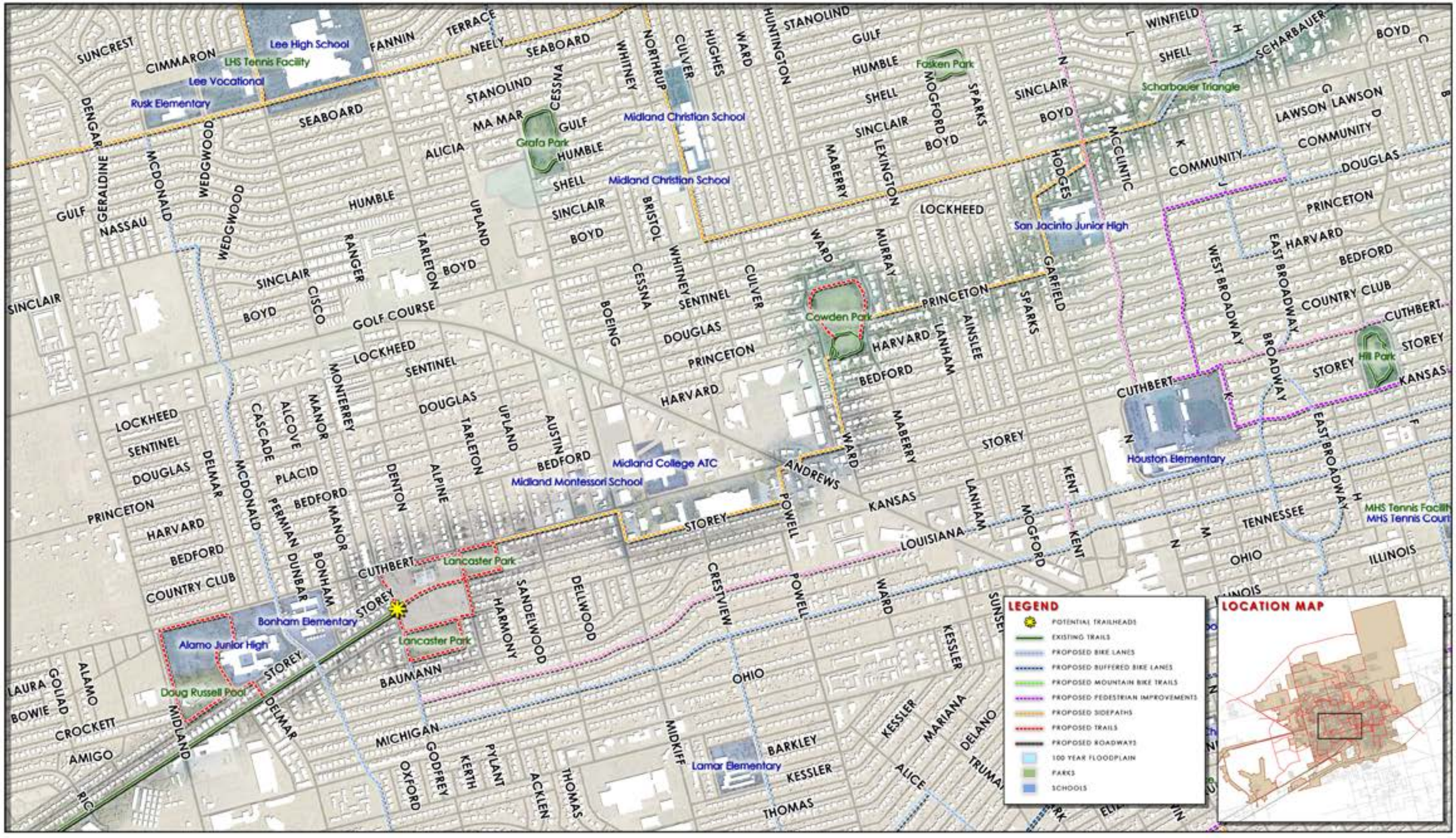





LEGEND
POTENTIAL TRAILHEADS
EXISTING TRAILS
PROPOSED BIKE LANES
PROPOSED BUFFERED BIKE LANES
PROPOSED MOUNTAIN BIKE TRAILS
PROPOSED PEDESTRIAN IMPROVEMENTS
PROPOSED SIDEPATHS
PROPOSED SHARROWS
PROPOSED TRAILS
PROPOSED ROADWAYS
100 YEAR FLOODPLAIN
PARKS
SCHOOLS
LOCATION MAP
CRADDICK
HOLIDAY HILL
CHARLES
SUNRISE
PARADISE
ALMEY
RIDGEFIELD
RUSTIC
CORSAIR
BENT TREE
GREEN TREE
CARRINGTON
ISLAND
CHESLEY
BREEZEWAY
BELLA
SEQUOIA
SHADY OAK
HACKBERRY
DRIFTWOOD
MIDLAND
MIDKIFF
PASSAGE
FAIRFIELD
PATRICK
CHELSEA
HALFF
NORTH 2
0 250 500 1,000 1,500 2,000
Feet
N

Enhancements to Power Line Trail - The power line corridor trail is the most prominent trail in Midland. Enhancements should be made to improve the overall appearance of this trail. This could include improved landscaping and grass next to the trail, added amenities such as benches along the trail where feasible, and improve crosswalk markings when the trail crosses a roadway.

Power Line Trail to Scharbauer Drive - The existing power line corridor trail is one of the most utilized trails in Midland. Extending this trail into the central part of the city is a high priority. It is recommended that the existing trail extend through Lancaster Park (see illustration to the right), then utilize a series of proposed sidepaths to connect to Cowden Park and San Jacinto Junior High.



LEGEND

- POTENTIAL TRAILHEADS
- EXISTING TRAILS
- PROPOSED BIKE LANES
- PROPOSED BUFFERED BIKE LANES
- PROPOSED MOUNTAIN BIKE TRAILS
- PROPOSED PEDESTRIAN IMPROVEMENTS
- PROPOSED SIDEPATHS
- PROPOSED TRAILS
- PROPOSED ROADWAYS
- 100 YEAR FLOODPLAIN
- PARKS
- SCHOOLS

