Foster Drive Reconstruction
Project Development Report

Completed For:

City of Conroe, Texas

September 2022

Completed by:

THE **GOODMAN** CORPORATION

Contents

List of Tables

List of Figures

1. Project Introduction

The Foster Drive Reconstruction Project will reconstruct and widen the existing road from two to four lanes and add pedestrian facilities on both sides of the project corridor. The project corridor extends from S Frazier Street (SH 75) to Porter Road on Foster Drive (Figure 1). Foster Drive (Major Collector) intersects four key roads – S Frazier St/ SH 75 (Principal Arterial), S 1st St (Minor Arterial), 7th St (Major Collector) and Porter Road (Principal Arterial) within the project limits.

The project corridor is 1.62 miles long and is mainly surrounded by single-family residential properties. The project corridor also includes civic and institutional land uses – Anson W Runyan Elementary School, Conroe Fire Department Station No. 3, and the proposed Oscar Johnson, Jr. Community Center. The project corridor intersects a Union Pacific (UP) railroad track, almost 80 feet east of the western project limit. The railroad runs parallel to S Frazier St The project also intersects three creeks – Silverdale Creek, Stewart Creek, and a tributary of Stewarts Creek (Wetlands). Conroe Memorial Park Cemetery is a designated historic property within the project area and located at the eastern limit of the corridor.

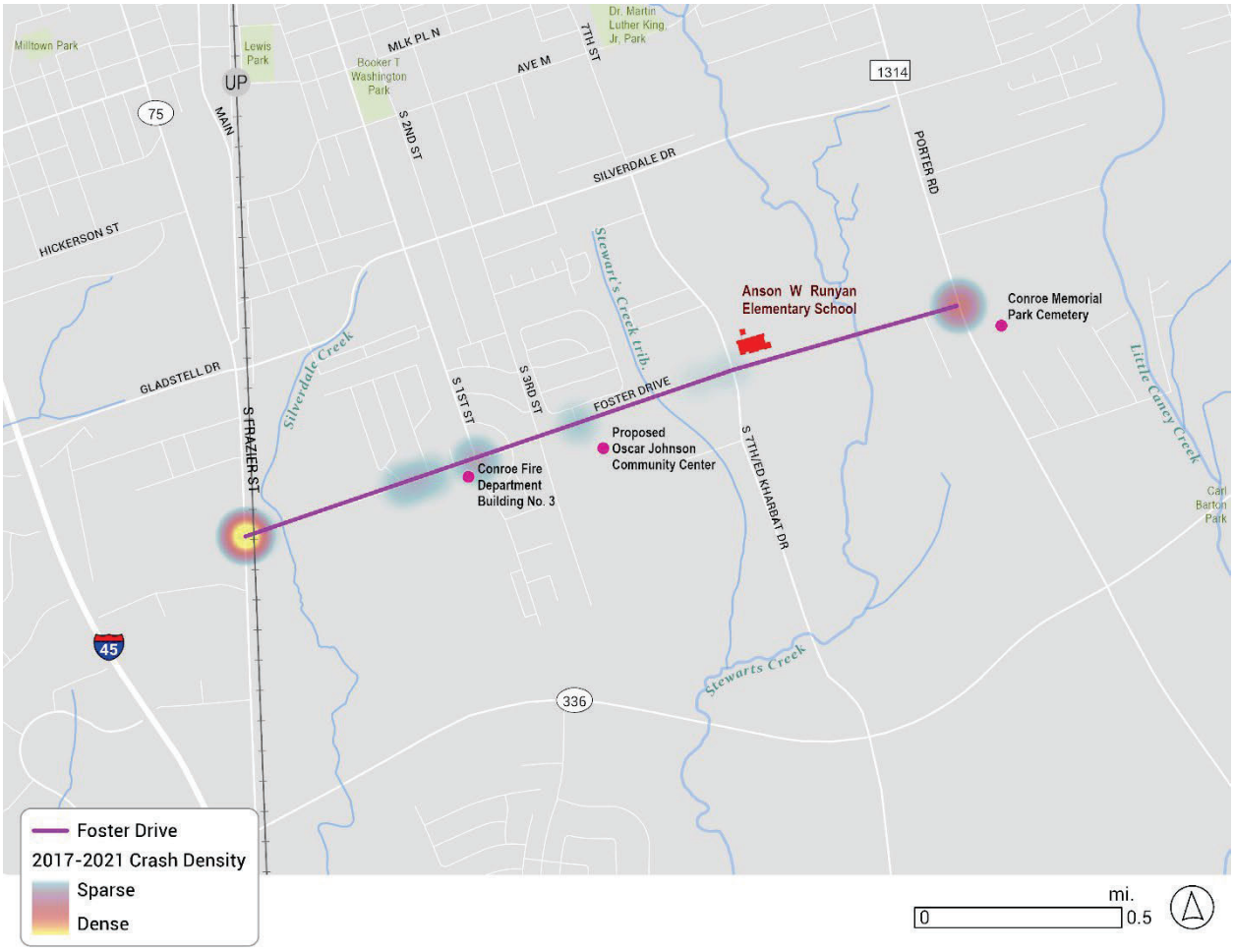

Figure 1 Foster Drive Project Limits

2. Existing Conditions – Brief Overview

Foster Drive, as it exists, is a two-lane, undivided asphalt roadway with open ditches on both sides and culverts at the adjoining property entrances. The pavement has longitudinal and cross-cracks with faded pavement markings. The project corridor's ROW varies between 55' to 110' (Figure 2). Table 1 summaries the existing ROW within the project limits:

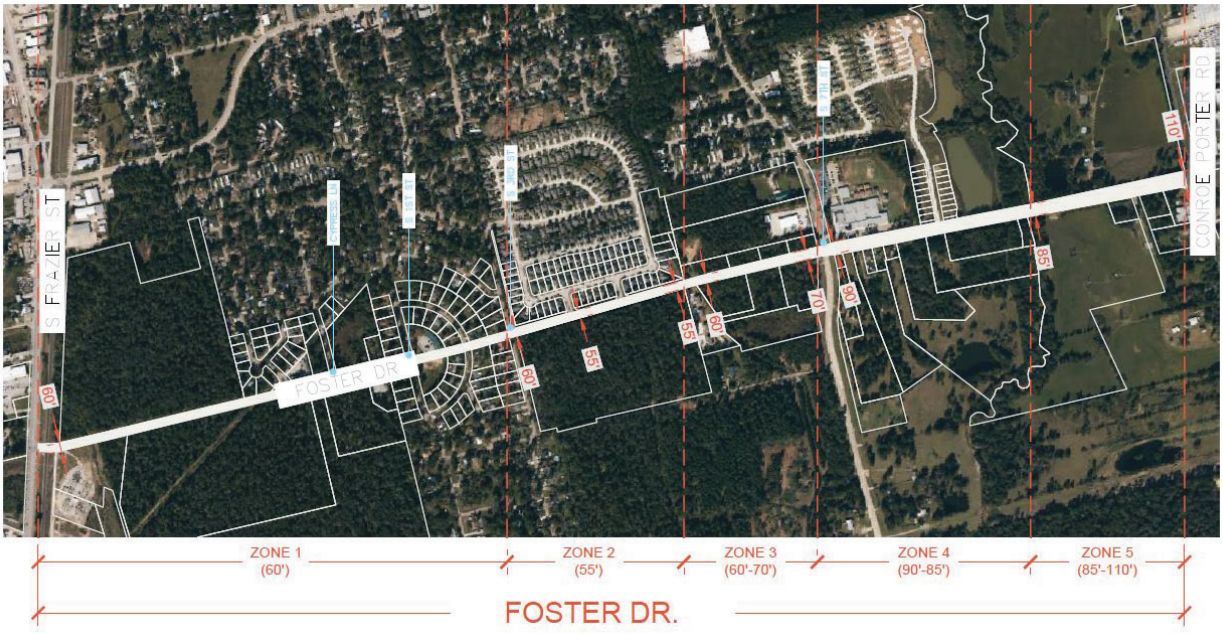

Figure 2 Various ROWs along Foster Drive

Table 1 Foster Drive ROW by Segments

Zone	Segment Name	Segment Length (in feet)	Existing ROW
1	S Frazier St to S 3rd St	3,510'	60'
2	S 3rd St to Wetland	1,360'	55'
3	Wetland to S 7th St	1,000'	60'
4	S 7th St to 1,520' after S 7th St	1,520'	85'
5	1,520' after S 7th St to Porter Road	1,150'	110'

The travel lane is 11 feet wide in both directions, with non-continuous sidewalks, missing crosswalks, and unpaved shoulders on either side. The existing alignment is not centered on the available ROW (Figures 3 and 4).

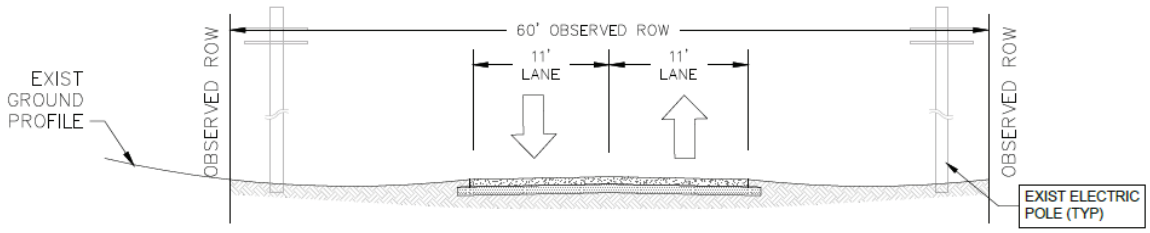

Figure 3 Foster Drive existing Section (between S 1st St and S 3rd St)

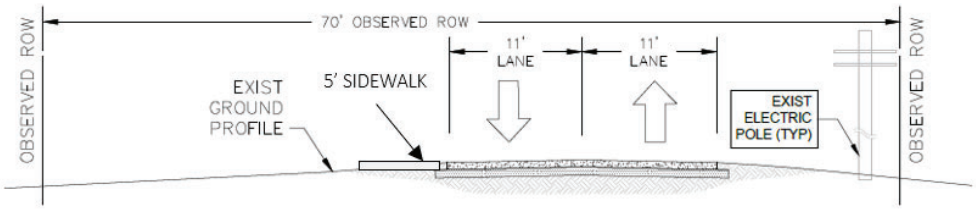

Figure 4 Foster Drive Existing Section (before S 7th St)

Within the project limits, Foster Drive intersects with five through streets, creating four-approach intersections. The following table summarizes the existing conditions of the intersections with key characteristics:

Table 2 Intersection Characteristics

Intersection Name	Traffic Control Mechanism	State of Good Repair	Lane Widths *(Foster Drive and Intersecting St, respectively)*
Foster Drive and S. Frazier St	Stop Controlled (has a railroad crossing)	Moderate	2 lane and 5 lanes (2,2, and center turn-lane)
Foster Drive and S 1st St	Stop Controlled	Good	2 lane and 2 lanes
Foster Drive and S 3rd St	Stop Controlled	Good	2 lane and 2 lanes
Foster Drive and S 7th St (also called Ed Kharbat St)	Stop Controlled	Good	2 lane and 2 lanes
Foster Drive and Porter Rd	Traffic Signal (w. span wire)	Moderate	2 lanes and 4 lanes

The intersection of Foster Drive with S. Frazier St includes a Union Pacific (UP) railroad track, almost 80 feet east of the western project limit, that runs parallel to S Frazier St (Figure 5). The railroad crossing has an automatic gate arm on both sides and experiences approximately 13 daily train trips. The vehicular intersection lacks a traffic light and is currently stop-controlled.

Figure 5 At grade railroad crossing (Looking towards S Frazier St)

A 0.3-mile stretch on Foster Drive between E Lightning Bug Ct and Anson Runyan Elementary School has a 5' wide sidewalk. The sidewalk on the north side of the corridor connects to an existing sidewalk on S 7th St. This segment of the sidewalk along the project corridor was built in 2016 after a severe bike crash around Anson Runyan Elementary School. Given the constrained ROW at this intersection (55'- 60'), a slotted curb has been placed between the travel lanes and sidewalk in place of a paved shoulder and buffer space for pedestrian safety (Figure 6).

