Houston-Galveston Area Council

Friendswood Active Transportation Plan

Appendix 3: Opportunity Analysis

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Prepared By:

THE GOODMAN CORPORATION

Introduction

The City of Friendswood, in partnership with the Houston-Galveston Area Council (H-GAC), is developing a citywide active transportation plan focusing on connecting residents, workers, and visitors to community assets such as parks, schools, and other important destinations. Building on existing plans and completed, ongoing, and planned improvements to the multimodal network, the active transportation plan focuses on improving connectivity and safety of pedestrians and cyclists by conducting an existing conditions assessment, public involvement, opportunity analysis, and making recommendations on actionable strategies. The result will be an implementable plan that envisions Friendswood as safe, resilient, and multimodal community with better access to parks, trails, commercial and retail centers, and neighborhoods.

Building on the project's preceding efforts, the project team combined a data-driven analysis of quantitative factors with qualitative feedback from the public and Steering and Stakeholder Committees to guide this task. Comparing different sets of quantitative data across multiple categories enabled the project team to determine the highest priority areas where new active transportation (or upgrades to existing) facilities are needed most.

This memo describes the process and activities the project team utilized to determine where active transportation is needed in th4 City of Friendswood and is organized into the following sections:

- Opportunities
- Primary Active Transportation Network
- Gaps
- Needs-Based Analysis

Opportunities

The project team provided several opportunities for participants to identify active transportation needs – desired locations for walking or biking, location for sidewalks, trails, and bicycle infrastructure, and locations where people feel uncomfortable walking, rolling, or biking - were provided:

- Steering Committee: June 25, 2025
- Community: City of Friendswood July 4th Celebration (July 4, 2025)
- Stakeholder Committee: September 4, 2025

At each of these occasions, a large map showing the City of Friendswood was displayed on a table and colored dots that corresponded with the various categories were provided to participants. All identified opportunities were then mapped and are illustrated in Figure 1. Results of the opportunity activity include:

- 46 opportunities for active transportation (walk, bike, trail).
- 28 locations where participants want to walk.
- 27 locations where participants want to bike.
- 11 locations where participants are uncomfortable using active transportation.

Opportunity Map

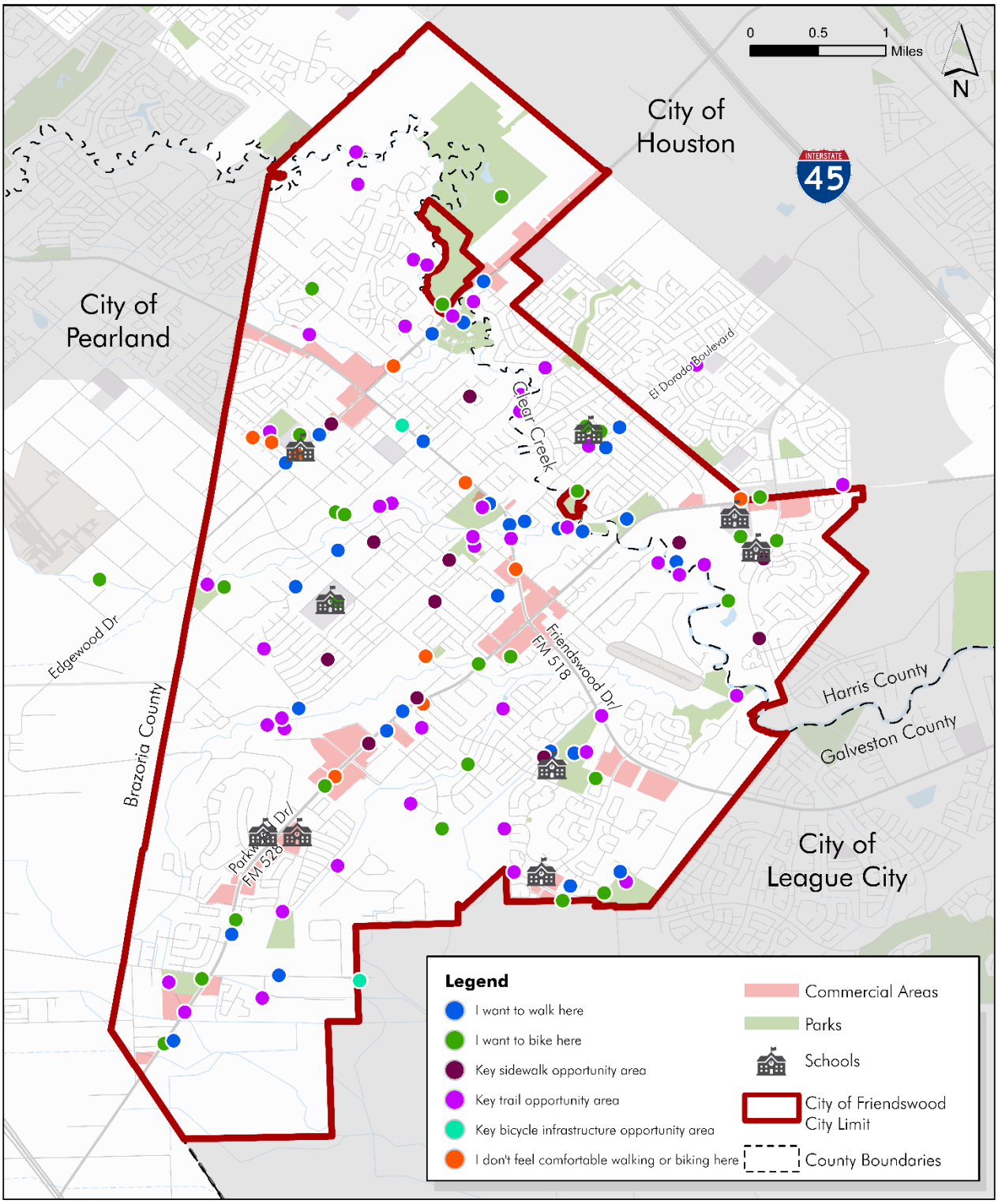


Figure 1. Map of all identified opportunities

Primary Active Transportation Network

Using the identified opportunities as a guide, the project team developed a Primary Active Transportation Network (PATN) to connect these opportunities to schools, parks, neighborhoods, and commercial areas (refer to Figure 2). The PATN takes into consideration connections with adjacent communities. Based on information gathered in preceding efforts, utilizing creeks and flood conveyance channels was not possible given right-of-way constraints and complexities with easements, so the PATN avoided these areas, instead prioritizing main corridors and neighborhood connections.

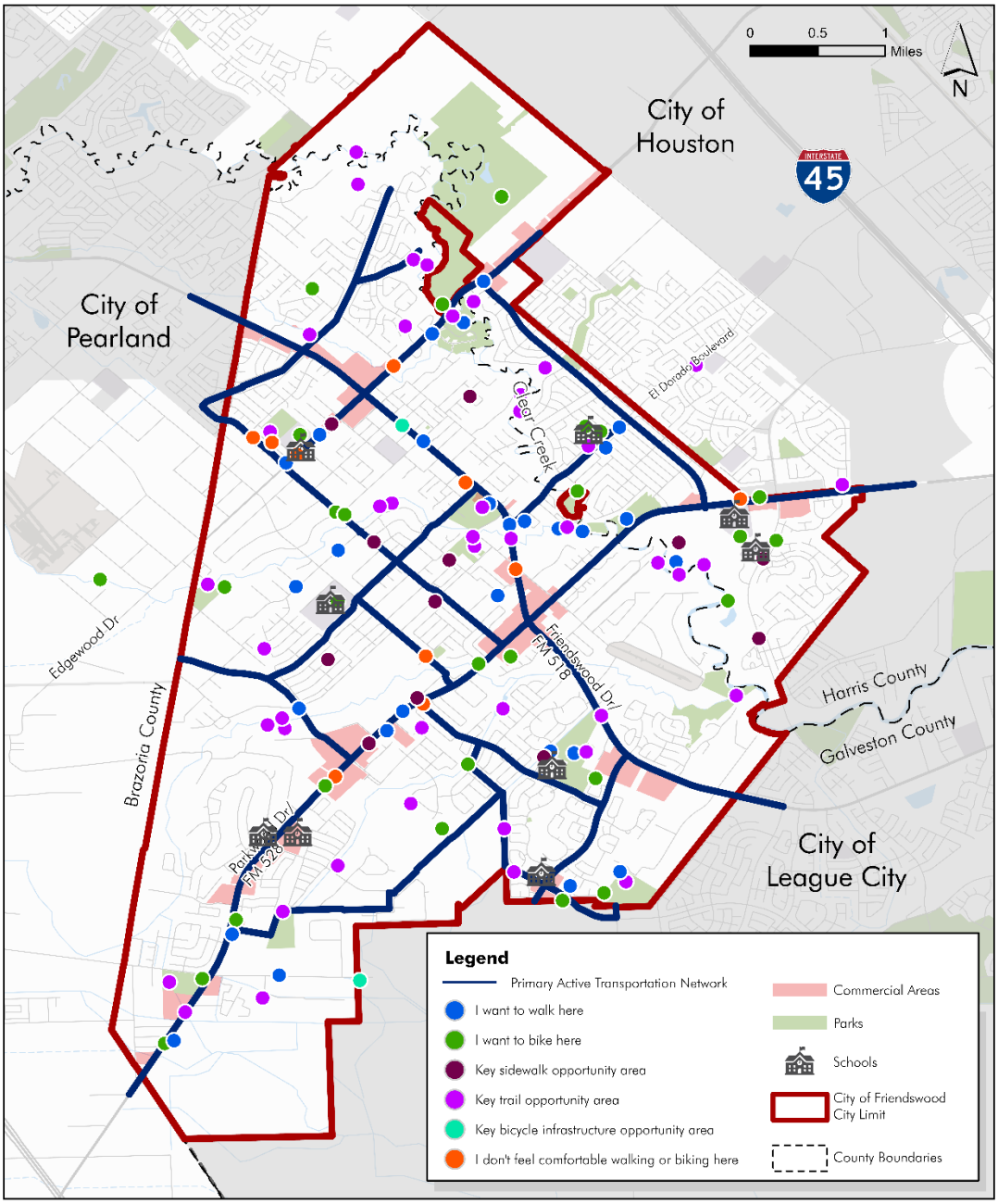


Figure 2. Primary Active Transportation Network in relation to identified opportunities.

Several iterations of the PATN were developed, each refined using feedback received from the City of Friendswood, the Steering Committee, the Stakeholder Committee, and the community (refer to Figure 3). The final PATN is illustrated in Figure 4.

