State Highway 146
Subregional Plan

146
TEXAS

Kimley»Horn | HOAC

Revised September 2018

SH 146 SUBREGIONAL PLAN

March 2018

PREPARED FOR

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FIGURES

TABLES

Executive Summary

EXECUTIVE SUMMARY

OVERVIEW

The State Highway 146 Subregional Study was commissioned by the Houston-Galveston Area Council (H-GAC), and funded by the Texas Department of Transportation (TxDOT) and the cities of Baytown and Mont Belvieu. SH 146 is an important regional corridor that serves as a major north-south thoroughfare, freight route, and hurricane evacuation route. Areas surrounding SH 146 are a rapidly growing part of the greater Houston-Galveston region in terms of population, employment, freight movement and traffic.

*The **vision** of the SH 146 Subregional Plan is to improve mobility and safety of the roadway network for all users.*

To realize this vision, a set of project goals were developed to further define the expectations of the participating agencies and to provide guidelines for the recommendations.

GOALS

- Enhance safety by addressing the needs of all users
- Mitigate congestion
- Mitigate mobility barriers
- Address commercial vehicle issues
- Increase connectivity for all modes of transportation
- Enhance streetscapes
- Engage the public in decision making process

STUDY AREA

The study area includes the City of Mont Belvieu and the eastern portion of the City of Baytown. This area is experiencing a growing amount of commuter, residential, and industrial traffic as the petrochemical and manufacturing plants continue to expand. These expansions have added thousands of short-term workers to the area as well as hundreds of new permanent employees. In addition to shift change traffic, major industrial and manufacturing companies located within the area contribute to growing traffic and safety issues. The study area is shown in Figure 1.

Recommended physical improvements focus primarily on two distinct zones: along the SH 146 Corridor and the Peripheral Intersections. The SH 146 Corridor extends roughly eight miles along SH 146 from the Liberty-Chambers County line to Cedar Bayou, approximately 1,000 feet north of Massey-Tompkins Road. The Peripheral intersections studied are comprised of 19 major intersections located within and around the study area.

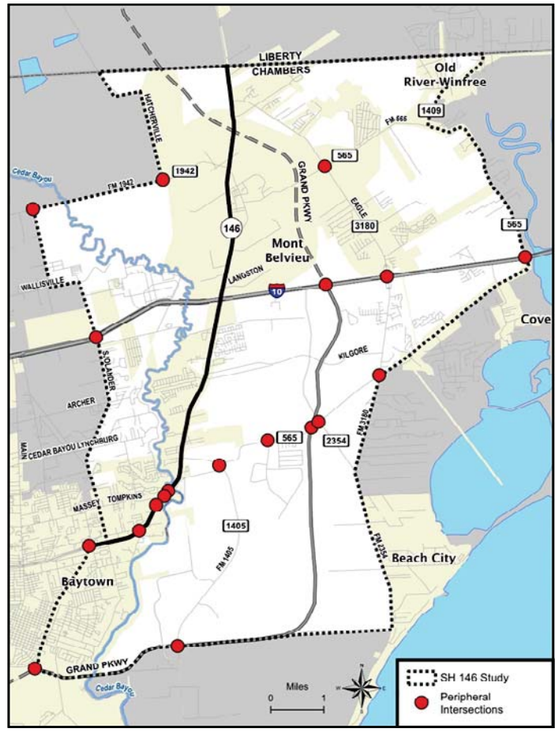

Figure 1 – Study Area

PUBLIC INVOLVEMENT

An important aspect of this study was to actively engage the public early in the process and to continue to gather feedback throughout the life of the project. Feedback was received from three different groups: a steering committee, area stakeholder groups, and the public. Table 1 summarizes the major issues that were identified by each group. The "Data" column indicates if field investigations, previous studies, or traffic analyses have identified the issue as a concern.

A steering committee was created to gather input from local agencies within the study area, provide guidance and technical expertise throughout the study. Stakeholder groups were comprised of local business owners, industry representatives, elected officials, emergency responders, and leaders from the surrounding schools and faith communities. Two public meetings were held for the project, both of which were well attended by a diverse mix of people from the surrounding area.

Major Issues	Steering	Stakeholders	Public	Data
SH 146 Congestion	X	X	X	X
Signal Timings	X	X	X	X
Driveway Consolidation	X			X
School Zones (Safety)	X	X	X	X
Underutilization of SH 99	X	X	X	X
Heavy Haul Traffic	X	X	X	X
Additional Road Connections	X	X	X	X
Railroad Crossings	X	X	X	X
Bike / Pedestrian Facilities		X	X	
Aesthetics	X	X	X	X
Hurricane Evacuation Route	X	X	X	X
Cedar Bayou Crossing	X	X	X	X
Hazardous Material Hauling			X	
FM 565 & FM 3180 Congestion	X	X	X	X

Table 1 – Common Issues

TRAFFIC OPERATIONS

The existing roadway network and traffic volumes for the year 2017 were modeled to determine the delay at each study intersection. 2017 Average Daily Traffic (ADT) counts and corresponding roadway capacity are shown in **Figure 2**, and PM peak hour Level of Service (LOS) for signalized intersections is shown in **Figure 3**.

CRASH ANALYSIS

Crash data for the study area was obtained from H-GAC and TxDOT's Crash Records Information System (CRIS) for the five-year period from 2011 through 2015. During the five-year period, about 688 crashes occurred on the study corridor.

In **Figure 4**, the heat map shows the crash locations along the corridor. Locations with the highest crash numbers (shown in red) include the intersections of:

- SH 146 at FM 1942
- SH 146 at Loop 207
- SH 146 at IH 10
- SH 146 at Redwood Drive
- SH 146 at El Chaco Drive
- SH 146 at FM 1405
- SH 146 at FM 565

The crash records indicate that areas with high driveway density, such as SH 146 near IH 10, experience a much higher crash frequency than other sections of the corridor.

PREVIOUS PLANS

Several transportation-related projects are planned within the study area. Planned projects at study intersections were considered short-term projects (unless otherwise denoted). These projects were incorporated into the short-term improvement exhibits and improved-scenario Synchro™ models. A map of funded projects is shown in **Figure 5**.

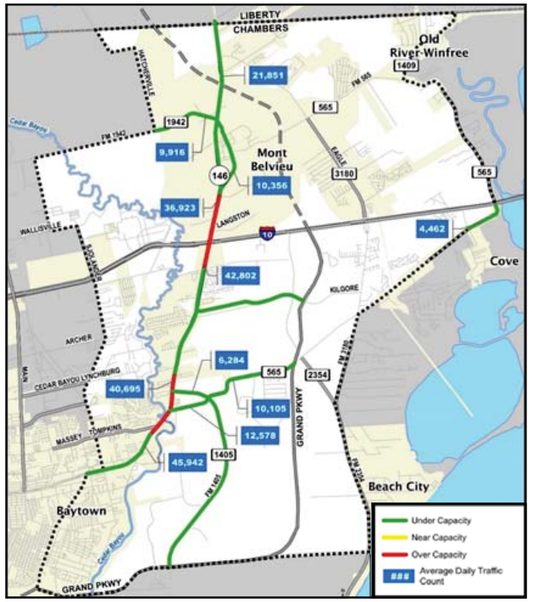

Figure 2 – 2017 Average Daily Traffic and Roadway Capacity

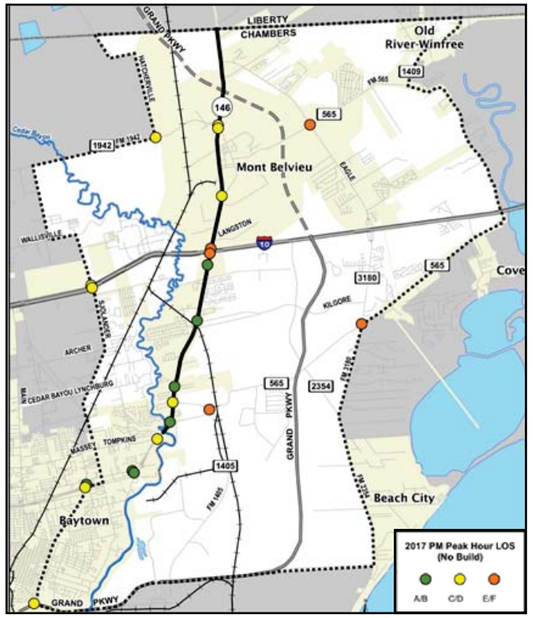

Figure 3 – 2017 PM Peak Hour Intersection LOS

Figure 4 – SH 146 Study Corridor Crash Data Heat Map (2011-2015)

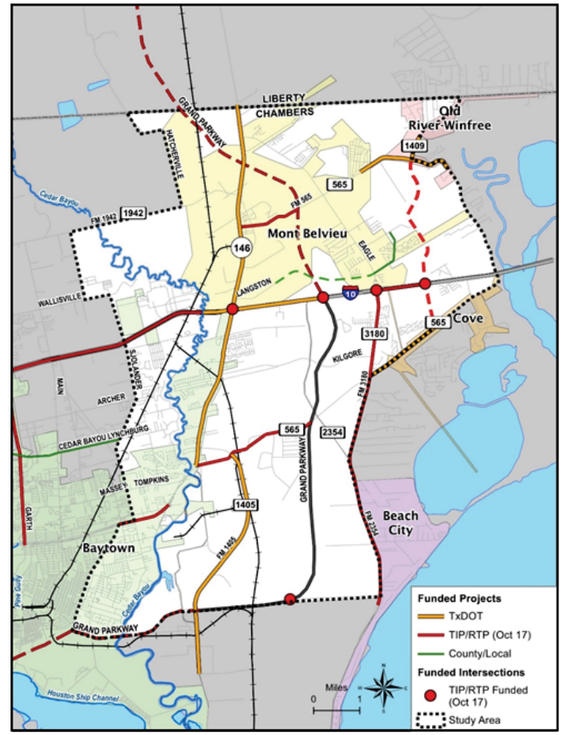

Figure 5 – Planned Projects

BARRIERS

Barriers to mobility within the study area include natural and man-made barriers. Natural barriers (such as bayous and their floodways) and manmade barriers (such as railroads and pipelines) can limit the feasibility of mobility improvements by their high construction cost. Barriers to mobility within the study area are shown in **Figure 6a and 6b**.

Cedar Bayou is the most prominent natural barrier to mobility and has hindered the construction of an east-west roadway between IH 10 and Massey-Tompkins Road. A major but less-apparent man-made barrier, especially along SH 146 in Mont Belvieu, are pipelines located above and below grade. Pipelines play a major role in the ability to improve mobility in the study area. The increased cost associated with accomodating pipelines sometimes prohibit roadway widening. Crossing or relocating pipelines must be considered before constructing any major improvements within the study area.

SUMMARY OF ALL RECOMMENDATIONS

The following recommendations are proposed to be implemented over the next 20 years (**Figure 7**), are intended to improve safety and mobility in the study area.

Roadways

- 8.2 miles of access management modifications along SH 146.
- 34 miles of new road connections
- 63 miles of roadway widenings
- 5 Potential Cedar Bayou crossings

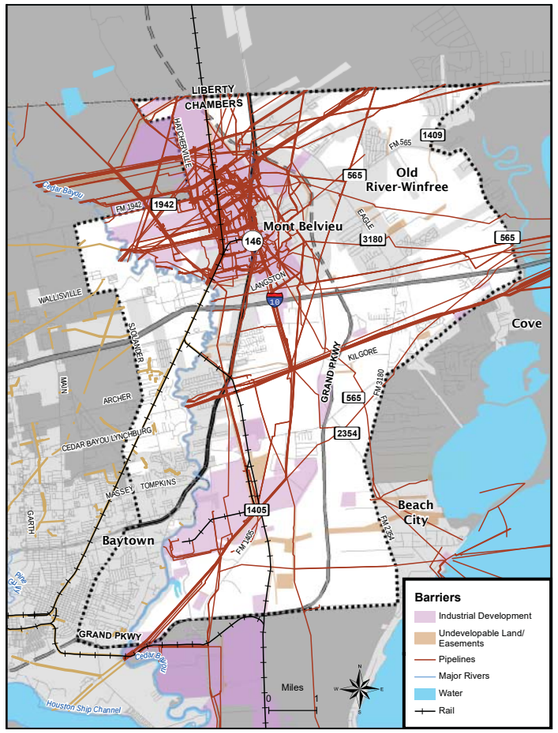

Figure 6a – Barriers to Mobility - Manmade

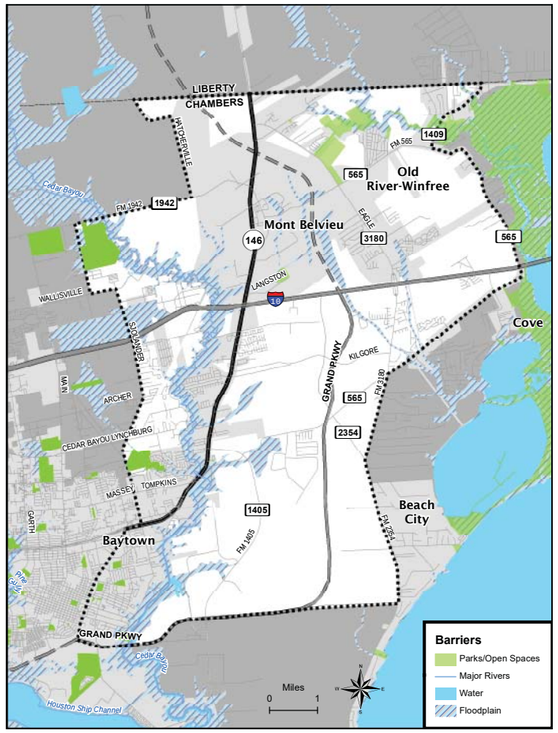

Figure 6b – Barriers to Mobility-Natural

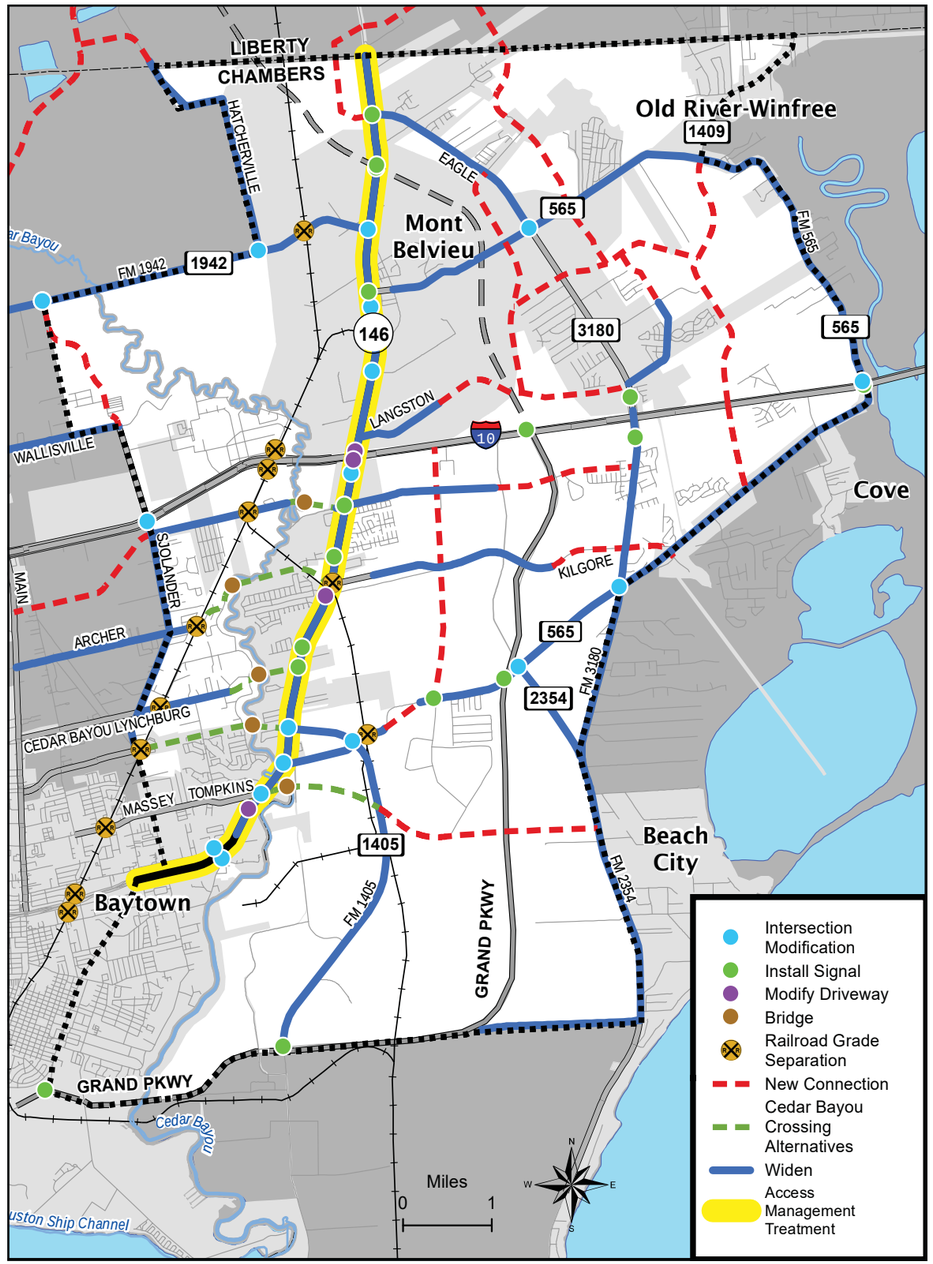

Figure 7 – Recommended Physical Improvements

Intersections

- Adjust signal timing and restripe intersections at all signalized intersections.
- Add turn lanes and other capacity improvements to alleviate delay.
- Install 20 signals throughout the study area.
- Construct 12 grade-separated railroad crossings.

Transit

- Implement general paratransit
  - (Demand Response – Dial a Ride)
- Explore/Analyze flexible routing in Baytown and Mont Belvieu
- Develop an Action Plan to determine the strategy for implementing service in Chambers County
- Work with large employers for additional transit opportunities

Bike and Pedestrian

- Develop 25 Miles, bike/trail corridors
- Develop 10 Miles, pedestrian corridors

POLICY

- Address truck / heavy vehicle concerns
- Establish new land use policies and ordinances
- Chambers and Harris County policies should complement each other
- Chambers and Harris County Economic Development policies should complement each other
- Adopt the Goals of the Texas Freight Mobility Plan
- Establish 380/381 area
- Address Hurricane Harvey concerns
- Review SH 99 toll policy
- Harness innovative technology

OTHER

- Develop a Chambers County Thoroughfare Plan

SHORT-TERM RECOMMENDATIONS

Detailed drawings identifying specific recommendations along the SH 146 corridor and at peripheral intersections are presented in pages 33-85.

LONG-TERM RECOMMENDATIONS

Concept-level exhibits that show long-term recommendations at key intersections are presented in pages 91-97.

COST ESTIMATES

Estimated plan costs were divided between short-term and long-term recommendations. Short-term recommendations can be implemented within five years, and long-term recommendations within six years or greater.

Short Term	$15-20 Million
Long Term	$725-825 Million
Total	**$740-845 Million**

ANTICIPATED PLAN BENEFITS

Benefits of short-term recommendations include improvements to mobility, safety, and air quality. Based on a comparison of year 2025 traffic operations along SH 146 with and without short-term recommendations, the following benefits are anticipated:

- **Reduction in number of crashes:**
  - Annual crash cost savings of $4.2 M
- **Enhancement to traffic operations:**
  - Reduce Travel Time during peak periods by 22%
  - Improve speed during peak periods by 32%
  - Annual travel time savings of $5.5 M during peak periods
- **Improvements to Air Quality**
  - Reduction of 16% of Volatile Organic Compounds (VOC), carbon monoxide (CO), and nitrogen oxides (NOx) levels.

Similar to short-term benefits, long-term recommendations improve mobility, safety, and air quality. However, these improvements are more difficult to quantify due to the uncertainty of traffic projects, the timeline of improvement construction, and changes in technology. Benefits of long-term improvements, described in a general sense, are as follows:

- Enhancements to safety and streetscapes by improved bike and pedestrian facilities
- Congestion mitigation, increased connectivity, and reduced mobility barriers by roadway and intersection improvements
- Address commercial vehicle issues by constructing railroad overpasses and implementing new policy
- Implement transit services for elderly and disabled

FUNDING

Texas provides three ways for cities and counties to implement physical improvements or changes for their jurisdictions:

- Regulatory
- Financing
- Economic development

These strategies should be incorporated into comprehensive plans and used for transportation, flood mitigation, parks, housing etc. Each strategy is unique and most effective if combine with other economic strategies.

Pro-active approaches could help to move projects forward in H-GAC's Transportation Improvement Program. Examples include:

- County and/or local jurisdictions acquiring right-of-way in advance
- Encourage landowners and developers to donate right-of-way
- County and/or local governments can fund feasibility and traffic studies, environmental studies and preliminary engineering and design
- County and/or local governments could pay the full cost of relocating utilities and pipelines and constructing drainage improvements

POLICY AND ORDINANCE NEXT STEPS

1. Consider creating region-wide 380/381 districts
2. Meet with developers early in development process to discuss concerns and facilitate a shared vision. Make sure the plat and permit information is shared among the common members of the study area to allow power in collaboration for the necessary improvements.
3. Ordinance amendments for local regulations should be shared with the counties and cities to insure complementary standards.
4. Hold at least two meetings per year with public partners and the private industry to discuss private sector plans.

IMPLEMENTATION NEXT STEPS

The steps below outline the key actions to be undertaken and the agencies responsible to implement the recommended improvements in the SH 146 Subregional Study. TxDOT, Chambers and Harris Counties and the Cities of Baytown and Mont Belvieu should form a working group to coordinate improvements and policies in the coming years.

Implementation Step	Responsible Agency
Accept SH 146 Subregional Plan	Baytown & Mount Belvieu
Transportation Policy Council acceptance of SH 146 Subregional Plan	H-GAC
Implement system-wide signal retiming	TxDOT
Secure funding for short-term improvements	H-GAC and TxDOT
Coordinate with TxDOT for median & intersection aesthetics	Baytown & Mount Belvieu Chamber of Commerce
Perform design for short-term improvements	TxDOT
Implement short-term improvements	TxDOT
Secure funding for long-term improvements	Baytown & Mount Belvieu Chamber of Commerce & TXDOT
Perform environmental documentation and schematic design	TxDOT
Perform detailed design of long term-improvements	TxDOT
Implement long-term improvements	TxDOT
Program long range thoroughfare improvements and update thoroughfare plans	Cities and Counties
Conduct route alignment and preliminary engineering studies for Cedar Bayou crossing	Baytown
Conduct environmental & hydrologic/hydraulic studies for Cedar Bayou crossing	Baytown
Coordinate with United States Army Corps of Engineers on Cedar Bayou crossing	Baytown
Perform detailed design of Cedar Bayou crossing	Baytown
Implement Cedar Bayou Crossing	Baytown

Chapter 1

Introduction

SH 146 at Kilgore Parkway (2006)

CHAPTER 1: INTRODUCTION

OVERVIEW

The State Highway 146 Subregional Study was commissioned by the H-GAC, and funded by TxDOT and the cities of Baytown and Mont Belvieu. The overall objective of the study was to develop short- and long-term innovative and actionable transportation strategies through a combination of physical, operational and regulatory measures that improve mobility, safety, and access to jobs, homes, and services in the study area.

SH 146 is an important regional corridor that serves as a major north-south thoroughfare, freight route, and hurricane evacuation route. The area surrounding SH 146 is a rapidly growing part of the greater Houston-Galveston region in terms of population, employment, freight movement and traffic.

The study included an analysis of current and future population, employment, and economic development conditions. An extensive traffic data collection and analysis effort was completed to examine the roadway network and identify existing traffic bottlenecks and roadway facilities with high congestion levels and/or potentially unsafe conditions. Multiple steering committee and stakeholder group meetings, as well as two separate public meetings, were held at different stages in the project to gather feedback from the participating agencies and communities.

This report outlines short- and long-term transportation improvements to increase safety, mitigate congestion, improve air quality, incorporate multi-modal mobility solutions, and enhance the aesthetics of the highway. Intended to be more than a typical single roadway corridor access management study,the recommendations provide a roadmap for the collaborative future efforts of TxDOT, Harris and Chambers Counties, and the Cities of Baytown and Mont Belvieu.

STUDY AREA

The study area (Figure 8) includes the Cities of Mont Belvieu and the eastern portion of the City of Baytown. This area is experiencing a growing amount of commuter, residential, and industrial traffic as petrochemical and manufacturing plants continue to expand. These expansions have added thousands of short-term workers to the area as well as hundreds of new permanent employees. In addition to shift change traffic, major industrial and manufacturing companies located within the area contribute to growing traffic and safety issues.

Recommended physical improvements were focused primarily on two distinct zones: along the SH 146 Corridor and at peripheral intersections. The SH 146 Corridor extends roughly eight miles along SH 146 from the Liberty-Chambers County line south to Cedar Bayou, approximately 1,000 feet north of Massey-Tompkins Road. The Peripheral intersections studied are comprised of 19 major intersections located within the study area.

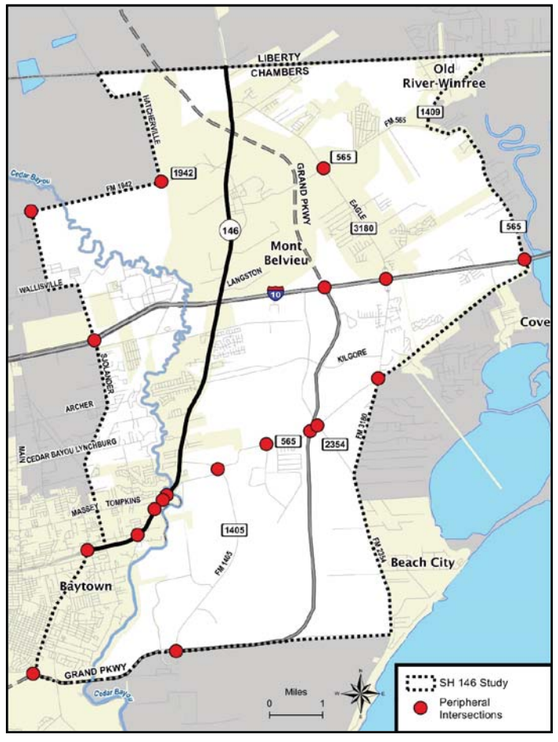

Figure 8 – Study Area

VISION AND GOALS

A vision statement was developed by the steering committee to set the purpose and overall tone of the study.

*The **vision** of the SH 146 Subregional Plan is to improve mobility and safety of the roadway network for all users.*

To realize this vision, a set of project goals was developed to further define the expectations of the participating agencies and to provide guidelines for the recommendations. These goals also provided the framework for the evaluation process to determine the effectiveness of recommended improvements.

GOALS

- Enhance safety by addressing the needs of all users
- Mitigate congestion
- Mitigate mobility barriers
- Address commercial vehicle issues
- Increase connectivity for all modes of transportation
- Enhance streetscapes
- Engage the public in decision making process

PROCESS

The study was initially scheduled to be completed over the course of one year; however, three months were added to the schedule to allow affected communities to begin recovery from Hurricane Harvey. The first months of the project focused primarily on data collection and identifying existing issues within the study area. The study team also met with the steering committee, stakeholders, and the public early-on in the process to gather input on problem areas and common concerns from local agencies and surrounding communities. Based on the assembled feedback and evaluation of the existing conditions, short- and long-term recommendations were developed. Solutions were then presented to each of the public involvement groups for comment. After refining the recommended improvements and completing the evaluation process, this report was reviewed and published; it contains 11 chapters which are summarized as follows:

CHAPTER 1: INTRODUCTION

Introduction – describes the study area and what the study is intended to accomplish.

CHAPTER 2: PUBLIC INVOLVEMENT

Public Involvement – describes the process and who provided input throughout each stage of the study.

CHAPTER 3: EXISTING NETWORK

Existing Network – describes the existing roadway, transit, bicycle, and pedestrian facilities within the study area.

CHAPTER 4: DATA COLLECTION

Data Collection – details what data was collected to identify needs and recommend improvements.

CHAPTER 5: DATA ANALYSIS

Data Analysis – describes the analysis preformed to identify needs.

CHAPTER 6: NEEDS BASED PLAN

Needs Based Plan – describes the needs identified and summarizes these needs in a table and map.

CHAPTER 7: SHORT-TERM RECOMMENDATIONS

Short-Term Recommendations – describes the recommendations of the study that can be implemented within five years.

CHAPTER 8: LONG-TERM RECOMMENDATIONS

Long-Term Recommendations – describes study recommendations that will take five years or more to implement.

CHAPTER 9: PLAN COST AND BENEFIT

Plan Cost and Benefit – describes the cost and benefits of short-term and long-term improvements.

CHAPTER 10: IMPLEMENTING THE PLAN

Implementing the Plan – charts the path forward with funding and next steps.

CHAPTER 11: SUMMARY

Summary – contains a summary of the report.

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Chapter 2

Public Involvement

SH 146 at Kilgore Parkway (2017)

CHAPTER 2: PUBLIC INVOLVEMENT

PUBLIC INVOLVEMENT PLAN

An important aspect of this study was to actively engage the public early in the process and to continue to gather feedback throughout the life of the project. H-GAC developed a Public Involvement Plan (PIP) that identified public involvement activities throughout the course of the study. A full version of the PIP is located in the **Appendix**.

Steering Committee Meeting

STEERING COMMITTEE

A steering committee was created to gather input from local agencies within the study area to provide guidance and technical expertise throughout the study. Committee members developed the vision statement and goals; received, reviewed and provided input throughout the development of the plan; met as needed during the study; recommended stakeholders and encouraged public meeting attendance. Summaries of these meetings are in the **Appendix**.

Members of the steering committee included non-elected representatives from:

- City of Baytown
- City of Mont Belvieu
- TxDOT – Beaumont District
- TxDOT – Houston District
- Chambers County
- Harris County
- Harris County Transit
- Baytown Police Department
- Mont Belvieu Police Department
- Baytown Chamber of Commerce
- Baytown West Chambers County Economic Development Foundation

Steering Committee Meeting

STAKEHOLDER GROUPS

Stakeholder groups were comprised of local business owners, industry representatives, elected officials, emergency responders, and leaders from the surrounding schools and faith communities. The purpose of stakeholder meetings was to obtain specific information on the needs and concerns of persons living and/or working in the study area. Two rounds of stakeholder meetings were held during the study. The first round of meetings, the stakeholders were given an overview of the study and asked to provide feedback on mobility and safety in the study area. The second round of meetings were held to present the study recommendations and provide stakeholders an opportunity for comments. A survey was distributed at the meeting, asking stakeholders for input regarding existing issues and potential solutions. Individual meetings were also held with several of the major energy and railroad companies to gain a better understanding of their operations and gather additional information on their future plans. Stakeholder input was used to refine and prioritize short-term and long-term recommendations.

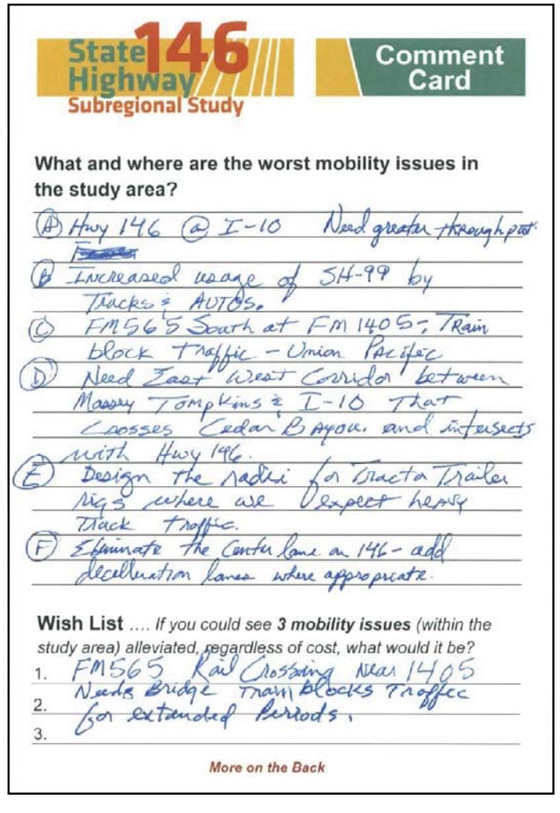
PUBLIC MEETINGS

Two public meetings were held for the project. Both meetings were well attended by a diverse mix of people from the surrounding area. These meetings relayed the purpose, process, and progress of the study and were designed to maximize public convenience and allow discussions on any issue within the study area.

- The first meeting was held on June 6, 2017 at the Living Hope Church in Baytown. Attending elected officials and the public were given an overview of the project and presented with findings of the existing conditions analysis. Input from the steering committee and stakeholder meetings held prior to the public meeting was also relayed to the public. Comment cards were distributed to record and organize input from the public. Comment cards from the first public meeting are in the **Appendix**.

- The second meeting was held on January 11, 2018 in Mont Belvieu. This purpose of this meeting was to present the recommendations and provide an opportunity for final public questions and comments. Comment cards were distributed to record and organize input from the public. Comment cards from the second public meeting are located in the **Appendix**.

Stakeholder Committee Meeting



State Highway 146 Subregional Study

Comment Card

What and where are the worst mobility issues in the study area?

(A) Hwy 146 @ I-10 Need greater throughput
(B) Increased usage of SH-99 by Trucks & AUTOS.
(C) FM565 South at FM 1405 - Train block Traffic - Union Pacific
(D) Need East West Corridor between Massey Tompkins & I-10 that crosses Cedar Bayou and intersects with Hwy 146.
(E) Design the radii for Tractor Trailer Rigs where we expect heavy Truck Traffic.
(F) Eliminate the center lane on 146 - add deceleration lanes where appropriate.

Wish List .... *If you could see* ***3 mobility issues*** *(within the study area) alleviated, regardless of cost, what would it be?*

1. FM565 Rail Crossing Near 1405
2. Needs Bridge Train Blocks Traffic
3. for extended Periods.

More on the Back

Chapter 3 Existing Network

I-10 at SH 99 (2006)

CHAPTER 3: EXISTING NETWORK

ROADWAY

The existing roadway network consists of roads ranging in classification from interstate highway to local streets. The primary roadway network consists of the following:

Interstates are high-speed, limited access highways that are the backbone of the county's roadway transportation network. They provide mobility to and from other counties and major destinations. Toll roads are also included in this category, examples include IH 10 and SH 99.

IH 10 is the only interstate facility within the study area. IH 10 bisects the study area, connects it to the cities of Houston and Beaumont, and serves as a major transportation corridor not only for the region, but also for the state as a whole. IH 10 crosses the width of Texas, and is the southernmost cross-country interstate highway in the American Interstate Highway System. It begins in Santa Monica, California and ends in Jacksonville, Florida. Portions of IH 10 serves as a hurricane evacuation route.

In the study area IH 10 is four lanes with shoulders and a posted speed limit of 65 mph. Access to and from IH 10 is provided by grade-separated interchanges along with two-lane, one-way frontage roads.

SH 99/Grand Parkway Toll Road is located on the eastern side of the study area. The facility is a major north/south arterial. SH 99 currently ends at IH 10. Construction on the northern portion of the road will be operational within the next five years. This section of Grand Parkway/SH 99 will link Chambers County to IH-69 and IH-45 in Montgomery County.

