



PARKS AND RECREATION DEPARTMENT

HIKE AND BIKE TRAIL PLAN

*Interim Update
2019-2020*



Prepared by



VICKREY & ASSOCIATES, INC.
CIVIL • ENVIRONMENTAL • SURVEY
LANDSCAPE ARCHITECTURE

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INTRODUCTION – HIKE AND BIKE TRAIL PLAN UPDATE

In 2010 the City of New Braunfels adopted a Parks Master Plan that included a chapter regarding trails. This Chapter has been used as the City's Hike and Bike Trail (HBT) Plan for the last decade. It is being used as a trail and greenway planning tool to enhance the City's transportation and park network. That Plan identified trail types and standards and most importantly, it identified on- and off-street trail connections to neighborhood/community parks, schools, and commerce throughout the City and its extra-territorial jurisdiction (ETJ). The proposed trails were later incorporated in the 2012 Regional Transportation Plan to identify transit and bike/pedestrian needs, alternative transportation networks and connections. The HBT Plan has provided the City with new trails such as the Countyline Memorial Trail, Oak Run bike lanes and other trail connections that have enhanced the City's non-motorized transportation network. However, rapid growth in both land use, roadways, and population leaves the 2010 HBT Plan outdated.

Since the adoption of the HBT Plan nearly 10 years ago, the City's population has grown exponentially which has led the City to re-evaluate its parks and recreation inventory and land use requirements to meet the community's ongoing park and recreational needs. In



2017, The City's Parks Strategic Master Plan was adopted to address such issues by updating the City's parkland goals, identifying unmet recreational needs, and establishing future land acquisition and development strategies. The facilities most desired by residents which are currently not provided included, "walking and biking trails" and "paved/unpaved trails."

The 2017 Parks Strategic Master Plan included projects from the HBT Plan, but it did not reexamine the trail recommendations. It was determined that a future effort would reexamine trail plans for future efforts, thus the Interim Update.

The Parks Strategic Master Plan was adopted and used to inform the Parks section of Envision New Braunfels. This is the City's newly adopted comprehensive land use plan. It touched on a variety of topics that impact land use, future development, and the economic viability of the community. It acknowledged parks as a benefit and trails as a multipurpose strategy for linking neighborhoods, increasing mobility, and maintain a high quality of life.

While each of the aforementioned plans identified trails and greenways as strategies to reaching specific goals, the plans did not provide a review of existing efforts, revised trail standards based on best management practices, or give recommendations for trail priorities to address the public desire for more walking and biking trails.

To tackle this and the growing interest in hike and bike trails, this document provides an update to the 10-year old plan. This Plan includes updating the City's inventory of completed trail projects, codifies trail classification and types, as well as standards for trails, incorporates newly adopted planning studies, and introduces new trail opportunities. The HBT Plan gives City staff, elected officials, development, and citizens a more accurate

glimpse on current trails and future corridor planning and implementation efforts. This will provide a better map to localized priorities and reduce

There are numerous benefits to developing hike and bike trails, such as offering low-cost recreational opportunities, safe, alternative forms of transportation, substantial health benefits, habitat enhancements for plants and wildlife, and unique opportunities for outdoor education and cultural interpretation. The key benefits identified in this plan are taken from various planning documents (2017 Envision New Braunfels Comprehensive Plan; Strategic Parks and Recreation Master Plan, Trail Component, 2010; Downtown Implementation Plan, 2010; Regional Transportation Plan, 2012; Mobility 2040; Regional Bicycle & Pedestrian Planning Study) and are supported by public input.

WALNUT AVENUE POCKET PARK AND TRAIL



TRAIL USERS & TYPOLOGY

CATEGORIES OF TRAIL USERS TYPES

Trails attract a diverse set of users, such as walkers, joggers, runners, bird watchers, and cyclists and offer alternative means of travel, provide recreation opportunities, and improve quality of life. To accommodate the variety of user types, the American Association of State Highway and Transportation (AASHTO) identifies the following trail design guidelines:

Typology

Regional or arterial trails are defined as “community wide trail systems” which travel long distances to link different parts of the city together and to other city trail facilities. These trails are typically ten feet wide with concrete or asphalt paving. Trail access points should be located every half mile. Facilities include trailheads with amenities.

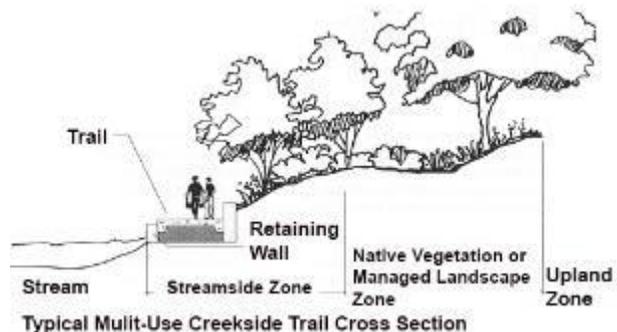
Neighborhood trails provide access between neighborhoods and connect to regional or arterial trails. These trails are six feet in width and constructed of concrete or asphalt.

Natural trails typically have a compacted earth surface with a minimum of six feet in width but can be as wide as ten to twelve feet for greater visibility. An additional two- to four-foot shoulder is recommended as a “Safe Zone” to provide visibility to obstructions and hazards such as animals, roots, rocks, and understory vegetation. It is recommended to use trail surfaces that create an atmosphere compatible with the natural beauty of the corridor.

Multi-Use Paths are physically separated from motorized vehicular traffic by an open space or barrier. They can be located within road right of ways, parks, and trail corridors and are shared by multiple users including, but not limited to, pedestrians, joggers, runners, and bicyclists. Generally, two types of surface treatments are used: crushed granite or hard surface pavement. Anticipated use and location should be considered when selecting surface treatment, which should also meet the City of New Braunfels' Park Standards.

Stream Corridor and Drainage Way Multi-Use Trails are located within waterways and designed to protect water quality and wildlife habitats, mitigate damaging effects of flooding from storms, and filter pollutants from overland flow. It is recommended to provide an undisturbed vegetated buffer within waterway corridor floodplains and floodways. Prescriptive buffer widths will be site specific, depending on stream, riparian buffer, and watershed; water quality; impervious surfaces; slope; soil hydrology; and vegetation. Stream corridor trail categories include the following multi-use trails:

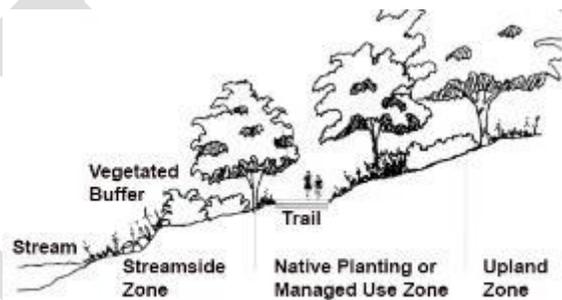
- **Creekside and Drainage Way Multi-Use Trails** are located only in urban areas, where right-of-way constraints and channeled streams restrict trail development within floodways. Creekside trails are designed to be 10 feet wide to accommodate walkers, bicyclists, and joggers. These multi-use trails are



typically positioned directly adjacent to the stream channel and are therefore subject to frequent flooding. Creekside trails require hard-paved surfaces of concrete to withstand high-velocity stream flows. Retaining walls or other structural elements may also be required for stable construction and to protect the trail from erosion and flood damage. Installation of railings, benches, signage, and trash receptacles that could obstruct flow during storm events should be carefully considered and located to minimize their effect on flood waters and protect the amenities from flood damage. The use of retaining walls as seat walls is one way in which non-obtrusive amenities can be included on this type of trail facility. Special consideration should be paid to mitigating the impacts of trail construction on the natural environment.

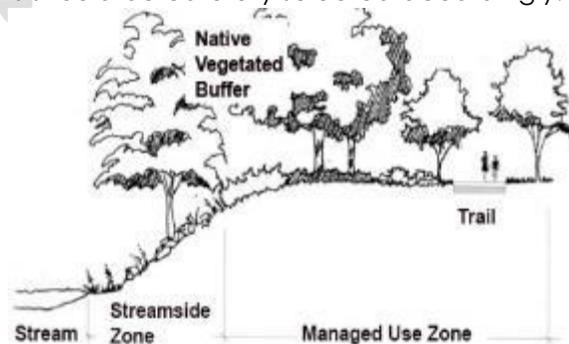
■ **Floodway and Floodplain Multi-Use Trails**

are designed to be 10 feet wide to accommodate a variety of users and are typically positioned within the floodway but not directly adjacent to streams. Some vegetative buffer between the stream and trail should be left intact. Like the creekside trails, floodways are subject to periodic flooding, but not as frequently. These trails require paved surfaces of either asphalt or concrete, depending on frequency of flooding and expected velocity of flow. A proper trail foundation is important and will increase the longevity of the trail. Soft shoulders should not be constructed due to flood considerations, and special attention should be given to mitigating negative impacts from trail development on the natural stream environment. All elements of the trail including the trail tread, railings, benches, and trash receptacles will be periodically flooded. The design and materials for these trails should be carefully selected accordingly.



Typical Multi-Use Trail Cross Section Within Floodway

- **Upland Multi-Use Trails** are designed to accommodate a variety of users. They are positioned completely outside designated floodplains, with an undisturbed vegetative buffer between any streams and the trail. It is recommended that these trails be built with paved asphalt or aggregate stone, depending on the preference of local user groups. Upland multi-use trails should be built to a minimum of 10 feet wide.



Typical Multi-Use Trail Cross Section Within Floodplain

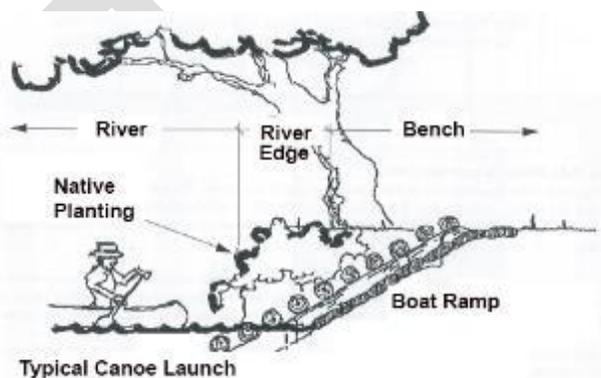
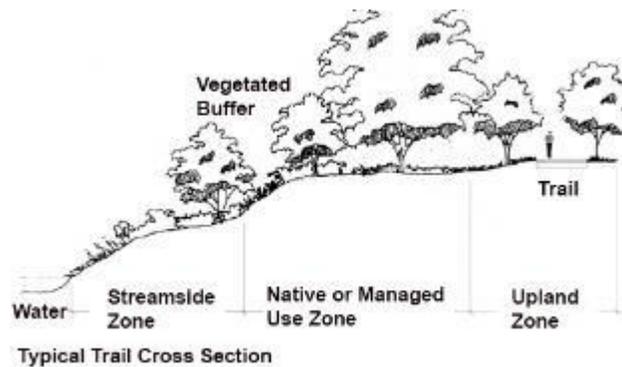
Water Based Trails are adjacent to rivers and streams that are designated to support canoeing, kayaking, and boating. Water based trails can be designed with features and facilities such as signage systems, improved rapids, safety systems, and access points.

On Street or Striped Bicycle Lanes can be used to link off-street trails and provide seamless connection and transitions. Striped bicycle lanes should be a minimum of four to five feet in width from the street edge of the gutter pan; a width of five feet is preferred.

TRAILHEADS AND ACCESS POINTS

Trailheads and Access Points: Trailheads are primary means of accessing a trail, typically at the terminus points of each trail. They may include parking lots, restrooms, picnic facilities, and other recreational amenities. Access points, on the other hand, refer to minor connections between the trail and nearby residential communities, recreational parks, and roadways. When developing both trailheads and access points, designers should consider people with disabilities and users with a wide range of skill levels. Accessible pathways should be developed that connect the public right-of-way and the public transit system to trailheads and access points. It is also crucial that all built facilities—such as parking lots, restrooms, picnic facilities and drinking fountains at trailheads and along the trails—comply with Texas Accessibility Standards (TAS). Although each project must be evaluated on an individual basis, the following general guidelines should be considered in the development and placement of trailheads and access points:

- Trailheads should be placed at each terminus of a trail corridor, and any place where a large concentration of trail users is expected, such as major parks along the trail.
- An accessible pathway should be developed that connects parking and other accessible elements to the trailhead.
- Trailheads should at least include parking, emergency phone service, benches, drinking fountains, animal waste bag dispensers, bike racks and repair area, native landscaping, and trail maps, and may also include restrooms, site lighting, trash receptacles, and picnic facilities.
- Trailhead facilities located adjacent to or within residential neighborhoods should be designed to ensure compatibility with the surrounding neighborhood.
- Trail access points should be placed wherever trail access is expected, such as at adjacent communities, schools, commercial areas, and parks.