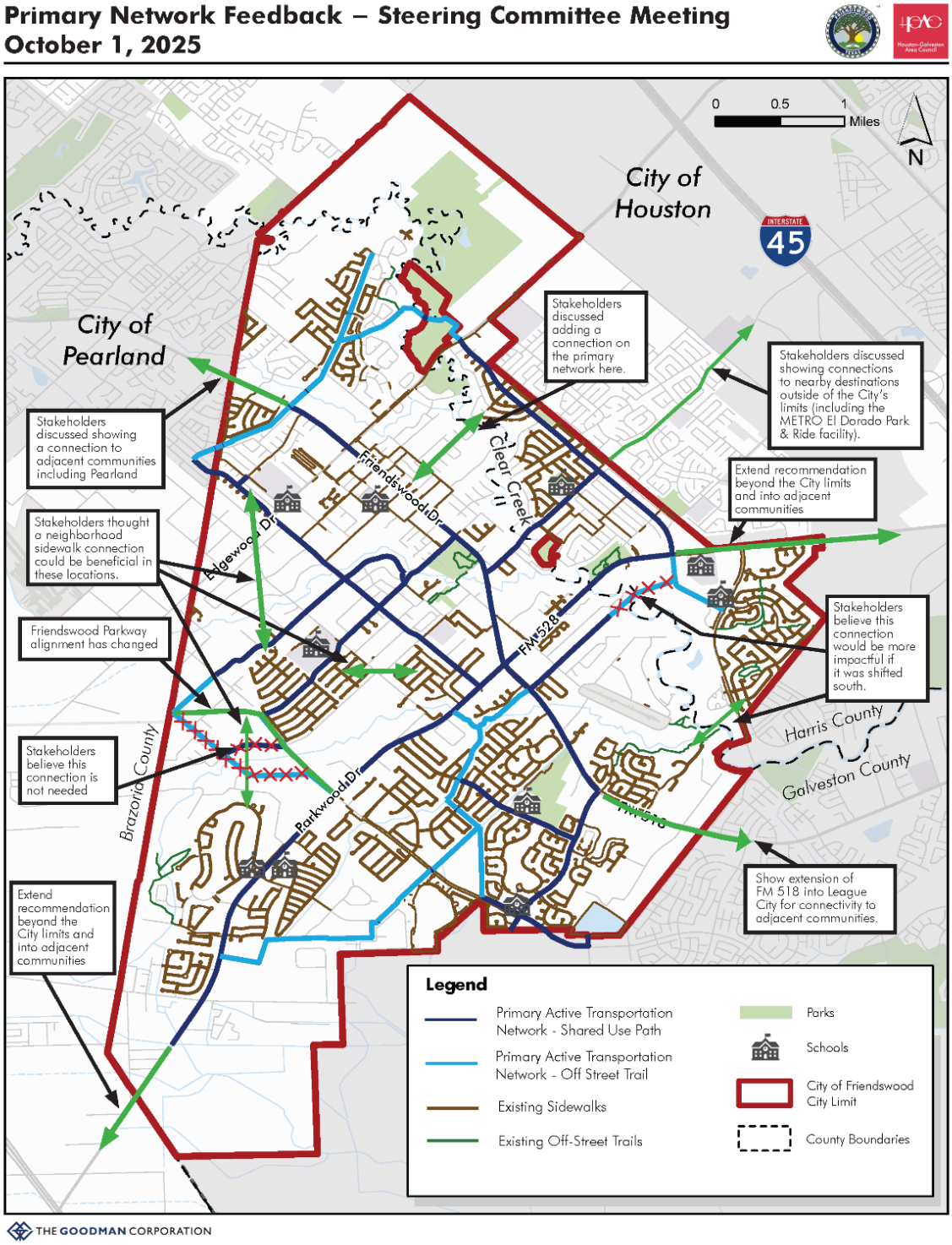


Figure 3. Feedback received on the Primary Active Transportation Network

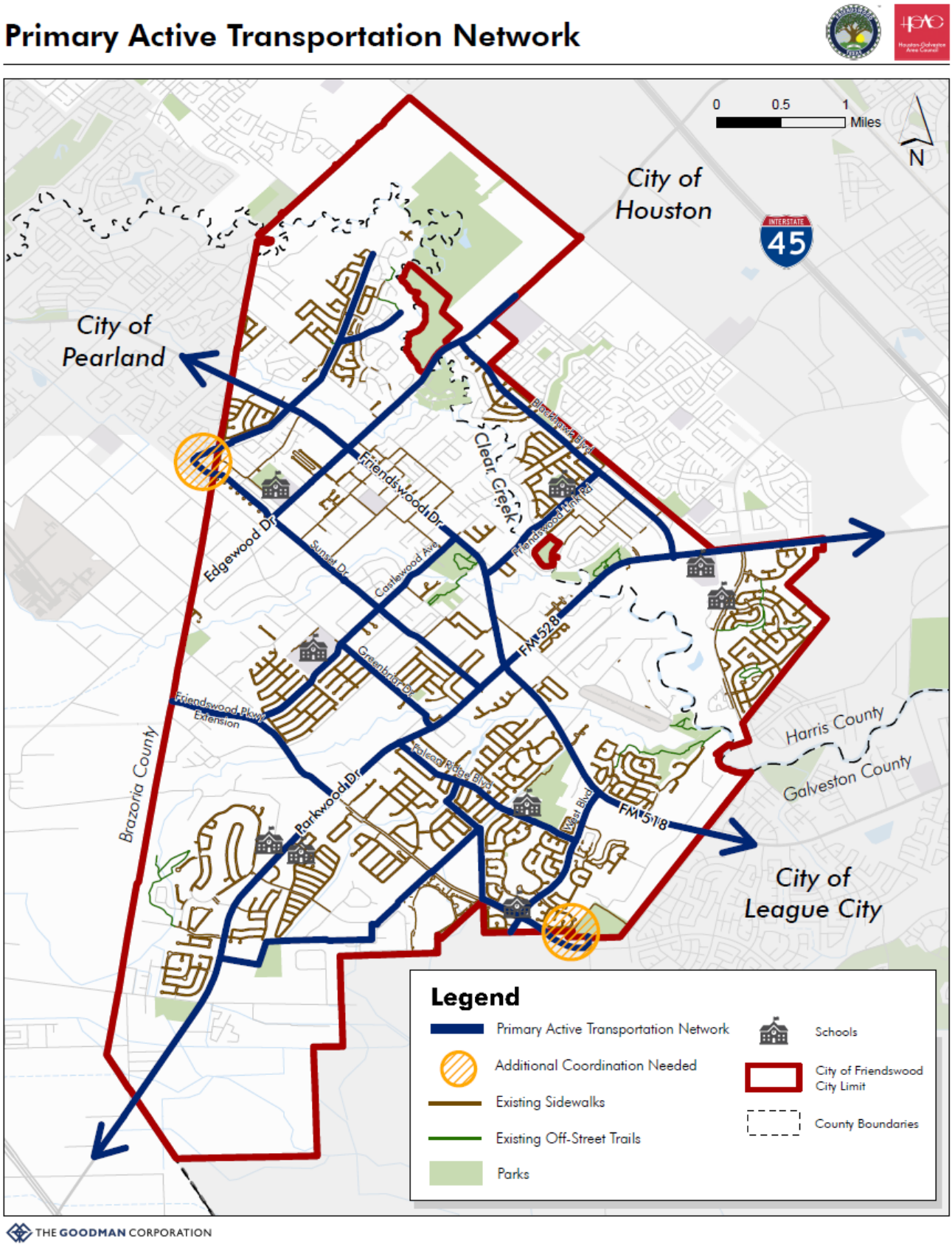


Figure 4. Primary Active Transportation Network

Gap Analysis

The project team used the PATN as a guide to inform project recommendations. First, the project team identified gaps in active transportation infrastructure along the PATN using a combination of aerial imagery and field verification. Infrastructure gaps, including missing sidewalks on one or both sides of the street, missing off-street trails, and missing crosswalks are illustrated in Figure 5. These gaps informed the proposed projects to be evaluated as part of the needs-based analysis, described in the next section.