US and State Highways are non-freeway facilities that carry large volumes of traffic at relatively higher speeds. They provide regional (north-south and east-west) mobility and provide access to local roads.

SH 146 within Chambers County is a north-south, five-lane roadway with shoulders and open ditch drainage. The speed limit along SH 146 varies from 45 to 65 mph within the study area. A typical cross section (see Figure 9) consists of two 12-foot lanes with an 8-foot shoulder in each direction, separated by a 16-foot two-way-center-turn lane.

Farm-to-Market (FM) roads are state-maintained roads common throughout the County and serve as rural arterials. They provide regional access, connectivity, and mobility in the county and to adjacent counties. There are five FM roads located in the study area: FM 565, FM 1405, FM 1942, FM 2345, and FM 3180.

TRANSIT SERVICE AND AMENITIES

A portion of the study area is located in Chambers County, which includes eastern portions of Baytown and the City of Mont Belvieu. General transit service does not exist within any portion of Chambers County. The only service currently offered is a limited senior citizens and persons with disabilities demand-response van service, funded through the Federal Transit Administration and Chambers County.

Portions of Baytown located in Harris County are served by local and regional bus routes. Portions of Baytown located in Harris County are served by local and regional bus routes. Public transit services in Harris County include the following:

- Baytown Park and Ride
  - sponsored by Baytown and Harris County Transit
  - operated by Metropolitan Transit Authority of Harris County (METRO)
  - located at San Jacinto Mall (near Garth Road and IH 10)
- Five local bus routes
  - operated by Harris County Transit
  - providing service between central areas of Baytown to the Baytown Park and Ride and surrounding communities.

A map showing the existing transit service in study area is shown in Figure 10.

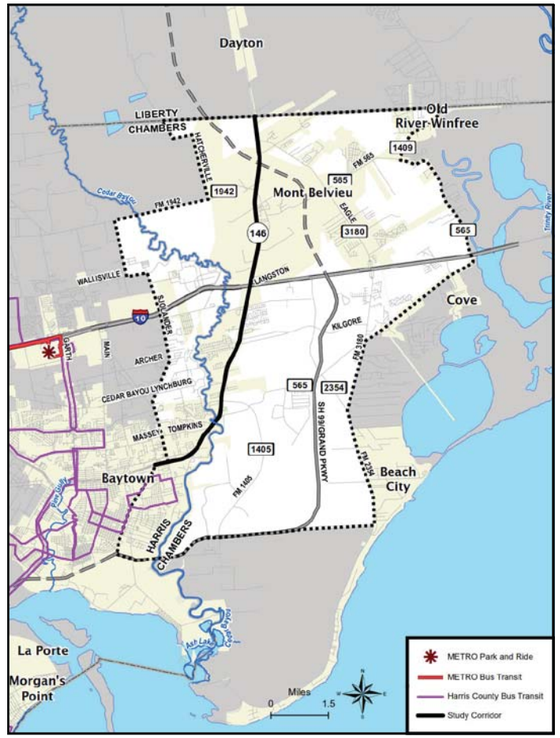


Figure 10 – Transit Service and Amenities

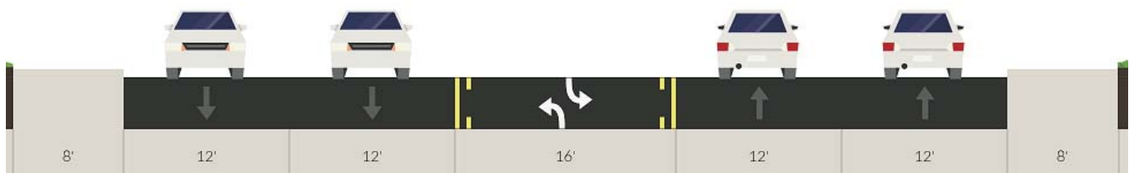


Figure 9 – Existing SH 146 Cross-Section

BIKE AND PEDESTRIAN FACILITIES

Baytown and Mont Belvieu have hike and bike trails located in parks. Both cities have developed or are developing hike-and-bike trail plans with the intent of creating community-wide connections, both for on- and off-street travel. Currently, SH 146 does not accommodate pedestrians or cyclists along most of the corridor and sidewalks are limited to the SH 146 IH 10 intersection.

Recent bike and pedestrian improvements along Eagle Drive in Mont Belvieu have set the standard for pedestrian facilities in the area. The road has sidewalks on both sides of the street. However, a ten-foot wide shared use path along the east side of Eagle Drive between Lakes of Champions Boulevard and FM 565 has received positive feedback from the residents of Mont Belvieu. A map showing the existing bikeways and trails in and near the study area is shown in Figure 11.

Bike and pedestrian facilities were identified as an issue by the stakeholders and the public. Most concerns were related to the lack of sidewalks and other pedestrian facilities along SH 146 or safety hazards in school areas.

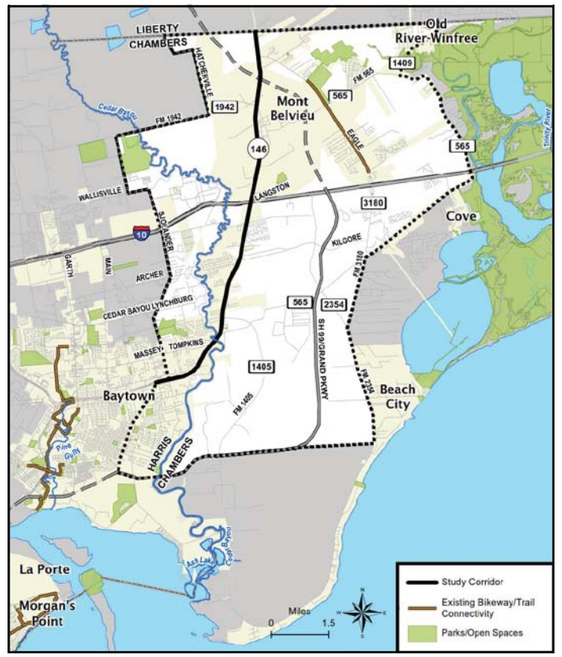


Figure 11 – Bicycle and Pedestrian Facilities

146
TEXAS

Chapter 4
Data Collection

I-10 at SH 99 (2010)

CHAPTER 4: DATA COLLECTION

TRAFFIC OPERATIONS

Traffic Volumes

Turning Movement Counts (TMCs) were collected at all study intersections on January 28, 2017 between 6:30am – 8:30am and 5:00pm – 7:00pm. Weekend TMCs were also collected. Truck traffic was identified as a concern and TMCs were collected by vehicle class to determine the percent of heavy vehicles at each intersection. 24-hour bi-directional ADT counts were collected at 11 locations along study corridors to understand daily traffic patterns along each corridor. These ADTs and corresponding roadway capacity are shown in **Figure 12**. A summary of traffic data is available as an **Appendix** and raw traffic counts are available as **Supplemental Data.**

Truck Volumes

Heavy vehicle percentage on a standard thoroughfare is approximately 2%. However, industrial land use throughout the study area generates significant truck traffic and the SH 146 corridor has an average heavy vehicle percentage of 6.5%. At multiple intersections throughout the study area the heavy vehicle percentage was greater than 8% and was 18% at the intersection of FM 1405 and SH 99.

Trucks are using SH 146 to transport a variety of goods, much of which is related to the plastics and resins plants in the study area, as well as cargo to/from the Port of Houston to the south.

Currently, permitted loads are prohibited on SH 99. If tolls were eliminated for large trucks on SH 99, as it operates today, several major companies located north of IH 10, would still use SH 146 in lieu of SH 99 as it is the shortest and most cost-effective route.

Traffic Volume Growth

An annual growth rate was used to account for background traffic volume growth within the study area. An annual growth rate was determined for each intersection, as traffic growth is expected to vary across the study area. Growth rates range from 2% to 7% per year and were applied (compounded annually) to the 2017 traffic volumes to determine future traffic volumes. In addition to overall traffic volume increases, the percentage of truck traffic on roadways is expected to increase due to the expansion of industry in the study area.

Intersection Delay

Traffic operations are affected by various geometric factors including roadway type (e.g. divided or undivided), number of lanes, lane widths, and grades. Level-of-Service (LOS), which is a measure of the degree of congestion, ranges from LOS A (free flowing) to LOS F (a congested, forced flow condition). The LOS at intersections reflects the delay (sec/veh) at each intersection. The existing roadway network and 2017 traffic volumes were modeled to determine the delay of each study intersection. 2017 AM and PM peak hour LOS for signalized intersections are shown in **Figure 13** and **Figure 14**, respectively. A summary of LOS analysis results is available in the **Appendix** and output is available as **Supplemental Data**.

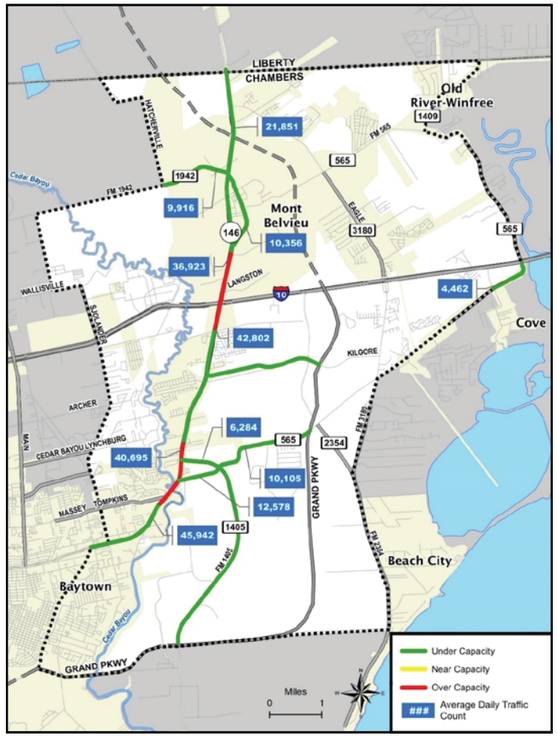


Figure 12 – 2017 Average Daily Traffic and Roadway Capacity

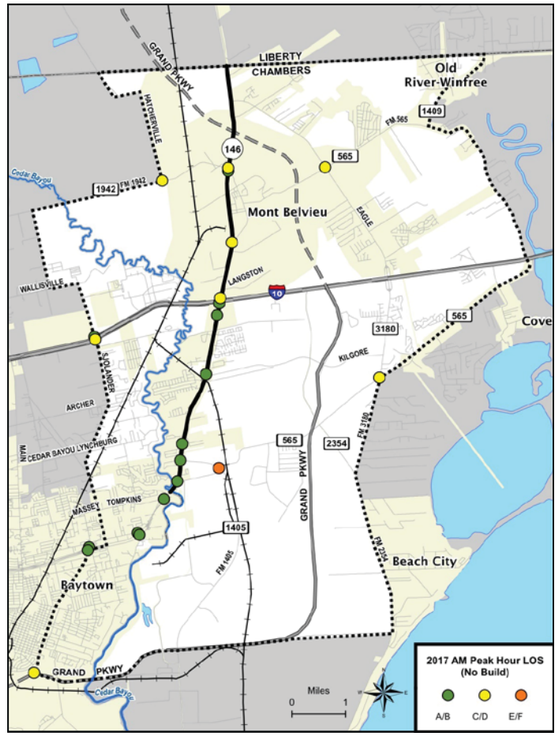


Figure 13 – 2017 AM Peak Hour Intersection LOS

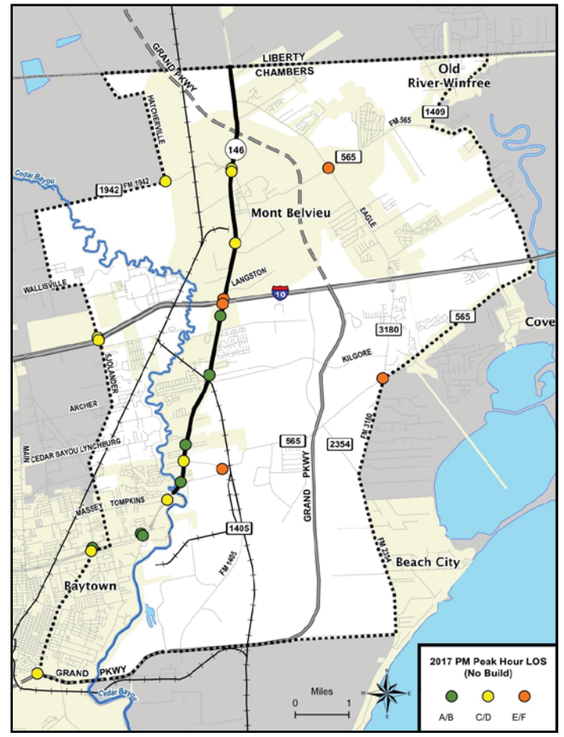


Figure 14 – 2017 PM Peak Hour Intersection LOS

CRASH ANALYSIS

Crash data for the study area was obtained from H-GAC and TxDOT's Crash Records Information System (CRIS) for the five-year period from 2011 through 2015. The analysis was performed along SH 146 (from Tompkins Dr to SL 479) and at the intersections near SH 146.

A total of 689 crashes were recorded along SH 146 during the five-year period. A total of 233 crashes were recorded at 10 intersections near SH 146. Peripheral intersection crashes are shown in **Table 2** below. Additional crash data analysis is available in the **Appendix**.

Figure 15 shows the breakdown of crashes by severity. Approximately 70% of all crashes were property-damage-only crashes, while approximately 28% of crashes involved injuries. Fatal crashes accounted for approximately two percent of all crashes.

Figure 16 shows the breakdown of crashes by collision type. A high number of rear-end collisions and angle collisions were observed along the study corridor for the years 2011 through 2015. Frequent driveways, inadequate driveway spacing and bad signal timing are contributing factors to the high number of rear-end collisions. Access management techniques can limit turns and reduce the number of angle collisions.

Intersection	Crashes
FM 1942 at Hatcherville Road	27
FM 565 at FM 3360	44
FM 3180/Eagle Drive at IH 10 Service Roads (North of IH 10)	6
FM 3180/Eagle Drive at IH 10 Service Roads (South of IH 10)	10
FM 565 at FM 1405	67
FM 565 at Ameriport Parkway	8
FM 565 at SH-99 Service Roads	5
FM 565 at FM 2354	8
FM 565 at FM 3180	27
SH 99 at FM 1405	31

Table 2 – Peripheral Intersection Crashes

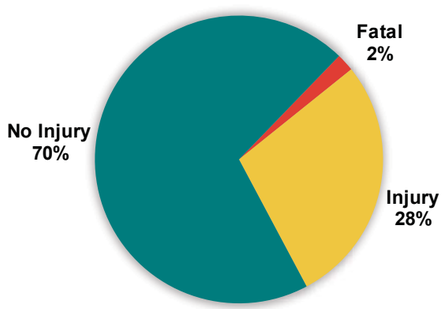


Figure 15 – Crash Severity

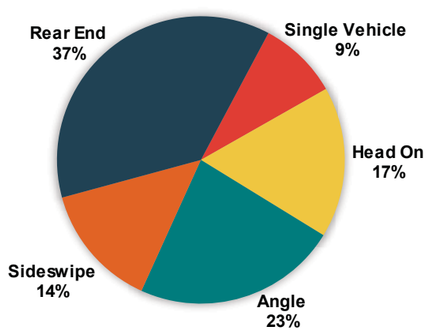


Figure 16 – Collision Type

In **Figure 17**, the heat map shows the crash locations along the corridor on SH 146 for the five-year period. Highest crash locations (shown in red) include the intersections of:

- SH 146 at FM 565
- SH 146 at FM 1405
- SH 146 at El Chaco Drive
- SH 146 at Redwood Drive
- SH 146 at IH 10
- SH 146 at Loop 207
- SH 146 at FM 1942

Areas with high driveway density, such as SH 146 near IH 10, experience a much higher crash frequency than other sections of the corridor. Crash data along SH 146 is shown in exhibits in the **Appendix**.

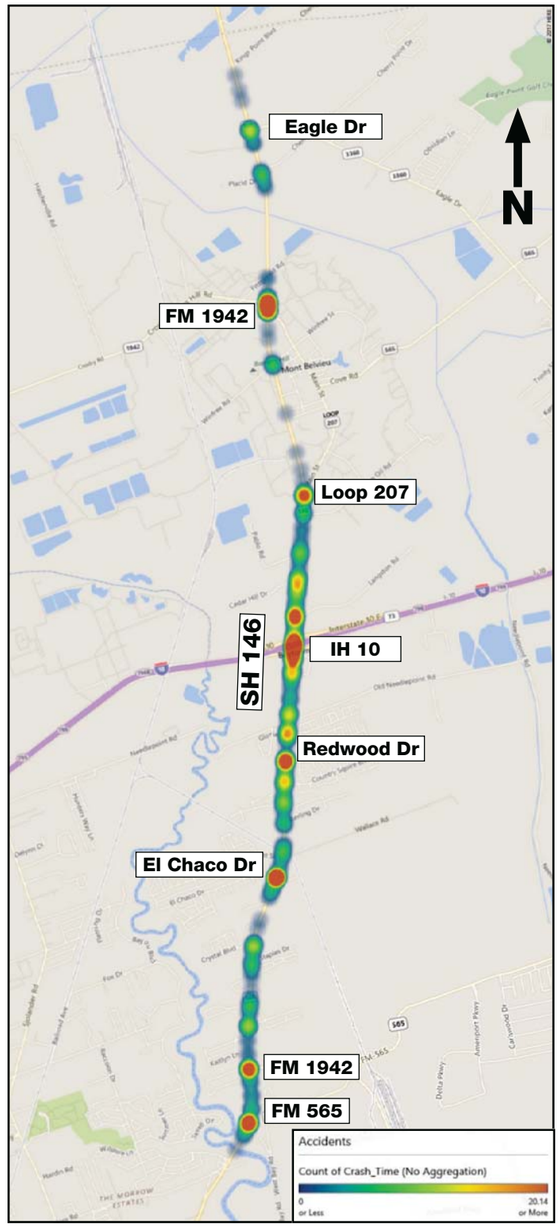


Figure 17 – SH 146 Study Corridor Crash Data Heat Map (2011-2015)

TRANSIT PLANNING EFFORTS

Previous regional and local studies[1] have assessed the need for additional transit service in the SH 146 corridor area and Chambers County. The 2009 H-GAC Chambers County Transit Plan noted that due to its smaller population, Chambers County is at a disadvantage to receive adequate funding to support a comprehensive countywide transit system.

However, with a growing population along SH 146 and the clustering of major employers, community services, and other development, the increasing need for transit connections serving multiple trip purposes must be considered.

Recommendations for transit expansion from the 2009 plan include:

- County-wide demand-response transit service for the public with eventual fixed route service expansion through available regional, state, or federal funding
- Strategic partnerships with other transit agencies, such as Harris County Transit, to provide a commuter shuttle between eastern Harris County and western Chambers County
- Strategic partnerships with local employers to provide employee shuttle service

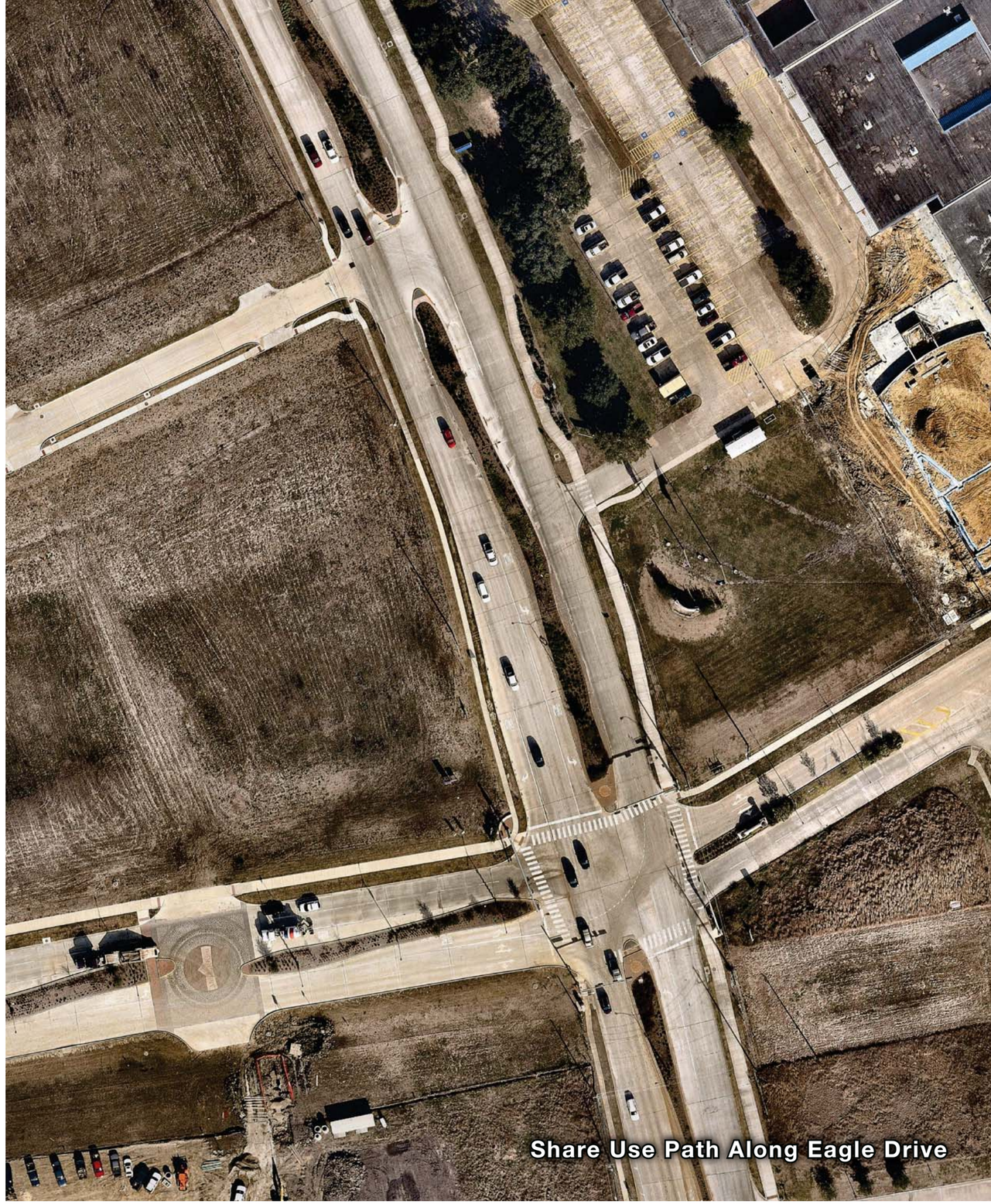
The City of Baytown Mobility Plan (2013) assessed transit service across Baytown, including the SH 146 corridor. While many recommendations included modifying existing bus service serving central areas of the City, this plan also included a conceptual commuter rail alignment that would connect the Union Pacific Railroad east to Sjolander Road. While this rail service was evaluated as a Tier II (moderate performing) corridor by an H-GAC study, long-term bus service recommendations included connections between a future Baytown rail transit center and residential/employment areas along and east of SH 146.

More recent short-term study recommendations indicated the need for implementation of a moderate expansion in transit service. The H-GAC Regionally Coordinated Transportation Plan (RCTP) in 2017 noted in Finding # 8 “Chambers County does not have a designated public transit service provider among the 13 counties in the Gulf Coast Planning Region.” Recommendation # 8 indicates the need for countywide service that links communities within the county[2].

BIKE AND PEDESTRIAN PLANNING EFFORTS

Baytown’s Strategic Parks and Recreation Master Plan (Playbook 2020) outlines different trail types that may be appropriate to serve a variety of non-motorized transportation and recreational travel purposes. These include regional trails, neighborhood trails, parkway sidewalks, and on-street bicycle lanes.

As additional areas develop along SH 146, both cities should take advantage of opportunities for integrating sidewalk, trail, and bicycle facilities into new roadway projects and new developments. Along parts of the corridor with existing development, improving existing streets and utilizing natural corridors or easements may provide appropriate ways to increase multimodal access to the corridor. For example, the widening of Eagle Drive in Mont Belvieu provided an opportunity to create a more walkable corridor with the addition of sidewalks; shared used path, enhanced landscaping, and a direct connection to schools, businesses, and Mont Belvieu City Park.



1 2009 H-GAC Chambers County Transit Plan, City of Baytown Mobility Plan (2013), H-GAC Regionally Coordinated Transportation Plan (RCTP)

2 Page 66 of RCTP Final Report Houston Galveston Area Council, September 2017.

DEMOGRAPHICS

Population

Population density is a crucial factor in transportation planning, as it influences an area's ability to support its population base. The highest densities within the sub-region are west of SH 146, south of IH 10 in the City of Baytown and east of FM 3180, south of IH 10. Population densities are lower east of SH 146, south of IH 10 in the City of Baytown and east of Eagle Drive, north of IH 10 City of Mont Belvieu but these areas are experiencing significant single-family residential development.

While the entire study area is expected to increase in population and relative density by the year 2035, densities are expected to increase the most in the northeastern portion of the City of Mont Belvieu. The central portion of the study area will also likely experience growth east of SH 146, north of Kilgore Road, and south of IH 10.

Mont Belvieu's population has grown 75 percent from 2006 to 2016. Due to the City's proximity to the Port of Houston and petrochemical industry, investors continue to seek development opportunities in Mont Belvieu[4]. Mont Belvieu will continue to grow and is expected to increase in population by 220% between 2015 and 2045, as shown in **Figure 18**.

Baytown's population has grown approximately one and a half percent per year since 2010[5].

Population will continue to grow and is forecast to increase in population by 43%between 2015 and 2045, as shown in **Figure 19**.

Employment

Employment density within the sub-region roughly mirrors population density. In 2017, the largest of concentrations of jobs were in Mont Belvieu along SH 146 and south of SH 146 in Baytown. A map illustrating employment density is shown in **Figure 21**.

The centerpieces of the study area's economies are three industrial districts: AmeriPort Industrial Park, Bay10 Business Park, and TGS Cedar Port Industrial Park. These districts primarily support petroleum and petrochemical processing. The anchors of the business community are ExxonMobil, Bayer, and Chevron Phillips. In addition to the heavy industry in the business community, Baytown is home to the Cedar Crossing Industrial Park. With a total expanse of 15,000 acres, Cedar Crossing Industrial Park is considered the world's fifth largest industrial park and the largest on the Gulf Coast. Cedar Crossing has attracted many top-tier companies with significant operations[6].

Eagle Drive is considered the "Main Street" of Mont Belvieu. It is a mixture of commercial properties, local schools and City Offices.

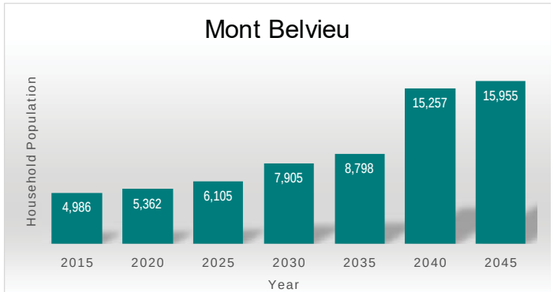


Figure 18 – Mont Belvieu Population

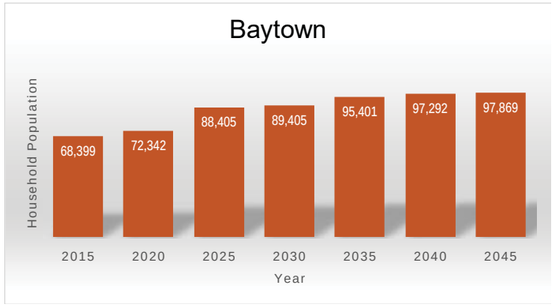


Figure 19 – Baytown Population

LAND USE

SH 146 Land Use Existing Conditions

The following summarizes the major land use development issues that impact mobility along SH 146:

- Numerous driveways, especially near the I-10 intersection, increase the number of traffic conflict points which causes unsafe driving conditions
- Limited driveway connectivity between adjacent developments
- Limited opportunities to improve corridor aesthetics and create community identity
- Numerous residential subdivisions have only one entrance point on SH 146, with no connectivity between subdivisions or access to other secondary thoroughfares

The existing land use and development pattern along the SH 146 corridor (percentages shown in **Figure 20a**. Map shown in **Figure 20b, page 18**) is characterized by the significant amount of industrial development north of IH 10 through Mont Belvieu with a focus of commercial at the intersection of IH 10 and SH 146, access points to residential subdivisions further north and mobile home/RV parks towards IH 10.

South of IH 10 in Baytown, SH 146 provides the main access point for a mix of commercial, retail, and numerous single-family home subdivisions and mobile home/RV parks. A large concentration of industrial developments are located near the intersection of FM 565 and FM 1405.

Much of the study area remains undeveloped with opportunity sites for further industrial, commercial, and residential uses. This development influences the land use context and traffic patterns in the area. Corridor improvements should satisfy the travel needs of the various roadway users while also supporting the economic and quality of life goals of the two communities.

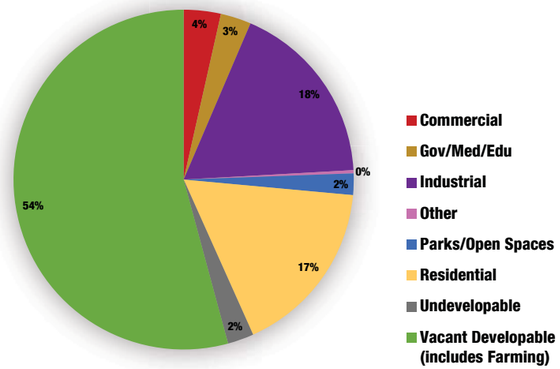


Figure 20a – Existing Land Use Percentages

3 Transportation Analysis Zone (TAZ) is an area defined by transportation officials for organizing traffic-related data, especially origin-destination trip statistics.

4 Dixon, Catie (2016 February 11). Downstream Activity Is Causing This SE Town to Boom, And Fidelis Project Is Proof. Bisnow Houston. Retrieved from www.bisnow.com/houston web 2017 December 1.

5 "Population.us." Baytown, TX Population. N.p., n.d. Web. 23 Jan. 2018.

6 Cushman & Wakefield Sells World's 5th Largest Industrial Park. (2014 December 3). Retrieved from www.cushmanwakefield.com web 2017 December 1.

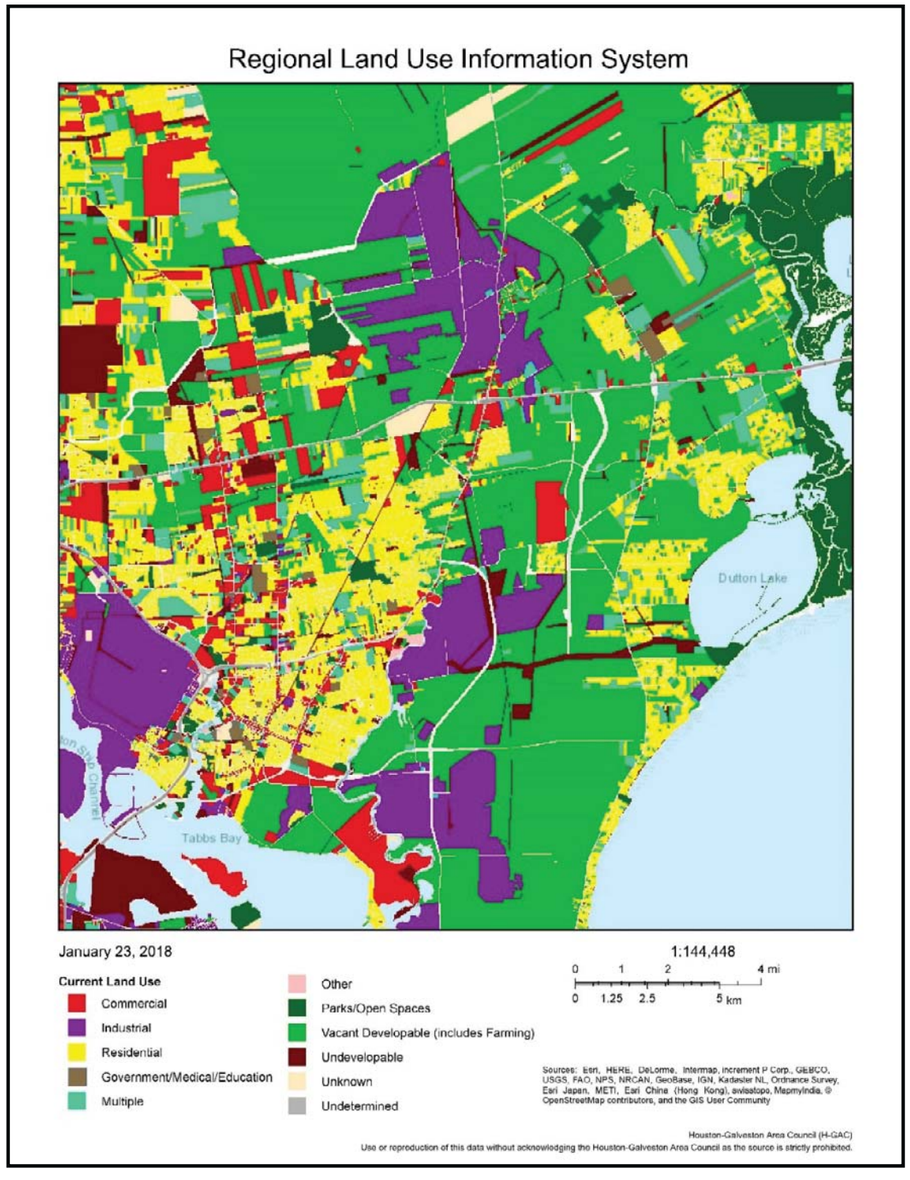


Figure 20a – Existing Land Use

PREVIOUS PLANS

Several transportation-related projects are planned within the study area. Planned projects at study intersections were considered short-term (unless otherwise denoted long-term). These projects were incorporated into the short-term improvement exhibits and improved-scenario Synchro™ models. A map of funded projects is shown in **Figure 21**. Information about planned projects is as follows, and further information is available in the **Appendix**.

Several mobility studies are underway (or were recently completed) due to the area's significance in freight transportation including the Ports Area Mobility Study, Regional Freight Study, Texas Freight Mobility Plan (2017), IH 10 East Planning and Environmental Linkage Study and I-69 Bypass Study. Aspects of these studies build on one another and are likewise incorporated into this report, as applicable.