LOCATION MAP

HALFF

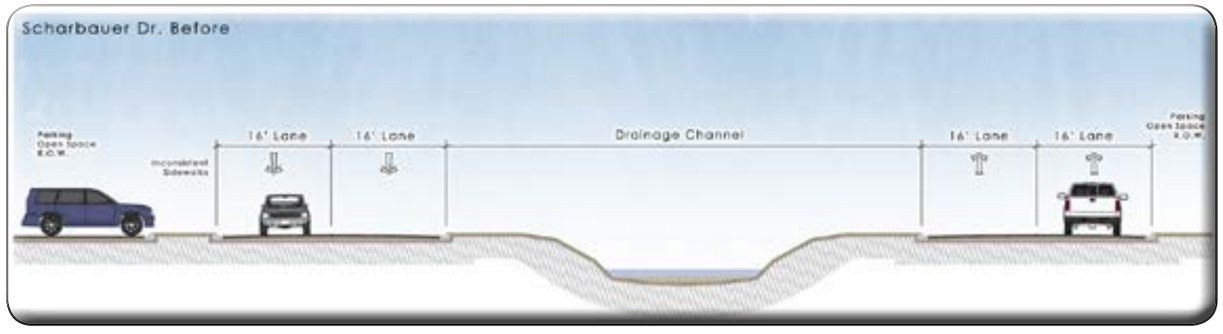
SCHARBAUER DR. TO BONHAM

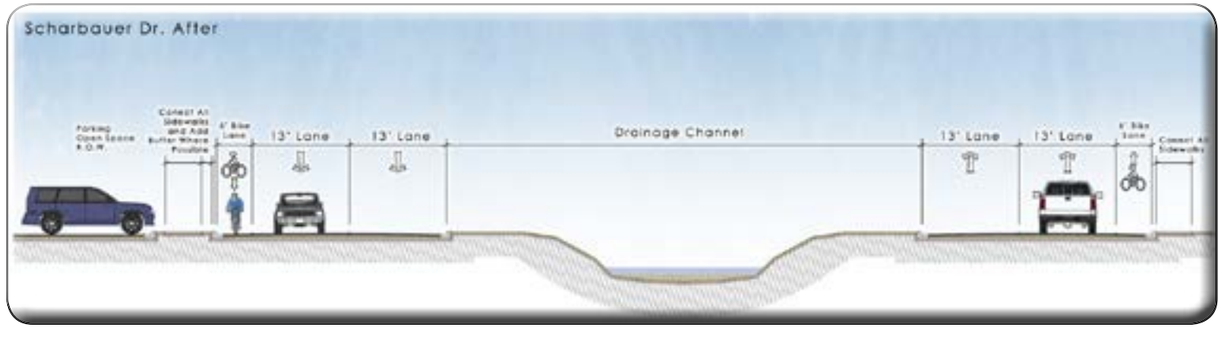
0 250 500 1,000 1,500 2,000 Feet

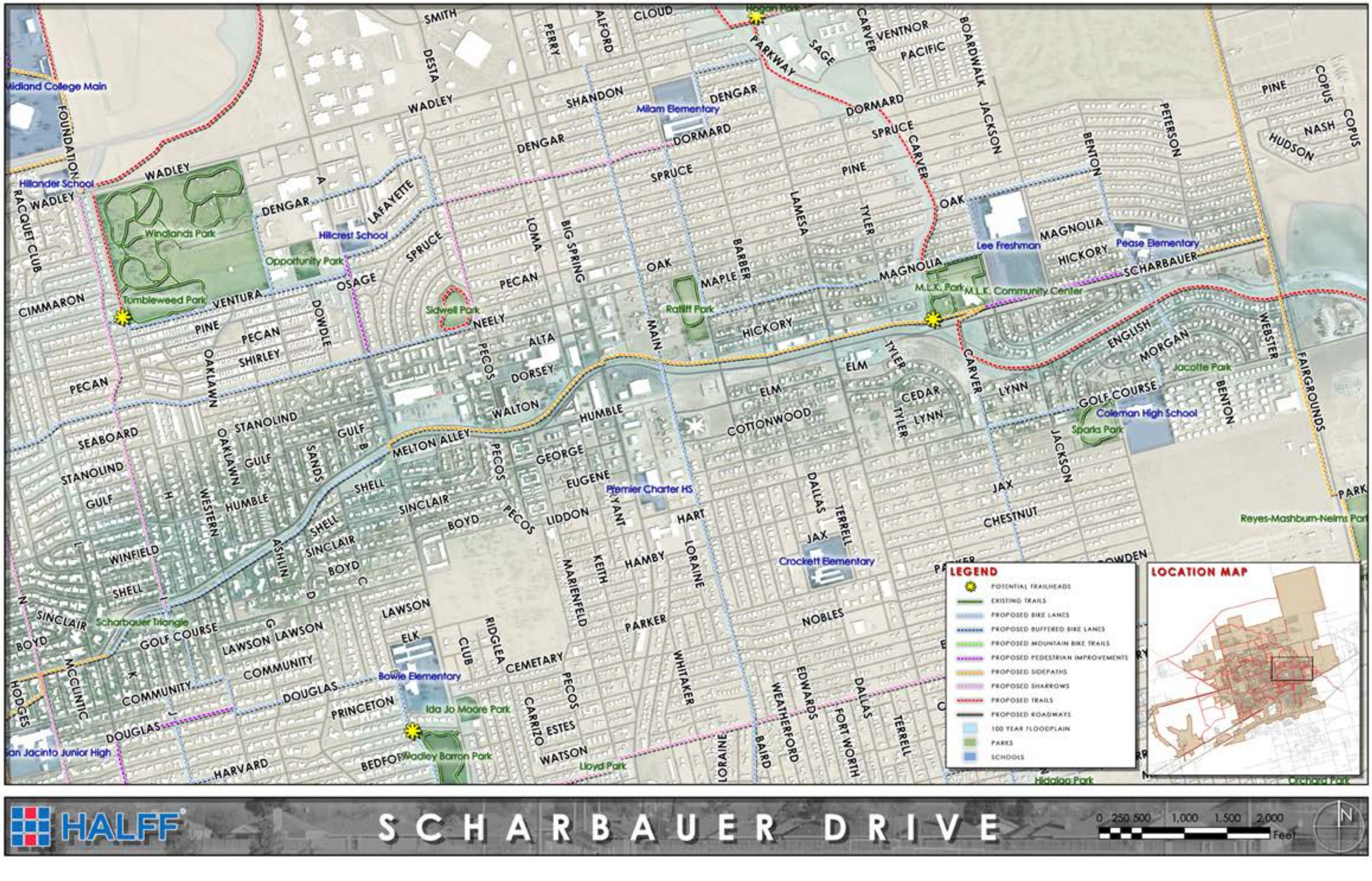
N

Scharbauer Drive - A bike lane is proposed along Scharbauer Drive, from Golf Course Road to A Street. This section of the road currently has two 16' vehicle travel lanes in each direction with a large drainage channel in the middle. It is recommended that the vehicle travel lanes be reduced to 13' each, allowing space for a 6' bike lane. The gaps in the pedestrian sidewalk should also be filled in where needed.

Once east of A Street, it is proposed that a sidepath be constructed to connect to MLK Park.






Midland College Main
FOUNDATION
Hillander School
WADLEY
RACQUET CLUB
Windlands Park
Tumbleweed Park
CIMMARON
VENTURA
PINE
PECAN
OAKLAWN
SHIRLEY
DOWDLE
OSAGE
DENGAR
A
LAFAYETTE
Hillcrest School
Opportunity Park
SPRUCE
LOMA
BIG SPRING
Sidwell Park
NEELY
PECOS
ALTA
DORSEY
WALTON
HUMBLE
MELTON ALLEY
GEORGE
EUGENE
Premier Charter HS
LIDDON
BRYANT
HART
LORAINE
MARIENFELD
KEITH
HAMBY
PARKER
WHITAKER
CEMETARY
RIDGLEA
CLUB
ELK
LAWSON
LAWSON COMMUNITY
COMMUNITY
GOLF COURSE
Scharbauer Triangle
SINCLAIR
BOYD
MCCLINTIC
HODGES
DOUGLAS
PRINCETON
HARVARD
Bowie Elementary
Ida Jo Moore Park
Bradley Barron Park
San Jacinto Junior High
CARRIZO
ESTES
WATSON
Lloyd Park
SEABOARD
STANOLIND
GULF
SHELL
WESTERN
ASHLIN
WINFIELD
SANDS
H
I
J
K
L
N
SMITH
DESTA
WADLEY
PERRY
ALFORD
CLOUD
Hogan Park
SHANDON
Milam Elementary
DENGAR
DORMARD
PARKWAY
SAGE
CARVER
VENTNOR
PACIFIC
BOARDWALK
JACKSON
PETERSON
BENTON
PINE
COPUS
NASH
HUDSON
SPRUCE
LAMESA
TYLER
OAK
BARBER
MAPLE
Ratliff Park
MAGNOLIA
M.L.K. Park
M.L.K. Community Center
Lee Freshman
HICKORY
Pease Elementary
SCHARBAUER
MAIN
ELM
COTTONWOOD
CEDAR
LYNN
ENGLISH
MORGAN
WEBSTER
FAIRGROUNDS
Jacobs Park
GOLF COURSE
Coleman High School
Sparks Park
DALLAS
TERRELL
JAX
CHESTNUT
Crockett Elementary
NOBLES
EDWARDS
WEATHERFORD
FORT WORTH
BAIRD
Hidalgo Park
Orchard Park
Reyes-Mashburn-Neims Park
LEGEND
POTENTIAL TRAILHEADS
EXISTING TRAILS
PROPOSED BIKE LANES
PROPOSED BUFFERED BIKE LANES
PROPOSED MOUNTAIN BIKE TRAILS
PROPOSED PEDESTRIAN IMPROVEMENTS
PROPOSED SIDEPATHS
PROPOSED SHARROWS
PROPOSED TRAILS
PROPOSED ROADWAYS
100 YEAR FLOODPLAIN
PARKS
SCHOOLS
LOCATION MAP
HALFF
SCHARBAUER DRIVE
0 250 500 1,000 1,500 2,000
Feet
N

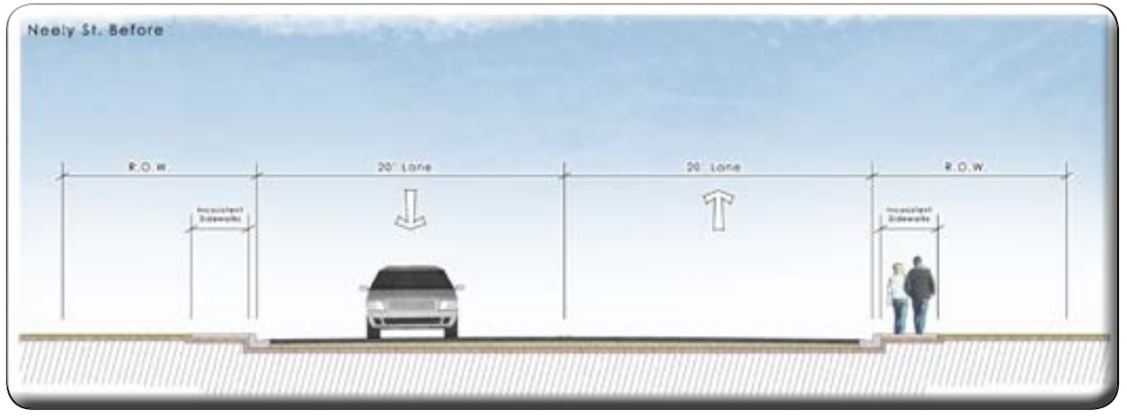
West Midland - Similar to the north, the western side of Midland is relatively still undeveloped and provides opportunities for trails. A looped trail is proposed around CJ Kelly Park, and extending west towards Highway 158 along the drainage corridor. A mountain biking trail is also proposed within CJ Kelly Park.

