

January 2023

FM 685 Corridor Study: Draft Report

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Executive Summary

1. Project Overview

The FM 685 Corridor Study is a study of the FM 685 / Dessau Rd corridor within the City of Pflugerville City limits, extending from SH 130 at Copper Mine Drive to just south of Wells Branch Parkway. The objective of the study is to identify long-term solutions that address congestion, safety, multiple modes of travel, and regional connectivity.

a.) Purpose and Need

The project's purpose and need statement is as follows:

This project is needed because the capacity of the FM 685 roadway is inadequate to meet current and future traffic volumes stemming from population growth and increased traffic volumes, resulting in reduced mobility and increased safety concerns on this stretch of roadway. The project is also needed to provide safe access for pedestrians and bicycles throughout the corridor. The purpose of the proposed project is to improve mobility for vehicles, provide connectivity for bicycle and pedestrians along the corridor, and address safety concerns.

b.) Transportation Master Plan

In November 2019, the Pflugerville Pforward Transportation Master Plan (TMP) was adopted as the City of Pflugerville's long-range plan identifying immediate and future infrastructure needs. FM 685 was ranked as a high priority project in the TMP. It was recognized as an arterial of concern due to importance for multimodal connectivity, congestion relief, and safety concerns, which was confirmed via public feedback. The project identified a need for a corridor study due to the complexity of the corridor to provide detail beyond a typical section and provide details for multimodal connections, intersection improvements, and opportunities to plan for integration of land use into the transportation design.

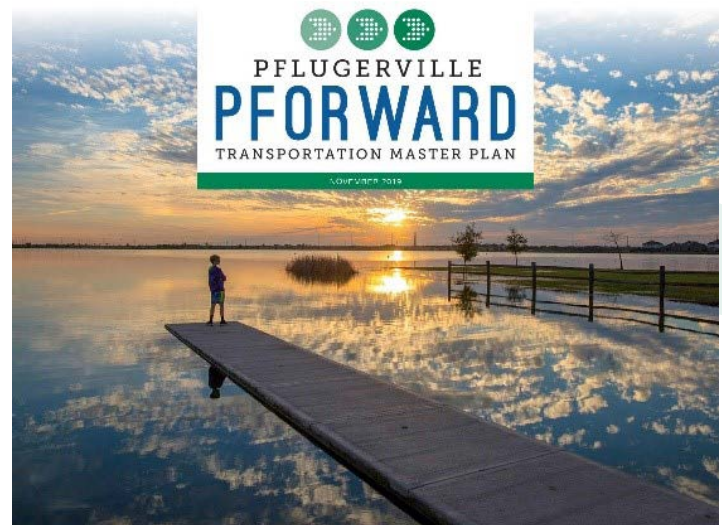


Figure E-1: Transportation Master Plan

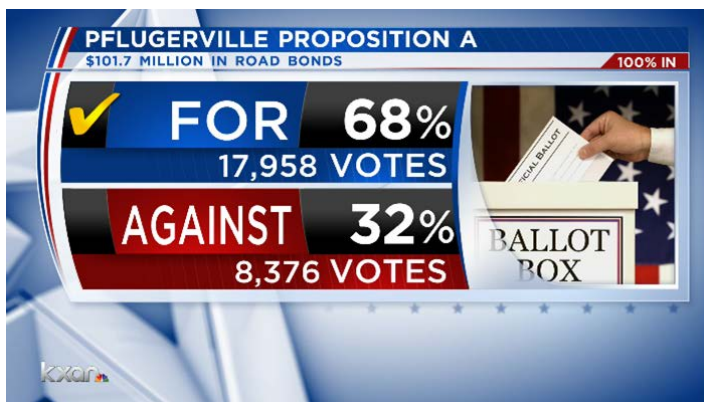


Figure E-2: 2020 Transportation Bond: Proposition A

c.) 2020 Transportation Bond

Following the adoption of the Transportation Master Plan, several projects were advanced forward as Proposition A to the citizens of Pflugerville in November 2020, which included the high-ranking FM 685 Corridor Study project. The bond passed with over two-thirds of the vote and included \$101.7 Million in road bond projects. The FM 685 project included funding for a Corridor Study, Schematic and Environmental Documentation, and Design, but was not funded for construction. In addition to the FM 685 Corridor Study, two short-term intersection projects were funded on the corridor at the intersections with SH 130 and Pflugerville Parkway.

d.) Engagement Summary

The Corridor study included a hybrid approach to engagement, including multiple opportunities for in person engagement at multiple Open Houses, pop-up events like at Deutschen Pfest and high school football games, and business stakeholder meetings and corridor walks. Online, a project website was posted for the duration of the project and promoted on social media with surveys and interactive map activities for the public to review and comment on the project. In total, over 400 people were engaged with cumulatively across all events for the duration of the project.

In addition to a robust public engagement plan, a Technical Committee, comprised of members from the City of Pflugerville, Texas Department of Transportation (TxDOT), Travis County, and the Capital Area Metropolitan Planning Organization met bi-monthly for the duration of the plan development. Technical Committee feedback and recommendations were a vital element of the plan development and are represented in the final preferred concept for the corridor.



Figure E-3: Deutschen Pfest Public Engagement

2. Existing Deficiencies

a.) Congestion Summary

The Existing Conditions analysis in the report identifies much of the corridor at capacity during multiple peaks of the day, with most intersections experiences a failing Level of Service (LOS) a measure of delay that exceeds acceptable conditions. This is suggestive of the need to build a 6-lane facility for additional throughput capacity on the corridor to accommodate not only future growth on the corridor, but also traffic that exists today.

b.) Safety Summary

The safety analysis shows crashes occur throughout the corridor, with concentrations at signalized intersections. While Pecan Street had the highest crash incidences from 2019-2021, over half of reported crashes occurred during the construction of the current Continuous Flow Intersection (CFI). A total of 469 crashes occurred on the corridor during the 3 year period, with nearly 1/3 of crashes resulting in either possible or actual injuries and 1 fatality. Most significantly, it was found that failure to control speed was the most common contributing factor to crashes, followed closely by left turn crashes, predominantly at existing traffic signals.

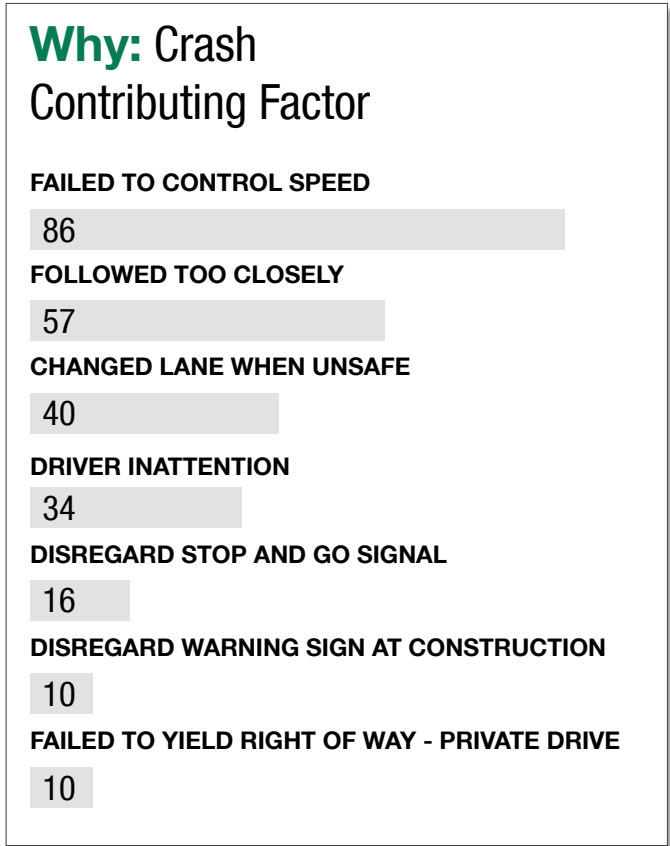


Figure E-4: Crash Summary by Contributing Factors

c.) Multimodal Connectivity

Sidewalk and pedestrian facilities were found to be severely limited and completely lacking in large stretches of the FM 685 / Dessau Rd Corridor. In addition, there are no bicycle facilities along the corridor, while there are several existing trail systems that cross the corridor, such as the Heritage Loop Trail in several locations. The Transportation Master Plan identified multiple high priority connections on this corridor. The provision of facilities to accommodate pedestrians and cyclists is of critical importance to provide access and alternative methods of travel to both existing businesses and proposed developments on the corridor.

3. Alternatives Analysis

a.) Alternatives Sourcing

Alternatives for improvements on the corridor were identified by reviewing past studies of the corridor and soliciting feedback via an in-person Open House in May 2022 that was well attended by the public. In addition, the project team and the Technical Committee sourced additional potential projects for the corridor for consideration in the alternatives analysis. A baseline assumption for the purposes of the analysis was that the Transportation Master Plan would be completed at build-out of the City. This would assume that both funded 2020 Transportation Bond Projects as well as unfunded new connections and expansions would be completed as Pflugerville finishes building out its land to the projections of the Aspire 2040 Comprehensive Plan.

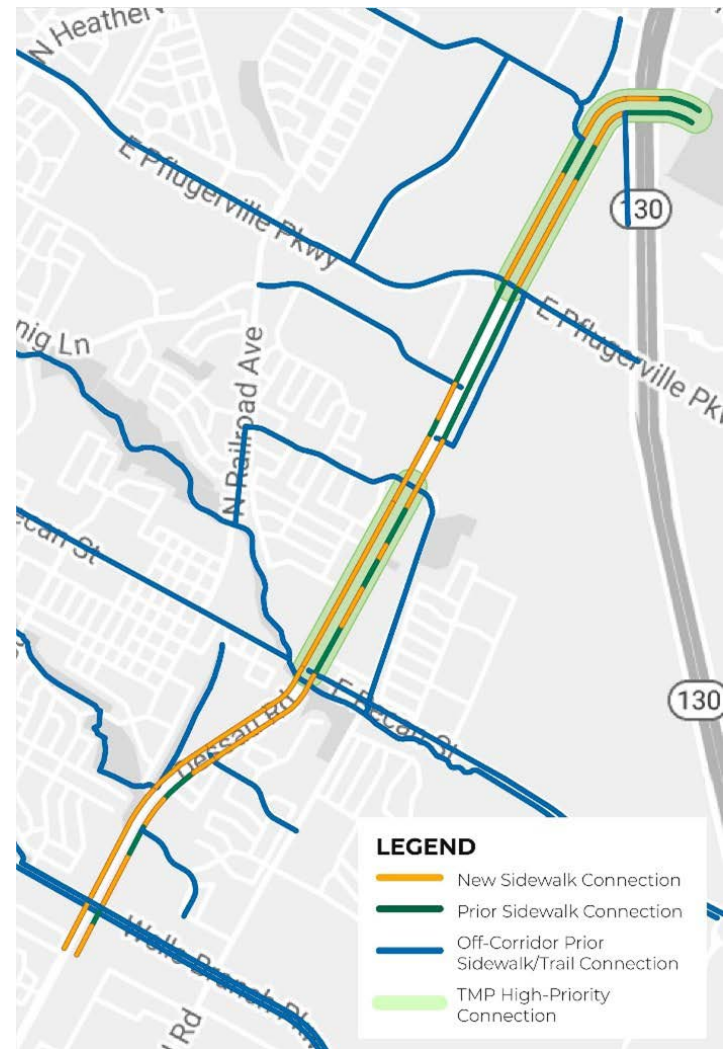


Figure E-5: Sidewalk Connectivity Needs

b.) Alternatives Filtering

Alternatives for improvements on the corridor were filtered through a multi-step process with the Technical Committee and based on analysis by the project team. The first step in this process was a feasibility analysis for improvements. For improvements deemed infeasible due to constraints, exorbitant costs, or lack of identifiable benefit, they would be eliminated from further evaluation. The second step was to develop a prioritization tool that would rank out the best potential alternatives through a high-level analysis and in consultation with City staff and the Technical Committee. This resulted in 2 primary alternatives for the corridor with some additional intersection locations requiring analysis of 3 alternatives in addition to a no-build scenario.

c.) Alternative Selection Process

Alternatives were evaluated against several categories as displayed in the image below. Many of these were compared against potential scoring criteria for the CAMPO call for projects, and were evaluated to be competitive for a variety of funding sources.



Ultimately, the project team, City staff, and the Technical Committee arrived at two primary concepts based on evaluations: a “urban boulevard” concept and a “superstreet concept”. The urban boulevard concept would be a slower speed street with narrower lane widths focused on access to adjacent properties and opportunities to create a safe environment for walking and biking. The superstreet concept prioritizes throughput at higher speeds for regional traffic, while still providing shared use paths on both sides of the street, but has a higher right-of-way footprint and requires significant right-of-way

Figure E-6: Prioritization Scoring Categories

at intersections to accommodate u-turns for users who would be prohibited from crossing or turning left at most intersections with FM 685. A significant finding was that the urban boulevard option has 25% less traffic volume in the build-out scenario due to vehicles using other routes, driven by the lower speed in this alternative. A summary of the main features of each alternative can be found in Figure E-7 below



Alternative 1: Superstreet	Alternative 2: Urban Boulevard
120 ft ROW	120 ft ROW
Higher Speed – 55 MPH	Lower Speed – 35 MPH
WB-67 Design Vehicle U-Turns Passenger Car Left Turns	WB-67 Design Vehicle All Turns
Minor Street Right Turn Only	Minor Street Full Access
1-side SUP	2-side SUP
	

Figure E-7: Primary Features of Alternatives

4. Preferred Concept

a.) Overall Corridor Features

The preferred concept includes a 6 lane section with tree planted medians and shared use paths on each side of the street as illustrated in Figure E-8.

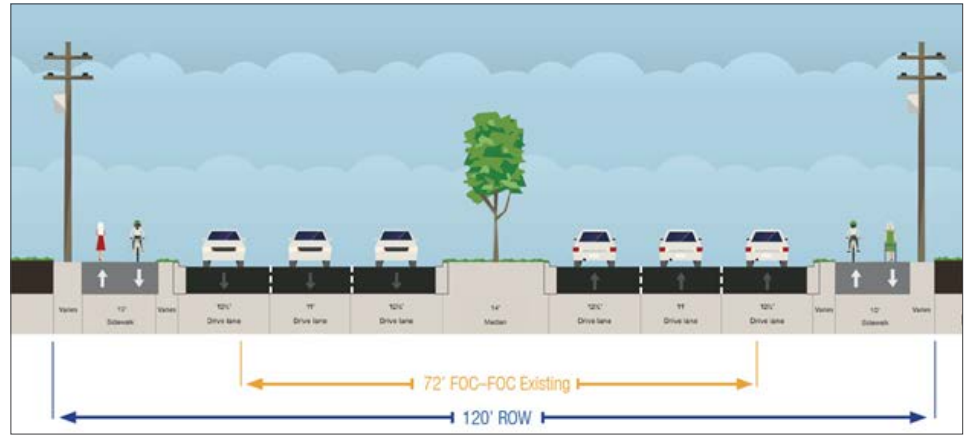


Figure E-8: Proposed Typical Section Preferred Concept

The concept also includes opportunities for placemaking on the corridor as identified in the horizontal conceptual layout in the Appendix as well as connections to off-corridor trail systems. The preferred concept operates at an acceptable Level of Service (LOS) in the build-out year based on the Corridor Study analysis for both the 6-lane section and at the intersections.

b.) Intersection Recommendations

Intersection recommendations were the result of detailed traffic analysis in Synchro, which accounted for known developments in the near term as well as long-term growth projections based on the future land uses in the Aspire 2040 Comprehensive Plan. A summary of the recommended intersection improvements for the final preferred concept can be seen in the Table E-1. It should be noted that some improvements are funded for the short-term via the 2020 Transportation Bond at SH 130 and Pflugerville Parkway as well as a traffic signal at Applewood Drive by TxDOT.

Intersection	Preferred Alternatives
FM 685 & SH 130 Interchange	<ul style="list-style-type: none"> • U-Turn bridges • Bridge widening with 2 added eastbound lanes • Reconfigured channelized dual right turn lanes with added crosswalk and traffic signal
FM 685 & Town Center Drive	<ul style="list-style-type: none"> • Additional turn lanes • Artistic crosswalk opportunity
FM 685 & (Future) Geraldine	<ul style="list-style-type: none"> • Signalize intersection
FM 685 & Pflugerville Parkway	<ul style="list-style-type: none"> • Full CFI (Continuous Flow Intersection) • Conversion of floodplain space into park
FM 685 & Pfennig Lane	<ul style="list-style-type: none"> • Additional dedicated right turn lane from Pfennig
FM 685 & Split Oak / Old Austin-Hutto Road	<ul style="list-style-type: none"> • Lane reassignment and signal timing improvements
FM 685 & Applewood Drive	<ul style="list-style-type: none"> • Signalize intersection

Table E-1: Preferred Intersection Alternatives

FM 685 & (Future) Main Street	<ul style="list-style-type: none"> • Signalize intersection • Gateway entrance treatment
FM 685 & FM 1825 / Pecan Street	<ul style="list-style-type: none"> • Pecan Street bridge over FM 685 • Gateway sign structure
Dessau Road & Oxford Drive	<ul style="list-style-type: none"> • Signalize intersection • Add west leg to connect Oxford Drive
Dessau Road & Olympic Drive	<ul style="list-style-type: none"> • Signalize intersection • Add west leg to connect Olympic Drive
Dessau Road & Wells Branch Parkway	<ul style="list-style-type: none"> • Additional turn lanes and extended turn lane storage

Table E-1: Preferred Intersection Alternatives

c.) Visualizations

A 2-Dimensional concept was developed for the corridor recommendations and can be found in the Appendix. In addition, a 3D model was developed which can be viewed at this link on the City’s YouTube channel which was displayed to the public at the December 2022 Open House. Some minor changes were made after development of the 3D model that are reflected accurately in the appendix of this report. A screen capture of the 3D visualization is shown in Figure E-9.



Figure E-9: 3D Rendering of E. Pflugerville Pkwy Continuous Flow Intersection

5. Implementation

a.) Planning Level Cost Estimate

The anticipated planning level construction cost, not including utility relocations or Right-of-Way acquisitions, is \$126.7 Million to build the entire preferred concept. It should be noted that a more refined cost will be developed in future phases of the project during the schematic phase. A rough breakdown of the total cost is summarized in the graphic Figure E-10.

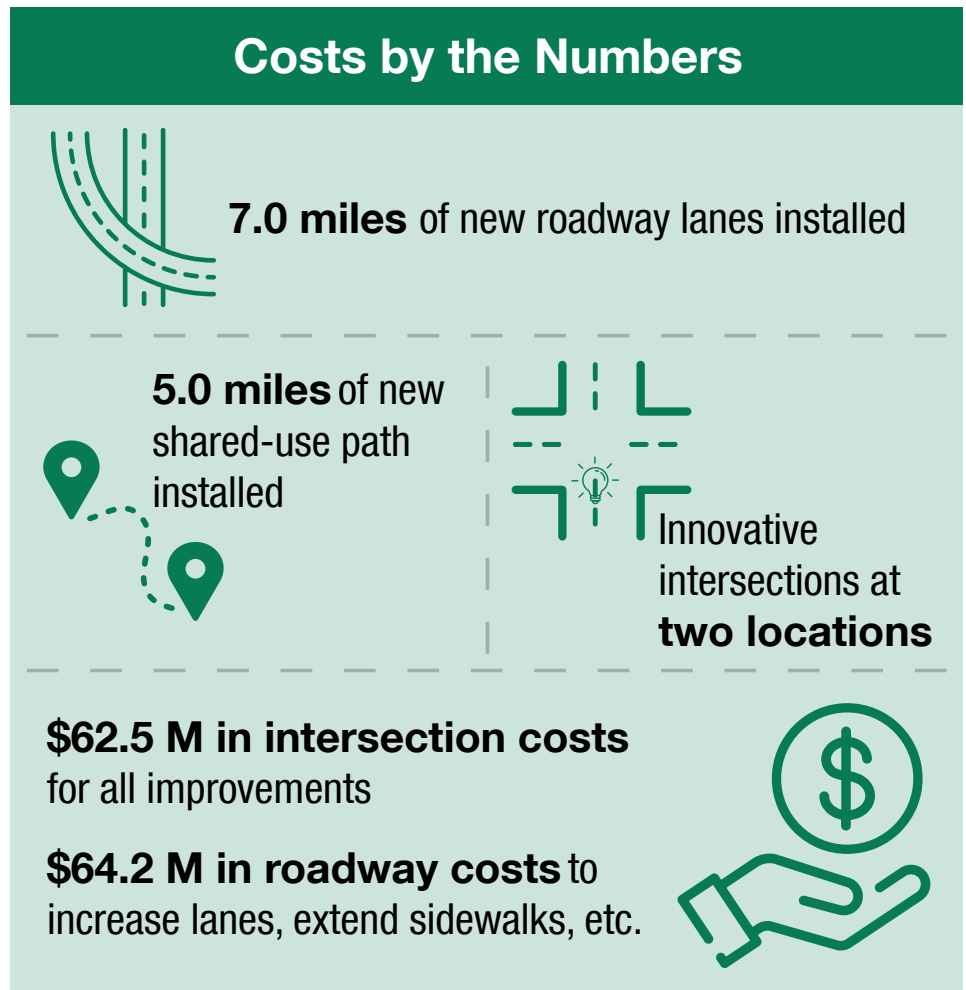


Figure E-10: Planning Level Cost Summary

b.) Future Project Phases

The FM 685 corridor project was funded through design (Plans, Specifications & Estimates) as part of the 2020 Transportation Bond, which will likely take several years to reach completion. Construction funding has not yet been identified and is anticipated to require outside funding sources to complete. The project may be approached in phases due to the scale of the project as further project development occurs. A summary of the future project phases, funding status, and approximate timeframe is summarized in Figure E-5.



Figure E-11: Future Project Phases Summary

Chapter 1: Introduction

A. 2020 Bond

In November 2020, a City of Pflugerville transportation and mobility bond worth over \$100 million was approved by voters. The FM 685 Corridor Study is one of several projects funded by this bond, which focuses on infrastructure improvements throughout the city. There are several other bond projects in the vicinity of the FM 685 corridor, such as intersection improvements along FM 685 at Copper Mine Drive Overpass and Pflugerville Parkway, Main Street extension, Immanuel Road widening, Pfluger Farm Lane extension, as well as improvements to Pecan Street and Pflugerville Parkway. A comprehensive list of all projects on the bond are listed later in the report in Figure 3-24.

B. Pflugerville Pforward Transportation Master Plan

In November 2019, the Pflugerville Pforward Transportation Master Plan (TMP) was adopted as the City of Pflugerville’s long-range plan identifying immediate and future infrastructure needs. As seen in Figure 1-1, the TMP listed several objectives used when identifying infrastructure needs in Pflugerville, which included safety enhancements, multimodal connectivity, congestion relief, the development of policy directives as well as a Capital Improvement Program. FM 685 was ranked as a high priority project in the TMP. It was recognized as an arterial of concern due to importance for multimodal connectivity, congestion relief, and safety concerns, which was confirmed via public feedback.