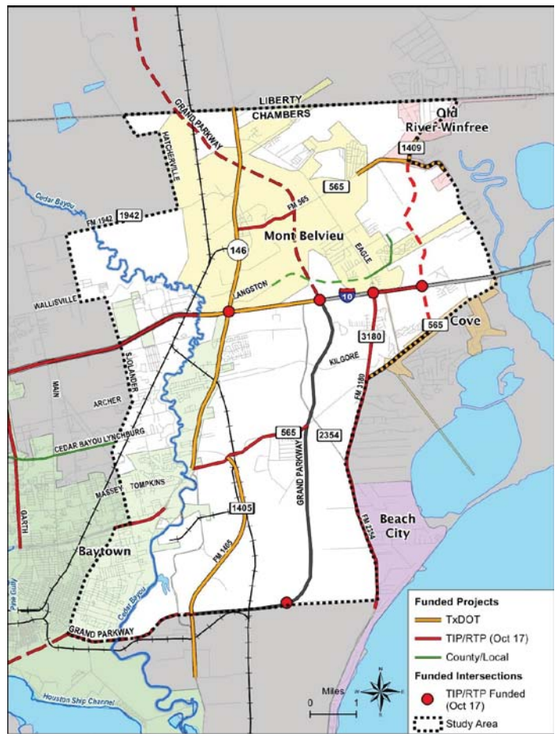


Figure 21 – Funded Projects

Funded Projects:

- FM 1409 – extend FM 1409 from FM 565 (north of IH 10) to FM 565 (south of IH 10)
- FM 3180 – widen between IH 10 and FM 565
- FM 3180 at IH 10 – construct overpass and standard diamond interchange
- FM 565 – widen FM 565 from Loop 207 to Eagle Drive
- FM 565 – widen FM 565 from SH 146 to SH 99, construct railroad overpass, and remove S-curve in this segment
- SH 146 – HSIP funds are available for access management treatments along SH 146 within Chambers County
- SH 146 – construct four main lanes and grade separation from N. Alexander Dr. to Massey Tompkins Rd
- SH 146 at SH 99 – Reconfiguration is under construction to make SH 99 the through route
- SH 146 at IH 10 – construct median improvements and extend/widen turn lanes.
- SH 99 at IH 10 – construct four direct connectors (toll)
- SH 99 – construct four-lane tollway with interchanges and two non-continuous two-lane frontage roads from Liberty County Line to IH 10

Chapter 5

Data Analysis

Eagle Drive at Eagle Creek Drive (2008)

CHAPTER 5: DATA ANALYSIS

COMMON ISSUES

A majority of the main concerns expressed by each of the public involvement groups overlapped. **Table 3** depicts the major common issues that were identified. The "Data" column indicates if field investigation, previous studies, or traffic analyses identified the issue as a concern.

GAP ANALYSIS

Gap analyses identify where gaps exist in existing roadway, transit, pedestrian and transit network. Missing links in the existing thoroughfare network include Cedar Bayou crossings, roadway extensions of Langston Drive, Needlepoint Road and Old Needlepoint Road, and several new connections. Areas where development has occurred and obstructed road extensions include major industrial centers west of SH 146 between Loop 207 and future SH 99 and south of FM 565 between Cedar Bayou and FM 1405 (see Existing Land Use in **Figure 20**).

Several gaps exist in the existing pedestrian and transit networks. Sidewalk connectivity along SH 146 and FM 3180 would provide north-south pedestrian connectivity. Bikeway connectivity along Langstone Drive, Needlepoint Road, and FM 565 would provide east-west connectivity. Additional transit service should be considered in partnership with an existing transit provider.

BARRIERS

Barriers to mobility within the study area include natural and man-made barriers, such as Cedar Bayou and numerous at-grade rail crossings. Natural barriers, such as bayous and floodways, and man-made barriers, such as railroads and pipelines, can restrict the feasibility of mobility improvements by increasing construction cost. Barriers to mobility within the study area are shown in **Figure 22a and 22b**.

Cedar Bayou and the adjacent floodway is the most prominent natural barriers to mobility. These barriers have hindered the construction of an east-west roadway between IH 10 and Massey-Tompkins Road. A major man-made barrier, especially along SH 146 in Mont Belvieu, are pipelines located above and below ground. Pipelines play a major role in the ability to improve mobility in the study area. Pipeline relocation must be considered before constructing any major improvements within the study area.

Major Issues	Steering	Stakeholders	Public	Data
SH 146 Congestion	X	X	X	X
Signal Timings	X	X	X	X
Driveway Consolidation	X			X
School Zones (Safety)	X	X	X	X
Underutilization of SH 99	X	X	X	X
Heavy Haul Traffic	X	X	X	X
Additional Road Connections	X	X	X	X
Railroad Crossings	X	X	X	X
Bike / Pedestrian Facilities		X	X	
Aesthetics	X	X	X	X
Hurricane Evacuation Route	X	X	X	X
Cedar Bayou Crossing	X	X	X	X
Hazardous Material Hauling			X	
FM 565 & FM 3180 Congestion	X	X	X	X

Table 3 – Common Issues

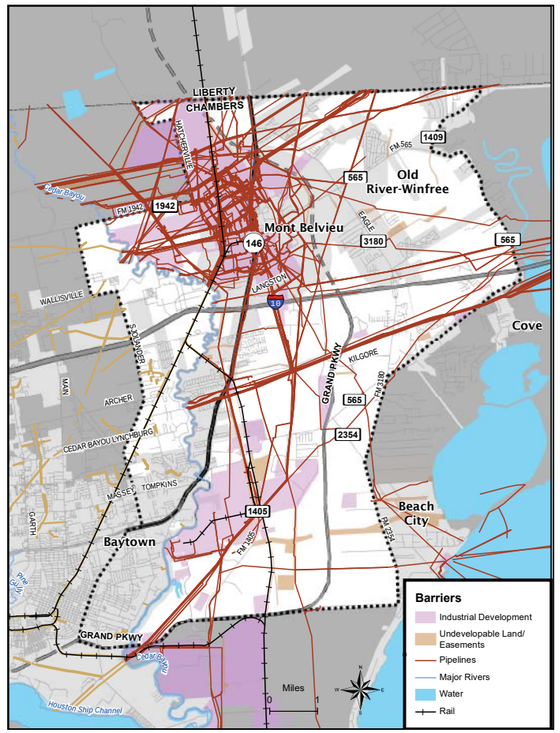


Figure 22a – Barriers to Mobility - Manmade

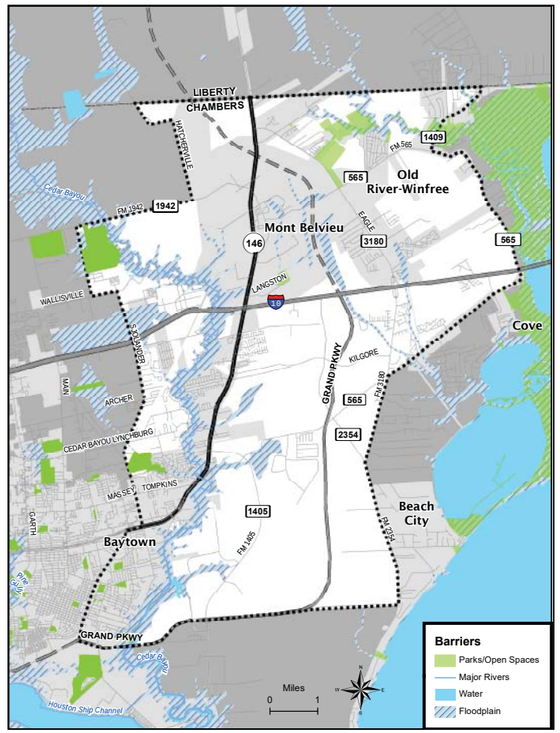


Figure 22b – Barriers to Mobility-Natural

NO BUILD ALTERNATIVE

"No build" analyses answer the question "what happens if nothing is done in the area?" This analysis evaluates traffic operations with future traffic volumes and the existing roadway network. As stated in **Chapter 3**, traffic volume growth is expected to vary across the study area between 2% to 7% per year.

Existing roadway network and future traffic volumes were modeled using Synchro™ to determine the delay (sec/veh) of each study intersection. 2025 and 2035 PM peak hour LOS for study intersections are shown in **Figure 23** and **Figure 24**, respectively. A summary of Level of Service (LOS) analysis results is available in the **Appendix** and output is available as **Supplemental Data**.

By year 2025, the majority of study intersections are operating at an unacceptable Level of Service (LOS) and by 2035 all intersections are failing operationally. Intersections that are expected to experience the highest delays if nothing is done to improve capacity include the intersections of FM 565 at FM 1405, FM 565 at Eagle Drive, and IH 10 and SH 146.

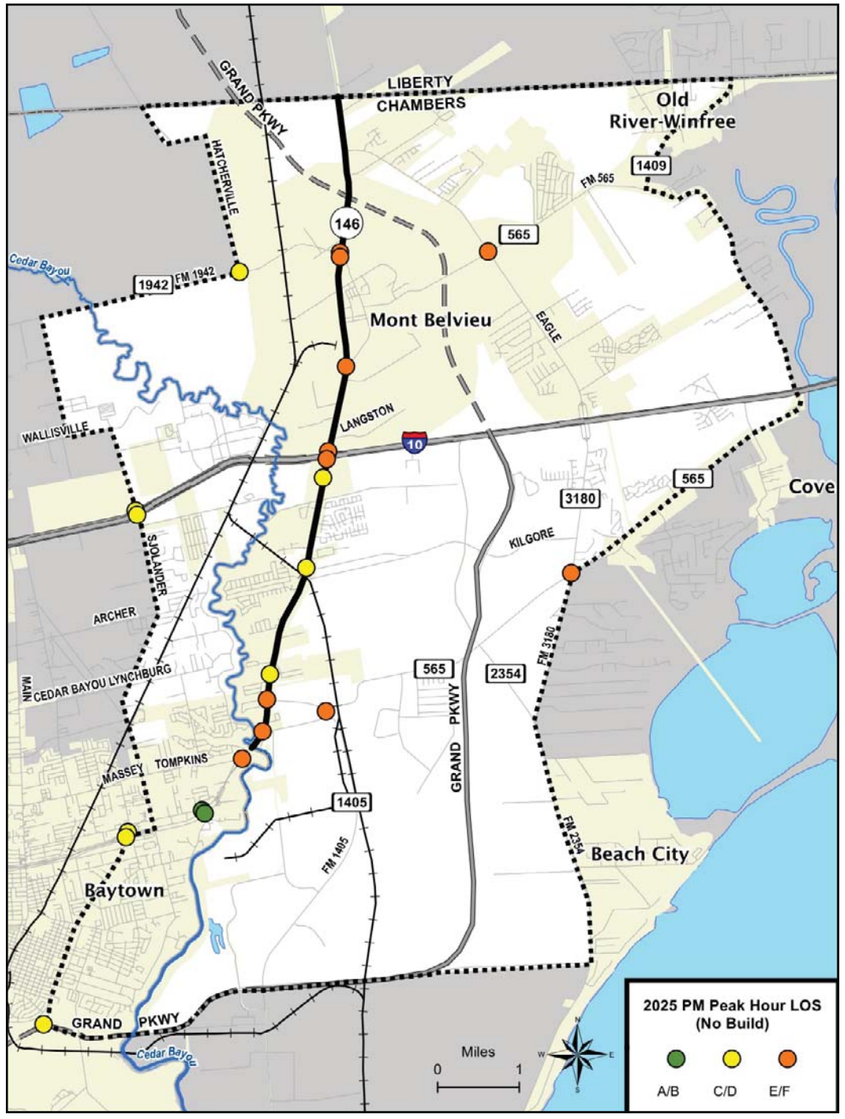


Figure 23 – 2025 PM Peak Hour Level of Service (LOS)

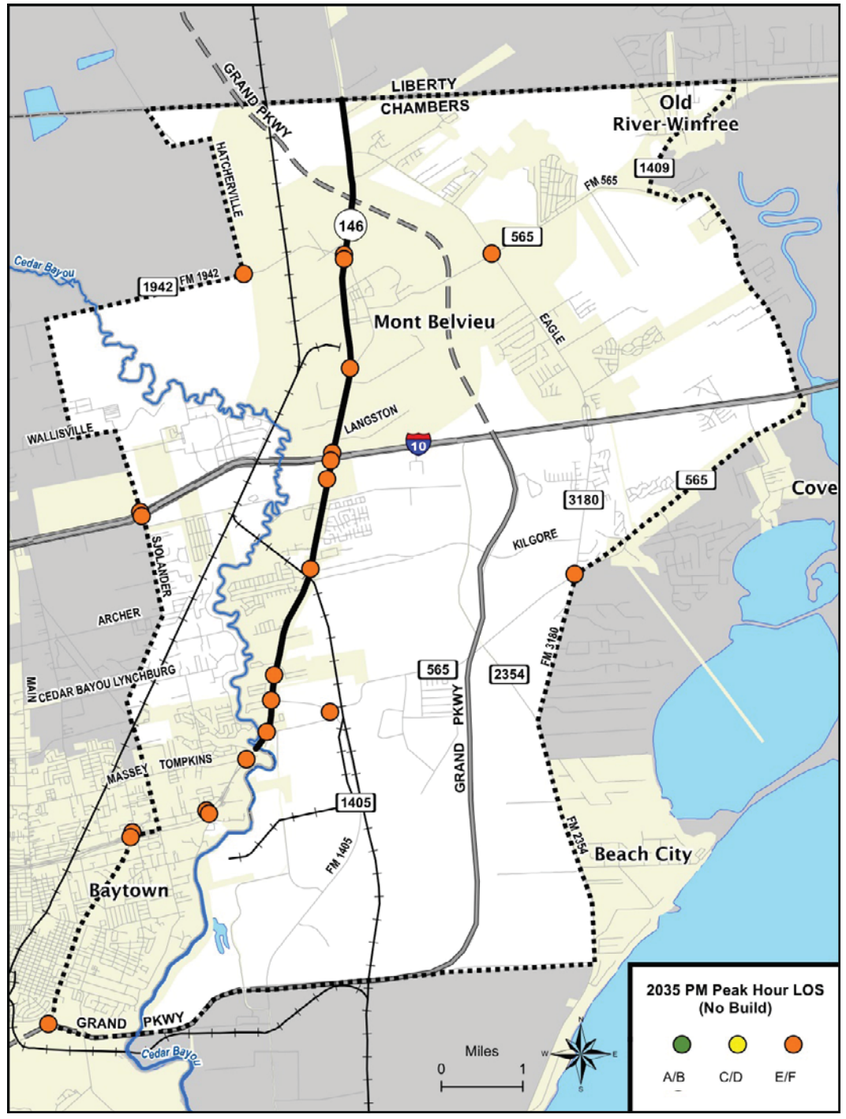


Figure 24 – 2035 PM Peak Hour Level of Service (LOS)

146
TEXAS

Chapter 6

Needs-Base Plan

Eagle Drive at Eagle Creek Drive (2017)

CHAPTER 6: NEEDS–BASED PLAN

ROADWAY NEEDS

This section presents the needs-based plan and the proposed improvements to address those needs. The needs-based plan is not financially constrained and was developed by analyzing existing traffic conditions in addition to projected traffic volumes and population growth. The needs-based plan, shown in **Figure 25** identifies the road and intersection improvements that are needed between now and future study years. Alternatives developed to address identified needs and priority projects were established by ranking the results of existing condition analysis to determine what improvements should be implemented near-term. The projects were then presented to the steering committee for review and input.

New road connections (shown in red) are needed throughout the study area. Recent development to the north and east has created travel demand and spurred the need for additional connections, particularly in Mount Belvieu. Approximately 40 miles of new connections are needed throughout the study area.


Eagle Dr at IH 10

Roadway widenings (shown in blue) are needed along several existing thoroughfares. Roads such as SH 146 and FM 565, which serve as spines across the network, are expected be at capacity by year 2035. Approximately 68 miles of widened roadway is needed throughout the study area.

As identified in previous Baytown planning studies, a Cedar Bayou crossing is also needed (shown in green). The crossings are needed to alleviate existing and future traffic in Baytown. Existing crossings located at IH 10 and SH 146 require patrons and emergency vehicles to travel indirect routes far north/south and add unnecessary traffic along SH 146 and Sjolander Road. Five Cedar Bayou crossing alternatives were identified as potential solutions.

Access management treatments (shown in yellow) are needed along SH 146 from the Chambers/Liberty county line to Ferry Road. There are safety, mobility, and environmental benefits to implementing access management treatments along SH 146. Approximately 8.2 miles of access management modifications are needed along SH 146.

INTERSECTION NEEDS

In the short-term, signal timing adjustment and pavement restriping are needed at all signalized intersections in the study area. These items are normal maintenance for traffic signals and are not enumerated individually on the map.

Intersection modifications (shown in blue) are needed where intersections are expected to be above capacity or operate with excess delays. Turn lanes and other capacity improvements can be constructed to alleviate delay at these locations.

Traffic signal installations (shown in green) are needed where intersection safety or volume is expected to warrant a traffic signal. Approximately twenty signal installations are needed throughout the study area.

Railroad grade separations (shown as RR crossing symbol) are needed throughout the study area. At-grade railroad crossings create safety and operational issues. Twelve railroad grade separations are needed throughout the study area.


FM 565 at FM 3180

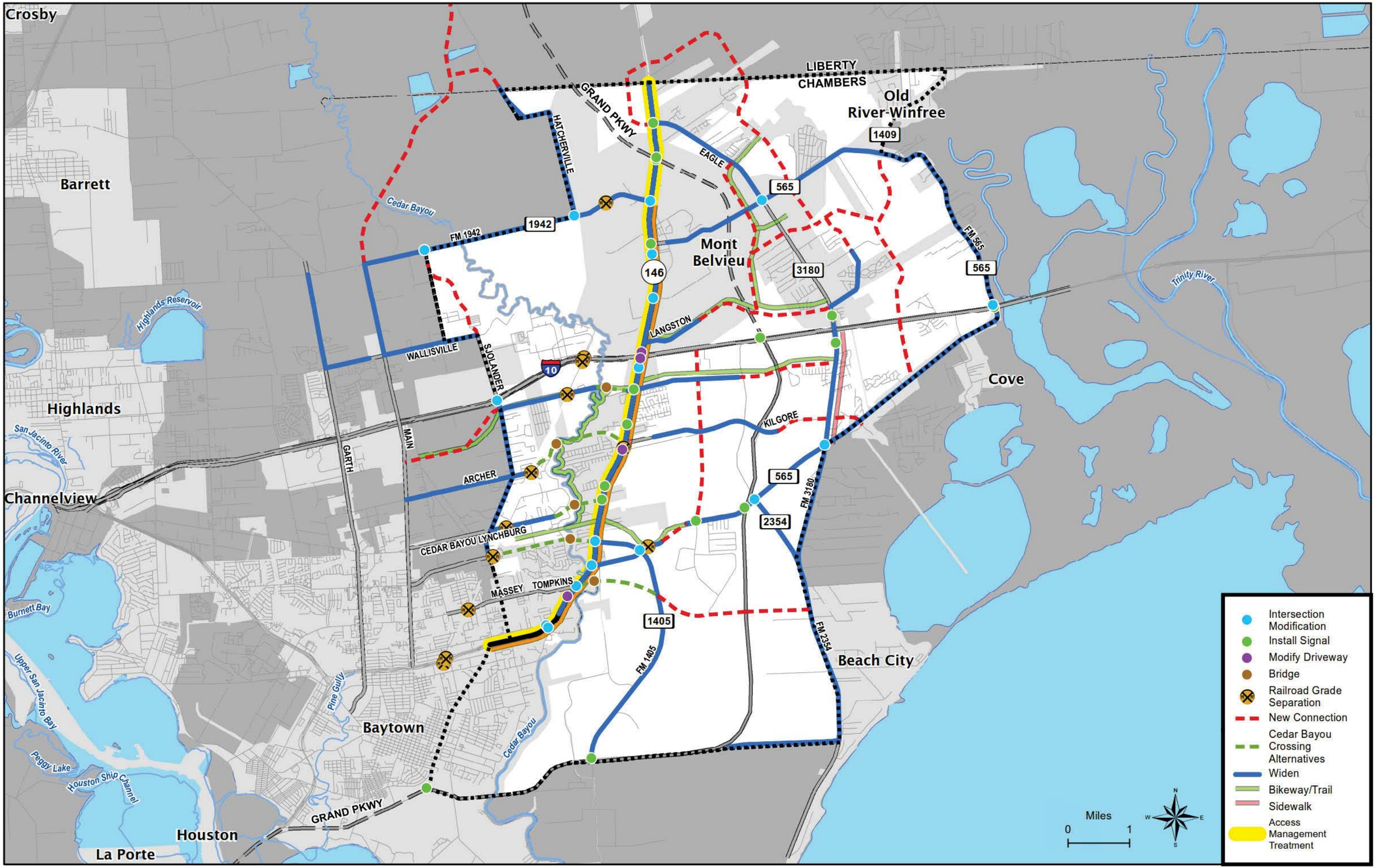


Figure 25 – Needs–Based Plan

Chapter 7

Short-Term Recommendations

SH 146 at Main Walmart Driveway (2008)

CHAPTER 7: SHORT-TERM RECOMMENDATIONS

EXHIBITS

Summary

Short-term improvements were developed based on identified issues from data collection and analysis, and input from the steering committee, stakeholders and the public. Short-term improvements are typically lower cost, within the existing street right-of-way (ROW), and simple to implement within five years. A summary of short-term improvements is shown in **Table 4** and **Figure 26**.

Proposed Improvements	SH 146	Peripheral Intersections	Total
Close Roadway	1	4	5
Construct Island (Raised)	14	11	25
Widen Roadway	14	18	32
Construct New Road	1	2	3
Construct Left Turn Lane	63	16	79
Construct Right Turn Lane	18	17	35
Construct Acceleration Lane	7	2	9
Align Roadway	2	0	2
Remove Traffic Signal	1	1	2
Revise Signal Timing	1	1	2
Modify Traffic Signal	2	2	4
Install Traffic Signal	3	12	15
Construct Raised Median	48	6	54
Construct S-Median	19	1	20
Construct Turbo -T	3	0	3
Construct Median Opening	19	1	20
No Median	3	0	3
Close Driveway	19	0	19
Provide share access	31	0	31
Add Sidewalk	20	0	20
Driveway modification	4	1	5
Total	**293**	**95**	**388**

Table 4 – Summary of Short-Term Improvements

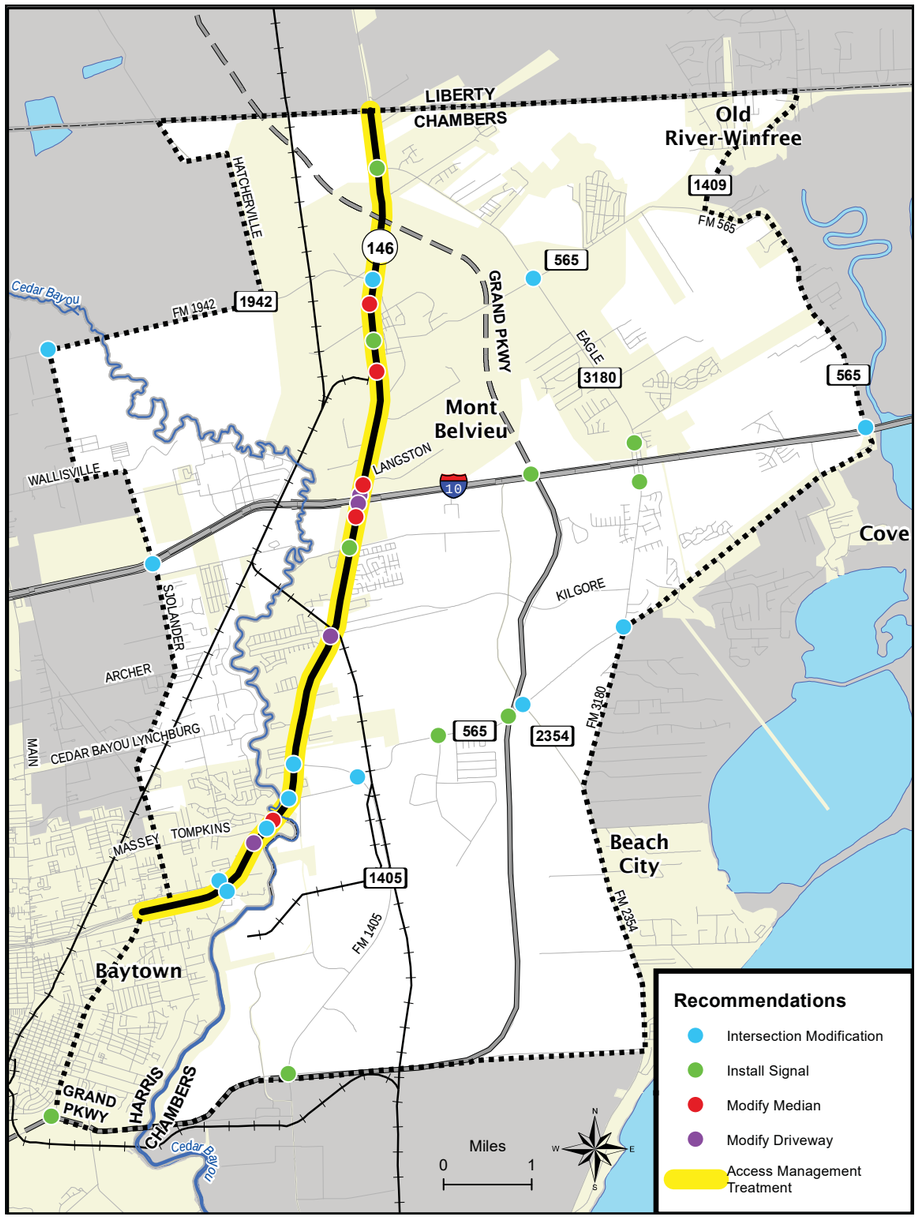


Figure 26 – Summary of Short-Term Improvements

SH 146

Improvements recommended along the SH 146 corridor are primarily access management improvements. Access management is the careful planning of the location, design, and operation of driveways, median openings, interchanges, and street connections. The purpose of access management is to provide access to land development in a manner that preserves access while improving the safety and efficiency of the transportation system. Access management improves safety by limiting the number of conflict points along a roadway through consolidating the number of driveways and median openings and through restricting certain movements. **Detailed drawings**, identifying specific recommendations along the SH 146 corridor, are presented in following pages.

Peripheral Intersections

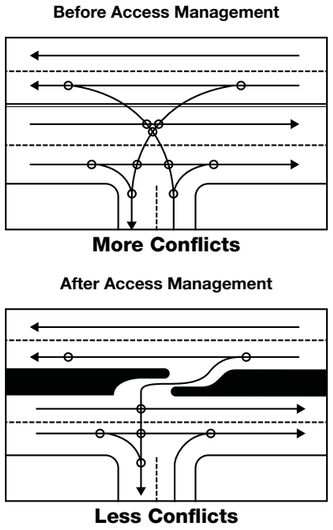
Improvements recommended at peripheral intersections are primarily capacity improvements, which include modifying the roadway, adding turn lanes, and installing traffic signal control. As there are several funded projects in the study area, many of the improvements shown at the peripheral intersections include aspects of published studies and plans. **Detailed drawings** identifying specific recommendations at peripheral intersections, are presented after the corridor pages.

SHORT-TERM IMPROVEMENT TYPES

Raised Median Installation

A raised median is recommended for approximately 8.2 miles along SH 146 between Massey Tompkins Road and Eagle Drive. High-speed roadways with raised medians are safer than roadways with a two-way left-turn lane similar to what exists along SH 146. The recommended cross section (**Figure 27**, **Figure 28**, and **Figure 29**) consists of two 12-foot lanes with an 8-foot shoulder in each direction, separated by a 16-foot raised median. As shown in **Conceptual Exhibits**, the raised median will narrow to provide left-turn lanes periodically.

Based on studies conducted across the country, roadways with a raised median have an average crash rate about 25 percent less than roadways with a continuous left-turn lane.



Reducing conflict points from 11 to 6.
(Source: Access Management, Balancing Access and Mobility, Florida Department of Transportation, 2013)

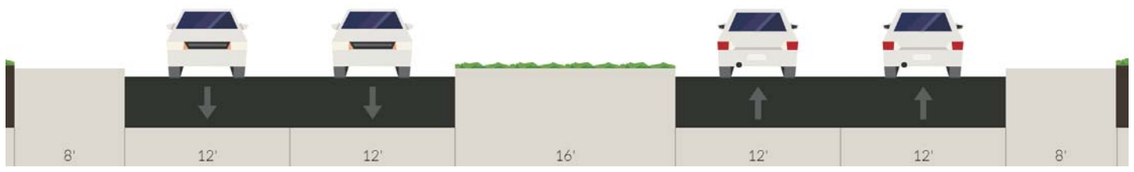


Figure 27 – Recommended SH 146 Cross-Section (Raised Median)

Figure 28 – Raised Median at Intersections

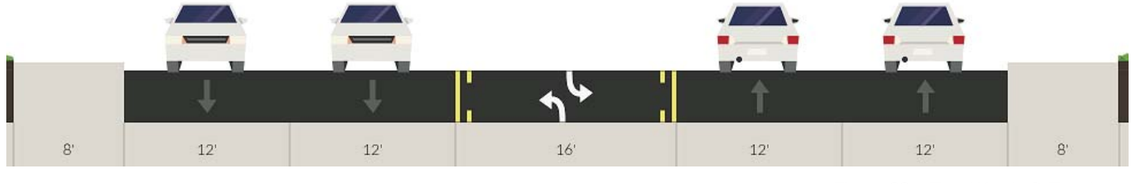
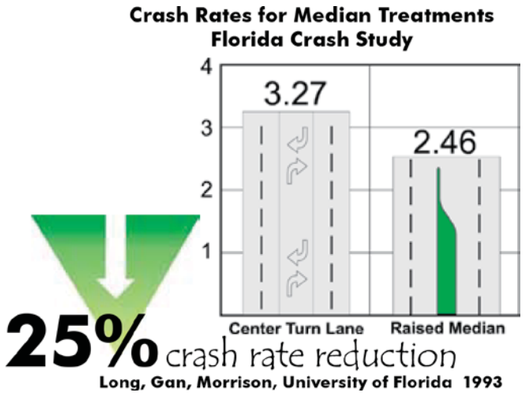


Figure 29 – Two-Way Left-Turn Lane

Driveway Consolidation

Driveway consolidation is recommended at 30 locations along SH 146. Consolidating driveways involves removing, combining, or relocating existing driveways for the purpose of improving safety. Research shows that closely spaced driveways can have a direct impact on crash frequency along a roadway. Moreover, research shows that a relationship (shown in **Figure 30**) exists between driveway access density and crash rates such that as driveway density increases, crash rates increase.

Driveway consolidation is only possible through a cooperative agreement between the property owner and the agency attempting to consolidate the driveway. Application of this technique will be focused on the areas of greatest need - for instance, the areas along SH 146 near IH 10 where high driveway densities and crash hot spots have been identified.



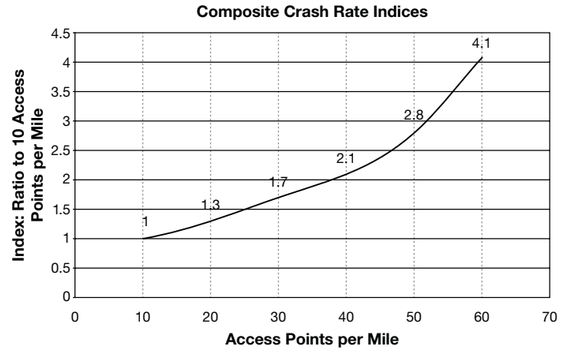


Figure 30 – Driveway Density vs Crash Rate

Cross-Access Provisions

Cross-access is recommended at several locations along SH 146. Cross-access provisions along a street can have positive benefits for both the traveling public and property owners. Fewer driveways reduce the number of conflict points along the street, increasing safety. Sharing access can increase the available area for parking and development and allow vehicles to circulate between businesses without having to re-enter the major roadway.

Pedestrian Facilities

A key goal of the study is to enhance safety by addressing the needs of all users. A field investigation was conducted to evaluate the presence and condition of existing pedestrian facilities. Pedestrian facility improvements such as cross walks, pedestrian ramps, intersection lighting, and sidewalk connectivity are recommended at several intersections in the study area (provided in the ***Crash Analysis* Appendix**). The primary goal of the pedestrian facility improvements is to provide an environment where patrons are safe to walk. Approximately 2.5 miles of sidewalk are recommended along SH 146 between Warren Road and Old Needlepoint Road.

Right-Turn Lane

Right-turn lanes (**Figure 31**) are recommended at 18 locations along SH 146 and 16 locations at peripheral intersections. Constructing deceleration lanes provide safety and operational benefits by allowing turning vehicles to exit the roadway without affecting the through movement of traffic. This allows a more efficient flow of traffic in the corridor and allows vehicles to form platoons at the signalized intersections, thereby maximizing the volume that the signal can handle. Lengths of auxiliary lanes are a function of the posted speed, but queue lengths are normally established on a case by case basis. Additional analysis should be performed to determine the length of the right-turn lanes recommended.

Left-Turn Lane

Left-turn lanes (**Figure 32**) are recommended at 56 locations along SH 146 and 16 locations at peripheral intersections. Much like right-turn lanes, left-turn lanes also allow turning vehicles to exit the through lanes without affecting the through traffic. Left-turn lanes should provide adequate queue storage for signalized and unsignalized intersections based on an operational analysis. The length of deceleration is dependent on the posted speed and the amount of speed differential acceptable for the thoroughfare. Additional analysis should be performed to determine the length of the left-turn lanes recommended.

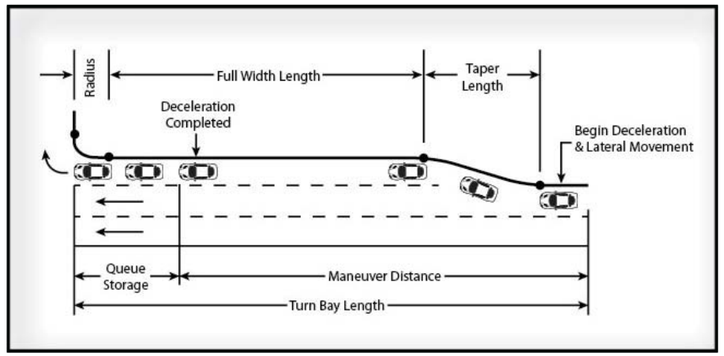


Figure 31 – Right-Turn Lane

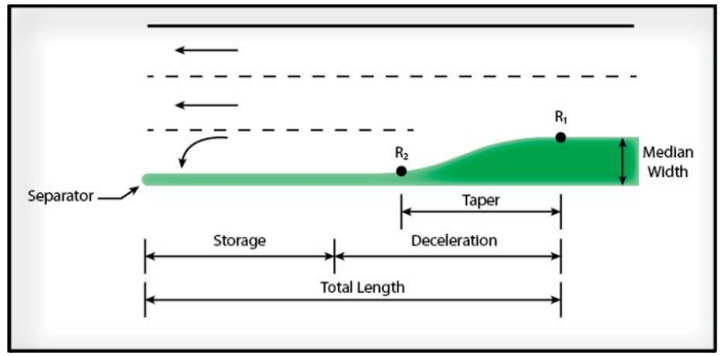


Figure 32 – Left-Turn Lane

ITS Device

Signal retiming is recommended throughout the study area. Signal timing is a cost-effective technique to improve the overall traffic flow along the SH 146 corridor. Proper signal timing along SH 146 can increase the efficiency of the of vehicles to pass in the shortest time. It also affects the air quality in the study area because travel time and idling is reduced.

Dynamic message signs exist at five locations along SH 146 and are used to update drivers on real-time traffic conditions. A dynamic message sign is recommended to be installed at the intersection of FM 1405 at FM 565 to alert drivers of a train blocking FM 565 or traffic in the vicinity of the intersection caused by the train.