Figure 6 Curb Stops along Foster Drive Sidewalk (between E Lighting Bug Ct and Anson Runyan Elementary School); A typical section of the sidewalk to Anson Runyan Elementary School

The existing roadway spans over three creeks - Silverdale Creek, Stewart Creek, and a tributary of Stewarts Creek (Figure7). Silverdale Creek is seasonal in nature and passes under the existing Foster Drive alignment through a channeled culvert (Figure 8).

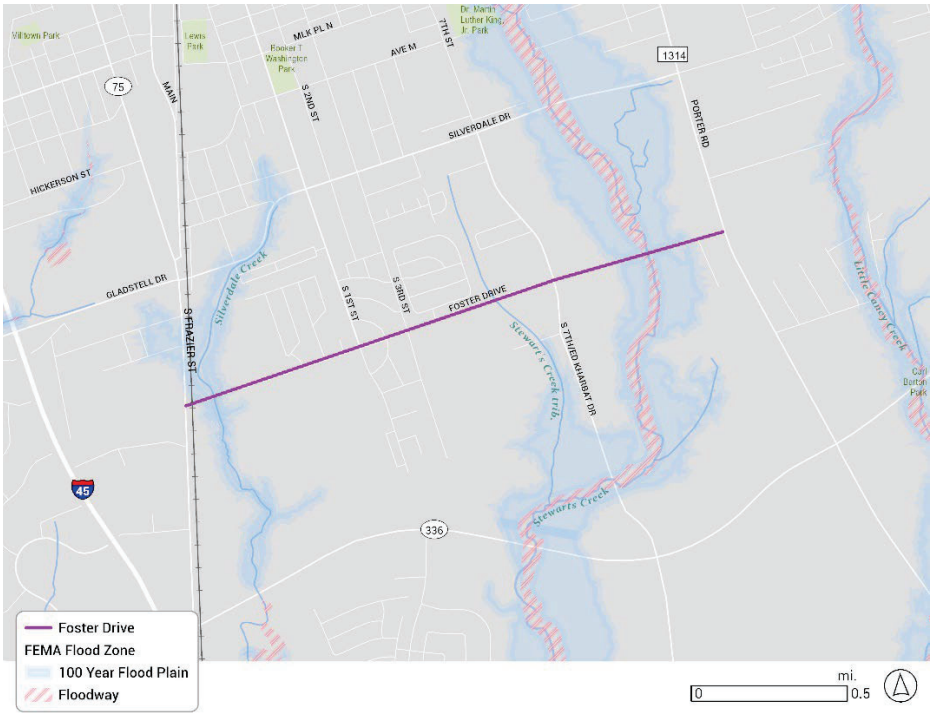

Figure 7 Creeks and Floodplains in Project Limits

Figure 8 Crossing at Silverdale Creek

The existing alignment of Foster Drive spans over Stewarts Creek as an undivided two-lane elevated bridge (250 feet long) without any sidewalk accommodations (Figure 9). The existing bridge cross-section is 45’ wide and has a paved 9’ wide shoulder with the 12’ wide travel lanes (Figure 10).

Figure 9 Bridge over Stewarts Creek

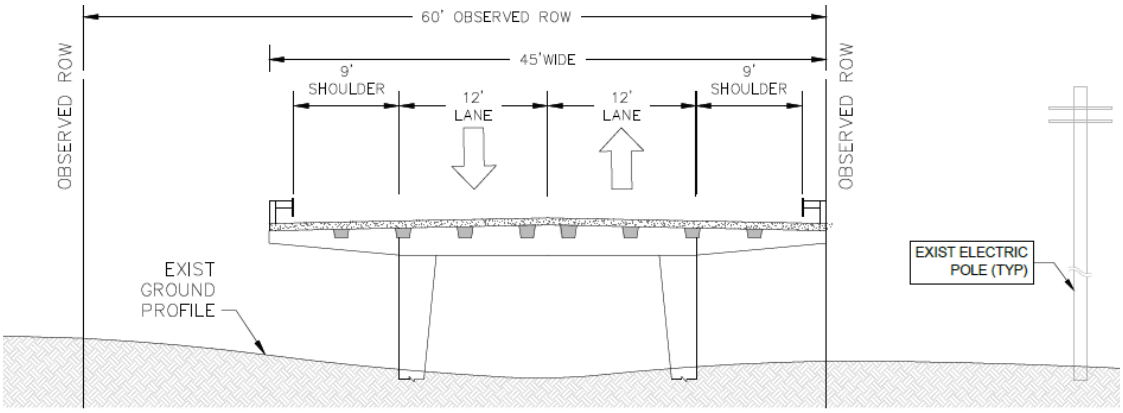

Figure 10 Existing Bridge Cross section at Stewarts Creek

The Stewarts Creek's tributary intersects Foster Drive almost 1,000' west of S 7th St (also known as Ed Kharbat Dr). This tributary is seasonal and passes under the existing Foster Drive through a channeled culvert (Figure 11).

Figure 11 Stewart Creek Wetland on Foster Drive passes through a culvert

On either side of Foster Dr. are utility poles carrying overhead electric wires and telephone lines. Some of these utility poles have streetlights mounted on them. Around the intersections, streetlights are mounted independently for better night visibility.

3. Project Scope

The Foster Drive Reconstruction Project proposes to widen the road from two to four lanes and install five feet-wide sidewalks with ADA-compliant ramps and crosswalk markings on both sides of Foster Drive from S Frazier St to Porter Road. Project limits are shown in Figure 1. The proposed cross-section adapts the City of Conroe's minor arterial concrete street section standard details (Figure 12) that specify a minimum right-of-way (ROW) of eighty feet (80') to seventy feet (70') (Figure 13). The effective reduction of 10' is an outcome of minimizing (min 4.5' of variable space) the proposed buffer space between the sidewalks and the ROW line. The proposed design does not alter travel lanes or sidewalk widths.

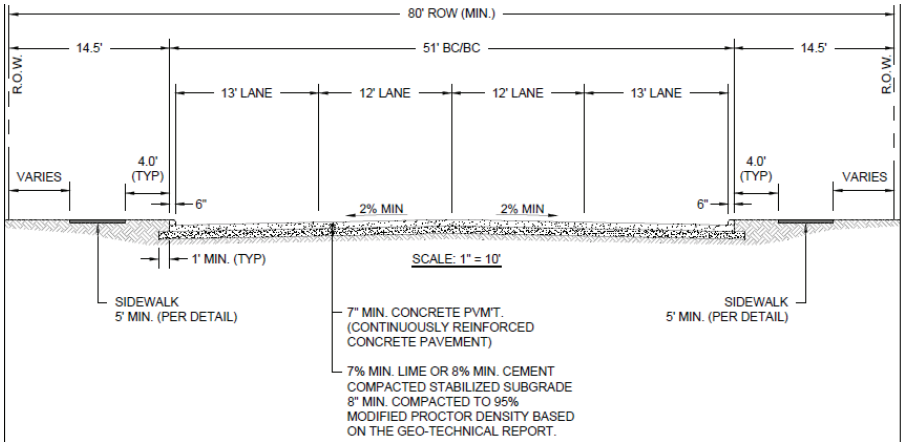

Figure 12 City of Conroe's minor arterial concrete street section standard details

In case, where the ROW is less than 70', this width is further reduced to 60' by removing the buffer of 4' on both sides between the sidewalk and travel lanes (Figure 14). This is done to avoid the additional ROW acquisition. The 4' buffer helps in placing concrete shuttering and other construction related procedures. In its absence, the construction becomes a little challenging but isn't impossible.

Figure 13 and 14 illustrates the proposed cross-sections.

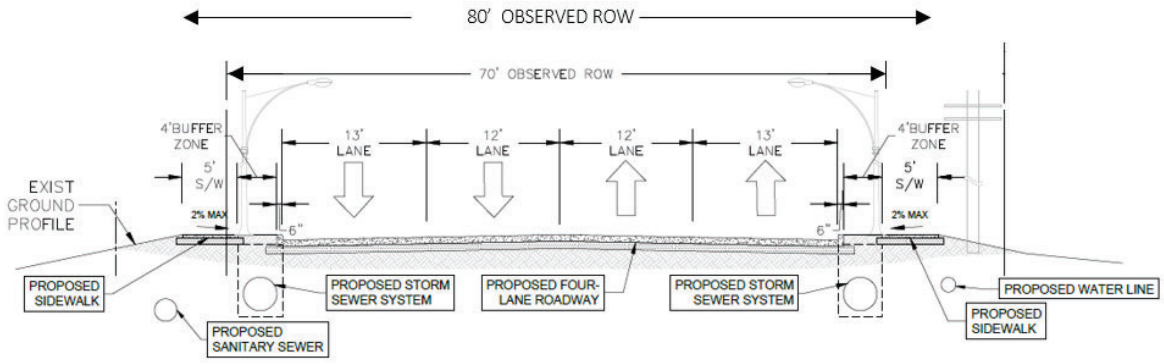

Figure 13 Foster Drive Proposed Cross-section 01

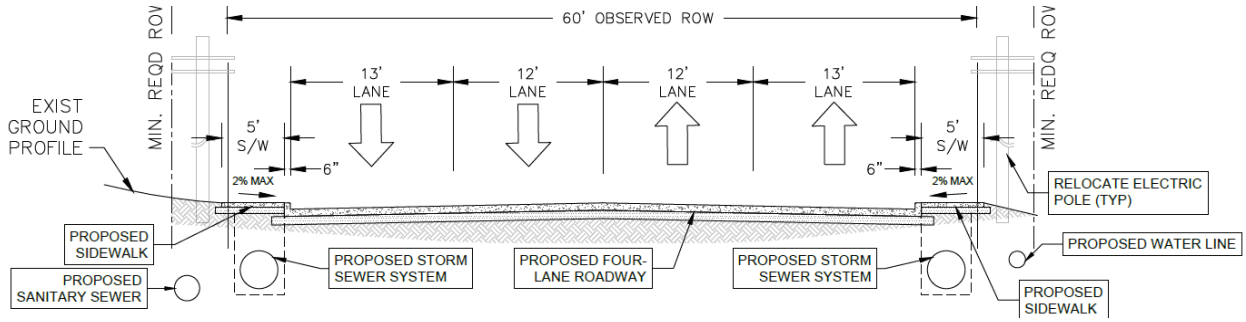

Figure 14 Foster Drive Proposed Cross-section 02

The upcoming sections elaborate on the proposed design in the following order:

- **Zone 1a** - S Frazier St to Cypress Ln
- **Zone 1b -** Cypress Ln to S 1st St
- **Zone 1c -** S 1st St to S 3rd St
- **Zone 2**- S 3rd St to Wetland
- **Zone 3**- Wetland to S 7th St
- **Zone 4** - S 7th St to 1,520' after S 7th St)
- **Zone 4a** - Stewarts Creek Bridge
- **Zone 5 –** 1,520' after S 7th St to Porter Road

Zone 1a – S Frazier St to Cypress Ln

Figure 15 illustrates the proposed intersection of Foster Drive and S Frazier St (intersection at the project's western limits). Note this cross-section alignment continues up to Cypress Lane (0.4 mile). The available ROW at this section is 60'. The proposed cross section measures 69' in width and will need ROW acquisition. The

proposed intersection upgrade includes expansion from two-to-four lanes (including a dedicated left-turn lane), lane widening, addition of traffic signals, railroad crossing upgrade to include replacement of railroad gate, addition of sidewalks, ADA ramps, and crosswalks.