- Trail access points should include signage identifying the trail and may include a map and drinking fountain. Limited parking may also be included, but because trail access points are designed to give access from local amenities to the trail, it may be unnecessary.

TRAIL AMENITIES

Resting Areas: Rest areas are generally small, level places located along a trail that provide users the opportunity to move off the main traveled path to stop to rest from demanding grades and slope conditions. Periodic rest areas are beneficial to all trail users but are particularly crucial for people with mobility impairments. Rest areas are most effective when placed at points of interest or scenic lookouts. The design and placement of rest areas will vary for each trail, depending on the terrain and intended use, so the specific design of each rest area should be considered individually. The following guidelines provide general recommendations:

- Trail rest areas should at least include a seating area and a place to park a trail vehicle (bicycle, etc.). They may also include a drinking fountain, restroom facilities, and signage when deemed necessary.
- Trail rest areas should be located approximately every half-hour of travel time. The distance between rest areas is dictated by the use modes on the trail.
- Trail rest areas should be located after any prolonged uphill slope, especially for bicycle and walking trails.
- The surface of rest areas should be firm and stable. Grades should not exceed 5%, and cross slopes should not exceed 2%.

Connection to Public Transit: In order to promote the principles of the Envision New Braunfels Comprehensive Plan of reducing auto dependency, maximizing community cohesion, and making the most effective use of community resources and infrastructure, every effort should be made to develop intermodal connections throughout the City and surrounding region, including bikeways and trails. The development of bikeways and trails for recreational and transportation uses is most effective when connected to existing regional public transit systems, such as buses, bike share, scooters, and/or park-and-ride lots. This allows people to take advantage of a wider range of transportation options, including walking and bicycling, and provides them with a potentially seamless transfer between travel modes. As future bikeways and trails are developed throughout the City and County, trail planners and designers are strongly encouraged to contact the appropriate governing agencies to work toward greater connectivity. Each trail must be evaluated on an individual basis and consider the following recommendations:

- Provide locations of connection that are safe, obvious, and convenient.
- Provide locations that are readily accessible by pedestrians.
- Provide secure bicycle parking at each location.

Signage and Markings: Adequate signage and markings are essential to trails to increase the safety and comfort of trail users. Signs communicate important information about the trail to the user, such as navigational and educational information, warnings of potential trail hazards, and regulatory uses. The Texas Manual on Traffic Control Device (TMUTCD) and Federal Highway Administration's Manual on Uniform Traffic Control Devices are

valuable resources that regulate standard signage and pavement markings. Types of trail signs include the following:

- **Informational Signs** direct and guide users along trails in the most simple and direct manner possible. Signs may include identification of trailheads and access points, identification of cross streets, trail maps, descriptions of surface type, grade, and cross-slope, and other trail features.
- **Directional Signs** inform trail users of their location along the trail and the distance to destinations and points of interest. They may include street names, trail names, direction arrows, mile markers, and mileage to points of interest.
- **Interpretive Facilities** allow trail users to gain an understanding of the unique environment through which they travel. Each trail's interpretive program will be different, based on its location, potential interpretive resources along the trail, and the use of the trail. Interpretive facilities throughout the trail system may highlight various aspects of the landscape, native plants and animals, geologic history, and cultural history. As trail planners and designers incorporate these unique environmental resources into the trail experience, consideration should be given to providing interpretive information in a format that is accessible to people with vision impairments and people with limited English skills.
- **Warning Signs** alert trail users to potentially hazardous or unexpected conditions. These signs should be posted in advance of any condition such as upcoming roadway, railroad, or trail intersections; blind curves; steep grade, height, or width constraints; and emergency access coordinated with mile markers with GPS coordinates.
- **Regulatory Signs** inform trail users of the "rules of the trail" as well as selected traffic laws and regulations. They include, but are not limited to, the following: appropriate user modes for each trail, yield signs for multi-use trails, bike speeds, controlling direction of travel, stop and yield signs. Trail STOP signs should be installed on shared-use paths at points where bicyclists and other users are required to stop. YIELD signs should be installed on shared-use paths at points where bicyclists and other users have an adequate view of conflicting traffic as they approach the sign, and where trail users are required to yield the right-of-way to the conflicting traffic.

Site Lighting improves visibility and safety at trailheads, access points, and intersections for night use when nighttime security could be an issue. AASHTO recommends using average maintained horizontal illumination levels of 5 lux (0.5-foot candles) to 22 lux (2-foot candles), depending on the location. Where special security problems exist, higher illumination levels may be considered. Lighting poles should meet the recommended horizontal and vertical clearances for each trail type and luminaires and poles selection should be at a scale appropriate for trail users.

Fencing: Appropriate fencing should be incorporated into each trail design, as necessary, to deter trespassing onto adjoining properties and to provide a safety buffer at dangerous locations along a trail. The following are minimum standards:

- Material of fencing to be dictated by surrounding neighborhood and site-specific needs.

- Fences and railings shall be a minimum height of 42 inches.

Landscaping can be designed to provide numerous benefits for the trail environment, such as water quality, buffers, soil erosion, protection of wildlife habitat, and pollution prevention. It is recommended that trail designers preserve and incorporate the natural landscaping as much as possible. Other landscape design considerations include selecting plant materials that maintain appropriate safe sight distance, provide enough visibility to maintain security, and provide visual barriers along steep slope edges.

Yearly landscape maintenance is recommended to protect the safety of trail users and the general integrity of trail facilities. Maintenance recommendations include mowing native grasses twice a year to promote water filtration and water quality and to increase plant material flower and seed production that is beneficial to insects, birds, and wildlife. Trees and shrubs should be selectively pruned or thinned to obtain trail clearances, and trees in poor health that may fall and create pathway hazards should be removed.

Bollards, Gates, and Medians: Certain road crossings or intersections may create a need to limit vehicular access to the trail. Removal bollards and gates are possible solutions to restrict motor vehicles. Removal bollards can effectively restrict motorized vehicles from the trail and still allow pedestrians, bicyclists, emergency responders, and maintenance personnel access to pass through. It is important to design highly visible bollards, so they do not present a collision hazard to bicyclists. Low level landscaping, 6" to 12" in height, can enhance visibility and create a low buffer around the bollard.

Gates will completely restrict trail access because they stop vehicular, pedestrian, and bicycle traffic. Another method to limit trail use is to divide the trail entrance into two sections with a median or small island. The median should be wide enough to plant low shrubs to discourage vehicle traffic and to provide visibility for bicyclists. The landscaping creates a "soft" barrier should the cyclist inadvertently enter the median; it also allows maintenance vehicles to straddle the median for trail access.

Art Installations: Local artists can be commissioned to provide art for the trail system, making it uniquely distinct by providing trail and community identity. Many trail art installations are functional as well as aesthetic, as they may provide places for people to sit and engage their senses.

TYPES OF BICYCLE FACILITIES

The Hike and Bike Trail (HBT) Plan is a high-level on- and off-street plan. It is intended to show trails for non-vehicular transportation users. These trails include on-street facilities in order to accommodate potential constraints, such as right-of-way limitations, property ownerships, topography, and access. Including on-street bike facilities to offer seamless connection opportunities is important and practical for the implementation of a comprehensive HBT Plan.

Bicycle facilities are pathways designed for bicyclists' travel and should comply with AAMPO New Braunfels Bicycle & Pedestrian Planning Study and the latest American Association of State Highway and Transportation Officials (AASHTO) standards. Types of bicycle facilities include the following:

Bicycle Lanes are designated by a lane stripe, pavement markings, and signage. Striped bicycle lanes promote areas reserved for bicyclists. Typically, the solid stripe of the bicycle lane is either dropped or dashed prior to and through intersections, to allow for both cyclists' and motorists' turning movements.

Green Bike Lanes feature contrasting green color pavement marks that define the bike lanes and extend them through intersections and other traffic conflict areas, such as merge areas where turning vehicles must cross a through bike lane.

Sidewalks: When bicycle volumes and/or pedestrian volumes are expected to be low, or if a street right-of-way is constrained, sidewalks may be used as bicycle facilities. However, bicyclists' travel speed should not be faster than approximately 5-10 mph.

Bicycle Boulevards give preference to bicyclists over cars by diverting motorized traffic. Design elements may include diverters, reconfiguration of stop signs to favor the bicycle boulevard, traffic calming devices, shared lane markings, and crossing improvements at high traffic crossings.

Bikeways are roads or pathways specifically designated for the exclusive use of bicycles and do not necessarily have to be within the roadway.

Protected Bike Lanes separate bikes from motorized vehicle traffic by a row of parked cars, a curb, or some other physical separation.

Bicycle/Bus/Taxi Shared Lanes are restricted travel lanes for bicycles, buses, and/or taxis.

Climbing Bicycle Lanes are marked land on one side of the road to benefit cyclists going up steep hills at slower speeds.

Shoulders are 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 and has few crossings or driveways. Texas legal code allows continuous use of the shoulder by bicycles, emergency vehicles, and maintenance crews.

Shared Lanes (with markings) are the right-most through-traffic lanes that are 14 feet 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 they are shared.

Wide Curb Lanes are the right most through-traffic lanes that are greater than 14 feet 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.

Shared Roadways are any roadways upon which a bicycle lane is not designated, are not bicycle boulevards, and that may be legally used by bicyclists regardless of whether the roadway is specifically designated as a bicycle route. Shared roadways can be described in three ways: as shared lanes, wide curb lanes, or paved shoulders.

Rail-Trails are shared use paths, either paved or unpaved, built within the right-of-way of a former railroad.

Rail-with-Trails are shared use paths, either paved or unpaved, built within the right-of-way of an active railroad.

These facilities shall comply with the latest AASHTO guidelines at the time of design and construction.

DESIGN STANDARDS AT CROSSINGS

At Grade Crossings: Road Crossing Trail intersections with roads present the greatest safety concerns due to traffic volume and speeds. The following standards need to be considered for all road crossings. All intersections should be in accordance with AASHTO.

- The trail should intersect at 90 degrees, or as closely to this as possible.
- The trail width may need to be increased near the intersection to reduce conflicts among the users, such as stopping and grouping of cyclists.
- The trail should meet the road at the same elevation, with enough landing areas for the user.
- Good sight distance needs to be assured for both motorists and trail users.
- Signage is to be provided to warn road and trail users of the intersection.
- A visible crosswalk should be delineated at the intersection in accordance with the Manual of Uniform Traffic Control Devices, produced by the Federal Highway Administration.
- Curb ramps and detectable warnings may be necessary in certain situations.
- Intersection lighting may be needed to add to the safety of the crossing.
- Higher volume streets, such as arterials and collectors, may warrant a grade separated crossing.

Midblock Crossings are used when a trail crosses a roadway or railroad where other intersections do not exist. Typical midblock crossings include perpendicular crossings where trails intersect a roadway at right angles, and skewed crossings where trails intersect a roadway at an angle.

An important issue when designing a crossing is to ensure that drivers and trail users are aware of the presence of each other. Signage, pavement treatments, and other permanent traffic-calming measures should be implemented on both the road and the trail to warn users of an upcoming crossing. Traffic calming devices on trails may include rumble strips to alert cyclists to slow down or stop. Likewise, the road pavement treatments should include coloring or special materials to alert drivers. Roadway speed bumps near trail crossings may be required if drastic change is necessary. Using a median crossing on both the trail and intersecting roadway is another option to reduce speed. The design of low medians on a trail can narrow the trail as it approaches a crossing, directing the trail user to slow down. This treatment also allows trail access for emergency vehicles. Roadway medians may be installed to provide additional visual cues to reduce vehicle speeds. Medians can also provide refuge for trail users when crossing high-volume streets. Designers should consult the "Guide for the Development of Bicycle Facilities," produced by AASHTO, and the MUTCD, and seek approval from the City of New Braunfels Public Works.

Pedestrian Bridges are required in locations where typical drainage channel crossings span anywhere from 50 to 200 feet. These bridges may be typical prefabricated designs but should always strive to be a step above the customary steel bridge design. Bridges

should be at least one to two feet wider on each side of a bridge so pedestrians can stop and view the adjacent scenery without obstructing the trail. Any bridge that is specifically designated for bicycle traffic must have appropriate railings for bicyclists and pedestrians as per AASHTO Bridge Design Specification requirements for bridge railing. Bridge approaches and span should not exceed 5% slope for ADA access. Safe and easily accessed crossings at major highways, drainage channels, or the Guadalupe and Comal Rivers should be included in the plan for New Braunfels. All major crossings will require partnerships and coordination with TxDOT or property owners.