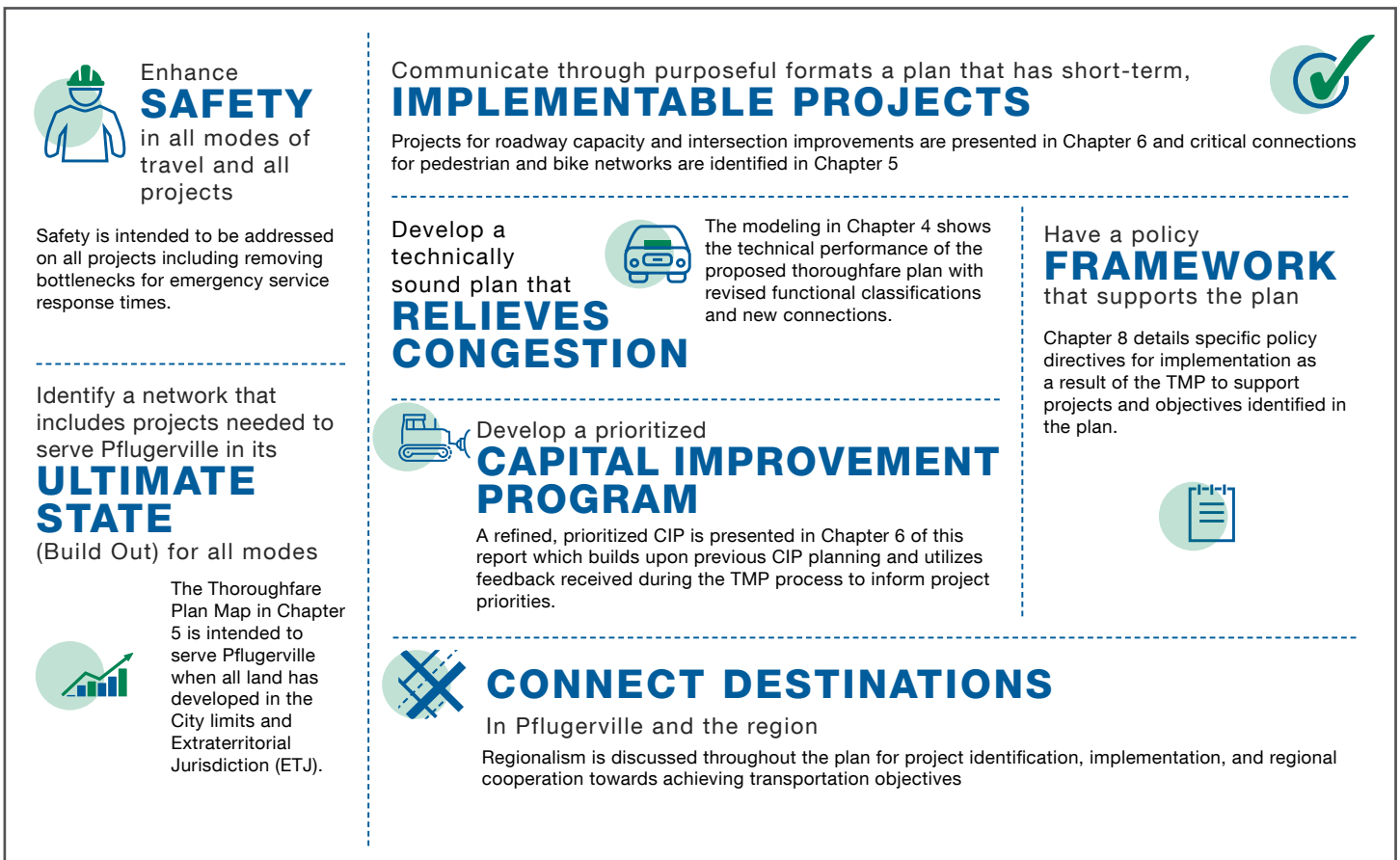


Figure 1-1: Pflugerville Transportation Master Plan Goals

The TMP’s overall recommendation for FM 685 was to reclassify the corridor as a 6-lane major arterial, which would include 10 foot shared-use paths on both sides of the roadway. See Figure 1-2 for a typical cross section recommended in the TMP.

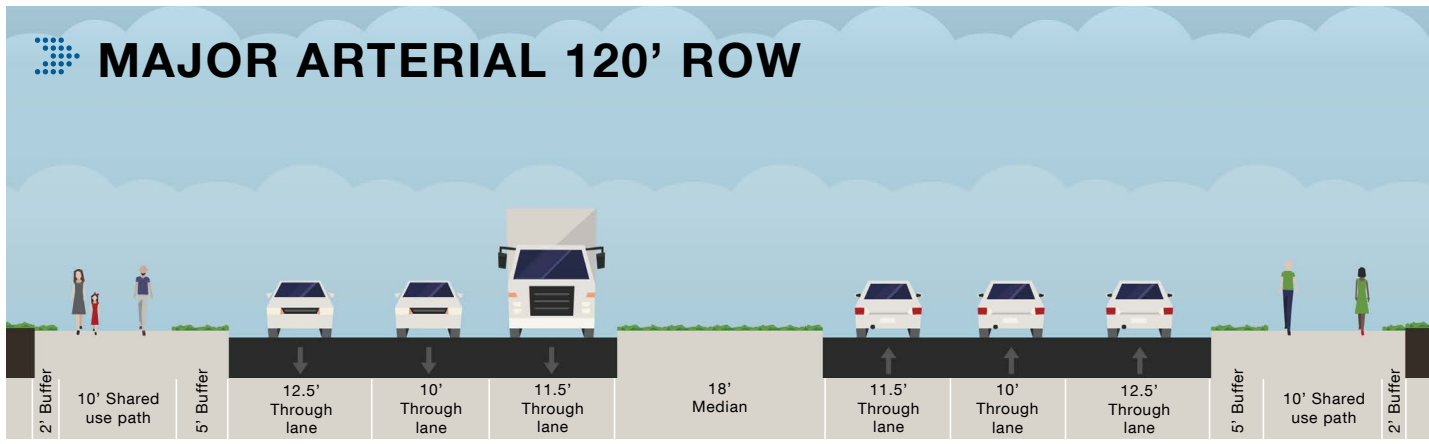


Figure 1-2: Major Arterial Cross Section

C. Purpose and Need Statement

The following was developed for preliminary National Environmental Protection Agency (NEPA) environmental scoping, which is intended to drive the TxDOT environmental scoping process as this project moves into schematic design and is supported by information found in Figure 1-3 and Figure 1-4 showing population growth and crash rates over time:

This project is needed because the capacity of the FM 685 roadway is inadequate to meet current and future traffic volumes stemming from population growth and increased traffic volumes, resulting in reduced mobility and increased safety concerns on this stretch of roadway. The project is also needed to provide safe access for pedestrians and bicycles throughout the corridor. The purpose of the proposed project is to improve mobility for vehicles, provide connectivity for bicycle and pedestrians along the corridor, and address safety concerns.

	2010	2021	% Increase
City of Pflugerville	46,936	65,191	38.9
Travis County	1,024,266	1,290,188	26.0

Figure 1-3: Local Growth Rates

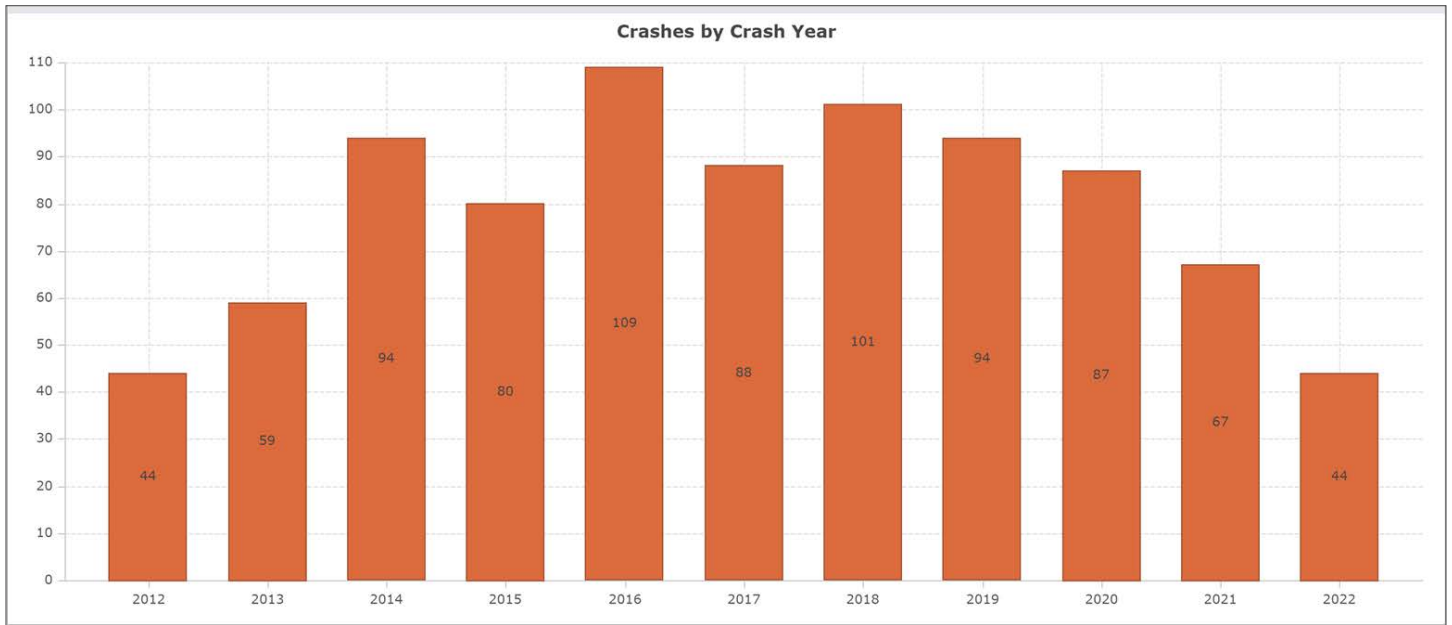


Figure 1-4: Crashes Along FM 685 by Year*

**It is to be noted that in Figure 1-4, the number of crashes for 2022 includes the available data through June 2022*

D. Technical Committee Membership

The Technical Committee consisted of representatives from partnering agencies and City staff. Representatives for the Committee were identified by City staff with support of the Project Team. The Committee served as ambassadors for the Corridor Study and supported the Project Team and City in soliciting community engagement, developing a corridor vision, and giving feedback on recommendations developed for the Corridor Study. The Project Team prepared for and facilitated five meetings with the Committee at critical milestones throughout the project. Following each meeting, the Project Team compiled feedback received in meeting minutes for documentation purposes and used the feedback received in refining the Corridor Study.

The Technical Committee included the following representatives:

- Emily Barron – City of Pflugerville
- Jeremy Frazzell – City of Pflugerville
- Michael Patroski – City of Pflugerville
- Charlie Watts – Travis County
- David Greear – Travis County
- Nick Samuel – Capital Area Metropolitan Planning Organization (CAMPO)
- Jason Cavness – Texas Department of Transportation (TxDOT)
- Brandon Hobbs – TxDOT

E. Stakeholder Groups

A robust Public Involvement Plan was developed to identify critical stakeholders on the corridor and was executed throughout the Corridor Study process. An overarching goal of the Public Involvement Plan is to be inclusive and equitable, reaching transportation users of all ages and abilities that travel in and through the FM 685 corridor. Stakeholders involved in this process include, but are not limited to the following:

- General Public
- Partnering Agencies (TxDOT, Travis County, CAMPO)
- Property Owners along the corridor
- Business owners and tenants along the corridor
- HOAs located along the corridor
- Pflugerville ISD
- Other stakeholder groups in Pflugerville

Chapter 2 details the Public Involvement Process and engagement received throughout the Corridor Study and the level of stakeholder input that was used in development and refinement of the final recommendations in this study.

Chapter 2: Public Involvement

A. Summary Stakeholder Outreach

Since May 2022, the FM 685 Corridor Study Team has engaged with the community through events and activities, both as specific targeted events like Open Houses and Stakeholder Meetings as well as pop-up events at events occurring in the City or near the FM 685 / Dessau Corridor. A timeline of events is shown in Figure 2-1 below:

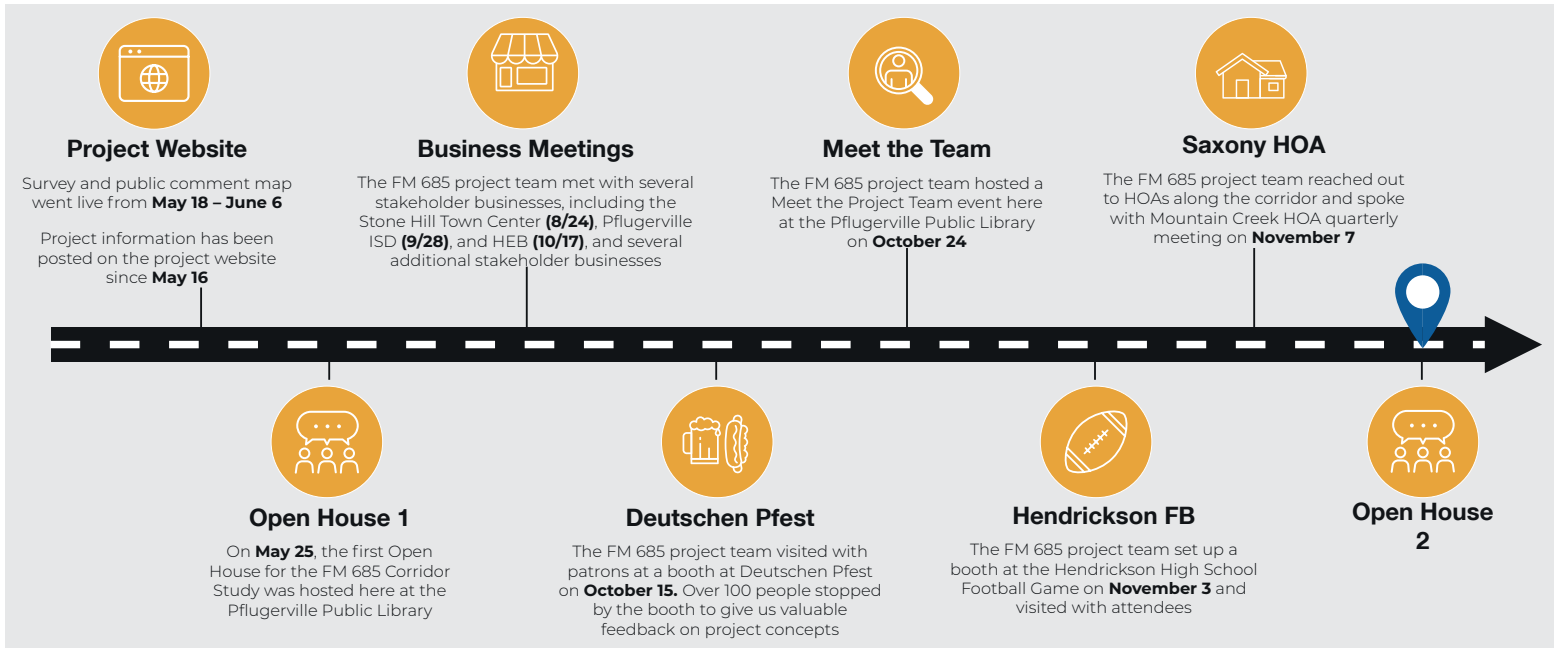


Figure: 2-1: Corridor Study Engagement Events

In addition to Open Houses, various stakeholder meetings were held with Stone Hill Town Center, Pflugerville ISD, Typhoon Texas, and HEB to gather input from affected businesses and landowners on and around the corridor. In the meetings, stakeholders were shown alternatives for the corridor and asked to give their input on transportation related issues and needs in the area.

Deutschen Pfest, a Hendrickson High School Football game, and a Saxony HOA meeting were attended by members of the project team to present proposed alternatives, gather more feedback, and raise awareness of the project.

B. Summary of Public Meetings

The first public meeting for the project occurred May 25th, 2022 at the Pflugerville Public Library. The goal of the event was to gather input from the public about what improvements should be included in the FM 685 Corridor Study, existing needs or concerns along the corridor, and education on existing conditions related to congestion, safety, and other background projects in the 2020 Bond. The public meeting presented the study area through five different segments along the corridor (as shown in Chapter 3 of this report) and asked for feedback from the public regarding how they currently use FM 685, where they typically go, and what the Corridor Study should address. Several interactive activities were offered, including opportunities to answer surveys and leave comments. Detailed results Appendix H includes a full report on the meeting to show how the meeting was advertised and all materials presented as part of the study.

The December 1st Open House was hosted at the Pflugerville Public Library and was the final public meeting for the project in 2022. This event was similar to the first public meeting and held with the intention of allowing the public to see the final recommended concept for the corridor, including 3D renderings and rollplots. Informational boards were posted with results from the alternatives analysis and modeling. Attendees were also given the opportunity to interact with the project team, fill out surveys, and leave feedback on the alternatives.



Figure 2-2: Public Meeting Draft Boards Activity



Figure 2-3: Public Meeting Markup a Map Activity

1. Public Meeting #1 Results

Leading up to the first public meeting, postcards raising awareness of the meeting and project website were sent to residents of neighborhoods adjacent to FM 685. Advertisements for the meeting were included in the Key to the City newsletters throughout May and sent to 7,500 subscribers. Overall, 15 posts were made in English and Spanish to Twitter, Instagram, and Facebook, which included the meeting date and project website.

By the Numbers



38

Attendees



88

Surveys
filled out online



104

Total
Survey Respondents



113

Total
Map Comments

a.) Survey Results

The following charts illustrate a subset of the responses received on the FM 685 / Dessau Corridor Study mobility survey. The intent of the survey was to determine travel preferences, destinations, and needs along the corridor from frequent users of the corridor. A full documentation of survey responses can be found in Appendix H.

The survey respondents answered questions regarding their travel behavior and habits as summarized in the charts below. Over 90% of respondents answered that they choose to drive or carpool in a personal vehicle when traveling on or across FM 685. A majority of respondents described the corridor as a part of their commute, with most crossing or travelling along it multiple times a day.

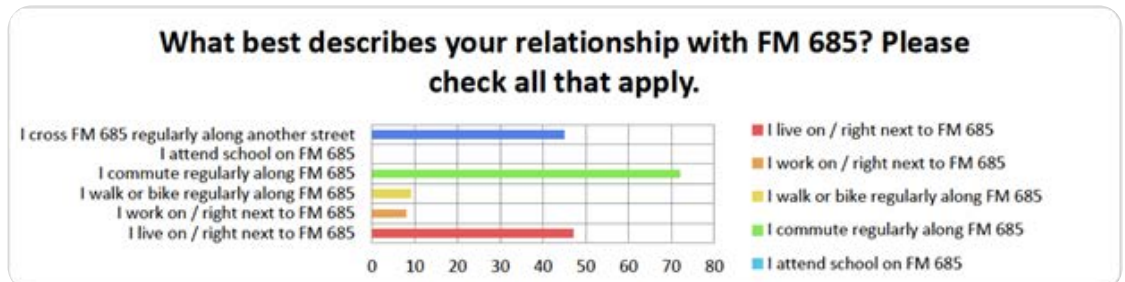


Figure 2-4: Respondent Relationship with FM 685



Figure 2-5: Respondents FM 685 Trips Per Day

The common destinations along FM 685 are shown in the figure below, with most respondents frequenting the Stone Hill Town Center, grocery stores (such as HEB and Walmart), and various dining locations.

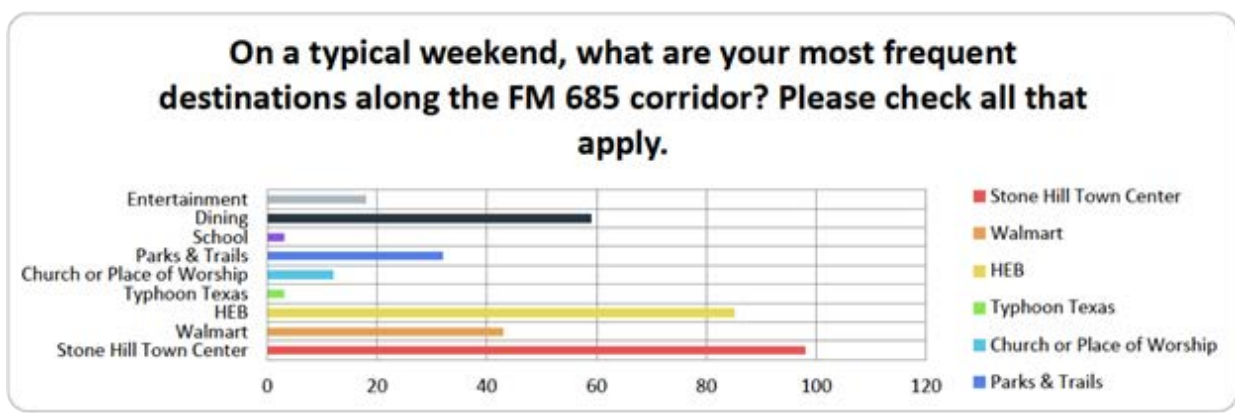


Figure 2-6: Respondents Frequent Destinations on FM 685

Respondents were asked why they prefer travelling in their personal vehicles as opposed to walking or biking. Most respondents answered that they do not feel safe enough to travel along FM 685 outside of a vehicle. This can also be attributed to the lack of pedestrian and bicycle access along the corridor, which was another popular answer. The distance to their preferred location was the second most common answer.

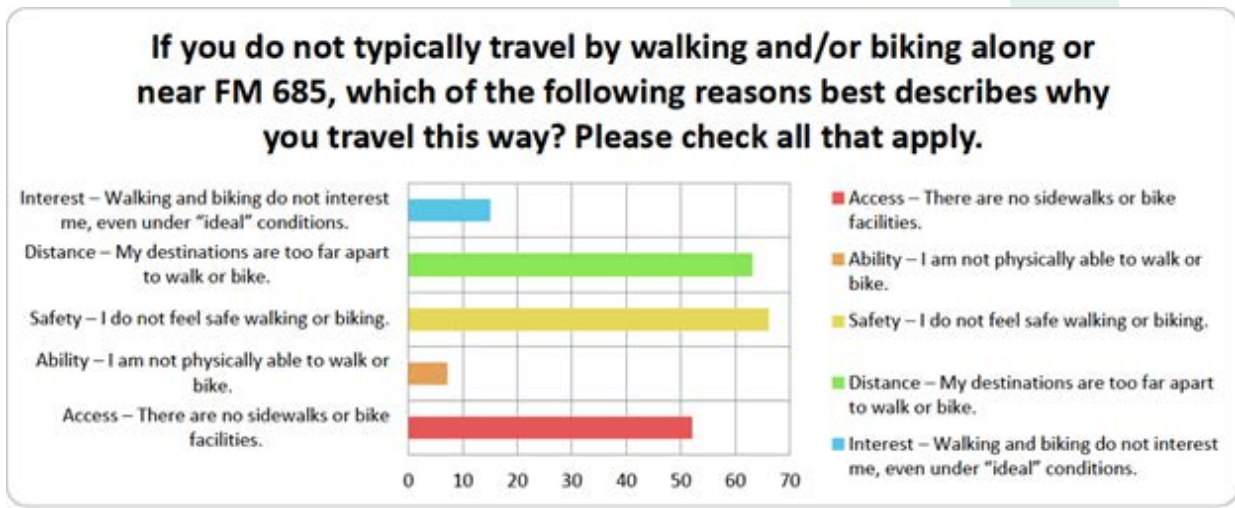


Figure 2-7: Respondents Reasons for Driving Instead of Walking or Biking

Survey respondents were asked to rank their priorities for improving the corridor with congestion relief being the highest ranked priority by a clear margin. The safety and welfare of users was the second most prioritized answer.



Figure 2-8: Respondents Priorities for FM 686 (Average Rank Position)

b.) “Markup a Map” Activity

During the “Markup a Map” activity, the public was encouraged to place sticky notes with descriptions of problems and issues they have with FM 685 today and their suggestions for how they should be addressed as seen in Figure III 9. Background development projects and funded background transportation projects were included along with a high resolution aerial of the corridor for comment, which was mirrored in the online activities.



Figure 2-9: “Markup a Map” Activity for 1st Public Meeting

Including the online map comments, the most frequent suggestions can be seen below:

- Add U-turn bridges for SH 130 interchange
- Add dedicated southbound right turn into Town Center Dr from FM 685
- Improve signal timings at Pflugerville Pkwy
- Improve intersection configuration and timings at Split Oak / Old Austin – Hutto Rd
- Install sound walls at neighborhoods
- Install signal at Applewood Drive intersection
- Improve Pecan Street intersection
- Improve trail and sidewalk connectivity
- Add additional turn lanes at Wells Branch Pkwy intersection or improve signal timings

2. Public Meeting #2 Results

In the weeks leading up to the second public meeting, advertisements for the meeting were included in the Key to the City newsletters, the Pflugerville Pflag newspaper, and the Community Impact website throughout November. Overall, 10 posts were made to Twitter, Instagram, Facebook, and NextDoor, which included the meeting date and project website.