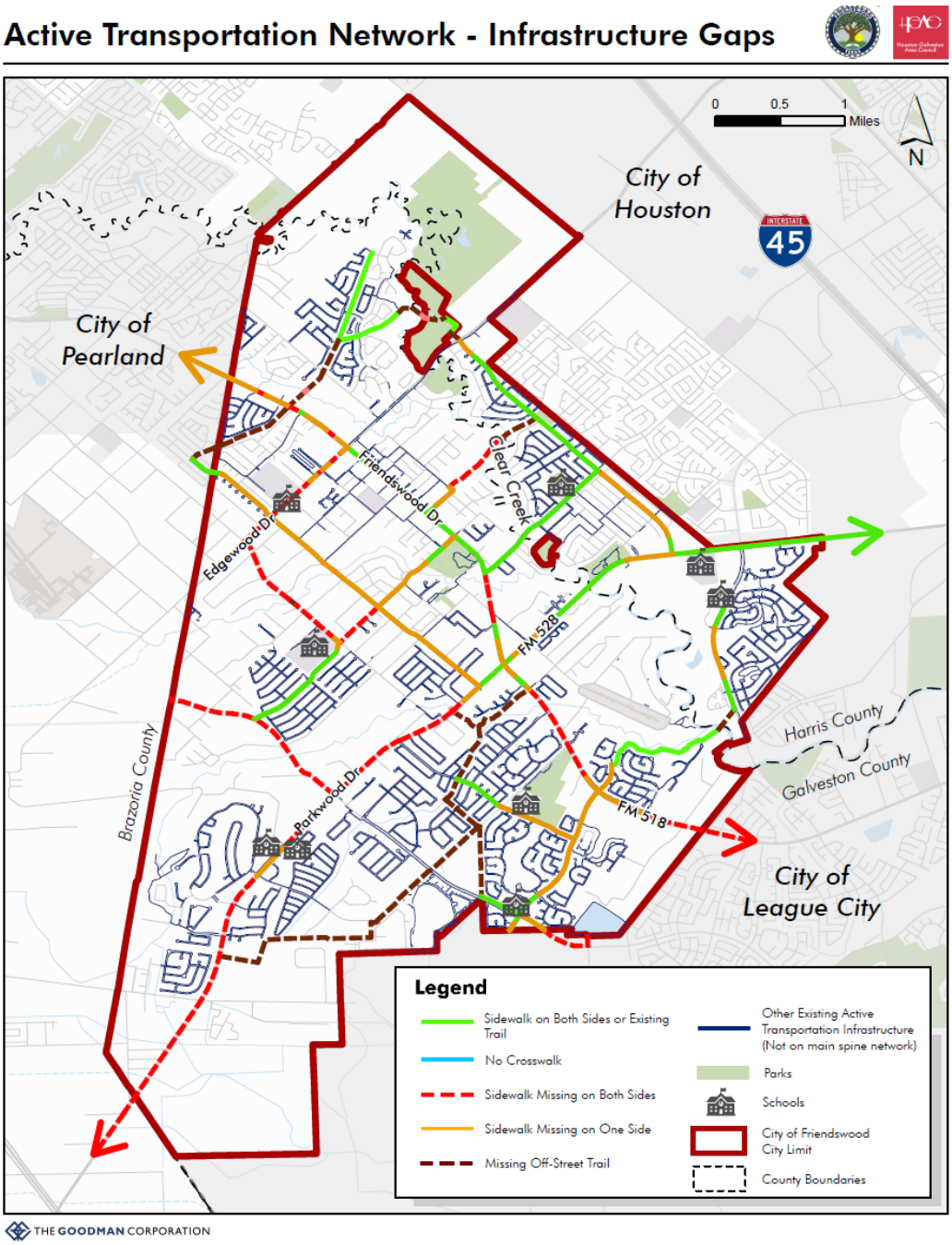


Figure 5. Infrastructure gaps along the Primary Active Transportation Network

Needs-Based Analysis

This analysis evaluates and prioritizes the proposed active transportation projects by measuring conditions within defined criteria to identify the relative need for project implementation within the group of proposed projects. Conditions are captured as value metrics — such as crash frequency, destination density, or network connectivity — measured across all projects. Because each metric uses different units of measurement (e.g., counts, percentages, linear feet), raw values are normalized using a Z-score method so they can be compared and combined on a common scale. Each criterion is scored on a relative basis, meaning a project's score reflects how it compares to the other projects within this specific group of recommendations. Each category is weighted to reflect the goals and objectives of the community, with all weights summing to 100% on a 1,000-point scale.

Scoring Pipeline

The scoring pipeline begins with the raw data value for each criterion, which is then normalized using a Z-score standard deviation method to place all metrics on a common scale (refer to Figure 6). Once normalized, a directional adjustment is applied to account for whether a higher or lower normalized score indicates greater need. The adjusted score is then multiplied by the assigned point value for that criterion to produce a final criterion score. Individual criterion scores are summed within each category to produce a category score, and category scores are then multiplied by their respective category weights to calculate a weighted total. Projects are ranked from highest to lowest weighted total, with the highest score receiving a rank of 1. No tiebreaker methodology is applied.

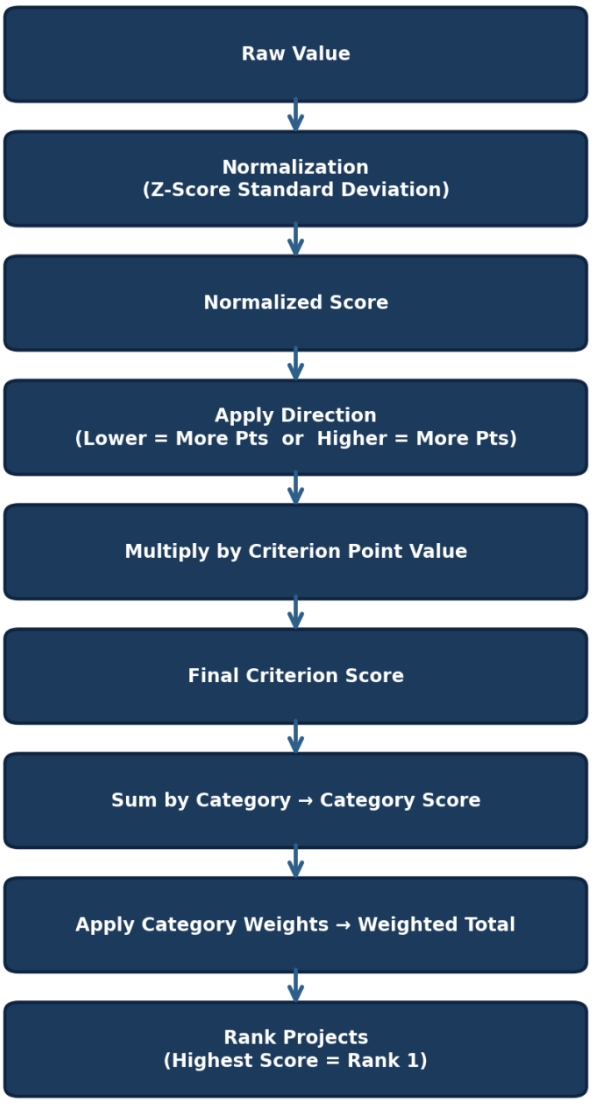


Figure 6. Scoring Pipeline

Project Prioritization Criteria

Six evaluation categories, were selected for this analysis – safety, mobility, connectivity, access, environment, and public input. Each category is evaluated by measurable criteria described in the following sections.

Safety

The Safety category score was aggregated based on five criteria. Corridors with more safety concerns score higher, as improvements there yield the greatest positive impact. The criteria used in the safety category are:

- **5-Year Average of Vehicle Crashes -** sourced from TxDOT Crash Record Information System (CRIS) Database. These data are calculated as a 5-year average of all vehicle crashes along the proposed project corridors. A higher average is indicative of more need.
- **5-Year Average of Pedestrian Crashes:** sourced from TxDOT CRIS. The data is calculated as a 5-year average of all crashes involving pedestrians along the proposed project corridors. A higher number of pedestrian-related crashes could indicate **a** need for infrastructure improvements.
- **5-Year Average of Bike Crashes**: sourced from TxDOT CRIS Database. The data is calculated as a 5-year average of all crashes involving cyclists along the proposed project corridors. A higher number of cyclist-related crashes could indicate a need for infrastructure improvements.
- **5-Year Average Monetized Values of Injuries (In Millions):** sourced from TxDOT CRIS Database. Per the Federal Highway Administration's (FHWA) guidance documents, the "5-Year Average Monetized Values of Injuries (In Millions)" combines two established FHWA methodologies: the 5-year rolling average for injury counts and the comprehensive crash cost monetization process. A higher value could indicate that infrastructure improvement could reduce the cost of vehicular related crashes to society.
- **5-Year Crash Rate:** sourced from TxDOT CRIS Database. This data is calculated as an average 5-Year crash rate per million vehicle miles normalized on average annualized traffic (AADT) and translated into a percentile rank. A higher rate is indicative of more need.

For proposed projects that occur outside of the motorized public right-of-way, alternative corridors that serve the alignment's function of moving people from point A to point B were selected to calculate the potential safety benefit from their implementation.

Mobility: Moving People

The Mobility category has an aggregated score based on the following two criteria:

- **Highest Functional Classification:** sourced from TxDOT Functional Classification. Functional classification is a value assigned to the statewide roadways by TxDOT to demonstrate the roadway design as it relates to traffic capacity: the lower the classification number, the more potential for higher vehicle traffic (i.e., a designation of Functional Classification 1 is an Interstate), which means more potential for conflict with bike and pedestrian activity.
- **Existing Pedestrian and Bicycle Commuters**: sourced from the Houston-Galveston Area Council (H-GAC) Activity-Connectivity Explorer (ACE); an interactive web mapping tool used to identify and analyze activity centers, density, and connectivity within the 13-county H-GAC region. Ped-Bike Commuter data identifies areas with potential demand for bicycle and pedestrian commuters. Demand is derived by analyzing the current distance travelled by commuters (home to work) and their means of transportation.

Connectivity: Networks

Criteria in this category score higher if they connect to more bicycle and/or trail networks and remove or mitigate significant barriers to mobility. The Connectivity category has an aggregated score based on the following three criteria:

- **Existing Bike Network Connection:** Sourced from a combination of H-GAC Bike and Trail routes, City of Houston Bike Plan, and City of Friendswood. Projects that improve, functionally connect to, or complete a connection to or within an existing bike route receive a higher score. Tabulated objectively, a 'yes' scored full points, while a 'no' yielded zero points.
- **Barrier Elimination:** Sourced from the project description and visual analysis of the project environment. Projects that crossed significant geological barriers, such as creeks, were given a score of 3. Projects whose description included intersection crossing improvements located on collectors or above were awarded 2 points and projects that filled in pedestrian infrastructure gaps were awarded 1 point.
- **Existing Trails Connection -** Sourced from a combination of H-GAC Bike and Trail routes, City of Houston Bike Plan, and City of Friendswood. Projects that improve, functionally connect to or complete a connection to or within an existing bike route or trail receive higher priority scores. Tabulated objectively, a 'yes' scored full points, while a 'no' yielded zero points.

Access: Reaching Destinations

The Access category has an aggregated score based on 10 criteria:

- **Schools, parks, community centers, grocery stores, healthcare facilities and care facilities (e.g., childcare, senior care, mental health), Government buildings, and places of worship:** Sourced from Data Axel, Google Maps, City of Friendswood.
- **Commercial areas, multifamily housing**: Sourced from H-GAC Land Use.

Projects near more destinations score higher, as they connect more people to the places they need to go. The number of key destinations within a quarter-mile buffer of the project is counted.

Environment

The Environment category has an aggregated score based on two criteria:

- **Floodplains** and **Wetlands:** Sourced from Federal Emergency Management Agency and US Fish and Wildlife Service, respectively.

For both criteria, the percentage of the total linear feet that fall within the floodway, 100-year flood zone, or recorded wetland area is calculated. The lower the percentage of the project that falls within the target areas (the less potential for environmental conflict) results in a higher score for those criteria. Projects with less environmental impact score higher, favoring routes that avoid sensitive natural areas.

Public Input

The Public Input category has an aggregated score based on one criterion:

- **Community feedback** gathered at public meetings is factored into the score. Projects identified by residents as important score higher, ensuring prioritization reflects community values.

Score Weighting

Raw data values are first normalized to enable fair comparison across different units. A two-tier weighting structure then controls scoring influence. Point values assigned to individual criteria determine their weight within a category, while percentage weights assigned to categories determine each category's share of the total score. These settings enabled the City of Friendswood to align the ranking with its policy priorities. The final weights used for each category are illustrated in Figure 7.