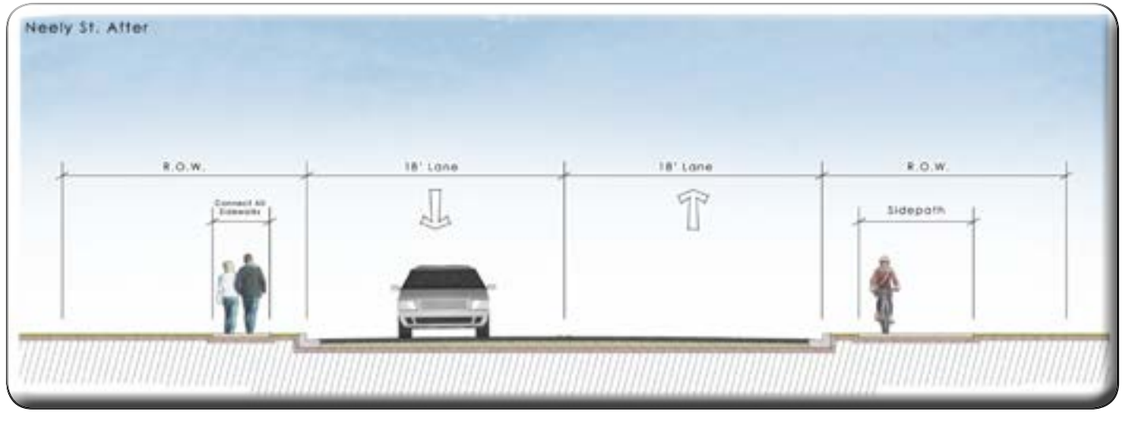

LOCATION MAP
LEGEND
POTENTIAL TRAILHEADS
EXISTING TRAILS
PROPOSED BIKE LANES
PROPOSED BUFFERED BIKE LANES
PROPOSED MOUNTAIN BIKE TRAILS
PROPOSED PEDESTRIAN IMPROVEMENTS
PROPOSED SIDEPATHS
PROPOSED SHARROWS
PROPOSED TRAILS
PROPOSED ROADWAYS
100 YEAR FLOODPLAIN
PARKS
SCHOOLS
TUMBLEWEED
COYOTE
ROADRUNNER
1247
1250
158
CACTUS
DESERT WIND
WIND CHASE
EVENING STAR
BARTON CREEK
OAK CREEK
MEDINA
NAVASOTA
PEDERNALES
SABINE
RIO GRANDE
LOS PATIOS
CARMEL
LLANO
GUADALUPE
SAN SABA
HOLIDAY HILL
BRAZOS
LAVACA
CONROE
LIVINGSTON
C.J. Kelly Park
EDGEMONT
OAKMONT
SPRINGMONT
PINEMONT
Essex Park
ROSEMONT
SAGEMONT
TREMONT
WHITTLE
LEAGUE
CAMDEN
FENWAY
EBBETS
CROWLEY
WADLEY
SUNMORE
HERITAGE
SUNDANCE
STERLING
Abell Junior High
PRESTON
Bush Elementary
UNBURST
HOYA
IDLEWILDE
HIGHLAND
ASHWOOD
CRANSTON
HATHAWAY
DEVLIN
SUNSHINE
CALLAWAY
GRASSLAND
HEREFORD
RIDGEMONT
HILLCREST
Grasslands Park
HEARTLAND
Scharbauer Elementary
DREXEL
MCKITTRICK
SINCLAIR
DEEANNA
WINDDRIFT
FRINGEWOOD
CENTERVIEW
STONECREST
HOMESTEAD
ANDREWS
250
HALFF
WEST
0 250 500 1,000 1,500 2,000
Feet
N

Neely Avenue - A sidepath is proposed along Neely Avenue from Whittle Way to Northrup Drive. The current roadway has 20' vehicle lanes in each direction. It is recommended to reduce the vehicle travel lanes to 18' in width and shift them to one side, then utilize the remaining right-of-way for a sidepath. The sidepath should be at least 8' in width (see before/after cross section below).

A bike lane is proposed along Neely Avenue from Northrup Drive to Pecos Street. The scenario utilizes a lane diet to reduce the existing vehicle travel lanes from 20' to approximately 15' with a 5' bike lane (see before/after illustration to the left).

Westridge Park - The area west of Loop 250 and Scharbauer Sports Complex is expected to develop and roadway expansions are already planned. As the roadways are developed, it is recommended that sidepaths be developed as well to create attractive off-street facilities in this area that can be used by both pedestrians and bicyclists.






MOSSWOOD
HOMESTEAD
BRENTWOOD
JADEWOOD
FRINGEWOOD
HEREFORD
WINDDRIFT
GREENRIDGE
HAYWOOD
PRAIRIE RIDGE
ANDREWS
158
191
250
CATALINA
WESTRIDGE
DEAUVILLE
GRIFFITH
COLT
RANGERS
AVALON
CANDLESTICK
SHEA
GEHRIG
MAYS
CLEMENTE
WAGNER
LEGENDS
DIMAGGIO
NOLAN RYAN
CHAMPIONS
TRADEWINDS
Scharbauer Sports Complex
PRINCETON
IDLEWILDE
WESTCLIFF
WOODCREST
HARVARD
BEDFORD
COUNTRY CLUB
DOUGLAS
DELMAR
MCDONALD
PERMIAN
Bonham Elementary
Alamo Junior High
Doug Russell Pool
CUTHBERT
LAURA
BOWIE
CROCKETT
AMIGO
GOLIAD
ALAMO
MIDLAND
TECHNOLOGY
NETWORK
House Park
RIC
STOREY
WOODCREST
EASTWOOD
IDLEWILDE
SWEETBRIAR
STONYBROOK
BELAIRE
SUNNYSIDE
ILLINOIS
LEDDY
ROOSEVELT
MONTY
HARLOWE
TANNER
EDGEWOOD
SHADYLANE
MESA
CRESCENT
DEWBERRY
GLENWOOD
BENTWOOD
THORNRIDGE
TANGLEWOOD
WILLOWOOD
ROCKYLANE
BEAL
Jones Elementary
MERCEDES
THOMASON
LEISURE
EISENHOWER
WILSHIRE
PARKDALE
ERIE
MEADOW
VERSAILLES
BURCHILL
PLEASANT
PASADENA
BROWNWOOD
LESLIE
KRISTIE
GRACELAND
Henderson Park
Henderson Elementary
LOCATION MAP
LEGEND
POTENTIAL TRAILHEADS
EXISTING TRAILS
PROPOSED BIKE LANES
PROPOSED BUFFERED BIKE LANES
PROPOSED MOUNTAIN BIKE TRAILS
PROPOSED PEDESTRIAN IMPROVEMENTS
PROPOSED SIDEPATHS
PROPOSED SHARROWS
PROPOSED TRAILS
PROPOSED ROADWAYS
100 YEAR FLOODPLAIN
PARKS
SCHOOLS
HALFF
WESTRIDGE PARK
0 250 500 1,000 1,500 2,000
Feet
N

Chapter Six

Implementation Strategy

Implementation Strategy

As shown in the previous chapter, there are many opportunities for on- and off-street facilities in Midland. Over the next decade, it is anticipated that many of these opportunities can actually be implemented. However, the city's efforts should be focused on those trails, corridors and streets that provide the most beneficial impact, and that truly begin to create a major citywide network.

This chapter presents the high priority facilities to be built using prioritization criteria developed for Midland. Costs shown in this section represent pre-design estimates, and are developed at an order of magnitude or master planning level. They are intended to provide a general range of the overall cost for a segment, and will vary as more detailed design occurs. Grants or other opportunities may lower the cost of each segment. Where known, property acquisition is noted, but specific acquisition costs will vary and need to be further investigated. Cost projections are also included to allow elected officials, staff and developers to identify funding needs and to prepare an action plan for implementation.

Key projects were selected to meet the goals established by the planning effort, and to reflect citizen comments and desires received during the public input process. The implementation of each specific facility should coordinate with the following steps:

1. Preliminary items - Environmental analysis (if needed), detailed property easement or right of way needs analysis (if needed), detailed feasibility/concept design, and identification of funding for each project should be obtained before proceeding.

2. Permits - By City of Midland, possibly Midland County and all involved corridor owners, e.g. TxDOT, utility companies, railroad companies and Midland airport. Responsibility for the project permitting construction typically lies with the City of Midland.

3. Partnerships and Supplemental Funding - Research for necessary grant qualification, council approval to apply for grant pursuits or other funding sources, and completion of right of way acquisition (if needed) should be settled at this point.

4. Design - Preparation of engineering and construction documents, specifications and cost estimates, followed by bid documents and bidding procedures after permits and funding are clarified. Even if for bicycle lane striping and internally prepared, schematic engineering of the route and intersections is recommended, since each corridor has its own unique characteristics and needs.

5. Physical construction or implementation of the project.

Network Prioritization Methodology

The prioritization methodology is geared towards identifying near-term projects that will have the greatest impact. The priority assigned to each facility type was evaluated based on two major areas: feasibility and benefit.

A. Feasibility of the proposed facility:

- Is the corridor or right of way owned by the City of Midland or available to be used?
- Will the facility have an impact on vehicular mobility in Midland? If on-street, is under-utilized pavement available, or are additional traffic impact reviews necessary?
- Is the corridor or facility easy to construct, or is it in a constrained area that may be more difficult to work in?
- Will the proposed facility impact existing features along the corridor, such as existing trees or drainage?
- What is the implementation cost of this segment? Is it relatively low and able to be done relatively soon, or is it higher in cost and does it require longer term funding sources such as bonds?
- Has there been any specific citizen input regarding this facility, either for or against it?