Detailed Drawings

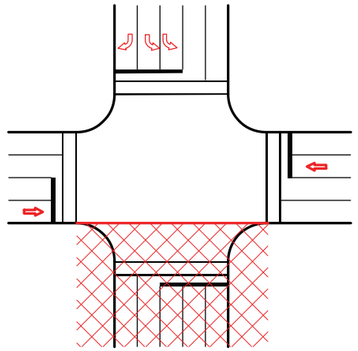
A short-term improvement toolbox showing typical improvements such as roadway widening, turn lane construction, and raised median installation are presented in pages 30. Each improvement is denoted with an ID which can serve as a legend on the drawings and used to tabulate the quantity of improvements.

Specific recommendations identified along the SH 146 corridor are presented in pages 33-64. The first page of this subset presents a keymap and cost estimate for recommendations along the SH 146 corridor. A table summarizing the improvements (tabulated by improvement type) is presented on the subsequent page. Detailed drawings of the SH 146 corridor with specific recommendations denoted with improvement IDs are shown in remaining pages.

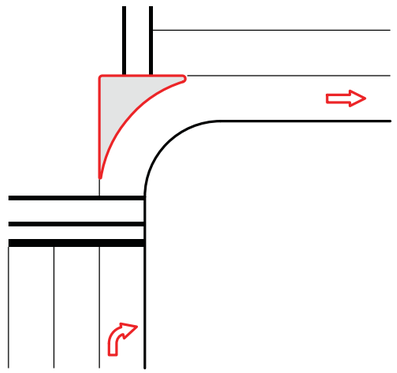
Specific recommendations identified at peripheral intersections are presented in pages 65-85. The first page of this subset presents a keymap and cost estimate for recommendations at peripheral intersections. A table summarizing the improvements (tabulated by improvement type) is presented on the subsequent page. Detailed drawings of peripheral intersections with specific recommendations denoted with improvement IDs are shown in remaining pages.

DATE: 3/5/2018

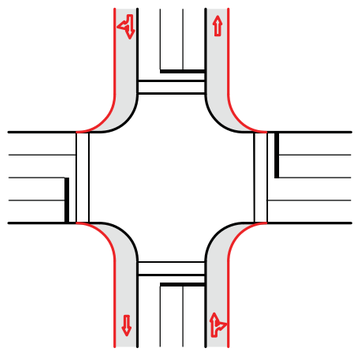
ROADWAY (R)



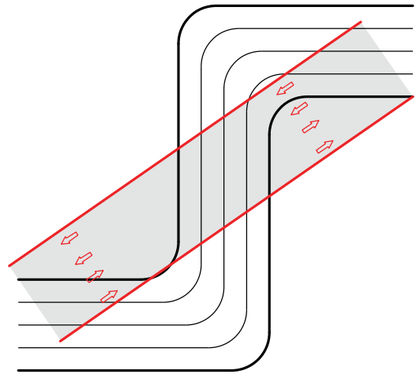
R1-CLOSE ROADWAY



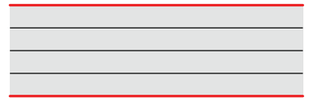
R2-PROVIDE ISLAND



R3-WIDEN ROADWAY

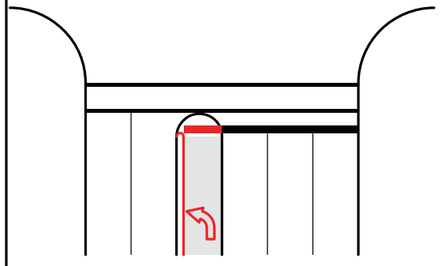


R4-REALIGN ROADWAY

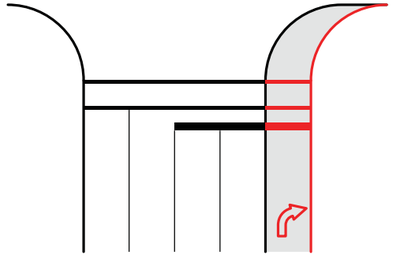


R5-CONSTRUCT NEW ROADWAY

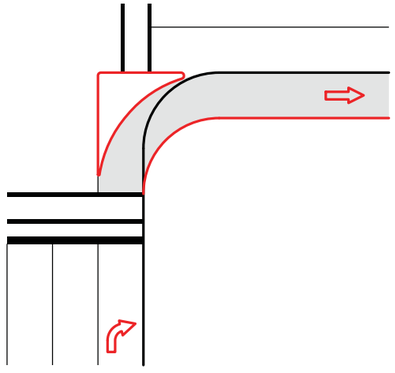
INTERSECTION (I)



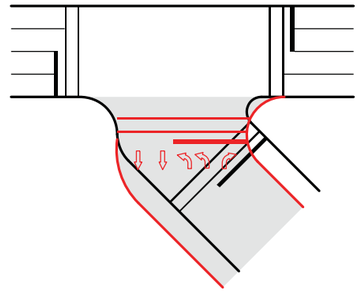
I1-CONSTRUCT LEFT-TURN LANE



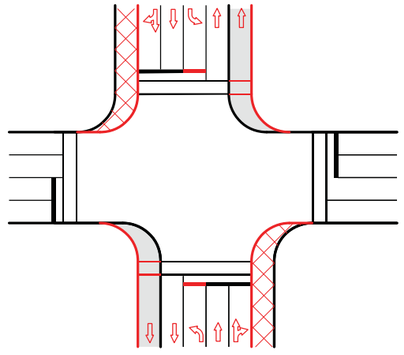
I2-CONSTRUCT RIGHT-TURN LANE



I3-CONSTRUCT ACCELERATION LANE

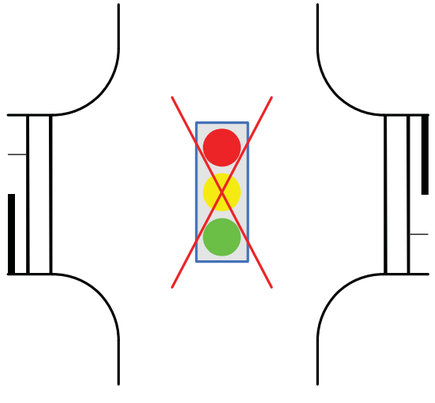


I4-ALIGN CURVE
(REDUCE ANGLE)

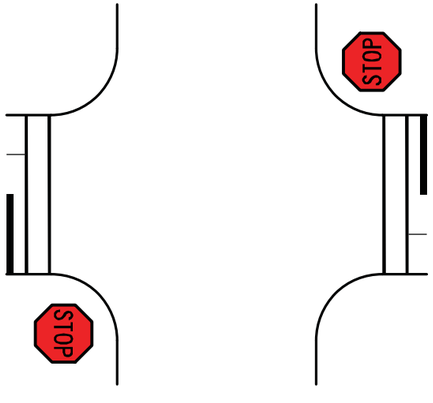


I5-ALIGN TRAVELWAY
(REDUCE OFFSET)

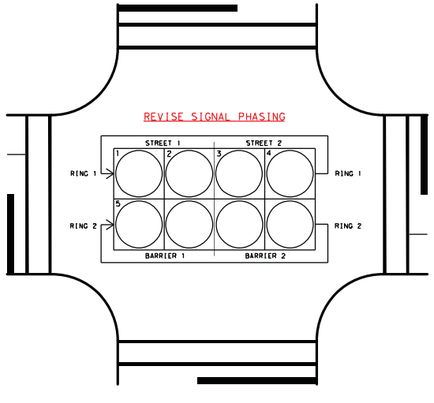
SIGNAL (S)



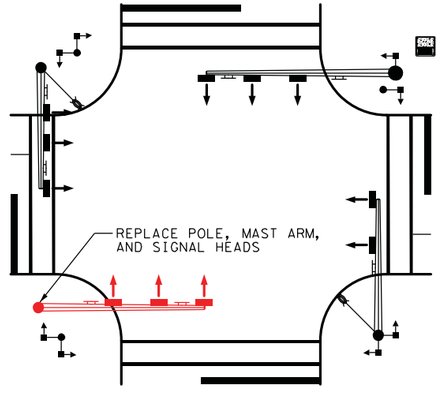
S1-REMOVE TRAFFIC SIGNAL



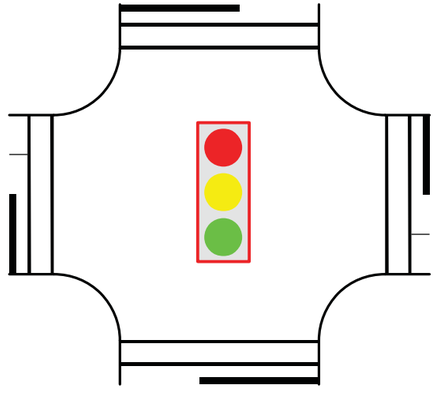
S2-INSTALL STOP SIGN CONTROL
(OR CONDUCT WARRANT STUDY)



S3-REVISE SIGNAL PHASING



S4-MODIFY TRAFFIC SIGNAL

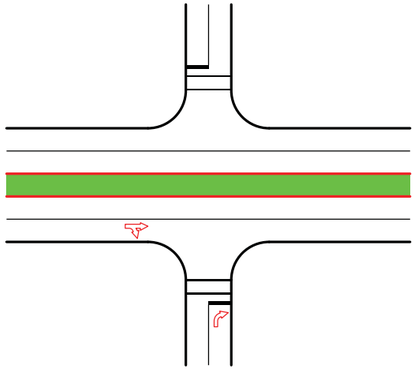


S5-INSTALL TRAFFIC SIGNAL

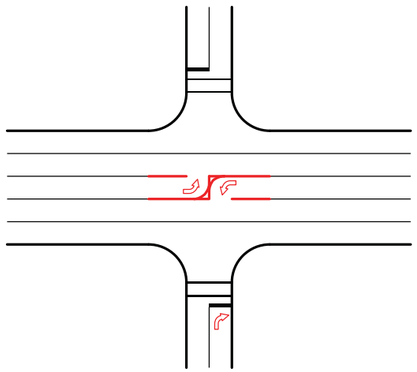
NEAR-TERM IMPROVEMENT TOOLBOX: MOBILITY IMPROVEMENT TYPES

DATE: 3/5/2018

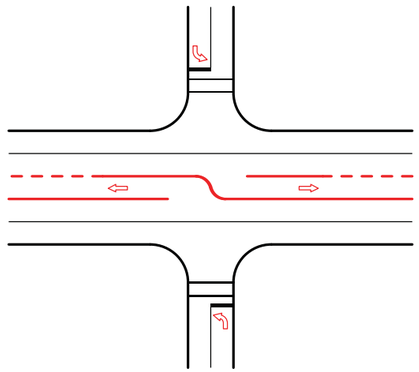
MEDIAN (M)



M1-CONSTRUCT RAISED MEDIAN
(RIRO ACCESS)

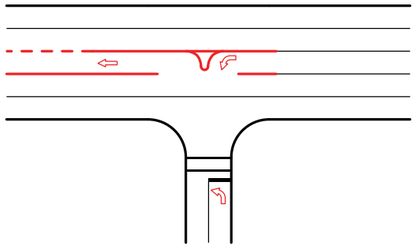


M2-CONSTRUCT S-MEDIAN
(LI ACCESS)

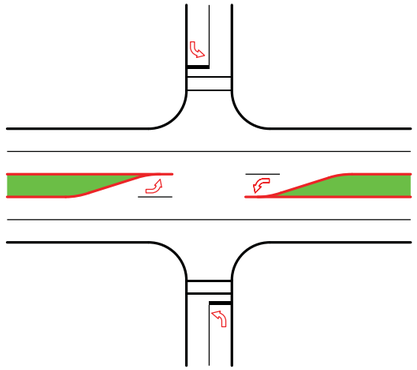


M3-CONSTRUCT REVERSE S-MEDIAN
(LO ACCESS)

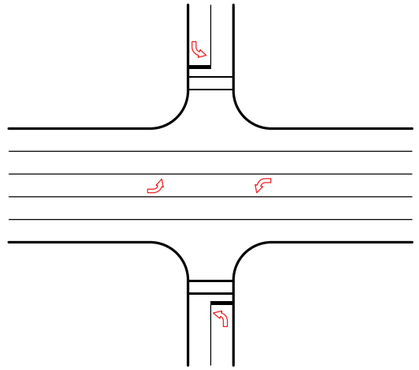
MEDIAN (M)



M4-CONSTRUCT TURBO-T
(LILO ACCESS)

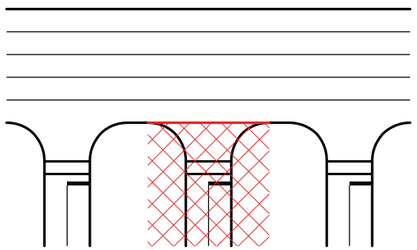


M5-CONSTRUCT MEDIAN OPENING
(FULL ACCESS)

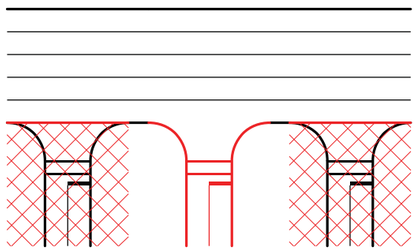


M6-TWLTL TO REMAIN
(FULL ACCESS)

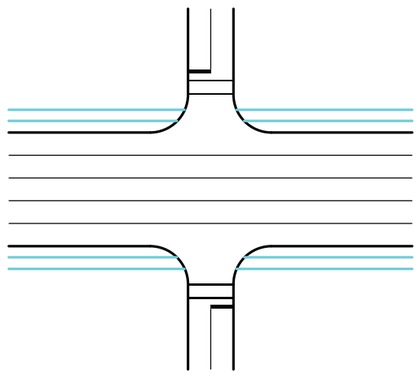
DRIVEWAY (D)



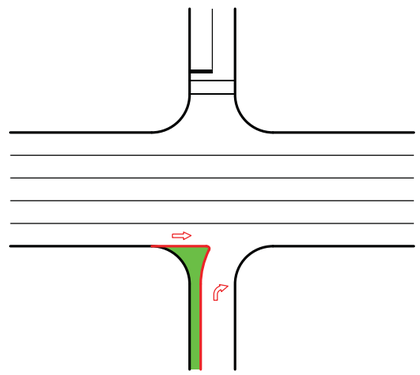
D1-CLOSE DRIVEWAY



D2-PROVIDE SHARED ACCESS
(CONSOLIDATE DRIVEWAYS)

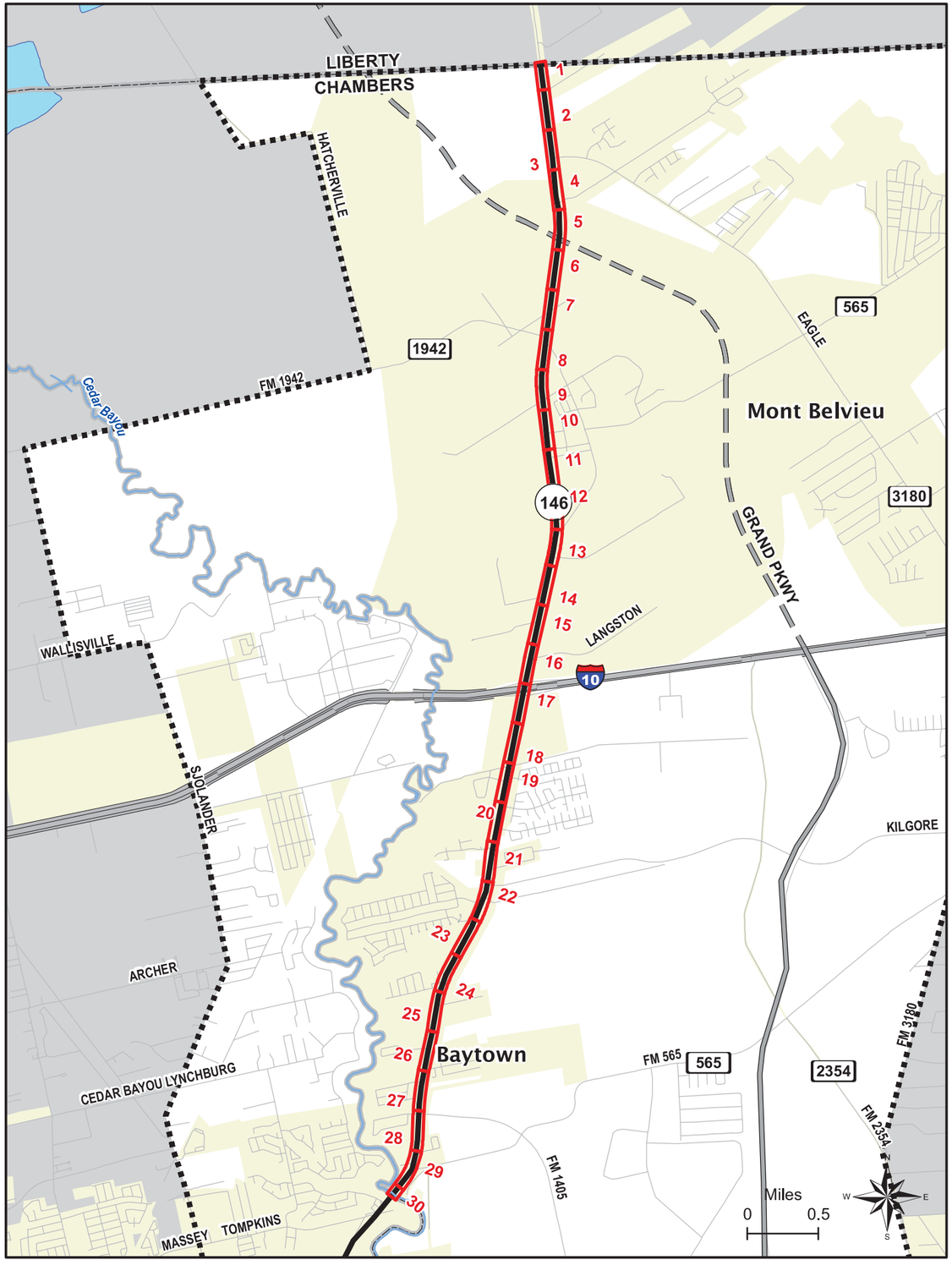


D3-PROVIDE SIDEWALK



D4-DRIVEWAY MODIFICATION
(RO ONLY ACCESS)

NEAR-TERM IMPROVEMENT TOOLBOX: ACCESS IMPROVEMENT TYPES



SHORT-TERM IMPROVEMENT COST ESTIMATE: SH 146 CORRIDOR

Near-Term Improvements - SH 146 Corridor (By Sheet)		
Sheet	Intersection	Cost Estimate*
1	No Intersections	$ 15,000
2	Kings Point Road	$ 23,000
3	Eagle Drive	$ 610,000
4	Placid Dr., Cherry Point	$ 280,000
5	No Intersections	$ 290,000
6	No Intersections	$ 270,000
7	Fitzgerald Road	$ 240,000
8	FM 1942, Loop 207 N	$ 580,000
9	Equistar Chemical Driveway, Winfree Road	$ 180,000
10	FM 565	$ 375,000
11	Williams St., Chevron Truck Driveway	$ 220,000
12	No Intersections	$ 240,000
13	Loop 207S, Targa Driveway, Targa Employee Parking, Sun Oil Rd	$ 310,000
14	Warren	$ 340,000
15	Cedar Hill	$ 330,000
16	Langston, Truck Stop Driveway, IH 10 WBFR	$ 1,490,000
17	IH 10 EBFR & SH 146, Walmart Driveway	$ 1,890,000
18	Main Walmart Driveway	$ 770,000
19	Old Needlepoint Rd., Pine Meadows	$ 765,000
20	Country Squire Blvd.	$ 220,000
21	Lynnwood Sterling Dr.	$ 200,000
22	Kilgore Pkwy, Pinehurst St	$ 260,000
23	El Chaco, Baron Ridge	$ 260,000
24	Shell Rd., Crystal Blvd.	$ 180,000
25	Staples	$ 280,000
26	Bayou Bend, Clark Elementary School Driveway, Devinwood Dr.	$ 280,000
27	Cedar Landing	$ 390,000
28	FM 1405, N Twisted Oak St	$ 400,000
29	Lincoln Cedars, FM 565	$ 750,000
30	No Intersections	$ 6,000
	Contingency (Approx. 20%)	**$ 2,556,000**
	Total (Unfunded)	**$ 15,000,000**

*2018 Local Construction Cost Estimate
(Source: TxDOT Average Low Bid Unit Prices by District, District 20)

SHORT-TERM IMPROVEMENT SUMMARY: SH 146 CORRIDOR

Sheet	Intersection	Number of Improvements	Estimated Cost*	MOBILITY																ACCESS									
				Roadway					Intersection					Signal						Median						Driveway			
				Close Road	Install Island	Widen Road	Realign Road	New Road	Left Turn Lane	Right Turn Lane	Acceleration Lane	Align Curve	Align Travelway	Remove Signal	Install Stop Sign	Revise Signal Timing	Modify Traffic Signal	Install Signal	Raised Median	S-Median	Reverse S-Median	Turbo T Median	Median Opening	No Median	Close Driveway	Provide Share Access	Add Sidewalk	Driveway Modification
1	No Intersections	1	$15,000																				1				
2	Kings Point Road	1	$23,000																				1				
3	Eagle Drive	8	$610,000		2				1	2								1	1				1				
4	Placid Drive, Cherry Point Road	4	$280,000						1										2	1								
5	No Intersections	3	$290,000																2				1					
6	No Intersections	4	$270,000						1										2	1								
7	Fitzgerald Road	9	$240,000						3										3	3								
8	FM 1942, Loop 207 N	9	$580,000	1	1				1	1				1			1		2				1					
9	Equistar Chemical Driveway, Winfree Road	7	$180,000						3										2	1			1					
10	FM 565	7	$375,000						1	2								1	2				1					
11	Williams Street, Chevron Truck Driveway	8	$220,000						2										2	1			2			1		
12	No Intersections	3	$240,000						2										1									
13	Loop 207S, Targa Driveway, Targa Employee Parking, Sun Oil Road	9	$310,000		1		1		3							1			1				2					
14	Warren Road	16	$340,000						3										2	1			1		2	5	2	
15	Cedar Hill Drive	15	$330,000						1	1	1								2			1				5	4	
16	Langston, Truck Stop Driveway, IH 10 WBFR	31	$1,490,000		4	1			4	3	1								2	2			1		1	8	4	
17	IH 10 EBFR & SH 146, Walmart Driveway	31	$1,890,000		4	3			6	2	1								2	2					1	6	4	
18	Main Walmart Driveway	16	$770,000			4			3	1									2				2				4	
19	Old Needlepoint Road, Pine Meadows Blvd	19	$765,000			4			2	1	1		2					1	1				1		3		2	1
20	Country Squire Blvd.	10	$220,000						3										2	1			1		2			1
21	Lynnwood Sterling Drive	6	$200,000						1		1								1			1			2			
22	Kilgore Parkway, Pinehurst Street	10	$260,000						4										2	1			1		1			1
23	El Chaco Drive, Baron Ridge Drive	4	$260,000						1										1				1		1			
24	Shell Road, Crystal Blvd.	11	$180,000			2			3		1								1			1			3			
25	Staples Drive	10	$280,000						3										2	1					2	2		
26	Bayou Bend, Clark Elementary School Driveway, Devinwood Drive	10	$280,000						3	1									2	2			1			1		
27	Cedar Landing Drive	8	$390,000						2	1									2	1						1		1
28	FM 1405, N Twisted Oak Street	8	$400,000		1				3	1	1								1				1					
29	Lincoln Cedars Drive, FM 565	15	$750,000		1			1	3	2							1		2	1			1		1	2		
30	No Intersections	1	$6,000																1									
Contingency (Approx. 20%)			$2,556,000																									
Total		**294**	**$15,000,000**	**1**	**14**	**14**	**1**	**1**	**63**	**18**	**7**	**0**	**2**	**1**	**0**	**1**	**2**	**3**	**48**	**19**	**0**	**3**	**19**	**3**	**19**	**31**	**20**	**4**

DATE: 3/5/2018

KEYMAP SHEET: 1

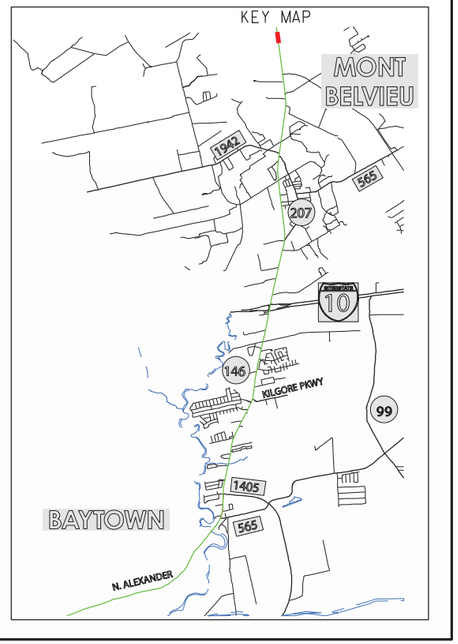
0 25 50 75 100

APPROX. SCALE: 1"=100'

LEGEND
- EXISTING ROW
- EXISTING PAVEMENT EDGE
- EXISTING TWLTL
- PROPOSED PAVEMENT EDGE
- PROPOSED MEDIAN
- PROPOSED IMPROVEMENT
- PROPOSED SIDEWALK

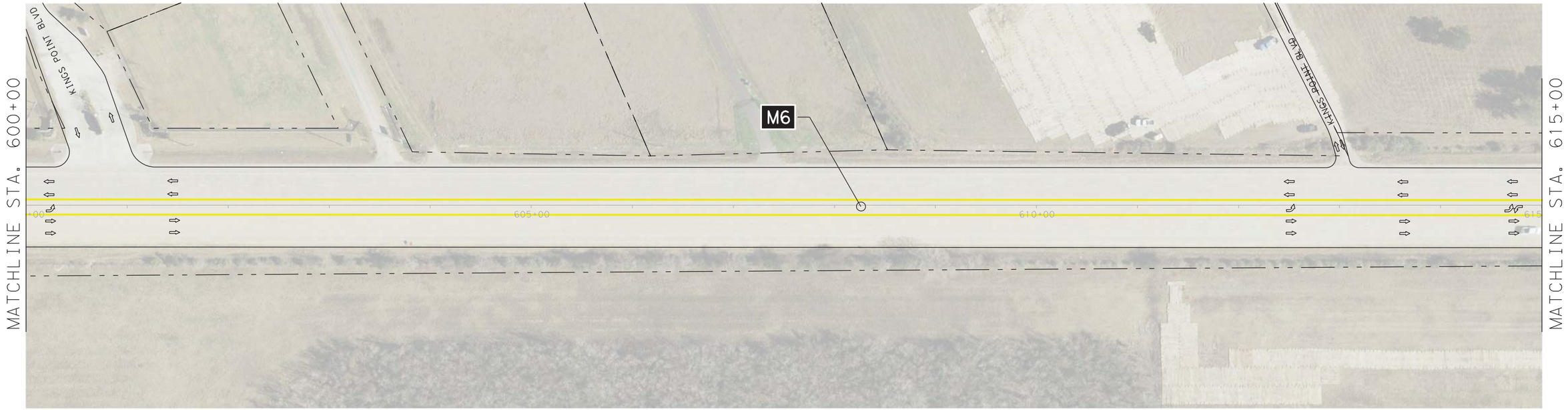
Cost Estimate: $ 15,000

Objective Group	Improvement Group	ID	Near-Term Improvements
Mobility	(R) Roadway	R1	Close Roadway
		R2	Provide Island (Painted or Raised)
		R3	Widen Roadway
		R4	Realign Roadway
		R5	Construct New Roadway
	(I) Intersection	I1	Construct Left-Turn Lane
		I2	Construct Right-Turn Lane
		I3	Construct Acceleration Lane
		I4	Align Curve (Reduce Angle)
		I5	Align Travelway (Reduce Offset)
	(S) Signal	S1	Remove Traffic Signal
		S2	Install Stop Sign Control (Conduct Warrant Study)
		S3	Review Signal Timings
		S4	Modify Traffic Signal
		S5	Install Traffic Signal (or Conduct TSWA)
Access	(M) Median	M1	Construct Raised Median (RIRO Access)
		M2	Provide Left-In Access
		M3	Construct Reverse S-Median (LO Access)
		M4	Construct Turbo-T (LILO Access)
		M5	Provide Full-Access
		M6	TWLTL To Remain (Full-Access)
	(D) Driveway	D1	Close Driveway
		D2	Provide Shared Access (Consolidate Driveways)
		D3	Provide Sidewalk
		D4	Driveway Modification (RO Access Only)



DATE: 3/5/2018

KEYMAP SHEET: 2



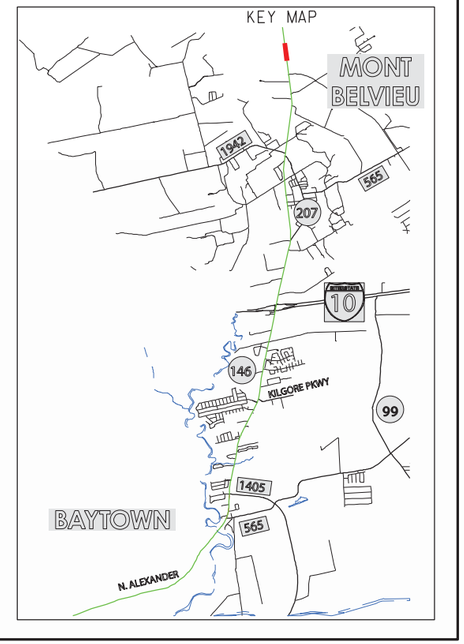
0 25 50 75 100

APPROX. SCALE: 1"=100'

LEGEND
- EXISTING ROW
- EXISTING PAVEMENT EDGE
- EXISTING TWLTL
- PROPOSED PAVEMENT EDGE
- PROPOSED MEDIAN
- PROPOSED IMPROVEMENT
- PROPOSED SIDEWALK

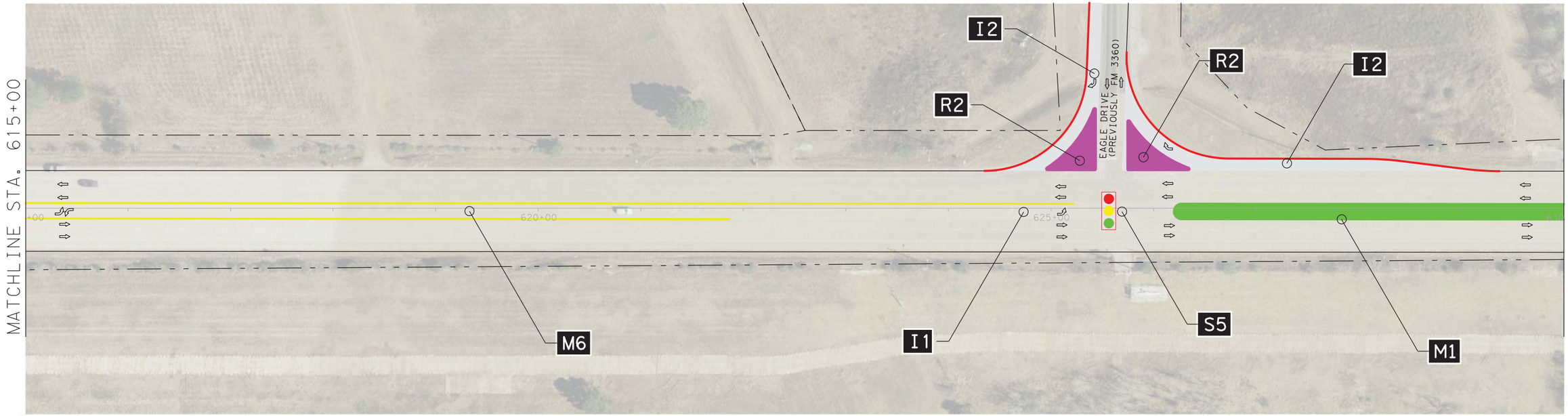
Cost Estimate: $ 23,000

Objective Group	Improvement Group	ID	Near-Term Improvements
Mobility	(R) Roadway	R1	Close Roadway
		R2	Provide Island (Painted or Raised)
		R3	Widen Roadway
		R4	Realign Roadway
		R5	Construct New Roadway
	(I) Intersection	I1	Construct Left-Turn Lane
		I2	Construct Right-Turn Lane
		I3	Construct Acceleration Lane
		I4	Align Curve (Reduce Angle)
		I5	Align Travelway (Reduce Offset)
	(S) Signal	S1	Remove Traffic Signal
		S2	Install Stop Sign Control (Conduct Warrant Study)
		S3	Review Signal Timings
		S4	Modify Traffic Signal
		S5	Install Traffic Signal (or Conduct TSWA)
Access	(M) Median	M1	Construct Raised Median (RIRO Access)
		M2	Provide Left-In Access
		M3	Construct Reverse S-Median (LO Access)
		M4	Construct Turbo-T (LILO Access)
		M5	Provide Full-Access
		M6	TWLTL To Remain (Full-Access)
	(D) Driveway	D1	Close Driveway
		D2	Provide Shared Access (Consolidate Driveways)
		D3	Provide Sidewalk
		D4	Driveway Modification (RO Access Only)



DATE: 3/5/2018

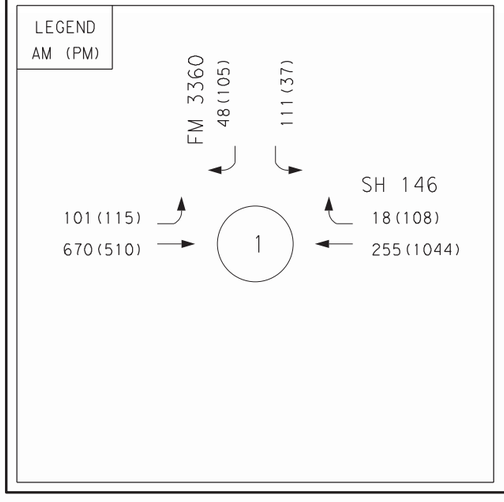
KEYMAP SHEET: 3



0 25 50 75 100

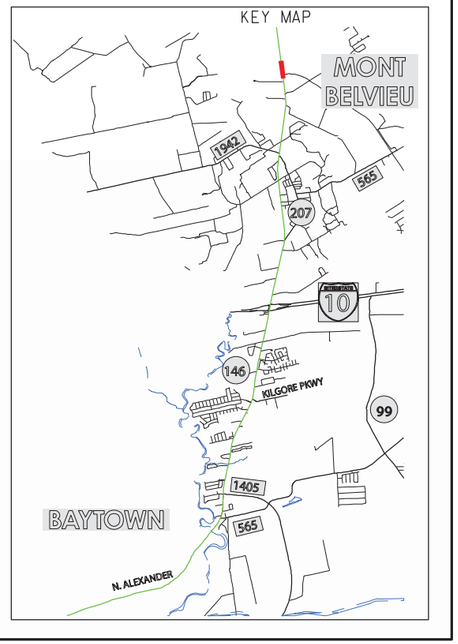
APPROX. SCALE: 1"=100'

LEGEND
- EXISTING ROW
- EXISTING PAVEMENT EDGE
- EXISTING TWLTL
- PROPOSED PAVEMENT EDGE
- PROPOSED MEDIAN
- PROPOSED IMPROVEMENT
- PROPOSED SIDEWALK