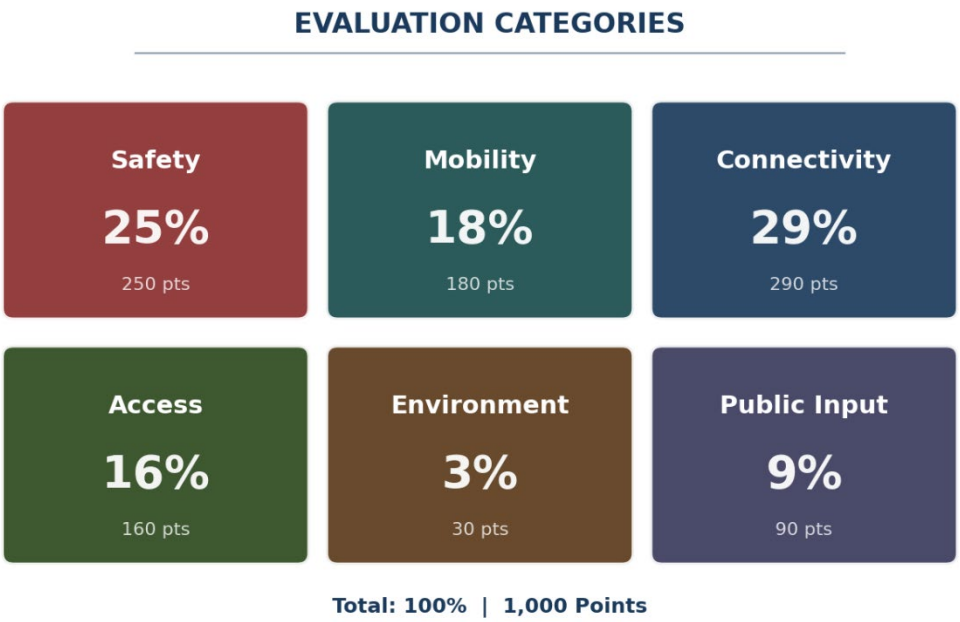


Figure 7. Score Weighting

Proposed Project Recommendations

Using the evaluation categories, criteria, and associated weighting, this analysis ranked fifteen projects, illustrated in Figure 8.

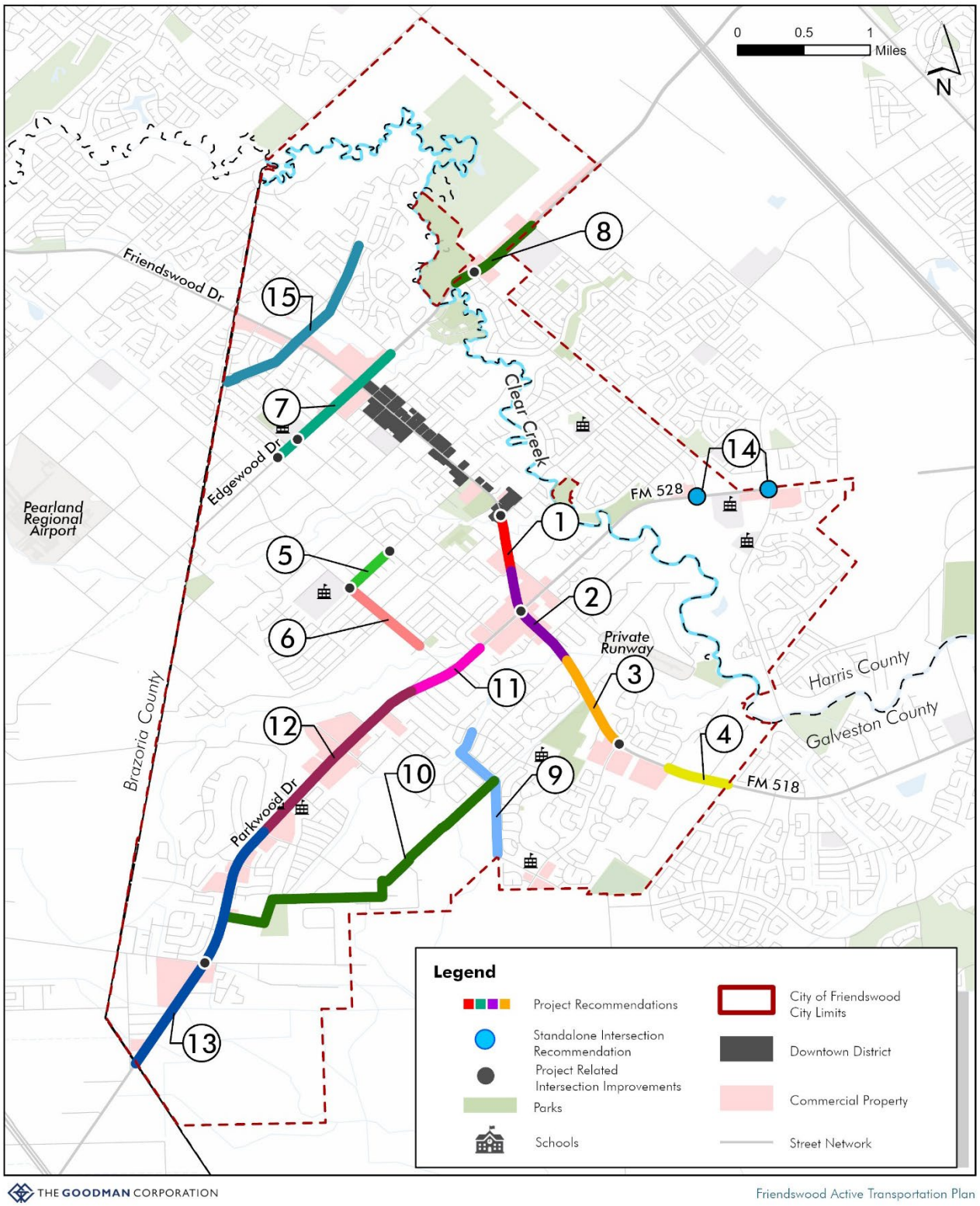


Figure 8. Proposed Projects ranked using the needs-based analysis.

Overall Ranking by Category

Figure 9 displays how all 15 project recommendations perform across the six evaluation categories. Projects are ordered by their overall weighted rank, so the projects with the greatest need are ranked higher. Green cells indicate strong performance in a specific category, while red cells signal weak performance. The proposed project on FM 518 from Whispering Pines Avenue to Silverstone Drive (Project 1) ranks the highest overall, followed by Project 2 – FM 518 from Silverstone Drive to Eagle Lakes Drive. Refer to Appendix 3.1 for score per individual evaluation category.

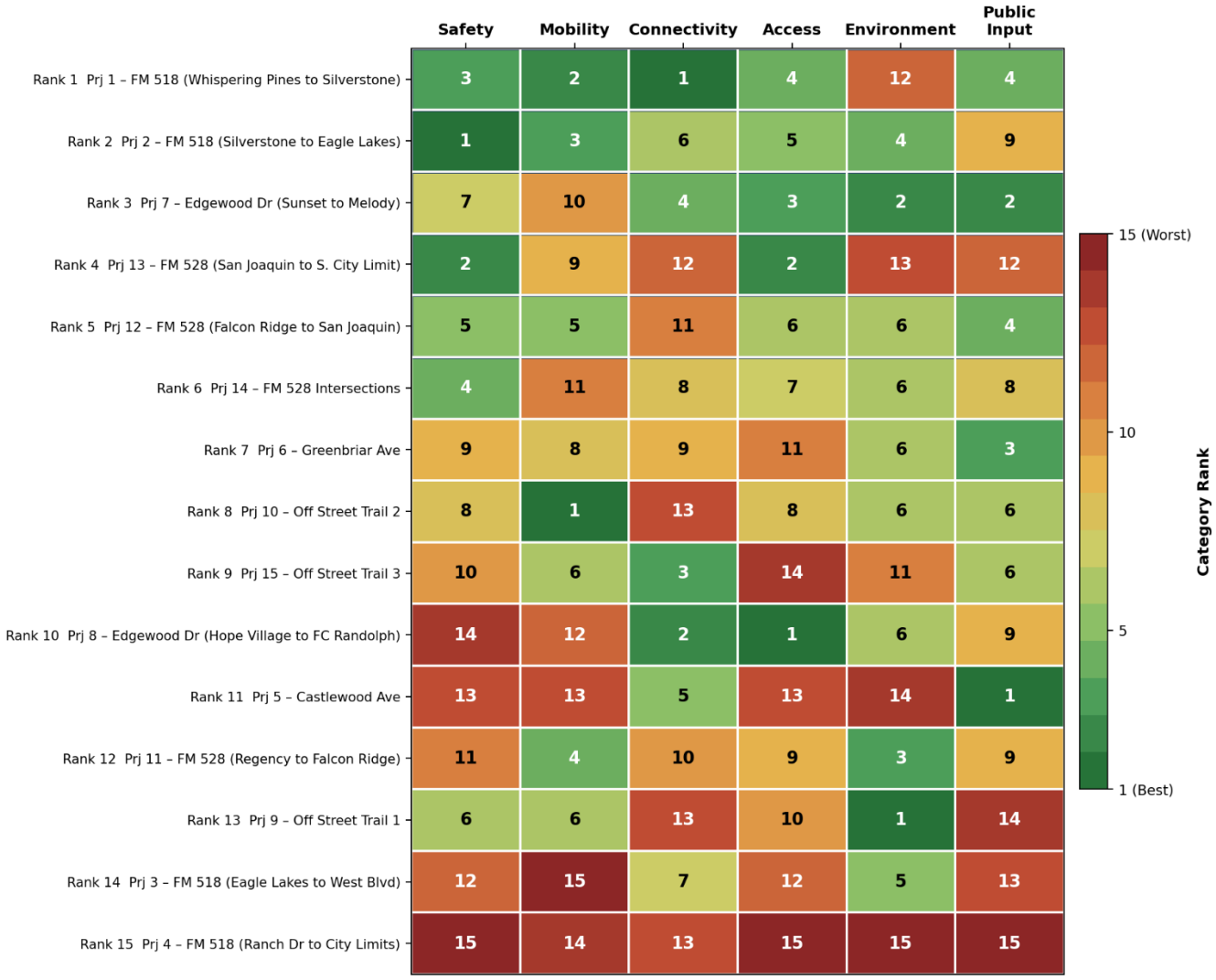


Figure 9. Project rank by evaluation category

Highest ranking projects overall

The five highest-ranking projects overall are listed in Table 1 and mapped in Figure 10.

Table 1. Five highest ranking projects overall.