B. Benefits of the proposed facility:

- How important is this improvement to citywide pedestrian and bicycle connectivity?
- Does this segment help overcome a barrier or close a key gap?
- How important is this improvement to the residents in the areas around it? Does it connect to local destinations such as schools, parks or nearby retail? Does it provide a recreation and transportation facility that is not common in the area?
- Is it near an area that might have a high degree of use?
- Could it serve as a potential demonstration or catalyst project?

It is important to note that prioritization is intended to help evaluate segments and determine which should be built initially; however, unique factors may come into play on some corridors that make affect the prioritization of individual actions and possibly rank higher or lower.

Consider embarking on an extensive on- and off-street facility development schedule over the next ten years - Midland continues to grow rapidly, and demand for quality of life features such as trails and bicycle facilities will continue to be needed. It is while the city is growing that it becomes the easiest time in which to build pedestrian and bicycle facilities.

If feasible, fund the construction of one to two miles of off-street trails per year for the next ten years. Maintain a steady funding channel so that trail development can remain a high priority over the next decade.

Develop strategies to work with private sector development. Voluntary and

mandatory processes to work with private development should be put in place immediately, so as to not miss any opportunity to implement segments of trails by new developments or during major street improvement projects.

The high priority proposed network is shown on the map to the right and is summarized on the tables on the following pages.

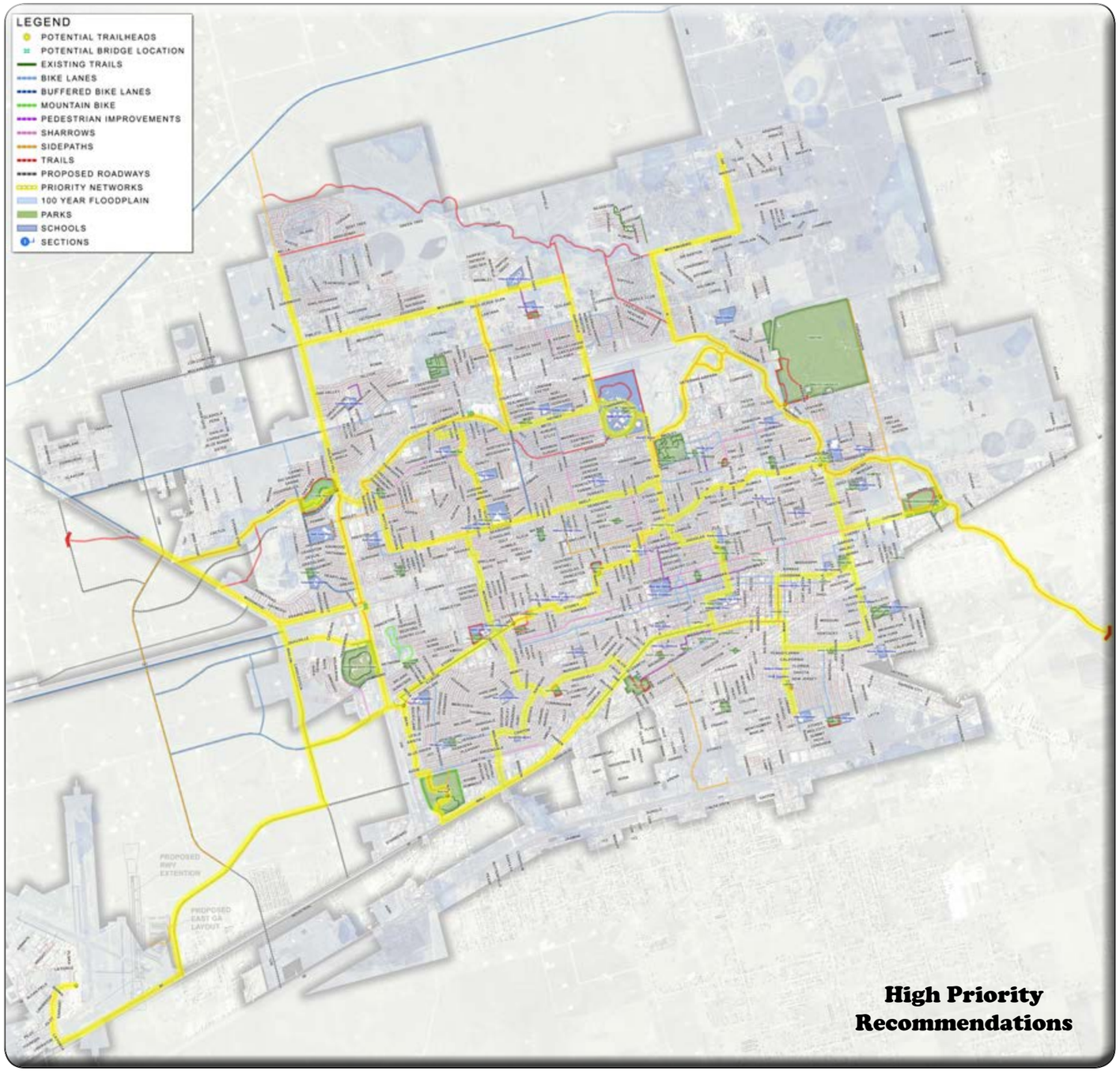


Table 6.1 High Priority Off-Street Facilities					
Name	**From**	**To**	**Length (in l.f.)**	**Facility Type**	**Potential Cost Range**
Trails					
Airpark Drainage Trail	Foundation Blvd.	Big Spring St.	10,990	Trail	$1,570,000 to $2,090,000
Airpark Trail	A St.	Big Spring St.	3,250	Trail	$470,000 to $620,000
Beal Park Trail	Inside Beal Park	Inside Beal Park	2,440	Trail	$350,000 to $470,000
CJ Kelly Park to 158	Hwy. 158	Crowley Blvd.	8,320	Trail	$1,190,000 to $1,580,000
Cowden Park	Within Cowden Park	Within Cowden Park	1,770	Trail	$260,000 to $340,000
Garfield St.	Loop 250	Chaparral Cir.	2,230	Trail	$320,000 to $430,000
Jal Draw	Tremont Ave.	Haynes Ave.	11,370	Trail	$1,620,000 to $2,160,000
Loop 250	Holiday Hill	Wadley Ave.	1,660	Trail	$240,000 to $320,000
Loop 250	Wadley Ave.	Andrews Hwy.	5,410	Trail	$770,000 to $1,030,000
Midkiff Rd.	Mockingbird Ln.	Moss Ave.	7,660	Trail	$1,090,000 to $1,460,000
Midland College Perimeter 1	Garfield St.	Foundation Blvd.	5,320	Trail	$760,000 to $1,010,000
Midland Draw	Big Spring St.	Lamesa Rd.	5,220	Trail	$750,000 to $990,000
N Garfield St. Extension	Green Tree to Saddle Club Trail	Texland Cir.	1,080	Trail	$160,000 to $210,000
Scharbauer Drainage Extension	Scharbauer Dr.	City Limits	22,090	Trail	$3,140,000 to $4,190,000
Sun Garden Village Drainage	Wadley Ave.	Magnolia Ave.	4,110	Trail	$590,000 to $780,000
Sidepaths					
Beal to Westridge	Loop 250	Beal Park	5,430	Sidepath	$620,000 to $780,000
Beal Park	Anetta Dr.	Wall St.	3,730	Sidepath	$430,000 to $530,000
Cowden Park to Golf Course Rd.	Maberry St.	Golf Course Rd.	3,940	Sidepath	$450,000 to $560,000
Fairgrounds Rd.	Loop 250	Cuthbert Ave.	13,120	Sidepath	$1,500,000 to $1,870,000
Farm Rd. 1369	Green Tree to Saddle Club Trail	Mockingbird Ln.	8,920	Sidepath	$1,020,000 to $1,270,000
Foundation Blvd.	Chaparral Cir.	Wadley Ave.	1,330	Sidepath	$160,000 to $190,000
Godfrey St.	St. Andrews Dr.	Neely Ave.	4,740	Sidepath	$540,000 to $680,000
Godfrey St. North	Haynes Ave.	St. Andrews Dr.	1,390	Sidepath	$160,000 to $200,000
Holiday Hill	Mockingbird Ln.	Loop 250	9,670	Sidepath	$1,100,000 to $1,380,000
Hwy. 158	West of CR 1250	Deauville Blvd.	10,940	Sidepath	$1,250,000 to $1,560,000
Lancaster to Cowden Park	Lancaster Park	Cowden Park	5,850	Sidepath	$670,000 to $840,000
Legend Park Connection	Deauville Blvd.	Hall of Fame Blvd.	2,670	Sidepath	$310,000 to $380,000
Midland Airport Route	Hall of Fame Blvd.	Midland Airport	34,790	Sidepath	$3,960,000 to $4,950,000
Mockingbird Ln.	Holiday Hill	Garfield St.	15,970	Sidepath	$1,820,000 to $2,270,000
Mockingbird Ln.	A St.	SH 349	5,440	Sidepath	$620,000 to $780,000
Mockingbird Ln.	Garfield St.	A St.	6,040	Sidepath	$690,000 to $860,000
N A st.	Mockingbird Ln.	Loop 250	5,360	Sidepath	$610,000 to $770,000
N Garfield St.	Texland Cir.	Loop 250	4,800	Sidepath	$550,000 to $690,000
Neely Ave.	Whittle Way	Northrup Dr.	10,230	Sidepath	$1,170,000 to $1,460,000