Cost Estimate: $ 610,000

Objective Group	Improvement Group	ID	Near-Term Improvements
Mobility	(R) Roadway	R1	Close Roadway
		R2	Provide Island (Painted or Raised)
		R3	Widen Roadway
		R4	Realign Roadway
		R5	Construct New Roadway
	(I) Intersection	I1	Construct Left-Turn Lane
		I2	Construct Right-Turn Lane
		I3	Construct Acceleration Lane
		I4	Align Curve (Reduce Angle)
		I5	Align Travelway (Reduce Offset)
	(S) Signal	S1	Remove Traffic Signal
		S2	Install Stop Sign Control (Conduct Warrant Study)
		S3	Review Signal Timings
		S4	Modify Traffic Signal
		S5	Install Traffic Signal (or Conduct TSWA)
Access	(M) Median	M1	Construct Raised Median (RIRO Access)
		M2	Provide Left-In Access
		M3	Construct Reverse S-Median (LO Access)
		M4	Construct Turbo-T (LILO Access)
		M5	Provide Full-Access
		M6	TWLTL To Remain (Full-Access)
	(D) Driveway	D1	Close Driveway
		D2	Provide Shared Access (Consolidate Driveways)
		D3	Provide Sidewalk
		D4	Driveway Modification (RO Access Only)



DATE: 3/5/2018

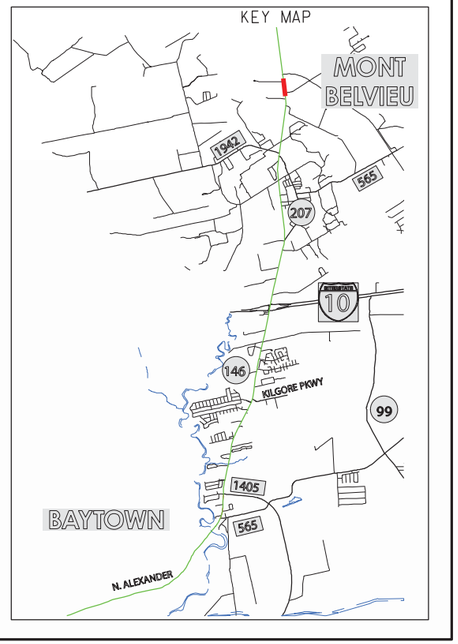
0 25 50 75 100

APPROX. SCALE: 1"=100'

LEGEND
- EXISTING ROW
- EXISTING PAVEMENT EDGE
- EXISTING TWLTL
- PROPOSED PAVEMENT EDGE
- PROPOSED MEDIAN
- PROPOSED IMPROVEMENT
- PROPOSED SIDEWALK

Cost Estimate: $ 280,000

Objective Group	Improvement Group	ID	Near-Term Improvements
Mobility	(R) Roadway	R1	Close Roadway
		R2	Provide Island (Painted or Raised)
		R3	Widen Roadway
		R4	Realign Roadway
		R5	Construct New Roadway
	(I) Intersection	I1	Construct Left-Turn Lane
		I2	Construct Right-Turn Lane
		I3	Construct Acceleration Lane
		I4	Align Curve (Reduce Angle)
		I5	Align Travelway (Reduce Offset)
	(S) Signal	S1	Remove Traffic Signal
		S2	Install Stop Sign Control (Conduct Warrant Study)
		S3	Review Signal Timings
		S4	Modify Traffic Signal
		S5	Install Traffic Signal (or Conduct TSWA)
Access	(M) Median	M1	Construct Raised Median (RIRO Access)
		M2	Provide Left-In Access
		M3	Construct Reverse S-Median (LO Access)
		M4	Construct Turbo-T (LILO Access)
		M5	Provide Full-Access
		M6	TWLTL To Remain (Full-Access)
	(D) Driveway	D1	Close Driveway
		D2	Provide Shared Access (Consolidate Driveways)
		D3	Provide Sidewalk
		D4	Driveway Modification (RO Access Only)



DATE: 3/5/2018

KEYMAP SHEET: 5

0 25 50 75 100

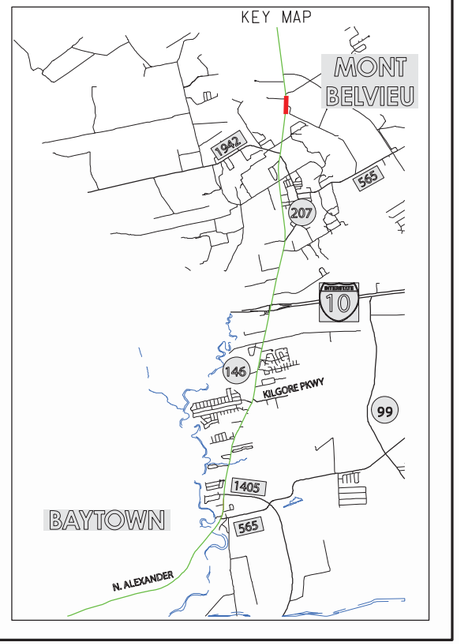
APPROX. SCALE: 1"=100'

LEGEND

- EXISTING ROW
- EXISTING PAVEMENT EDGE
- EXISTING TWLTL
- PROPOSED PAVEMENT EDGE
- PROPOSED MEDIAN
- PROPOSED IMPROVEMENT
- PROPOSED SIDEWALK

Cost Estimate: $ 290,000

Objective Group	Improvement Group	ID	Near-Term Improvements
Mobility	(R) Roadway	R1	Close Roadway
		R2	Provide Island (Painted or Raised)
		R3	Widen Roadway
		R4	Realign Roadway
		R5	Construct New Roadway
	(I) Intersection	I1	Construct Left-Turn Lane
		I2	Construct Right-Turn Lane
		I3	Construct Acceleration Lane
		I4	Align Curve (Reduce Angle)
		I5	Align Travelway (Reduce Offset)
	(S) Signal	S1	Remove Traffic Signal
		S2	Install Stop Sign Control (Conduct Warrant Study)
		S3	Review Signal Timings
		S4	Modify Traffic Signal
		S5	Install Traffic Signal (or Conduct TSWA)
Access	(M) Median	M1	Construct Raised Median (RIRO Access)
		M2	Provide Left-In Access
		M3	Construct Reverse S-Median (LO Access)
		M4	Construct Turbo-T (LILO Access)
		M5	Provide Full-Access
		M6	TWLTL To Remain (Full-Access)
	(D) Driveway	D1	Close Driveway
		D2	Provide Shared Access (Consolidate Driveways)
		D3	Provide Sidewalk
		D4	Driveway Modification (RO Access Only)



DATE: 3/5/2018

KEYMAP SHEET: 6

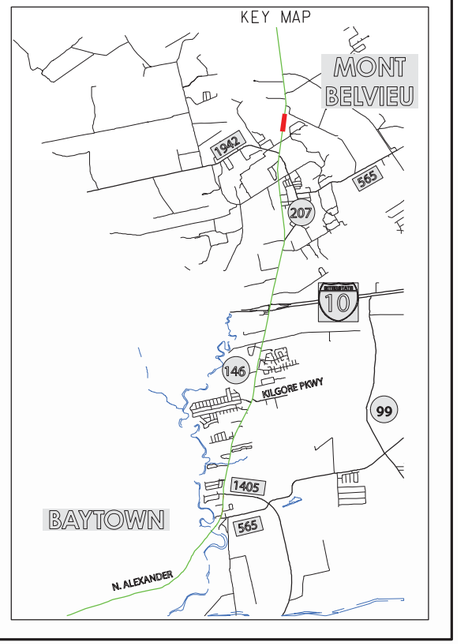
0 25 50 75 100

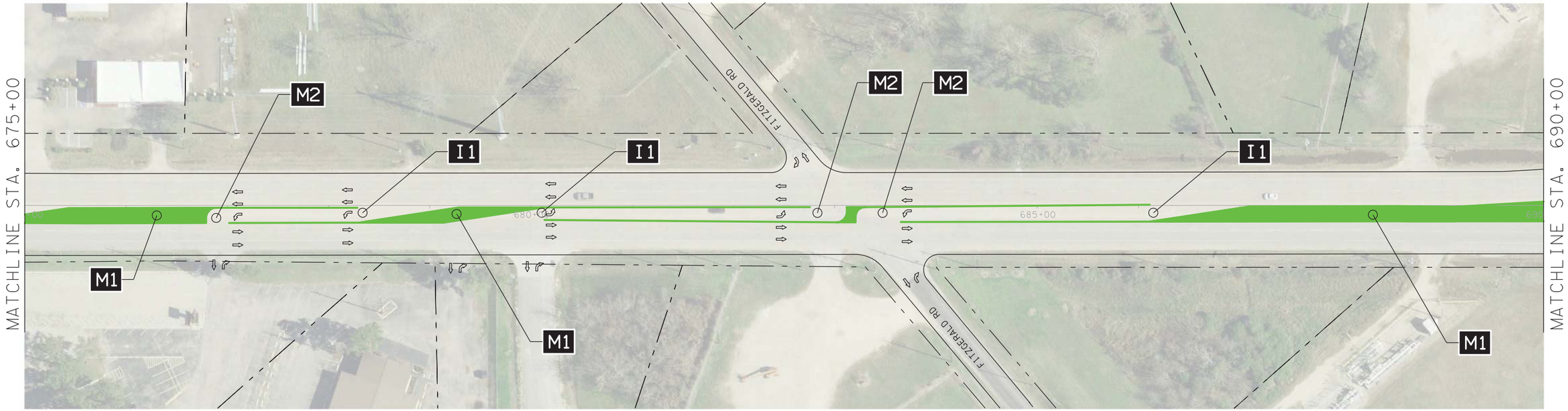
APPROX. SCALE: 1"=100'

LEGEND
- EXISTING ROW
- EXISTING PAVEMENT EDGE
- EXISTING TWLTL
- PROPOSED PAVEMENT EDGE
- PROPOSED MEDIAN
- PROPOSED IMPROVEMENT
- PROPOSED SIDEWALK

Cost Estimate: $ 270,000

Objective Group	Improvement Group	ID	Near-Term Improvements
Mobility	(R) Roadway	R1	Close Roadway
		R2	Provide Island (Painted or Raised)
		R3	Widen Roadway
		R4	Realign Roadway
		R5	Construct New Roadway
	(I) Intersection	I1	Construct Left-Turn Lane
		I2	Construct Right-Turn Lane
		I3	Construct Acceleration Lane
		I4	Align Curve (Reduce Angle)
		I5	Align Travelway (Reduce Offset)
	(S) Signal	S1	Remove Traffic Signal
		S2	Install Stop Sign Control (Conduct Warrant Study)
		S3	Review Signal Timings
		S4	Modify Traffic Signal
		S5	Install Traffic Signal (or Conduct TSWA)
Access	(M) Median	M1	Construct Raised Median (RIRO Access)
		M2	Provide Left-In Access
		M3	Construct Reverse S-Median (LO Access)
		M4	Construct Turbo-T (LILO Access)
		M5	Provide Full-Access
		M6	TWLTL To Remain (Full-Access)
	(D) Driveway	D1	Close Driveway
		D2	Provide Shared Access (Consolidate Driveways)
		D3	Provide Sidewalk
		D4	Driveway Modification (RO Access Only)





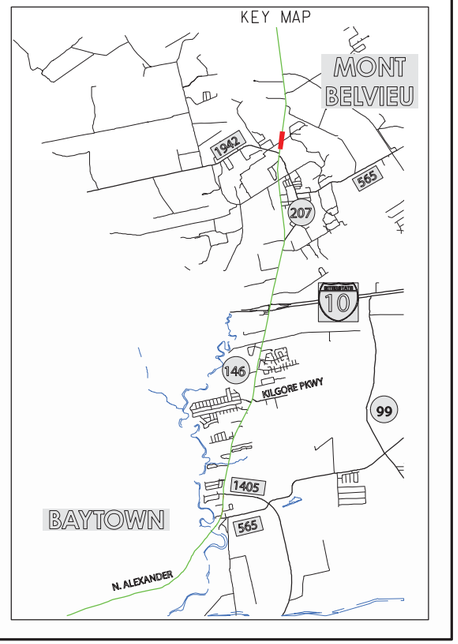
0 25 50 75 100

APPROX. SCALE: 1"=100'

LEGEND
- EXISTING ROW
- EXISTING PAVEMENT EDGE
- EXISTING TWLTL
- PROPOSED PAVEMENT EDGE
- PROPOSED MEDIAN
- PROPOSED IMPROVEMENT
- PROPOSED SIDEWALK

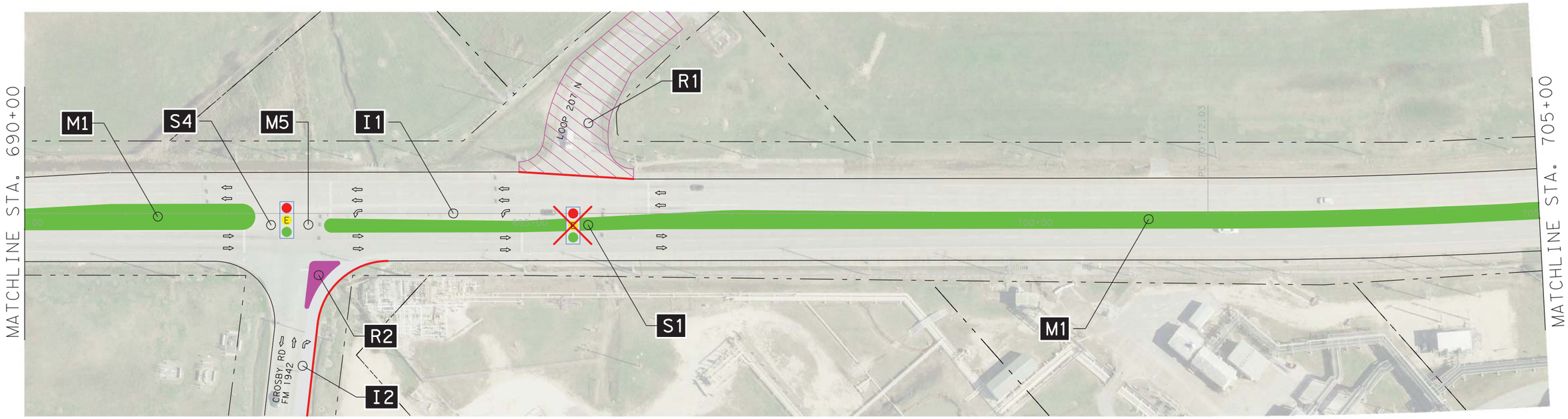
Cost Estimate: $ 240,000

Objective Group	Improvement Group	ID	Near-Term Improvements
Mobility	(R) Roadway	R1	Close Roadway
		R2	Provide Island (Painted or Raised)
		R3	Widen Roadway
		R4	Realign Roadway
		R5	Construct New Roadway
	(I) Intersection	I1	Construct Left-Turn Lane
		I2	Construct Right-Turn Lane
		I3	Construct Acceleration Lane
		I4	Align Curve (Reduce Angle)
		I5	Align Travelway (Reduce Offset)
	(S) Signal	S1	Remove Traffic Signal
		S2	Install Stop Sign Control (Conduct Warrant Study)
		S3	Review Signal Timings
		S4	Modify Traffic Signal
		S5	Install Traffic Signal (or Conduct TSWA)
Access	(M) Median	M1	Construct Raised Median (RIRO Access)
		M2	Provide Left-In Access
		M3	Construct Reverse S-Median (LO Access)
		M4	Construct Turbo-T (LILO Access)
		M5	Provide Full-Access
		M6	TWLTL To Remain (Full-Access)
	(D) Driveway	D1	Close Driveway
		D2	Provide Shared Access (Consolidate Driveways)
		D3	Provide Sidewalk
		D4	Driveway Modification (RO Access Only)



DATE: 3/5/2018

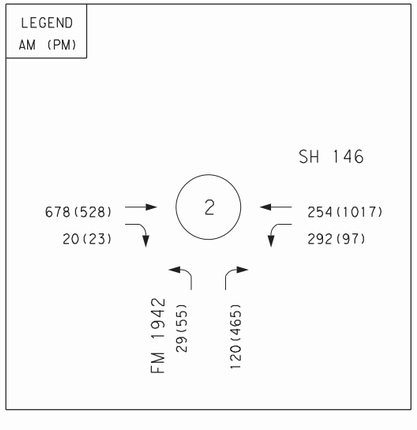
KEYMAP SHEET: 8

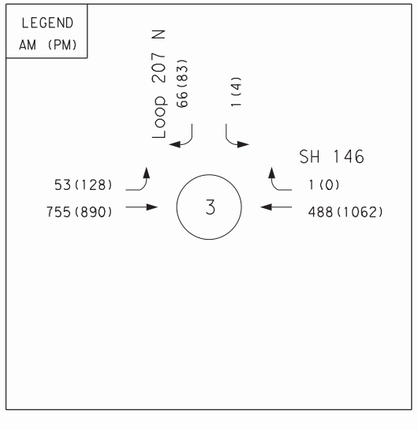


0 25 50 75 100

APPROX. SCALE: 1"=100'

LEGEND
- EXISTING ROW
- EXISTING PAVEMENT EDGE
- EXISTING TWLTL
- PROPOSED PAVEMENT EDGE
- PROPOSED MEDIAN
- PROPOSED IMPROVEMENT
- PROPOSED SIDEWALK





Cost Estimate: $ 580,000

Objective Group	Improvement Group	ID	Near-Term Improvements
Mobility	(R) Roadway	R1	Close Roadway
		R2	Provide Island (Painted or Raised)
		R3	Widen Roadway
		R4	Realign Roadway
		R5	Construct New Roadway
	(I) Intersection	I1	Construct Left-Turn Lane
		I2	Construct Right-Turn Lane
		I3	Construct Acceleration Lane
		I4	Align Curve (Reduce Angle)
		I5	Align Travelway (Reduce Offset)
	(S) Signal	S1	Remove Traffic Signal
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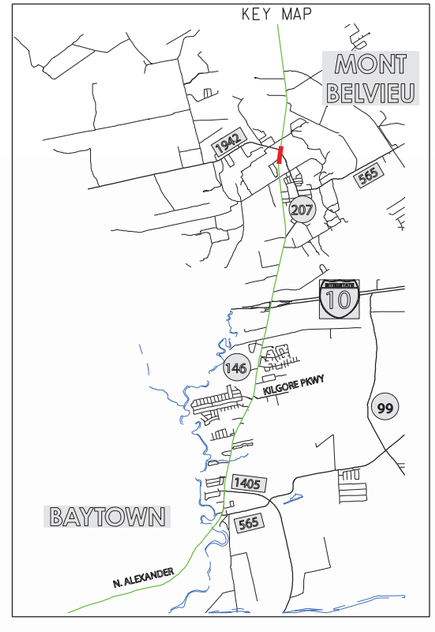
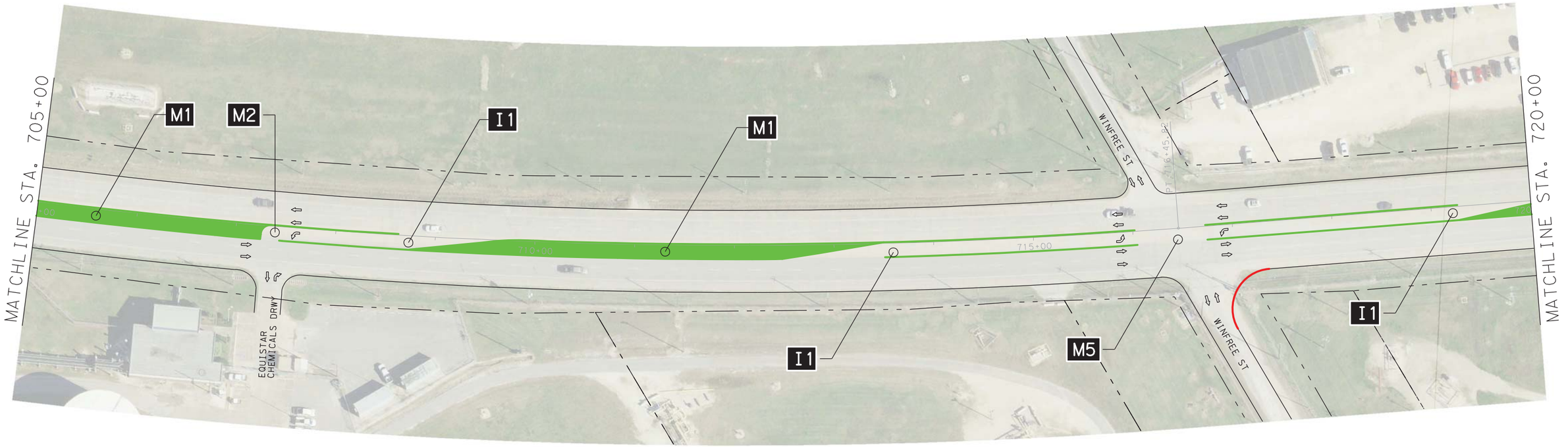
		S3	Review Signal Timings
		S4	Modify Traffic Signal
		S5	Install Traffic Signal (or Conduct TSWA)
Access	(M) Median	M1	Construct Raised Median (RIRO Access)
		M2	Provide Left-In Access
		M3	Construct Reverse S-Median (LO Access)
		M4	Construct Turbo-T (LILO Access)
		M5	Provide Full-Access
		M6	TWLTL To Remain (Full-Access)
	(D) Driveway	D1	Close Driveway
		D2	Provide Shared Access (Consolidate Driveways)
		D3	Provide Sidewalk
		D4	Driveway Modification (RO Access Only)



DATE: 3/5/2018

KEYMAP SHEET: 9

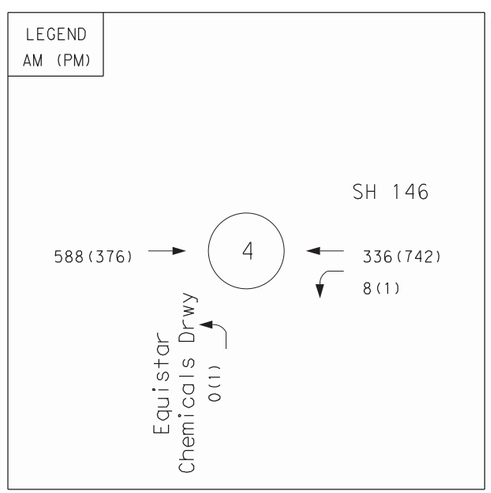


Cost Estimate: $ 180,000

0 25 50 75 100

APPROX. SCALE: 1"=100'

LEGEND
- EXISTING ROW
- EXISTING PAVEMENT EDGE
- EXISTING TWLTL
- PROPOSED PAVEMENT EDGE
- PROPOSED MEDIAN
- PROPOSED IMPROVEMENT
- PROPOSED SIDEWALK



Objective Group	Improvement Group	ID	Near-Term Improvements
Mobility	(R) Roadway	R1	Close Roadway
		R2	Provide Island (Painted or Raised)
		R3	Widen Roadway
		R4	Realign Roadway
		R5	Construct New Roadway
	(I) Intersection	I1	Construct Left-Turn Lane
		I2	Construct Right-Turn Lane
		I3	Construct Acceleration Lane
		I4	Align Curve (Reduce Angle)
		I5	Align Travelway (Reduce Offset)
	(S) Signal	S1	Remove Traffic Signal
		S2	Install Stop Sign Control (Conduct Warrant Study)
		S3	Review Signal Timings
		S4	Modify Traffic Signal
		S5	Install Traffic Signal (or Conduct TSWA)
Access	(M) Median	M1	Construct Raised Median (RIRO Access)
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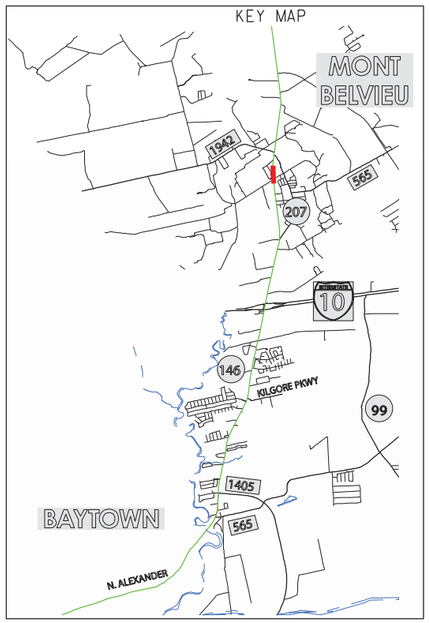
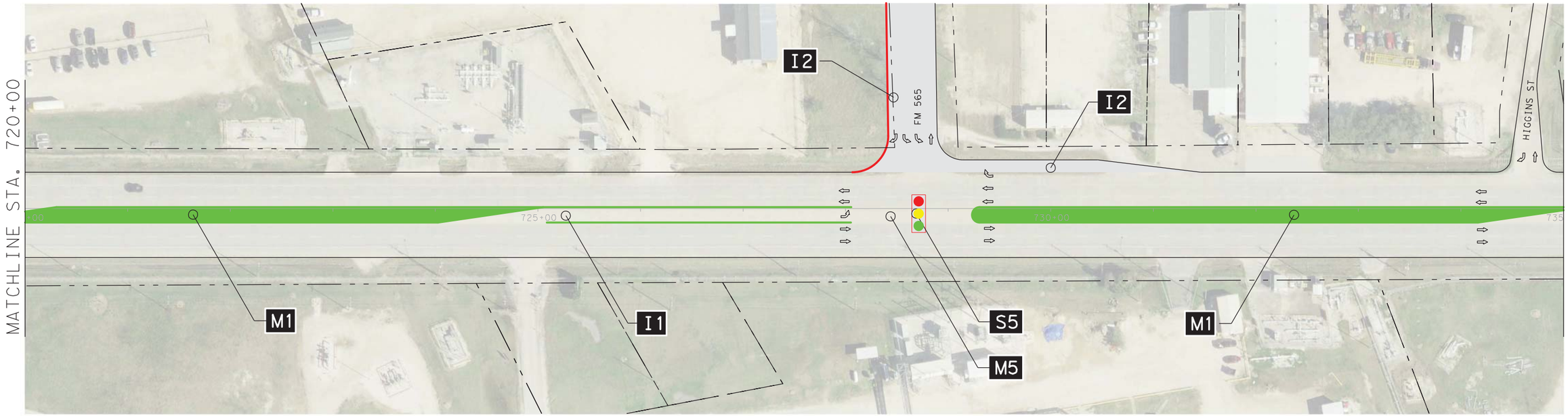
		M3	Construct Reverse S-Median (LO Access)
		M4	Construct Turbo-T (LILO Access)
		M5	Provide Full-Access
		M6	TWLTL To Remain (Full-Access)
	(D) Driveway	D1	Close Driveway
		D2	Provide Shared Access (Consolidate Driveways)
		D3	Provide Sidewalk
		D4	Driveway Modification (RO Access Only)



DATE: 3/5/2018

KEYMAP SHEET: 10



0 25 50 75 100

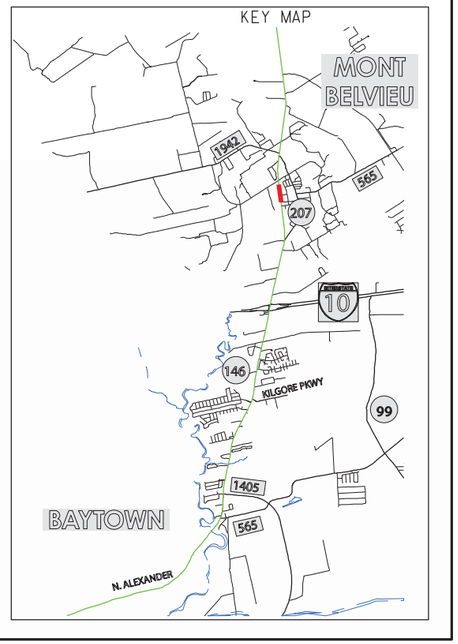
APPROX. SCALE: 1"=100'

LEGEND

- EXISTING ROW
- EXISTING PAVEMENT EDGE
- EXISTING TWLTL
- PROPOSED PAVEMENT EDGE
- PROPOSED MEDIAN
- PROPOSED IMPROVEMENT
- PROPOSED SIDEWALK

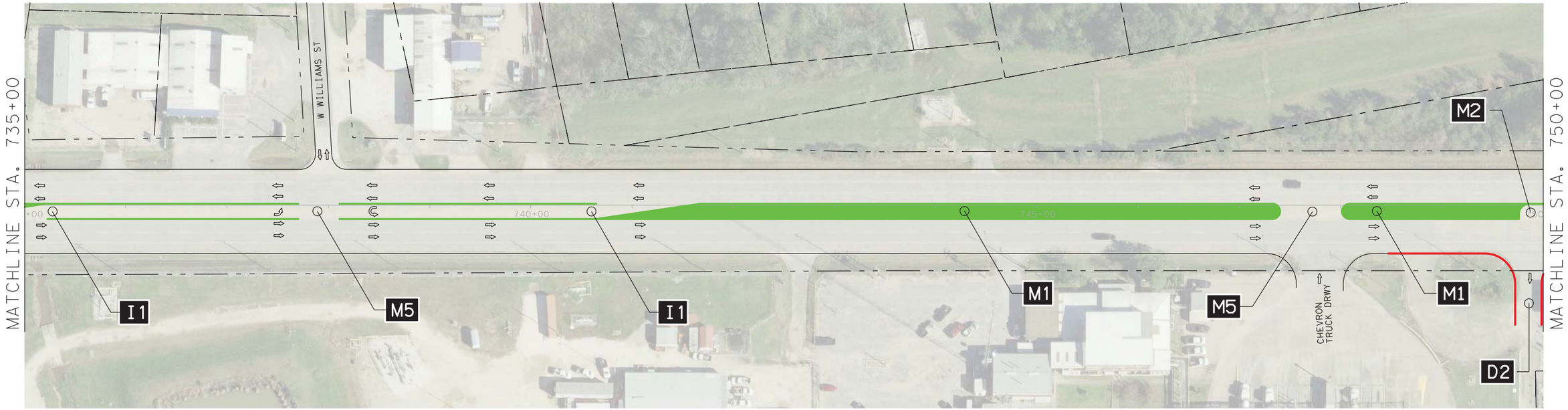
Cost Estimate: $ 375,000

Objective Group	Improvement Group	ID	Near-Term Improvements
Mobility	(R) Roadway	R1	Close Roadway
		R2	Provide Island (Painted or Raised)
		R3	Widen Roadway
		R4	Realign Roadway
		R5	Construct New Roadway
	(I) Intersection	I1	Construct Left-Turn Lane
		I2	Construct Right-Turn Lane
		I3	Construct Acceleration Lane
		I4	Align Curve (Reduce Angle)
		I5	Align Travelway (Reduce Offset)
	(S) Signal	S1	Remove Traffic Signal
		S2	Install Stop Sign Control (Conduct Warrant Study)
		S3	Review Signal Timings
		S4	Modify Traffic Signal
		S5	Install Traffic Signal (or Conduct TSWA)
Access	(M) Median	M1	Construct Raised Median (RIRO Access)
		M2	Provide Left-In Access
		M3	Construct Reverse S-Median (LO Access)
		M4	Construct Turbo-T (LILO Access)
		M5	Provide Full-Access
		M6	TWLTL To Remain (Full-Access)
	(D) Driveway	D1	Close Driveway
		D2	Provide Shared Access (Consolidate Driveways)
		D3	Provide Sidewalk
		D4	Driveway Modification (RO Access Only)



DATE: 3/5/2018

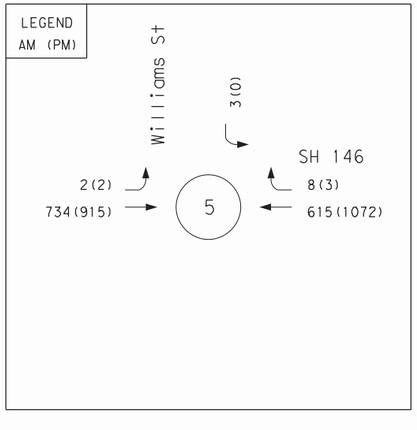
KEYMAP SHEET: 11

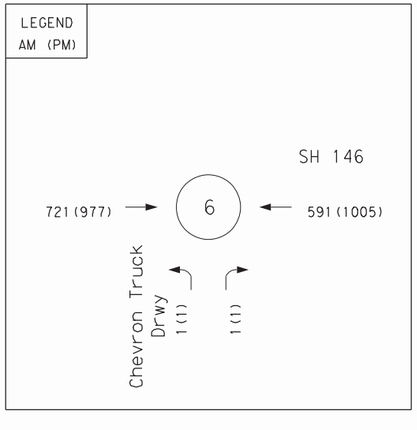


0 25 50 75 100

APPROX. SCALE: 1"=100'

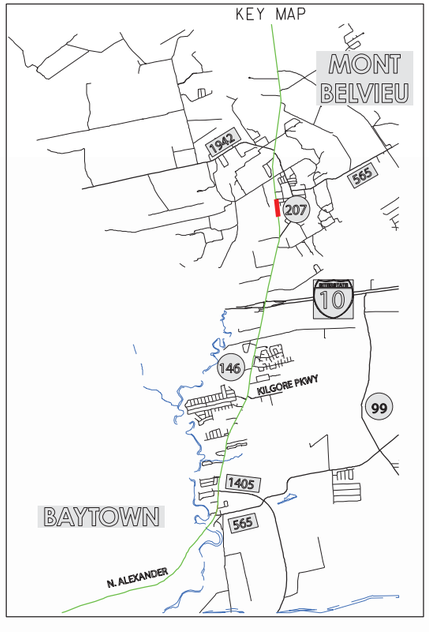
LEGEND
- EXISTING ROW
- EXISTING PAVEMENT EDGE
- EXISTING TWLTL
- PROPOSED PAVEMENT EDGE
- PROPOSED MEDIAN
- PROPOSED IMPROVEMENT
- PROPOSED SIDEWALK