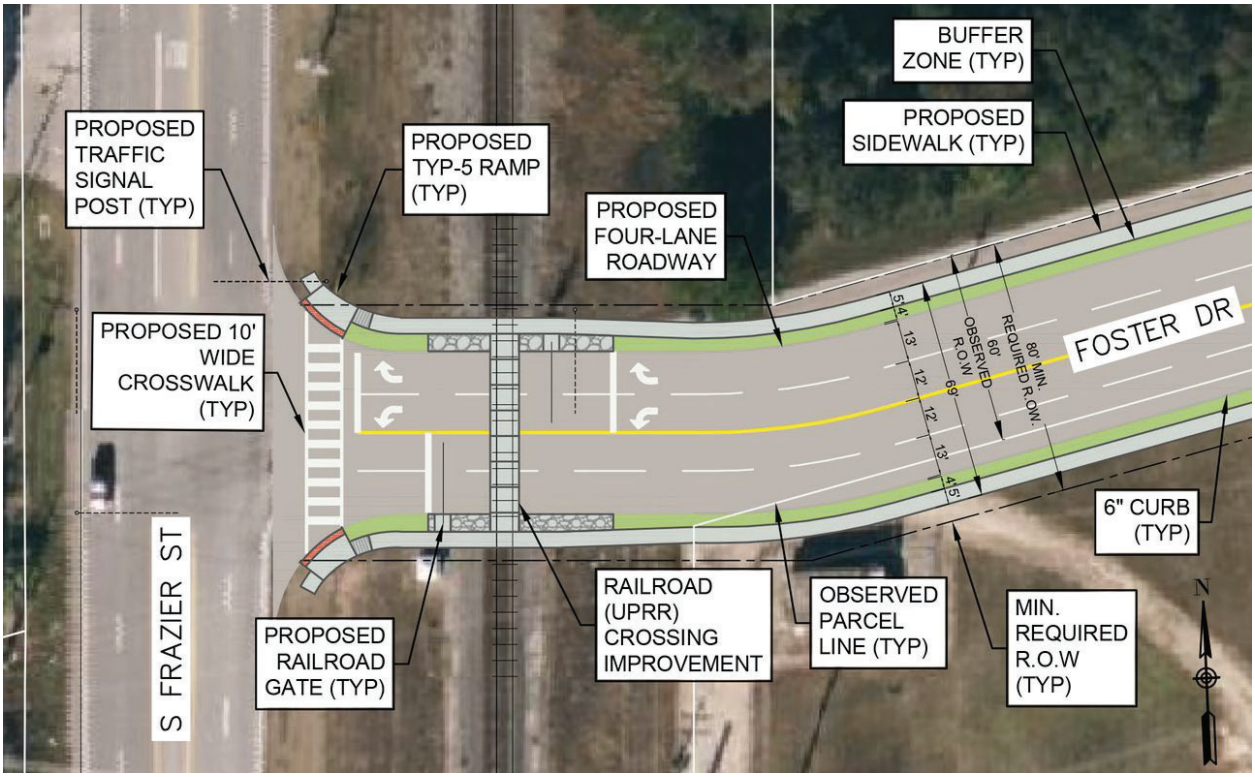

Figure 15 Proposed Intersection of Foster Drive and S Frazier St

Zone 1b - Cypress Ln to S 1st St

The segment between Cypress Lane and S 1st St measures 0.1 miles and has an existing ROW of 60'. The proposed cross section utilizes the existing ROW of 60' to fit four travel lanes and 5' sidewalks on both sides without any buffer (Figure 16 and Figure 17). This segment has some existing residential properties abutting the corridor, and the proposed cross-section was worked out to avoid acquiring any additional ROW.

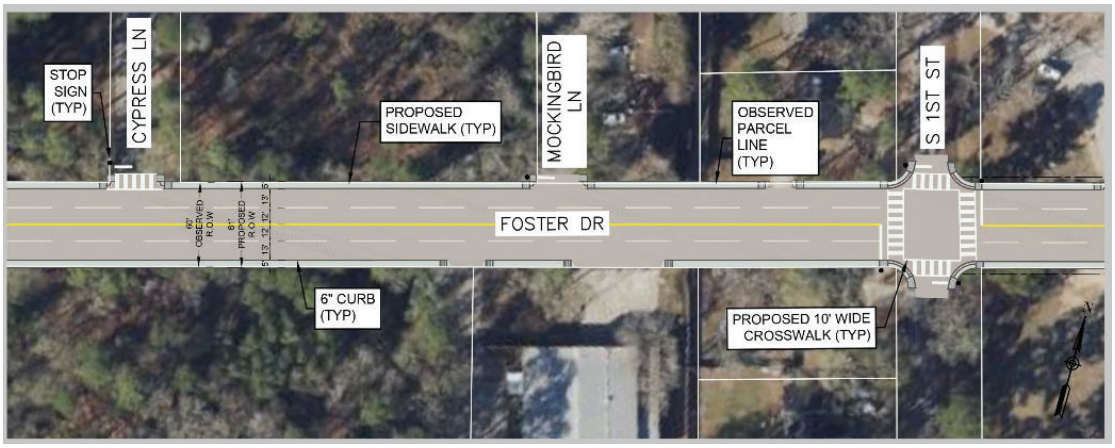

Figure 16 Foster Drive Proposed Schematic between Cypress Ln and S 1st Street

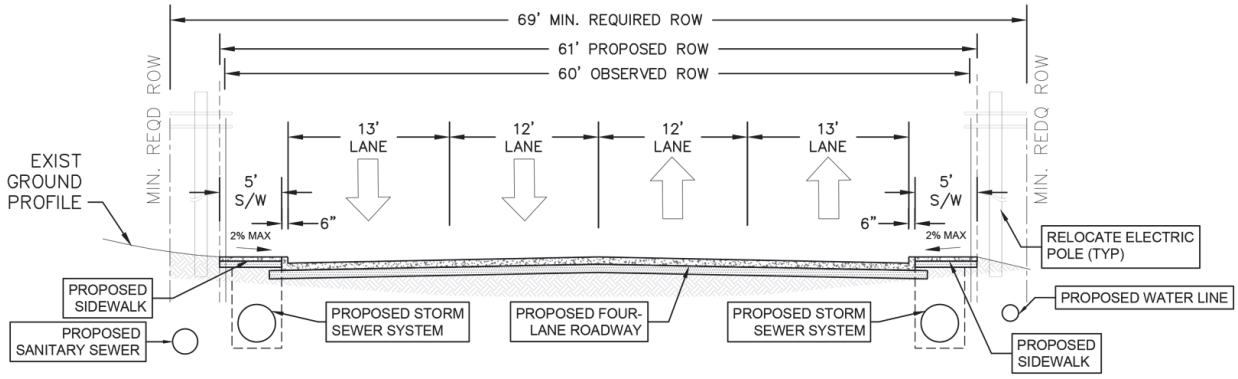

Figure 17 Foster Drive Proposed Section between Cypress Ln and S 1st St

Zone 1c – S 1st St to S 3rd St

A 0.15-mile stretch between S 1st St and S 3rd St has an available ROW of 60', and existing residential lots have house walls built close to the lot lines (Figure 18). The proposed cross section omits the 4' buffer from both sides of the roadway to continue the travel lanes and sidewalks throughout the corridor. Figures 19 and 20 illustrate the proposed plan and section, respectively. This segment continues the 60' cross-section from the previous segment.

Figure 18 Residential properties very close to the ROW between S 1st and S 3rd St

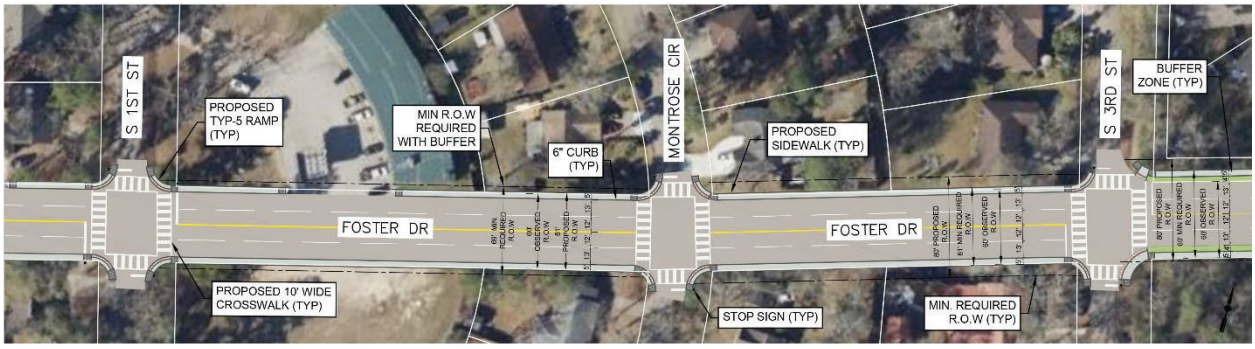

Figure 19 Foster Drive Proposed Schematic between S 1st St and S 3rd St

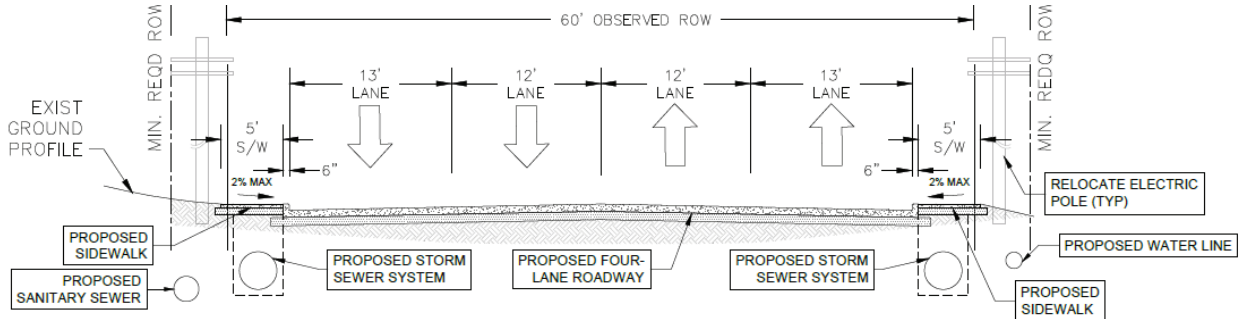

Figure 20 Foster Drive Proposed Section between S 1st St and S 3rd St

Zone 2 – S 3rd St to Wetland

Figure 21 illustrates the proposed cross-section between S 3rd St and the Wetland. This stretch has an existing ROW of 55’ and is the tightest stretch on the project corridor. The proposed Oscar Johnson Jr. Community Center is south of this stretch. The land belongs to the City of Conroe. The proposed cross section measures 69’ and would need additional ROW acquisition. The City has agreed to donate the needed ROW from the proposed Community Center parcel on the south side of the project corridor. Additionally, as per the recent communication between the City and residential property owners along Lightning bug Ct, the property owners have agreed to donate the requisite ROW on the north side of the project corridor.

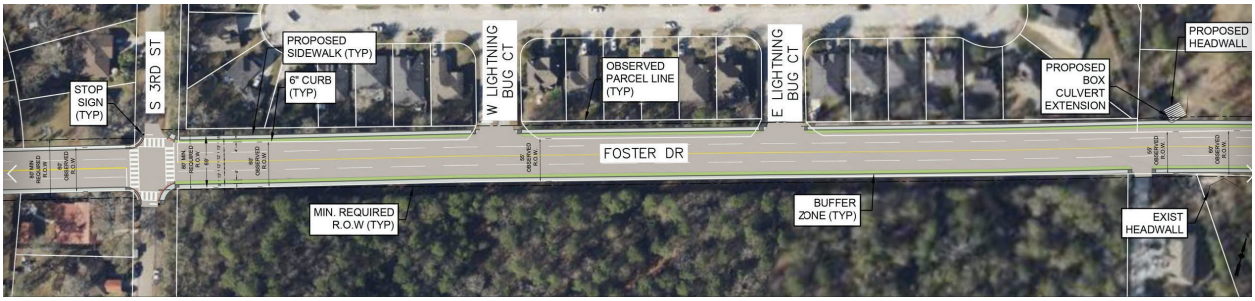

Figure 21 Foster Drive Proposed Schematic between S 3rd St to the Wetland

Zone 3 – Wetland to S 7th St

The segment between Wetland and S7th St measures 0.18 miles and has an existing ROW of 60'. The proposed cross section measures 69' (Figure 13) and would need additional ROW acquisition. Most parcels along this stretch are vacant, making ROW acquisition possible.