Rank	Project ID		Project Name	Score/1000
1	1		FM 518 from Whispering Pines Avenue to Silverstone Drive	682.4
2	2		FM 518 from Silverstone Drive to Eagle Lakes Drive	601.0
3	7		Edgewood Drive (FM 2351) from Sunset Drive to Melody Lane	560.8
4	13		FM 528 from San Joaquin Pkwy/Cypress Point Drive to City Limit	491.6
5	12		FM 528 from Falcon Ridge Boulevard to San Joaquin Parkway	490.8

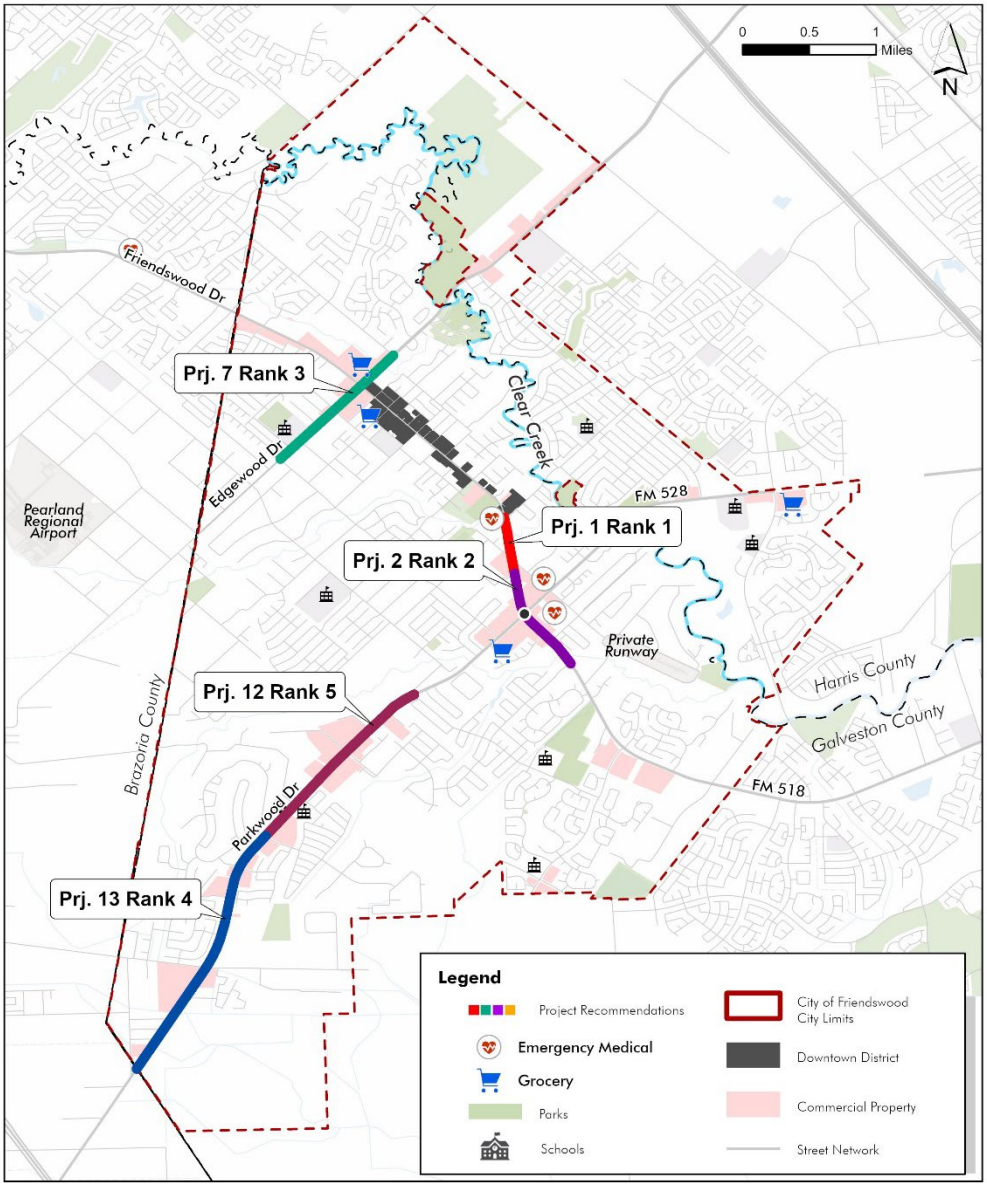


Figure 10. Five highest ranking projects overall

Rank 1 — Project 1: FM 518 From Whispering Pines Avenue to Silverstone Drive **(682.4 pts)**

Project 1 achieved the highest overall score, supported by the strongest connectivity performance in the group (249.5 out of 290 possible), approximately twice as high as the next highest score in that category. This is particularly influential given that Connectivity carries the largest category weight at 29%. The project also placed in the top four across Safety (3rd), Mobility (2nd), Access (4th), and Public Input (4th), reflecting consistently strong performance across the evaluation criteria. Its lowest-scoring category was Environment (12th), though at 3% weight, this accounted for a relatively small difference in overall points. Project 1 represents a corridor where measured conditions indicate a high level of need across nearly all evaluation categories.

Rank 2 — Project 2: FM 518 From Silverstone Drive to Eagle Lakes Drive **(601.0 pts)**

Project 2 received the highest Safety score among all 15 projects (209.5 out of 250 possible), reflecting elevated crash frequency, pedestrian-involved incidents, and monetized injury values along its corridor. It also performed well in Mobility (3rd) and Environment (4th). The scoring difference between Project 2 and Project 1 is largely attributable to Connectivity — Project 2 scored 136.9 compared to Project 1's 249.5, a difference of approximately 112 points in the most heavily weighted category. Its Public Input score (9th, 30.6 pts) was also lower than several other top-five projects. Nonetheless, the corridor's demonstrated safety need supports its position as the second-ranked project.

Rank 3 — Project 7: Edgewood Drive (FM 2351) From Sunset Drive to Melody Lane **(560.8 pts)**

Project 7 received the highest scores among the top five in both Public Input (85.0, 2nd overall) and Environment (19.2, 2nd overall), and placed 3rd in Access (92.5), reflecting strong community interest and destination-access conditions. Its Connectivity score (172.3, ranked 4th) provided a solid contribution from the most heavily weighted category. The project's lower Mobility score (10th, 70.1 pts) limited its total, as Mobility carries an 18% weight. Project 7 demonstrates how strong community engagement combined with consistent access and environmental performance can contribute to a top-three finish, even without leading in the two highest-weighted categories.

Rank 4 — Project 13: FM 528 From San Joaquin Parkway/Cypress Point Drive to Southern City Limit **(491.6 pts)**

Project 13 showed a split performance across categories. It ranked 2nd in both Safety (183.9) and Access (94.6), reflecting a corridor with elevated crash history and proximity to a high number of key destinations. However, it ranked 12th in both Connectivity (87.7) and Public Input (24.9), indicating more limited connections to existing bicycle and trail networks and fewer community-identified needs during public meetings. The 69-point gap between Rank 3 and Rank 4 is largely associated with the Connectivity difference — at 29% weight, the gap between Project 13's 87.7 and Project 7's 172.3 accounts for a substantial portion of that separation.

Rank 5 — Project 12: FM 528 From Falcon Ridge Boulevard to San Joaquin Parkway **(490.8 pts)**

Project 12 exhibited the most balanced performance among the top five, with no category rank lower than 11th and no category rank higher than 4th. It placed in the top six across Safety (5th), Mobility (5th), Access (6th), and Public Input (4th, scoring 62.1). This consistent profile resulted in a total just 0.8 points below Project 13 for fourth place. Similar to Project 13, its Connectivity score (11th, 88.3 pts) limited its ability to close the gap with the top three projects. Project 12 represents a corridor where conditions indicate a steady, moderate level of need across all evaluation dimensions rather than a concentrated need in any single category.

Performance by category

The following sections describe how the five highest-ranking projects scored against each other in each category.

Safety

Safety carries a 25% category weight (250 max points). Among the top five, Project 2 scored highest in this category with a weighted score of 209.5 (refer to Figure 11), reflecting elevated crash frequency and injury costs along its corridor. Project 13 followed at 183.9. While Project 1 ranked first overall, it placed third in Safety (147.8), suggesting that its strength in other categories — particularly Connectivity — helped compensate for a more moderate safety score. The 25% weight means safety-related need plays an important role in differentiating projects, though it is balanced by the influence of the other five categories.

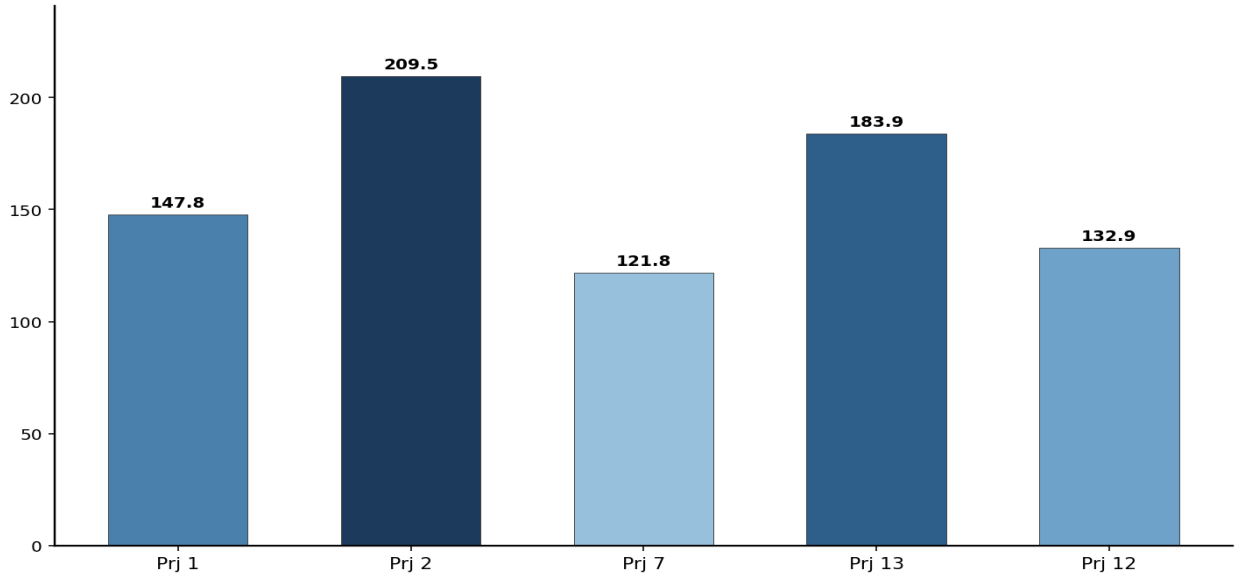


Figure 11. Safety scores for the five highest ranking projects

Mobility

Mobility carries an 18% category weight (180 max points). Project 1 scored highest among the top five at 121.6 (refer to Figure 12), consistent with its location along a higher-functional-

classification corridor that serves notable pedestrian and bicycle commuter demand. Project 2 followed at 116.8, with Project 12 at 105.4. Projects 13 and 7 received lower scores in this category (90.1 and 70.1 respectively), though both maintained their position in the overall top five due to stronger performance in other weighted categories. At 18%, Mobility represents a meaningful component of the total score, though it carries less influence than either Safety or Connectivity.