Railroad Crossings pose unique hazards, particularly for the wheeled trail user. The wheel of the train requires a 2-inch-wide gap (flangeway gap) parallel to each rail. This gap is a potential hazard for cyclists, in-line skaters, and wheelchair users. The following recommendations should be considered in designing the railroad crossing:

- The trail approach and crossing should be as nearly 90 degrees as possible.
- The trail crossing should be raised to the same level as the top of the rails. A surface material such as textured rubber railroad crossing pads provides a stable surface with good traction.
- The crossing approach should be ramped with minimal grades. Provide a flat area for 5 feet on either side of the track, free of obstacles, with a firm, stable surface.
- The trail should be hardened or stabilized for enough distance so that debris is not carried onto the track. A specific distance has not been established for this stabilized surface; however, 20 feet from each rail is a recommended minimum.
- Signs and warning devices should be used to alert the train and trail user of the crossing.
- These devices should accommodate users with various types of impairment. Warning gates may be necessary in some situations.

Other Trail Crossings: Intersections of two trails present situations that can be alleviated by the following means:

- Crossings should be offset to create three-way intersections instead of four-way.
- The trails should intersect at 90-degree angles.
- The trails should have minimum grade approaches with stable, smooth surfaces.
- Signs should be provided to indicate direction, distance, and user right of way.
- Signage needs to be in a format applicable to the impairment of the potential user.
- The intersection should provide good sight distance and visibility for safety and security.

Bridge Crossings: Pedestrian bridges can be used to facilitate crossing the Comal and Guadalupe Rivers, as well as major arterials and creeks when necessary. Although bridges are designed to fulfill a practical role, with safety as the ultimate purpose, designers are encouraged to incorporate bridge solutions that reflect the unique character of each trail and its surroundings, with minimal environmental impact. It is recommended to use engineered, prefabricated, clear span bridges of welded steel construction for all required bridge structures, including roadways. These bridge solutions are widely recognized in the

bridge industry and have been used successfully on trail projects throughout the country. They are safe, durable, economically priced, and come in a variety of designs and spanning capabilities. The following specifications should be considered as minimum standards for the design and construction of each bridge:

- Bridges must be designed by a licensed and registered engineer in the State of Texas.
- Bridges for pedestrians and/or bicycle traffic shall be designed for a live load to meet local codes. Where bicycle or pedestrian bridges are expected to be used by maintenance vehicles, special design consideration should be made for these loads.
- Bridges should be designed to withstand wind loads.
- Bridges should be designed to accommodate temperature differentials and maximum deflection allowances.
- Bridge materials should be of unpainted weathering steel, or painted steel with either wood decking or a poured concrete floor.
- All structural members should have a minimum thickness of material of at least 3/16".
- Bridge fabricators must be certified by the American Institute of Steel Construction and have the personnel, organization, experience, capability, and commitment to produce a safe and quality product.
- Workmanship, fabrication, and shop connections should be in accordance with AASHTO specifications.

Underpasses are common solutions to avoid at grade road crossings, bridges, and railroad tracks. Underpasses should be designed by a registered Texas engineer and must comply with AASHTO specifications. Generally, an eight-foot vertical clearance is recommended. Trail surfaces should be striped with site lighting within the underpass to prevent collisions and for added security. Signage is recommended at both sides of the underpass entrance to indicate slopes. Warning information, such as clearance height, above street names, directional signs to alternate routes, and a swinging bar before the underpass to indicate the low height, should be considered.

TRAIL ACCESSIBILITY

Trails should comply with the most current Accessibility Guidelines for Outdoor Areas, under the supervision of the United States Architectural and Transportation Barriers Compliance Board and Texas Accessibility Standards (TAS) guidelines for design and construction of multi-use trails.

MAINTENANCE

Regular maintenance protects the investment of public funds, while enhancing user safety, protecting resources, and providing continued access to the public. A maintenance program developed by the City of New Braunfels Department of Parks and Recreation should be established and adopted by the operating agencies responsible for trail maintenance in order to preserve the trails and facilities, insure the safety and comfort

of trail users, and maintain a harmonious relationship with adjacent property owners. Every trail should be inspected and evaluated on a regular basis to identify the need for minor or major maintenance repairs. Different types of trails will differ greatly in their maintenance requirements; however, all trails will require a variety of preventative and corrective activities to insure longevity, safety, and accessibility. Although not adopted by the City, the following maintenance is recommended:

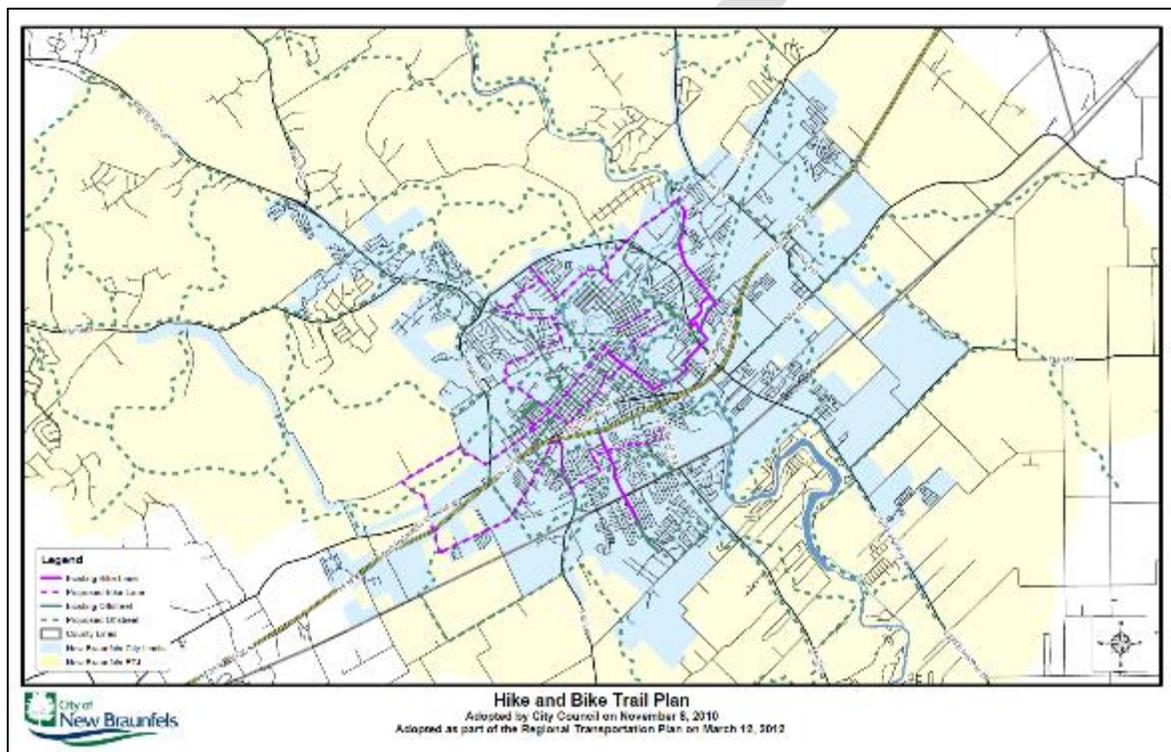
- Sign replacement.
- Map or signage updates.
- Sweeping and brush removal.
- Trash removal and litter clean-up.
- Repair or replacement of trail support amenities such as parking lots, benches, restrooms, etc.
- Clearing of vegetation for adequate sight distances.
- Repair of flood damage, such as silt clean-up, culvert clean out, etc.
- Minor re-grading.
- Repainting or repair of trash receptacles, benches, signs, and other trail amenities.
- Seasonal mowing, leaf-blowing, grooming, planting, pruning, and beautification.

DRAFT

CITY OF NEW BRAUNFELS HIKE AND BIKE TRAIL PLAN – INTERIM UPDATE 2019-2020

EXISTING HIKE & BIKE TRAILS IN NEW BRAUNFELS TODAY

A system of Hike and Bike Trails in new Braunfels has developed over the last two decades. Hike and bike trail system planning began in the early to mid-2000's and continues today. The City's most popular trails are the Dry Comal Nature Trail, Panther Canyon Nature Trail, Arboretum Trail in Landa Park, and Countyline Memorial Trail. Several new segments of trail have been installed by development under platting code requirements and contain gaps due to right-of-way or undeveloped land parcels. As land develops and HBT planning continues, these gaps will be connected.



Design standards from NRPA, AASHTO and NACTO are used as guidelines to classify the appropriate trail typology for the City's existing trail typology and determine appropriate future trail typology. The City's existing hike and bike network has been classified in the following ways. Hike and bike trails in the City are grouped by location type, as either on-street or off-street, then further classified depending on location, facility, size and use.

On-street refer to bike facilities. These facilities may include designated bike routes (D), striped bike lanes (L), and protected bike lanes (P). Currently, the City has one designated bike route and does not have any protected bike lanes. Striped bike lanes are located along various collectors and arterials throughout the city.

Off-street refers to trails. These are classified into three types: nature (n), neighborhood (N), and multi-use (M). Nature trails have natural or crushed granite surfacing. Neighborhood trails are 6-foot concrete walking paths located in a neighborhood or community park. Multi-use trails and greenways are range from eight to 12-foot wide concrete trails installed

CITY OF NEW BRAUNFELS HIKE AND BIKE TRAIL PLAN – INTERIM UPDATE 2019-2020

off-road or alongside a road. Currently, there are approximately 13 or more miles of existing trails (not including the bike facilities), most of these are neighborhood park trails.

There are approximately 13 miles of on-street trail, or bike facilities, in New Braunfels, with all but one being a striped bike lane. In terms of off-street trails, there are about 13.5 miles. The HBT Inventory Table provides more detail about the length, location, and type of trails.



Torrey Park Neighborhood Trail (N)



Mill Street Designated Bike Route (D)



Panther Canyon Nature Trail (n)



Oak Run Bike Lane (L)



Countyline Memorial Trail Multi-use (M)



Veramendi Bike Lane (L)

CITY OF NEW BRAUNFELS HIKE AND BIKE TRAIL PLAN – INTERIM UPDATE 2019-2020

HIKE AND BIKE TRAIL INVENTORY TABLE				
ON-STREET				
	Type	Limits	Distance (miles)	Districts
<i>Comal Ave.</i>	L	E. San Antonio St. to Faust Bridge	~1.33	CC5; PD1
<i>Churchill Dr. & Post Rd.</i>	L	Porter St. to Gruene Rd.	~1.57	CC4, 5; PD1
<i>FM 306</i>	L	IH-35 to city limits	2.00	CC4; PD1
<i>Gruene Rd.</i>	L	Post St. to Sunnybrook Dr.	~1.62	CC4; PD1
<i>Industrial St.*</i>	L	Gruene Rd. to Loop 337	~0.50	CC4; PD1
<i>Landa St.</i>	L	Landa Park Dr. to Walnut Ave.	~0.60	CC1, 3; PD1
<i>Mill St.</i>	D	Comal River to Hidalgo Ave.	1.90	CC1; PD4
<i>Oak Run Parkway*</i>	L	Hwy 46 to Geneva St.	~0.70	CC3; PD4
<i>Pahmeyer Dr.</i>		Anna Lee to Voss Farms Elementary	~1.90	CC2; PD3
<i>S. Walnut Ave.</i>	L	Camellia Ln. to Jerad St.	~1.17	CC2; PD3
OFF-STREET				
	Type	Limits	Distance (miles)	Districts
<i>August Fields**</i>	M	FM 1101 to Alves Lane	0.60	CC5; PD2
<i>County Line Memorial Trail</i>	M	S. Seguin Ave to Countyline Rd.	2.00	CC6; PD3
<i>Dry Comal Nature Trail</i>	n		2.50	CC1; PD1, 4
<i>Ernest Eikel Park</i>	N		~0.25	CC1; PD4
<i>Fischer Park</i>	N		2.00	CC6; PD3
<i>FM 1101</i>	M	Luxe Apt to Creekside Way	~0.15	CC4; PD2
<i>FM 1101</i>	M	Springs at Creekside	~0.15	CC4; PD2
<i>FM 1101</i>	M	West Village Creekside to S. Kowald Ln.	~0.50	CC5; PD2
<i>Haymarket Park</i>	N		0.15	CC5; PD1
<i>HEB Soccer Complex</i>	N		~0.50	CC1; PD4
<i>Kraft Park</i>	N		~0.75	CC6; PD3
<i>Landa Park</i>	N		1.00	CC5; PD1
<i>Panther Canyon</i>	n		~0.75	CC5; PD1
<i>Solms Park</i>	N		0.35	CC1; PD4
<i>Torrey Park</i>	N		0.25	CC5; PD1
<i>Morningside Park</i>	N		0.25	CC1; PD3
<i>Walnut Ave. Pocket Parks*</i>	M	Elliot Knox to Landa St.	1.10	CC1, 6; PD1
<i>S. Walnut Ave.*</i>	M	Jerad St. to W. Klein Rd.	~1.00	CC2; PD3

*(One side only) **Not yet under City ownership

**CITY OF NEW BRAUNFELS
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NEW BRAUNFELS HIKE & BIKE TRAIL STANDARDS

The HBT Plan is a high level on- and off-street plan which is intended to show trails for non-vehicular transportation users. These trails include on-street facilities in order to accommodate potential off-street constraints, such as right-of-way limitations, property ownerships, topography, and access. Any proposed trail will require a more in-depth analysis for feasibility and construction. The City's HBT Plan, with some deviations, is based on existing locations of trail, site topography, or other constraints, and is determined by Parks staff in coordination with other departments. Only when the route has final approval from the Parks and Recreation Department should design and/or trail construction begin. Projects, public or private, requiring construction of hike and bike trail facilities must provide seamless connection to ensure trail continuity and accessibility for HBT users and maintenance—similarly required for street stubs, roadway and sidewalk connections. When new developments, road projects, or parks projects link to existing trail it delivers an instant connection and provide immediate usage.