Table 6.1 High Priority Off-Street Facilities

Name	From	To	Length (in l.f.)	Facility Type	Potential Cost Range
Sidepaths Continued					
Scharbauer Dr.	A St.	MLK Park	7,910	Sidepath	$900,000 to $1,130,000
Scharbauer Sports Underpass	Scharbauer Sports Complex	Loop 250	2,480	Sidepath	$290,000 to $360,000
SH 349	Arapahoe Rd.	Mockingbird Ln.	4,600	Sidepath	$530,000 to $660,000
Thomason Dr. Extension	Midland Airport Route	Loop 250	5,345	Sidepath	$610,000 to $760,000
Wall St.	Beal Pkwy.	Midkiff Rd.	10,470	Sidepath	$1,190,000 to $1,490,000
Whittle Way	Wadley Ave.	Neely Ave.	2,430	Sidepath	$280,000 to $350,000
Pedestrian Sidewalk Improvements					
Holloway Ave.	Ulmer Park	Missouri Ave.	4,330	Sidewalk Improvement	$110,000 to $130,000
Loraine St.	Michigan Ave.	Missouri Ave.	2,290	Sidewalk Improvement	$60,000 to $70,000
Missouri Ave.	K St.	Main St.	5,970	Sidewalk Improvement	$160,000 to $170,000
Gist Ave.	Rankin HWY	S Lamesa Rd.	5,230	Sidewalk Improvement	$140,000 to $150,000
Collins Ave.	Johnston St.	S Main St.	3,660	Sidewalk Improvement	$100,000 to $110,000

Table 6.2 High Priority On-Street Facilities					
Name	**From**	**To**	**Length (in l.f.)**	**Facility Type**	**Potential Cost Range**
Bike Lanes					
Broadway St.	Community Ln.	Wall St.	6,790	Bike Lane	$65,000 to $71,000
Crowley Ave.	CR 60	Pedernales Dr.	2,800	Bike Lane	$27,000 to $30,000
Devonian Dr.	Versailles Dr.	Raymond Rd.	1,250	Bike Lane	$12,000 to $14,000
E Louisiana Ave.	A St.	Carver St.	7,150	Bike Lane	$68,000 to $75,000
Hicks Ave.	Main St.	Mineola St.	2,760	Bike Lane	$27,000 to $29,000
I St.	Scharbauer Dr.	Douglas Ave.	1,880	Bike Lane	$18,000 to $20,000
Kiwanis Park	Godfrey St.	Ward St.	5,780	Bike Lane	$55,000 to $61,000
Main St.	Washington Ave.	Stokes Ave.	5,460	Bike Lane	$52,000 to $57,000
Main St.	Tennessee Ave.	Front St.	2,150	Bike Lane	$21,000 to $23,000
McDonald St.	Neely Ave.	Avondale Dr.	9,940	Bike Lane	$95,000 to $104,000
Michigan Ave.	Lancaster Park	Crestview Rd.	3,390	Bike Lane	$33,000 to $36,000
Mineola St.	New York Ave.	Gist Ave.	4,140	Bike Lane	$40,000 to $44,000
N Carver St.	Golf Course Rd.	New York Ave.	9,360	Bike Lane	$89,000 to $98,000
N Carver St.	Scharbauer Drainage Extension	Golf Course Rd.	900	Bike Lane	$9,000 to $10,000
N Loraine St.	Louisiana Ave.	Michigan Ave.	390	Bike Lane	$4,000 to $5,000
Neely Ave.	Northrup Dr.	I St.	5,990	Bike Lane	$57,000 to $63,000
New York Ave.	Main St.	Carver St.	5,080	Bike Lane	$49,000 to $53,000
Polo/Castleford/Bluebird	Melville Dr.	Castleford Rd.	6,870	Bike Lane	$66,000 to $72,000
Raymond Rd.	Avondale Dr.	Canyon Dr.	2,720	Bike Lane	$26,000 to $29,000
S Midland Dr.	Versailles Dr.	Wall St.	3,160	Bike Lane	$30,000 to $33,000
Scharbauer Dr.	Golf Course Rd.	A St.	4,240	Bike Lane	$41,000 to $45,000
Versailles Dr.	Meadow Dr.	Devonian Dr.	1,960	Bike Lane	$19,000 to $21,000
Ward St.	Haynes Dr.	Wadley Ave.	2,620	Bike Lane	$25,000 to $28,000
Whittle Way	Tremont Ave.	Wadley Ave.	610	Bike Lane	$6,000 to $7,000
Buffered Bike Lanes					
Crowley Blvd.	Pedernales Dr.	Highland Blvd.	3,570	Buffered Bike Lane	$48,000 to $51,000
Main St.	Front St.	Washington Ave.	930	Buffered Bike Lane	$13,000 to $14,000
Wall St.	Midkiff Rd.	F St.	9,840	Buffered Bike Lane	$131,000 to $140,000
Sharrows					
Castleford/Melville	Bluebird Ln.	Garfield St.	3,470	Sharrow	$10,000 to $20,000
I St.	Wadley Ave.	Scharbauer Dr.	5,030	Sharrow	$20,000 to $30,000
Main St.	Louisiana Ave.	Tennessee Ave.	730	Sharrow	$3,000 to $10,000
Tremont Ave.	Loop 250	Dentcrest Dr.	3,210	Sharrow	$10,000 to $20,000
Ward St.	Wadley Ave.	Neely Ave.	2,610	Sharrow	$10,000 to $20,000

General Facility Type Costs

General order of magnitude facility costs are shown in the table below and were derived using the following assumptions:

Cost projections are calculated on a per mile basis. Costs also include an additional allowance for:

- Surveying
- Design
- Construction administration associated with the design of each facility

No allowance for right of way acquisition is included in these typical costs, since most (but not all) recommendations utilize public or quasi-publicly owned corridors. Costs shown are in 2015 dollars and do not include an escalation factor since precise construction dates have not been established. When a timeframe for development is established, escalation factors should be added and should be based on actual construction costs at the time and recent inflation trends.

Bridge costs should be added where a bridge is determined to be needed. Additional amenities such as benches and trail signage are not included. Also, other extraordinary features, such as trail lighting or extensive landscaping are not included but can be added on a case by case basis where appropriate.

These costs are the basis for facility segment and barrier crossing enhancement cost projections shown in this report. These costs are order of magnitude estimates and should be treated as a starting point for establishing budgets. Costs shown in this master plan will vary based on the more detailed assessments. Note that actual costs if implemented by Midland area governmental or non-profit staff may be lower.

Table 6.3 General Cost Ranges for Typical Trail and Bicycle Facilities

Facility Type	Details	Potential Cost Range
Trail	10’ wide, concrete	$750,000 to $1,000,000 per mile
Sidepath	10’ wide, concrete	$600,000 to $750,000 per mile
Sidewalk Improvement	Connects existing gaps or is a completely new sidewalk where necessary	$140,000 to $150,000 per mile
Mountain Biking Trail	Within parks, similar to a nature trail	$25,000 to $30,000 per mile
Bicycle Lane	Lane striping, pavement markings, both directions	$50,000 to $55,000 per mile
Buffered Bicycle Lane	Buffer zone striping, pavement markings, both directions	$70,000 to $75,000 per mile
Sharrow	Pavement markings, both directions	$20,000 to $25,000 per mile
Route Signage	Should be placed every 250 linear feet +/-	$5,000 to $15,000 per mile
Lane Diet	Reduce lane widths to add bicycle facility	$75,000 to $150,000 per mile
Road Diet	Remove travel lane to add bicycle facility	$75,000 to $150,000 per mile

Maintenance Considerations

Maintenance of on- and off-street facilities is as important as building them. Utilizing materials to reduce regular maintenance, giving attention to regular sweeping of the facilities, and ensuring that the surface is smooth are all elements that make the facilities attractive and usable. The benefits of a good maintenance program are far-reaching, including:

- A high standard of maintenance is an effective advertisement for promoting the use of trails or on-street bicycle facilities.
- Good maintenance can be an effective deterrent to vandalism, litter, and encroachments.
- Good maintenance is necessary to preserve positive public relations between the adjacent land owners and the city.
- Good maintenance can make enforcement of regulations on the trail more efficient. Local clubs and interest groups will take pride in “their” trail and will be more apt to assist in protection of the facility.
- A proactive maintenance policy will help improve safety along the trail or bicycle lane.

Sidepaths and Trails

Maintenance activities typically include replacement of small sections of pavement, landscape maintenance, facility upkeep, sign replacement, mowing, litter removal, and painting. A successful maintenance program requires continuity and can involve a high level of citizen participation. Routine maintenance on a year-round basis will not only improve safety, but will also prolong the life of the facility.

Vegetation - Plantings should be placed far enough apart to maintain good visibility and avoid creating an enclosed feeling. This will also give pathway users good, clear views of their surroundings. Under-story vegetation within most pathway rights-of-way should not be allowed to grow higher than 36 inches for visibility purposes, except in cases where the under-story vegetation is natural, desirable, and part of the habitat required for wildlife. Tree species selection and placement should minimize vegetative litter on the trail and root uplifting of pavement.

Vertical clearance along the trail should be periodically checked, and any overhanging branches should be pruned to a minimum vertical clearance of ten feet (10’).

Mowing - The shoulder zone adjacent to a pathway should be frequently mowed to allow for people to step off the facility if needed when passing another user.