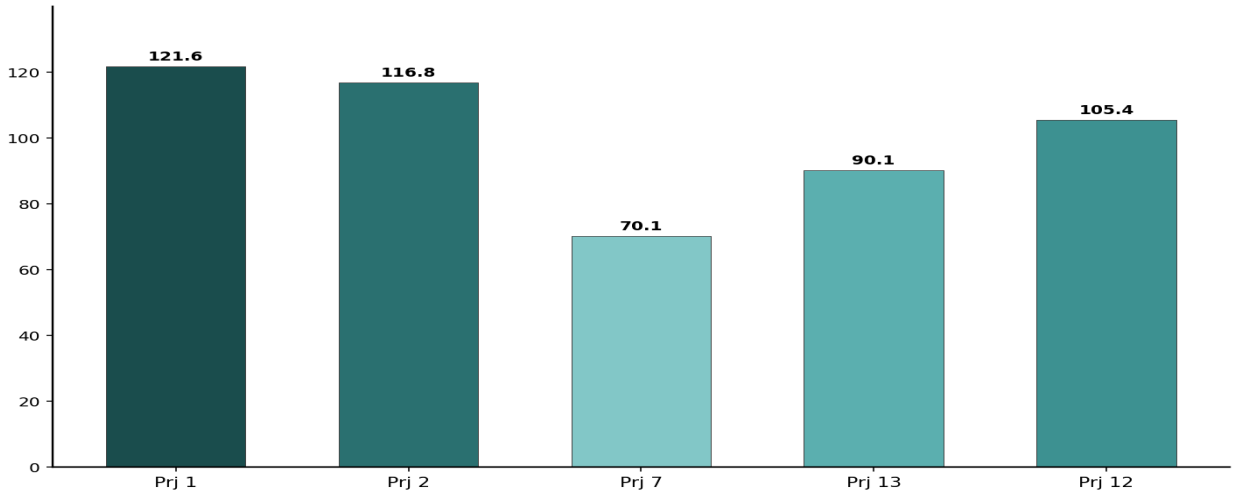


Figure 12, Mobility scores for the five highest ranking projects

Connectivity

Connectivity carries the highest category weight at 29% (290 max points), making it the most influential factor in determining overall rank. Project 1 scored 249.5 in this category — roughly twice the next highest among the top five — which is a key reason it achieved the top overall position even with a third-place finish in Safety (refer to Figure 13). Project 7 scored 172.3, reflecting strong connections to existing trail and bike networks. Projects 2, 12, and 13 scored between 87.7 and 136.9, indicating more moderate Connectivity performance relative to Project 1. Given its 29% weight, differences in this category tend to have a greater effect on final rankings than differences of similar magnitude in other categories.

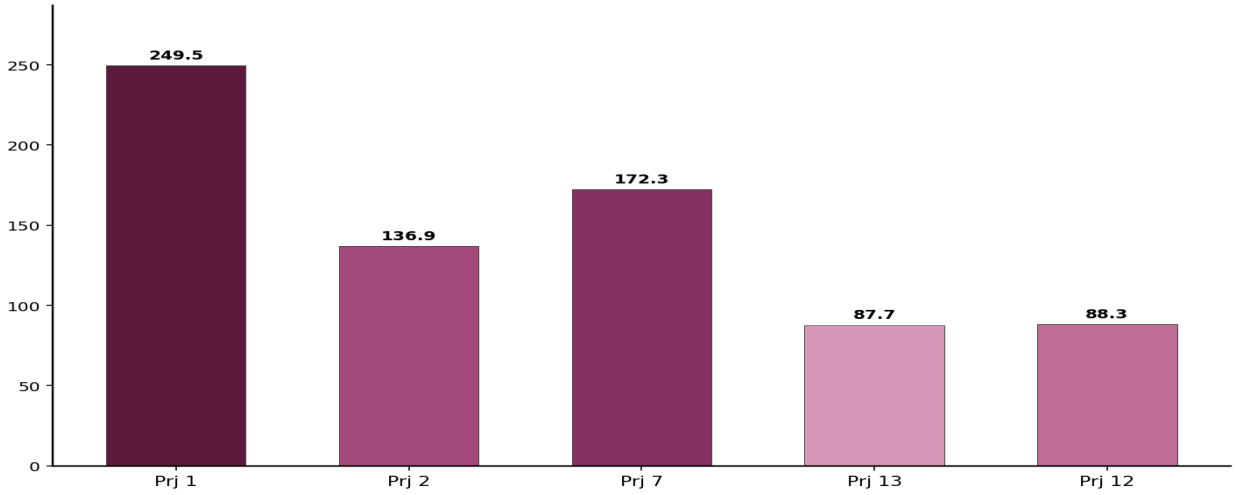


Figure 13. Connectivity scores for the five highest ranking projects

Access

Access carries a 16% category weight (160 max points). The top five projects scored within a relatively narrow range (86.6 to 94.6), suggesting that proximity to key destinations — schools, parks, healthcare facilities, and commercial areas — is fairly consistent across these corridors. Project 13 scored highest at 94.6, followed by Project 7 at 92.5, both located along corridors with higher destination density (refer to Figure 14). At 16%, Access contributes a moderate share to the total score. Because the scores among the top five are closely grouped, this category had a limited effect in distinguishing the final rankings among the leading projects.

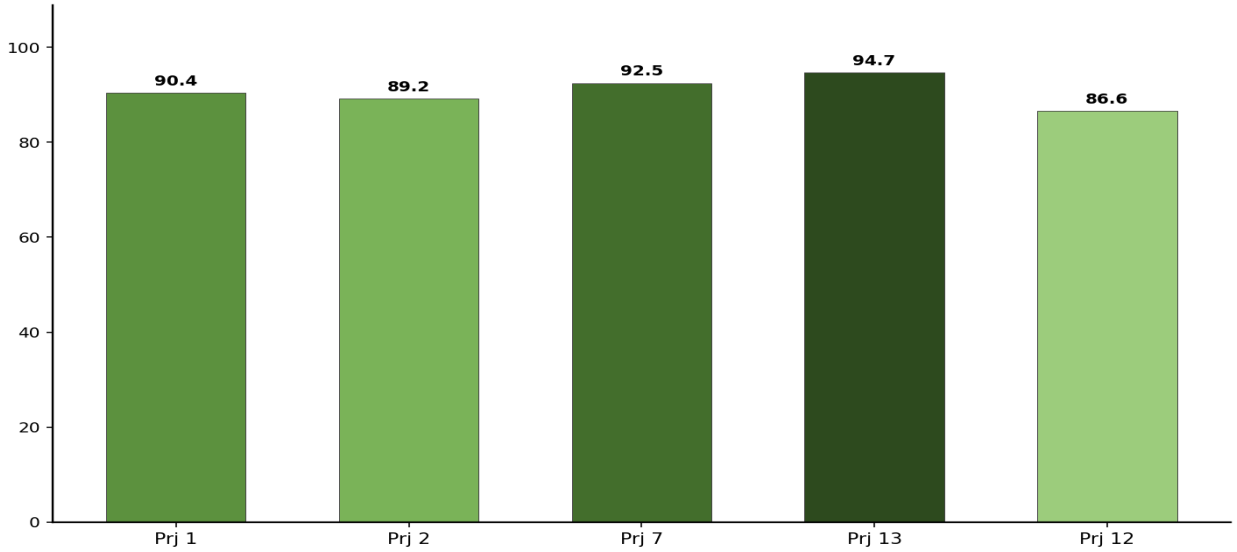


Figure 14. Access scores for the five highest ranking projects

Environment

Environment carries the lowest category weight at 3% (30 max points). The highest score among the top five was Project 7 at 19.2, which represents a small portion of its 560.8 overall total (refer to Figure 15). With the top five scoring within a narrow range (10.5 to 19.2), the 3% weight means that differences in environmental performance account for only a few points of separation in the overall rankings. This weighting reflects the community's chosen priorities, which placed greater emphasis on connectivity, safety, and mobility as the primary indicators of project need, while still accounting for environmental considerations at a lower level of influence. Most of the proposed projects are located within existing public right-of-way, which generally reduces the potential for new environmental impacts and further limits the degree to which this category differentiates one project from another.

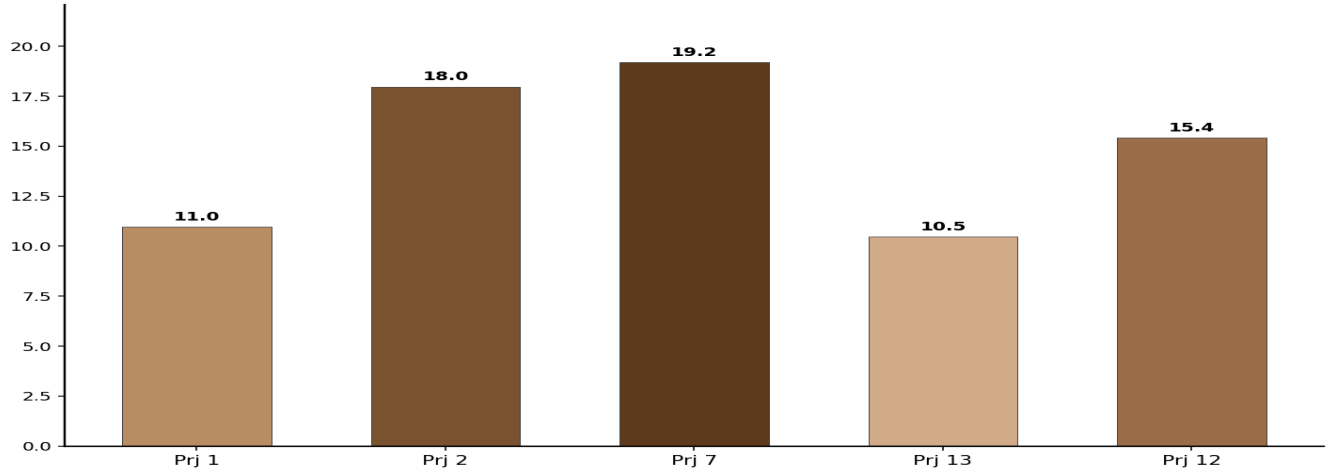


Figure 15. Environment scores for the five highest-ranking projects

Public Input

Public Input carries a 9% category weight (90 max points). Project 7 scored highest among the top five at 85.0, reflecting strong community interest expressed during public engagement meetings (refer to Figure 16). Projects 1 and 12 each scored 62.1, while Projects 2 and 13 received lower scores of 30.6 and 24.9 respectively. At 9%, Public Input provides a meaningful but measured level of influence — sufficient to affect closely scored projects by a few positions, though not enough to overcome larger scoring differences in the more heavily weighted categories. Project 7's strong community support, along with its leading scores in Connectivity and Environment, contributed to its third-place overall finish.