Zone 4 – S 7th St to 1,520'after S 7th St

The stretch designated under Zone 4 is 0.28 miles long and has an existing ROW of 85'. The proposed cross section measures 69' (Figure 13) and would not need additional ROW acquisition.

Zone 4a- Stewarts Creek Bridge

Figure 22 illustrates the proposed bridge over Stewart's Creek on Foster Drive. The available ROW at this section varies between 85' to 100'. The proposed bridge design measures 69' and 110' wide at the through and split sections, respectively. The proposed alignment utilizes the existing bridge to move right-side traffic (towards Porter Rd.), and the new bridge accommodates the left-moving traffic (towards S Frazier St). The cross-section provides 12' and 13' wide travel lanes along with 8' wide shoulders on each side (Figure 23).

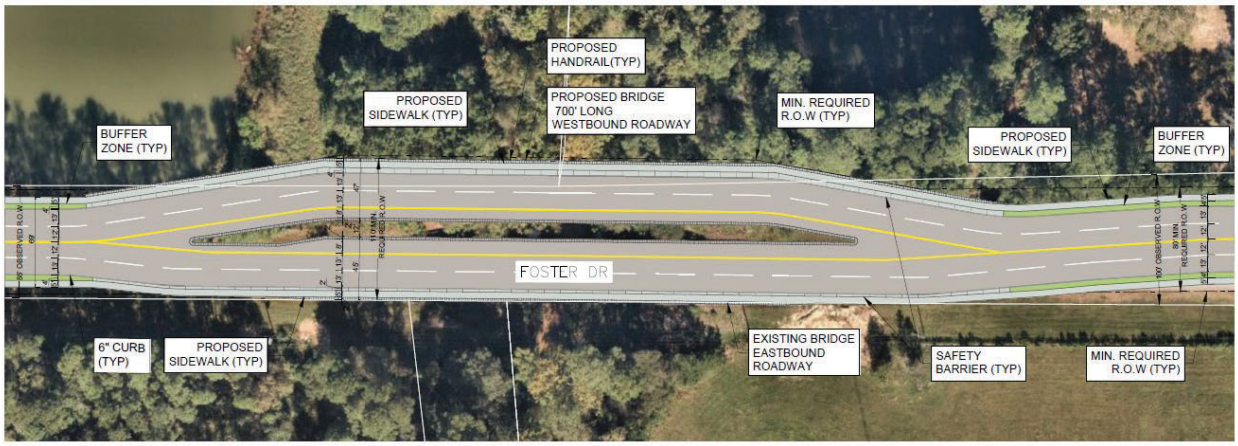

Figure 22 Proposed Bridge over the Stewart's Creek

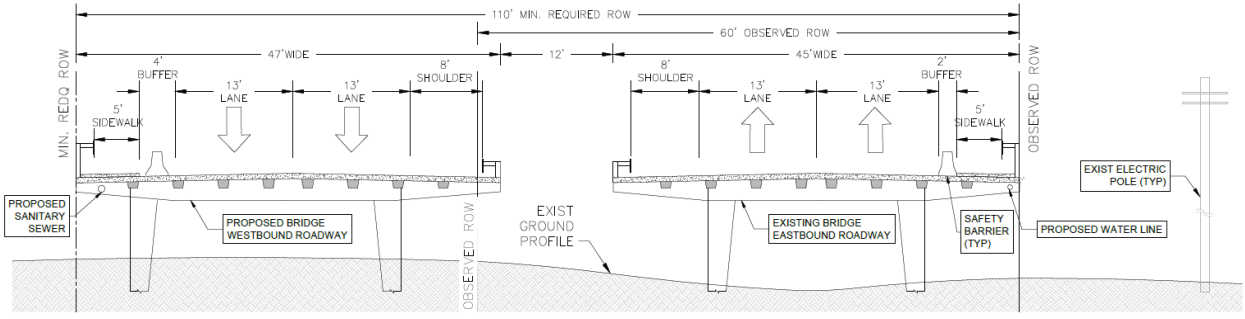

Figure 23 Proposed Bridge Cross Section

Zone 5 - 1,520' after S 7th St to Porter Road

Figure 24 illustrates the proposed intersection of Foster Drive and N Porter Road (intersection at the project's eastern limits). The available ROW at this section is 110'. The proposed cross section measures 69' in width. The proposed intersection upgrade includes expansion from two-to-four lanes (including a dedicated left-turn

lane), lane widening, replacement of span wire traffic signal with mast arms, and addition of sidewalks, ADA ramps, and crosswalks.

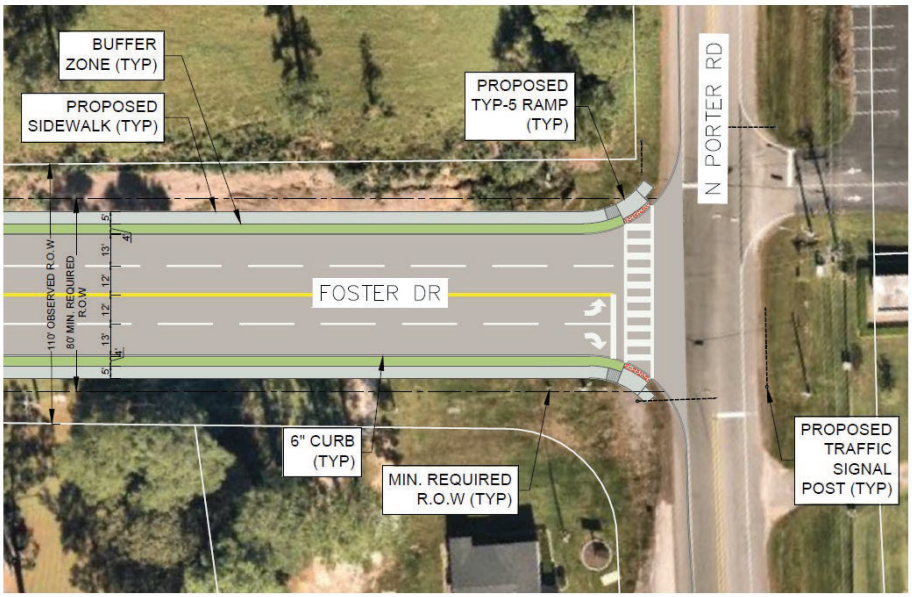

Figure 24 Proposed Intersection of Foster Drive and Porter Road

The proposed pavement design will utilize concrete panels. The drainage improvements include:

- Adding 24-inch reinforced concrete pipes (17,240 ft) for stormwater and 4' by 4' stormwater inlets (46 nos. of inlets).
- Junction boxes (18 nos.).
- Extending 4' by 5' box culverts (20 ft).

Multimodal improvements include installing a 5' wide sidewalk with ADA-compliant ramps and curb extensions and adding crosswalk markings. The project will also have the installation of additional street lighting.

Water and sanitary sewer improvements were not considered in the development of this scope but may be relocated and/or upgraded as a component of the project and further reviewed at the detail design phase.

The project will improve the following intersections:

- Foster Dr. and S Frazier St. –
  The proposed intersection upgrade includes expansion from two-to-four lanes (including a dedicated left-turn lane), lane widening, addition of traffic signals, railroad crossing upgrade to include replacement of railroad gate, addition of sidewalks, ADA ramps, and crosswalks.
- Foster Dr. and S 7th St –
  The upgrade will signalize the intersection, and add sidewalks, ADA ramps, and crosswalks.
- Foster Dr. and Porter Road –
  The proposed intersection upgrade includes expansion from two-to-four lanes (including a dedicated left-turn lane), lane widening, replacement of span wire traffic signal with mast arms, and addition of sidewalks, ADA ramps, and crosswalks.

The project corridor's ROW varies between 55' to 110' and would need ROW acquisition to yield the desired cross-section. The proposed ROW acquisition to yield a consistent width of 69' does not cause any displacement. In sections with limited ROW that are surrounded by existing residential developments, the designed width has been kept at 60' to avoid any displacement (refer to Figure 14 for proposed cross-section). The following table quantifies the ROW acquisition within the project limits with Scenario 2 as the preferred scenario:

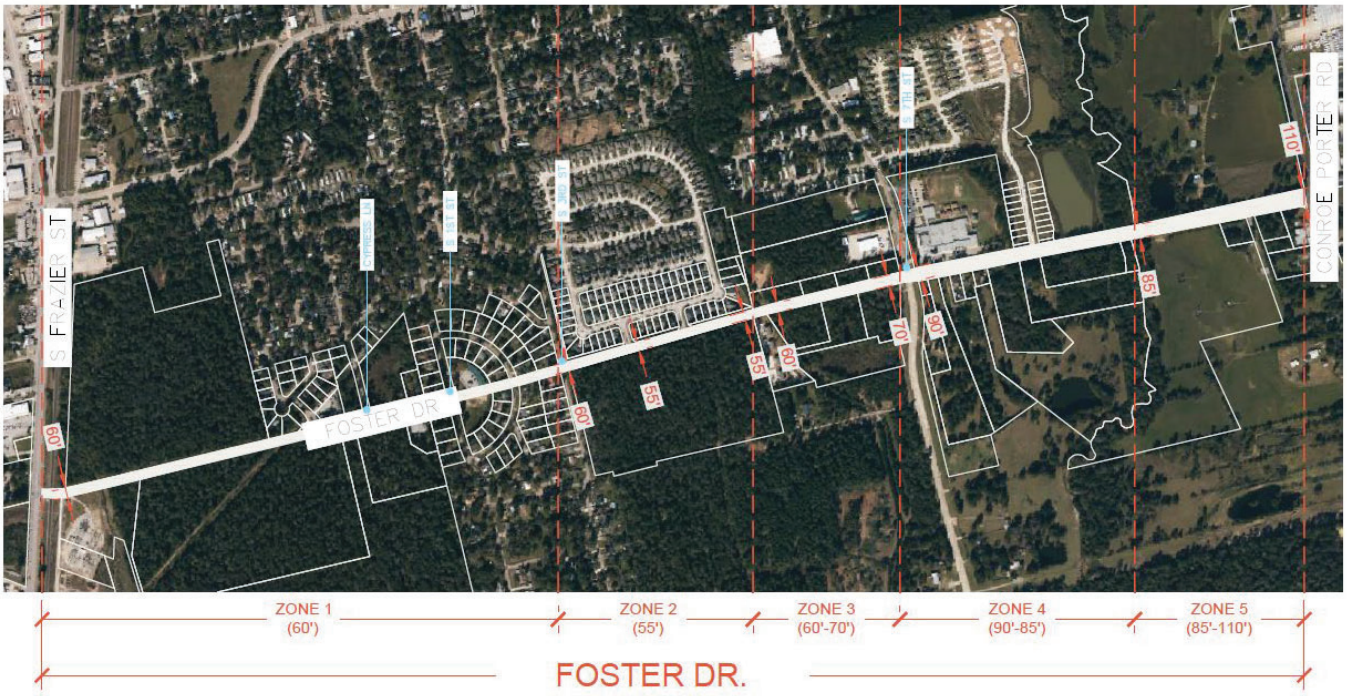

Figure 25 Various ROWs along Foster Drive

Table 3 Foster Drive ROW Acquisition Summary

Zone	Segment Name	Segment Length (in feet)	Existing ROW	Proposed ROW (in linear feet)			Acquisition (in sq. feet)		
				Proposed ROW (as per Conroe Guideline) [1]	*Minimum Acquisition needed for redesigned width of 69' [2]*	*Proposed ROW of 60' [3]*	*To attain 80' ROW [1]*	*To extend ROW with minimum acquisition [2] – Preferred Scenario*	*To attain 60' ROW [3]*
1a	S Frazier St to Cypress Ln	2,190'	60'	80'	69'	60'	43,800	**19,710**	NA
1b	Cypress Ln to S 1st St	560'	60'	80'	60'#	60'	11,200	**0**	NA
1c	S 1st St to S 3rd St	760'	60'	80'	60'#	60'	15,200	**0**	NA
2	S 3rd St to Wetland	1,360'	55'	80'	69' *	60'	34,000	**19,040**	6,800
3	Wetland to S 7th St	1,000'	60'	80'	69'	60'	20,000	**9,000**	NA
4	S 7th St to 1520' after S 7th St	1,520' (including the bridge)	85'	80'	69'	60'	NA	**NA**	NA
4a	Stewarts Creek Bridge	250'	85'	110'^	110'^	110'^	6,250	**6,250**	6,250
5	1520' after S 7th St to Porter Road	1,150'	110'	80'	69'	60'	NA	**NA**	NA
						Total	130,450	**54,000**	13,050

* Easement donation on south of from Oscar Community Center (City owned Property); easement donation on north from residential developments between E and W Lighting Bug Ct
# The proposed width is kept at 60' to avoid ROW acquisition along the existing residential stretch
^The proposed bridge cross-section remains constant (110') in all three scenarios

(Note: All preliminary engineering drawings in the report reflect the assumptions of Scenario 2)

4. Project Purpose and Need

Most funding and oversight agencies, including TxDOT, and the USDOT, require recipients to develop a project purpose and needs statement for grant application. The purpose of a project is considered the "what" of the project, outlining the project scope and elements that will be developed. The project need(s) addresses the "why" of the project, drawing out the unmet needs and societal benefits that the project will accomplish.