Criteria Off-Street		Multi-Use (M)	Nature (n)	Neighborhood (N)
Easement Width	Desirable	25'	25'	10'
	Minimum	20'	20'	
Trail Width	Desirable	12'	10'	6'-8'
	Minimum	10'	6-8'	6'
Shoulder Width	Desirable	5 ½'	5'	5'
	Minimum	2'	2'	2'
Surface Type	Desirable	Permeable concrete	Permeable	Permeable concrete
	Acceptable	Concrete	Crushed stone	Concrete
Trail Grade	Desirable	1%-3%	1%-3%	1%-3%
	Maximum	5%	5%	5%
Surface Grade	Desirable	1%	1%	1%
	Maximum	2%	2%	2%
Vertical Clearance	Desirable	10'	10'	10'
	Minimum	8'	8'	8'
Horizontal Clearance (edge of trail)	Desirable	4-5'	4-5'	4-5'
	Minimum	2'	2'	2'
Viewshed (line of sight within corridor)	Desirable	200'	200'	200'
	Minimum	150'	150'	150'
Signage	Desirable	Trailhead/access mile markers	Trailhead/access mile markers	Trailhead/access mile markers
	Minimum	Entry sign	Entry sign	Entry sign

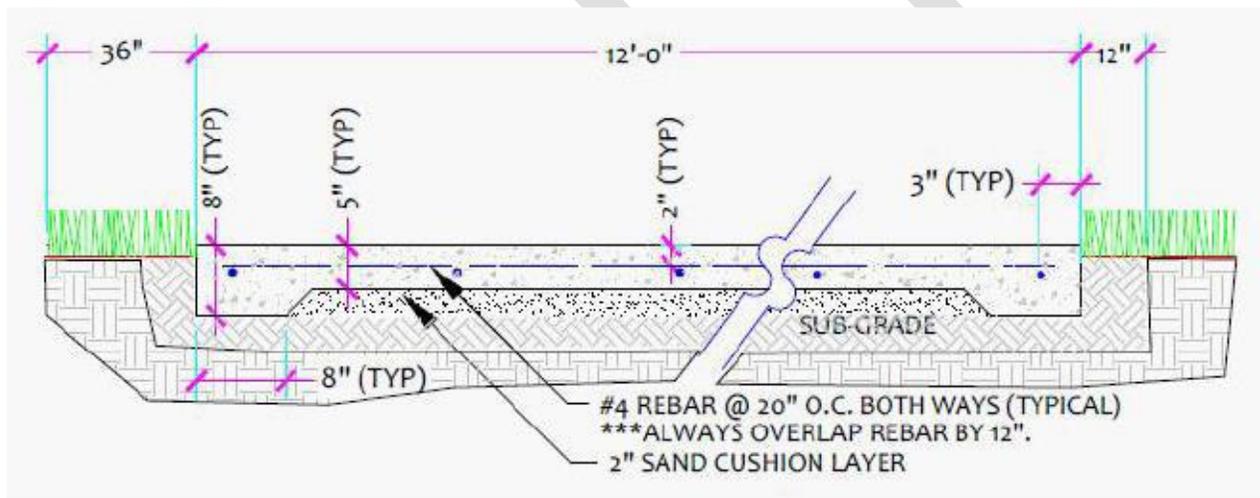
Trails construction standards are based on maintenance, cost, and capacity of the Parks Department, unless otherwise approved by the Department Director. Trails should be

CITY OF NEW BRAUNFELS HIKE AND BIKE TRAIL PLAN – INTERIM UPDATE 2019-2020

designed to conform to both standards recommended by AASHTO and newer recommendations developed by National Association of City Transportation Officials (NACTO).

These guidelines specify high-quality, common elements for use along all trail systems. The design of new trails should make use of these elements in a manner that enhances the trail experience. The hike and bike trail network can meet both recreational and non-motorized daily commuting objects, and simplify maintenance by achieving the following objectives:

- Trails should be gently curvilinear and may include a combination of radii and straight segments.
- The recommended width for two-way, shared use paths is 10- to 12-feet of concrete walking and biking trail to accommodate multiple uses by walkers, bicyclists, parents with strollers, people in assisted devices, or people walking their dogs, etc.
- Slopes should be no greater than 5%, and cross slopes no greater than 2%.
- A minimum of five feet of right-of-way is required on either side of the trail for



access.

- Trails near homes should be at least ten feet from residential property lines.

Refer to City of New Braunfels' Thoroughfare Plan cross section updates for minor and major collectors and minor and principal arterials for appropriate off-street width requirements.

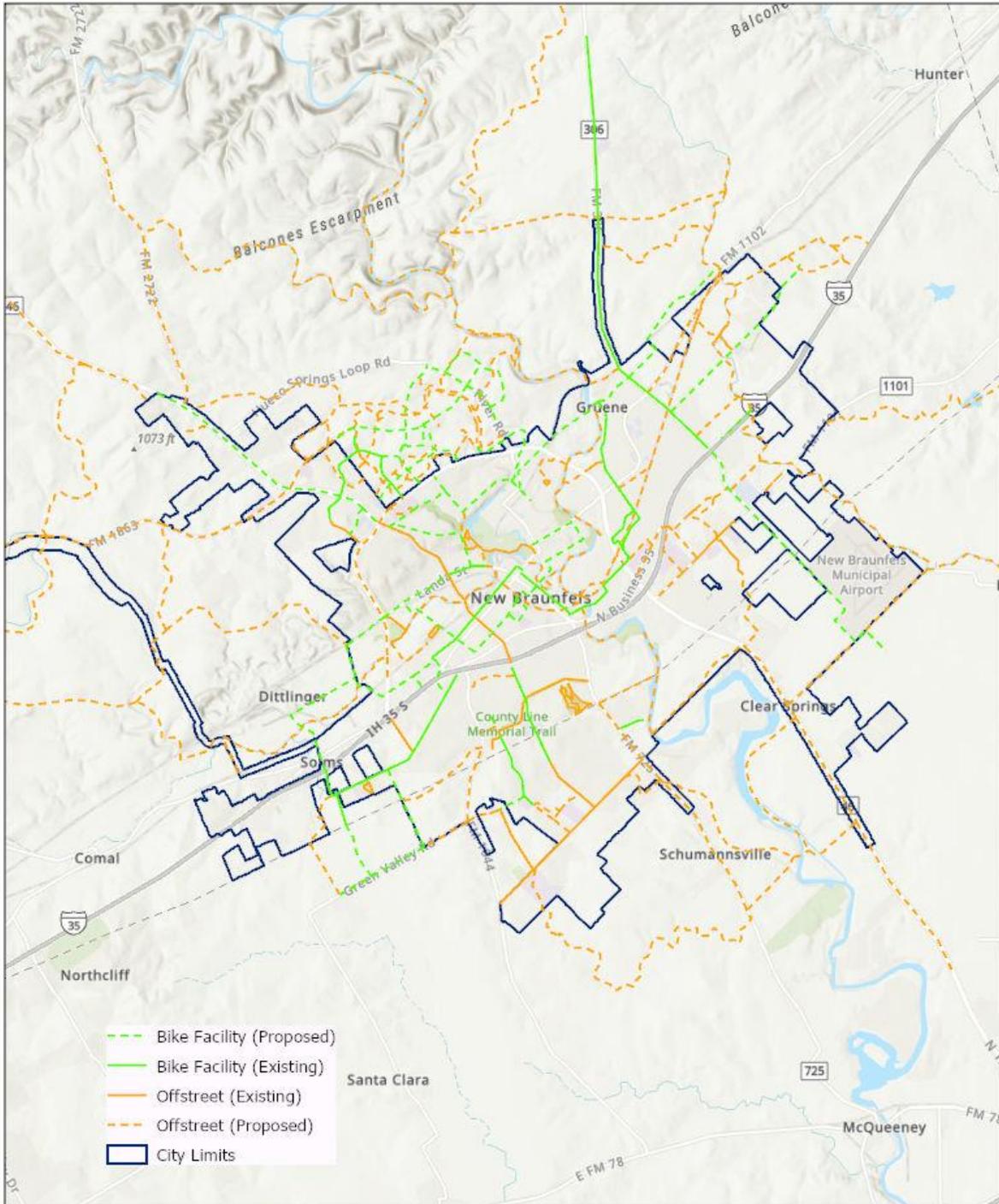
PROPOSED TRAILS IN NEW BRAUNFELS TODAY

The HBT Update is a high-level view of trail opportunities. This Update provides hike and bike trail alignments, additions, and removals. It uses existing parks, streets, and land development projects for the adjustments and recommendations. The following exhibits show current and recommended future trail alignment. The alignments are approximate and with the intention to show general geographic locations. Detailed planning and design still need to be developed to locate precise trail alignments. Any requirements by the City Code for HBT alignment should be conducted in coordination with City Departments, specifically Parks and Recreation, Planning, and the City Engineer.



The image above shows a proposed bike route along Branch Lane and an off-street trail connection along existing City drainage to create a connection between existing bike lanes on Gruene Road and FM 306. This route proposes a safer and separate route compared to Common Street where no multi-use facilities are planned however there is a wide shoulder.

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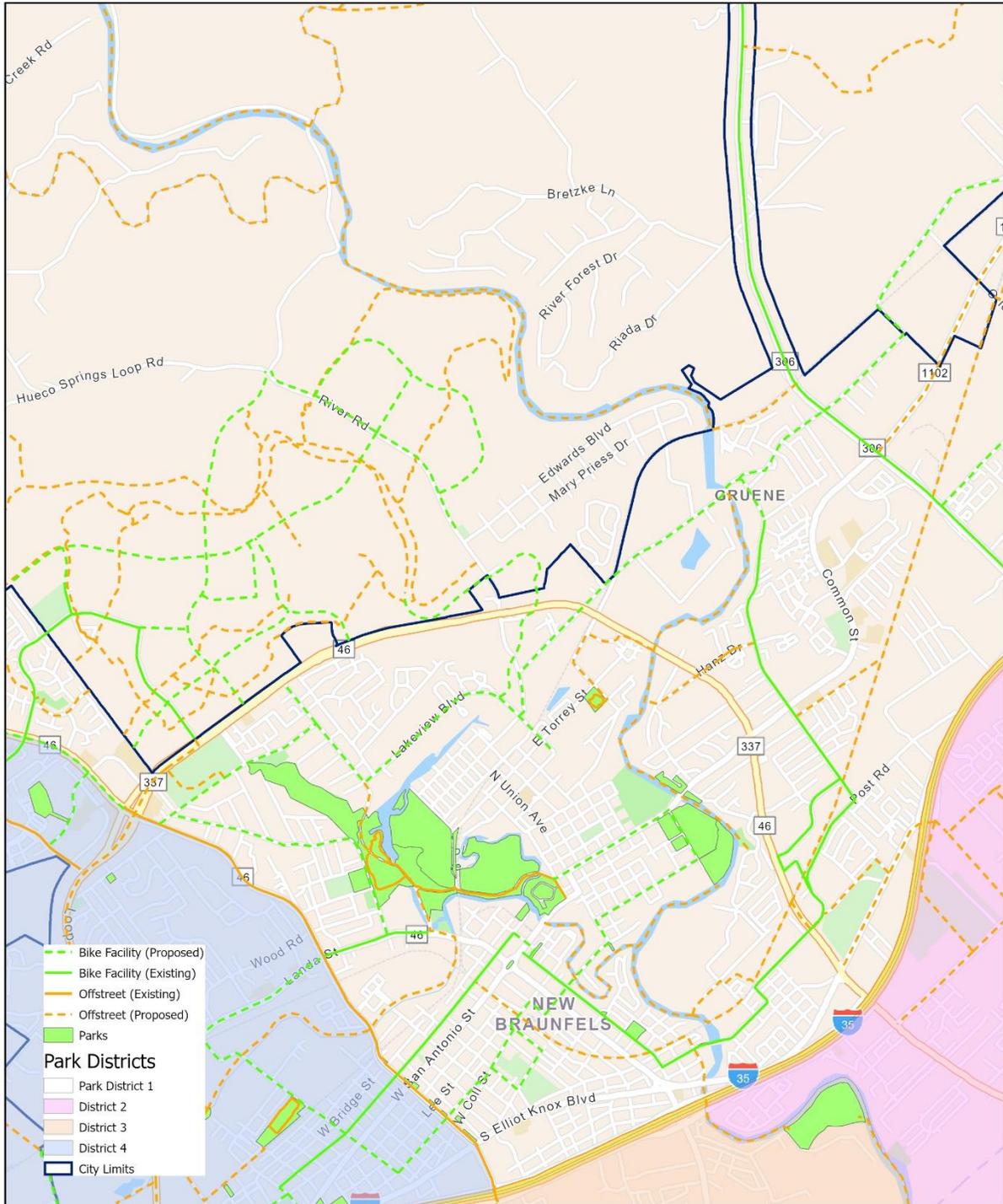
Hike and Bike Trail Plan