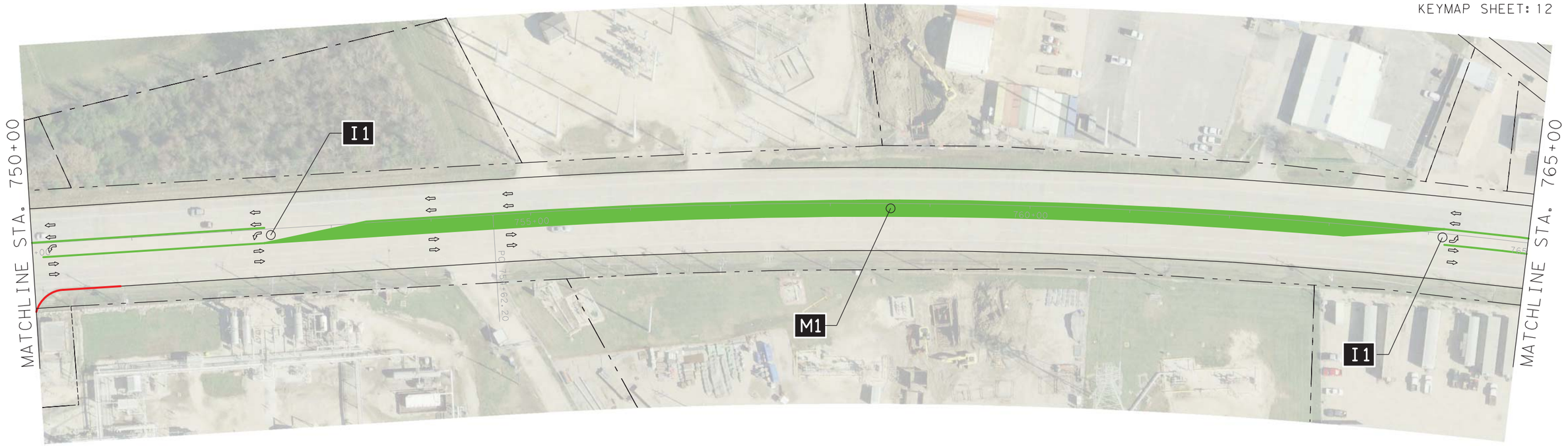
Cost Estimate: $ 220,000

Objective Group	Improvement Group	ID	Near-Term Improvements
Mobility	(R) Roadway	R1	Close Roadway
		R2	Provide Island (Painted or Raised)
		R3	Widen Roadway
		R4	Realign Roadway
		R5	Construct New Roadway
	(I) Intersection	I1	Construct Left-Turn Lane
		I2	Construct Right-Turn Lane
		I3	Construct Acceleration Lane
		I4	Align Curve (Reduce Angle)
		I5	Align Travelway (Reduce Offset)
	(S) Signal	S1	Remove Traffic Signal
		S2	Install Stop Sign Control (Conduct Warrant Study)
		S3	Review Signal Timings
		S4	Modify Traffic Signal
		S5	Install Traffic Signal (or Conduct TSWA)
Access	(M) Median	M1	Construct Raised Median (RIRO Access)
		M2	Provide Left-In Access
		M3	Construct Reverse S-Median (LO Access)
		M4	Construct Turbo-T (LILO Access)
		M5	Provide Full-Access
		M6	TWLTL To Remain (Full-Access)
	(D) Driveway	D1	Close Driveway
		D2	Provide Shared Access (Consolidate Driveways)
		D3	Provide Sidewalk
		D4	Driveway Modification (RO Access Only)



DATE: 3/5/2018

KEYMAP SHEET: 12



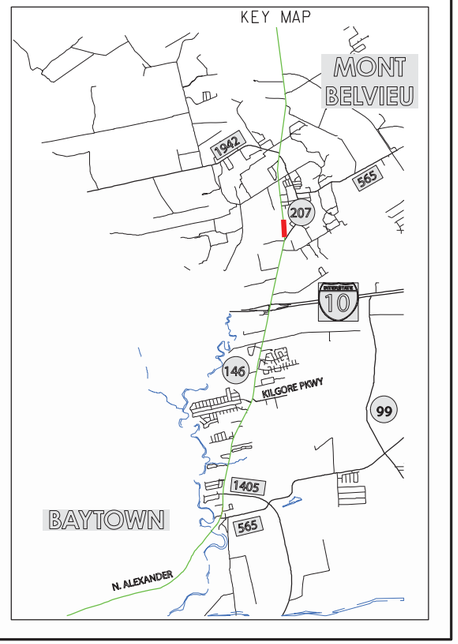
0 25 50 75 100

APPROX. SCALE: 1"=100'

LEGEND
- EXISTING ROW
- EXISTING PAVEMENT EDGE
- EXISTING TWLTL
- PROPOSED PAVEMENT EDGE
- PROPOSED MEDIAN
- PROPOSED IMPROVEMENT
- PROPOSED SIDEWALK

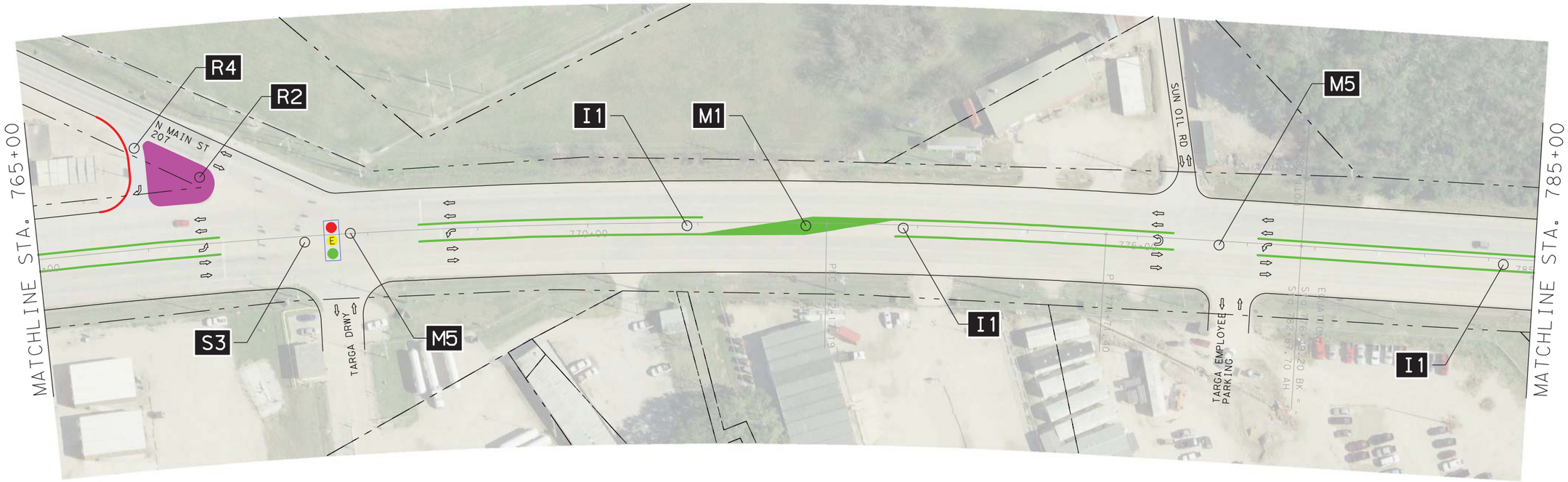
Cost Estimate: $ 240,000

Objective Group	Improvement Group	ID	Near-Term Improvements
Mobility	(R) Roadway	R1	Close Roadway
		R2	Provide Island (Painted or Raised)
		R3	Widen Roadway
		R4	Realign Roadway
		R5	Construct New Roadway
	(I) Intersection	I1	Construct Left-Turn Lane
		I2	Construct Right-Turn Lane
		I3	Construct Acceleration Lane
		I4	Align Curve (Reduce Angle)
		I5	Align Travelway (Reduce Offset)
	(S) Signal	S1	Remove Traffic Signal
		S2	Install Stop Sign Control (Conduct Warrant Study)
		S3	Review Signal Timings
		S4	Modify Traffic Signal
		S5	Install Traffic Signal (or Conduct TSWA)
Access	(M) Median	M1	Construct Raised Median (RIRO Access)
		M2	Provide Left-In Access
		M3	Construct Reverse S-Median (LO Access)
		M4	Construct Turbo-T (LILO Access)
		M5	Provide Full-Access
		M6	TWLTL To Remain (Full-Access)
	(D) Driveway	D1	Close Driveway
		D2	Provide Shared Access (Consolidate Driveways)
		D3	Provide Sidewalk
		D4	Driveway Modification (RO Access Only)



DATE: 3/23/2018

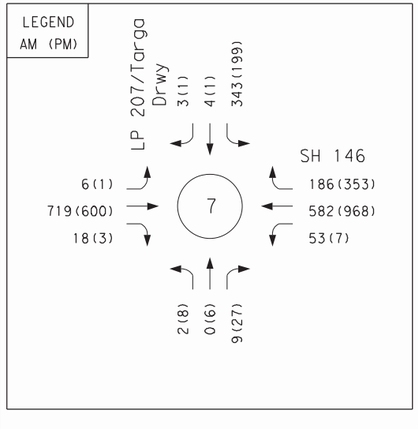
KEYMAP SHEET: 13

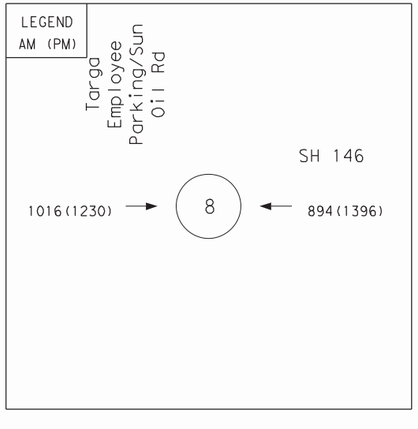


0 25 50 75 100

APPROX. SCALE: 1"=100'

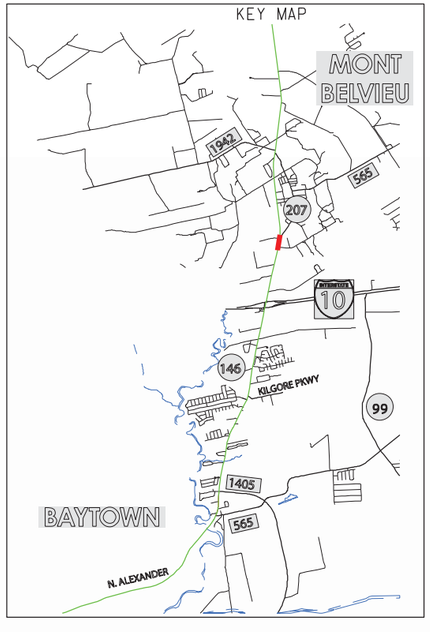
LEGEND
- EXISTING ROW
- EXISTING PAVEMENT EDGE
- EXISTING TWLTL
- PROPOSED PAVEMENT EDGE
- PROPOSED MEDIAN
- PROPOSED IMPROVEMENT
- PROPOSED SIDEWALK



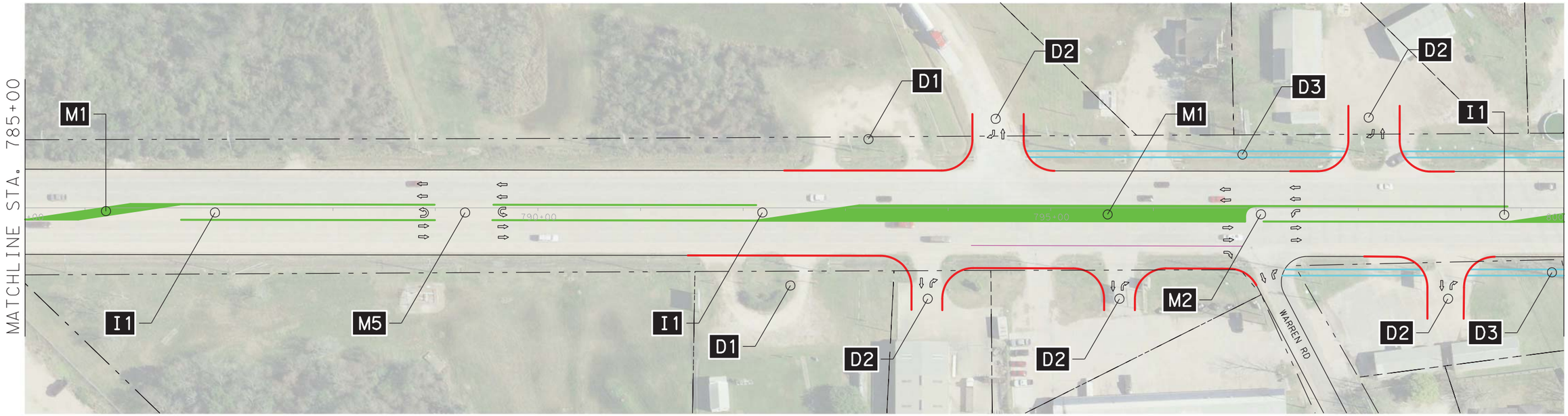


Cost Estimate: $ 310,000

Objective Group	Improvement Group	ID	Near-Term Improvements
Mobility	(R) Roadway	R1	Close Roadway
		R2	Provide Island (Painted or Raised)
		R3	Widen Roadway
		R4	Realign Roadway
		R5	Construct New Roadway
	(I) Intersection	I1	Construct Left-Turn Lane
		I2	Construct Right-Turn Lane
		I3	Construct Acceleration Lane
		I4	Align Curve (Reduce Angle)
		I5	Align Travelway (Reduce Offset)
	(S) Signal	S1	Remove Traffic Signal
		S2	Install Stop Sign Control (Conduct Warrant Study)
		S3	Review Signal Timings
		S4	Modify Traffic Signal
		S5	Install Traffic Signal (or Conduct TSWA)
Access	(M) Median	M1	Construct Raised Median (RIRO Access)
		M2	Provide Left-In Access
		M3	Construct Reverse S-Median (LO Access)
		M4	Construct Turbo-T (LILO Access)
		M5	Provide Full-Access
		M6	TWLTL To Remain (Full-Access)
	(D) Driveway	D1	Close Driveway
		D2	Provide Shared Access (Consolidate Driveways)
		D3	Provide Sidewalk
		D4	Driveway Modification (RO Access Only)



DATE: 3/5/2018



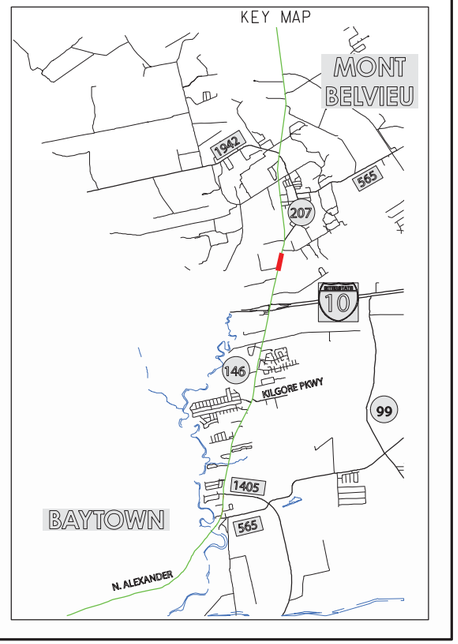
0 25 50 75 100

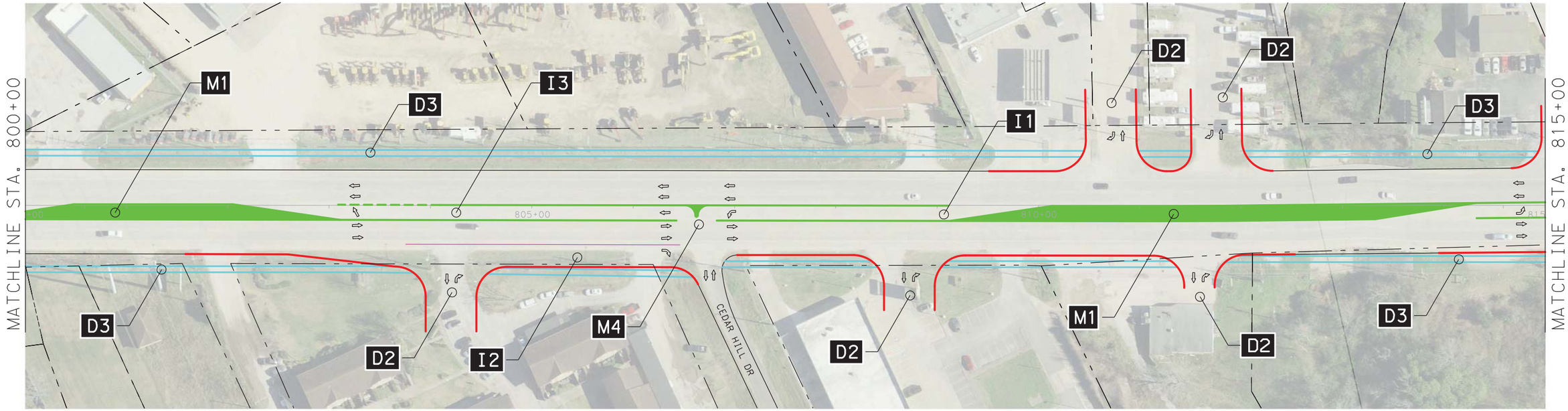
APPROX. SCALE: 1"=100'

LEGEND
- EXISTING ROW
- EXISTING PAVEMENT EDGE
- EXISTING TWLTL
- PROPOSED PAVEMENT EDGE
- PROPOSED MEDIAN
- PROPOSED IMPROVEMENT
- PROPOSED SIDEWALK

Cost Estimate: $ 340,000

Objective Group	Improvement Group	ID	Near-Term Improvements
Mobility	(R) Roadway	R1	Close Roadway
		R2	Provide Island (Painted or Raised)
		R3	Widen Roadway
		R4	Realign Roadway
		R5	Construct New Roadway
	(I) Intersection	I1	Construct Left-Turn Lane
		I2	Construct Right-Turn Lane
		I3	Construct Acceleration Lane
		I4	Align Curve (Reduce Angle)
		I5	Align Travelway (Reduce Offset)
	(S) Signal	S1	Remove Traffic Signal
		S2	Install Stop Sign Control (Conduct Warrant Study)
		S3	Review Signal Timings
		S4	Modify Traffic Signal
		S5	Install Traffic Signal (or Conduct TSWA)
Access	(M) Median	M1	Construct Raised Median (RIRO Access)
		M2	Provide Left-In Access
		M3	Construct Reverse S-Median (LO Access)
		M4	Construct Turbo-T (LILO Access)
		M5	Provide Full-Access
		M6	TWLTL To Remain (Full-Access)
	(D) Driveway	D1	Close Driveway
		D2	Provide Shared Access (Consolidate Driveways)
		D3	Provide Sidewalk
		D4	Driveway Modification (RO Access Only)





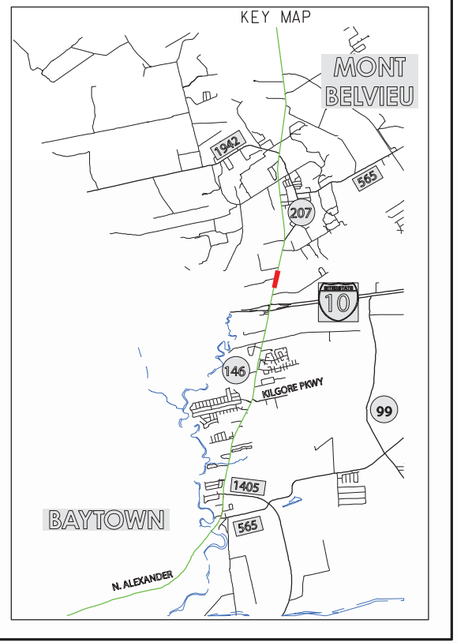
0 25 50 75 100

APPROX. SCALE: 1"=100'

LEGEND
- EXISTING ROW
- EXISTING PAVEMENT EDGE
- EXISTING TWLTL
- PROPOSED PAVEMENT EDGE
- PROPOSED MEDIAN
- PROPOSED IMPROVEMENT
- PROPOSED SIDEWALK

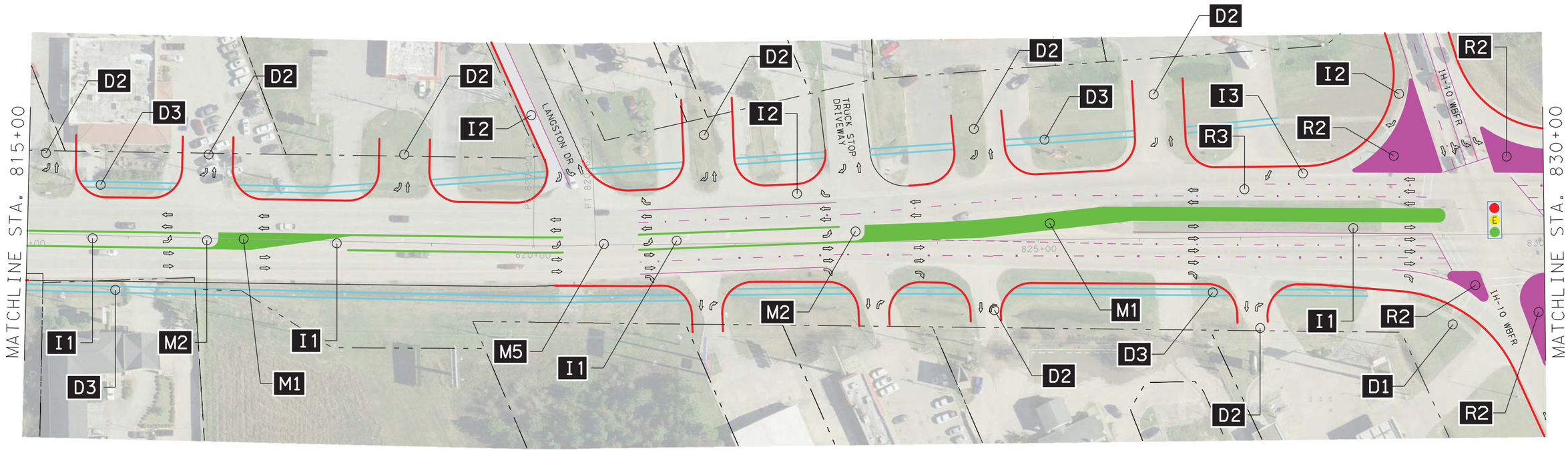
Cost Estimate: $ 330,000

Objective Group	Improvement Group	ID	Near-Term Improvements
Mobility	(R) Roadway	R1	Close Roadway
		R2	Provide Island (Painted or Raised)
		R3	Widen Roadway
		R4	Realign Roadway
		R5	Construct New Roadway
	(I) Intersection	I1	Construct Left-Turn Lane
		I2	Construct Right-Turn Lane
		I3	Construct Acceleration Lane
		I4	Align Curve (Reduce Angle)
		I5	Align Travelway (Reduce Offset)
	(S) Signal	S1	Remove Traffic Signal
		S2	Install Stop Sign Control (Conduct Warrant Study)
		S3	Review Signal Timings
		S4	Modify Traffic Signal
		S5	Install Traffic Signal (or Conduct TSWA)
Access	(M) Median	M1	Construct Raised Median (RIRO Access)
		M2	Provide Left-In Access
		M3	Construct Reverse S-Median (LO Access)
		M4	Construct Turbo-T (LILO Access)
		M5	Provide Full-Access
		M6	TWLTL To Remain (Full-Access)
	(D) Driveway	D1	Close Driveway
		D2	Provide Shared Access (Consolidate Driveways)
		D3	Provide Sidewalk
		D4	Driveway Modification (RO Access Only)



DATE: 3/5/2018

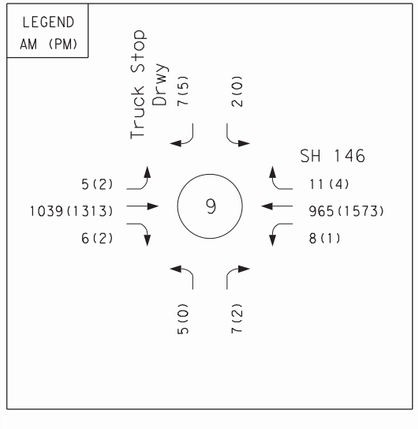
KEYMAP SHEET: 16

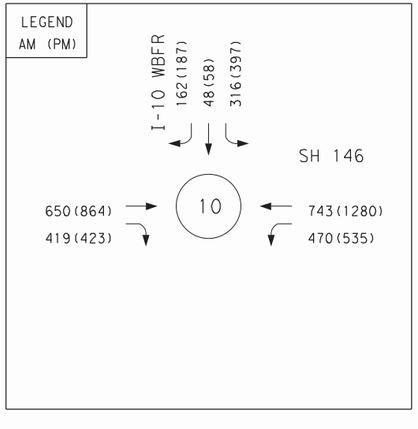


0 25 50 75 100

APPROX. SCALE: 1"=100'

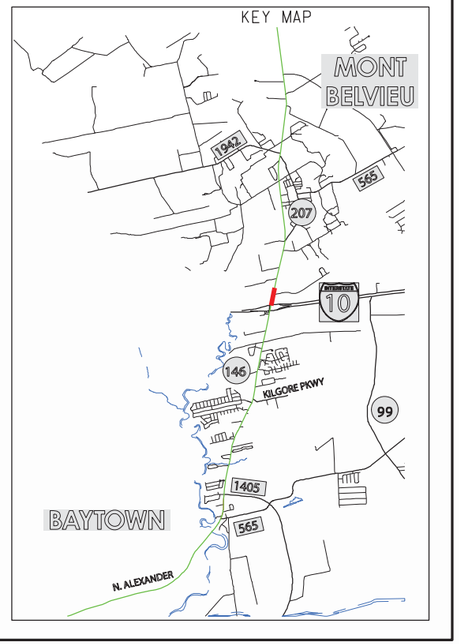
LEGEND
- EXISTING ROW
- EXISTING PAVEMENT EDGE
- EXISTING TWLTL
- PROPOSED PAVEMENT EDGE
- PROPOSED MEDIAN
- PROPOSED IMPROVEMENT
- PROPOSED SIDEWALK





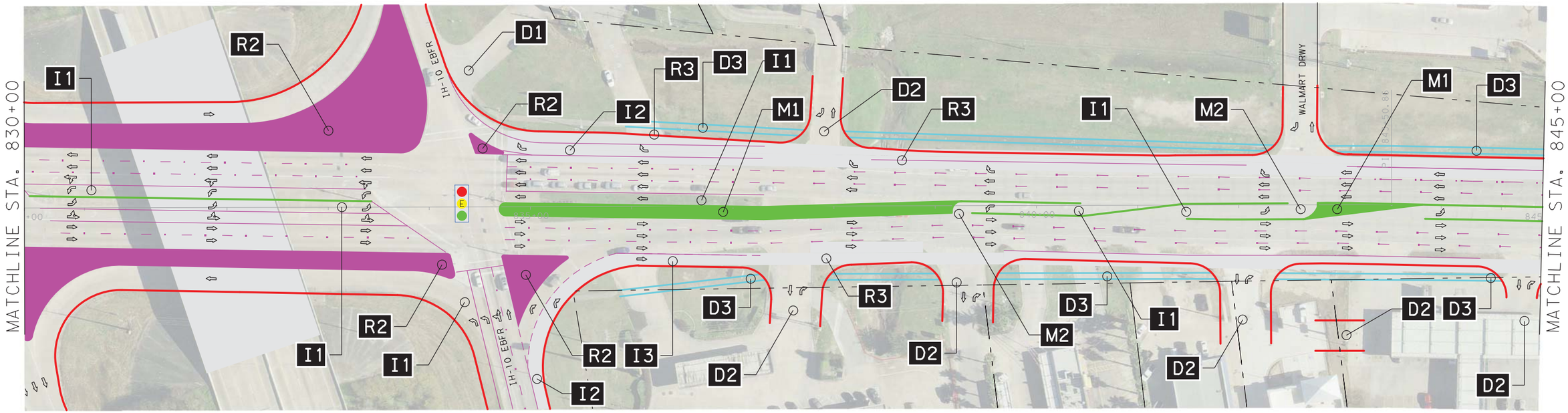
Cost Estimate: $1,490,000

Objective Group	Improvement Group	ID	Near-Term Improvements
Mobility	(R) Roadway	R1	Close Roadway
		R2	Provide Island (Painted or Raised)
		R3	Widen Roadway
		R4	Realign Roadway
		R5	Construct New Roadway
	(I) Intersection	I1	Construct Left-Turn Lane
		I2	Construct Right-Turn Lane
		I3	Construct Acceleration Lane
		I4	Align Curve (Reduce Angle)
		I5	Align Travelway (Reduce Offset)
	(S) Signal	S1	Remove Traffic Signal
		S2	Install Stop Sign Control (Conduct Warrant Study)
		S3	Review Signal Timings
		S4	Modify Traffic Signal
		S5	Install Traffic Signal (or Conduct TSWA)
Access	(M) Median	M1	Construct Raised Median (RIRO Access)
		M2	Provide Left-In Access
		M3	Construct Reverse S-Median (LO Access)
		M4	Construct Turbo-T (LILO Access)
		M5	Provide Full-Access
		M6	TWLTL To Remain (Full-Access)
	(D) Driveway	D1	Close Driveway
		D2	Provide Shared Access (Consolidate Driveways)
		D3	Provide Sidewalk
		D4	Driveway Modification (RO Access Only)



DATE: 3/5/2018

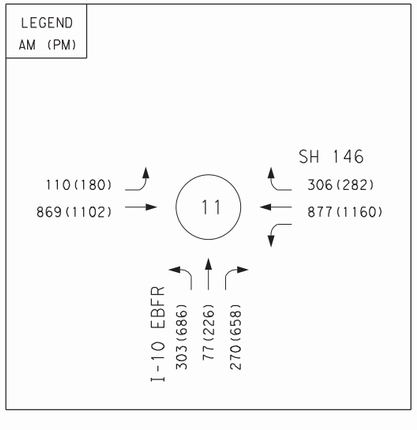
KEYMAP SHEET: 17

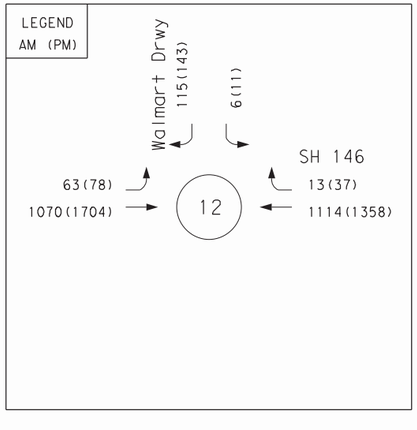


0 25 50 75 100

APPROX. SCALE: 1"=100'

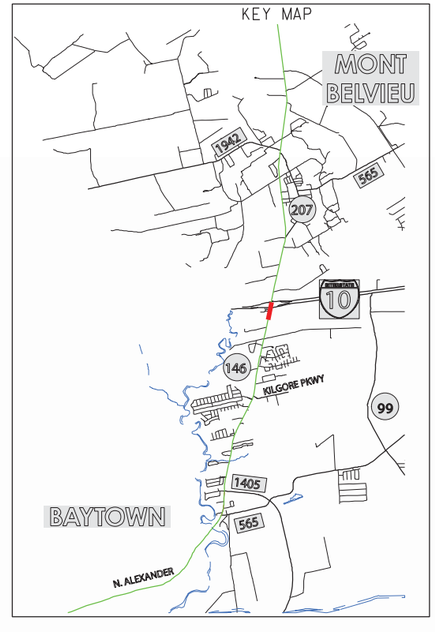
LEGEND
- EXISTING ROW
- EXISTING PAVEMENT EDGE
- EXISTING TWLTL
- PROPOSED PAVEMENT EDGE
- PROPOSED MEDIAN
- PROPOSED IMPROVEMENT
- PROPOSED SIDEWALK





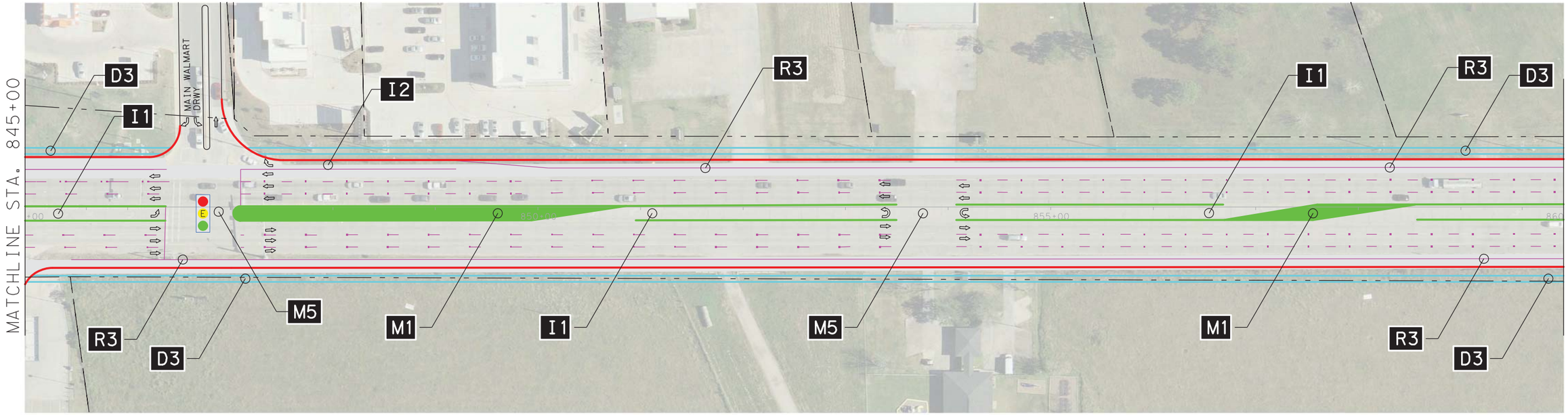
Cost Estimate: $1,890,000

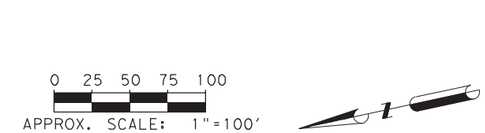
Objective Group	Improvement Group	ID	Near-Term Improvements
Mobility	(R) Roadway	R1	Close Roadway
		R2	Provide Island (Painted or Raised)
		R3	Widen Roadway
		R4	Realign Roadway
		R5	Construct New Roadway
	(I) Intersection	I1	Construct Left-Turn Lane
		I2	Construct Right-Turn Lane
		I3	Construct Acceleration Lane
		I4	Align Curve (Reduce Angle)
		I5	Align Travelway (Reduce Offset)
	(S) Signal	S1	Remove Traffic Signal
		S2	Install Stop Sign Control (Conduct Warrant Study)
		S3	Review Signal Timings
		S4	Modify Traffic Signal
		S5	Install Traffic Signal (or Conduct TSWA)
Access	(M) Median	M1	Construct Raised Median (RIRO Access)
		M2	Provide Left-In Access
		M3	Construct Reverse S-Median (LO Access)
		M4	Construct Turbo-T (LILO Access)
		M5	Provide Full-Access
		M6	TWLTL To Remain (Full-Access)
	(D) Driveway	D1	Close Driveway
		D2	Provide Shared Access (Consolidate Driveways)
		D3	Provide Sidewalk
		D4	Driveway Modification (RO Access Only)

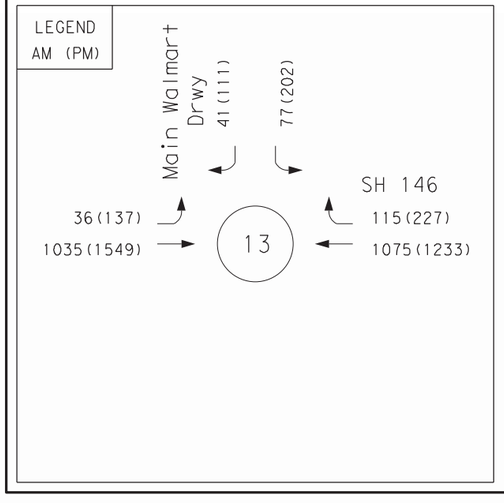


DATE: 3/5/2018

KEYMAP SHEET: 18



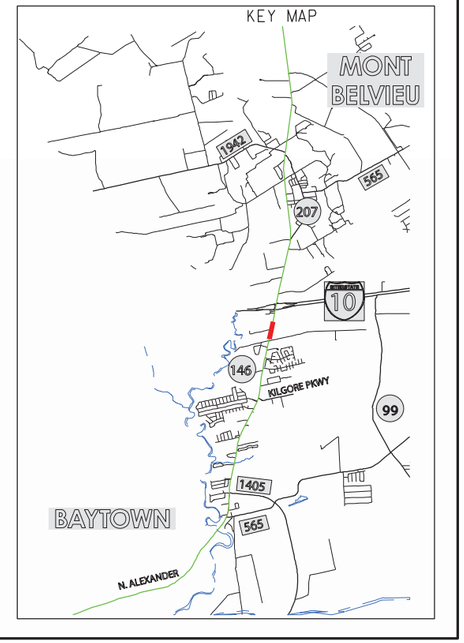




LEGEND
- EXISTING ROW
- EXISTING PAVEMENT EDGE
- EXISTING TWLTL
- PROPOSED PAVEMENT EDGE
- PROPOSED MEDIAN
- PROPOSED IMPROVEMENT
- PROPOSED SIDEWALK