By the Numbers



48

Attendees



12

Comment Cards



99

Total Map Comments and Stickers

The recommended preferred concept and results were presented at the December 1st Open House to allow the public the opportunity to interact with the project team and leave feedback on the preferred concept. **A feature of the Public Meeting was a 3D rendering of the corridor, which received positive response and was significant in helping the public visualize the proposed improvements.** There were a recorded 48 attendees at the meeting that left 12 comment cards and 13 comments on the preferred concept maps with an additional 13 “thumbs up” or “thumbs down” stickers placed on the map. Scans of the preferred concept maps with comments can be found in Appendix H. Some of the generally popular and unpopular comments are listed below:



Watch the 3D video of the preferred Concept for the FM 685 / Dessau Corridor

Positive	Concerns
New Pedestrian/Trail Elements	Neighborhood connections (Oxford & Olympic)
Reduced Speed Limits	New facilities coming before existing street/sidewalk maintenance
Pecan Street Overpass	Main Street connection
	Not enough grade separated pedestrian crossings (under/overpasses)

There were also boards for people to place reaction stickers (thumbs up, thumbs down) regarding aesthetics, alternatives, and to record their place of work and residence. Full documentation of Open House #2 materials and summary can be found in Appendix H.

a.) Online Engagement

The preferred concept map was posted online to the project website for the community to provide extended additional feedback. After project closing, there were a total of 73 comments, which comprised of 16 positive comments, 39 constructive feedback comments, and 18 general comments. A summary of the positive and constructive feedback are listed below:

- Positive feedback:
 - Additional turn lanes
 - Additional thru lanes
 - New signals
 - Pedestrian/trail elements
- Constructive feedback:
 - New neighborhood connections – worried about cut through traffic
 - Short-term configurations – frustrated that they are not planned to last
 - Pecan Street Continuous Flow Intersection (CFI)
 - Pflugerville Parkway Superstreet
 - Not enough capacity (right turn lanes and thru lanes at SH 130 interchange)
 - Unsure about purpose of Main Street Connection

C. Summary of Online Activities / Website

The public was provided the opportunity to give feedback in person at the public meetings while also encouraged to give virtual feedback through online activities on the project's website. The online website contains all project related documents along with concept maps, a 3D rendering video, the project timeline, and opportunities to leave feedback.

The surveys provided included questions regarding the following:

- Age and occupational status
- What describes your relationship with FM 685?
- How many trips do you make along or across FM 685 per weekday?
- What destinations do you frequent?
- Why do you prefer not to walk or bike the corridor?
- What are your priorities along the corridor?

Results from the surveys and comments on the preferred concept maps are included in the previous section. Figure III-4 illustrates the comments received on the online version of the preferred concept.



Figure 2-10: Online Conceptual Layout Activity

D. Technical Committee

The feedback from each Open House, online engagement, and stakeholder meetings was presented to the Technical Committee at various meetings throughout the process to discuss where changes could be made to address citizens' concerns. The technical committee provided valuable technical expertise and regional perspectives in development of the Corridor Study as a coordinated effort for regional mobility solutions. A total of 5 meetings were held between April and December 2022 with representation from the City of Pflugerville, Travis County, TxDOT and CAMPO present at each meeting.

Chapter 3: Corridor Characteristics

A. Existing Land Use and Character Zone Assessment

This section evaluates the existing context in terms of land use and character along the project area limits. For the purposes of this evaluation, the 3.7-mile long section of the corridor is divided into five distinct character zones:

- Zone 1: FM 685 and SH 130 Interchange (SH 130)
- Zone 2: FM 685 from SH 130 SBFR to Pflugerville Parkway (Town Center)
- Zone 3: FM 685 from Pflugerville Parkway to Justice Center Drive (Pfennig)
- Zone 4: FM 685 from Justice Center Drive to Pecan Street / FM 1825 (Applewood)
- Zone 5: Dessau Road from Pecan Street to Pflugerville’s city limits (Dessau)

These character zones can be seen on a map in Figure 3-1. It should be noted that TxDOT has jurisdiction over Zones 1-4 (FM 685), whereas the City of Pflugerville has ownership of the right-of-way for Zone 5 (Dessau Road).

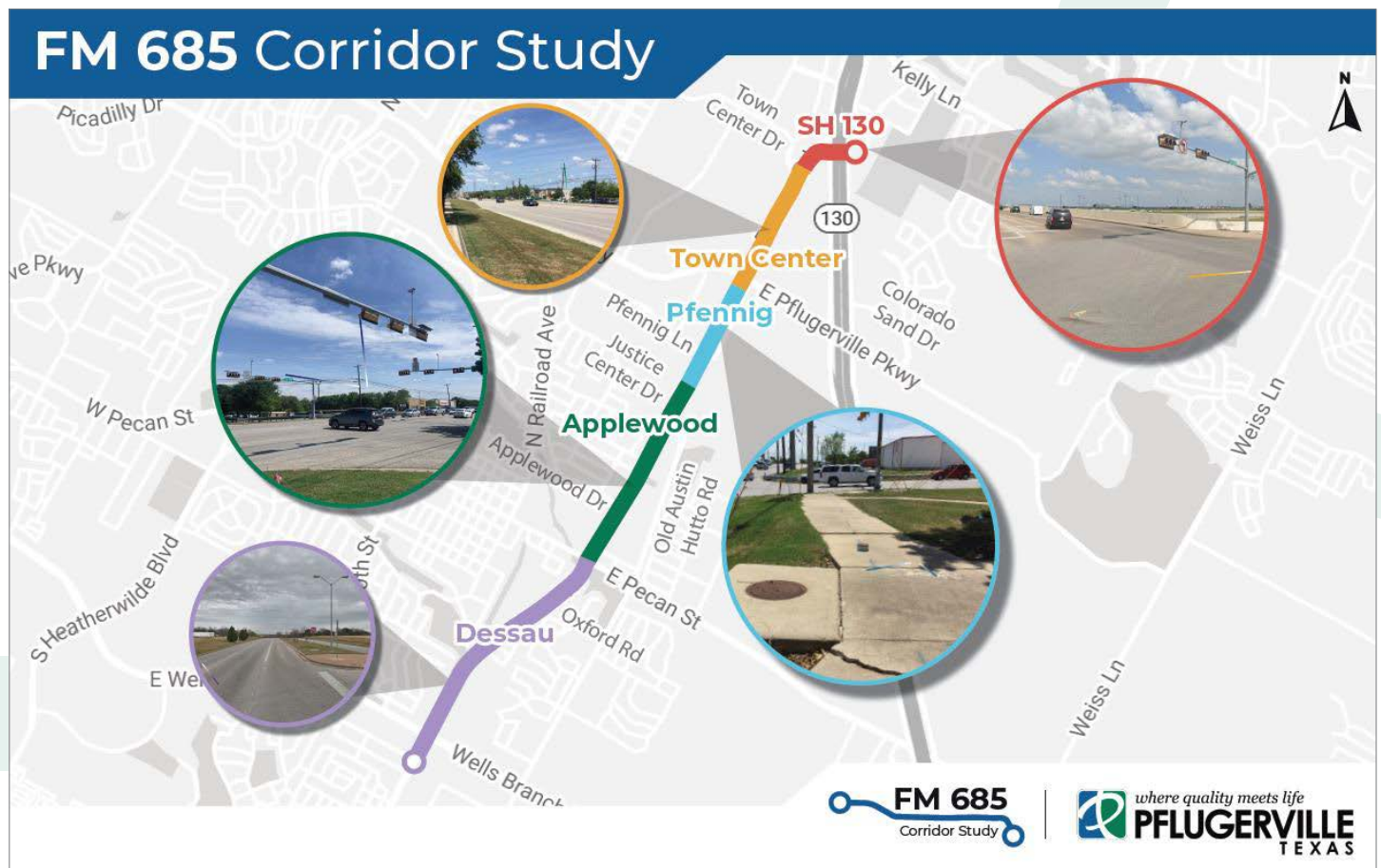


Figure 3-1: Character Zone Map

Zone 1 – FM 685 and SH 130 Interchange (SH 130)



Figure 3-2: Pedestrian Path from Hendrickson High School to Stone Hill Town Center

This section of the corridor is approximately ¼ mile in length and extends from the west leg of the interchange to the Colorado Sand Drive intersection. It serves as the corridor’s primary access point onto SH 130 and is generally owned by TxDOT. This interchange requires special consideration for improvements due to SH 130’s designation as a toll road. North of this interchange, the frontage roads of SH 130 are designated as FM 685 for several miles north before shifting east of SH 130 in Hutto and becoming Chris Kelley Boulevard. This section and the surrounding developments were constructed from the early to late 2000s. The interchange is generally undeveloped in the lots adjacent to its corners; however, Hendrickson High School exists just to the east with Stone Hill Town Center to the west. This results in a significant number of pedestrians crossing the interchange, which has substandard pedestrian facilities crossing the bridge with virtually no separation from vehicles. This is mainly due to the lack of sidewalks on the north side of the bridge and west of the interchange along FM 685. Pedestrians will typically disregard the lack of crosswalks on the west side of the interchange and cross to reach the north/west side of FM 685. Pedestrians then must cross the two channelized right turn lanes that currently run free with no traffic control devices, which makes this a particularly dangerous spot to cross. Although this section of the corridor may favor automobiles, it is not particularly auto friendly as the interchange tends to act as a bottleneck and is the source of lengthy queues and long delays. The existing 65-foot width of the bridge limits the options for short-term mitigations for the large setbacks that exist at the interchange.

2020 Bond Intersections II Project examined short term solutions along this portion of the corridor coincident with the writing of this report

Zone 2 – FM 685 from SH 130 SBFR to Pflugerville Parkway (Town Center)



Figure 3-3: Stone Hill Town Center | Source: NewQuest Properties



Figure 3-4: Bridge Crossing Wilbarger Creek

This $\frac{3}{4}$ mile long section of the corridor is mostly undeveloped with the exception of the Typhoon Texas Waterpark and Stone Hill Town Center commercial developments surrounding the Town Center Drive intersection. The Stone Hill Town Center is a heavy commercial zone which mostly consists of restaurants on the east side of the development directly adjacent to FM 685, with major retail stores and hotels on the west side of the development. This development took place between the late 2000s to late 2010s. Some of the major retail includes Target, Best Buy, Dick's Sporting Goods, Home Depot, etc., which attract thousands of consumers daily. South of Typhoon Texas Waterpark to Pflugerville Parkway, FM 685 remains completely undeveloped on both the east and west sides. Although this section is currently undeveloped, the planned NorthPointe development on the east side

of FM 685 just south of Typhoon Texas may begin development in the coming years, but is currently unplatted adjacent to FM 685. The potential for the extension of Terrell Lane can be expected to expand development of Stone Hill Town Center to the south. However, development on the west side of FM 685 in this section may be a challenge due to the substantial extents of the floodplain. Despite the floodplain, this section of the corridor is relatively flat.

The only sidewalks that exist in this section are along the developed areas of FM 685 south of the Town Center Drive intersection. The undeveloped areas north and south of Typhoon Texas Waterpark do not have sidewalks or bike facilities with the exception of both sides of the bridge over Wilbarger Creek just north of the Pflugerville Parkway intersection. This sidewalk is separated from traffic by guardrails and includes metal railing on the outside edges. There are no designated bike lanes or bike paths in this section of the corridor. This section of the corridor heavily favors automobiles with a full median throughout (except at signals) and long storage lanes.

Zone 3 – FM 685 from Pflugerville Parkway to Justice Center Drive (Pfennig)

This zone of FM 685 is slightly longer than ½ mile, one of the shorter character zones, and is almost completely commercially developed on both sides with Wal-Mart claiming the most real estate and consumers. Other businesses along this section include gas stations, auto care, fast food, banks, and more. Most of the development occurred between the late 2000s and late 2010s, with the exception of the southwest corner of the Pfennig intersection. There is a significant cross slope in this section of the corridor with many of the developments along the west side of FM 685 requiring retaining walls. It also happens to be



Figure 3-5: Pflugerville Crossing Strip Mall

the most pedestrian friendly section of FM 685 with sidewalks along both sides in front of every business except for Gaston & Sheehan Auctioneers & Realty. Although there may be sidewalks on both sides of this zone, some sections of sidewalk require repair in order to become ADA compliant. The right-of-way in this area is the most constrained with development built-out on both sides and thus is the most challenging to widen to a 6-lane section, especially at intersections where additional right-of-way may be required for turn lane improvements. However, the 6 lane section as shown in the 2019 TMP requires 120 feet of right-of-way, consistent with the current available space. Grades in this section may require additional retaining walls to fit a widened 6 lane section, however, increasing overall project costs. Similar to zone 2, this section is very automobile oriented with a full median throughout except at the signalized intersection with Pfennig Lane, which can be expected to be more frequently used and developed after it is extended to Pecan Street. With the exception of some trees that appear to be on the adjacent developed properties, minimal landscaping is present and completely lacking in the median. There are also long storage lanes for turns at intersections throughout this zone. Part of the floodplain from zone 2 also crosses through the northeastern most part of zone 3 where Walgreens is located.



Figure 3-6: Cracked Sidewalk and Raised Water Valve

Zone 4 – FM 685 from Justice Center Drive to Pecan Street / FM 1825 (Applewood)

This character zone of FM 685 is just short of 1 mile in length and generally includes a mix of single-family residential on the west and older commercial/industrial developments on the east. Most of the development in this section began in the 1980s and the east side has slowly continued to develop over the decades since. The Saxony neighborhood is located to the west of FM 685 with some small pockets of commercial developments between. Bohls Place is a single-family residential neighborhood on the east side of Old Austin-Hutto Drive where the older commercial developments along FM685 act as a buffer. The north and south ends of this section are relatively undeveloped; however, there are planned developments at these locations. The vacant 29-acre property on the northwest corner of the Pecan Street intersection across from H-E-B is the site of the future Pflugerville Downtown East development. This site is within a floodplain and is the only part of this zone of the corridor that is within a floodplain. Directly north of Split Oak Drive / Old Austin-Hutto Road is also relatively vacant with the exception of the older Pflugerville Office Park. The recent addition of the roundabout on Old Austin-Hutto Road has created a northeast leg with potential for extension, as depicted in the Transportation Master Plan. This section remains automobile centric with long storage lanes for left turns and a full median throughout except at the signalized Split Oak Drive / Old Austin-Hutto Road intersection, as well as the Applewood Drive intersection. The full median ends where the future Downtown East lot begins, allowing left turns from the commercial developments along the east side of FM 685.

Despite the lack of continuous sidewalks on both sides of FM 685, this zone includes the Heritage Loop Trail along Old-Austin Hutto Road. The trail is separated from FM 685 traffic with an underpass just north of Split Oak Drive / Old Austin Hutto Road and connects the Saxony and Bohls Place neighborhoods.



Figure 3-7: Old Austin-Hutto Road Roundabout



Figure 3-8: Heritage Loop Trail

Zone 5 – Dessau Road from Pecan Street to Pflugerville City Limits (Dessau)



Figure 3-10: Olympic Drive Extension and Brio Apartments

This zone consists of approximately 1.3 miles of the corridor, making it the longest section of the corridor and is mostly undeveloped directly adjacent to the roadway. It is also the newest section of the corridor as it was not constructed until the late 1990s with the surrounding neighborhoods developing in the 1990s and 2000s. Not much was developed during the 2010s besides the CVS and Walgreens at the Wells Branch Parkway intersection. This section of the corridor ends its designation as FM 685 and becomes known as Dessau Road where TxDOT ownership ends and City of Pflugerville maintenance begins. Just a few hundred feet off the corridor adjacent to the vacant lots are single-family residential communities. However, the west side lacks access to the corridor as Oxford Drive and Olympic Drive dead end before connecting at Dessau Road. Existing developments directly adjacent to the roadway include: a senior living complex called Cambridge Villas on the east side of Dessau Road directly south of Oxford Drive, a small strip center just south of the Pecan Street intersection, along with the CVS and Walgreens on the south corners of the Wells Branch Parkway intersection.



Figure 3-9: Wuthruch Hill Farm

Some new developments are currently being constructed along the corridor such as, a multi-family complex just southeast of the Olympic Drive intersection, and a smaller single-family neighborhood called Old Town East being developed off Carson Lane across Dessau Road from the existing strip center. The auto-centric design continues through this zone with a wide full median including continuous street lighting starting just south of Pecan Street that extends south to the end of the project limits. This is also the only section of the corridor with landscaping present with several rows of trees planted in the median intermittently. The median is also wider in this zone, with the possibility of widening to a 6-lane section into the median. There are median cuts with left turn storage lanes at the Carson Lane, Oxford Drive, Olympic Drive, and Wells Branch Parkway intersections.

Similar to zone 4, this section of the corridor lacks sidewalks on both sides except directly in front of developed lots along Dessau Road. In spite of this, it is one of the more densely populated areas for parks, trails, and green space, albeit with poor connectivity. These include Wuthrich Park (Settlers Valley Trail), Pflugerville Park (Pfairways Trail), and Bohls Park (Bohls Loop & Heritage Loop Trail). Just like in zone 4, Heritage Loop Trail passes under the roadway, just south of the Pecan Street intersection. This trail and Bohls Park are located in a floodplain. Another floodplain can be found towards the south end of this section.

B. Roadway Characteristics

FM 685 / Dessau Road south of SH 130 remains relatively consistent in the sense that it is typically a 4-lane divided arterial. However, there are some slight deviations from this typical section. Illustrative existing cross sections for each character zone can be found in Appendix D of this report along with location of where the cross sections were derived from.

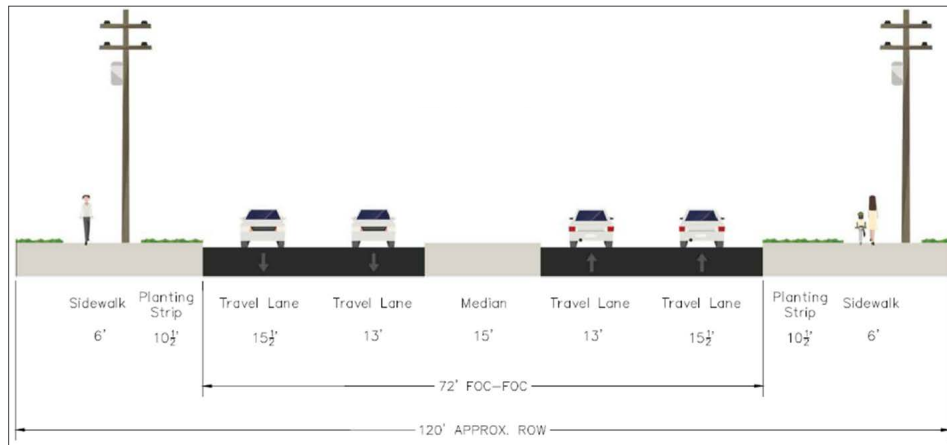


Figure 3-11: Pfennig Character Zone Cross Section

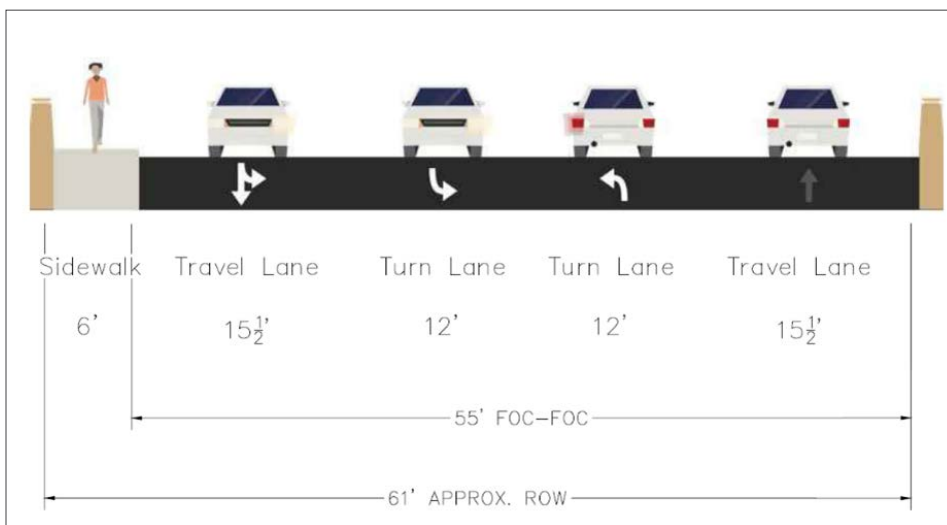


Figure 3-12: SH 130 Character Zone Cross Section

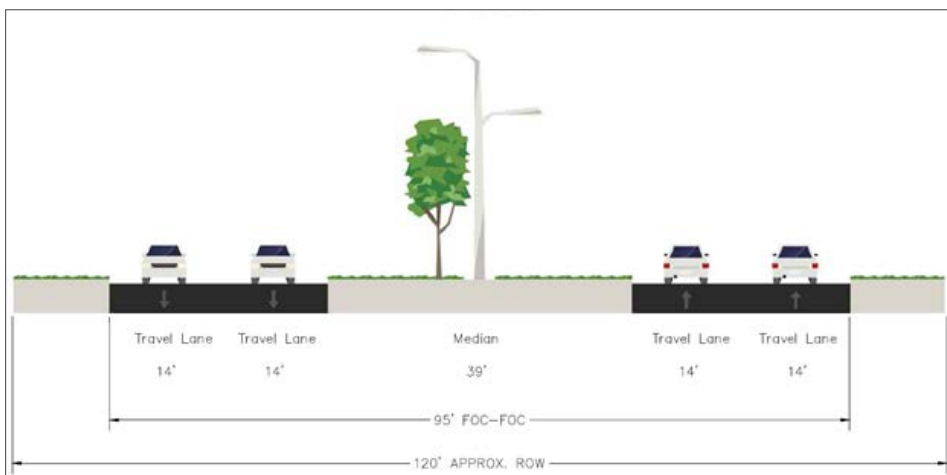


Figure 3-13: Dessau Character Zone Cross Section

For the most part, in the portion of FM 685 from Town Center Drive to Pecan Street, the typical roadway section is a 72' roadway (curb to curb) with 1.5' curb and gutters striped for four travel lanes, including a 15' median. The approximate lane widths differ with the outside lanes being 14' while the inside lanes are 12', both measured from the center of the lane line to the lip of the gutter pan. Connected sidewalks only exist on both sides of the street in the Pfennig section, as seen in Figure 3-11. Median breaks exist only at the signalized intersections with the exception of Applewood Drive. Left turn lanes are provided at these intersections and median breaks. The short section of FM 685 north of Town Center Drive through the SH 130 interchange varies drastically in lane width, approach lane configuration, and cross section. This is mostly due to the 61' width of the overpass bridge at the interchange, which constrains alternative possibilities, as seen in Figure 3-12. Disregarding the bridge cross section, the curb to width varies between 55' and 92' from Colorado Sand Drive to Town Center Drive.

From Pecan Street to the Pflugerville city limits just south of Wells Branch Parkway, the typical roadway section is a 95' roadway with curb and gutter striped for four 13' thru lanes and a 39' median, which lighting and landscaping, as seen in Figure 3-13. Median breaks exist at Carson Lane, Oxford Drive, and Olympic Drive, as well as the signalized Wells Branch Parkway intersection, each with left turn storage lanes.

C. Existing Bicycle and Pedestrian Infrastructure

1. Pedestrian Accommodations

Pedestrian facilities are scarce along FM 685 / Dessau Road and typically only appear along the frontage of developed lots. The section with the best sidewalk connectivity is between Pflugerville Parkway and Justice Center Drive. However, nearly every intersecting roadway with a signalized intersection at FM 685 / Dessau Road has consistent sidewalk connectivity on at least one side of the street. Where sidewalks do exist along the corridor, they typically range between 6' to 10' in width and are predominantly 6' with only the section in front of Cambridge Villas measuring at 5'. Several locations along the corridor do not provide ADA-compliant facilities due to non-compliant cross-slopes, running slopes for pedestrian curb ramps, or inadequate accommodations at signalized intersections.



Figure 3-14: Cracked Uneven Sidewalks along FM 685



Figure 3-15: Cyclist riding Heritage Loop Trail

2. Bicycle Facilities

There are no explicitly marked bicycle facilities on FM 685 / Dessau Road that were observed in the field. There are several bicycle friendly trails in the vicinity of the corridor including Settlers Valley Trail, Pfairways Trail, Bohls Loop, and Heritage Loop Trail. The only cyclists were observed during the afternoon weekday field visit in April on the Heritage Loop Trail along Split Oak Drive / Old Austin-Hutto Road as shown in **Figure 3-15**.

D. Existing Utilities and Floodplains

The City of Pflugerville Public Works Department addresses customer needs when water and wastewater service is being requested and conducts Subdivision, Site Plan, and Zoning reviews regarding water and wastewater service. Included in Pflugerville's Capital Improvement Program are Wastewater and Water Line Rehabilitation projects that examine and review each utility line to provide a condition assessment to determine the need for repairs with provided cost estimates. Pflugerville's Drainage Master Plan was completed in summer of 2022 and the report is being finalized. These programs and master plans identify projects for completion in the vicinity of the project, whereas this section of the report focuses primarily on existing facilities.