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Park District 1

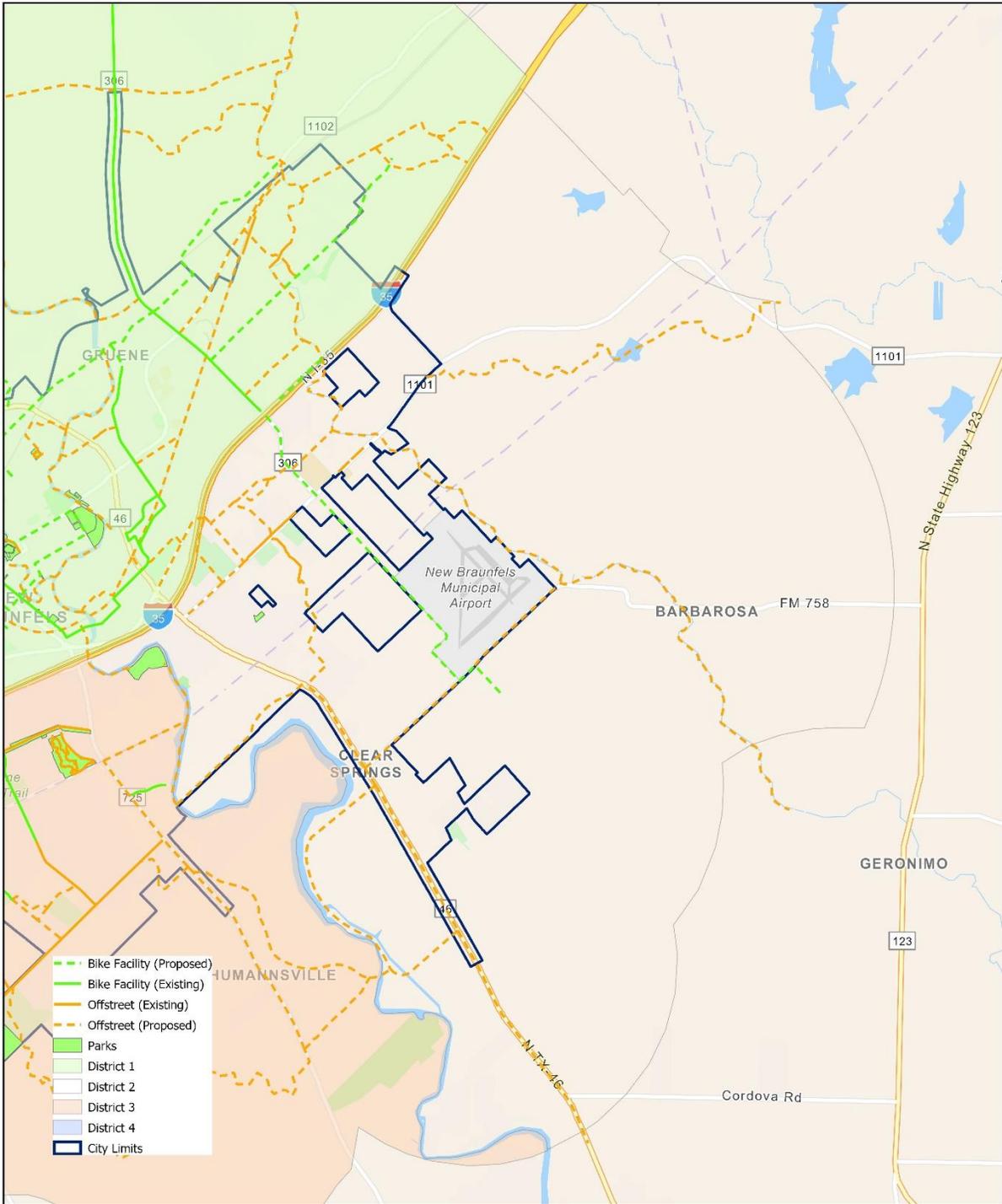
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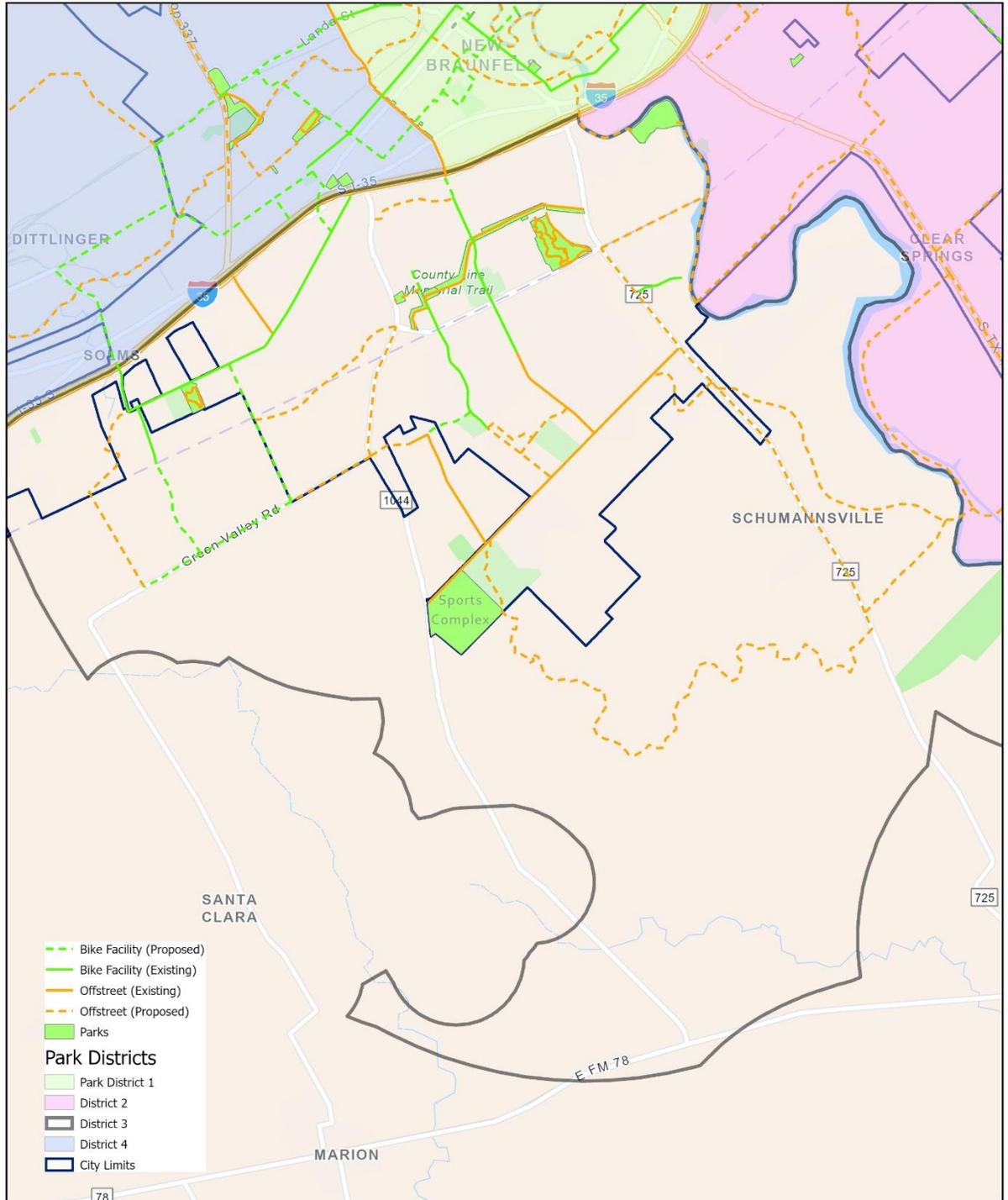
Park District 2



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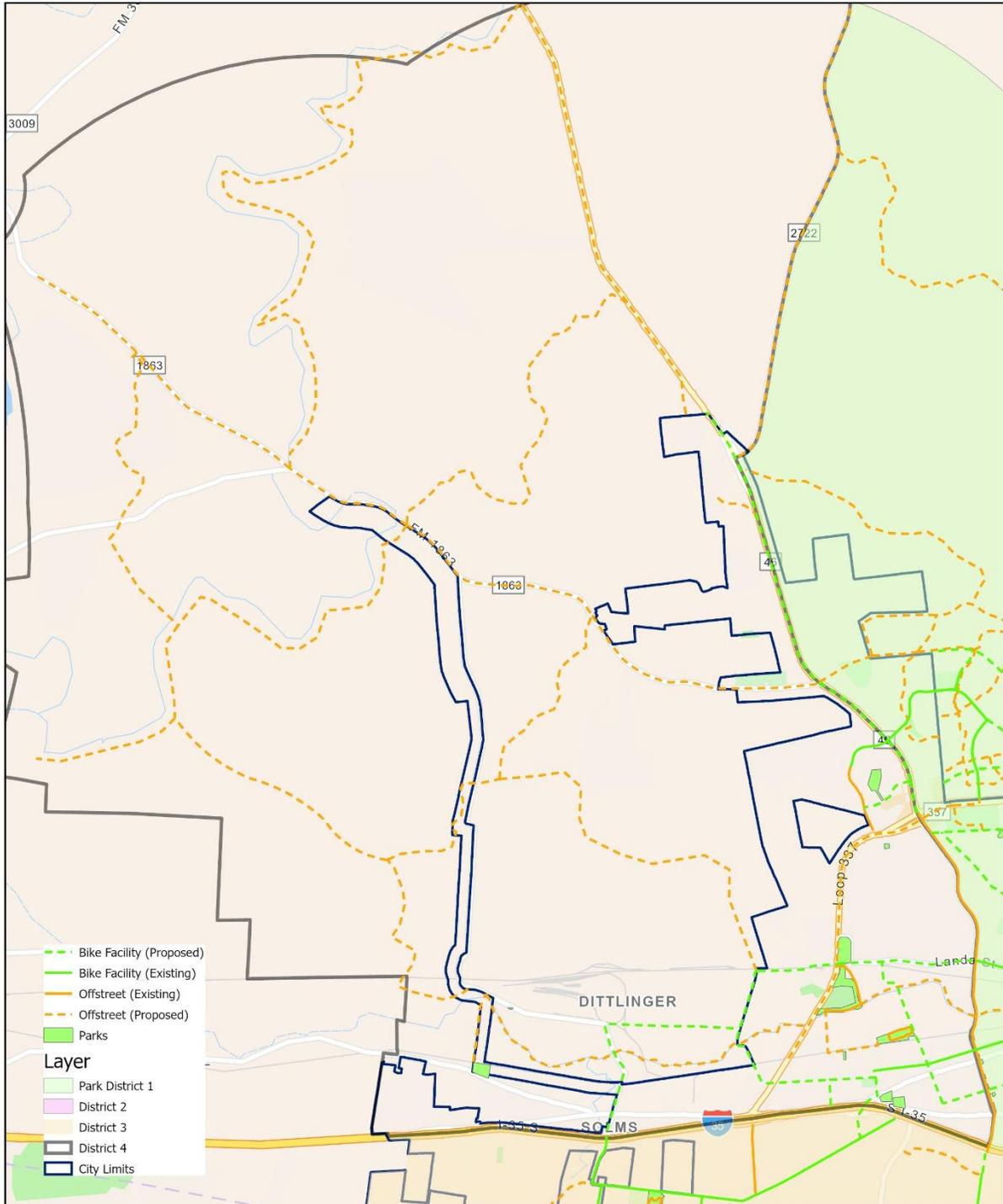
Park District 3



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Park District 4



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HIKE & BIKE TRAIL OPPORTUNITIES

In addition to the overall HBT Plan, there are several specific trail opportunities that are recommended for advancement in order to implement the citywide trail network. The HBT Update reviewed completed City and development projects as well as previously proposed trails to determine applicability for the trail recommendations. The proposed trails listed below, many of which are not new, are based on public input, development investment, and gaps in the existing system. Each will require opportunities for additional community input and partnership, and funding for trail construction. Area highlighted in red include an approximate geography of the area for trail connections and access.