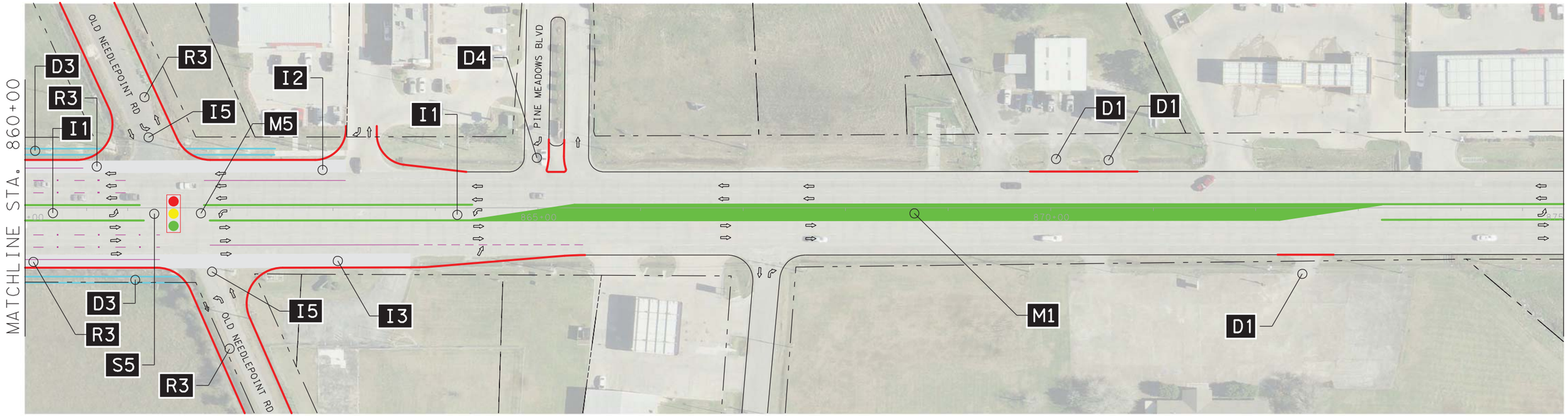
Cost Estimate: $ 770,000

Objective Group	Improvement Group	ID	Near-Term Improvements
Mobility	(R) Roadway	R1	Close Roadway
		R2	Provide Island (Painted or Raised)
		R3	Widen Roadway
		R4	Realign Roadway
		R5	Construct New Roadway
	(I) Intersection	I1	Construct Left-Turn Lane
		I2	Construct Right-Turn Lane
		I3	Construct Acceleration Lane
		I4	Align Curve (Reduce Angle)
		I5	Align Travelway (Reduce Offset)
	(S) Signal	S1	Remove Traffic Signal
		S2	Install Stop Sign Control (Conduct Warrant Study)
		S3	Review Signal Timings
		S4	Modify Traffic Signal
		S5	Install Traffic Signal (or Conduct TSWA)
Access	(M) Median	M1	Construct Raised Median (RIRO Access)
		M2	Provide Left-In Access
		M3	Construct Reverse S-Median (LO Access)
		M4	Construct Turbo-T (LILO Access)
		M5	Provide Full-Access
		M6	TWLTL To Remain (Full-Access)
	(D) Driveway	D1	Close Driveway
		D2	Provide Shared Access (Consolidate Driveways)
		D3	Provide Sidewalk
		D4	Driveway Modification (RO Access Only)



DATE: 3/5/2018

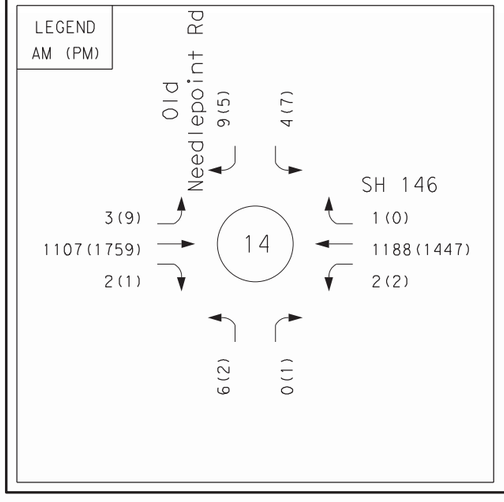
KEYMAP SHEET: 19



0 25 50 75 100

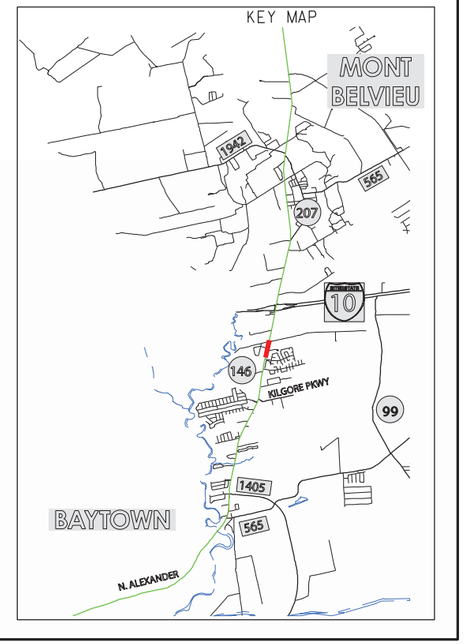
APPROX. SCALE: 1"=100'

LEGEND
- EXISTING ROW
- EXISTING PAVEMENT EDGE
- EXISTING TWLTL
- PROPOSED PAVEMENT EDGE
- PROPOSED MEDIAN
- PROPOSED IMPROVEMENT
- PROPOSED SIDEWALK



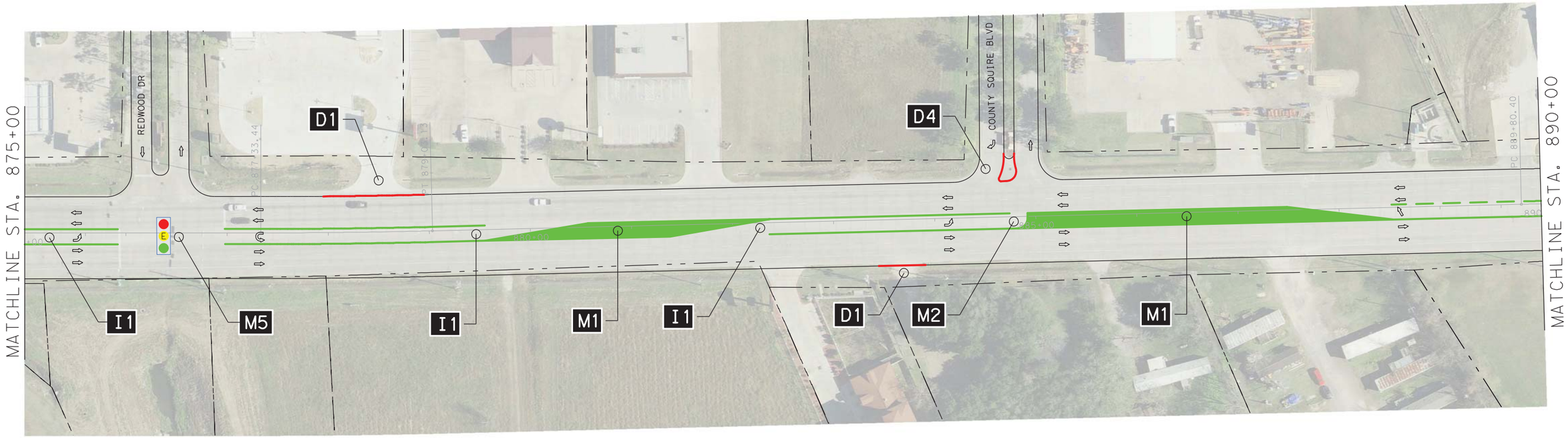
Cost Estimate: $ 765,000

Objective Group	Improvement Group	ID	Near-Term Improvements
Mobility	(R) Roadway	R1	Close Roadway
		R2	Provide Island (Painted or Raised)
		R3	Widen Roadway
		R4	Realign Roadway
		R5	Construct New Roadway
	(I) Intersection	I1	Construct Left-Turn Lane
		I2	Construct Right-Turn Lane
		I3	Construct Acceleration Lane
		I4	Align Curve (Reduce Angle)
		I5	Align Travelway (Reduce Offset)
	(S) Signal	S1	Remove Traffic Signal
		S2	Install Stop Sign Control (Conduct Warrant Study)
		S3	Review Signal Timings
		S4	Modify Traffic Signal
		S5	Install Traffic Signal (or Conduct TSWA)
Access	(M) Median	M1	Construct Raised Median (RIRO Access)
		M2	Provide Left-In Access
		M3	Construct Reverse S-Median (LO Access)
		M4	Construct Turbo-T (LILO Access)
		M5	Provide Full-Access
		M6	TWLTL To Remain (Full-Access)
	(D) Driveway	D1	Close Driveway
		D2	Provide Shared Access (Consolidate Driveways)
		D3	Provide Sidewalk
		D4	Driveway Modification (RO Access Only)



DATE: 3/5/2018

KEYMAP SHEET: 20



0 25 50 75 100

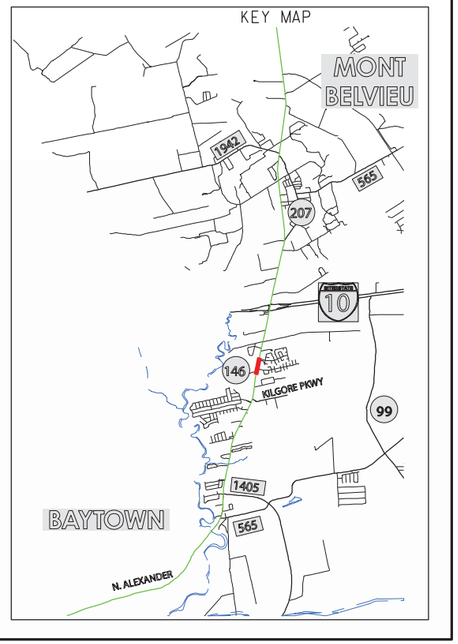
APPROX. SCALE: 1"=100'

LEGEND

- EXISTING ROW
- EXISTING PAVEMENT EDGE
- EXISTING TWLTL
- PROPOSED PAVEMENT EDGE
- PROPOSED MEDIAN
- PROPOSED IMPROVEMENT
- PROPOSED SIDEWALK

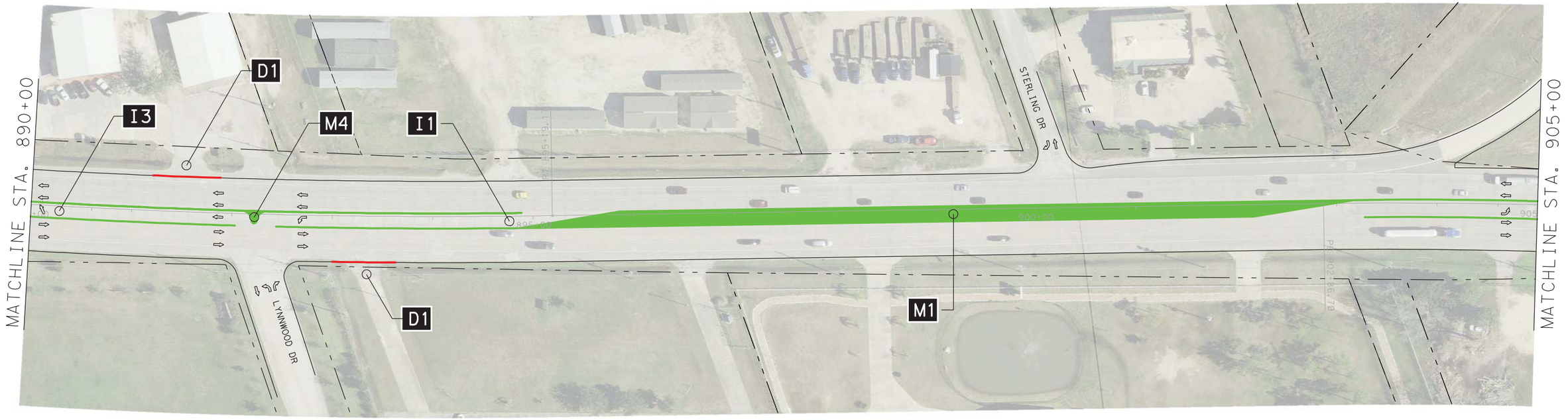
Cost Estimate: $ 220,000

Objective Group	Improvement Group	ID	Near-Term Improvements
Mobility	(R) Roadway	R1	Close Roadway
		R2	Provide Island (Painted or Raised)
		R3	Widen Roadway
		R4	Realign Roadway
		R5	Construct New Roadway
	(I) Intersection	I1	Construct Left-Turn Lane
		I2	Construct Right-Turn Lane
		I3	Construct Acceleration Lane
		I4	Align Curve (Reduce Angle)
		I5	Align Travelway (Reduce Offset)
	(S) Signal	S1	Remove Traffic Signal
		S2	Install Stop Sign Control (Conduct Warrant Study)
		S3	Review Signal Timings
		S4	Modify Traffic Signal
		S5	Install Traffic Signal (or Conduct TSWA)
Access	(M) Median	M1	Construct Raised Median (RIRO Access)
		M2	Provide Left-In Access
		M3	Construct Reverse S-Median (LO Access)
		M4	Construct Turbo-T (LILO Access)
		M5	Provide Full-Access
		M6	TWLTL To Remain (Full-Access)
	(D) Driveway	D1	Close Driveway
		D2	Provide Shared Access (Consolidate Driveways)
		D3	Provide Sidewalk
		D4	Driveway Modification (RO Access Only)



DATE: 3/5/2018

KEYMAP SHEET: 21



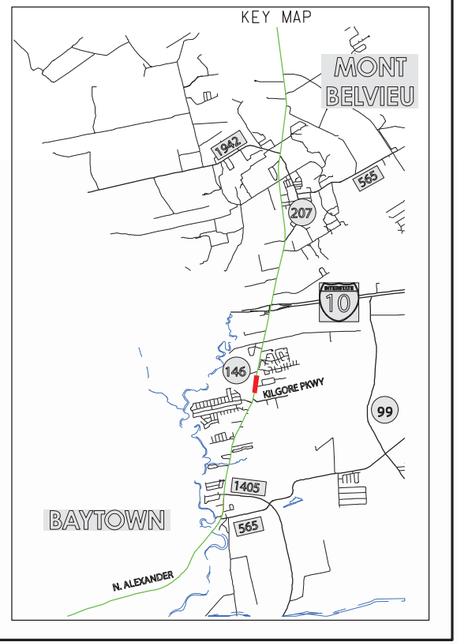
0 25 50 75 100

APPROX. SCALE: 1"=100'

LEGEND
- EXISTING ROW
- EXISTING PAVEMENT EDGE
- EXISTING TWLTL
- PROPOSED PAVEMENT EDGE
- PROPOSED MEDIAN
- PROPOSED IMPROVEMENT
- PROPOSED SIDEWALK

Cost Estimate: $ 200,000

Objective Group	Improvement Group	ID	Near-Term Improvements
Mobility	(R) Roadway	R1	Close Roadway
		R2	Provide Island (Painted or Raised)
		R3	Widen Roadway
		R4	Realign Roadway
		R5	Construct New Roadway
	(I) Intersection	I1	Construct Left-Turn Lane
		I2	Construct Right-Turn Lane
		I3	Construct Acceleration Lane
		I4	Align Curve (Reduce Angle)
		I5	Align Travelway (Reduce Offset)
	(S) Signal	S1	Remove Traffic Signal
		S2	Install Stop Sign Control (Conduct Warrant Study)
		S3	Review Signal Timings
		S4	Modify Traffic Signal
		S5	Install Traffic Signal (or Conduct TSWA)
Access	(M) Median	M1	Construct Raised Median (RIRO Access)
		M2	Provide Left-In Access
		M3	Construct Reverse S-Median (LO Access)
		M4	Construct Turbo-T (LILO Access)
		M5	Provide Full-Access
		M6	TWLTL To Remain (Full-Access)
	(D) Driveway	D1	Close Driveway
		D2	Provide Shared Access (Consolidate Driveways)
		D3	Provide Sidewalk
		D4	Driveway Modification (RO Access Only)



DATE: 3/5/2018

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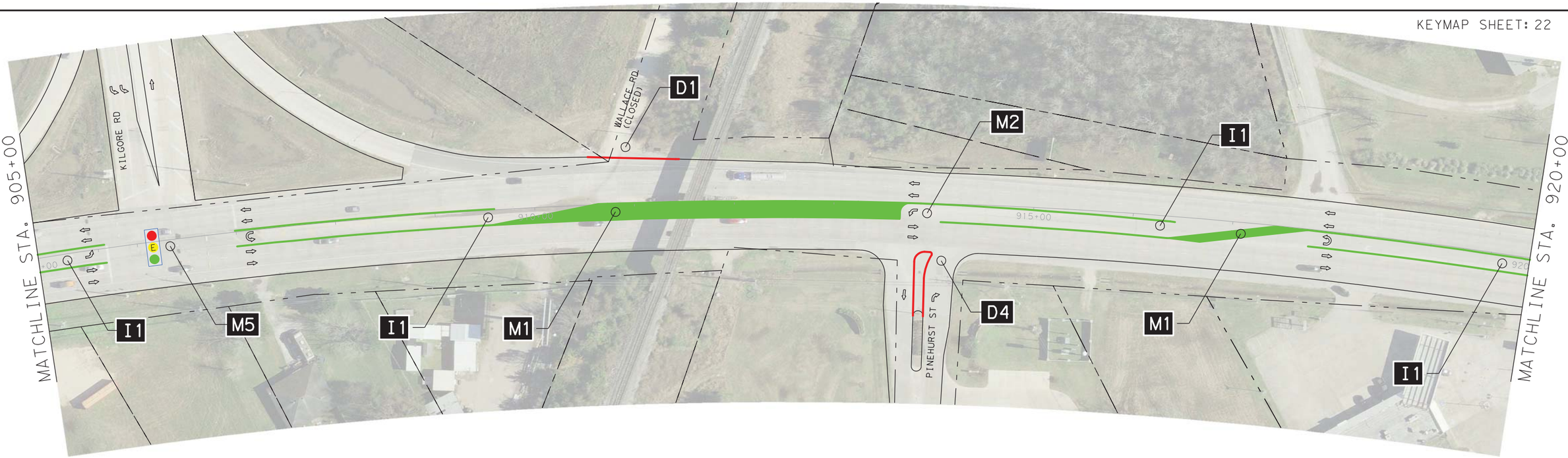
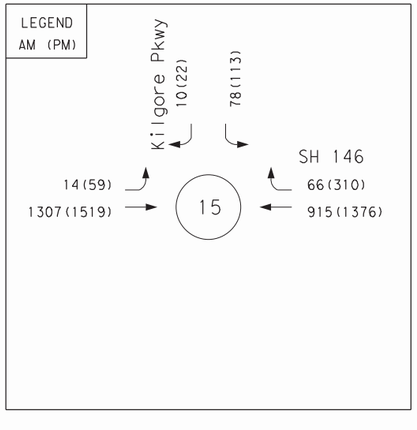
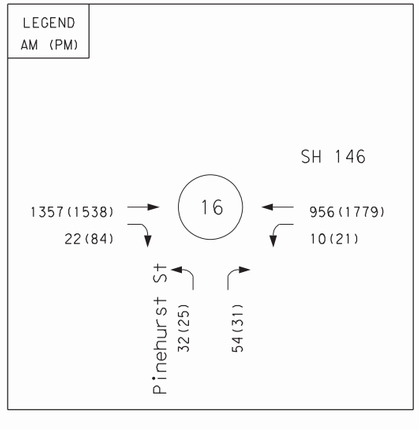


0 25 50 75 100

APPROX. SCALE: 1"=100'

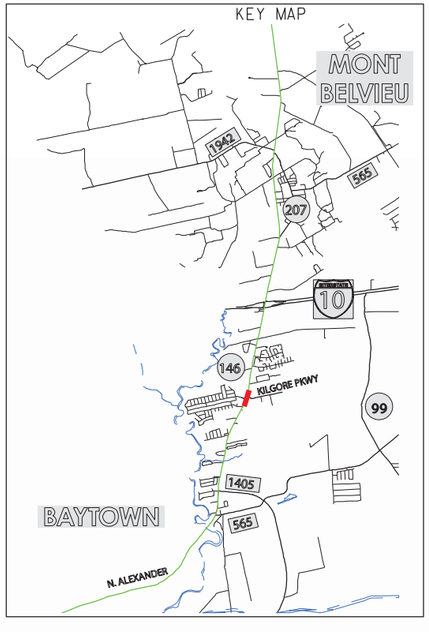
LEGEND
- EXISTING ROW
- EXISTING PAVEMENT EDGE
- EXISTING TWLTL
- PROPOSED PAVEMENT EDGE
- PROPOSED MEDIAN
- PROPOSED IMPROVEMENT
- PROPOSED SIDEWALK





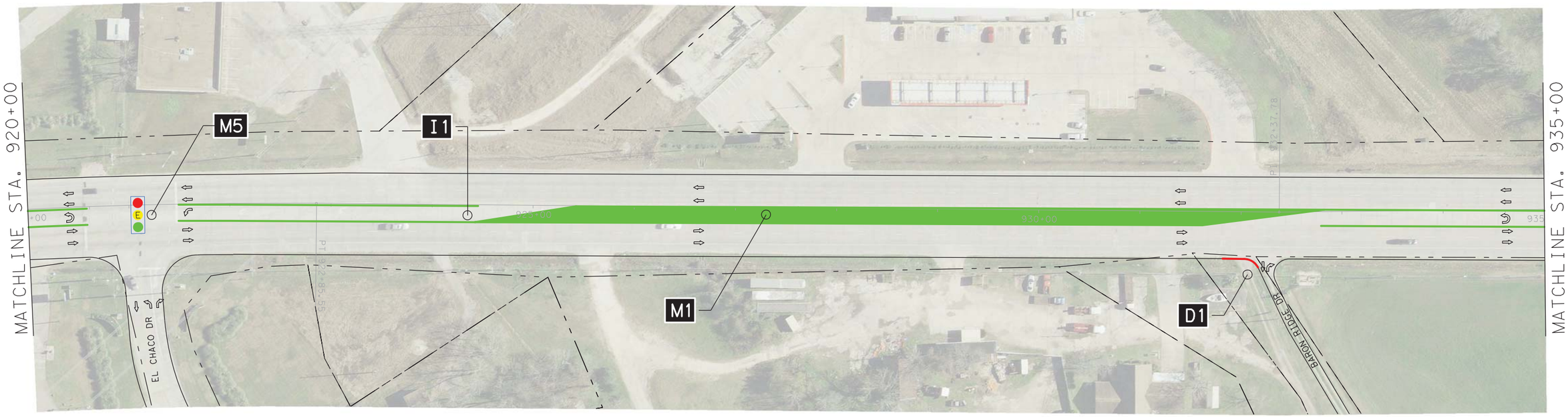
Cost Estimate: $ 260,000

Objective Group	Improvement Group	ID	Near-Term Improvements
Mobility	(R) Roadway	R1	Close Roadway
		R2	Provide Island (Painted or Raised)
		R3	Widen Roadway
		R4	Realign Roadway
		R5	Construct New Roadway
	(I) Intersection	I1	Construct Left-Turn Lane
		I2	Construct Right-Turn Lane
		I3	Construct Acceleration Lane
		I4	Align Curve (Reduce Angle)
		I5	Align Travelway (Reduce Offset)
	(S) Signal	S1	Remove Traffic Signal
		S2	Install Stop Sign Control (Conduct Warrant Study)
		S3	Review Signal Timings
		S4	Modify Traffic Signal
		S5	Install Traffic Signal (or Conduct TSWA)
Access	(M) Median	M1	Construct Raised Median (RIRO Access)
		M2	Provide Left-In Access
		M3	Construct Reverse S-Median (LO Access)
		M4	Construct Turbo-T (LILO Access)
		M5	Provide Full-Access
		M6	TWLTL To Remain (Full-Access)
	(D) Driveway	D1	Close Driveway
		D2	Provide Shared Access (Consolidate Driveways)
		D3	Provide Sidewalk
		D4	Driveway Modification (RO Access Only)



DATE: 3/5/2018

KEYMAP SHEET: 23



0 25 50 75 100

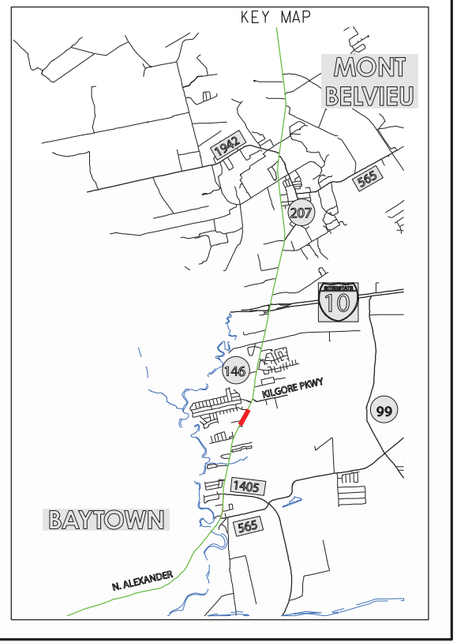
APPROX. SCALE: 1"=100'

LEGEND

- EXISTING ROW
- EXISTING PAVEMENT EDGE
- EXISTING TWLTL
- PROPOSED PAVEMENT EDGE
- PROPOSED MEDIAN
- PROPOSED IMPROVEMENT
- PROPOSED SIDEWALK

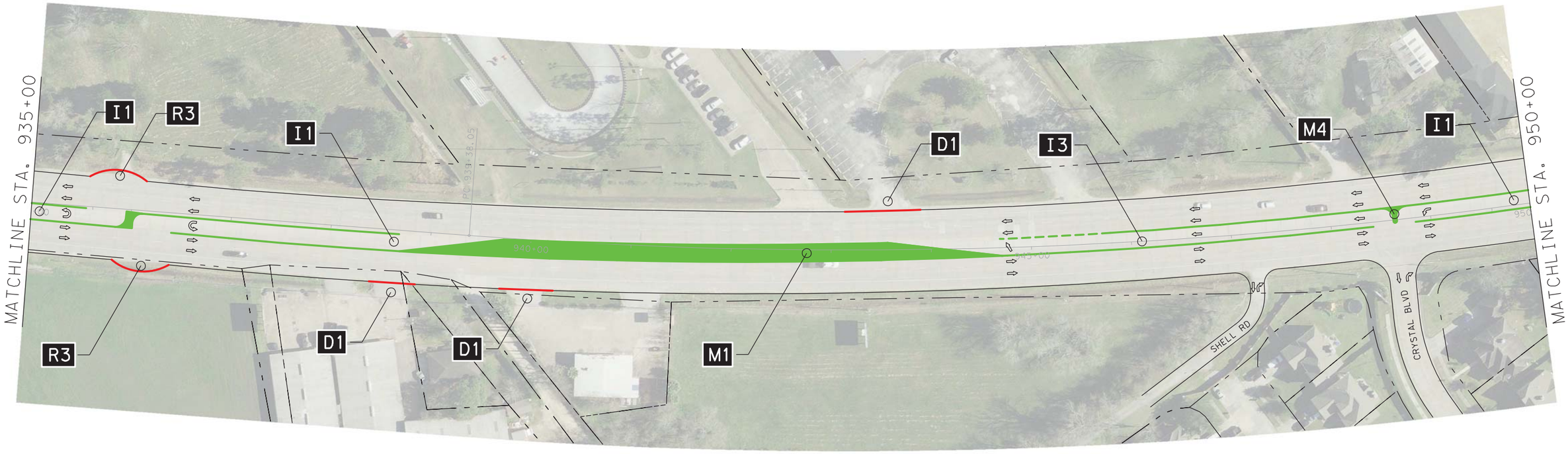
Cost Estimate: $ 260,000

Objective Group	Improvement Group	ID	Near-Term Improvements
Mobility	(R) Roadway	R1	Close Roadway
		R2	Provide Island (Painted or Raised)
		R3	Widen Roadway
		R4	Realign Roadway
		R5	Construct New Roadway
	(I) Intersection	I1	Construct Left-Turn Lane
		I2	Construct Right-Turn Lane
		I3	Construct Acceleration Lane
		I4	Align Curve (Reduce Angle)
		I5	Align Travelway (Reduce Offset)
	(S) Signal	S1	Remove Traffic Signal
		S2	Install Stop Sign Control (Conduct Warrant Study)
		S3	Review Signal Timings
		S4	Modify Traffic Signal
		S5	Install Traffic Signal (or Conduct TSWA)
Access	(M) Median	M1	Construct Raised Median (RIRO Access)
		M2	Provide Left-In Access
		M3	Construct Reverse S-Median (LO Access)
		M4	Construct Turbo-T (LILO Access)
		M5	Provide Full-Access
		M6	TWLTL To Remain (Full-Access)
	(D) Driveway	D1	Close Driveway
		D2	Provide Shared Access (Consolidate Driveways)
		D3	Provide Sidewalk
		D4	Driveway Modification (RO Access Only)



DATE: 3/5/2018

KEYMAP SHEET: 24



0 25 50 75 100

APPROX. SCALE: 1"=100'

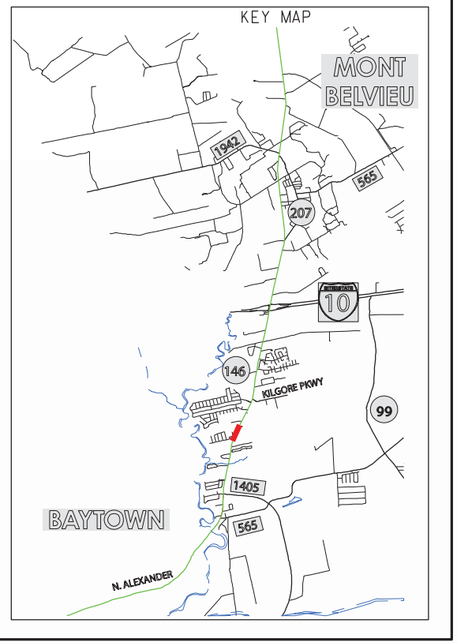
LEGEND

- EXISTING ROW
- EXISTING PAVEMENT EDGE
- EXISTING TWLTL
- PROPOSED PAVEMENT EDGE
- PROPOSED MEDIAN
- PROPOSED IMPROVEMENT
- PROPOSED SIDEWALK

Cost Estimate: $ 180,000

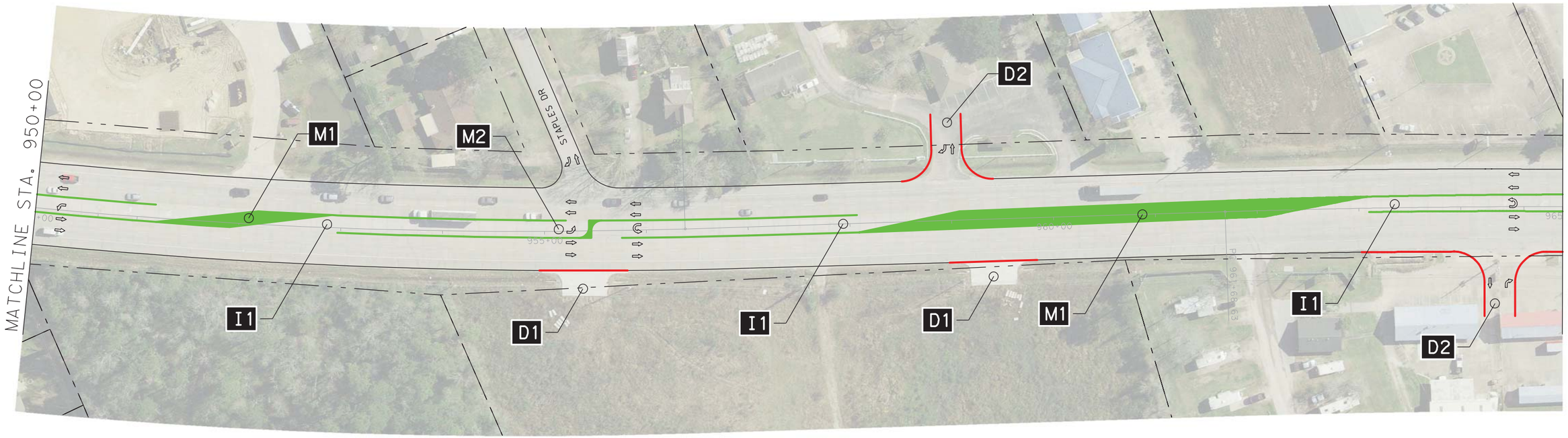
Objective Group	Improvement Group	ID	Near-Term Improvements
Mobility	(R) Roadway	R1	Close Roadway
		R2	Provide Island (Painted or Raised)
		R3	Widen Roadway
		R4	Realign Roadway
		R5	Construct New Roadway
	(I) Intersection	I1	Construct Left-Turn Lane
		I2	Construct Right-Turn Lane
		I3	Construct Acceleration Lane
		I4	Align Curve (Reduce Angle)
		I5	Align Travelway (Reduce Offset)
	(S) Signal	S1	Remove Traffic Signal
		S2	Install Stop Sign Control (Conduct Warrant Study)
		S3	Review Signal Timings
		S4	Modify Traffic Signal
		S5	Install Traffic Signal (or Conduct TSWA)
Access	(M) Median	M1	Construct Raised Median (RIRO Access)
		M2	Provide Left-In Access
		M3	Construct Reverse S-Median (LO Access)
		M4	Construct Turbo-T (LILO Access)
		M5	Provide Full-Access
		M6	TWLTL To Remain (Full-Access)
	(D) Driveway	D1	Close Driveway
		D2	Provide Shared Access (Consolidate Driveways)
		D3	Provide Sidewalk
		D4	Driveway Modification (RO Access Only)

KEY MAP



DATE: 3/5/2018

KEYMAP SHEET: 25



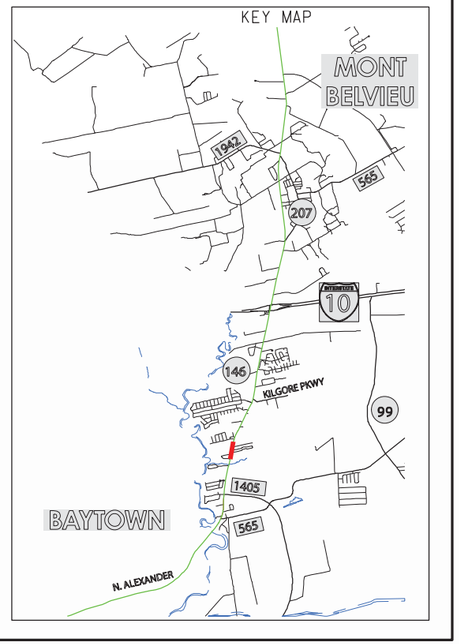
0 25 50 75 100

APPROX. SCALE: 1"=100'