The utility information in the following sections were obtained from the City of Pflugerville's GIS Open Data Portal along with Subsurface Utility Engineering (SUE) surveyed utility data. Based on the obtained information, the FM 685 corridor has a high level of utility congestion with multiple potential underground and overhead utility conflicts. Parallel overhead electric transmission lines present the largest obstacle to obtaining additional right-of-way, especially for the high-power transmission lines along the corridor, which are costly and time intensive to relocate. With the proximity of businesses and structures to the right-of-way in some sections, it may be difficult to find sufficient space in which to relocate utilities. Other potential conflicts include the underground fiber optic cable lines throughout the corridor with major crossings at intersections and parallel overhead electric lines with multiple telecommunication underbuilds. A summary of the utilities underground in each section is shown in the table below. Overhead utilities are generally Oncor and various telecom providers.

Section	Max No. of Utilities at a Single Location	Utility Types (Overhead and Underground)
SH 130	13	Electric, Telecom (multiple providers), Water, Wasterwater, Storm Drainage, Gas
Town Center	13	
Pfennig	11	
Applewood	9	
Dessau	8	

Table 1: Utility Presence by Section

Some of the more expensive and tedious utility adjustments and relocations along the corridor include the overhead electric transmission lines, multiple water and wastewater crossings, as well as several telecom and traffic controller cabinets. There are some major obstructions that will likely cause additional time and budget for relocations including concrete ditches, gas stations, bridges, and creeks.

1. Wastewater Infrastructure

Historically, the corridor was built with wastewater infrastructure generally in a south to north direction, resulting in newer wastewater mains towards the northern end of the FM 685 / Dessau corridor. Along the south section of the corridor, portions of the wastewater system are slightly older and GIS records do not indicate age. However, it can be assumed the wastewater lines along the corridor are no more than 30 years old based on the history of the corridor’s construction timeframe and surrounding developments.

Between the Split Oak Drive / Old Austin-Hutto Road & Pecan Street / FM 1825 intersections there are no existing wastewater mains within the corridor right-of-way.

There are a total of 12 wastewater crossings along the corridor. 4

of those crossings are underneath the bridges over Gilleland Creek and Wilbarger Creek, on both sides of each creek.

Nearly every wastewater line within the corridor vicinity is PVC besides a relatively new gravity sewer line extending from the lift station just northwest of the Pflugerville Parkway intersection. This line, which is made of FRP (fiberglass reinforced polymer), crosses under the bridge over Wilbarger Creek and extends towards SH 130.



Figure 3-16: Wastewater Lift Station Along FM 685

2. Water Infrastructure

Historically, the corridor was built with water infrastructure generally from the center of the corridor to the endpoints of the study area, resulting in newer water mains towards the northern and southern ends of the FM 685 / Dessau corridor. All water mains north of Pfennig Lane have installation dates after the year 2000 where records are provided. From Pfennig Lane to Oxford Drive, water mains were installed in the 1980s and 1990s excluding a few newer distribution lines. South of Oxford Drive to the edge of the Pflugerville city limits, the distribution lines were installed post-2005. Pipe materials used along the corridor are almost exclusively PVC and DI (ductile iron) with the exception of one AC (asbestos cement) distribution line that crosses the corridor under the Gilleland Creek bridge.

South of Pecan Street, water mains along the corridor right-of-way are sparse. There are currently 8 water main crossings along the length of the corridor.

Water main sizes range from 8 to 30 inches throughout the corridor. There is only one 30" transmission main throughout the corridor and it runs along the north side of Pflugerville Parkway and crosses FM 685. The next largest water main is 18" and runs along the west side of FM 685 north of Pflugerville Parkway. Transmission lines do not exist along the corridor south of Pfennig Lane where only 8 and 12 inch distribution mains are located.

3. Storm Sewer and Drainage

Three separate floodplains cross FM 685 / Dessau Road from SH 130 to the city limits south of Wells Branch Parkway. Coincidentally, each floodplain crosses the corridor at intersections with the other three minor arterials that intersect the roadway: Pflugerville Parkway, Pecan Street / FM 1825, and Wells Branch Parkway. All three floodplains flow to the south and east where they eventually meet the Colorado River. These floodplains correspond with Wilbarger Creek, Gilleland Creek, and a Gilleland Creek tributary to the south. A map showing the floodplain extents and where they cross the corridor can be seen in Figure 3-17.

Analysis of the existing storm sewer system is primarily based on the GIS dataset collected from the City of Pflugerville Open Data Portal. No installation dates are available in the record keeping system, but it can be assumed the drainage facilities are of similar age or older than the water and wastewater facilities along the corridor, coincident with roadway construction. Observations along the corridor indicate that denser development utilizes storm drains while undeveloped land near floodplains typically utilize surface drainage structures. Where street reconstruction is planned, consideration should be given to drainage conveyance analysis at creek crossings, especially at Gilleland Creek, as its resulting floodplain includes several parks throughout the city and the Pecan Street intersection.

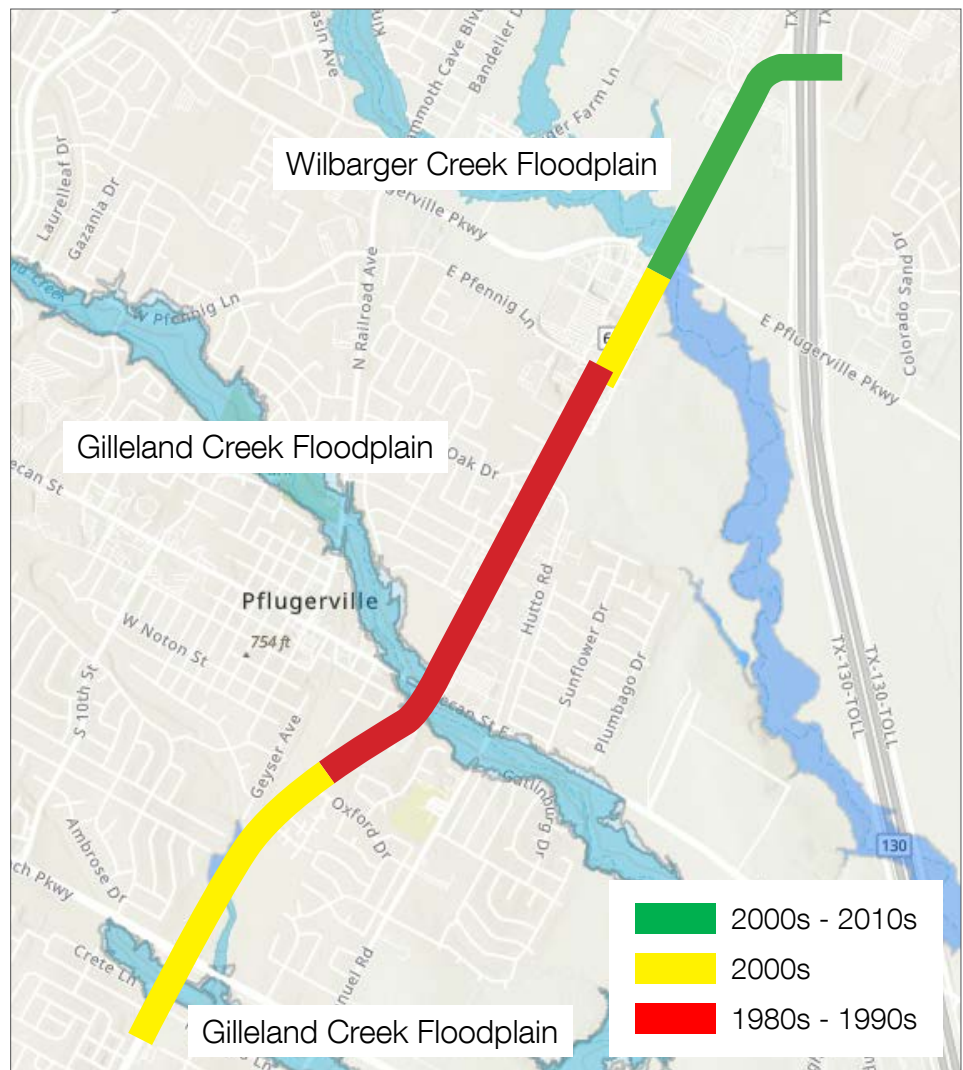


Figure 3-17: Floodplains Crossing Corridor

In 2018, the National Weather Service finalized a historical rainfall study in Texas called Atlas 14. This study determined that the Central Texas area has experienced heavier rainfall than in the past, which also means the risk for severe flooding is higher. Previous floodplain maps showed where flooding was likely to occur with roughly 10 inches of rainfall in a 24-hour period, which was equivalent to a 100-year storm. The updated floodplain maps will show a 100-year storm over a 24-hour period will produce upwards of 13 inches of rain in some areas. Improvements to existing drainage infrastructure may be necessary to accommodate this anticipated increase.



Figure 3-18: Drainage Culverts Prepared for Installation Along FM 685

E. Existing Traffic Conditions

Traffic counts were taken on the FM 685 / Dessau Road corridor between Tuesday, April 5, 2022 and Friday, April 8, 2022. Traffic counts taken were separated by mode including automobiles, heavy vehicles, bicycles and pedestrians at 7 signalized intersections along the corridor and 2 unsignalized intersections. A summary of existing traffic volumes by mode at intersections can be found in Appendix B of this technical memorandum. Intersection turning movement counts were taken on Wednesday, April 6, 2022 at the following locations:

- FM 685 at Copper Mine Drive Overpass (northbound and southbound)
- FM 685 at Town Center Drive
- FM 685 at Pflugerville Parkway
- FM 685 at Pfennig Lane
- FM 685 at Old Austin-Hutto Road / Split Oak Drive
- FM 685 at Pecan Street / FM 1825
- Dessau Road at Oxford Drive (unsignalized)
- Dessau Road at Olympic Drive (unsignalized)
- Dessau Road at Wells Branch Parkway

24-hour pneumatic tube counts at the following six (6) locations along the corridor were taken to approximate Average Daily Traffic (ADT) on the corridor for three consecutive weekdays between Tuesday, April 5, 2022 and Friday, April 8, 2022:

- FM 685 North of Town Center Drive
- FM 685 North of Pflugerville Parkway
- FM 685 North of Old-Austin Hutto Road / Split Oak Drive
- FM 685 North of Pecan Street / FM 1825
- FM 685 South of Pecan Street / FM 1825 (across bridge)
- FM 685 North of Wells Branch Parkway

Additionally, 13-hour (6AM-7PM) pedestrian and bike counts were taken for two consecutive days between Tuesday, April 5, 2022 and Wednesday, April 6, 2022 at the following locations:

- Heritage Loop Trail North of Split Oak Drive
- Heritage Loop Trail East of FM 685 (south of Pecan)
- Settlers Valley Trail West of Wuthrich Park

The ADT on the corridor varies between 26,000-34,000 and generally corresponds with the capacity for motorized vehicle travel in the segment of the corridor in which counts were taken. The ADT remains around the lower end of this range except around the commercial development between Pflugerville Parkway and Old Austin Hutto Road / Split Oak Drive, where it increases to the upper end of the range. Figure IV 19 on the following page shows the variation in daily traffic along the corridor shown in terms of Level of Service A-F for AM, Midday, and PM peak periods based on the capacities in the 2019 Transportation Master Plan. The daily level of service is roughly at capacity for the corridor, likely constrained by signalized intersection throughput.

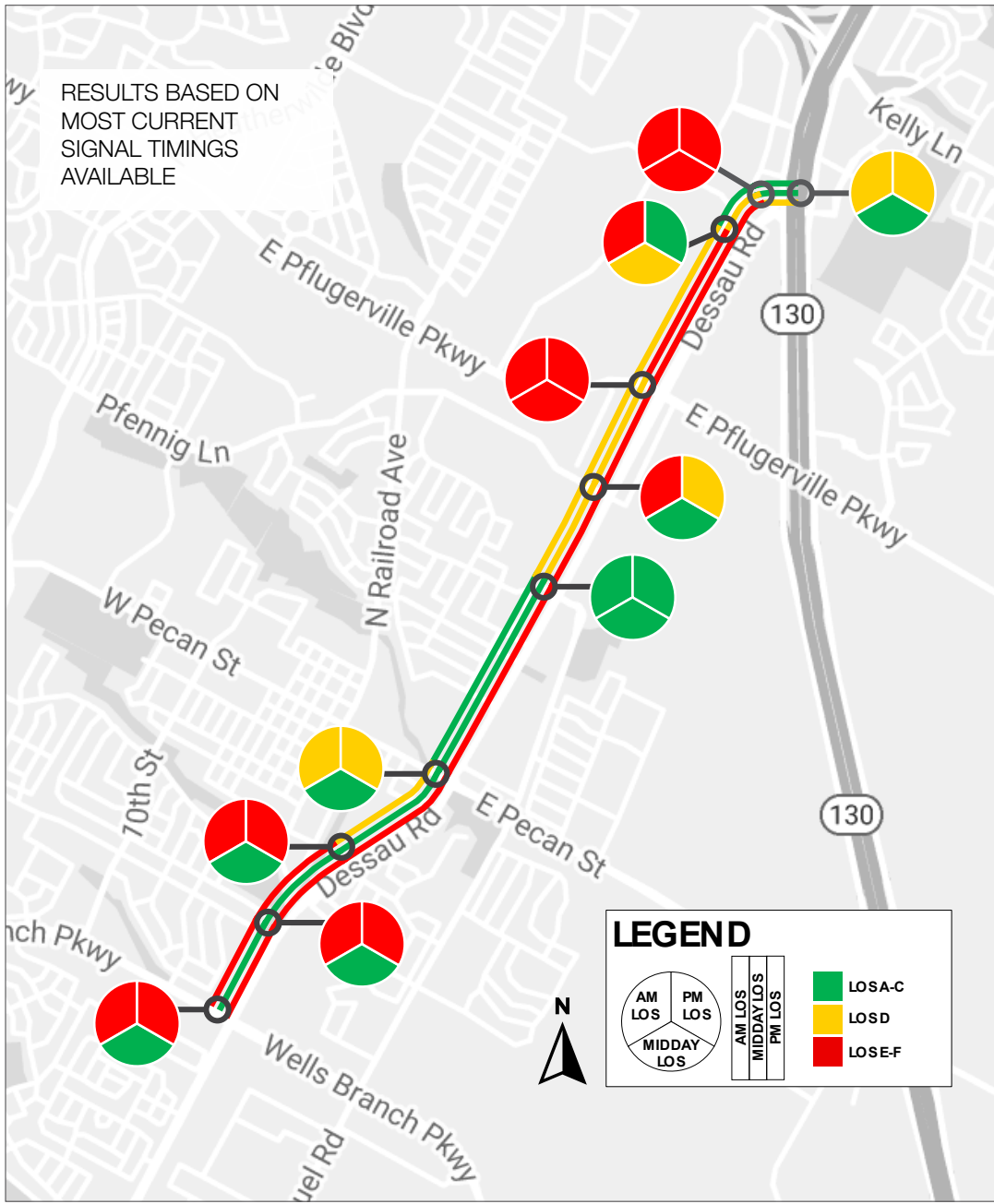


Table 2 on the following page breaks down the Level of Service (LOS) at intersections along the corridor based on modeling analyses. **Table 3** lists the Level of Service of the various segments along FM 685 / Dessau Road. The segment LOS are based on the volume to capacity ratio of the segments, with the capacity of a 4-lane divided roadway being 33,600 according to the Pflugerville Pforward Transportation Master Plan.

Figure 3-19: Current LOS Map

Table 2: Existing Intersection LOS Along Corridor

Intersection	Level of Service		
	AM Peak	Mid-day Peak	PM Peak
FM 685 & SH 130 NBR	D	C	D
FM 685 & SH 130 SBR	F	F	F
FM 685 & Town Center Drive	E	D	C
FM 685 & Pflugerville Parkway	F	F	F
FM 685 & Pfennig Lane	E	C	D
FM 685 & Split Oak Drive / Old Austin-Hutto Road	C	C	B
FM 685 & FM 1825 / Pecan Street	D	A	D
Dessau Road & Oxford Drive	F	C	F
Dessau Road & Olympic Drive	F	C	F
Dessau Road & Wells Branch Parkway	F	C	F

Table 3: Existing Segment LOS Along Corridor

Segment	ADT	V/C	LOS
FM 685 just North of Town Center Drive	27,543	0.82	E/F
FM 685 just North of Pflugerville Parkway	33,781	1.01	E/F
FM 685 just North of Split Oak Drive	32,020	0.95	E/F
FM 685 just North of Pecan Street	26,533	0.79	D
Dessau Road just South of Pecan Street	26,597	0.79	D
Dessau Road just North of Wells Branch Parkway	27,458	0.82	E/F

F. Crash History & Observations

Data collected from TxDOT’s Crash Data Analysis and Statistics (CRIS) database shows that 469 crashes occurred on FM 685 / Dessau Road or within 200’ of intersections along the corridor from 2019 through 2021. The majority of these crashes occurred at the following high-volume intersections:

- SH 130 Interchange – 22 Crashes
- Pflugerville Parkway – 46 Crashes
- Pfennig Lane – 31 Crashes
- Pecan Street – 48 Crashes*

*An active construction project occurred on this corridor in 2021, which saw nearly half of the three-year total’s crashes occur, resulting in an inflated overall crash count. For the 6 months following construction compared to 6 months prior to construction, a decrease in crashes was observed over the same period.

Figure 3-20 illustrates the concentration of crashes along the corridor. It was observed that the highest number of crashes was due to failure to control speed, indicative of speeding challenges on the corridor in the existing conditions. Additional details on crash severity, type, and contributing factors are included in Figures 3-21 through 3-23

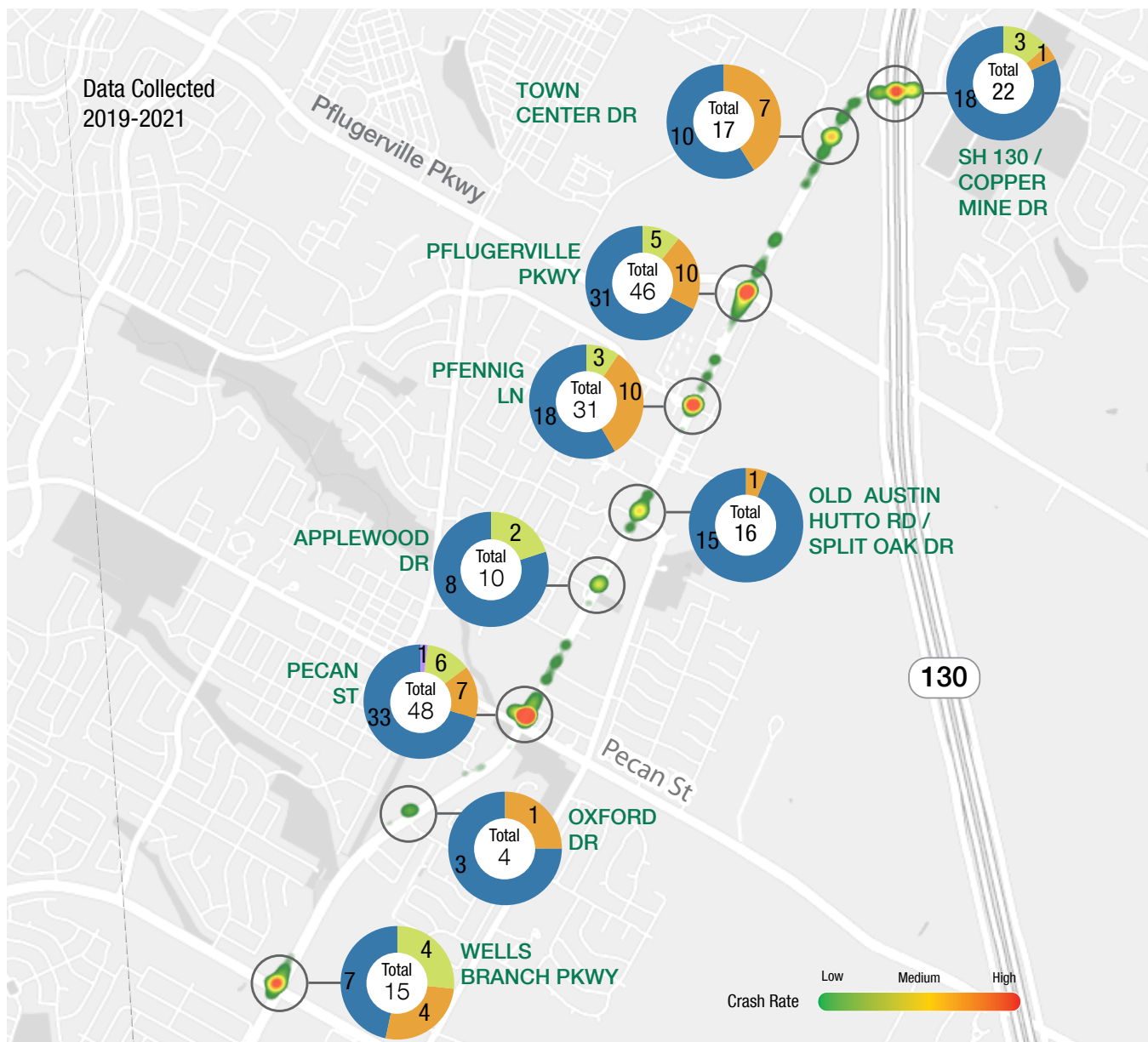


Figure 3-20: Crash Data Graphic

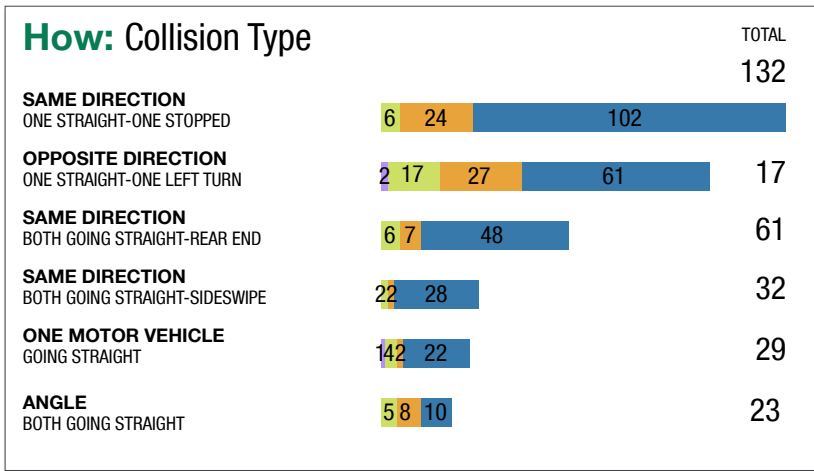


Figure 3-21: Crash Data How

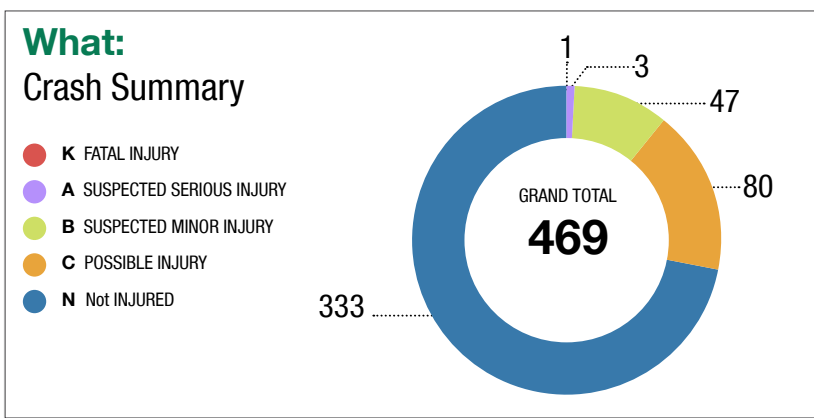


Figure 3-22: Crash Data What

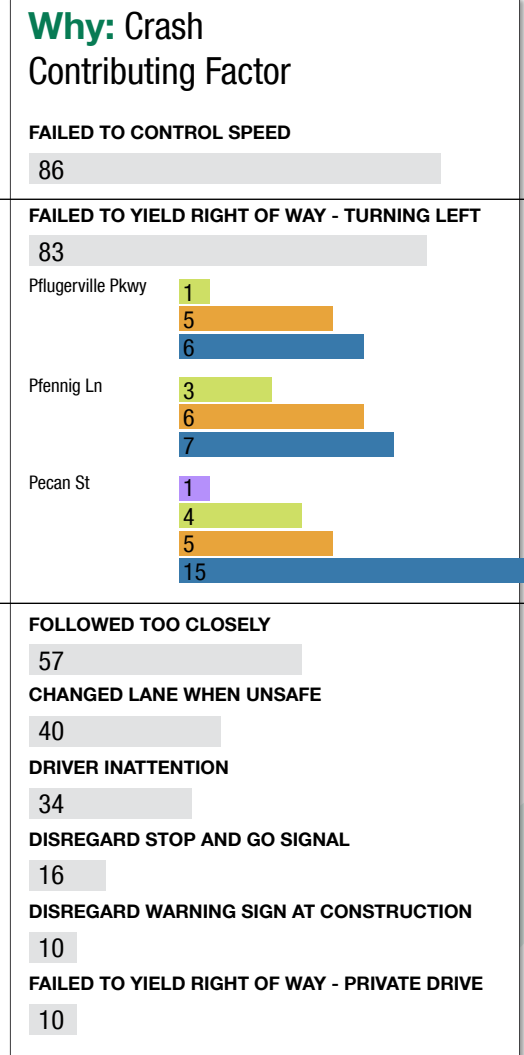


Figure 3-23: Crash Data Why

G. Current and Planned Projects in Project Area

1. Public Improvement Projects

a.) Pflugerville 2020 Transportation Bond Projects

In November 2020, Pflugerville voters approved over \$100 million in bonds for transportation and mobility projects throughout the city. The FM 685 Corridor Study is one of several projects funded by this bond, including several others in the vicinity such as, intersection improvements along FM 685, Main Street extension, Pecan Street and Pflugerville Parkway improvements, and many others listed below:

- Cameron Rd Realignment
- E Pecan St Improvements (approved for design only)
- Immanuel Rd Improvements
- Kelly Ln Phase 3
- Main St (approved for design only)
- City Intersection Improvements - SH 130 at CR 138; E Pflugerville Pkwy. at FM 685; Heatherwilde Blvd. at Pecan St.; FM 685 at Pecan St.; FM 685/Copper Mine Dr. Overpass; Hodde/Weiss at Cele Rd
- City Neighborhood Street Reconstruction - 10th St., Algred St., Applewood Dr., Bushmills Rd., Butler National Dr./Diablo Dr., Caldwell's Ln., Cedar Ridge Dr., Dalshank Rd., Edgemere Dr., Grand National Ave., Great Basin Ave., Kay Ln., Lincoln Ave., Mashburn St., Meadow Creek Dr., Mountain View Dr., Oak Ridge Dr., Option Ave., Picadilly Dr., Pflugerville Ln., Plumbago Dr., Rowe Ln., Russell St., Sullivan St., Taylor Ave., W. Custers Creek Bend, Windermere Dr., Yellow Sage St.
- FM 685 Corridor Improvements
- Central Commerce Dr Improvements
- E Pflugerville Pkwy Improvements
- Pfluger Farm Ln North Improvements
- SH 45 Frontage Roads Improvements
- Picadilly Dr Improvements

Also worth mentioning is the Colorado Sand Drive Extension/Connection project, which was a 2018 Bond Project. This project provided construction of a 4-lane divided section between Copper Mine Drive and Lone Star Ranch Boulevard. Improvements include roadway, curb and gutter, sidewalk, storm sewer, street lights, water lines, and wastewater lines. This project will fill the gap in Colorado Sand and will provide additional connectivity between Kelly Lane and Pflugerville Parkway.