Surfacing - Where concrete is the recommended surface material, cracks, ruts and water damage will need to be repaired periodically. Where drainage problems exist along the pathway, ditches and drainage structures will need to be kept clear of debris to prevent washouts along the pathway and maintain positive drainage flow. Checks for erosion along the pathway should be made during the wet season, and immediately after any storm that brings flooding to the local area. The use of pathways with natural soft surfaces may need to be minimized and/or prohibited during wet conditions.

Removal of debris - The pathway surface should be kept free of debris, especially broken glass and other sharp objects, loose gravel, leaves, and stray branches. Path surfaces should be swept periodically. Soft shoulders should be well maintained to maximize their usability.

Litter Removal - Litter receptacles should be placed at access points such as trailheads. Neighborhood volunteers, friends groups, and community service groups should be considered in addition to maintenance staff to help collect litter.

Sign inspection and replacement - Signage should be replaced along paths on an as needed basis.

On-Street Bicycle Facilities

Bicycles are more sensitive to irregularities and road debris than cars due to their smaller and lighter weight tires. Roadway features that cause minor discomfort to motorists, such as potholes and improper drain grates, can cause serious problems for bicyclists. Debris such as loose gravel or overgrown vegetation may seem minor to a vehicle, but can be serious hazards to bicyclists.

Furthermore, debris is more likely to build in bike lane areas due to the absence of vehicles in that area. In the implementation of bicycle facilities, consider the need to maintain bicycle facilities and give attention to regularly sweeping the bike lane and gutter area (as needed). Sweeping of bicycle lanes should be integrated into the traditional street sweeping schedule.

Re-striping - Painted lanes and lane symbols typically have a five year life cycle, and should be re-striped at or near to that interval. When re-striping is implemented, old striping must be removed before new striping is painted.

Pavement condition - Ensure that riding surfaces are relatively smooth and integrate the repaving of bicycle facilities with the regular schedule of repaving travel lanes.

Sign replacement - Sign conditions should be evaluated periodically, and signs should be replaced as needed.

Ordinances and Policies

Successful implementation of the master plan will require the protection of existing connections and the implementation of planned connections throughout the city. Although many of the trail corridors are intended to utilize public lands consistent with the goals and policies of the master plan, acquisition of corridors on private lands will be necessary in future development to successfully implement this plan.

Many options are available to the city, public agencies, non-profit groups, and private landowners to ensure the protection of these critical corridors. The objective of the master plan is to provide a menu of available options to both public agencies and private landowners, promoting flexibility and creativity in the negotiation process. Careful crafting of transactions between private landowners and public agencies can and should produce mutually beneficial results.

Trail Development Ordinance - Consideration of a trail development ordinance is recommended. Similar ordinances have been enacted in other cities in Texas, and have proven successful in helping to get trails constructed. Similar ordinances have been adopted in other Texas cities (such as Allen) that require complete developer construction of key trail segments that fall within their property limits, without city participation. City funding is then used for other regional trails or for trailhead development. Often, the required trails replace adjacent sidewalks, and therefore, do not add significantly to the cost of the development. Credits for landscaping, pavement, or other infrastructure elements can be given in return for trail construction. A central point to consider is that many developments these days will add trails automatically; therefore, such a mandatory trail development ordinance only serves to create a level playing field between the developments that include trails and those that will build them only if required to do so.

Develop Trail Cost Sharing Ordinance - An alternative type of ordinance is patterned after sidewalk requirements, in which adjacent property owners fund a portion of the trail installation cost, with the city covering the remainder of the cost.

New Development Reservations and Dedications - The preservation of corridors in conjunction with or independent of the open space areas required to be created with new residential development could be required in the City Code. Right of way reservations for sidepaths and trails could be required of new residential developments consistent with this master plan. An offer of dedication is required when a reasonable relationship is demonstrated between the need for the dedication and the characteristics and impacts of the proposed development.

The City Code could also provide incentives to new development to encourage implementation of the master plan. Reduction in required open space areas and fee waivers are two specific incentives for public trail reservations and dedications beyond that required of any new development. Additional flexibility could be provided for new development, promoting the highest quality development in concert with the public need and benefit derived from creative and innovative development proposals. This flexibility might come by allowing reductions in required off-street parking and flexibility in internal project circulation layout, which is justified with the reservation/dedication of lands in support of the planned hike and bike trail network.

Existing Development - In cases where corridors shown on the master plan intersect with existing developed areas, the acquisition of lands may be necessary to create connectivity with adjoining trail corridors. Acquisition can be accomplished through a variety of forms: outright purchase of property, purchase of easements, or donations. These varieties of acquisition may be employed, while always seeking the most cost effective method to secure appropriate public interest when necessary and warranted. Public/private negotiations for outright purchase of private property will be necessary in some instances; however, the purchase of easement or partial/restricted property rights at less cost to the public will be encouraged.

Trail Setback Recommendations - The purpose of this recommendation is to address the protection and preservation of trails and easements for future trail corridors. This will ease the implementation of the master plan by protecting, conserving and maintaining the abundant qualities of the lands along draws and drainage ways within Midland while increasing transportation and recreation opportunities.

Coordination with Ongoing and Future Transportation Improvements

Major public works improvements such as new street development or roadway resurfacing can provide an opportunity for sidepath or on-street bicycle facility development. The resurfacing of roads can also be used to consider striping bicycle lanes. New roads or the widening of existing roads can be sized to include bicycle lanes or to have sidepaths added as the road is built. When large new facilities are being built, whether by public or private entities, trail opportunities along their edges should be considered.

Every effort in the city, whether private or public, whether funded by the city or by another agency such as Midland County or TXDOT, should be considered early on as a potential bicycle facility or sidepath candidate. Ways in which to better leverage public funds, no matter which entity the funds are coming from, should also be considered early on so as to take advantage of opportunities as they occur.

Adequate right of way should also be acquired early so as to provide corridors for trails. It is extremely difficult to retrofit trails, sidepaths or on-street bicycle facilities once development around it has occurred.

Private sector developments should be carefully reviewed to determine if key trail corridors shown in this master plan can be integrated into the proposed development. In some cases, the city may consider funding portions of the recommended trails over and above the developer portion so as to expedite construction of the overall trail system.

Preservation and Access to Draws and Drainage

Draws and drainage corridors will be one of the major trail connections within Midland, and as such should be developed with access along at least one side of the draw. Because they are flood prone areas, these corridors are largely undevelopable, and can preserve much of the remaining natural space in Midland. Steps should be taken to require that natural drainage corridors be preserved and trail access be allowed. In most cases, streets paralleling the drainage corridor are preferred, rather than lots that back up to it and that effectively seal off the drainage from public view or access. Drainage channels can be planned in such a manner that they include trails along one or both sides, become an amenity for their development rather than an eyesore, and can be oriented so that adjacent homes are not impacted.

Support Programs

The investment in sidepaths, trails and, where feasible, on-street bicycle facilities can reach its fullest potential in Midland only if educational and promotional efforts are also implemented. This section reviews support programs to improve the bicycle and walking culture in the city.

Education and encouragement strategies often go hand in hand, since their purposes and methods often overlap. To be effective, promotional programs should not only be for the general public but also target specific populations and audiences in Midland, such as recreational bicyclists, youth, employees in certain key areas, and new bicyclists or walkers.

Consistent enforcement of the rules for pedestrians, bicyclists and motorists on the road is a critical component of creating a safe environment. This element focuses on efforts to enforce existing laws in a consistent fashion and ensures that law enforcement officers are properly trained to enforce bicycle laws. This component overlaps with efforts to educate bicyclists and motorists regarding applicable laws.

Support Programs Goal and Objectives

Provide educational, encouragement, and enforcement programs that support walking and bicycling in Midland.

Objectives:

I. **EDUCATE** all road users of all ages and abilities as to their rules, rights, and responsibilities.

II. **ENCOURAGE** bicycling and walking as a form of transportation and exercise.

III. Consistently **ENFORCE** the laws of the road.

Education Programs

Education is a crucial component of increasing walking and bicycling while maintaining a safe environment for all users. For bicycle riders in particular, it is essential to equip road users with the knowledge and skills to safely share the road. All users, including motor vehicle operators, should understand their rules, rights, and responsibilities. Methods to improve walking and bicycle safety education include the following.