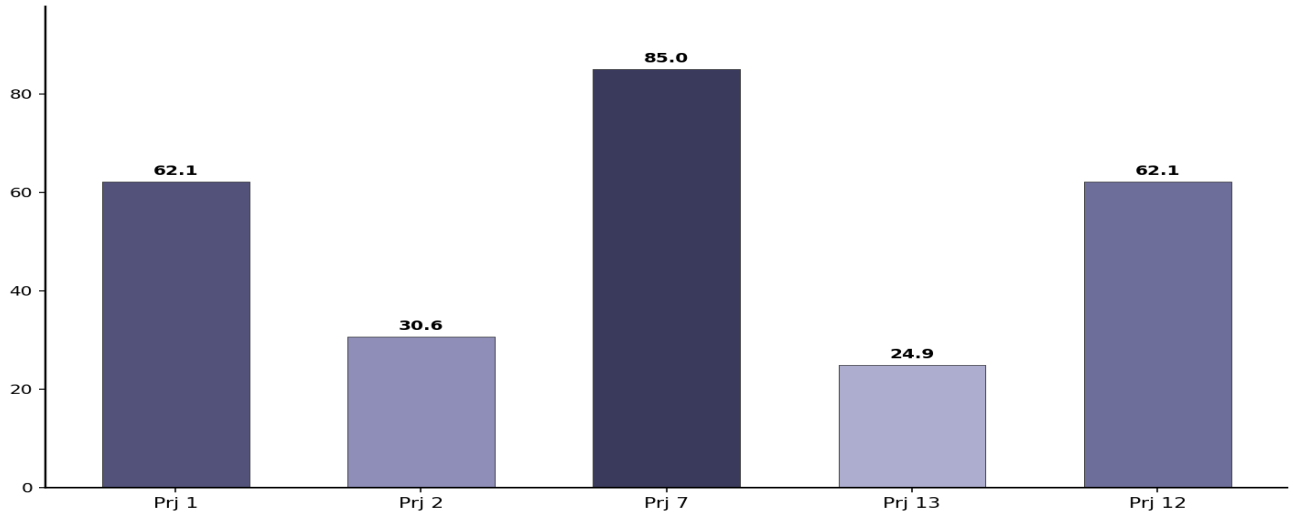


Figure 16. Public input scores for the five highest-ranking projects

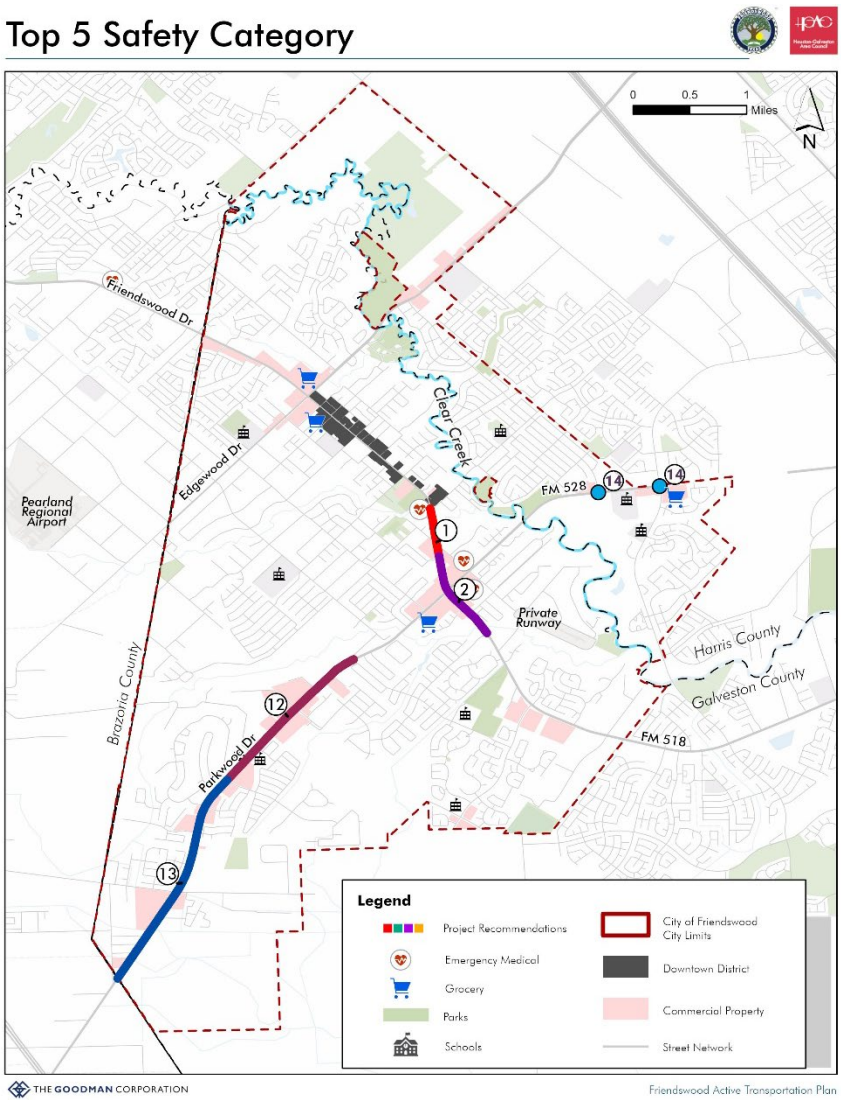
Summary

The project team analyzed potential opportunities and established a Primary Active Transportation Network (PATN), a framework that provides the city with a roadmap to create a safer, more resilient multimodal network that links residents to essential community destinations. A gap analysis was performed to identify missing infrastructure, such as sidewalks, trails, and crosswalks. To prioritize these improvements, a needs-based analysis was conducted, ranking projects across six weighted categories: Safety, Mobility, Connectivity, Access, Environment, and Public Input. The analysis resulted in a ranked list of 15 projects, with FM 518 (Whispering Pines to Silverstone) identified as the highest priority due to its exceptional connectivity and overall need. Together with previous project efforts, these analyses will inform the Recommendations and Implementation Plan.

Appendix 3.1. Project Category Performance

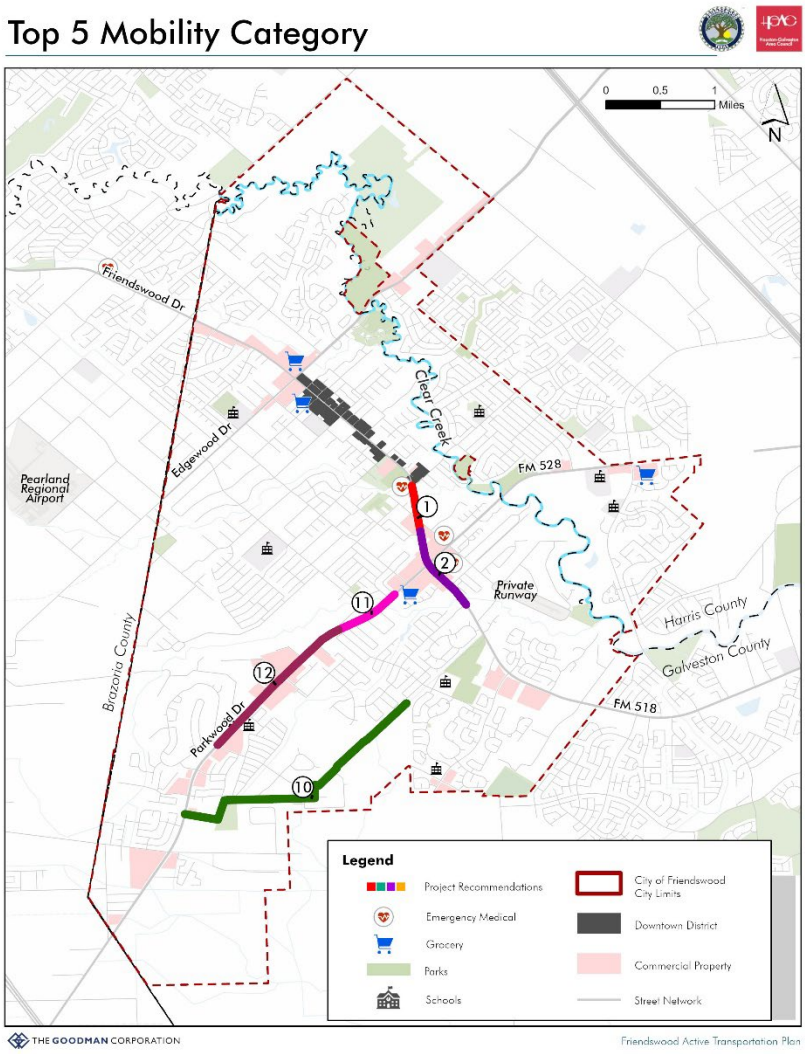
The following sections describe how the proposed projects ranked in an individual category. The five highest-ranking projects for each category are mapped.