A map of some of the major Bond Projects can be seen on the following page in Figure 3-24.

*Approximately 1/4 of
Projects on the Pflugerville
2020 Transportation Bond
List are within 1/2 Mile of
the Corridor*

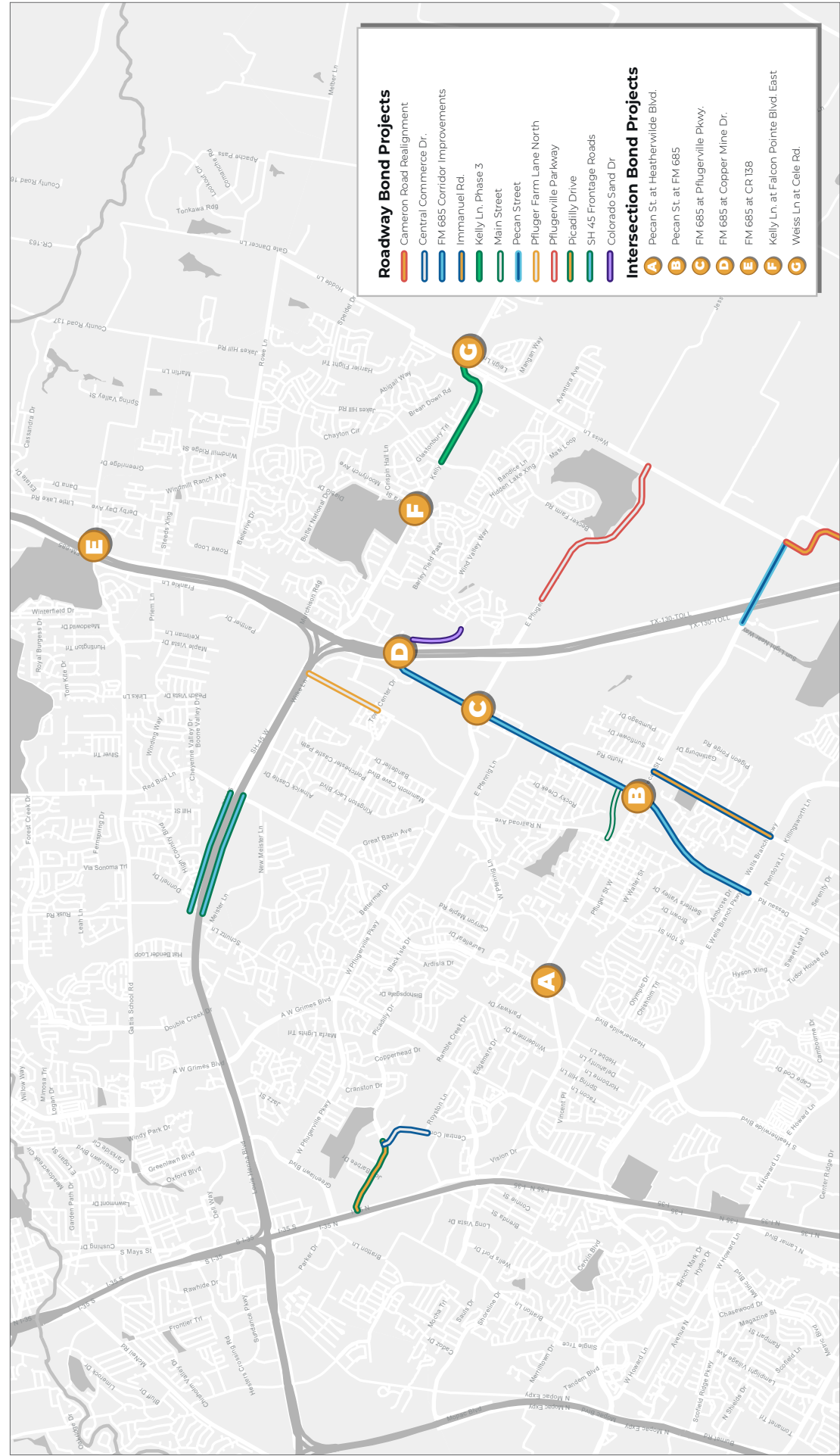


Figure 3-24: Pflugerville Bond Transportation Projects Map

2. Prior Planning Efforts on the Corridor

a.) Transportation Master Plan

The Pflugerville Transportation Master Plan adopted in November 2019 is a long-range plan identifying transportation needs, such as safety enhancements, multimodal connectivity, and congestion relief, that the City of Pflugerville should consider as one of the fastest growing cities in the country. The FM 685 corridor is repeatedly identified throughout the TMP as an arterial of concern requiring various improvements to accommodate anticipated traffic. The most significant project recommendation for FM 685 was the reclassification of the highway as a 6-lane major arterial with 10 foot shared-use paths on each side.

b.) Aspire 2040

The Pflugerville Aspire 2040 Comprehensive Plan adopted in April 2022 engaged the public to determine the aspirations and goals of the community, which will be used for public policy initiatives regarding economic development, transportation, land use, and more. Some of the transportation and mobility goals outlined in the plan include: focus on sidewalk connectivity, enhance major corridors, expand the transit system, invest in the efforts of the TMP to advance the mobility network, and more.

The Comprehensive Plan's future land use map shows a shift to mixed-used commercial development along FM 685, highlighting the need for improved multimodal infrastructure. The Plan also reiterates the TMP's public engagement survey where FM 685 is recognized as a priority improvement project by the community.

c.) Other Prior Planning Efforts on the Corridor

(1) CAMPO MoKan Corridor Study – The MoKan Corridor is a planned multimodal corridor which shared right-of-way (ROW) and roadway alignment with FM 685.

(2) CAMPO Regional Arterials Plan – The CAMPO Regional Arterials Plan made recommendations for FM 685 within the study's project limits, such as improvements to the Pflugerville Parkway intersection and the interchange at SH 130.

(3) Kelly Lane Major Investment Study (MIS) – FM 685 was analyzed in Phase 2 of the Kelly Lane MIS, which recommended the next 5 Year Capital Improvement Plan (CIP) include funding to widen FM 685 with an additional thru lane in each direction. It also recommended the FM 685 Corridor Study should consider innovative intersection designs as well as widening the overpass at SH 130.

H. Concurrent Planning Efforts

1. SH 130 Corridor Study

The SH 130 Access Ramp Corridor Study is one of the projects included in Pflugerville's 5 Year CIP and is tasked with looking into the possibility of ramp reversals along SH 130, which would help improve safety, mobility, and connectivity.

2. Rowe Lane Corridor Study

A future corridor study is planned for the Rowe Lane extension from FM 685 / SH 130 to Heatherwilde Boulevard as part of Pflugerville's 5 Year CIP, which will also look at interchange alternatives with SH 130.

3. Downtown East

The City of Pflugerville is considering a public-private partnership (P3) to develop the 29-acre Pfluger Tract into a mixed-use complex at the northwest corner of the FM 685 and Pecan Street / FM 1825 intersection.

4. TIRZ

Pflugerville's approval of the Tax Increment Reinvestment Zone (TIRZ) will help pay for infrastructure like all new roads, parking decks, and other common-use facilities that otherwise would not be built and allows for higher density projects.

5. AV/CV Studies

TxDOT is in the early stages of a feasibility study for a connected and automated corridor along the MoKan ROW. Details were not available to be provided during development of this study

I. Environmental Constraints Analysis

Environmental constraints were analyzed in order to determine potential obstacles during the design and construction phases of the project. Some of the key findings are listed below:

- Three potential water features within the project limits
 - Wilbarger Creek
 - Gilleland Creek
 - Unnamed tributary to Gilleland Creek
- Project occurs outside Edwards Aquifer and mapped karst zones
- Multiple federally and state-listed species potentially inhabit the county but the project exists outside known or mapped habitat
- Potential presence of archeological resources in undisturbed areas as seen in Figure 3-25
- Presence of historic resources within and near the project
- Phase I ESA is recommended due to records of Leaking Petroleum Storage Tank (LPST)

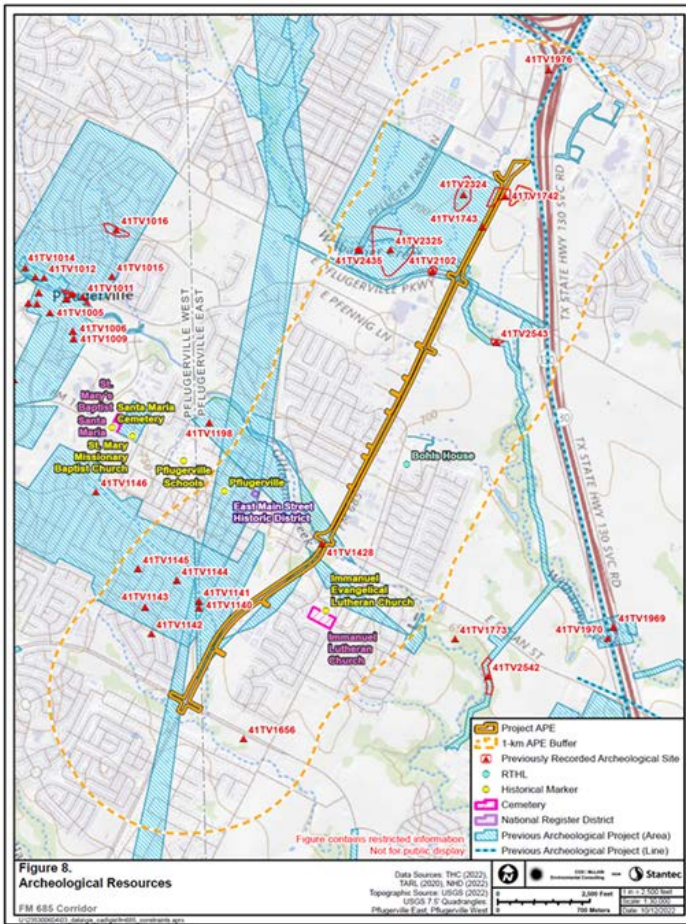


Figure 3-25: Archeological Resources Map



Figure 3-26: Gilleland Creek

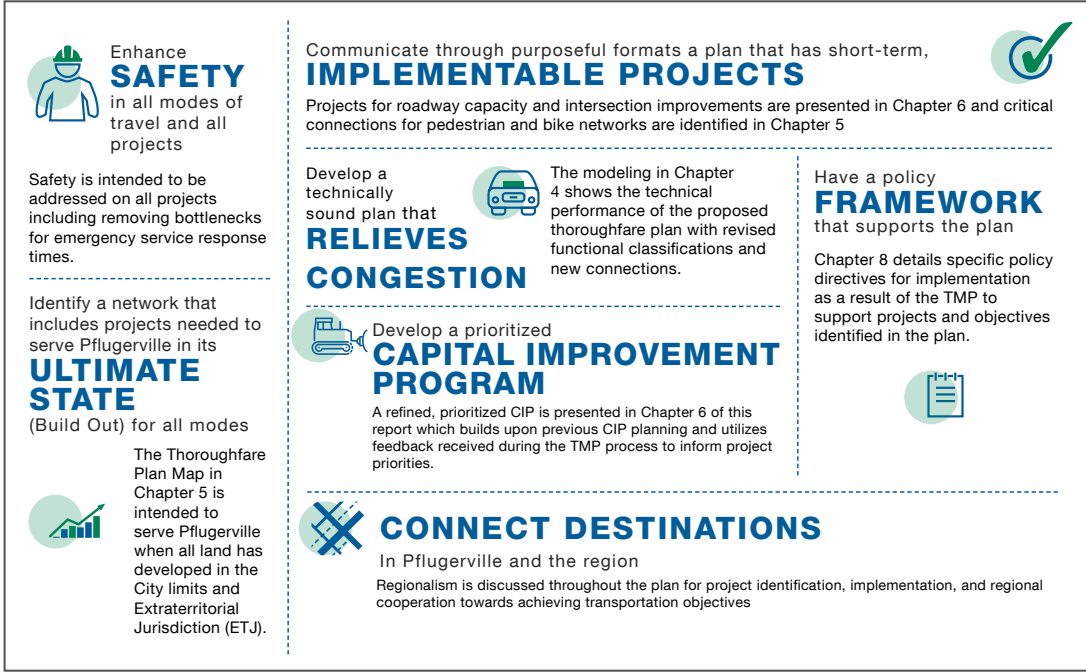


Figure 3-27: Site of LPST

Chapter 4: Alternatives Development

A. Identification of Alternatives

The process for identifying and evaluating alternatives began with discussing general alternatives like alternative routes, innovative intersections, adding capacity, multimodal, and aesthetic elements for the corridor. In discussing the alternatives for further evaluation and prioritization, the Transportation Master Plan objectives were consulted, shown in Figure 4-1, as well as potential alternatives from past studies.



- TMP
 - Safety
 - Congestion
 - Connectivity
- Design
 - Regional Plans
 - Implementation
 - Constructio Cost
- Other Environmental
 - Property Impacts
 - Displacements
 - Natural Resources
- Stakeholder Input

Figure 4-1: Transportation Master Plan Objectives

Past studies of the FM 685 corridor and their recommendations were evaluated as a basis for alternatives identification along the corridor. A common theme of the past reports was the need for capacity enhancements, specifically the expansion from 4 to 6 lanes along the corridor. There was also a focus on improving the existing bike and pedestrian connectivity by adding shared-use paths and closing critical gaps in facilities that exist along FM 685 today in both developed and undeveloped areas. The past studies reviewed in identifying alternatives include the following, which are further described in Chapter 3 of this report:

City of Pflugerville's	CAMPO's	TxDOT	Travis County
Transportation Master Plan: Pflugerville Pforward Kelly Lane Major Investment Study Comprehensive Plan: Aspire 2040 2020 Transportation Bond Intersections II	MoKan Study Regional Arterials Plan 2045 Plan	Statewide Planning Map	Blueprint

(short-term projects along the FM 685 corridor)

At Technical Committee Meeting #1, the committee marked up areas of concern and their desires for the corridor as seen in Figure 4-2 on an aerial map of the corridor and surrounding areas. These ideas were also included in screening of alternatives for prioritization.



Figure 4-2: Technical Committee Conceptual Layout Activity

In addition to the past studies, technical committee feedback, and consultant recommendations, the ideas for inclusion in the potential solutions to the corridor were sourced from the Open House in May 2022 described in Chapter 2 of this report. Specifically, the “Markup a Map” activity both in person and online were critical sources of ideas for solutions on the FM 685 / Dessau corridor and are highlighted specifically in the next section in the screening of alternatives.

B. Screening of Alternatives

Prior to the screening of alternatives, a purpose and need for the corridor was developed based on the existing conditions analysis of current challenges in Chapter 3 and the public feedback on priorities at the May 2022 Open House. The purpose and need for the project served as a guide for the screening, selection, and prioritization of alternatives, and is also explained in the Introduction in Chapter 1.

This project is needed because the capacity of the FM 685 roadway is inadequate to meet current and future traffic volumes stemming from population growth and increased traffic volumes, resulting in reduced mobility and increased safety concerns on this stretch of roadway. The project is also needed to provide safe access for pedestrians and bicycles throughout the corridor. The purpose of the proposed project is to improve mobility for vehicles, provide connectivity for bicycle and pedestrians along the corridor, and address safety concerns.

The vision for the corridor is to address long-term solutions for congestion and safety, enhanced multimodal connectivity, a lower speed 6-lane cross section, and to address regional connectivity.

1. Corridor-Wide Alternatives

Specific alternatives identified were classified as “corridor-wide” in nature as they could be applied for the entirety of the corridor, irrespective of location specific conditions. The corridor-wide alternatives are seen in Figure 4-3: Overall Network Alternatives, and were evaluated for appropriateness in the Selection of Alternatives section that follows.

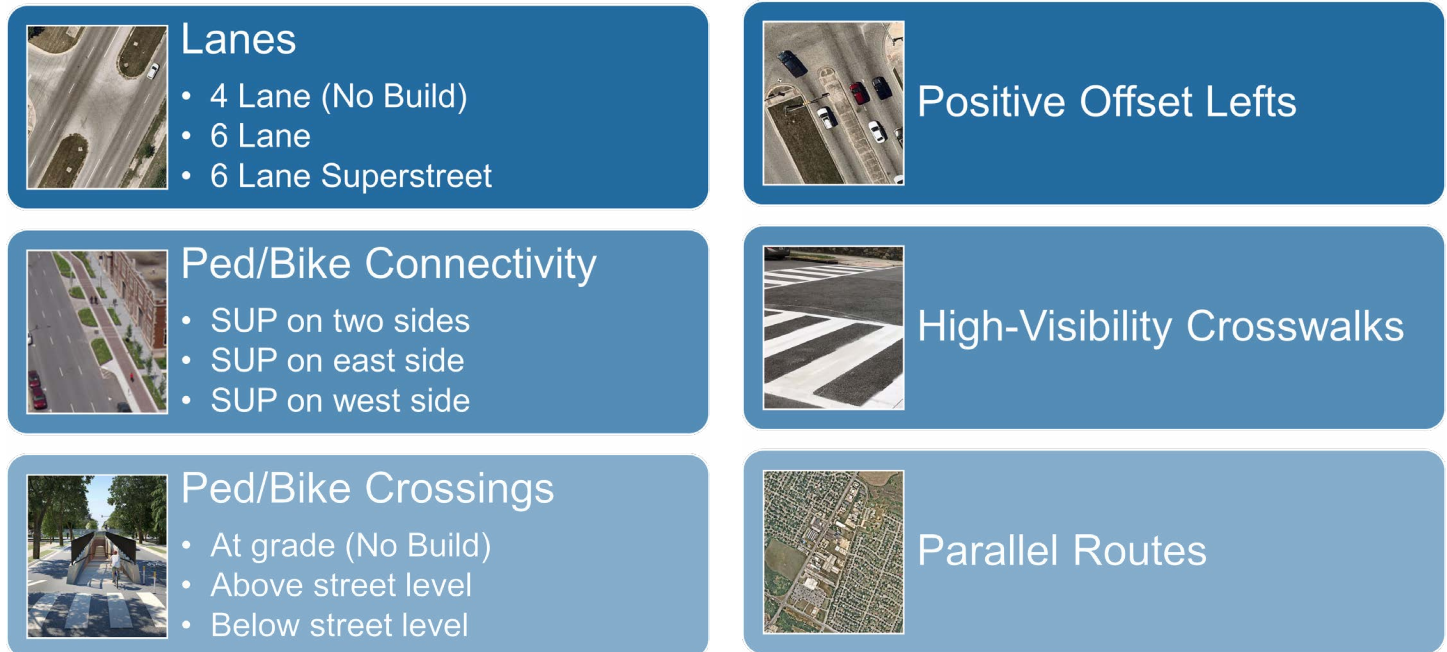


Figure 4-3: Overall Network Alternatives

2. Character Zone Specific Recommendations

Location specific alternatives were screened based on inputs identified in the previous section of this Chapter and categorized geographically by the five Character Zones established in Chapter 3. Each of the five Character zones was presented with the alternatives identified by the public and as well as the top alternatives identified by the project team. Each segment’s alternatives can be seen in Figure 4-4: SH 130 Segment Alternatives through Figure 4-8: Dessau Segment Alternatives below:

SH 130 Segment Alternatives

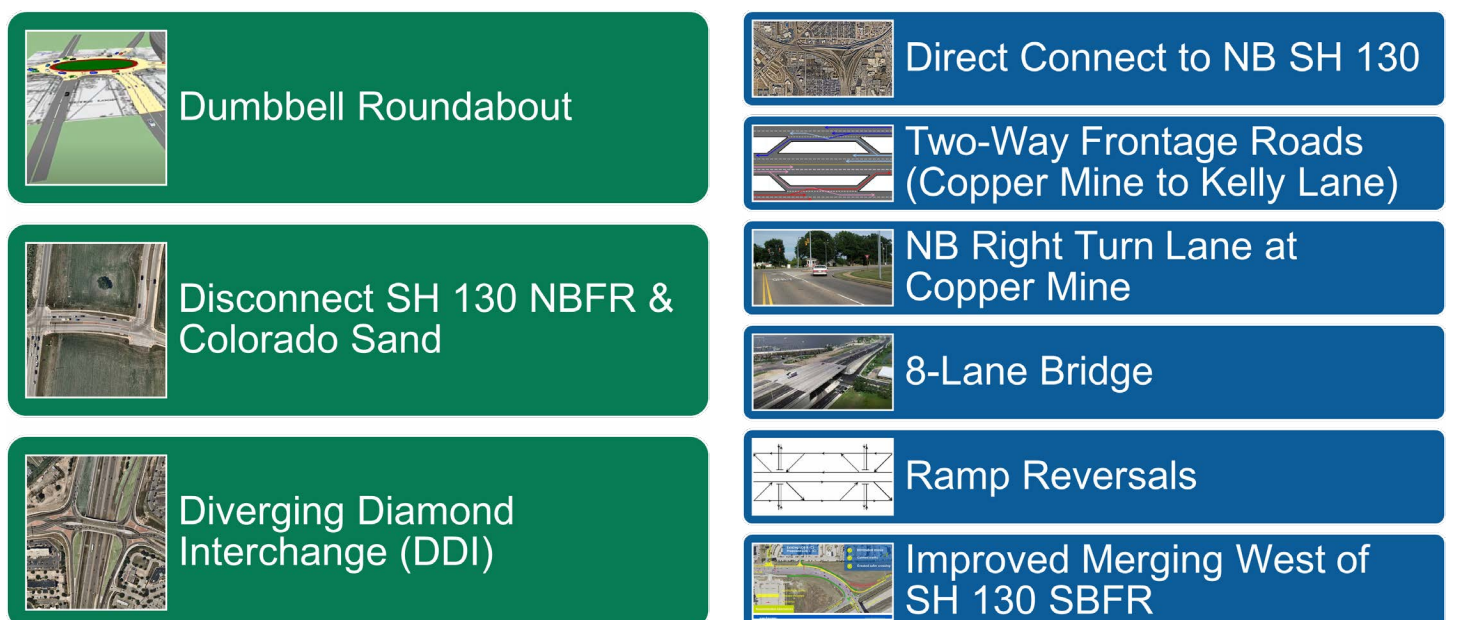


Figure 4-4: SH 130 Segment Alternatives

Town Center Segment Alternatives

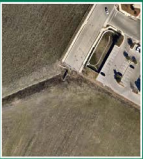
= KH Identified = Public Identified




**Pflugerville Parkway
Nontraditional Intersection
Improvements**




**Dedicated Acceleration Lane
from Town Center Dr**



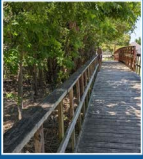
**Terrell Extension and North
Pointe Connection**



**Improving Pedestrian &
Bicycle Infrastructure to FM
685**




**Improve Routes from
Stonehill Town Center**



**“Placemaking” NW of
Pflugerville Parkway to
create a park and trails**

Figure 4-5: Town Center Segment Alternatives

Pfennig Segment Alternatives




**Ped & Bike Routes Off-
Corridor**

- East side couplet
- West side through parking lot



Dropoff Railing Protection



Old-Austin Hutto Connection



Street Lighting




**Pfennig extension &
widening**


Figure 4-6: Pfennig Segment Alternatives

Applewood Segment Alternatives


= KH Identified = Public Identified




**Applewood Dr & Main Street
New Traffic Signals**




Turn Lane Improvements



**Trail Connectivity &
Crossings**




**U-Turn Safety Improvements
at Split Oak**




**Sound Walls for
Neighborhoods**

Figure 4-7: Applewood Segment Alternatives


Dessau Segment Alternatives




**Oxford Dr & Olympic Dr
Connections & Signals**




**Pecan Street Grade
Separation**



**Trail Connectivity &
Crossings**



**Close Median Opening on
EB Wells Branch before FM
685 EBL Turn Lane**



**Add a SBR turn lane at Wells
Branch**

Figure 4-8: Dessau Segment Alternatives



C. Alternatives Prioritization and Selection

The screened alternatives were discussed among the technical committee who recommended the analysis and evaluation of each alternative at a high level for appropriateness to include in the ultimate alternatives for prioritization. At this point in the process, alternatives were evaluated for feasibility and ability to accomplish the project’s purpose, need, and overall vision.