4.1 Project Purpose Statement

The project will reconstruct the Foster Drive corridor from S Frazier St to Porter Road with four travel lanes and improve pedestrian amenities. This project will improve sidewalks, lighting, curb ramps, and crosswalks. It will replace the open ditches with a new covered drainage system to prevent flooding and non-point source pollution from open drainage systems.

Project Needs

Increase Vehicular Capacity
Upgrade Pavement Conditions
Upgrade Storm Water facilities
Provide Safe Streets for All
Enhance Multimodal Mobility
Equitable Development

In summary, the Foster Drive Reconstruction Project will provide all road users with a well-lit, safer, and more efficient corridor along with a safe and continuous pedestrian path serving neighboring households, schools, and businesses.

4.2 Project Needs

Foster Drive is classified as a minor Arterial in the Conroe 2035 Thoroughfare Plan's functional classification (updated 2017). Per Conroe's 2035 Thoroughfare Plan, the recommended ROW for minor arterials is a minimum of 80'. The existing field conditions do not readily comply with the recommendations. As described in the project scope section, the recommendations were adapted per field findings to yield the most feasible solution. The Foster Drive corridor functions as an essential east-west connection for Conroe. The average annual daily traffic (AADT) for 2016 and 2040 is summarized here (Table 4), as per TxDOT Statewide Map:

Table 4 Foster Drive Segment-wise ADDT

Segment	2016 AADT	2040 AADT	% Change
Between S Frazier St and Baretta Drive	4,705	6,587	40%
Between Baretta Drive and S 1st St	4,156	5,818	39%
S 1st St and S 7th St	2,109	2,953	37%
S 7th St and Porter Road	1,507	2,110	40%

The AADT on the corridor is expected to rise by about 40% over the next 20 years. The existing speed limit is 30mph, and the 24-hour truck percentage is 3.2% - noticeably lower than other minor arterial roads in Conroe. The lower-than-average truck percentage on this corridor can be attributed to the high share of residential land uses surrounding the corridor.

The project needs were identified through a detailed analysis and are as follows:

- Vehicular Capacity
- Pavement Conditions
- Upgrade Drainage
- Safety
- Multimodal Mobility

The upcoming sections develop each need in detail:

4.2.1 Increase Vehicular Capacity and Upgrade Pavement Conditions

The City of Conroe anticipates significant residential growth along Foster Drive between S Frazier St and Porter Road. This growth is corroborated by the H-GAC future land use model and TxDOT Statewide Planning Map Tool. This traffic volumes are anticipated to increase daily delays, too, from 121 hours in 2025 to approximately 1,790 hours in 2045. The existing two-lane roadway is insufficient to support the growing vehicular travel demand along Foster Drive. The intersections with their current configuration, will operate at LOS F in PM peak hour of year 2045 and so will have considerable delay. HCM analysis in Synchro shows that the proposed reconstruction with four lanes will improve the traffic operation to LOS C or D for the same period for intersections along the corridor (Table 5).

Table 5 Foster Drive Intersection LOS

Intersection Name	No Build LOS				Fully Build LOS			
	AM		*PM*		*AM*		*PM*	
	2025	*2045*	*2025*	*2045*	*2025*	*2045*	*2025*	*2045*
Foster Drive and S. Frazier St (railroad crossing)	F	F	F	F	B	C	B	C
Foster Drive and S 1st St	A	C	B	F	A	B	B	D
Foster Drive and S 7th St (also called Ed Kharbat St)	B	D	B	F	B	B	A	C
Foster Drive and Porter Rd	B	F	B	F	A	B	B	C

The City endeavors to maintain growth and development by building sufficient vehicular capacity and providing pedestrian-friendly mobility opportunities to meet the transportation needs of people of all ages while also improving the overall quality of life and neighborhood characteristics. The existing Foster Drive does not meet this standard.

Conroe Fire Department Station 3 is located along the corridor near the S 1st and Foster Drive intersection. The increased capacity will improve emergency service access and assist in faster response times. Current vehicular capacity will yield massive delays, rendering the emergency service inefficient.

The existing Level of Service during PM peak hours at the intersection of Porter and Foster Rd is B, meaning that the traffic flow is stable with a high degree of freedom to select the speed and operating conditions but with some influence from other users. However, traffic usually slows down during school hours and stops near Anson W Runyan Elementary School. Traffic lines up from the school's driveway to the east end of the bridge that crosses Stewart Creek, measuring up to a quarter mile. These queue-ups are bound to get longer in future, I the vehicular capacity of Foster Drive does not increase.

The existing asphalt is in moderate to poor condition with demonstrated transverse and longitudinal cracking, noticeably along the pavement centerline. There are several localized occurrences of pavement failure along the edges of the roadway. There are several locations where asphalt patching has been completed to repair pavement failure. The functional width of the roadway is perceived to be less than it is due to the edge of the

pavement failure and the uneven and inconsistent demarcation between the edge of the pavement and the adjacent landscape.

4.2.2 Upgrade Drainage

The project corridor crosses three creeks/wetlands and is located in the 100-year floodplain on the western and eastern ends. Although, there isn't much development in these areas. There are open drainage ditches along both sides of Foster Dr., with culvert crossings at the entrances. Post rainfall events, most drainage ditches retain standing water.

4.2.3 Provide Safe Streets for All

All levels of government need to create safe streets for all. For the State of Texas, traffic fatalities are a major concern. TxDOT is developing and implementing solutions to reduce the number of deaths on Texas highways by half in 2035 and to zero in 2050.[1]

The Highway Safety Improvement Program (HSIP) is a core Federal-aid program to significantly reduce traffic fatalities and severe injuries on all public roads. Over the years, HSIP has compiled effective resources and design directives for crash reduction for roads of all functional classifications. From 2017 to 2021, 193 crashes occurred along this corridor. Based on empirical studies and guidance:

- 5 of these crashes could have been reduced by 28% if the corridor had one additional through lane
- 26 of these crashes could have been reduced by 24% if the corridor modernized the traffic signal (near Porter Road intersection)
- 97 of these crashes could have been reduced by 35% if the corridor added a new traffic signal (S Frazier St intersection)
- 23 of these crashes were found to be ineligible for any reduction factor basis their occurrence and crash context

According to HSIP countermeasures, a continuous left-turn lane would reduce most turning movement crashes by 50%; and modernizing the intersections will reduce intersection-related crashes by 24%[2]. A sidewalk combined with lighting would reduce pedestrian and night-time auto-related crashes by 74%[3]. This Project includes all these elements in its scope and will reduce the likelihood of pedestrian-and vehicle-related crashes, thereby creating a safer street for all users.

Based on the statistical value of life and the severity of the injuries sustained, the total economic cost of the crashes from 2016-2020 was $7.5 million, averaging about $1.5 million per year. Additionally, the average 5-year crash rate in the Project corridor is 537 crashes per 100 million vehicle miles traveled - 200% more than the TxDOT statewide average of 215 crashes per 100 million vehicle miles. These statistics call out Foster Drive as an unsafe corridor.

[1] TxDOT Vision Zero . Retrieved from https://ftp.txdot.gov/pub/txdot-info/cst/conference/washto-wyer.pdf
[2] TxDOT. Highway Safety Improvement Manual, 2020. Retrieved August 2021 from https://www.txdot.gov/inside-txdot/forms-publications/publications/highway-safety.html
[3] TxDOT. Highway Safety Improvement Manual, 2020. Retrieved August 2021 from https://www.txdot.gov/inside-txdot/forms-publications/publications/highway-safety.html

4.2.4 Enhance Multimodal Connectivity

According to the 2017 FHWA NHTS (National Household Travel Survey), over 65% of respondents indicated that they do not walk more because there are no sidewalks or sidewalks in poor condition. Over 35% told they don't feel safe walking due to heavy traffic volumes.[4] Most people will not walk on high-volume streets with sidewalks in poor condition. Foster Drive is dominated by vehicular traffic and has no sidewalks. Integrating pedestrian pathways with ADA ramps and crosswalks will improve multimodal connectivity with current and future land uses (residential, school and upcoming Community Center) conducive to robust pedestrian activity. Building seamless, safe, and accessible paths along this roadway will enhance multimodal mobility, providing various benefits (see Project BCA Summary).

4.2.4.1 Conroe Connection Transit

Conroe Connection Transit (CCT) has a transit stop at the western limit of the project – at the intersection of Foster Drive and S Frazier St, serving on its South Route (Figure 26). CCT has 4 stops (South Route) within a quarter-mile walkshed from the project corridor – all along the S. Frazier St; this route serves key destinations like Conroe Regional Medical Center, Oscar Johnson Jr. Community Center, and Conroe Downtown. This route is served every 60 min on weekdays. The Foster Drive Reconstruction project will install sidewalks along the project corridor, thereby enhancing the pedestrian shed along the project corridor to improve access to Conroe's transit.

Figure 26 CCT Bus Stops with quarter mile radius

[4] Federal Highway Administration. National Household Survey 2017. Retrieved in August 2021 from https://nhts.ornl.gov/

4.2.4.2 Connectivity to Recreational Opportunities

To cater to Conroe's growing population's recreational needs, Oscar Johnson Jr. Community Center is being planned – one of the access points is from Foster Drive between S. 3rd Street and S. 7th Street. The Community Center has facilities like a pond, basketball courts, exercise stations, a recreational trail, and many such community amenities. Given the City's anticipation of significant residential growth along Foster Drive, the proposed Community Center is well-placed to cater to the incoming resident's recreational needs. Installing sidewalks along the Project corridor will create safe and accessible regional recreational opportunities for the corridor/City's residents and improve multimodal access to the facility (including CCT transit).

4.2.5 Connect Underserved Communities

This Project will safely connect the growing community to the education, and recreational opportunities. Transportation options have a significant impact on community residents' quality of life. Those with lower incomes are less likely to own cars and may not live in areas well served by high-quality transportation assets and thereby experiencing more difficulty in access schooling, employment, and other critical needs. These inferior transportation outcomes result from decades of inequitable auto-oriented planning. The Biden administration is committed to mitigating these outcomes by furthering equitable and inclusive policies and programs. To this effect, some of the initiatives that the administration is pushing are *safer and smart streets, bringing greater transparency to USDOT grant programs, investing in inner-city transit, and an emphasis on policies that leverage land-use components to deliver more innovative mobility options to residents*. While these initiatives have an integral equity and sustainability component, the discretionary dollars disbursed under these programs have performance indicators that evaluate the application's basis equity as a prioritized theme.