COUNTYLINE MEMORIAL TRAIL

Type	Multiuse, neighborhood
Distance	3 miles +/-
Cost Range	Varies
Funding	Alamo Area MPO, park development funds (connection to parks), bond funds, impact fees, private development
Timeframe	Short-term
Plan	2010 Parks Master Plan
Park District	3
Council District	2, 6

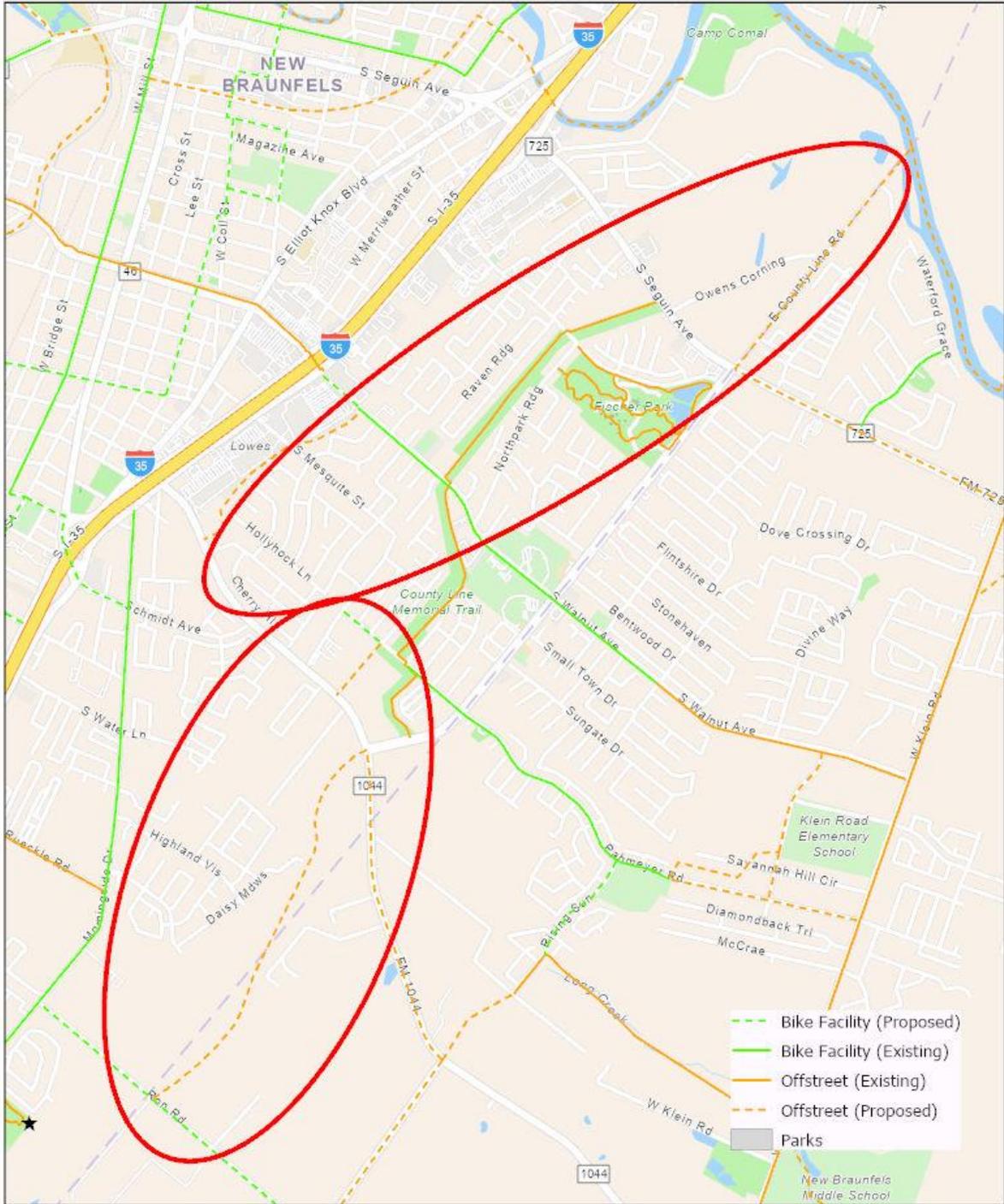
Status/Relevance

This trail remains an important trail within the citywide HBT network, as it is the City's first multi-purpose trail. The development of this trail has provided and will continue to provide connections to many neighborhoods and schools. Since 2010, a good portion of this trail concept has been completed as a part of the Countyline Memorial Trail from Seguin Street to Countyline Road. In 2020, a six-foot sidewalk connection along McQueeney Road will be installed, serving as a connection to the trail. This was a part of the Citywide Sidewalk Projects funded through the Transportation Alternatives funding. Additional trail connections may include links to Callen's Castle, Guadalupe River, and Morningside Park.

Implementation Needs:

- Planning efforts to extend trail connection to future site of Callen's Castle and link to Sports Complex.
- Planning and coordination with traffic and engineering for thoroughfare updates to Countyline Memorial Road.
- Planning and coordination efforts with NBISD school expansion plans.
- Planning and coordination efforts with future residential master plans.

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Countyline Memorial Trail



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DRY COMAL CREEK GREENWAY TRAIL

Type	Multiuse, neighborhood
Distance	6 miles +/-
Cost Range	Varies
Funding	Alamo Area MPO, park development funds (connection to parks), bond funds, impact fees, private development
Timeframe	Short-term
Plan	Envision New Braunfels, 2017 Parks Strategic Master Plan, 2010 Parks Master Plan
Park District	3
Council District	1, 3, 5

Status/Relevance

The Dry Comal Creek Trail continues to inspire the community and remains a priority for trail advocates in and around New Braunfels. The Dry Comal Nature Trail, located off Loop 337 and the Little League Ballfields, is envisioned to be a linear park and trail that extends north toward downtown and south toward Solms Park. The greenway extension outside the Loop would serve as three-mile trail connecting the southwest side of the City to parks, new neighborhoods, and other desirable areas closer to the central business district. The lower segment of this trail is undeveloped and would provide opportunities for community renewal. The development of the southern portion of the trail may provide opportunities for regional trail connection to San Antonio Greenway System.

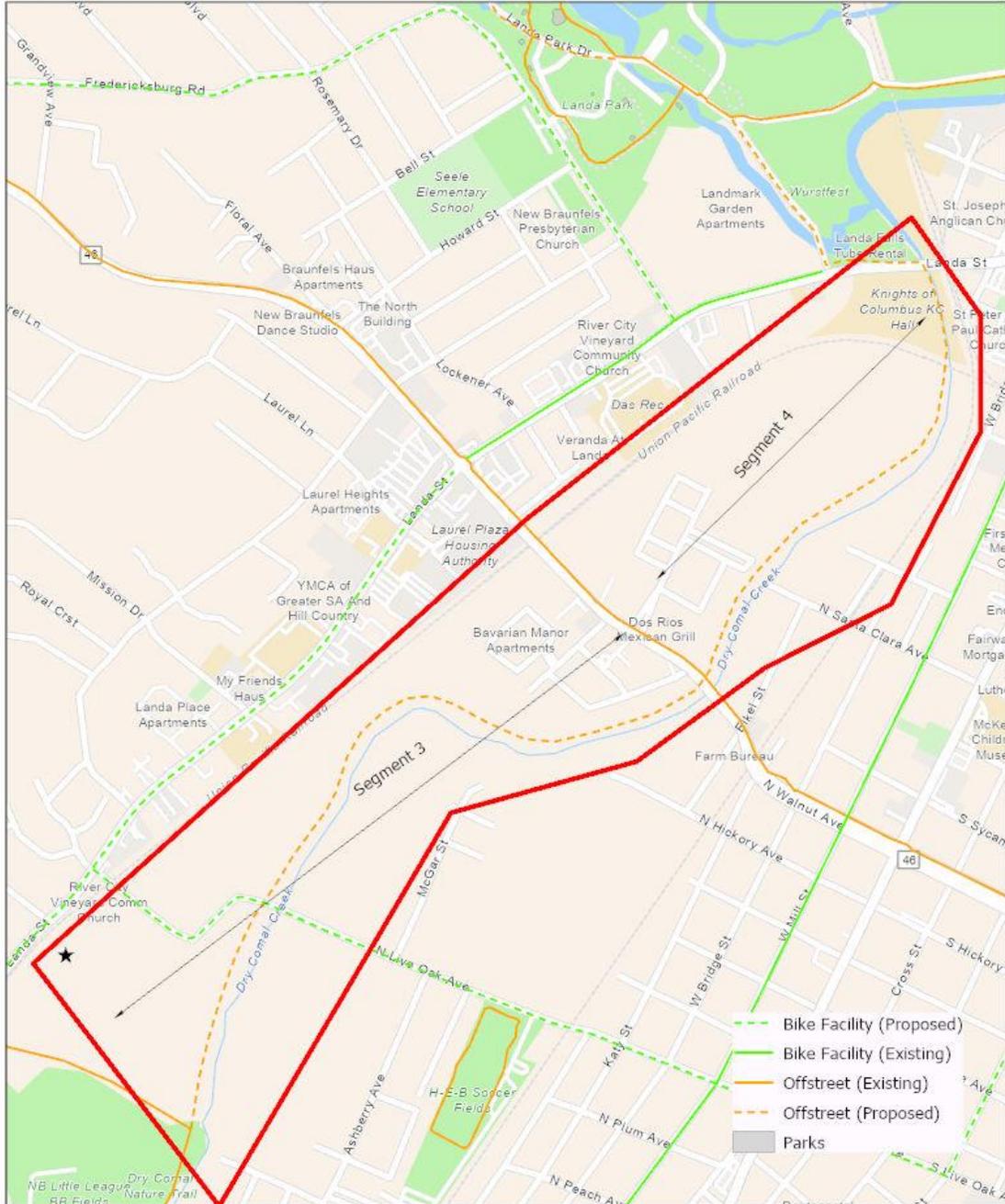
In 2006, the Town Creek Plan Development was approved for the dedication of nine acres for the creek park. This park land dedication for the creek trail would connect older and new development to Landa Park. Additional connections to a developed trail would provide access from the sidewalk and bike lane connections which have been installed along Landa Street and Walnut Avenue. In 2018, the City conducted a preliminary design with estimated project costs for a segment of the trail between Landa Street and Walnut Avenue. A master plan for the greenway is in progress and is expected to be approved in 2020. As a part of the master plan, the trail has been split into four segments to help phase the project.

Implementation Needs:

- Initiate park land dedication from Town Creek Development Agreement.
- Coordinate easements with Columbus Club and Union Pacific Railroad for northern segment.
- Complete design for Town Creek segment, including coordination with the railroad and property owners.
- Study feasibility for southern segment, near Sunbelt Park.

CITY OF NEW BRAUNFELS HIKE AND BIKE TRAIL PLAN - INTERIM UPDATE 2019-2020

- Coordinate with property owners in Segments 1 and 2 for input on trail alignment.
- Identify funding opportunities for ready segments.