The remainder of the meeting centered around the preliminary scoring of the various alternatives. The alternatives were re-categorized at this point in the process as either link projects (between intersections) and intersection projects for ease of comparison for alternatives selection. The scoring categories which each project on the corridor were evaluated on are shown in Figure 4-9:



Figure 4-9: Evaluated Link Alternatives

Details of the scoring criteria weighting can be found in Appendix F along with charts comparing the projects for each segment.

The link and intersection projects evaluated using the above criteria are shown in the Figure 4-10 and Figure 4-11 below:

<p>Full Corridor</p> <ul style="list-style-type: none"> • 4-Lane Section (No Build) • 6-Lane Section • 6-Lane Section (Superstreet) • SUP - two sides • SUP - one side 	<p>SH 130</p> <ul style="list-style-type: none"> • Disconnect Colorado Sand • Direct Connect to SH 130 • Two-Way Frontage Roads • NBR Lane at Copper Mine • 8-Lane Bridge 	<p>Town Center</p> <ul style="list-style-type: none"> • Terrell Extension • North Pointe Connection • Limestone Commercial Extension • Sidewalk Extensions
<p>Pfennig</p> <ul style="list-style-type: none"> • Bide-Ped Couplet Routes • Drop Off Railing • Old Austin Hutto Connection • Pfennig Extension 	<p>Applewood</p> <ul style="list-style-type: none"> • Install Drop Off Railing • Install Street Lighting • Trail Connectivity 	<p>Dessau</p> <ul style="list-style-type: none"> • Install Sound Walls • Trail Connectivity

Figure 4-10: Evaluated Link Alternatives



Figure 4-11: Evaluated Intersection Alternatives

1. Final Alternatives for Detailed Analysis

After presenting the scores for various projects on each segment, the technical committee discussed which alternatives to proceed with in the analysis. It was determined that three separate general concepts would be analyzed and compared:

1. Superstreet
2. Urban Boulevard
3. No Build

The first two concepts would include the expansion to six lanes and a 120-foot right-of-way section throughout the corridor. The highest ranked 2-3 intersection projects at each location were evaluated at the major intersections throughout the corridor. These two concepts would then be analyzed against the “No Build” option to compare to the roadway in its existing condition. Specific details on what was evaluated for each intersection are specified in Chapter 5. A chart detailing the method for screening intersection projects is shown below in Figure 4-12:

Intersection Project Screening / Feasibility Analysis			
Category	How KH will Evaluate	CAMPO Project Call Equivalent	CAMPO Points Description (based on 2019-2022 Project Call)
Capacity	Qualitative: A = Grade separation B = Innovative C = Traditional	Roadway Project Selection - Congestion & Mobility	5 Points: The project fills a gap, removes a barrier and enhances network connectivity. 5 Points: The project creates transportation network redundancy.
Safety	Qualitative: A = Highest comparative safety benefit B = Mid-range comparative safety benefit C = Lowest comparative safety benefit	Roadway Project Selection - Safety	10 Points: The project addresses a severe crash rate higher than CAMPO regional average (including pedestrian and bicycle crash rates). 5 Points: The project addresses additional safety issues.
Speed	Qualitative: A = Reduced speed B = No change in speed C = Increased speed		
ROW/ENV	Qualitative: A = No ROW impacts / no impacts to floodplain B = Minor ROW impacts / minor impacts to floodplain C = Major ROW impacts / major impacts to floodplain	Roadway Project Selection - Social and Environmental Impacts	5 Points: The project has incorporated measures that reduce, minimize or avoid negative impacts to the environment or cultural resources.
Cost	Qualitative: A = Lowest comparative cost B = Mid-range comparative cost C = Highest comparative cost		
Multimodal	Qualitative: A = Grade separated facility B = At-grade crossings with protection C = At-grade crossings without protection	Roadway Project Selection - Multimodal Elements	5 Points: The project provides pedestrian/bicycle accommodations identified in the Regional Active Transportation Plan or a locally adopted transportation plan.
Feasibility	Qualitative: A = No obvious impacts to other segments B = Modified access required for improvements C = Closures required or not feasible F = Not feasible (option eliminated)		
Regional Alignment	To be determined at technical committee meeting.	Roadway Project Selection - Planning & Regional Impact	10 Points: The project has undergone a comprehensive planning process or is identified as a priority in a local or regional transportation plan. 10 Points: The project is located on an existing or proposed regionally significant facility.

Figure 4-12: Screening Process for Intersection Alternatives

Chapter 5: Evaluation of Alternatives

To evaluate alternatives developed in Chapter 4, several performance measures were developed and analyzed using various tools to determine the optimal preferred concept for the FM 685 / Dessau Road corridor. The resulting preferred concept was interchangeable between alternatives, meaning that portions of the corridor may represent one alternative, while other portions of the corridor may represent another alternative. The results of the prioritization for the overall corridor (superstreet vs. urban boulevard) and specific intersections are documented in this Chapter.

A. Operational Performance Measures

1. Congestion: Level of Service

Level of Service (LOS) is a quantitative measure of traffic operating conditions related to the amount of traffic demand compared to the capacity of the system. LOS is scaled from A (best) to F (worst). The City of Pflugerville, like many jurisdictions, generally has a minimum LOS operations requirement of D. Figure 5-1 below explains the operations, maneuverability, and queues of LOS C, D, and F.

a.) Peak Hour Traffic Analysis

All intersections along the corridor were modeled in Synchro 11 software for the morning and afternoon peak hours to determine Level of Service (LOS), delay, and expected queuing for turns at intersections with the proposed improvements for each alternative. Queue lengths observed in the build-out year were incorporated into the design footprint to evaluate other adverse impacts and be determined if feasible or not to handle expected traffic.

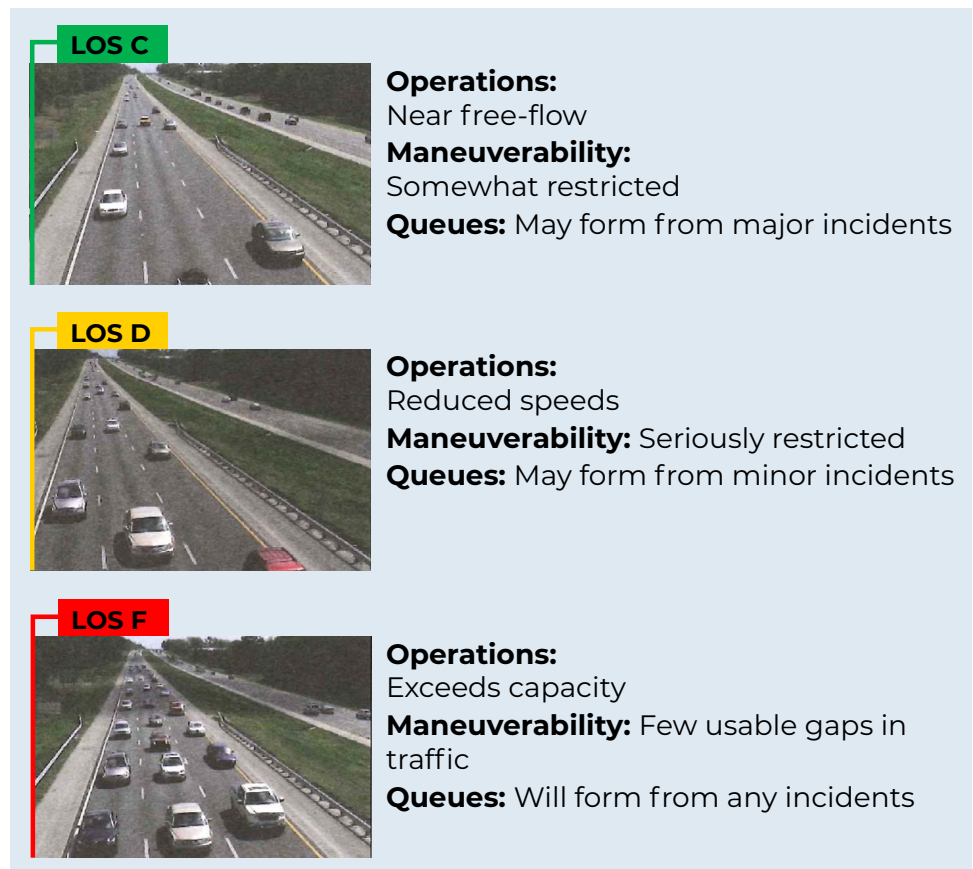


Figure 5-1: Level of Service Operations, Maneuverability and Queues

2. Travel Demand Modeling

For this effort, the project team used the updated 2040 CAMPO travel demand model used for the 2019 Pflugerville transportation master plan (TMP) to assess regional travel patterns based on proposed improvements. The updates included zone splits as well as coding additional network detail within the City Extra-Territorial Jurisdiction (ETJ). The project team also used the post-processor developed for the TMP which allows for the adjustment of forecast volumes based on how different the base volumes are from observed traffic counts.

Two different alternatives were evaluated for this effort, broadly described in Table 4 below.

Alternative 1 – “Superstreet”	Alternative 2 – “Urban Boulevard”
6 lanes divided principal arterial between SH 130 and 500 ft south of Wells Branch Pkwy	6 lanes divided principal arterial between SH 130 and 500 ft south of Wells Branch Pkwy
All connections from TMP	All connections from TMP
55 mph assumed speed	40 mph assumed speed
Direct connect ramps to SH 130 past Kelly Ln	Add U-turn bridge on SH 130 at north end of FM 685
FM 685 grade separated over Pflugerville Pkwy with diamond ramps	
FM 685 grade separated over Pecan St	Pecan St grade separated over FM 685
Terrell Ln connects to Pflugerville Pkwy	Terrell Ln connects to Pflugerville Pkwy

Table 4: Alternative Concept Comparison

The project team also ran the final corridor configuration in the 2045 CAMPO travel demand model to get assigned volumes from the latest travel demand model for the purpose of potential future grant applications.

B. Safety Performance Measures

1. Safety Countermeasures (CMF’s)

Alternative improvements were evaluated to determine the level of effectiveness at reducing crashes at given locations, which were primarily observed for intersection performance. National databases for CMF’s (crash mitigation factors) were used to determine specific levels of reduction in the overall scoring

2. Speed

Travel speed was considered a specific performance measure due to the propensity for lower severity crashes for vulnerable street users like pedestrians and bicyclists, which are anticipated to increase with provision of shared use paths. Lower travel speeds were given higher scores due to the safety benefit.

C. Other Performance Measures

1. Economic Development: Fiscal Impact Analysis

The Aspire Pflugerville 2040 Comprehensive Plan identified the future land uses along the FM 685 corridor that are appropriate for achieving the community’s goals and objectives. The future land use categories were based on several factors including the current state of FM 685.

As part of evaluating the alternatives for the FM 685 corridor from Pecan Street to SH 130, four comparable segments of roadway were identified in other Texas cities. The roadways were Bandera Road in San Antonio, East Whitestone Boulevard in Cedar Park, Westheimer in Houston, and Greenville Avenue in Dallas. Land use categories and property values were collected within ¼ mile on both sides of roadway for these comparable corridors. This data informed the potential build out and land use changes for the alternatives along the FM 685 corridor.

Using the comparable corridors data and existing trends within Pflugerville, three property value scenarios were created, seen in Table 5. The first scenario is based on Pflugerville’s future land use map found in the comprehensive plan. The future land use map identifies mixed-use commercial north of Pecan Street with lower density neighborhood commercial in the southern section of the corridor. The second scenario uses a superstreet design with a lower density pattern. For this scenario, the denser mixed-use commercial land use was replaced with mixed-density neighborhoods. This resulted in fewer residents and jobs as well as a lower property tax base. The third scenario incorporates an urban boulevard concept with greater density. For scenario 3, the roadway design encouraged higher density north of Pflugerville Parkway and south of Pecan Street. For example, commercial uses might have structured parking versus large surface lots. The greater building density results in more people and jobs per acre compared to scenario 1. The net result is scenario 3 yields the largest property tax base at full build out. Scenario three is the preferred alternative for FM 685.

	Property Value
Scenario 1 Baseline FLUM	\$1,602,109,774
Scenario 2 – “Superstreet” Lower Density	\$1,381,667,723
Scenario 3 – “Urban Boulevard” Greater Density	\$1,908,618,996

Table 5: Estimated Property Value at Built Out by Scenario

2. Multimodality

The design of each alternative (“Superstreet” and “Urban Boulevard”) was evaluated for national measures of pedestrian comfort and Level of Service for pedestrians and for bicycle level of stress for bikes. These are primarily influenced by the design of the built environment, speeds, and degree of separation for facilities.

3. Pedestrian and Bike Connectivity

Each alternative was evaluated for the improvement to pedestrian and bike connectivity, which was mostly influenced by the size of the buffer from the curb to shared use paths proposed, degree of conflict at crossings, and options for alternative paths.

4. Property Impacts

Each alternative was evaluated based on the number of parcels impacted and the total acreage of Right-of-Way required for the improvements based on the initial Corridor Study footprint. These were factored into the overall scoring for alternatives.

5. Cost-Benefit

Each alternative was weighed based on the cost-benefit ratio of the improvement, which included planning level construction costs for improvements weighted against safety benefits and delay benefits. Safety benefits include a weighted value based on crash severity at each location based on crash values from national databases. Delay benefits are based on both value of time and fuel savings calculated, which were approximated at \$30 per hour and \$3.50 per gallon of gas. The benefit calculations were approximated for a 20 year timeframe and used to weigh options comparatively for scoring.

The scoring criteria and weighting used for the final evaluation can be seen in Figure 5-2 and Figure 5-3 below in the dynamic tool developed for prioritization on the FM 685 / Dessau Road Corridor Study:

Intersection Criteria		Segment Criteria	
Congestion		Congestion	
20	0.2 LOS Intersections	0.25 Travel Time Links	UNUSED: 0.8
	0.15 Travel Time Links	0.2 Travel Speed	UNUSED: 0
	0.2 Queues	0.1 # of Stops	
	0.1 Travel Speed	0.35 Delay Savings	
	0.1 # of Stops	0.1 Emissions	
	0.2 Delay Savings		
	0.05 Emissions		
Safety		Safety	
20	0.25 CMF's	0.25 CMF's	UNUSED: 2
	0.25 Speed	0.25 Change in Speed	UNUSED: 0
	0.5 # Resolvable Crashes (3 years)	0.5 # Resolvable Crashes (3 years)	
Connectivity (Ped/Bike)		Connectivity (Ped/Bike)	
10	0.4 Crossing Index	0.4 Increase in Sidewalk Sides	UNUSED: 0
	0.6 Connectivity Index Change	0.6 Connectivity Index Change	
Economic Development		Economic Development	
10	0.4 Sales Tax	0.4 Sales Tax	UNUSED: 0
	0.2 Population Density	0.2 Population Density	UNUSED: 0
	0.2 Employment Density	0.2 Employment Density	
	0.2 Access Impacts	0.2 Access Impacts	
	1 Partial impacts during construction	1 Partial impacts during construction	
	2 Full closure during construction	2 Full closure during construction	
	2 Partial permanent impacts	2 Partial permanent impacts	
4 Full closure permanent impact	4 Full closure permanent impact		

Figure 5-2: Alternative Scoring Criteria

Intersection Criteria		Segment Criteria	
Cost		Cost	
20	0.3 Planning Level Construction Cost	20	0.3 Planning Level Construction Cost
	0.15 Safety Benefit Cost UNUSED: 0		0.15 Safety Benefit Cost UNUSED: 0
	0.15 Delay Benefit Cost		0.15 Delay Benefit Cost
	0.4 Benefit/Cost Ratio		0.4 Benefit/Cost Ratio
	\$30.00 Value of time		\$30.00 Value of time
	\$3.50 Cost of gas		\$3.50 Cost of gas
Property Impacts		Property Impacts	
10	0.4 Parcels Impacted UNUSED: 0	10	0.4 Parcels Impacted UNUSED: 0
	0.6 Acreage of ROW Required		0.6 Acreage of ROW Required
Multimodality UNUSED: 2		Multimodality UNUSED: 2	
10	0.5 Pedestrian Comfort / LOS	10	0.5 Pedestrian Comfort / LOS
	0.5 Bicycle Level of Stress		0.5 Bicycle Level of Stress
<p>100 - Total Points Available 68.6 - Highest Scoring Project 24.0 - Lowest Scoring Project 10.5 - Project Score Std Dev 4.8 - Points not used by any project</p>		<p>100 - Total Points Available 74 - Highest Scoring Project 30.0 - Lowest Scoring Project 12.4 - Project Score Std Dev 2.0 - Points not used by any project</p>	

Figure 5-3: Alternative Scoring Criteria

D. Alternatives Performance – Corridor-Level

The finalized conceptual Superstreet and Urban Boulevard alternatives identified and selected at the Technical Committee were evaluated for determination of a preferred concept. The main parameters incorporated throughout the overall corridor are shown below in Figure 5-4 for both concepts:

Alternative 1: Superstreet	Alternative 2: Urban Boulevard
120 ft ROW	120 ft ROW
Higher Speed – 55 MPH	Lower Speed – 35 MPH
WB-67 Design Vehicle U-Turns Passenger Car Left Turns	WB-67 Design Vehicle All Turns
Minor Street Right Turn Only	Minor Street Full Access
1-side SUP	2-side SUP




Figure 5-4: Parameters by Alternative Concept

Flipbooks for the two alternatives were provided to technical committee members for reference and can be found in Appendix I. The corridor segments were also analyzed with the Urban Boulevard alternative performing better than the Superstreet in a majority of the sections as seen in Figure 5-5 below:

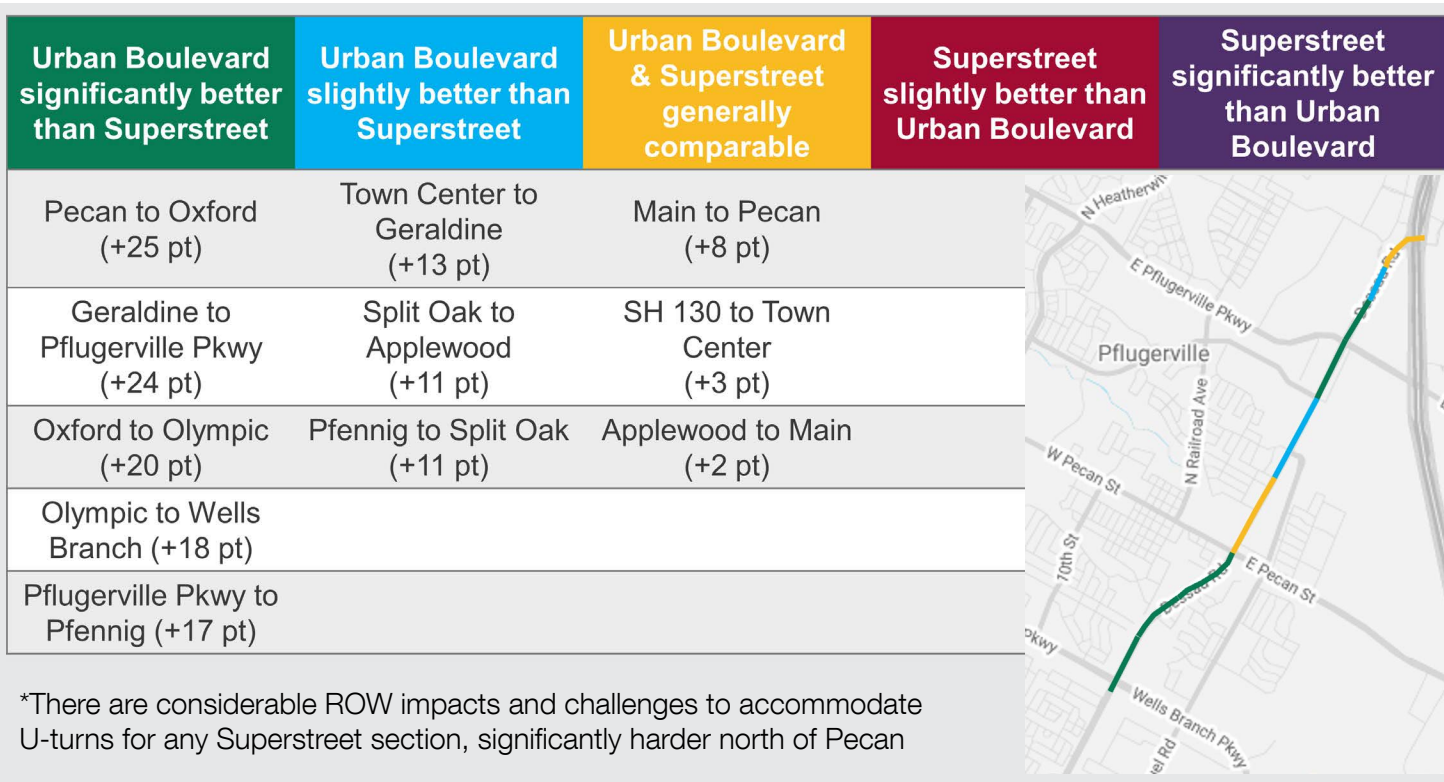


Figure 5-5: Sement Alternative Scoring

The alternatives incorporated into the Urban Boulevard concept typically scored higher than the Superstreet alternatives due to four major factors:

- Reduced volumes (congestion)
- Reduced speeds (safety)
- Smaller footprints (right-of-way impacts)
- Dual-sided SUP (multimodality)

E. Alternatives Performance – Intersections

Each intersection was evaluated for a minimum of 2 alternatives from those narrowed down in Chapter 4, with some cases calling for 3 alternatives to be evaluated that were feasible and reasonable. Flipbooks for the two alternatives were provided to technical committee members for reference and can be found in Appendix I. An example of the conceptual comparison can be seen in Figure 5-6 for Pecan Street:

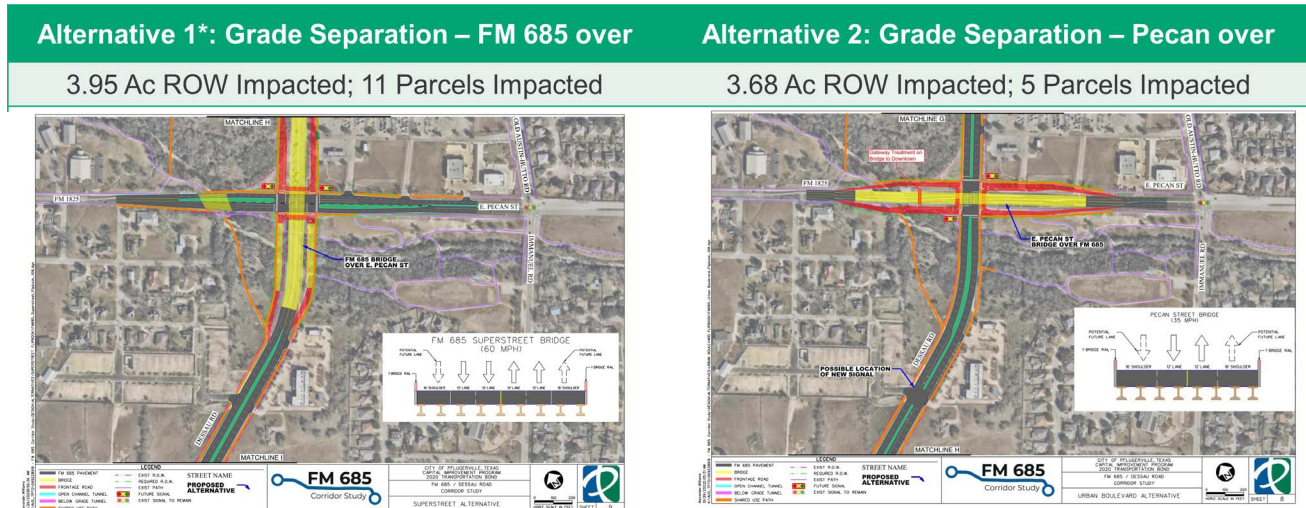


Figure 5-6: Conceptual Layout Comparison Example: Pecan Street

An example of one of the intersection comparisons based on resulting performance can be seen for FM 685 at Pecan Street in Figure 5-7.