This Project will improve an essential east-west connection in southeast Conroe. Within 500 feet of the project corridor, the population demographics show that indicators generally associated with underserved communities like a share of communities of color, households below the poverty level, the percentage of the population of color, the share of households with no vehicles, and households with less than high school education are significantly higher in the project area than its regional counterparts. Selected demographics for the Project corridor are presented below:

Table 6 EJ and Equity Demographics (Project vs Regional Comparison)

EJ and Equity Demographics[5] (Project vs Regional Comparison)				
Demographic	Project Area	City of Conroe	Montgomery County	Houston-The Woodlands-Sugar Land, TX MSA
2020 Total Population	560	94,469	649,403	7.2M
2020 Population Density (pop per sq. mi.)	3555.7	1,313	623	875
2019 Households Below the Poverty Level (%)	18%	10.83%	8.72%	12.66%
2019: People of Color Population (%)	32%	17.01%	13.55%	34.97%
2020: Less Than HS Education (%)	36%	17.36%	11.14%	7.34%
2019: Households with No Vehicles (%)	7%	4.79%	2.92%	4.88%
2019 Households with 1+ Persons with a Disability (%)	10%	21.10%	21.60%	20.74%

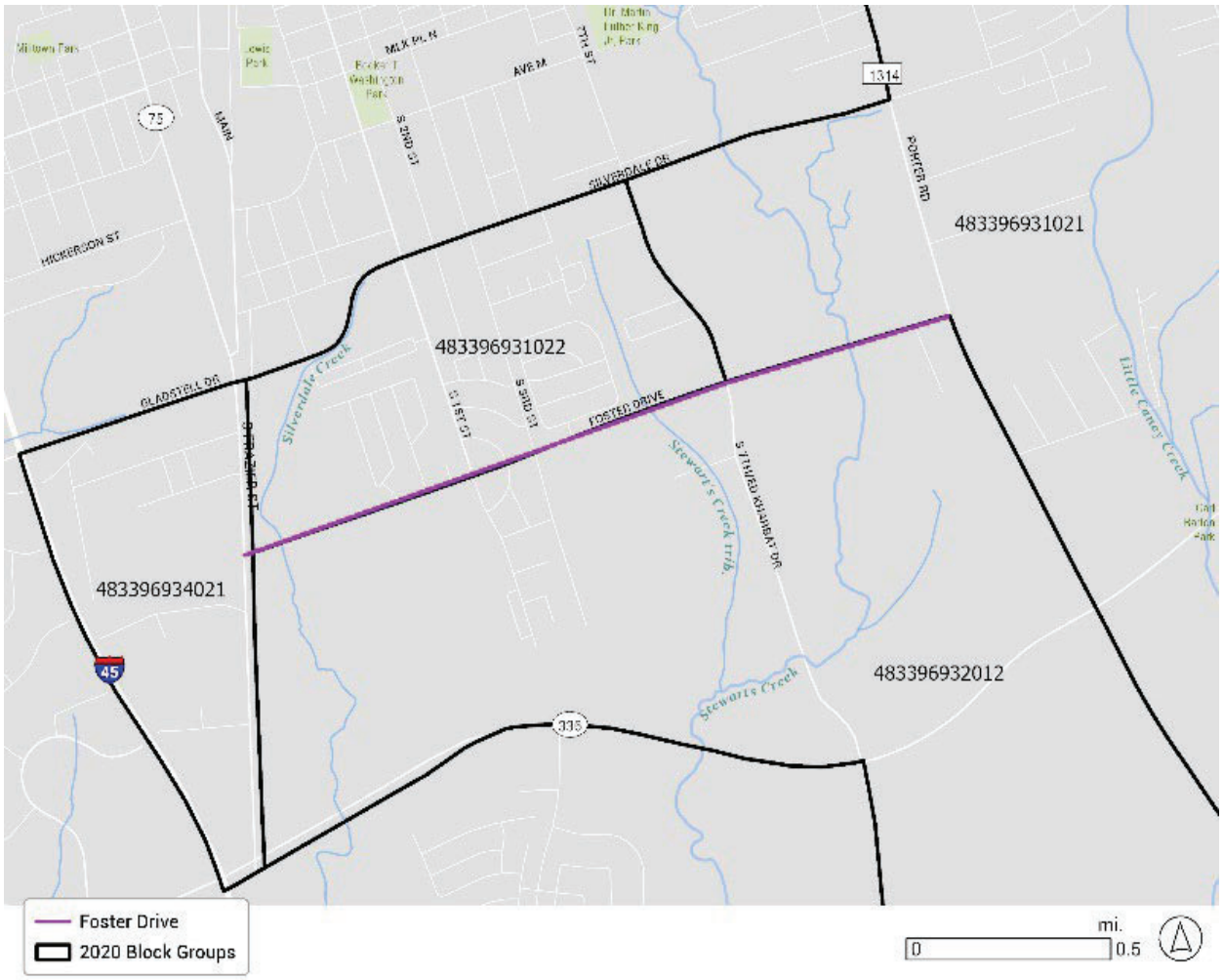

Figure 27 Census Block Group Adjacent to Foster Drive Project

[5] ARCGIS. Business Analyst. Retrieve in May 2021.

The following table maps out equity related demographics in block groups adjoining the project corridor:

Table 7 EJ and Equity Demographics (Project Area)

EJ and Equity Demographics[6] (Project Area)				
Demographic	483396932012	483396934021	483396931022	483396931021
2020 Total Population	2117	1502	2667	3679
2020 Population Density (pop per sq. mi.)	460.92	4581.42	6020	753.61
2019 Households Below the Poverty Level (%)	0%	31.42%	10.34%	4.08%
2019: People of Color Population (%)	38.78%	84.73%	86.5%	48.12%
2020: Less Than HS Education (%)	8.18%	42.39%	43.86%	20.44%
2019: Households with No Vehicles (%)	11.91%	16.46%	5.75%	2.55%
2019 Households with 1+ Persons with a Disability (%)	7.88%	13%	9.71%	9.71%

Block Group 483396934021 located west of the project corridor (Figure 27), has a high share of households below the poverty level, individuals with less than high school education, and households without a functional automobile. The other surrounding block groups also qualify as underserved communities based on high rates of demographic indicators that are generally associated with underserved communities like no functioning vehicles, less than high school education, and population of color.

The proposed Foster Drive Reconstruction Project will improve underserved community's access to multimodal transportation to meet their daily travel needs. Primarily, it will also enhance the corridor's vehicular capacity–resulting in better connectivity and faster travel time for residents to get to other parts of the City.

Projects Needs Summary

The project needs for Foster Drive corridor can be summarized as follows:

Significant residential growth is anticipated along Foster Drive. The corridor's existing capacity is expected to be insufficient to handle the vehicular volume and result in congestion and travel delays. There are no sidewalks on this corridor. It lacks safe, continuous, accessible pedestrian paths. Open ditches are contributing towards non-point source pollution in the area watershed. *The corridor has witnessed 193 crashes in the past five years. The average 5-year crash rate is 200% more than the TxDOT statewide average. The project corridor has a higher share of underserved communities compared to the regional average demonstrating the inequitable transportation outcomes of auto-centric transportation planning.*

[6] ARCGIS. Business Analyst. Retrieve in May 2021.

The Foster Drive Reconstruction Project addresses these needs by providing all road users with a well-lit, safe, and more efficient corridor along with a continuous pedestrian path serving neighboring households, schools, and businesses.

Planning literature[7] [8] demonstrates that adding accessible pedestrian facilities can increase property values and make the neighborhood more livable, resulting in increased appraisal values that provide additional property tax benefits to the corridor/neighborhood. Foster Drive Reconstruction is an investment to spur equitable economic development in Southeast Conroe and provide a quality living neighborhood with a well-connected travel network.

4.3 Advance Policy Goals

The data presented in the above sections justify the Project through technical analysis. The Project advances various safety, connectivity, equity, economic, environmental, and other related policies rooted within the national, state, regional, and local transportation agencies' objectives, goals, mission, and/or vision. This upcoming section delves deeper into policies set by national, state, and regional governments and whether the Foster Drive Reconstruction Project advances any of these.

National Transportation Policy and Planning

The United States Department of Transportation provides the leadership and sets the framework for transportation goals and objectives of the United States. These strategically developed goals permeate the state, regional and local transportation planning. The USDOT has adopted the following four goals within its USDOT Strategic Plan FY 2018-2022:[9]

- Safety: Reduce Transportation-Related Fatalities and Serious Injuries Across the Transportation System.
- Infrastructure: Invest in Infrastructure to Ensure Mobility and Accessibility and to Stimulate Economic Growth, Productivity and Competitiveness for American Workers and Businesses.
- Innovation: Lead in the Development and Deployment of Innovative Practices and Technologies that Improve the Safety and Performance of the Nation's Transportation System.
- Accountability: Serve the Nation with Reduced Regulatory Burden and Greater Efficiency, Effectiveness and Accountability.

In addition to the goals above, President Biden has publicly supported the Safe Streets for All program. This program is aimed at investing in infrastructure that reduces crashes and fatalities for all street users, specifically pedestrian and bicycle.[10] As of August 2021, this program has not been signed into law nor funded

[7] Liu, J. H., & Shi, W. (2017). Impact of bike facilities on residential property prices. Transportation research record, 2662(1), 50-58.
[8] The University of Delaware. Healthy and complete communities in Delaware: The walkability assessment tool. Retrieved in June 2017, from http://www.ipa.udel.edu/healthyDEtoolkit/walkability/benefits.html.
[9] United States Department of Transportation. DOT Strategic Plan Fiscal Years 2018-2022. Retrieved in April 2020 from https://www.transportation.gov/dot-strategic-plan.
[10] The White House. UPDATED FACT SHEET: Bipartisan Infrastructure and Investment Jobs Act. Retrieved in August 2021 from https://www.whitehouse.gov/briefing-room/statements-releases/2021/08/02/updated-fact-sheet-bipartisan-infrastructure-and-investment-jobs-act/.

but has received support by a number of US Senators and House members. In addition, President Biden issued EO 13985, Advancing Racial Equity and Support for Underserved Communities Through the Federal Government on January 20th, 2021. EO 13985 directs the Office of Management and Budget to: *in coordination with the heads of agencies, study strategies, consistent with applicable law, for allocating Federal resources in a manner that increases investment in underserved communities, as well as individuals from those communities.*[11]

The Foster Drive Reconstruction advances USDOT's policy goals by improving safety, and multimodal transportation choices, especially for underserved communities. Basis the HSIP directives, the design scope includes all elements that would reduce the likelihood of pedestrian and vehicular crashes, like – left turn lanes, modernizing intersections, a sidewalk combined with street lighting, and pedestrian median refuges. The project demographics around 500 feet from the project corridor highlight the higher share of underserved communities compared to the regional averages. Delivering the proposed project will improve safe and equitable transportation outcomes in Conroe.

State Transportation Policy and Planning

The TxDOT 2019-2023 Strategic Plan (TxDOT Plan) is the plan that will guide the agency over the next several years.[12] Included in the TxDOT Plan is the agency's mission, values, vision, goals and action plan and budgetary structure. The TxDOT Plan outlines seven strategic goals that are rooted in the Mission and Vision.

- Mission - Through collaboration and leadership, we deliver a safe, reliable, and integrated transportation system that enables the movement of people and goods.
- Vision - A forward-thinking leader delivering mobility, enabling economic opportunity, and enhancing quality of life for all Texans.

In May 2019, the TxDOT Transportation Commission issued MO 115481. This MO directs TxDOT to reduce to traffic fatalities in half by 2035 and end them entirely by 2050, which is statewide Vison Zero policy. To further support this Vision Zero policy, TxDOT's PLAN2050 outlines six goals, with corresponding objectives. One of the goals is to promote safety by reducing *crashes and lessen crash severity by implementing engineering solutions.*[13]

The project responds to the goals by integrating HSIP's design directives in its scope: the introduction of left turn lanes, modernizing intersections, adding sidewalks with street lighting, and introducing median pedestrian refuges at busy wide intersections, improving traffic safety. It is worth noting that the average 5-year crash rate in the Project corridor is 537 crashes per 100 million vehicle miles traveled - 200% more than the TxDOT

[11] 86 FR 7009. Executive Order 13985, Advancing Racial Equity and Support for Underserved Communities Through the Federal Government.
[12] Texas Department of Transportation. 2019-2023 Strategic Plan. Retrieved in August 2021from http://ftp.dot.state.tx.us/pub/txdot-info/sla/strategic-plan-2019-2023.pdf.
[13] TxDOT. What Are Our Goals? Retrieved in August 2021 from https://www.txdot.gov/inside-txdot/division/transportation-planning/statewide-plan/goals.html.

statewide average of 215 crashes per 100 million vehicle miles[14]- qualifying the corridor to become a priority project advancing State's Vision Zero policy.