Safety



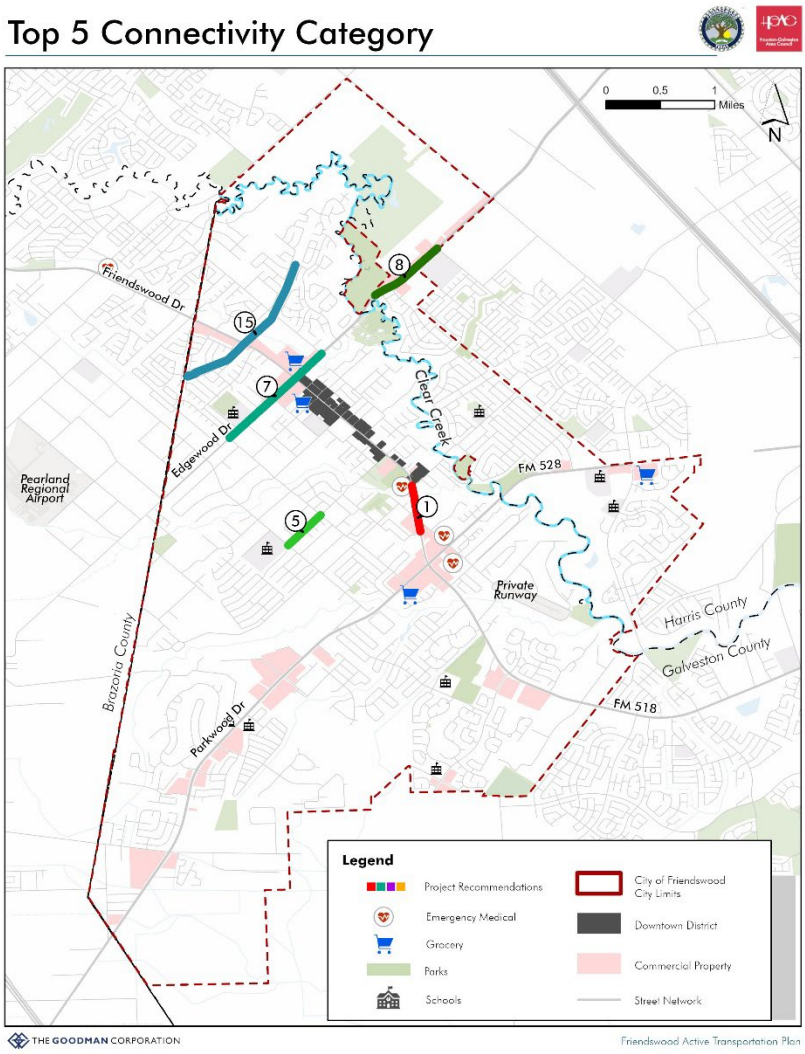
Category	Weight (%)	Max Points	Project ID	Category Rank	Category Score
Safety	25%	250	2	**1**	209.47
			13	**2**	183.87
			1	**3**	147.77
			14	**4**	144.62
			12	**5**	132.86

Mobility



Category	Weight (%)	Max Points		Project ID	Category Rank	Category Score
Mobility	18%	180		10	**1**	129.01
				1	**2**	121.64
				2	**3**	116.83
				11	**4**	111.69
				12	**5**	105.39

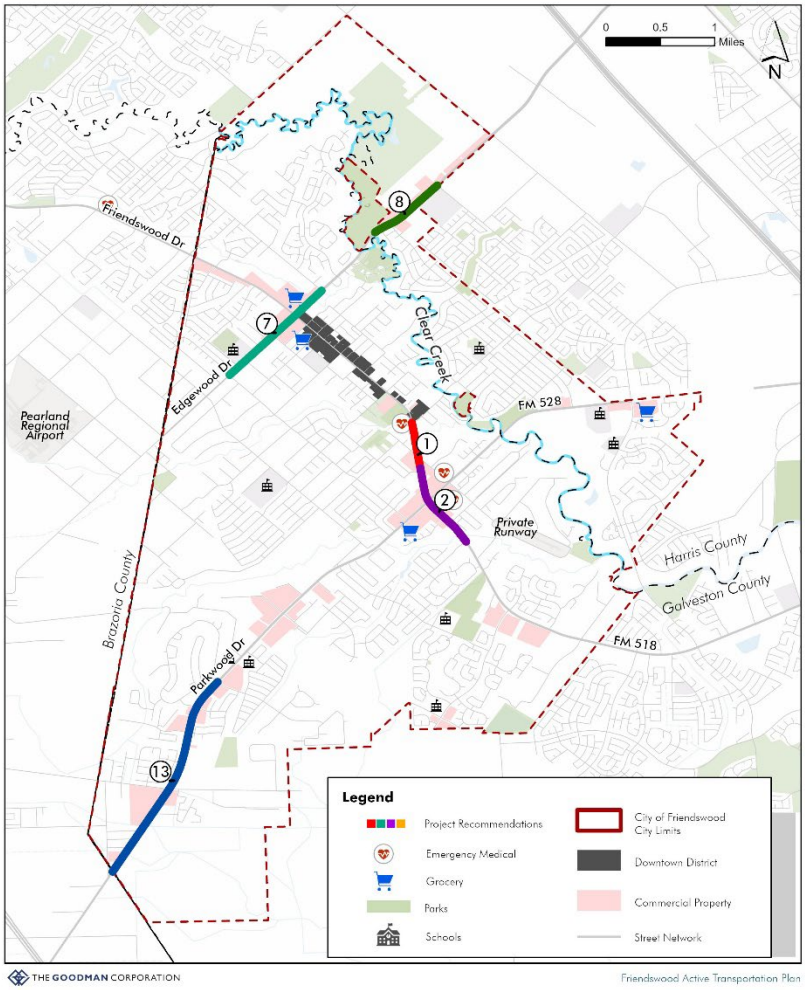
Connectivity



Category	Weight (%)	Max Points		Project ID	Category Rank	Category Score
Connectivity	29%	290		1	**1**	249.5
				8	**2**	182.27
				15	**3**	176.38
				7	**4**	172.27
				5	**5**	139.2

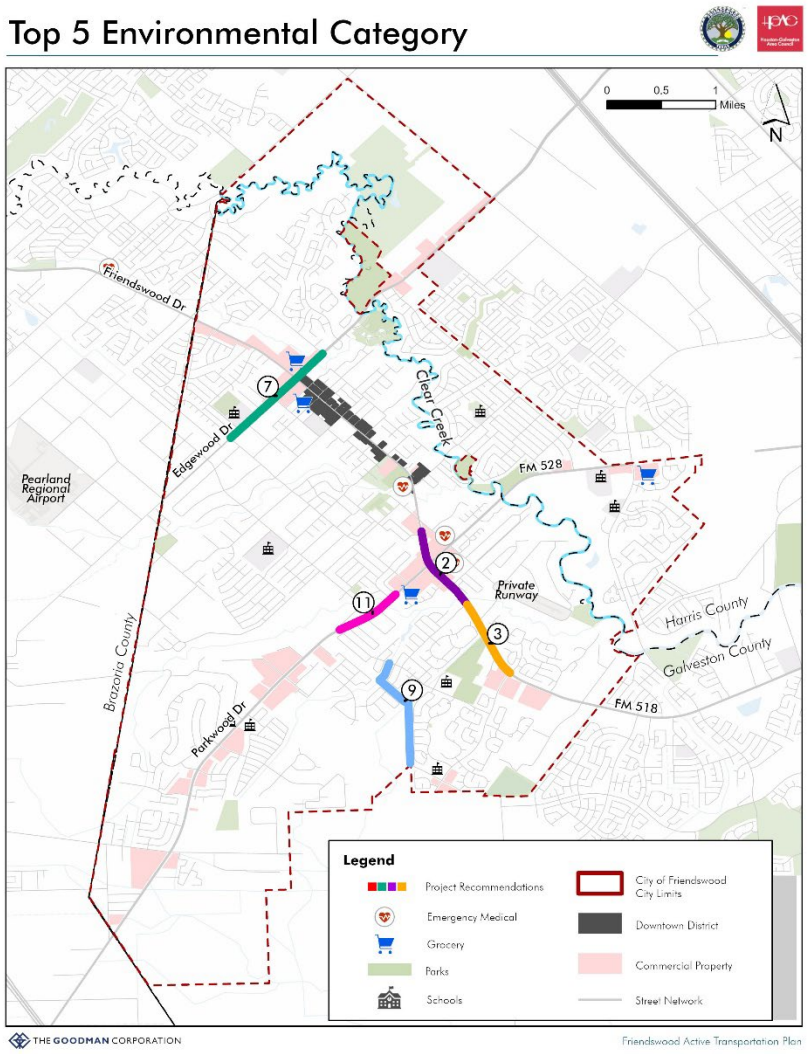
Access

Top 5 Access Category



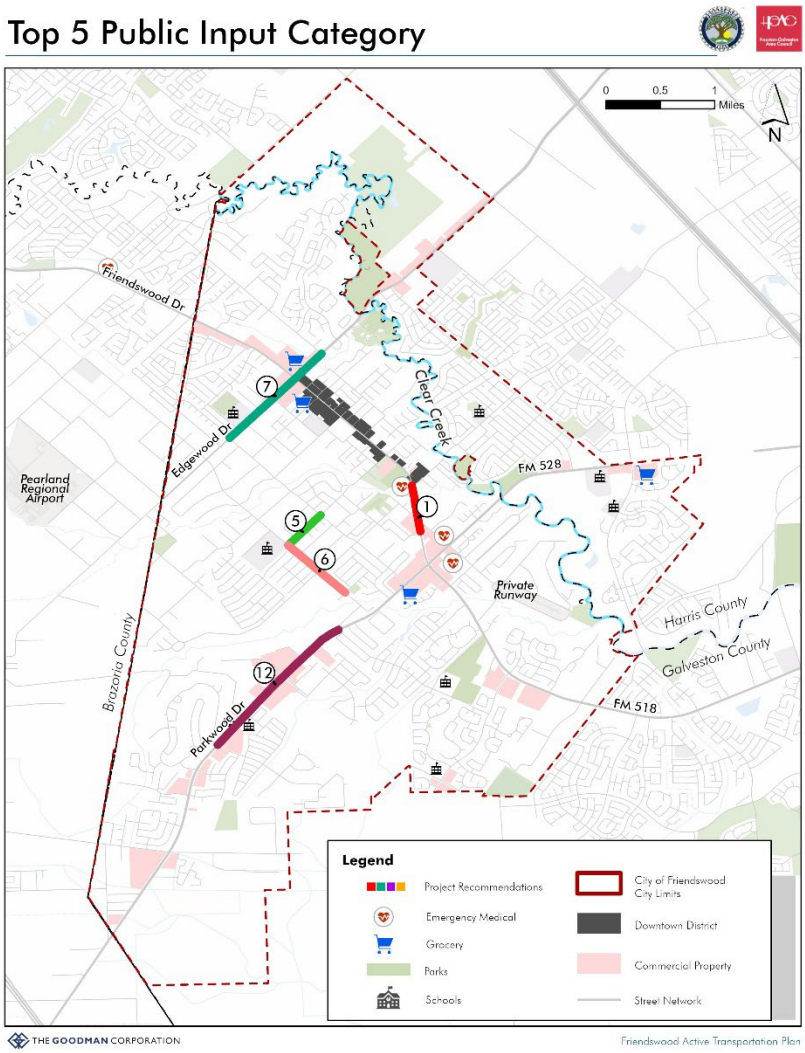
Category	Weight (%)	Max Points	Project ID	Category Rank	Category Score
Access	16%	160	8	**1**	106.7
			13	**2**	94.65
			7	**3**	92.48
			1	**4**	90.43
			2	**5**	89.17

Environment



Category	Weight (%)	Max Points	Project ID	Category Rank	Category Score
Environment	3%	30	9	**1**	22.22
			7	**2**	19.19
			11	**3**	19.08
			2	**4**	17.98
			3	**5**	17.68

Public Input



Category	Weight (%)	Max Points		Project ID	Category Rank	Category Score
Public Input	9%	90		5	**1**	87.71
				7	**2**	84.96
				6	**3**	80.08
				1	**4**	62.15
				12	**5**	62.15