Grade Separation – FM 685 over (24.0 points)	CFI (52.6 points)
LOS F	LOS D
Longer Overall Travel Time	Shorter Overall Travel Time
Combined queues ~7,050 ft	Combined queues ~1,150 ft
More Stops per Vehicle	Fewer Stops per Vehicle
Lesser impact to safety	Greater impact to safety
Lesser Pedestrian Connectivity	Greater Pedestrian Connectivity
Lesser Sales Tax Revenue	Greater Sales Tax Revenue
Lesser Density	Greater Density
Greater ROW acreage take	Lesser ROW acreage take
Lesser Cost/Benefit Ratio	Greater Cost/Benefit Ratio

Figure 5-7: Intersection Comparison Example

Details of the remainder of the scoring comparisons can be seen in Appendix F. A list of all the intersection improvements evaluated by location can be seen in Figure 5-11 below, with the selected alternative **bolded** in Table 6:

Intersection	Alternative 1 – Urban Boulevard	Alternative 2 – Superstreet	Alternative 3 – Additional
FM 685 & SH 130 Interchange	Disconnect Copper Mine Dr from Colorado Sand, widen bridge and add u-turn bridges	Add U-turn bridges and a tunnel to SH 130 mainlanes	Add U-turn bridges and widen bridge by 2 lanes for turns
FM 685 & Town Center Drive	Traditional signalized intersection with turn lane improvements and artistic crosswalk	Superstreet (restricted turns Town Center) with tunnel to SH 130	N/A
FM 685 & (Future) Geraldine	Traditional signal	Superstreet signal (restricted turns from Geraldine)	N/A
FM 685 & Pflugerville Parkway	Continuous Flow Intersection	Bridge Pflugerville Parkway over FM 685	N/A
FM 685 & Pfennig Lane	Traditional intersection with turn lane improvements	Superstreet (restricted turns from Pfennig)	N/A
FM 685 & Split Oak / Old Austin-Hutto Road	Traditional intersection with turn lane improvements	Superstreet (restricted turns from Split Oak and Old Austin-Hutto)	N/A
FM 685 & Applewood Drive¹	Traditional intersection with turn lane improvements	Superstreet (restricted turns from Applewood)	N/A

FM 685 & (Future) Main Street	Traditional signalized intersection with gateways at Main	Superstreet (restricted turns Main Street)	N/A
FM 685 & FM 1825 / Pecan Street	Pecan Street bridge over FM 685	FM 685 Bridge over Pecan Street	Improved Continuous Flow Intersection
Dessau Road & Oxford Drive	Traditional signalized intersection	Superstreet (restricted turns Oxford)	N/A
Dessau Road & Olympic Drive	Traditional signalized intersection	Superstreet (restricted turns Olympic)	N/A
Dessau Road & Wells Branch Parkway	Traditional intersection with turn lane improvements	Continuous Flow Intersection	N/A

Table 6: Intersection Alternatives Evaluated

Using the overall rankings for intersections and segments, the technical committee decided to use most of the urban boulevard alternatives with the exception of removing the FM 685 connection to Colorado Sand Drive. The final concept would incorporate the agreed upon alternatives.

Chapter 6: Preferred Concept

Following extensive public and stakeholder engagement and meetings with the Technical Committee and City staff, a final preferred concept was chosen in October 2022 to then be presented to the public for review and comment. This Chapter documents the primary features of the preferred concept and the performance metrics associated with the preferred concept that resulted from iterations from the alternatives analysis. This concept emerged as the clear best option to accomplish the stated project purpose and need as demonstrated in Chapter 5.

A. Concept Overview

1. Conceptual Layout Formats

A horizontal conceptual layout was created showcasing the full corridor and was presented to the public at the Open House in December 2022. Some changes were made based on public feedback and feedback from the Technical Committee represented in the final layout. The full conceptual layout can be seen in Appendix K.

In addition, a 3D rendering of the corridor was created to give a more detailed visualization of the recommended alternatives based on the horizontal conceptual layout presented at the Open House in December 2022. Snapshots of the 3D renderings can be seen in Figure 6-1 through Figure 6-4 below and the full video watched at [this link](#) on the City's YouTube channel.



Figure 6-1: 3D Rendering of SH 130 Interchange



Figure 6-2: 3D Rendering of E. Pflugerville Pkwy Continuous Flow Intersection



Figure 6-3: 3D Rendering of E. Pecan St Overpass



Figure 6-4: 3D Rendering of Wells Branch Pkwy Intersection

2. Typical Cross Section

The current cross section of 2 lanes in each direction with a median has proven to be inadequate for anticipated growth in Pflugerville and in many cases deficient today in this report. The proposed typical cross section for the long-term on FM 685 / Dessau Road is based on the Pflugerville Transportation Master Plan's cross section for major arterials, which includes the following:

- 120 feet of right-of-way
- 6 main lanes at 11' each (excluding 1.5' gutter pan on outside and inside lanes)
- Medians (14' face of curb to face of curb, to allow for potential trees)
- 10-foot shared-use paths on each side of the roadway

The 120-foot Right-of-Way is generally in place where development has occurred, and is required to be dedicated for undeveloped areas where the right-of-way is less than 120 feet today. There are some constrained sections where additional right-of-way may need to be purchased based on likely utility relocations. Easements for utilities and potentially for the shared use paths may also be explored in further implementation, where required.

An illustrative version of the preferred concept's typical cross section can be seen in Figure 6-5 below:

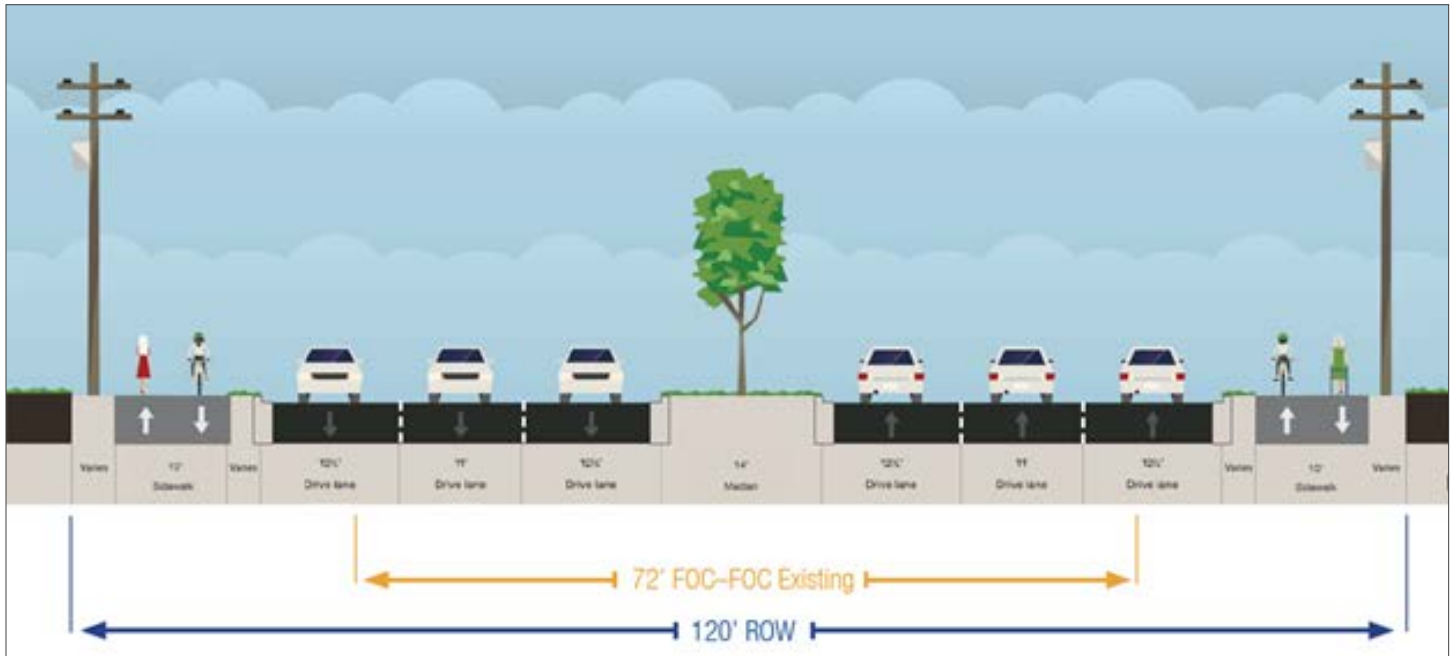


Figure 6-5: Preferred Concept Cross Section

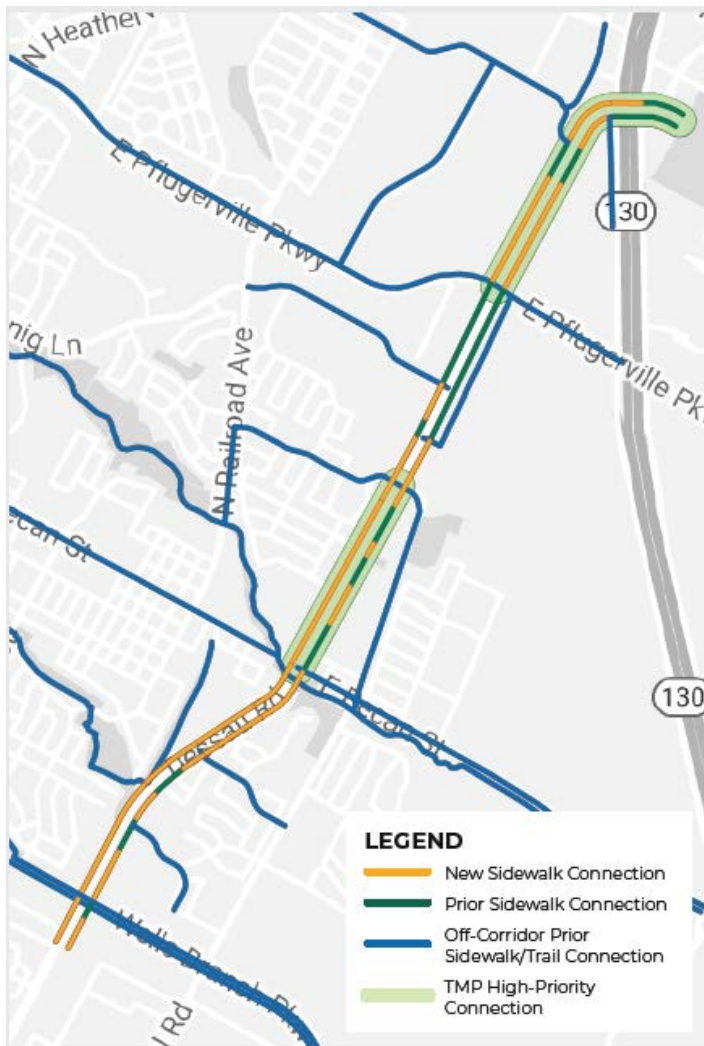


Figure 6-6: Sidewalk Connectivity

10-foot shared use paths are the standard arterial bicycle facility in Pflugerville, which are recommended as part of the preferred concept. Adding shared-use paths along both sides of the corridor provides much needed connectivity between sidewalks and trail paths that cross the corridor, as identified in the Transportation Master Plan and as seen in the Figure 6-6:

3. Lane Width

Due to right-of-way and feasibility constraints throughout the entire corridor, 11-foot lane widths were recommended in order to allow all elements of the cross section to be accommodated. Wider lane widths would require significant right-of-way impacts and acquisition as well as various design obstacles. In addition, the narrower lane widths reinforce the need for improved speed compliance on the corridor, as evidenced by the high percentage of crashes involving “failure to control speed” as a factor. Narrower lane widths have been shown through studies to correlate with lower speeds.

4. Speed

Pending TxDOT coordination and approval, the posted speed limit of the corridor was recommended to be 35 mph. This was based on the City’s desire to reclassify FM 685 as a low-speed urban facility. Considering the anticipated development along the corridor, increased pedestrian and bicycle activity due to improved shared-use path connectivity, and the 11-foot lane widths, reducing the speed limit to 35 mph is imperative to improve the safety and comfortability of all users.

In addition to improving safety by reducing risk of crash severity for pedestrians and bicyclists crossing the corridor, the 35 mph speed was shown to be crucial to travel demand management on the corridor, resulting in 25% lower volumes at build-out in Pflugerville when compared to the superstreet option in Chapter 5 at 55 miles per hour with 12-foot lanes and restricted turns at intersections. The ultimate speed on the corridor is anticipated to be a significant factor in reducing congestion on FM 685 / Dessau, which should push traffic to alternative routes, such as SH 130, for regional travel, as evidenced in the travel demand modeling.

5. Aesthetic Features

Several natural and man-made aesthetic improvements to the corridor were recommended as part of the alternatives analysis. Landscaping throughout the median, where space allows, is a consistent aesthetic recommendation along the corridor. Where there is not enough space in the medians, placing trees

along the shared-use path outside the right-of-way as development and redevelopment occurs would provide shade to pedestrian and bicyclists. There was not adequate space within the right-of-way to accommodate both shared use paths and trees behind the curbs on either side of the street due to right-of-way and utility constraints.

In regards to man-made aesthetics, adding a gateway sign structure on the potential Pecan Street bridge over FM 685 and incorporating art into the bridge walls along Pecan are recommended to improve the look and feel of the corridor. Strategically placed, the gateway structure would let drivers know they are entering downtown Pflugerville and provide a sense of place. An overhead gateway of this kind does not currently exist in the city of Pflugerville. Members of the public responded positively to several options for treatments to the Pecan Street bridge at an activity provided at Open House 2 in December 2022, the boards for which are in Appendix H of this report.

Another man-made aesthetic recommendation includes neighborhood-like entrance signs at the future intersection of Main Street and FM 685. Once the Downtown East development is completed, a monument sign marking the entrance to this development is recommended adjacent to FM 685, and may also be incorporated into aesthetic treatments for the recommended traffic signal at this location to enhance placemaking. Members of the public responded positively to several options for this treatment at an activity provided at Open House 2 in December 2022, the boards for which are in Appendix H of this report.

Adding asphalt art for cross walks can function both as a safety improvement, through increased visibility, and as aesthetic improvement. Research shows drivers tend to drive slower through intersections with artistic crosswalks, creating a safer environment for pedestrians and bicyclists. An artistic crosswalk concept was included in the 3D rendering at Town Center Drive and can be seen below in Figure 6-9, incorporating a pool themed crosswalk, as it leads into the Typhoon Texas waterpark.

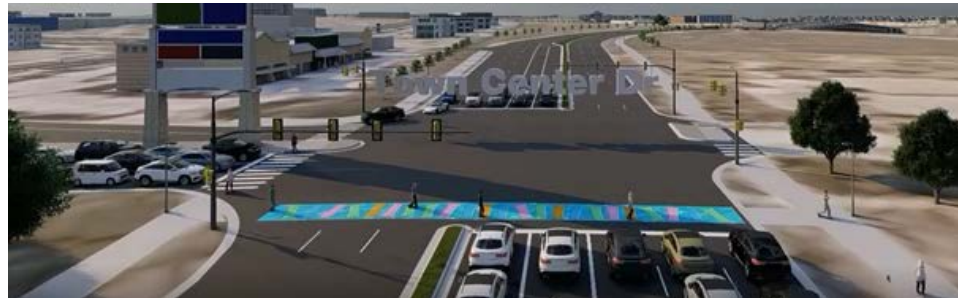


Figure 6-7: Artistic Asphalt Crosswalk

6. Intersections

A visual representation of the preferred intersection alternatives can be seen in the horizontal conceptual layout in Appendix K. A summary of the recommended intersection improvements for the final preferred concept can be seen in the Table 7 below, with specific intersections shown with expanded details within this section:

Intersection	Preferred Alternatives
<i>FM 685 & SH 130 Interchange</i>	<ul style="list-style-type: none"> • U-Turn bridges • Bridge widening with 2 added eastbound lanes • Reconfigured channelized dual right turn lanes with added crosswalk and traffic signal
<i>FM 685 & Town Center Drive</i>	<ul style="list-style-type: none"> • Additional turn lanes • Artistic crosswalk opportunity
FM 685 & (Future) Geraldine	<ul style="list-style-type: none"> • Signalize intersection
<i>FM 685 & Pflugerville Parkway</i>	<ul style="list-style-type: none"> • Full CFI (Continuous Flow Intersection) • Conversion of floodplain space into park
FM 685 & Pfennig Lane	<ul style="list-style-type: none"> • Additional dedicated right turn lane from Pfennig
FM 685 & Split Oak / Old Austin-Hutto Road	<ul style="list-style-type: none"> • Lane reassignment and signal timing improvements
FM 685 & Applewood Drive ¹	<ul style="list-style-type: none"> • Signalize intersection
<i>FM 685 & (Future) Main Street</i>	<ul style="list-style-type: none"> • Signalize intersection • Gateway entrance treatment
<i>FM 685 & FM 1825 / Pecan Street</i>	<ul style="list-style-type: none"> • Pecan Street bridge over FM 685 • Gateway sign structure
Dessau Road & Oxford Drive	<ul style="list-style-type: none"> • Signalize intersection • Add west leg to connect Oxford Drive
Dessau Road & Olympic Drive	<ul style="list-style-type: none"> • Signalize intersection • Add west leg to connect Olympic Drive
<i>Dessau Road & Wells Branch Parkway</i>	<ul style="list-style-type: none"> • Additional turn lanes and extended turn lane storage

Table 7: Preferred Intersection Alternatives

¹Improvement is funded for construction by TxDOT Highway Safety Improvement Program (HSIP), anticipated 2024

a.) SH 130 / Copper Mine Dr Overpass

The SH 130 / Copper Mine Drive Overpass had a substantial number of options explored in the alternatives development in prioritization, as shown in Chapters 4 and 5 of this report. Included in those alternatives were innovative intersections, such as a diverging diamond, disconnecting the overpass from Colorado Sand Dr, and a potential underground tunnel for FM 685 traffic destined for or originating from SH 130 main lanes to bypass this intersection and the intersection of SH 130 at Kelly Lane entirely. Ultimately, the configuration below resulted in an acceptable Level of Service (LOS) when traffic is fully built out in Pflugerville. The U-turn bridges were a popular recommendation at both Open Houses and provide relief to Stone Hill Town Center traffic destined north of this area. The traffic modeling showed that the bridge only needed to be 5 lanes wide, but was conservatively shown at 6 lanes wide for additional capacity and flexibility in future lane striping and operations. It should also be noted that improvements to this intersection were coordinated with the 2020 Transportation Bond Short-Term Project for this location to maximize re-use of planned improvements.

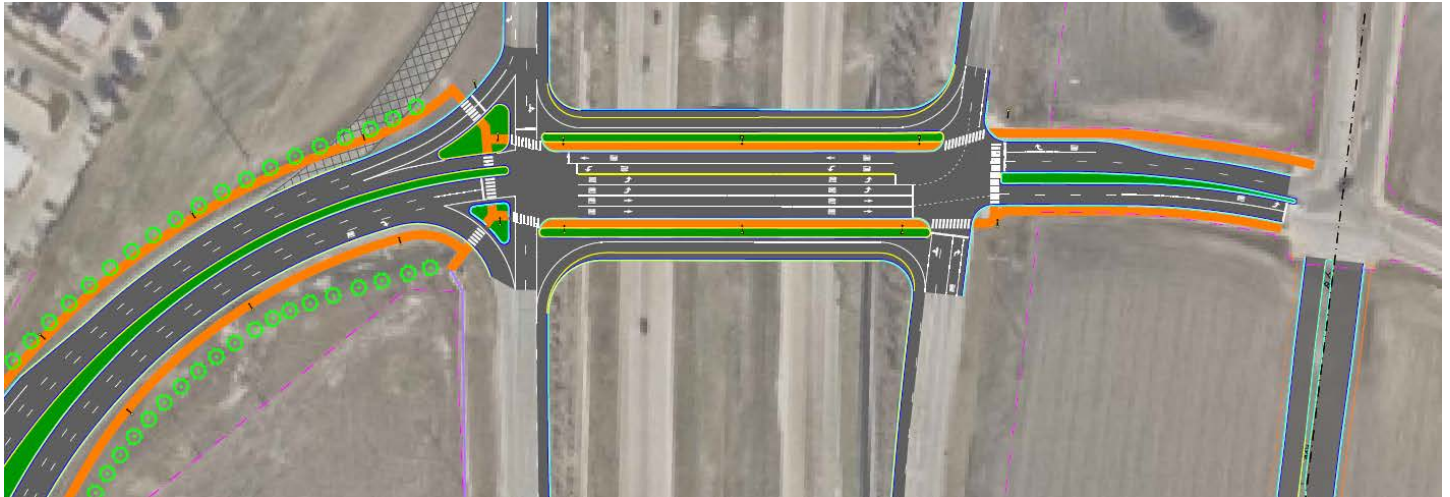


Figure 6-8: SH 130 / Copper Mine Dr Overpass Preferred Concept

b.) Town Center Drive

The Town Center Drive intersection received a significant number of comments from the public at both Open Houses, generally centering on the need for additional turn lanes in the northbound direction and improvement to right-turns from FM 685 into the Stone Hill Town Center shopping center from this general area. The preferred concept makes use of the existing shared use path adjacent to Typhoon Texas, improves turn lane capacity on all approaches to the intersection, and eliminates southbound left turns (since the entrance to Typhoon Texas is right-in, right-out access only). The traffic modeling shows that this intersection is projected to operate an acceptable level of service with the proposed improvements. The resulting wide median north of the intersection could serve as an additional gateway or landscaping treatment for aesthetic placemaking, but also preserves space if in the future there are improvements to SH 130 that could revisit a tunnel concept for regional traffic improvement both at Copper Mine Drive Overpass and Kelly Lane at SH 130. Figure 6-9 illustrates the preferred concept for the intersection at this location.