- Actively distribute information on the proper use of bicycle facilities. The city can provide residents with information about the purpose of new bicycle facility treatments (e.g., bicycle lanes, buffered bike lanes, sidepaths, etc.) and safe behaviors for using these facilities as they are being designed and installed. One way to extend this message is to develop a web page hosted on the city's website that includes information about each facility type. The website should provide as many graphics and visuals as possible, including videos (where appropriate) to describe safe maneuvers. Relevant educational material is already available from many sources, including Bike Texas.
- Temporarily police new facilities after implementation of educate Midland residents on safe bicycle riding. Police officers receive training on the rights and responsibilities of bicyclists and motorists. They should temporarily increase patrols for a period of time to help roadway users adjust to new on-street facilities when they are installed. These patrols are an opportunity to educate users on safe and unsafe behaviors, particularly how unsafe or illegal behaviors could jeopardize the safety of others. The city can develop educational pamphlets that patrol officers could distribute when talking to residents. These temporary police patrols should not be used to punish or serve citations but to educate roadway users. Officers should target all transportation modes, as unsafe behaviors by both motorists and bicyclists need to be corrected.
- Promote Safe Routes to School efforts at all primary schools in Midland. Most children start to ride bicycles at a young age. For adolescents, bicycles offer independence and self-reliance. Therefore it is important to teach students safe bicycle skills as early as possible and reinforce that message as they approach driving age. One way that cities across the nation have addressed education needs is to provide a citywide Safe Routes to School (SRTS) program. The purpose of the program is to educate children of the proper safety procedures when walking or biking, to encourage children to walk and bike to school if they are not currently doing so, and to improve facilities where students are already walking and biking. A key component of the program is educating students on safe walking and bicycling behavior. The city should encourage and support school district efforts to provide bicycle education for all students. To reach young students, many districts in Texas conduct regular bicycle "rodeos" or half day training sessions given to all students at a certain grade level.
- Provide youth and adult bicycle education opportunities. Private groups in Midland could provide bicycle safety skills courses taught by League of American Bicyclists (LAB) certified instructors. These courses are sometimes offered free of charge (where subsidized) or are offered at a reasonable charge (to compensate the instructors). The City of Midland can partner with or support area advocacy groups and certified instructors to provide a central information source and marketing for area bicycle education events, or provide a location on city property to conduct the training sessions. Target audiences may include area college students where bicycle safety courses could be offered as part of orientation programs held at the beginning of each school year. Incentives could also be offered to large employers to have employees become certified instructors and regularly offer classes to their employees. The more confident people are in their bicycling abilities and safety knowledge, the more likely they are to substitute some short car trips with ones on bicycles.

Example of a bicycle rodeo event in San Antonio

- Provide information to promote safe walking. Pamphlets and online information generated by many national and state entities can be distributed to Midland residents to help promote safe walking habits. Key areas to focus on include learning how to cross correctly at intersections, and to discourage trying to cross streets mid block.

Encouragement Programs

Encouragement and promotion is an important element in getting Midland residents to walk and bicycle more frequently. The City of Midland has a number of opportunities for encouragement programs. Methods to encourage walking and bicycling include the following.

Target a greater amount of walking in the City. A sample of the types of efforts specifically devoted to walking may include:

- Publicize key events, such as National Trails Day.
- Develop inexpensive temporary signs that can alert residents to easy walking opportunities, such as "5 minutes to walk to a local restaurant."
- Develop specific "walk scores" for schools and other key destinations in the city. Available at walkscore.com, this application quickly rates a destination in terms of its access via walking, and can help publicize how accessible many destinations in Midland are.
- Provide information on how to organize and

encourage walking groups or clubs. The city and local partners can help encourage neighbors to create groups that walk on a regular basis.

Encourage walking and bicycling by city leaders, local employees, and area employers. As part of an overall mission to improve the health and fitness of Midland residents, have city departments, elected officials, and city business leaders spearhead efforts to increase bicycling and walking. Encourage these leaders to attend walking and bicycling events, participate in public campaigns about walking and bicycling in Midland, or publicly recognize businesses that encourage their employees to commute by walking or bicycling. The city should encourage bicycling by providing information about economic benefits, health benefits, and potential commuting routes to employers and employees - all of which are found in this master plan. The following actions demonstrate support for bicycling:

- Promote Bike-to-Work and Bike/Walk-to-School Day. This encourages area employees, as well as children, to bicycle to work or school by demonstrating how it can be done regularly. Many communities choose to build on Bike-to-Work Day and Bike/Walk-to-School Day and use it as the centerpiece of a larger community event focused on the local bicycling community.

- Serve as an example by providing showers and lockers for employees. Another method is to require all new and existing public buildings owned and operated by the City of Midland to include facilities for bicycle commuters, such as showers and bicycle parking. A future update to the Development Code could require that all development projects (public and private) exceeding certain thresholds (size, density, use, etc.) should be required to provide bicycle facilities.

- Work with local bicycling groups to provide "bicycle mentors" to demonstrate to residents who have always driven to work how it may be possible to bicycle to work. Low-cost strategies can include educating employers on federal tax benefits for bicycle commuting by hosting workshops on a regular basis. Through the Federal Commuter Tax Benefit (Section 132(f) of the Internal Revenue Code reauthorized in 2013), employees can receive up to $20 per month tax free from their employer for expenses related to commuting to work via bicycle. The city can take their promotion a step further by promoting employer achievements on an annual basis with an awards program. Recognizing local employers for their efforts to encourage bicycle commuting promotes the awareness of bicycling and also showcases the efforts of leading examples. Employers get the benefit of the positive press, and the city benefits from the increase in bicycling.

Example of a bike to work/bike to school day event in Sugar Land, Texas. Images source: City of Sugar Land Transportation and Long Range Planning Department

Conduct a detailed school by school analysis to improve walking and bicycling routes to that school as part of any future Safe Routes to School Plan initiative. Using each school's attendance zone, develop a detailed list of smaller improvements that can create more attractive walking and bicycling routes to each school. While this master plan focuses on the citywide trail and bicycle network, a more detailed Safe Routes to School Plan would focus specifically on connecting the residences of enrolled school children to their school via a safe walking or bicycling route. A Safe Routes to School Plan also develops more detailed education and encouragement programs for walking and bicycling specifically aimed at school aged children.

Develop and distribute a route facility map. To increase the citizens' knowledge of existing walking and bicycling facilities and destinations in Midland and to encourage the use of those facilities, the city should develop a brochure type route map that can be printed and distributed.

Increase citywide availability of bicycle parking. To quickly expand the relatively small amount of bicycle parking available at key destinations in Midland, the city should consider purchasing bicycle racks in bulk and selling them at cost for installation at key destinations. The city may also partner with local advocacy organizations to support this type of program. For example, the advocacy group/organization could purchase the bike racks and administer the program of which businesses receive them, while the city can store the racks and possibly install them.

Safety and Enforcement Programs

Bicyclists are legally entitled to use the road but are required to obey the same rules and regulations that apply to vehicles. Enforcement should reinforce the right of each roadway user in Midland. The Midland Police Department should actively enforce traffic laws for both motorists and bicyclists.

Enforcement is a necessary part of increasing bicycle riding in Midland. To be effective, the enforcement program should be accompanied by awareness and education. The Police Department may elect to start with warnings and utilize citations only if necessary. Enforcement alone does not usually achieve long-term effects; rather, it needs to be partnered with strong education and encouragement efforts as well as physical improvements to facilities.

Another important aspect of a successful enforcement program is to recognize the nature of the problem. If a significant number of users practice an unsafe behavior, there may be a problem with the physical design. In these instances, an analysis of the physical environment may reveal that more detailed changes than those recommended in this master plan should be made to the infrastructure. First, the City of Midland should monitor the crash data. If warranted by a high number of incidents, then the Midland Police Department and the Transportation Department should work together to study how best to reduce bicycle and motor vehicle crashes. The approach should focus on improving the behaviors of both bicyclists and motorists.

Increase enforcement of bicycling related infractions. Targeted motorist behaviors include the following:

- Turning left and right in front of bicyclists
- Passing too close to bicyclists
- Speeding
- Parking in bicycle lanes where signage prohibits parking
- Rolling through stop signs or disobeying traffic signals
- Harassment or assault of bicyclists.

Bicyclist behaviors that should be targeted include the following:

- Ignoring traffic control (traffic signals and stop signs)
- Riding the wrong way or against traffic on a street
- Riding with no lights at night

Bicyclist safety is a shared responsibility between all roadway users. Enforcement priorities should be established through a collaborative process. Methods for enforcement programs are as follows.

Progressive Ticketing

1. EDUCATING
Establish community awareness of the problem. The public needs to understand the rights and responsibilities of both motorists and bicyclists. Raising awareness about the problem will change some behaviors and create public support for the enforcement efforts to follow.

2. WARNING
Announce what action will be taken and why. Give the public time to change behaviors before ticketing starts. Fliers, signs, newspaper stories and official warnings from officers can all serve as reminders.

3. TICKETING
Finally, after the warning time expires, hold a press conference announcing when and where the police operations will occur. If offenders continue their unsafe behaviors, officers issue tickets.

Source: Pedestrian and Bicycle Information Center, www.walkinginfo.org

3' safe passing campaign by Bike Texas. Image source: www.biketexas.org

Enact by ordinance a 3' safe passing rule in Midland. As of August 2014, 23 Texas cities, including Houston, Dallas, Fort Worth, San Antonio, Austin, and Midland have enacted a safe passing rule. Safe passing rules establish a standard safe passing distance of 3' (or 6' for commercial vehicles) that only applies when road conditions allow. It also prohibits the "right hook" (turning dangerously in front of a vulnerable road user) and failing to yield when making a left turn at an intersection. Ordinances that have been adopted apply to not just bicyclists but any vulnerable user in the road right-of-way, including pedestrians, construction workers, and persons in wheelchairs.

Cities that have enacted this law often conduct periodic enforcement campaigns to issue citations or warnings. They also sometimes have promotional campaigns, such as placing signs and billboards throughout the city or running TV and radio advertisements, to inform the public of the new ordinance.