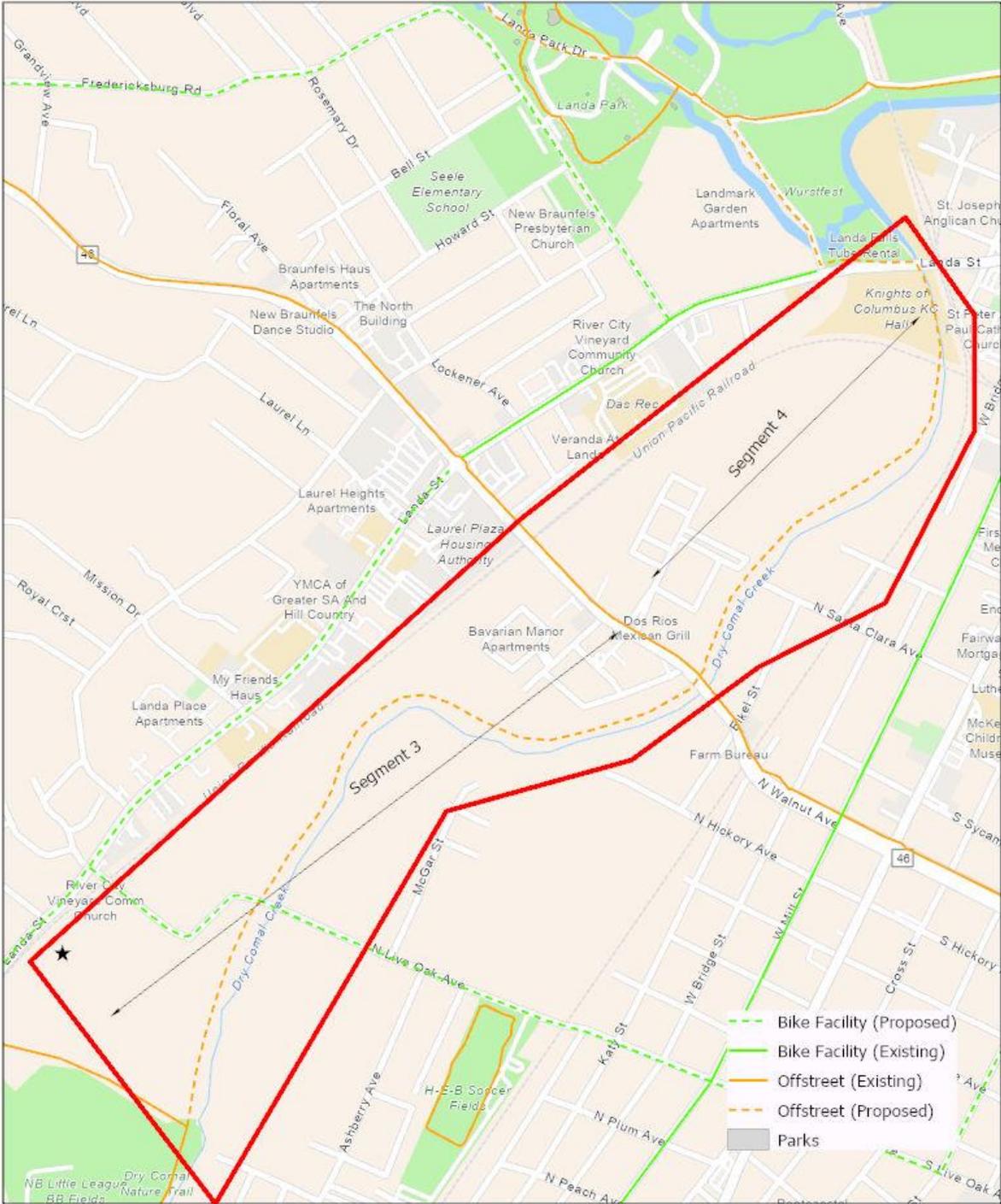
**Dry Comal Greenway Trail
Segment 3 & 4**



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Dry Comal Greenway Trail Segment 3 & 4



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RIVER TRAIL FROM CYPRESS BEND PARK TO COUNTY FAIRGROUNDS

Type	Multiuse, neighborhood, and bike facilities
Distance	3 miles +/-
Cost Range	Varies
Funding	Alamo Area MPO, park development funds (connection to parks), bond funds, impact fees, private development
Timeframe	Short-term
Plan	2017 Parks Strategic Master Plan, 2010 Parks Master Plan
Park District	1
Council District	4, 5

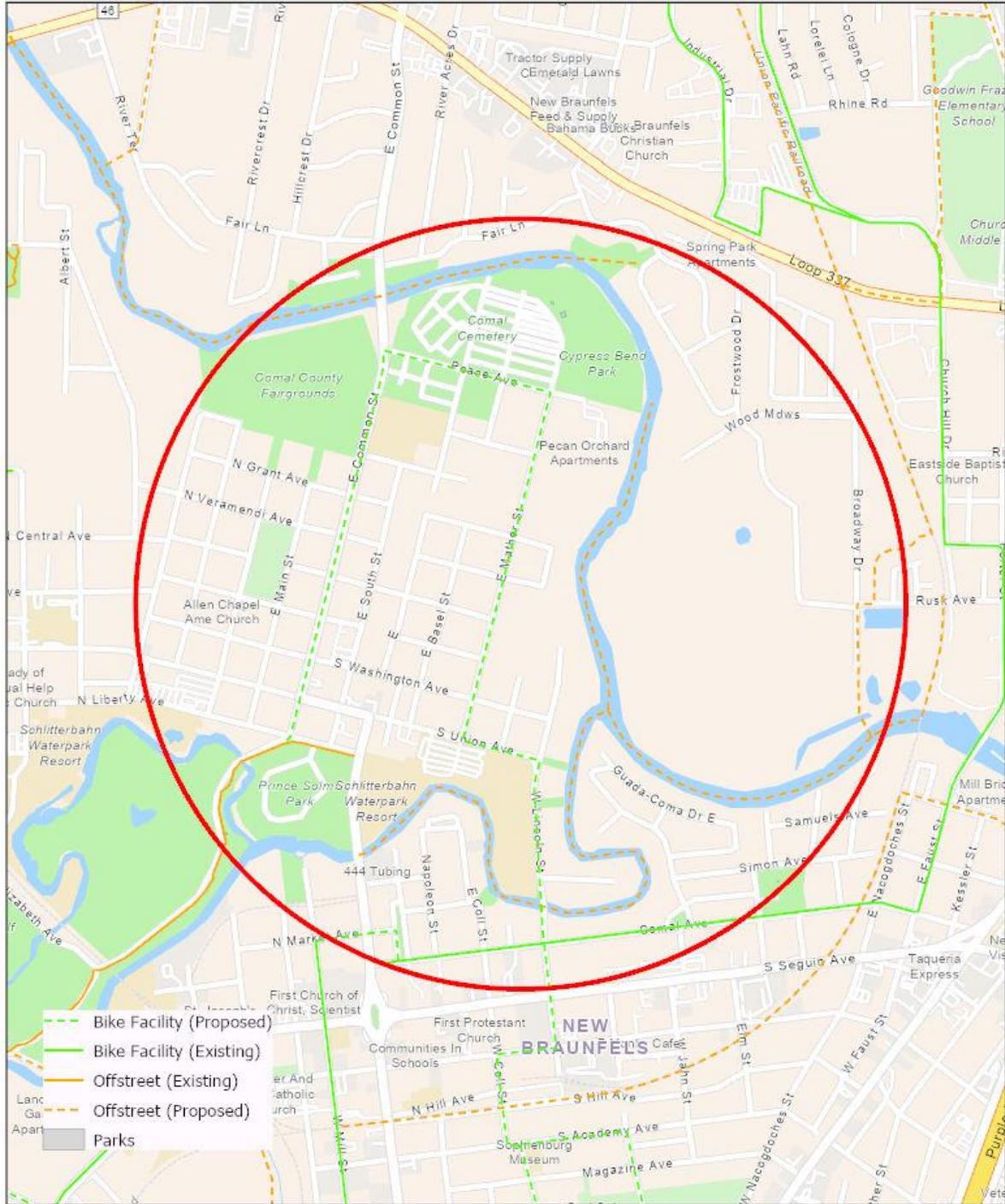
Status/Relevance

This trail concept may require further development based on other projects and plans at the City. The River Trail was originally introduced in the 2010 Parks Master Plan. Since 2010, Guadalupe River Acres Vision and Master Plan was approved, and this trail concept is a feature of that plan. Currently, that plan has no associated funding with it, but is identified as a priority project in the 2017 Parks Strategic Master Plan. Additionally, roadway improvements along Common Street, a future master plan for Cypress Bend Park, and a master plan for Comal County Fairgrounds may offer more in-depth discussion about off-street hike and bike trails connecting various civic locations, i.e., Comal Cemetery, Library, and Cypress Bend Park. Further evaluation of this trail opportunity may rely more on downtown/central bike network.

Implementation Needs:

- Monitor any bike or street improvements (Mather or Common) for opportunities to connect to city assets.
- Monitor funding for park plans such as the Guadalupe River Acres and Cypress Bend Park.

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River Trail



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ALLIGATOR CREEK TRAIL

Type	Multiuse, neighborhood
Distance	8 miles +/-
Cost Range	Varies
Funding	Alamo Area MPO, park development funds (connection to parks), bond funds, impact fees, private development
Timeframe	Short, mid-, and long
Plan	2010 Parks Master Plan
Park District	1, 2
Council District	2, 4, 6

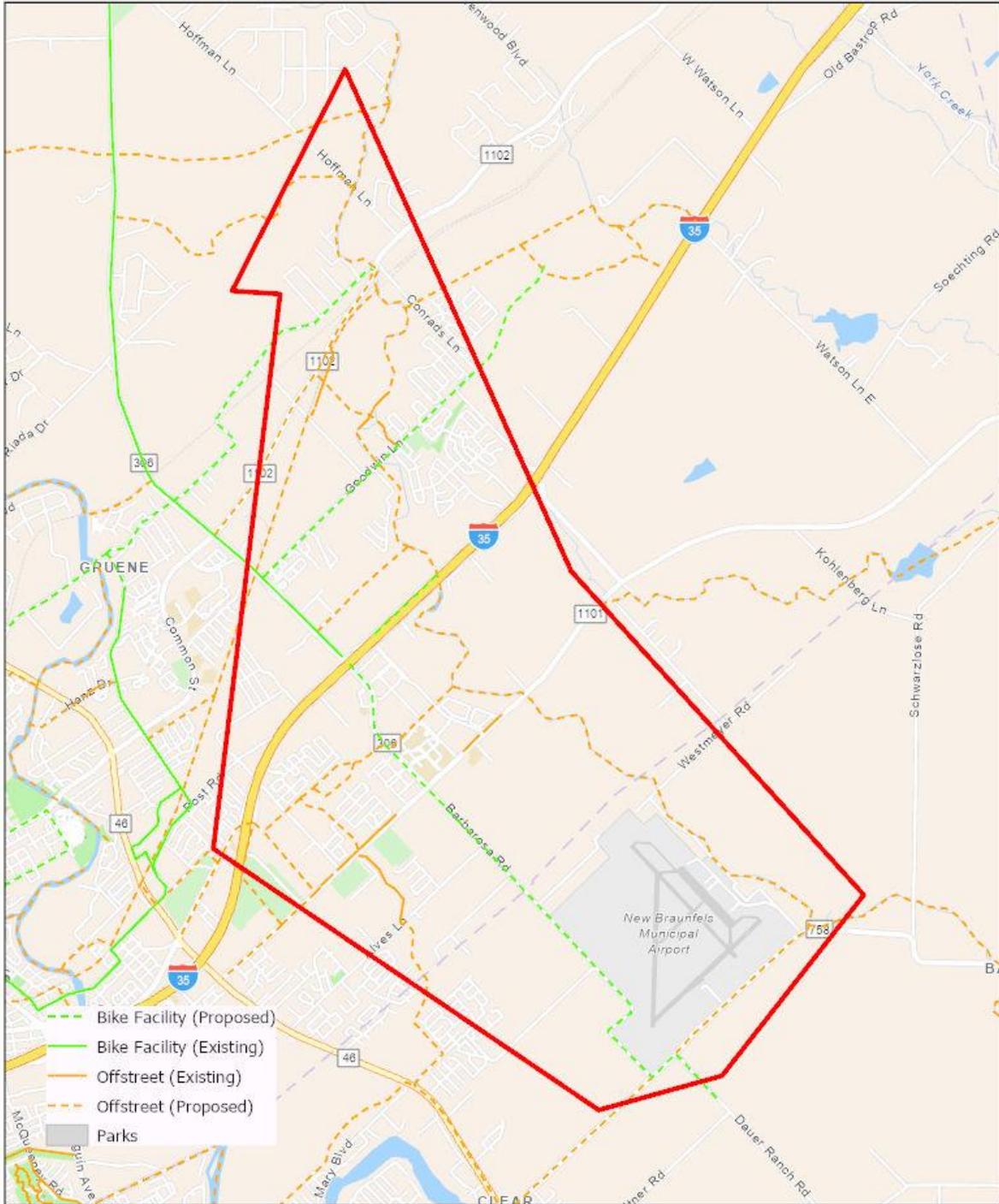
Status/Relevance

Alligator Creek, a major creek corridor in the northern and eastern portion of the City, is a tributary of Geronimo Creek watershed. It is an impaired stream and is a part of the Geronimo and Alligator Creeks Watershed Protection Plan (WPP). In 2010, much of this creek corridor was still undeveloped; however, nearly ten years later, the area has grown rapidly. Both east and west of IH-35 areas, the land use includes new multi-family, single-family, large attraction retail, schools, and a hospital campus. As areas around the creek continue to develop, the creek and floodplain should be preserved for open space, provide flood control and water quality measures, and provide trail and recreational opportunities. Some commercial and residential development in the area have complied platting code requirements for the HBT and other areas have provided sidewalk connections. Opportunities for connections, trailhead/park, and continuity are appropriate to pursue. This trail has strong opportunities to develop as envisioned.