Regional Transportation Policy and Planning

The H-GAC 2040 Regional Transportation Plan vision statement includes supporting project that increase safety, access, and mobility. One of the four strategies is to expand the multimodal network, which further aligns with the Project outcomes.[15]

In addition to the H-GAC 2040 Regional Transportation Plan, H-GAC recently completed a H-GAC 2045 Regional Active Transportation Plan. The H-GAC 2045 Regional Active Transportation Plan set forth a vision: In the year 2045, our region will have a multimodal transportation system through coordinated investments that supports a desirable quality of life, enhanced economic vitality and increased safety, access and mobility. This vision is supported by the goals of prioritizing safety, ensuring equity, connecting (areas of high-need), maintaining, monitoring, and encouraging use of active transportation modes.[16]

As described in Section 4.2.4 Enhance Multimodal Connectivity, the Foster Drive Reconstruction Project will install sidewalks along the project corridor and improve the pedestrian network accessing Conroe Connection Transit. This enhances access to affordable transportation options, especially for the underserved communities living around the corridor. Delivering the proposed project will advance the HGAC's objectives of expanding the multimodal network, local access, and mobility.

Local Transportation Policy and Planning

City of Conroe Comprehensive Plan 2040

Conroe's Comprehensive Plan envisions Conroe as a "….community of choice in the Houston metro area with a diversity of housing options in neighborhoods that are walkable and connected." The Plan's top guiding principle is to prioritize efforts and incentives to ensure adequate infrastructure within the City to support and attract existing and new developments.

The Future Land Use Plan identifies Foster Drive as a Mixed-Density neighborhood that needs better sidewalk access, especially around the elementary school (Anson Runyan Elementary School). The Plan also identifies the railroad intersection for a safety audit/upgrade. Although the Plan mentions the severe bike crash around Anson Elementary school, it does not prioritize Foster Drive under any proposed capital/intersection projects. Nonetheless, the proposed Foster Drive reconstruction project is consistent with the priorities and implementation directives in the Comprehensive Plan and will improve the quality of life for Conroe's residents.

[14] Texas Motor Vehicle Crash Statistics - 2020. (2020). TXDOT. https://www.txdot.gov/inside-txdot/forms-publications/drivers-vehicles/publications/annual-summary.html
[15] H-GAC. H-GAC 2040 Regional Transportation Plan. Retrieved in August 2021 from https://www.h-gac.com/getmedia/b6dc64b9-f5ea-4e7e-b708-38f64d15eccd/2040-RTP-revised-April-2016.pdf
[16] H-GAC. H-GAC 2045 Active Transportation Plan. Retrieved in August 2021 from http://2045rtp.com/documents/plan/Appendix-H-Regional-Active-Transportation-Plan.pdf

5. Project Cost

The total cost for the project is approximately **$29.7 million.**

Item No.	Item Description	Unit	Qty	Unit Cost	Total
GENERAL ITEMS					
1	Tree Protection	LS	1	$ 11,250	$ 11,250
2	Arborists	LS	1	$ 7,500	$ 7,500
3	Furnishing And Placing Topsoil (4")	SY	7,690	$ 4	$ 30,760
4	Block Sodding	SY	7,690	$ 5	$ 38,450
5	Tree Removal (24" - 30" Dia)	EA	10	$ 1,500	$ 15,000
6	Clearing And Grubbing	AC	8	$ 10,000	$ 80,000
7	Landscaping	SY	7,690	$ 10	$ 76,900
				GENERAL ITEMS SUBTOTAL	$ 259,900
ROADWAY					
1	Removing Conc (Driveways)	SY	3,270	$ 20	$ 65,400
2	Conc Curb & Gutter (TY II)	LF	17,240	$ 20	$ 344,800
3	Removing Stab Base & Asphalt Pav (12")	SY	23,950	$ 41	$ 9,81,950
4	Excavation (Roadway And Channel)	CY	18,300	$ 40	$ 732,000
5	Driveways (Conc)	SY	3,270	$ 85	$ 277,950
6	Conc Sidewalks (5")	SY	9,580	$ 70	$ 670,600
7	Curb Ramps (Ty 2)	EA	5	$ 2,500	$ 12,500
8	Curb Ramps (Ty 5)	EA	26	$ 3,000	$ 78,000
9	Curb Ramps (Ty 7)	EA	12	$ 2,500	$ 30,000
10	Pav Surf Prep For Mrk (24")	LF	340	$ 1	$ 340
11	Refl Pav Mrk Ty I (W)24"(Sld)(100mil)	LF	340	$ 7	$ 2,380
12	Pavement Sealer 24"	LF	340	$ 1	$ 340
13	Refl Pav Mrk Ty I (W)4"(Brk)(100mil)	LF	8,620	$ 1	$ 8,620
14	Refl Pav Mrk Ty I (Y)4"(Sld)(100mil)	LF	8,620	$ 2	$ 17,240
15	Raised Reflective Buttons	EA	440	$ 20	$ 8,800
16	Cement Treat (Subgrade) (8")	SY	47,890	$ 8	$ 383,120
17	Conc Pav (Joint Reinf) (10")	SY	47,890	$ 100	$ 4,789,000
18	Install Roadway Base	CY	9,140	$ 120	$ 1,096,800
19	Backfill (Ty A Or B)	CY	17,240	$ 20	$ 3,44,800
20	Removing Conc (Misc)	SY	80	$ 10	$ 800
21	Relocate School Speed Zone Flashing Light	EA	4	$ 2,000	$ 8,000
22	Upgrade Existing Traffic Signal To Mast Arm Including Foundations And All Appurtenance	LS	1	$ 2,50,000	$ 250,000
23	Improve Railroad Crossing	LS	1	$ 5,00,000	$ 500,000
24	Install Traffic Signal At The Intersection Of Frazier And Foster	LS	1	$ 3,00,000	$ 300,000
				GENERAL ITEMS SUBTOTAL	$ 10,903,000

DRAINAGE					
1	RC Pipe (Cl III)(24 In)	LF	17,240	$ 90	$ 1,551,600
2	Inlet (Compl)(PSL)(RC)(4ftx4ft)	EA	46	$ 6,000	$ 276,000
3	Junction Box (Install)	EA	18	$ 1,000	$ 18,000
4	Remove Str (Box Culvert)	EA	46	$ 2,970	$ 136,620
5	Conc Box Culvert (4 Ft X 5 Ft)(Extend)	LF	20	$ 1,130	$ 22,600
6	Remove Metal Beam Guard Fence	LF	1,040	$ 10	$ 10,400
				DRAINAGE ITEMS SUBTOTAL	**$ 2,015,200**
BRIDGE ACROSS STEWARTS CREEK					
1	Install 2-Lane Bridge With 5' Conc Sidewalk	LF	700	$ 6,000	$ 4,200,000
				DRAINAGE ITEMS SUBTOTAL	**$ 4,200,000**
CASH ALLOWANCE					
1	Permits	LS	1	$ 3,000	$ 3,000
2	TDLR Registration/Review/Inspection	LS	1	$ 10,000	$ 10,000
3	Install Lights	EA	43	$ 2,800	$ 120,680
4	Removal of Timber Poles	EA	59	$ 610	$ 35,990
5	Timber Pole (Cl 2) 30 Ft	EA	102	$ 1,860	$ 189,906
6	Relocate SM RD Sn SUP&AM TY 10BWG	EA	43	$ 400	$ 17,200
7	Adjusting Manholes	EA	15	$ 450	$ 6,750
8	Adjusting Manholes (Electric Box)	EA	18	$ 1,200	$ 21,600
9	Adjusting Manholes (Telephone Box)	EA	34	$ 3,500	$ 119,000
10	Remove And Relocate Fire Hydrant	EA	18	$ 10,000	$ 180,000
11	Adjusting Manholes (Water Valve Box)	EA	10	$ 400	$ 4,000
12	Relocate Existing Mailbox	EA	21	$ 510	$ 10,710
13	Row	LS	1	$ 3,78,300	$ 378,300
				CASH ALLOWANCE SUBTOTAL	**$ 1,097,100**
				Subtotal	$ 18,475,200
				Contingency (15%)	$ 2,771,300
				Mobilization (10%)	$ 1,847,600
				SWPP & Traffic Control (5%)	$ 923,800
				Total Construction Cost	**$ 24,017,900**
				Construction Management (2%)	$ 480,400
				Material Testing (1%)	$ 240,200
				Inspections & Quality Control (2%)	$ 480,400
				Total Construction Soft Cost	**$ 1,201,000**
				Environmental (2%)	$ 480,400
				Survey (2%)	$ 480,400
				Engineering PS&E (15%)	$ 3,602,700
				Total Engineering And Environmental Cost	**$ 4,563,500**
				TOTAL PROJECT COST	**$ 29,782,400**

6. Project Benefit/Costs Analysis Summary

A BCA was conducted on this Project, which quantifies the net difference between the No-Build and Build Scenarios. The No-Build Scenario assumes that roadway improvements will only consist of mill and overlay or deteriorate over time. There are no planned sidewalks within the No-Build Scenario. The build scenario assumes a replacement of infrastructure within public ROW along the project limits, which will include the following major components:

- Expand lanes from 2 lanes to 4 lanes
- Upgrading the two intersections (Porter Rd and Frazier) which includes:
  - Convert traffic signal from span wire to mast arm at the intersection of Foster and Porter Rd.
  - Convert controlled stop to traffic signal at the intersection of Foster and Frazier.
- Add new 5 feet with ADA-compliant ramps
- Reconstruct the roadway to concrete.
- Install curb and gutter using 24 inches reinforced concrete pipe along the corridor.

The societal benefits are grouped into sections based upon the latest RAISE discretionary grant criteria. Each benefit's baseline (No-Build) and Build methodology and calculations are contained within this technical memorandum, supported by the BCA Excel Workbook. The benefits are quantified and monetized for the BCA. The benefit-cost ratio is 7.2 in 2019 real dollars, and when discounted at a 7% discount rate, the benefit-cost ratio is 2.6.

Table 8 BCA Summary

BCA Summary		
Scenario	$2019 Real Dollars No Discount	$2019 Real Dollars 7% Discount
Benefits	$208,235,000	$54,178,000
Costs	$28,559,000	$20,139,000
BCA	7.291	2.690

A technical memorandum explaining the methodology is attached in Appendix A: Foster Drive Reconstruction Project Cost Benefit Analysis. A summary of the benefits is provided in the following table.

Benefits Summary

Benefit	Current Status/Baseline and Problem to be Addressed	Change to Baseline or Alternatives	Types of Impacts	$2019 Monetized Benefit	7% Discount Rate
Benefit 1: Useful Life	The current asset has 90% remaining useful life	Replace infrastructures within public ROW	Extend useful life	$14,493,000	**$2,496,000**
Benefit 2: State of Good Repair	Ongoing expensive maintenance	Very Little maintenance required of new facility through the planning horizon	Maintenance cost savings	$2,102,000	**$774,000**
Benefit 3: Value of Time	Outdated intersection designs and intersections operating at LOS F	Convert signals to mast arms and expand capacity	Travel time decrease	$133,607,000	**$35,327,000**
Benefit 4: Safety Benefits	Outdated design, disproportionally higher crash rates	Significant safety improvement resulting in 24% to 28% reduction in certain types of vehicle crashes.	Reduced crashes resulting in reduced fatalities and injuries	$3,105,000	**$1,370,000**
Benefit 5: Automobile Maintenance Benefits	Roadway is not conducive for walking.	Sidewalks will induce pedestrian demand	Reduced auto cost benefits derived from modal shift from auto to walk	$159,000	**$56,000**
Benefit 6: Automobile Fuel Benefits	Outdated intersection designs and intersections operating at LOS F	Improve traffic throughput at intersections	Reduced fuel cost derived from reduced idling	$40,875,000	**$10,560,000**
Benefit 7: Environmental Benefits	Roadway is not conducive for walking.	Sidewalks will induce pedestrian demand	Reduced auto cost benefits derived from modal shift from auto to walk	$8,000	$5,000
Benefit 8: Automobile Idling Environmental Benefits	Outdated intersection designs and intersections operating at LOS F	Improve traffic throughout at intersections	Reduced emissions cost derived from reduced idling	$13,886,000	**$3,590,000**
			Totals	**$208,235,000**	**$54,178,000**

Table 9 Benefits Summary

6.1 Benefits

6.1.1 Useful Life

The corridor will have a useful life of 50 years. Therefore, at the end of the 20-year planning horizon, 60% of the useful life remains. This monetized benefit is approximately $14.4 million in 2019 $. At a 7% discount rate using 2019$, the benefit will amount to $2.4 million. All benefit figures represented in this section are in 2019$.