Evaluate whether a helmet use law for young bicyclists is appropriate for Midland. Currently, there is no statewide law in Texas for helmet use for any age bicyclist. Twenty-one states and the District of Columbia have helmet laws for young bicyclists. Studies have estimated that helmet use may reduce head injury risk by as much as 85%[1]. Many local jurisdictions throughout the country and in Texas have adopted helmet ordinances for younger bicyclists. In Texas, those cities include:

- Arlington, for children under 18 years old
- Austin, for children under 18 years old
- Bedford, for children under 16 years old
- Coppell, for children under 15 years old
- Dallas, required for all users
- Fort Worth, for children under 18 years old
- Southlake, for children under 15 years old

Consider adopting an ordinance that prohibits vehicles from driving in the bicycle lanes. Texas law does not address motor vehicles being able to drive in a bicycle lane. This master plan recommends that Midland adopt such an ordinance, modeling it on similar ordinances which have been adopted in cities throughout Texas. Usually the ordinance will prohibit a motor vehicle from driving in, upon, or across a bicycle lane except when entering or leaving a driveway or parking space and when making a right turn. In cases where crossing the bicycle lane is necessary, the ordinance should also state that the motorist must first yield to any and all bicycle traffic.

Enforcement efforts do not need to necessarily come from police officers. Safe bicycle behavior can be established with good examples. Work with local advocacy groups to encourage a volunteer bicycle fleet to offer group rides to help people learn safe bicycling skills and responsibilities. These can be especially helpful for those venturing out on the road for the first time. Having several bicyclists riding together also reminds motorists of the presence of bicyclists and encourages courteous sharing of the road. Group rides can also help people confidently ride in the evening and night hours. Each group ride may begin with a review of safe bicycling laws and tips. Gently reminding riders of safe behavior along the ride helps new riders test the waters in a safe and welcoming environment.

Implementation Roles

The City of Midland is the primary implementing agency of this master plan. By adopting this plan, the city acknowledges its role and responsibility to take the lead in pursuing the plan's goals and objectives. Implementation actions by the city include actual construction of trails and bicycle facilities, and supporting programs to educate and encourage new users. Multiple city departments may have a role in implementing and operating the facilities envisioned in this master plan. These include the following:

- The Parks and Recreation Division will have major roles in implementing the master plan recommendations. Responsibilities will include developing and overseeing efforts to improve walking and bicycling, constructing trails, proposing bicycle facilities, facilitating education, encouragement and enforcement events, and coordinating among the various departments and agencies that have a role in implementing this plan.
- The Transportation Department may assist with facility development and day-to-day operations and maintenance of the city's roads and sidepaths, including signage and striping, where much of the on-street infrastructure may be built.
- The Engineering Department will lead the design and construction of bicycle infrastructure, including pavement markings, signalization, and signs.
- The Police Department will have a significant role in supporting and implementing safety education and enforcement components of this plan.
- The Planning Department enforces the City's Development Code and other development-related ordinances. This department is responsible for ensuring that infrastructure built through private development conforms to the city's codes. The department may also update the city's codes to establish new standards for projects in this plan.
- The Midland Odessa Transportation Organization can assist in future transportation planning and support implementation of the recommendations of this plan.
- Contract implementers such as Bike Texas may assist in coordinating programs, helping to secure funding, managing implementation projects, and conducting encouragement efforts.

These implementers should maintain a close working relationship with the city's Parks and Recreation Division to ensure that efforts by all parties are closely coordinated.

1 Thomas, S., Acton, C., Nixon J., Battistutta, D., Pitt, W.R., Clark, R. (1994) Effectiveness of bicycle helmets in preventing head injury in children: case-control study. BMJ Journal, 308 doi: http://dx.doi.org/10.1136/bmj.308.6922.173.

Sources of Funding

Trails and bicycle facilities are considered by Midland residents as one of their highest priorities. Therefore, funding for these facilities should be treated as a key item in both annual and longer term budgeting. Regular steady funding is recommended so that the network is added to on a continuous basis. A broad range of funding mechanisms, from both the public and private sectors should be considered. These include:

General Obligation Bond Funds - Bond funds are typically the primary source of significant development efforts. Larger capacity of these funding sources allows for more development to occur.

CIP Funds - An annual set-aside in the city's pay-as-you-go Capital Improvement Program (CIP) could be used to fund the on- and off-street network. These funds could also be leveraged as a match for state and federal grants if those become available.

Funding as Part of Other Projects - Both on- and off-street facilities can be efficiently funded as part of other larger city projects, such as new roads. However, separate trail and bicycle funding should not be added to road projects to help supplement roadway funding that is inadequate to begin with.

Special District Funding - Funding from special districts, other new public improvement areas, or tax increment financing areas can be used to help develop trails and bicycle facilities.

4B Tax - 4B Sales Tax may allocate funds for a wide range of uses intended to give communities an opportunity to undertake a project for quality of life improvements, including parks and trails, bicycle facilities, professional and amateur sport and athletic facilities, tourism and entertainment facilities, affordable housing, and other improvements or expenditures that promote new or expanded business activity that create or retain primary jobs.

Private Residential or Commercial Development - Some of the trails noted in this master plan are located within residential communities or adjacent to commercial or business areas. As such, trail segments associated with either existing or new development can be partially or entirely built by the private development community. Specific mechanisms to require trail development which can be adopted by the City Council were discussed earlier in the Ordinances and Policies section of this chapter.

Grants from a Variety of Sources - Grants that can be used for trail and bicycle facility development are available from a variety of sources. Given the resident support for alternative transportation methods, local pursuit of grants could be successful and should be aggressively pursued. Major grant types include:

- **Texas Parks and Wildlife Department Grants** - Through its outdoor recreation and community trail development grants, these matching grants can provide from $50,000 to $500,000 in grant assistance.
- **Transportation Alternatives Program -** Under the new Federal policy, MAP-21, the previous Transportation Enhancements, Safe Routes to School and Recreational Trails programs are combined into one. Under this new program, 2% of federal highway funds are reserved for projects defined as transportation alternatives, which includes trails.
- **Regional Surface Transportation Program (RSTP)** - This is a block grant program that makes money available statewide for roads, bridges, transit capital, and bicycle and pedestrian projects. Applicants eligible for RSTP funds include cities, counties, Metropolitan Planning Organizations (MPOs), transit operators, and the Texas Department of Transportation. Nonprofit organizations and special districts also may apply for funds, but they must have a city, county or transit operator sponsor and in some cases administer the project.
- **Highway Safety Improvement Program (HSIP)** - This is a federal safety program that provides funds for safety improvements on all public roads and highways. These funds serve to reduce traffic fatalities and serious injuries on all public roads.
- **Foundation and Company Grants** – Some assist in direct funding for projects, and some support efforts of non-profit or citizen organizations. Further info can be found at "The Foundation Directory" and at "The Foundation Grants Index" www.fdncenter.org
- **Grants for Greenways** - This is a national listing that provides descriptions and links to groups who provide technical and financial support for greenway interests.

Partnering - Partnering with regional volunteer groups can also be helpful when constructing new trail projects. Their efforts can be used as part of the required match for some grants. Midland volunteer programs, for example through schools or community groups, may substantially reduce the cost of implementing some of the proposed trail segments. Local construction companies might donate or offer discounted services, or local corporations might adopt bikeways.

Issues Associated with Funding

Funding for trail and bicycle facility development in Midland can come from a variety of sources such as generated locally, from the State of Texas, and from federal sources. Private development can also aid in the establishment of much of the future facilities throughout the city.

Each segment will have unique funding opportunities, based on the neighborhoods around it and the specific characteristics of the corridor. Key issues associated with funding are as follows:

- If possible, funding should be continuous and steady. Annual designation of funds for trails and bicycle facilities will result in a steady growth in the city's network, and will allow the citizens of Midland to see a continuous flow of new facilities every year, rather than in sporadic bursts.
- Construction of major trail corridors should be the focus of public expenditures. Major "spine" segments that connect neighborhood to neighborhood should be the primary focus of public expenditures for trails. Trails within and primarily serving private developments and individual neighborhoods should be paid for with private sector funds.
- Funds designated for the development of trails and bicycle facilities should not be taken from other developments. For example, both parks and trails are extremely important to the future quality of life in Midland, and funding one should not imply that the other need not be funded.

Reviewing Implementation

The Midland Hike and Bike Master Plan is a living document and should be updated periodically to assess progress, identify new opportunities, and re-evaluate goals and priorities. The citizens of Midland have expressed interest and support for a citywide network of on- and off-street facilities. The priorities should continually be updated and included in the annual Capital Improvements Program (CIP) as segments of the network are implemented.

As the city moves forward in building the network and implementing this master plan, it is important to continue to involve area stakeholders, residents and businesses located along any proposed routes. Public engagement is a critical component of any design process involving new trails and bicycle facilities, and is also vital when updating, changing or re-prioritizing any recommendations.

The city should initiate and maintain an annually updated Capital Improvement Project (CIP) list of short- and long-term trail and bicycle facility improvements based on this master plan. This CIP should be annually updated to reflect the highest priority projects for each fiscal year into the future.

To measure the successful implementation of the recommendations of this master plan, a series of benchmarks and periodic measures should be used to monitor implementation. They can include:

- Identify key locations for benchmark counts. Count bicycle and pedestrian users along key segments both before implementation and after to track changes.
- Review periodic American Community Survey data provided by the US Census on commuting mode share.
- Quantify the percentage of the system that is developed.
- Quantify education and encouragement efforts by counting the distribution of route maps, the number of classes and participants enrolled in safety programs, etc.
- Quantify end trip facilities provided at businesses and destinations within the city.