Implementation Needs:

- Acceptance of land in and around Alligator Creek that would be suited for multi-purpose trail connection.
- Identification one to two acres of park land for trailheads.
- Coordination with DOTs on IH-35 improvements at underpass for safe connection opportunities.
- Coordination with the Creekside development to identify new trail connections.
- Identification of regional connections to Hays County and San Marcos trail network.
- Development of a funding plan for design and construction of the trail to connect to the August Fields and Wasser Ranch HBT segments.
- Develop a master plan and preliminary engineering study.

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Alligator Creek Trail



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CAMP COMAL TRAIL

Type	Park, neighborhood
Distance	1 mile +/-
Cost Range	Varies
Funding	Alamo Area MPO, park development funds (connection to parks), bond funds, impact fees, private development
Timeframe	Short, mid-, and long
Plan	2010 Parks Master Plan
Park District	1, 2, 3
Council District	4, 5, 6

Status/Relevance

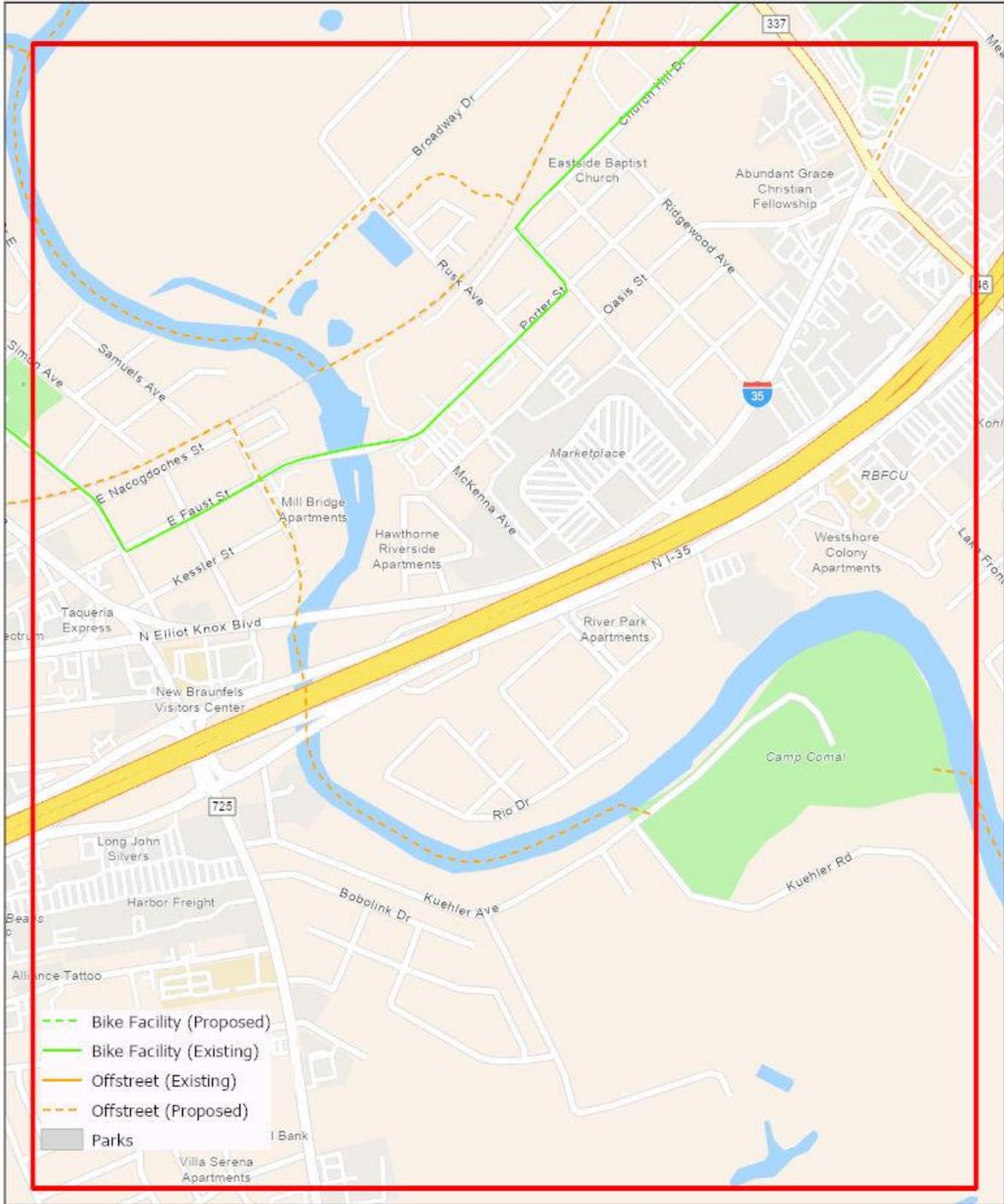
This trail would provide another potential river access focal point in the City. The trail is proposed to be developed around Camp Comal, which is adjacent to the river. Currently Camp Comal serves as a sports field primarily for girls' softball. Improvements to the fields are planned in conjunction with the new city sports complex. Any future improvements to the park will be comprehensive and consider trail development.

Off-street trail connections from Seguin Street, Guadalupe River, IH-35 Guadalupe Turnaround, and the Texas Department of Transportation boat access could open up opportunities for trail development and connection.

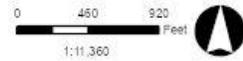
Implementation Needs:

- Monitor any major highway improvements in the area near the TXDOT boat launch.
- Coordinate future Camp Comal plans and improvements with citywide HBT Plan.
- Coordinate with NBU on area site plans near Camp Comal.

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Camp Comal Trail



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GRUENE LOOP TRAIL

Type	Park, neighborhood
Distance	1 mile +/-
Cost Range	Varies
Funding	Alamo Area MPO, park development funds (connection to parks), bond funds, impact fees, private development
Timeframe	Short, mid-, and long
Plan	2010 Parks Master Plan
Park District	3
Council District	4, 5

Status/Relevance

The Gruene Loop Trail is an existing bike lane and routes that incorporates potential off-street connections. It will provide a safe, scenic route by connecting existing and new infrastructure from Gruene and mid-town New Braunfels. Building off the existing bike lanes on Gruene Road, this trail connects the historic Faust Street Bridge to Gruene, and Gruene to FM 306. This proposed trail can serve as a beneficial link from the rapidly growing areas off FM 306 and neighborhoods in and around Gruene to downtown New Braunfels. These connections build off existing investments like bike lanes, city-owned property (drainage), and development code requirements. There are no public parks in the area, so a linear park trail could fill that gap and connect to natural amenities and existing parks such as Faust Street Bridge, Haymarket and Torrey parks, and ultimately downtown. Future connections could include access to Guadalupe River, Cypress Bend, and River Acres Park.

Implementation Needs:

- Monitor any major highway projects on IH-35.
- Coordinate with Public Works for ROW access for off-street connection.
- Coordinate with railroad and other nearby property owners for stakeholder input on planning efforts.
- Conduct a master plan.
- Conduct feasibility study and plan to determine costs and timeline.

SOLMS LOOP TRAIL

Type	Multipurpose, bike, and neighborhood
Distance	4 miles +/-
Cost Range	Varies
Funding	Alamo Area MPO, park development funds (connection to parks), bond funds, impact fees, private development
Timeframe	Short, mid-, and long
Plan	2003 Park Master Plan
Park District	P3
Council District	CC 1, 2, 6

Status/Relevance

The Solms Loop Trail located on the south east section of New Braunfels, is a network of existing multi-use and on-street bike facilities. It will link existing bike lanes and future off-street trail to Voss Farms Elementary School, Klein Road, Sports Complex, and New Braunfels Middle School (future high school). The trail will provide a safe and recreational multi-purpose and bike route for neighborhood residents as well as a safe route to schools and parks. Additional HBT connections will be made via a 10-foot trail within the Laubach subdivision and bike lane connections along Rising Sun Boulevard.

Implementation Needs:

- City departmental coordination for road projects and HBT requirements.
- Develop a master plan to engage the community, development and NBISD.
- Partner with the MPO on safe routes to school opportunities.

**CITY OF NEW BRAUNFELS
HIKE AND BIKE TRAIL PLAN - INTERIM UPDATE 2019-2020**



Solms Loop Trail

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MORNINGSIDE GREENWAY TRAIL

Type	Multiuse, neighborhood
Distance	3 miles +/-
Cost Range	Varies
Funding	Alamo Area MPO, park development funds (connection to parks), bond funds, impact fees, private development
Timeframe	Short-term
Plan	2010 Parks Master Plan
Park District	3
Council District	1

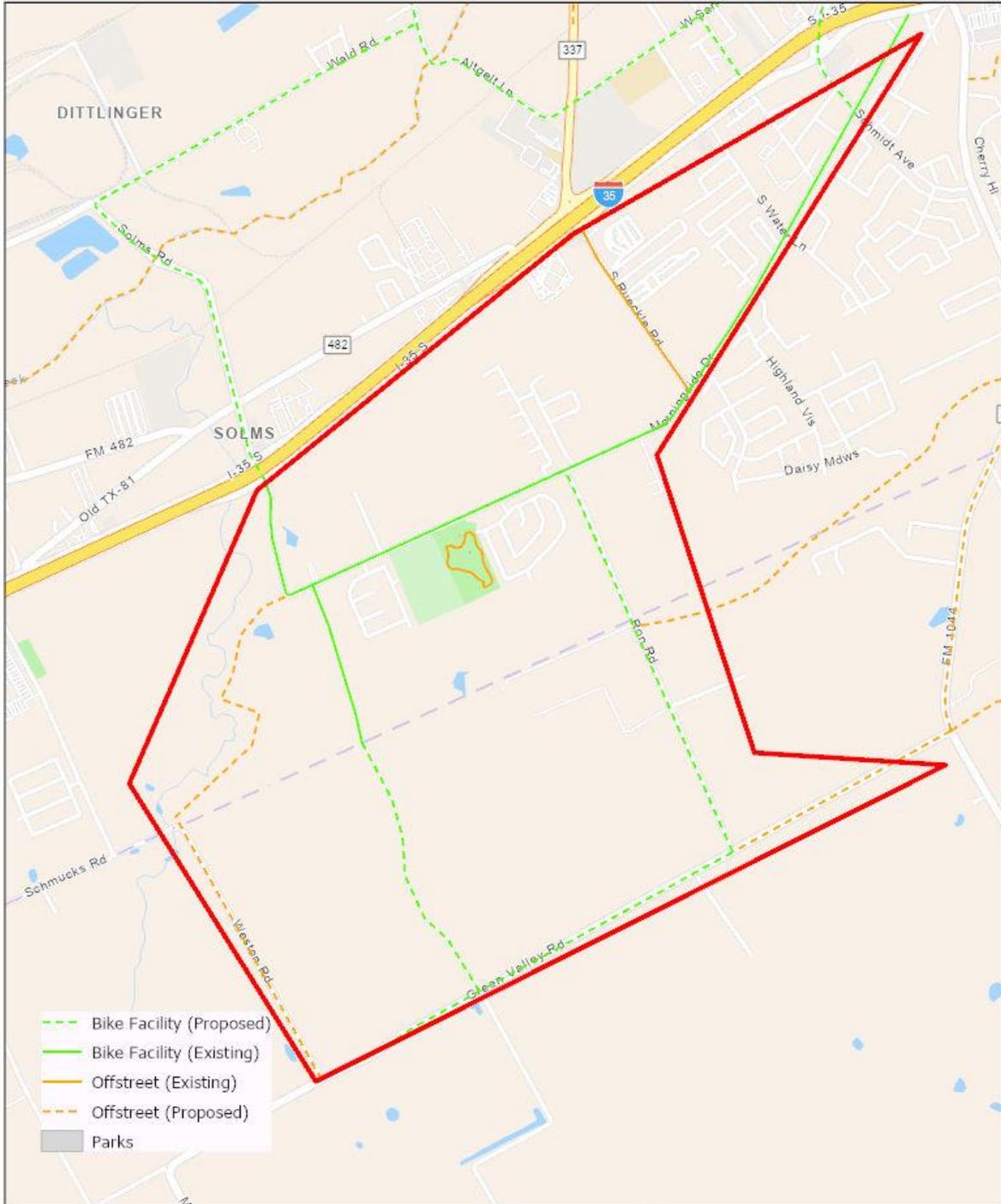
Status/Relevance

This trail opportunity connects existing multi-use paths along Morningside, Solms, and Rueckle and Morningside Park trails to future off-street trails in undeveloped areas of the City edge. It is located on the southeastern edge of the city. Overtime this area will begin to see fast residential development and opportunity for neighborhood connections.

Implementation Needs:

- Coordinate with new development in and around the Morningside Park to make appropriate connections to the existing trails or bike facilities.
- Monitor future road improvements along Green Valley Road, FM 1044, and Ron Road.

**CITY OF NEW BRAUNFELS
HIKE AND BIKE TRAIL PLAN - INTERIM UPDATE 2019-2020**



Morningside Greenway Trail



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