6.1.2 State of Good Repair

The project will reconstruct the corridor with concrete panels. If the roadway is not rebuilt, it will need to be maintained throughout the planning horizon. In addition to maintenance and rehabilitation costs incurred, users would incur increased operating costs on their vehicles due to the deteriorating pavement condition and added travel time costs owing to increased vehicular congestion. Overall, the Build Scenario is preferable to No-Build on the merits of savings under life cycle costs, maintenance, and user costs. Accumulated benefits yield approximately $2.10 million over the 20-year planning horizon. At a 7% discount rate,the benefit will amount to $774,000.

6.1.3 Value of Time Travelled

The vehicular traffic along the corridor is projected to rise through the planning horizon. The Project will modernize intersections, add turn lanes and widen travel lanes. This improvement will reduce the travel time over the No-Build Scenario. The resulting reduction in travel time will save users money, valued at $17.90 per hour for cars at a vehicle occupancy of 1.67 persons per vehicle. The total monetized benefit over the 20-year planning horizon is approximately $115 million. At a 7% discount rate, the benefit will amount to $32.13 Million.

6.1.4 Safety Benefits

The Project will improve safety along the Project corridor by reducing the number of vehicular crashes. The benefits are derived from the reduced human-affecting injury and property damages. A total of 193 crashes occurred from 2017 to 2021 along this corridor. Adding a left-turn lane along the corridor and proposed traffic signal improvements will reduce related crashes by up to 28%. Improving the intersection signals to current design standards will reduce crashes by up to 24%. Installing a traffic light where none existed before will bring down the crash rates by 35%. The total monetized benefit over the 20-year planning horizon is approximately $ 3.1 Million. At a 7% discount rate, the benefit will amount to $1.37 Million.

6.1.5 New Pedestrian Users & VMT Reduced

Adding sidewalks complete with ADA-compliant ramps, and crossings will induce additional pedestrian activity around the corridor. In a No Build scenario, the newly generated pedestrian activity would have been traversed using a vehicle. The 2018 H-GAC TDF predicts approximately 359 daily internal automobile trips within the Project area. The Project will result in 27% of these trips converting from automobile to new

pedestrian daily trips[17] [18],resulting in 60 to 70 new pedestrian daily trips in the Build Scenario. These new daily pedestrian trips will yield an annual VMT reduction of 14,660, which has various benefits.

6.1.6 Auto Costs

Operating a vehicle is one of the most expensive budget items in American households—the reduction in VMT from automobile trips converted to pedestrian results in a benefit for automobile owners. Improved roadway conditions also mean lower automobile wear and tear, which translates into auto-operational cost savings and fuel costs savings. Auto benefits are tabulated under two headers - pedestrian reduced auto use and fuel benefits.

6.1.6.1 Pedestrian reduced Auto Use benefit

In the no-build scenario, the Foster Drive surface continues to be of asphalt with cracks and damages the vehicles. The build scenario will reconstruct the roadway using concrete panels, providing a smoother surface for cars. The 2021 USDOT BCA Resource Guide estimates the cost of automobile operation as 43 cents ($2019) per mile. The value per mile includes operating costs, such as gasoline, maintenance, and depreciation. The benefit omits fixed costs of owning a vehicle, such as insurance and registration. The total automobile maintenance avoided by reducing VMT yields a net benefit of $159,000. At a 7% discount rate, the benefit will amount to $56,000.

6.1.6.2 Auto Fuel Benfits

Modernizing intersections and widening the Foster Drive corridor will reduce travel time and fuel consumed. The Synchro microsimulation projects had 2,360 gallons of fuel reduced because of the operational improvements throughout the planning horizon. The average fuel per gallon in 2019 was $2.36, less the fuel tax of $0.38, which provides a net cost per gallon of $1.98. Accumulated auto fuel savings from reduced idling amount to $ 40.8,Million. At a 7% discount rate,, this will equal $10.56 Million.

6.1.7 Environmental Benefits

The EPA has classified the Houston-Galveston-Brazoria area in marginal nonattainment of the eight-hour ozone standard; air quality does not meet federal standards.[19] The investment in mobility infrastructure could produce environmental benefits due to decreased automobile use or vehicle delay which will reduce air pollutants, which is important to the region's future growth. Environmental benefits are tabulated under two headers- reduced NOx emissions based on reduced VMT, and reduced NOx emissions based on reduced vehicle idling.

[17] Ewing, R., Greenwald, M. J., Zhang, M., et. al. (2009). Measuring the Impact of Urban Form and Transit Access on Mixed Use Site Trip Generation Rates -- Portland Pilot Study. Washington, D.C.: U.S. Environmental Protection Agency.

[18] Handy, S. et al. (2014). Impacts of Pedestrian Strategies on Passenger Vehicle Use and Greenhouse Gas Emissions - Policy Brief and Technical Background Document. California Air Resources Board. Retrieved from: https://arb.ca.gov/cc/sb375/policies/policies.html

[19] 8-Hour Ozone (2015) Nonattainment Area State/Area/County Report | Green Book | US EPA. (2021). Https://Www3.Epa.Gov/Airquality/Greenbook/Jncs.Html#TX. Retrieved September 2021, from https://www3.epa.gov/airquality/greenbook/jncs.html#TX

6.1.7.1 Reduced NOx emissions on basis of reduced VMT

For sidewalk improvements that enhance walkability, the environmental benefits accumulate from automobile trips being converted into pedestrian trips. The VMT benefit (described in the Auto Costs section) is derived and converted into the amount of NOx grams reduced, which is then monetized based on the H-GAC emissions factor. VMT is assumed to grow annually at the same rate as internal trips. Accumulated benefits amount to $8,000. At a 7% discount rate, this will equal $5,000.

6.1.7.2 Reduced NOx emissions on basis of reduced idling

Modernizing intersections and widening the Foster Drive corridor reduces vehicle idling, generating savings on fuel consumed. The optimized fuel consumption yields reduced NOx emissions resulting in societal benefits of $13.89 Million. At a 7% discount rate, this will equal $3.5 Million.

6.1.8 Local Economic Benefits

Benefits Monetized but Not Widely Accepted in Transportation Grant Applications

Accessible pedestrian facilities can spur increased property values, resulting in increased appraisal values that provide additional property tax benefits to the study area. Research has shown that walkability improvements can increase the property values of residential[20] and commercial properties.[21] Empirical evidence adjusted to the corridor context shows that the residential property values can go up by $4,672 per property and commercial property values can hike up by 9%. Benefits are only attributed to the increment for each property. Net local economic benefits add up to $114,000. At a 7% discount rate, this will equal $42,000.

7. NEPA Status

An environmental risk assessment was conducted for the Project corridor. The table below summarizes the potential for environmental risk or any "red flags" which would impact the project schedule or budget. The Foster Drive Reconstruction Project is not anticipated to adversely impact anything, although a moderate level of additional analysis/minor agency coordination is anticipated for the following:

Air Quality: projects that add capacity generally require a conformity analysis or an Air Quality Statement if receiving state or federal funding.

Cultural Resources: One designated historic resource in the project area is Conroe Memorial Park Cemetery at 1600 Porter Road. There are 26 properties potentially eligible as historical within the project's Area of Potential Effect. An archeological survey will likely be required due to proposed work outside the existing right-of-way.

Soil: A farmland evaluation will likely be required.

[20] Liu, J. H., & Shi, W. (2017). Impact of bike facilities on residential property prices. Transportation research record, 2662(1), 50-58.
[21] The University of Delaware. Healthy and complete communities in Delaware: The walkability assessment tool. Retrieved in June 2017, from http://www.ipa.udel.edu/healthyDEtoolkit/walkability/benefits.html.

Floodplains: The alignment is located in the 100-year floodplain in the western and eastern ends. There is little development in these areas. Coordination with local, state, and federal agencies may be required regarding project work within the floodplain.

Wetlands: The project crosses three creeks/designated wetlands. Coordination with local, state, and federal agencies may be required regarding wetlands.

Waters of the U.S.A determination: The creeks the alignment crossing may be considered. Waters of the U.S. A determination by local, state, and federal agencies may be required, as well as additional coordination.

Ecologically Sensitive Areas and Endangered and Threatened Species: Endangered and threatened species are present in Montgomery County. A moderate level of additional analysis/minor agency coordination is anticipated.

Right-of-Way and Acquisition: Some land acquisition is anticipated. The City of Conroe has begun informal discussions with property owners that could potentially be impacted by the need to acquire land outside the existing right-of-way.

Noise: Moderate level of additional analysis/minor agency coordination may be needed due to the project increasing capacity.

Foster Drive Reconstruction Project Environmental Review Summary

Table 10 Environmental Summary

Category	Review Summary
Land Use	No adverse impacts. Note that there is a rail line on the western end of the alignment; if coordination is required with the rail authority, it should begin as early in the project schedule as possible
Air Quality	The project will add capacity: one lane in each direction. **Projects that add capacity generally require a conformity analysis or an Air Quality Statement if receiving state or federal funding.**
Cultural Resources	There is one designated historic resource in the project area: Conroe Memorial Park Cemetery at 1600 Porter Road. There are 26 properties potentially eligible as historic within the project's Area of Potential Effect. A submittal to the State Historic Preservation Office (SHPO) will determine if Section 4(f) and 106 evaluations are required. Most of the alignment is in an area designated as "Surface Survey Recommended, No Deep Reconnaissance Recommended" for archeological resources. A portion of the project on the eastern end around Stewart's Creek is in an area designated as "No Surface Survey Recommended, Deep Reconnaissance Recommended only if Severe Deep Impacts are Anticipated." An archeological survey will likely be required due to proposed work outside the existing right-of-way.
Hazardous Materials	No adverse impacts.

Public Parks and Recreation Areas	No adverse impacts.
Population Characteristics and Socioeconomics	No adverse impacts. Projects are anticipated to improve safety and mobility for area residents.
Soil	The eastern end of the alignment is in Prime Farmland. While there is one residence on the south side of Foster, most of the area is undeveloped. **A farmland evaluation will likely be required.**
Wetlands	**The project crosses three creeks/designated wetlands. Coordination with local, state, and/or federal agencies may be required regarding wetlands.**
Floodplains	The alignment is located in the 100-year floodplain in the western and eastern ends. There is little development in these areas. **Coordination with local, state, and/or federal agencies may be required regarding project work within the floodplain.**
Waters of the U.S.	**The creeks the alignment crossing may be considered. Waters of the U.S. A determination by local, state, and/or federal agencies may be required, as well as additional coordination.**
Water Quality, Navigable Waterways, and the Coastal Zone	The project alignment crosses three creeks. **These waters may be considered jurisdictional, and the USACE would regulate any work done below the ordinary high-water mark. An agency determination, as well as additional coordination, may be required.**
Ecologically Sensitive Areas and Endangered and Threatened Species	Endangered and threatened species are present in Montgomery County; the proposed project is not anticipated to adversely impact habitat. A moderate level of additional analysis/minor agency coordination is anticipated.
Migratory Birds	No adverse impacts.
Right-of-Way and Acquisition	**Some land acquisition is anticipated. The City of Conroe has begun informal discussions with property owners that could potentially be impacted by the need to acquire land outside the existing right-of-way.**
Traffic and Parking	No adverse impacts.
Noise	No adverse impacts. Moderate level of additional analysis/minor agency coordination may be needed due to project increasing capacity.
Safety and Security	No adverse impacts.
Aesthetics	No adverse impacts.
Construction Impacts	No adverse impacts.