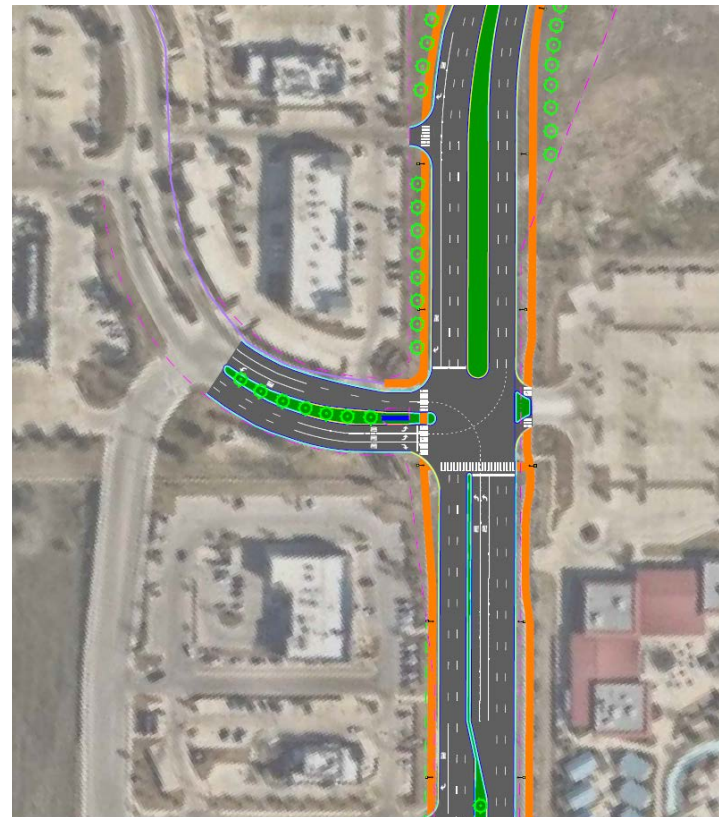


Figure 6-9: Town Center Drive Preferred Concept

c.) Pflugerville Parkway

Pflugerville Parkway was identified as the most congested and highest crash rate intersection (when factoring in construction related crashes at Pecan Street), and thus required innovative solutions to mitigate both of these challenges. In the alternatives prioritization in Chapter 5, another solution involving a bridge section for Pflugerville Parkway over FM 685 was explored, but was deemed infeasible due to excessive costs, significant environmental constraints, and did not perform as well as the preferred concept of a Continuous Flow Intersection (CFI). Figure 6-10 illustrates the preferred concept for the intersection at Pflugerville Parkway. It should also be noted that improvements to this intersection were coordinated with the 2020 Transportation Bond Short-Term Project for this location to maximize re-use of planned improvements.

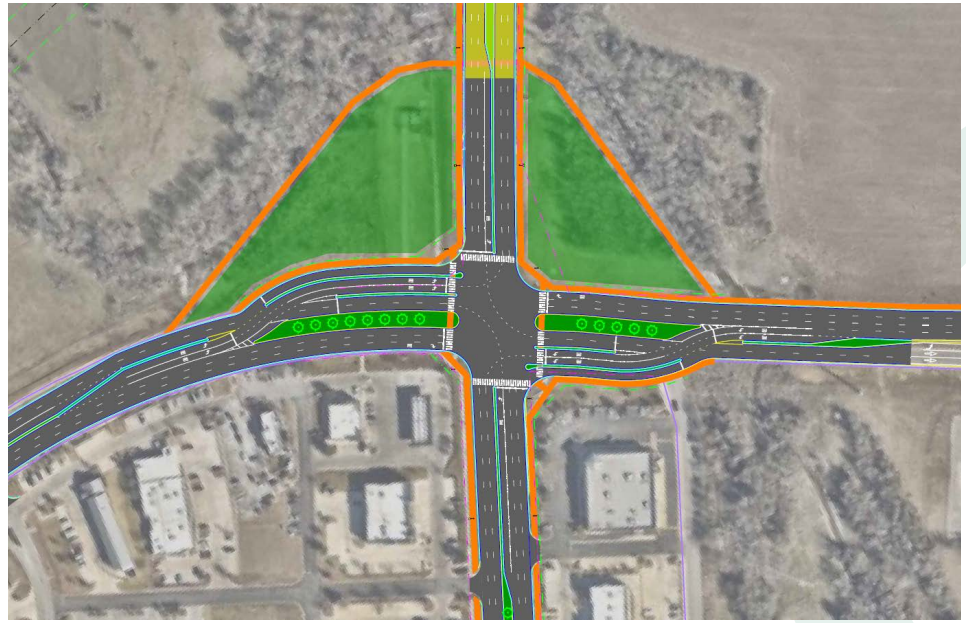


Figure 6-10: Pflugerville Parkway Preferred Concept

Several comments were received on this concept at the Open House in December 2022 out of concerns related to the existing CFI at the intersection with Pecan Street built in 2021. While both of these intersections are considered “CFI’s”, the design is quite different. This is illustrated in the side-by-side below of aerial concepts with driver viewpoint enhancements for the southbound left turn at the CFI at Pecan Street and FM 685 as well as a CFI in Cedar Park at Parmer Lane and Whitestone Boulevard (designed similar to the recommended CFI at Pflugerville Parkway and FM 685) in Figure 6-11. As can be seen in these images, the design is significantly different and eliminates the current condition experienced and commented about wrong-way drivers on the west leg of the intersection at FM 685 and Pecan Street.



Figure 6-11: Continuous Flow Intersection Comparison

d.) (Future) Main Street

Main Street is planned to extend from its existing terminus at Railroad Ave to the west of FM 685 and extend to FM 685 through the Downtown East development. This new connection was planned in the 2020 Transportation Master Plan and provides an alternative route to Pecan Street in this area as well as an urban boulevard as proposed. A separate design project was ongoing for this extension from the 2020 Transportation Bond and was coordinated with for improvements. This location was also determined through analysis regarding required turn lane lengths needed for this intersection at Pecan Street on FM 685 as part of the Corridor Study. The preferred concept is illustrated in Figure 6-12 below with potential monument signs shown in blue at the west side of the intersection.

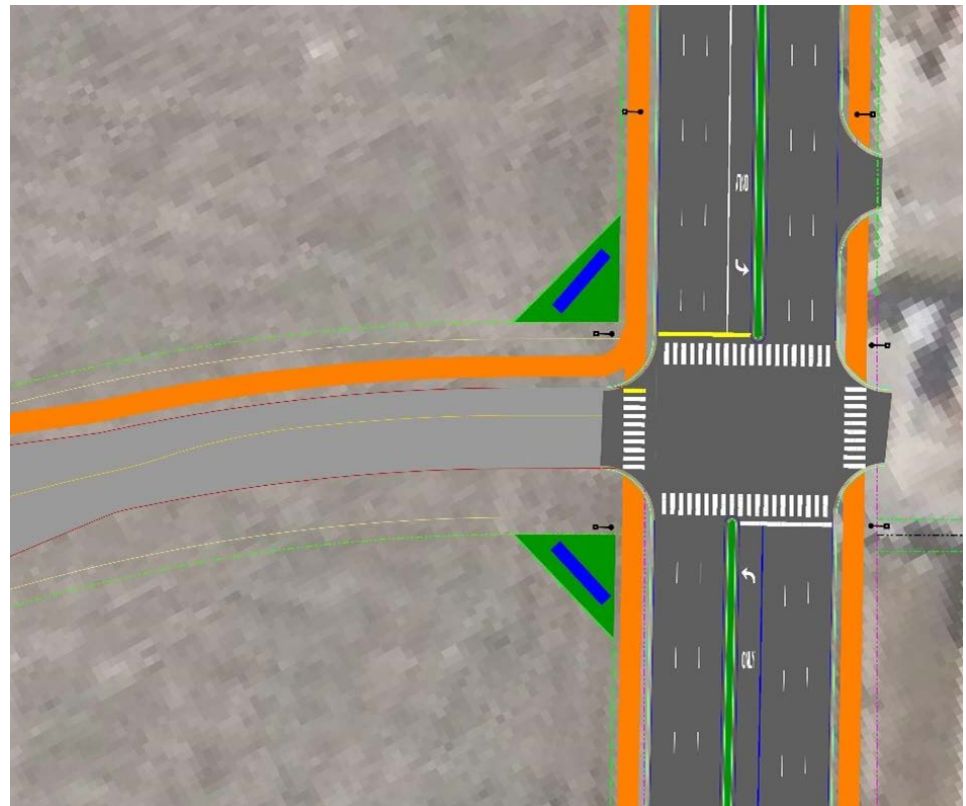


Figure 6-12: Main Street Extension Intersection Preferred Concept

e.) Pecan Street

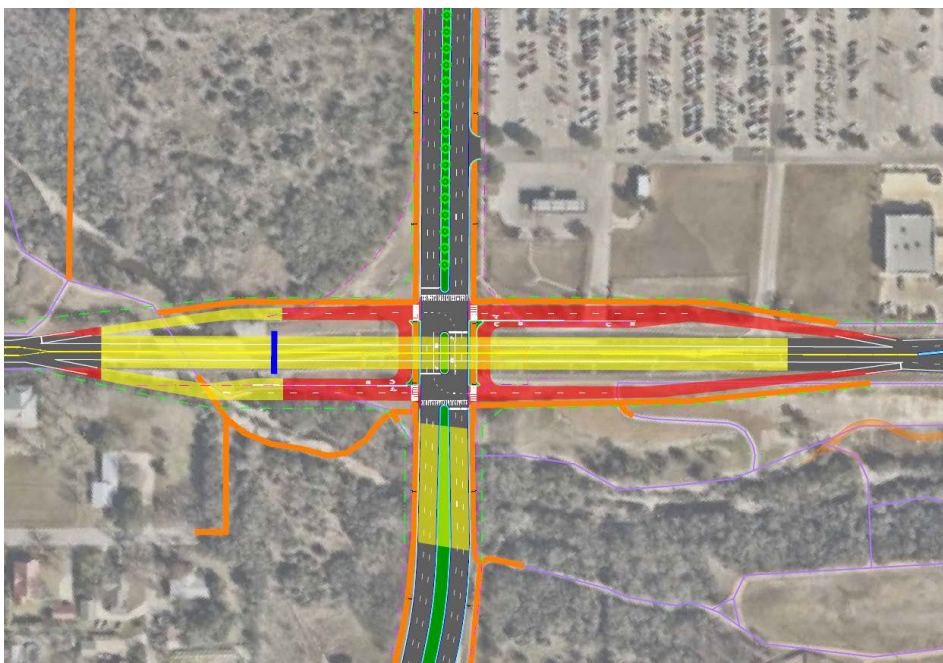


Figure 6-13: Pecan Street Preferred Concept

Pecan Street was the most commented on location throughout the process from the public, both at in-person events and online. The current Continuous Flow Intersection has caused significant concern among residents, although data shows it is operating more efficiently and with a lower crash rate in the 6 months since opening compared with the 6 months prior to the start of construction. The improvement made in 2021 was constrained due to funding and being unable to alter the existing bridge structures on Pecan St and FM 685 in the short-term. This long-term solution evaluated the current intersection, improving to a CFI like shown in this report as recommended for Pflugerville

Parkway, and with the preferred concept shown in Figure 6-13. In addition, a bridge for FM 685 over Pecan Street was also evaluated, but the option in the preferred concept performed best for Level of Service and delay. In addition, the right-of-way footprint for the Pecan Street bridge over FM 685 was significantly less than the alternative bridge configuration. Shared Use Paths are planned to cross on both sides of each facility and tie into the existing trail system.

f.) Wells Branch Parkway

Wells Branch Parkway is a regional east-west connection that will eventually connect to SH 130 to the east of this intersection, but did not connect at the time of this study. While several alternatives were evaluated at this location, a traditional intersection with expanded left and right turn lanes performed the best operationally and includes improvements to install shared use paths on Wells Branch to nearby areas. Figure 6-14 illustrates the preferred concept at Wells Branch Parkway.

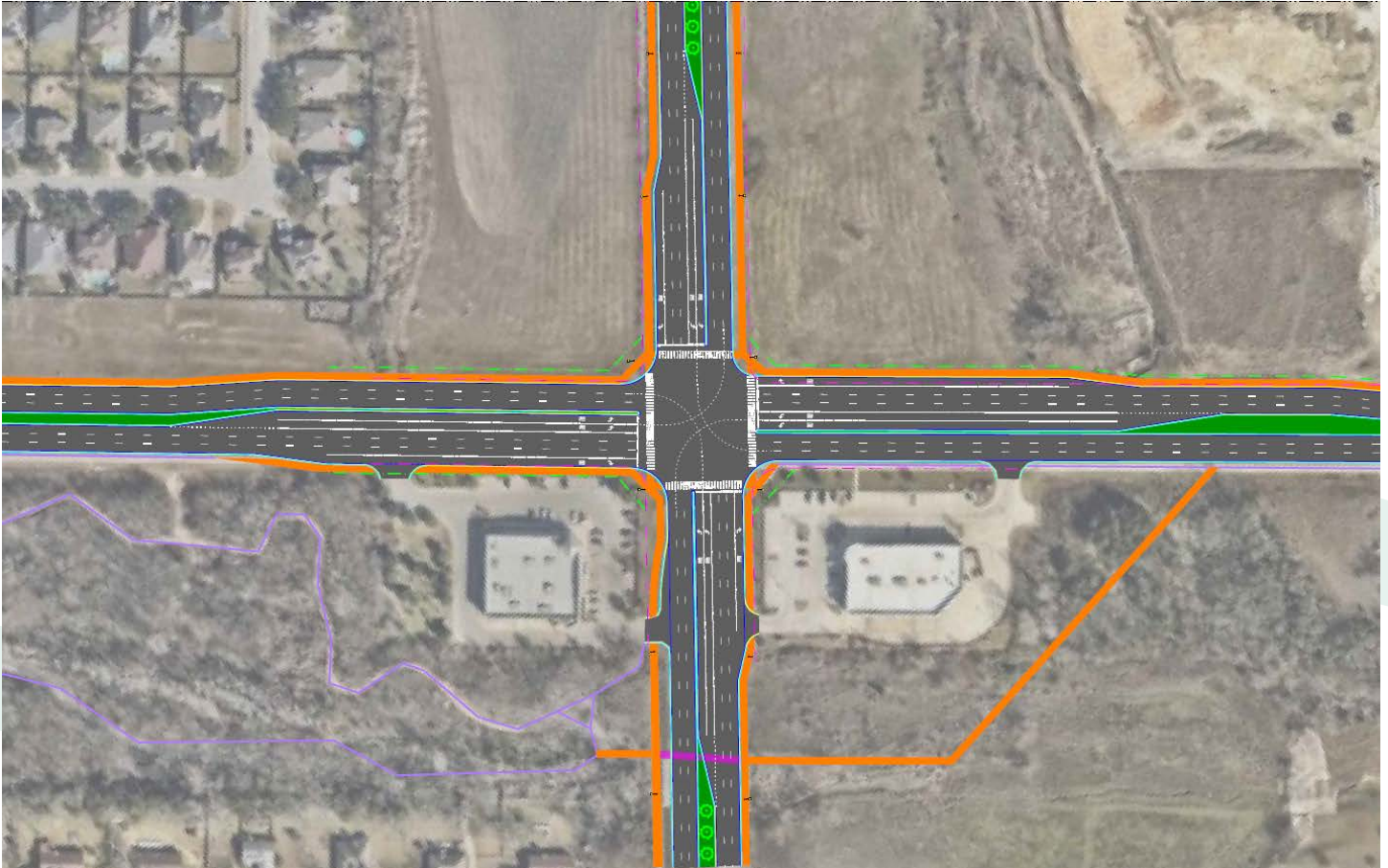


Figure 6-14: Wells Branch Parkway Preferred Concept

B. Preferred Concept Performance

This section specifies congestion and safety related improvements for the overall corridor for the preferred concept. Additional performance metrics are shown in Chapter 5 with alternative prioritization for the “Urban Boulevard” concept and for intersection specific information. Cost estimates and benefits will be detailed in the following Chapter 7.

1. Operational Performance

Traffic modeling software was used to analyze the Level of Service (LOS) at intersections and segments along the corridor. The preferred concept was analyzed with 2042 (20 years from now) projected traffic volume increases for when Pflugerville builds out with development. Using the same project volumes for 2042, the existing corridor was analyzed to be able to show the effect of the improvements. The Level of Service results can be seen in Figure 6-15 below:



Figure 6-15: LOS in 20 Years With and Without Improvements

2. Safety Metrics

Many of the recommended alternatives included in the preferred concept have significant safety benefits for drivers, pedestrians, and bicyclists. There is thorough data and analysis into the impact roadway improvements have on reducing crashes on roadways. Table 8 shows some of the recommended alternatives and the impacts they have on reducing crashes:

Improvement	Average Crash Reduction
Reduced speed limit to 35 mph	15% Overall Reduction
Dedicated turn lanes	10% Less Rear-End Collisions
Signalization at previously unsignalized existing intersections	25% Overall Reduction
Continuous Flow Intersections (removes conflict points)	12% Overall Reduction

Table 8: Crash Reductiton for Potential Safety Improvement

Chapter 7: Implementation

A. Potential Project Phasing

The FM 685 / Dessau corridor is a substantial project that will require funding from outside sources to the City to complete without a substantial investment via citizen vote. To accelerate construction timeframes, it is often recommended to break up a project into phases with independent utility. This could include designing and constructing intersection improvements first, then tying in widening from 4 to 6 lanes at a later time. Phasing may also include completing a portion of the corridor first and then subsequent sections as funding is available. It is recommended if the latter approach is taken that the northern end of the corridor be completed first (from Pflugerville Parkway to SH 130 along FM 685) as the most critically congested and lacking in pedestrian and bicycle infrastructure.

B. Future Phases of the Project

Disclaimer: Project schedule dates are subject to change

The FM 685 Corridor Improvements project is anticipated to develop in four phases:

Phase 1: Corridor Study (current phase)

Phase 2: Schematic & Environmental Preliminary Design (immediately following Corridor Study)

Phase 3: Final Design of Plans, Specifications, & Estimate (PS&E)

Phase 4: Construction

A timeline of the current Corridor Study phase and an estimate of the following phases is shown in Figure 7-1 below:



Figure 7-1: Project Timeline



1. Schematic

The schematic design will begin soon after the Corridor Study concept is approved.

The schematic phase incorporates more detail than the concept and is used to precisely analyze Right-of-way impacts and potential utility relocations, drainage needs for the corridor, and more detailed design to prepare for final design. Right-of-way acquisition and utility coordination may occur simultaneously during this phase as the project's final design becomes clear.



2. Environmental Clearance

Roadway construction projects must obtain environmental clearance before the project can break ground when federal funding or other impacts are involved, which are likely for the FM 685 / Dessau Road Corridor. Due to this, extensive environmental analysis is typically performed during the same phase as the schematic design and considers the environmental impacts due to the construction of the roadway. The NEPA process ensures projects are in compliance with applicable environmental laws, regulations, and standards.

C. Cost Estimates

Disclaimer: The following cost estimates are planning level costs and are subject to changes due to inflation and design changes in later phases of the project

With a total of 7.0 miles of new roadway lanes added, 5.0 miles of new shared-use paths installed, and two innovative intersections implemented along the corridor, the estimated total cost of the project amounts to \$126.7 million. This can be broken down to an estimated \$64.2 million accounting for general roadway costs to add lanes, extend sidewalks, etc. The remaining \$62.5 million would be required to implement all intersection improvements throughout the corridor.

It should be noted that these cost estimates do not include costs for utility relocations or the cost of property acquisitions via right-of-way or easements. These cost estimate details can be seen in Figure 7-2. A detailed Cost Estimate can be seen in Appendix G.



3. PS&E

The Plans, Specifications, & Estimate (PS&E) phase of roadway construction projects takes the schematic design and uses approved design criteria to create full construction documents. Typically, the plans are reviewed several times throughout the design process to ensure completeness, accuracy, and compliance. As part of the construction documents, a detailed breakdown of the project's cost estimate is provided to allow contractors to place their bids to construct the roadway.



4. Construction

Once the final plans have been submitted and approved, the contractor who was awarded the project can begin construction. Construction timelines can vary due to delays caused by material manufacturing, weather, etc. Funding for construction of the FM 685 project has not been acquired and the City of Pflugerville is looking at all options.

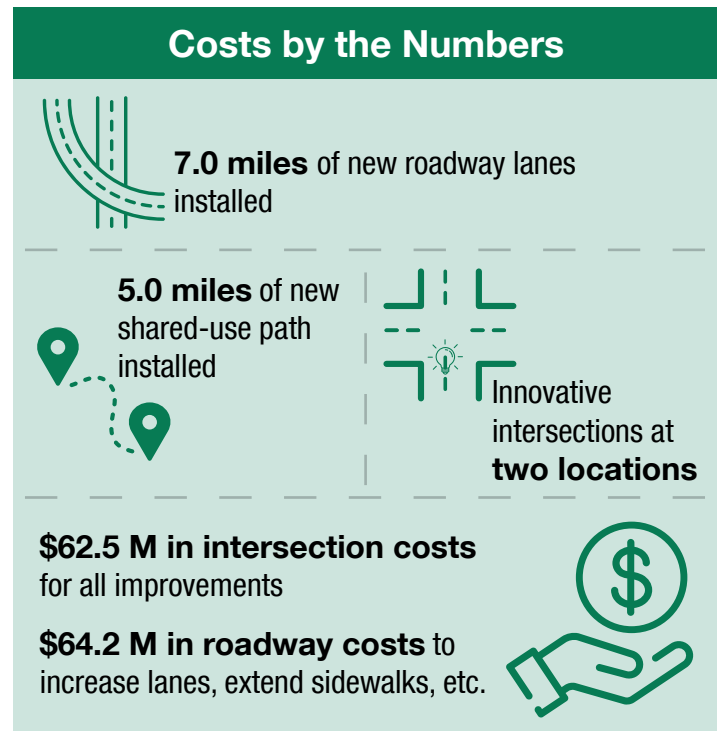


Figure 7-2: Project Costs

D. Cost Benefits of Project

The cost benefits attributed to the implementation and completion of the recommended alternatives over a 20-year period can be seen in Figure 7-3. Improved safety along the corridor contributes an estimated cost benefit of \$15.8 million to the community. Reduced traffic delay on and across FM 685 accounts for an estimated \$1.1 billion in cost benefits based on the median hourly pay of \$30. The fuel savings attributed to reduced congestion adds up to an estimated total of \$524.8 million based on a fuel cost of \$3.50 per gallon.

The recommended projects with the highest estimated benefit include side and parallel connections as well as signalization. Intersections with the most projected safety improvement include Pflugerville Parkway, Applewood Drive, and Pecan Street.

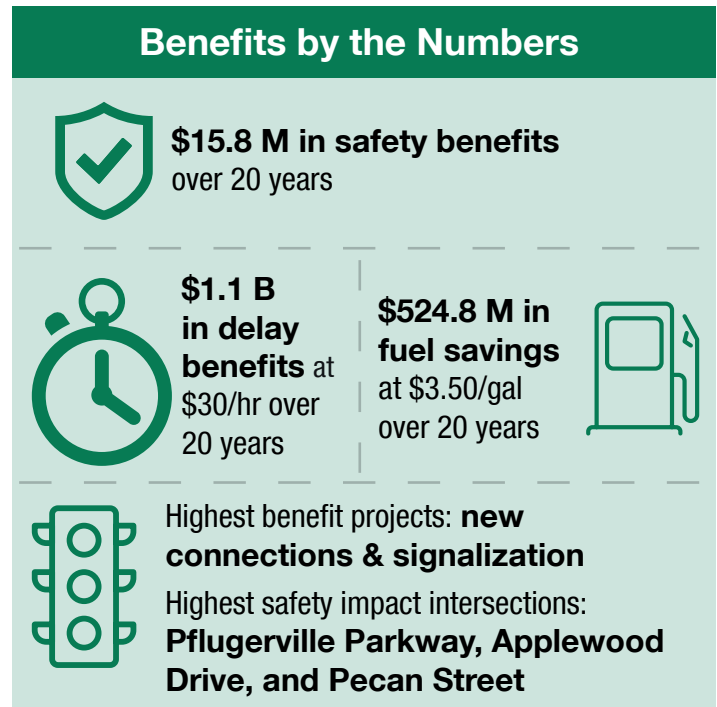


Figure 7-3: Project Cost Benefit

Appendices

A. Existing Conditions and Active Projects Layouts

B. Traffic Counts

C. Crash Detail Summary and Collision Diagrams

D. Existing Cross Sections

E. Synchro 11 Output Sheets

F. Alternatives Scorecards

G. Cost Estimate Details

H. Public Stakeholder Materials

I. Alternative Flipbooks and Final Concept Rollplot

J. 3D Renderings