LEGEND
- EXISTING ROW
- EXISTING PAVEMENT EDGE
- EXISTING TWLTL
- PROPOSED PAVEMENT EDGE
- PROPOSED MEDIAN
- PROPOSED IMPROVEMENT
- PROPOSED SIDEWALK

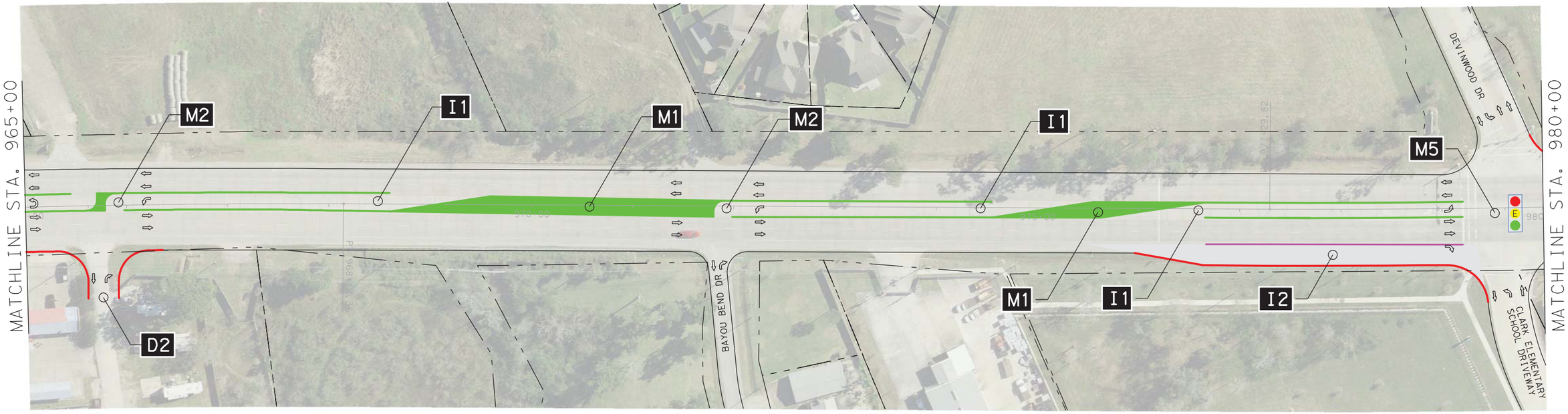
Cost Estimate: $ 280,000

Objective Group	Improvement Group	ID	Near-Term Improvements
Mobility	(R) Roadway	R1	Close Roadway
		R2	Provide Island (Painted or Raised)
		R3	Widen Roadway
		R4	Realign Roadway
		R5	Construct New Roadway
	(I) Intersection	I1	Construct Left-Turn Lane
		I2	Construct Right-Turn Lane
		I3	Construct Acceleration Lane
		I4	Align Curve (Reduce Angle)
		I5	Align Travelway (Reduce Offset)
	(S) Signal	S1	Remove Traffic Signal
		S2	Install Stop Sign Control (Conduct Warrant Study)
		S3	Review Signal Timings
		S4	Modify Traffic Signal
		S5	Install Traffic Signal (or Conduct TSWA)
Access	(M) Median	M1	Construct Raised Median (RIRO Access)
		M2	Provide Left-In Access
		M3	Construct Reverse S-Median (LO Access)
		M4	Construct Turbo-T (LILO Access)
		M5	Provide Full-Access
		M6	TWLTL To Remain (Full-Access)
	(D) Driveway	D1	Close Driveway
		D2	Provide Shared Access (Consolidate Driveways)
		D3	Provide Sidewalk
		D4	Driveway Modification (RO Access Only)



DATE: 3/5/2018

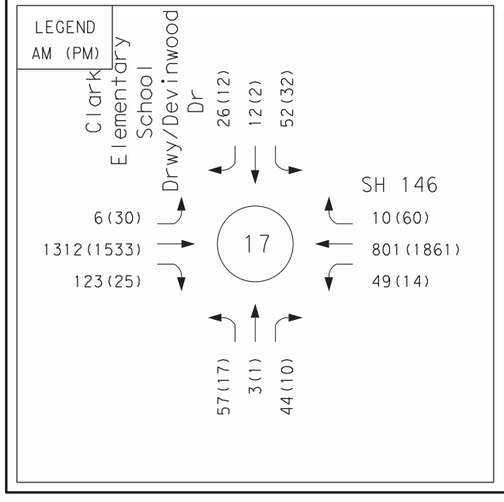
KEYMAP SHEET: 26



0 25 50 75 100

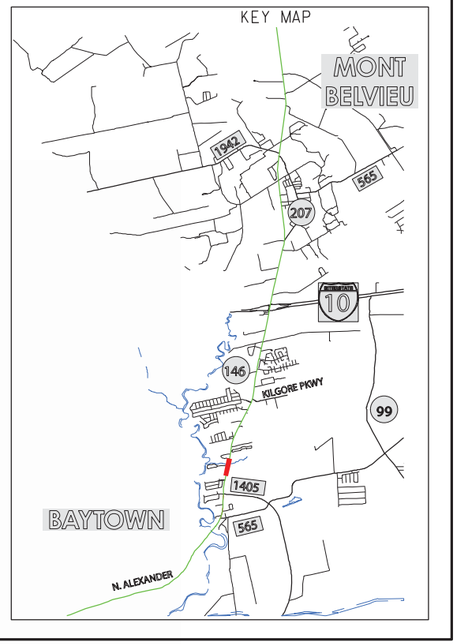
APPROX. SCALE: 1"=100'

LEGEND
- EXISTING ROW
- EXISTING PAVEMENT EDGE
- EXISTING TWLTL
- PROPOSED PAVEMENT EDGE
- PROPOSED MEDIAN
- PROPOSED IMPROVEMENT
- PROPOSED SIDEWALK



Cost Estimate: $ 280,000

Objective Group	Improvement Group	ID	Near-Term Improvements
Mobility	(R) Roadway	R1	Close Roadway
		R2	Provide Island (Painted or Raised)
		R3	Widen Roadway
		R4	Realign Roadway
		R5	Construct New Roadway
	(I) Intersection	I1	Construct Left-Turn Lane
		I2	Construct Right-Turn Lane
		I3	Construct Acceleration Lane
		I4	Align Curve (Reduce Angle)
		I5	Align Travelway (Reduce Offset)
	(S) Signal	S1	Remove Traffic Signal
		S2	Install Stop Sign Control (Conduct Warrant Study)
		S3	Review Signal Timings
		S4	Modify Traffic Signal
		S5	Install Traffic Signal (or Conduct TSWA)
Access	(M) Median	M1	Construct Raised Median (RIRO Access)
		M2	Provide Left-In Access
		M3	Construct Reverse S-Median (LO Access)
		M4	Construct Turbo-T (LILO Access)
		M5	Provide Full-Access
		M6	TWLTL To Remain (Full-Access)
	(D) Driveway	D1	Close Driveway
		D2	Provide Shared Access (Consolidate Driveways)
		D3	Provide Sidewalk
		D4	Driveway Modification (RO Access Only)



DATE: 3/23/2016

KEYMAP SHEET: 27

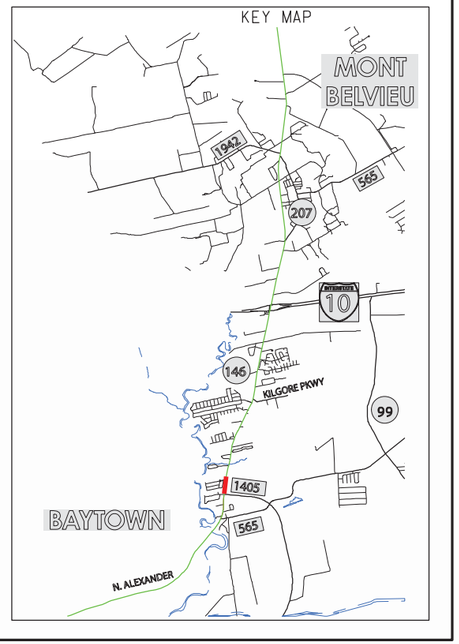
0 25 50 75 100

APPROX. SCALE: 1"=100'

LEGEND
- EXISTING ROW
- EXISTING PAVEMENT EDGE
- EXISTING TWLTL
- PROPOSED PAVEMENT EDGE
- PROPOSED MEDIAN
- PROPOSED IMPROVEMENT
- PROPOSED SIDEWALK

Cost Estimate: $ 390,000

Objective Group	Improvement Group	ID	Near-Term Improvements
Mobility	(R) Roadway	R1	Close Roadway
		R2	Provide Island (Painted or Raised)
		R3	Widen Roadway
		R4	Realign Roadway
		R5	Construct New Roadway
	(I) Intersection	I1	Construct Left-Turn Lane
		I2	Construct Right-Turn Lane
		I3	Construct Acceleration Lane
		I4	Align Curve (Reduce Angle)
		I5	Align Travelway (Reduce Offset)
	(S) Signal	S1	Remove Traffic Signal
		S2	Install Stop Sign Control (Conduct Warrant Study)
		S3	Review Signal Timings
		S4	Modify Traffic Signal
		S5	Install Traffic Signal (or Conduct TSWA)
Access	(M) Median	M1	Construct Raised Median (RIRO Access)
		M2	Provide Left-In Access
		M3	Construct Reverse S-Median (LO Access)
		M4	Construct Turbo-T (LILO Access)
		M5	Provide Full-Access
		M6	TWLTL To Remain (Full-Access)
	(D) Driveway	D1	Close Driveway
		D2	Provide Shared Access (Consolidate Driveways)
		D3	Provide Sidewalk
		D4	Driveway Modification (RO Access Only)



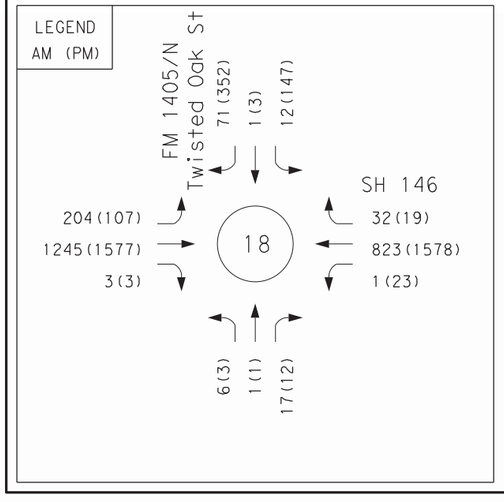
DATE: 3/5/2018

KEYMAP SHEET: 28

0 25 50 75 100

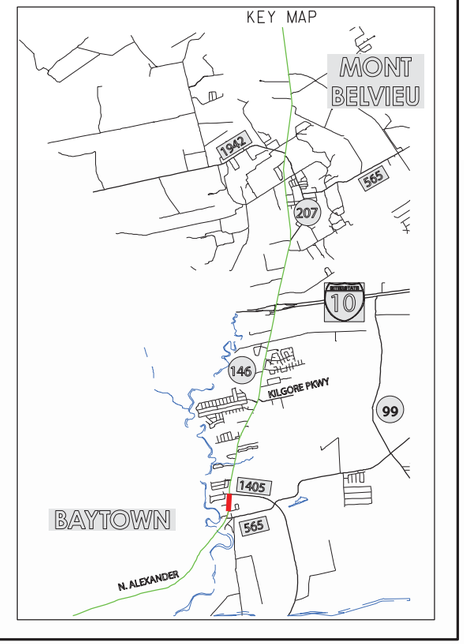
APPROX. SCALE: 1"=100'

LEGEND
- EXISTING ROW
- EXISTING PAVEMENT EDGE
- EXISTING TWLTL
- PROPOSED PAVEMENT EDGE
- PROPOSED MEDIAN
- PROPOSED IMPROVEMENT
- PROPOSED SIDEWALK



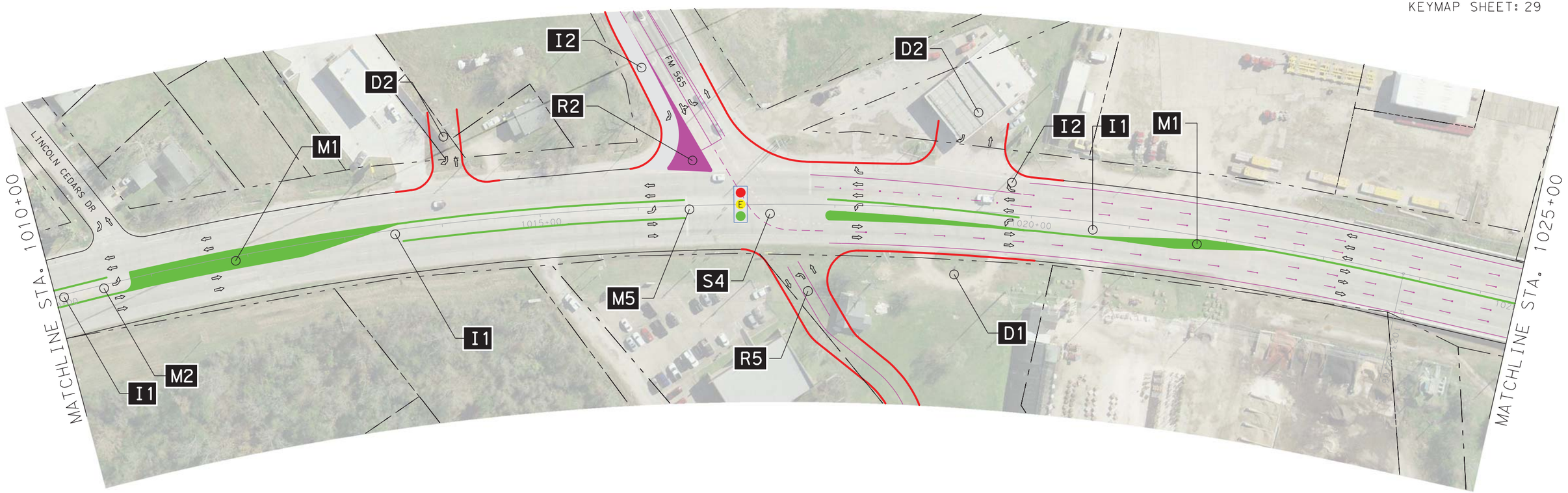
Cost Estimate: $ 400,000

Objective Group	Improvement Group	ID	Near-Term Improvements
Mobility	(R) Roadway	R1	Close Roadway
		R2	Provide Island (Painted or Raised)
		R3	Widen Roadway
		R4	Realign Roadway
		R5	Construct New Roadway
	(I) Intersection	I1	Construct Left-Turn Lane
		I2	Construct Right-Turn Lane
		I3	Construct Acceleration Lane
		I4	Align Curve (Reduce Angle)
		I5	Align Travelway (Reduce Offset)
	(S) Signal	S1	Remove Traffic Signal
		S2	Install Stop Sign Control (Conduct Warrant Study)
		S3	Review Signal Timings
		S4	Modify Traffic Signal
		S5	Install Traffic Signal (or Conduct TSWA)
Access	(M) Median	M1	Construct Raised Median (RIRO Access)
		M2	Provide Left-In Access
		M3	Construct Reverse S-Median (LO Access)
		M4	Construct Turbo-T (LILO Access)
		M5	Provide Full-Access
		M6	TWLTL To Remain (Full-Access)
	(D) Driveway	D1	Close Driveway
		D2	Provide Shared Access (Consolidate Driveways)
		D3	Provide Sidewalk
		D4	Driveway Modification (RO Access Only)



DATE: 3/5/2018

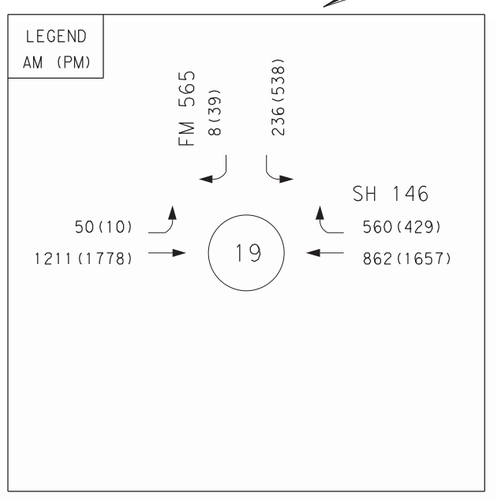
KEYMAP SHEET: 29



Cost Estimate: $ 750,000

0 25 50 75 100

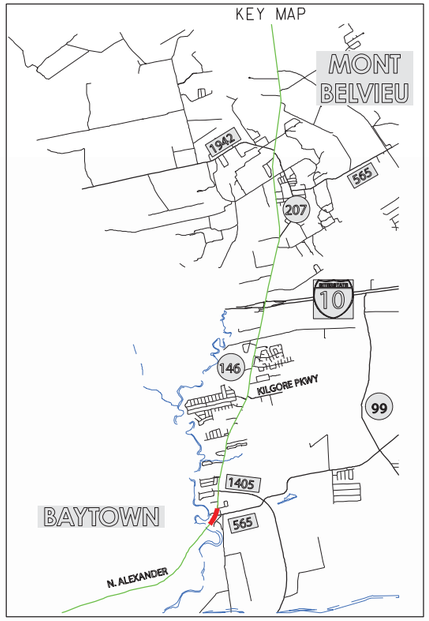
APPROX. SCALE: 1"=100'



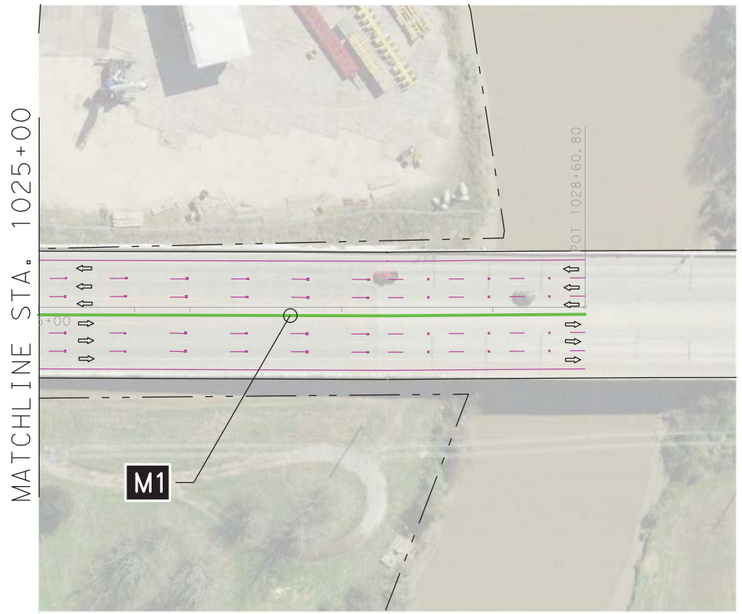
LEGEND
- EXISTING ROW
- EXISTING PAVEMENT EDGE
- EXISTING TWLTL
- PROPOSED PAVEMENT EDGE
- PROPOSED MEDIAN
- PROPOSED IMPROVEMENT
- PROPOSED SIDEWALK

Objective Group	Improvement Group	ID	Near-Term Improvements
Mobility	(R) Roadway	R1	Close Roadway
		R2	Provide Island (Painted or Raised)
		R3	Widen Roadway
		R4	Realign Roadway
		R5	Construct New Roadway
	(I) Intersection	I1	Construct Left-Turn Lane
		I2	Construct Right-Turn Lane
		I3	Construct Acceleration Lane
		I4	Align Curve (Reduce Angle)
		I5	Align Travelway (Reduce Offset)
	(S) Signal	S1	Remove Traffic Signal
		S2	Install Stop Sign Control (Conduct Warrant Study)
		S3	Review Signal Timings
		S4	Modify Traffic Signal
		S5	Install Traffic Signal (or Conduct TSWA)
Access	(M) Median	M1	Construct Raised Median (RIRO Access)
		M2	Provide Left-In Access
		M3	Construct Reverse S-Median (LO Access)
		M4	Construct Turbo-T (LILO Access)
		M5	Provide Full-Access
		M6	TWLTL To Remain (Full-Access)
	(D) Driveway	D1	Close Driveway
		D2	Provide Shared Access (Consolidate Driveways)
		D3	Provide Sidewalk
		D4	Driveway Modification (RO Access Only)

KEY MAP



DATE: 3/5/2018



0 25 50 75 100

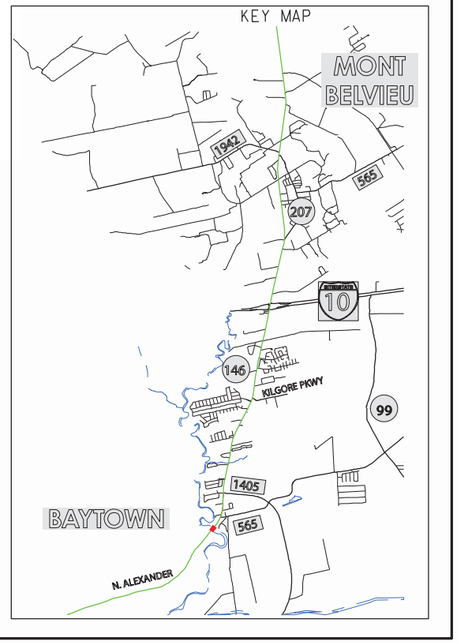
APPROX. SCALE: 1"=100'

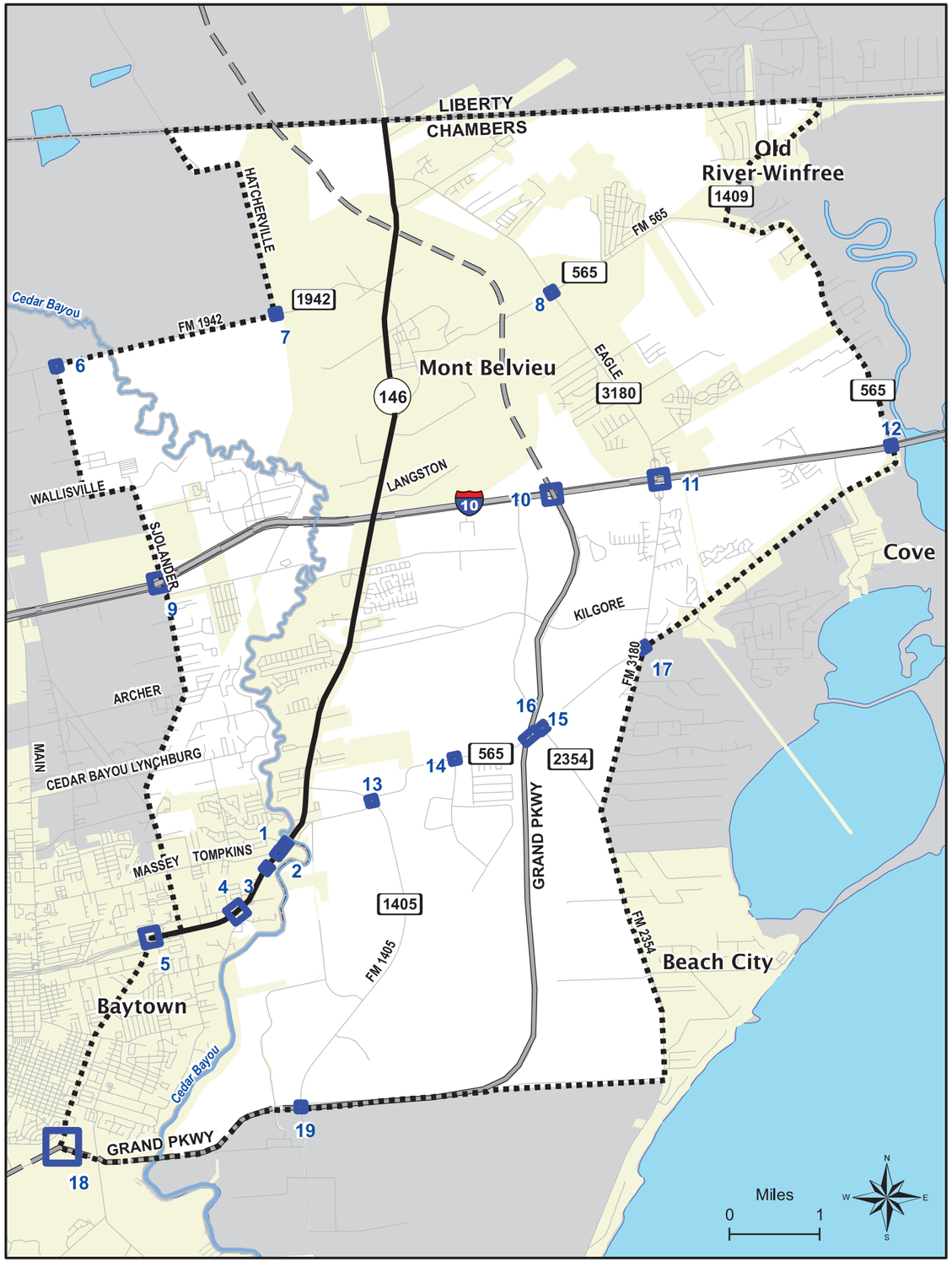
LEGEND

- EXISTING ROW
- EXISTING PAVEMENT EDGE
- EXISTING TWLTL
- PROPOSED PAVEMENT EDGE
- PROPOSED MEDIAN
- PROPOSED IMPROVEMENT
- PROPOSED SIDEWALK

Cost Estimate: $ 6,000

Objective Group	Improvement Group	ID	Near-Term Improvements
Mobility	(R) Roadway	R1	Close Roadway
		R2	Provide Island (Painted or Raised)
		R3	Widen Roadway
		R4	Realign Roadway
		R5	Construct New Roadway
	(I) Intersection	I1	Construct Left-Turn Lane
		I2	Construct Right-Turn Lane
		I3	Construct Acceleration Lane
		I4	Align Curve (Reduce Angle)
		I5	Align Travelway (Reduce Offset)
	(S) Signal	S1	Remove Traffic Signal
		S2	Install Stop Sign Control (Conduct Warrant Study)
		S3	Review Signal Timings
		S4	Modify Traffic Signal
		S5	Install Traffic Signal (or Conduct TSWA)
Access	(M) Median	M1	Construct Raised Median (RIRO Access)
		M2	Provide Left-In Access
		M3	Construct Reverse S-Median (LO Access)
		M4	Construct Turbo-T (LILO Access)
		M5	Provide Full-Access
		M6	TWLTL To Remain (Full-Access)
	(D) Driveway	D1	Close Driveway
		D2	Provide Shared Access (Consolidate Driveways)
		D3	Provide Sidewalk
		D4	Driveway Modification (RO Access Only)





SHORT-TERM IMPROVEMENT COST ESTIMATE: PERIPHERAL INTERSECTIONS

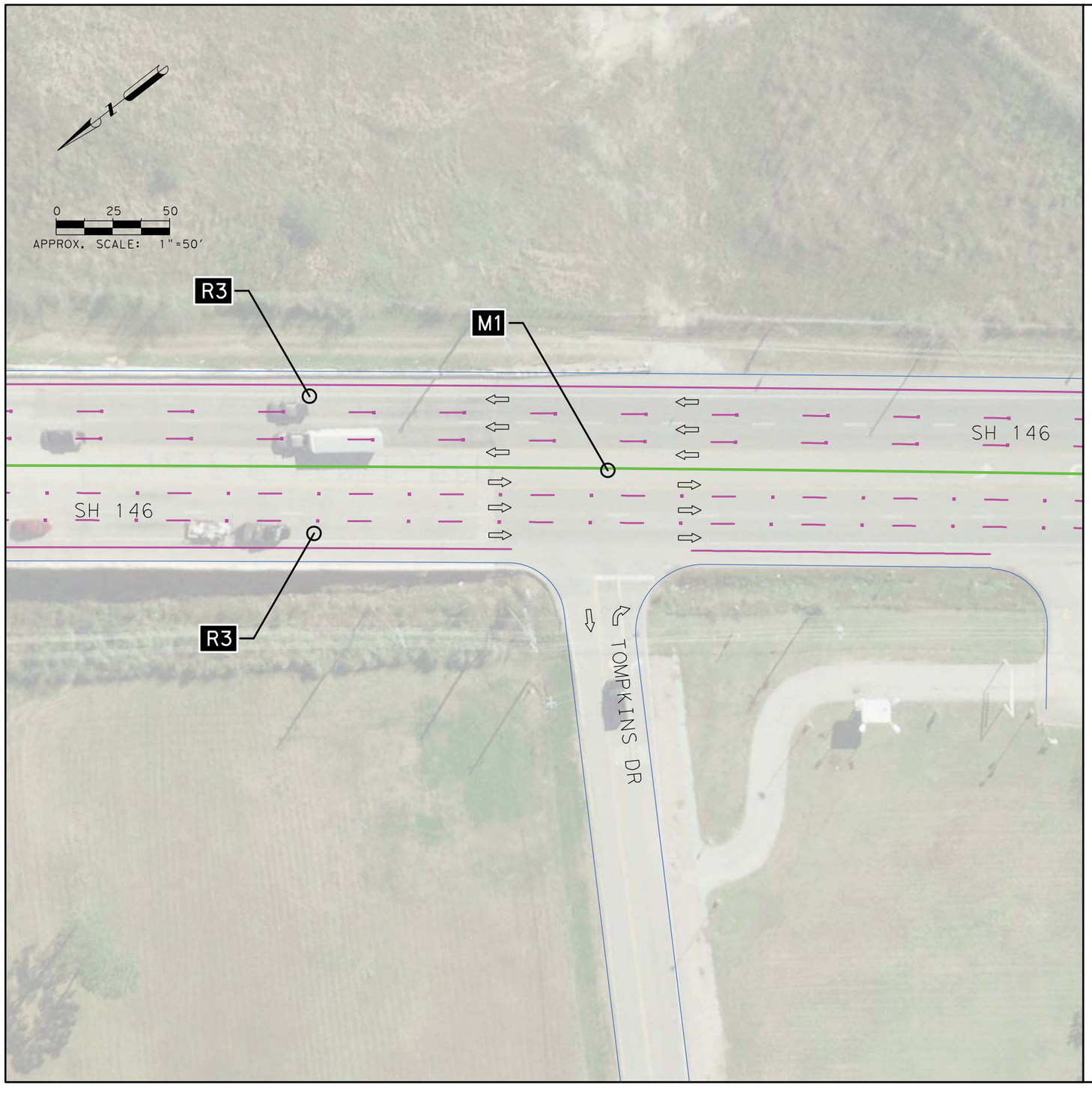
Near-Term Improvements - Peripheral		
Sheet	**Intersection**	**Cost Estimate***
1	SH 146 @ Tompkins Dr	$ 25,000
2	SH 146 @ Massey Tompkins Rd	$ 250,000
3	SH 146 @ Ferry Rd	$ 50,000
4	SH 146 @ N. Alexander Dr	Funded
5	N Alexander Dr (SH 146B) @ SH 146	$ 35,000
6	FM 1942 @ Hadden Rd	$ 120,000
7	FM 1942 @ Hatcherville Rd	$ 110,000
8	FM 565 @ Eagle Drive	$ 1,200,000
9	Sjolander Rd @ I-10	$ 10,000
10	SH 99 @ I-10	Funded
11	FM 3180 @ I-10	Funded
12	FM 565 @ I-10	$ 10,000
13	FM 565 @ FM 1405	Funded
14	FM 565 @ Ameriport Pkwy	Funded
15	FM 565 @ SH 99	Funded
16	FM 565 @ FM 2354 (S Cotton Lake Road)	$ 100,000
17	FM 565 @ FM 3180	Funded
18	SH 146B @ SH 99	Funded
19	FM 1405 @ SH 99	Funded
	Contingency (Approx. 20%)	**$ 390,000**
	Total (Unfunded)	**$ 2,300,000**

*2018 Local Construction Cost Estimate
(Source: TxDOT Average Low Bid Unit Prices by District, District 20)

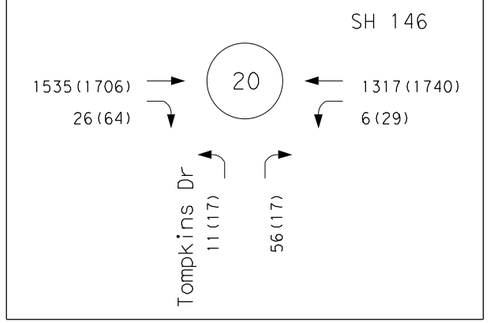
SHORT-TERM IMPROVEMENT SUMMARY: PERIPHERAL INTERSECTIONS

Sheet	Intersection	Number of Improvements	Estimated Cost*	MOBILITY															ACCESS									
				Roadway					Intersection					Signal					Median						Driveway			
				Close Road	Install Island	Widen Road	Realign Road	New Road	Left Turn Lane	Right Turn Lane	Acceleration Lane	Align Curve	Align travelway	Remove Signal	Install stop sign	Revise Signal timing	Modify Traffic Signal	Install Signal	Raised Median	S-Median	Reverse S-Median	Turbo T Median	Median Opening	No Median	Close Driveway	Provide share access	Add Sidewalk	Driveway modification
1	SH 146 at Tompkins Dr	3	$25,000.00			2													1									
2	SH 146 at Massey Tompkins Rd	11	$250,000.00			4			2	1							1		2				1					
3	SH 146 at Ferry Rd	6	$50,000.00			4													1									1
4	SH 146 at N. Alexander Dr	0	Funded																									
5	N Alexander Dr (SH 146B) at SH 146	3	$35,000.00						1					1						1								
6	FM 1942 at Hadden Rd	4	$120,000.00						2	2																		
7	FM 1942 at Hatcherville Rd	2	$110,000.00							1						1												
8	FM 565 at Eagle Drive	16	$1,200,000.00		4	4				4	1						1		2									
9	Sjolander Rd at I-10	1	$10,000.00						1																			
10	SH 99 at I-10	13	Funded		2			2	2	2	1							4										
11	FM 3180 at I-10	24	Funded	4	4	4			6	4								2										
12	FM 565 at I-10	1	$10,000.00						1																			
13	FM 565 at FM 1405	0	Funded																									
14	FM 565 at Ameriport Pkwy	0	Funded																									
15	FM 565 at SH 99	2	Funded															2										
16	FM 565 at FM 2354 (S Cotton Lake Road)	5	$100,000.00		1				1	3																		
17	FM 565 at FM 3180	0	Funded																									
18	SH 146B at SH 99	2	Funded															2										
19	FM 1405 at SH 99	2	Funded															2										
	Contingency (Approx. 20%)		$390,000.00																									
	Total	**95**	**$2,300,000.00**	**4**	**11**	**18**	**0**	**2**	**16**	**17**	**2**	**0**	**0**	**1**	**0**	**1**	**2**	**12**	**6**	**1**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**1**

DATE: 3/5/2018



LEGEND
AM (PM)



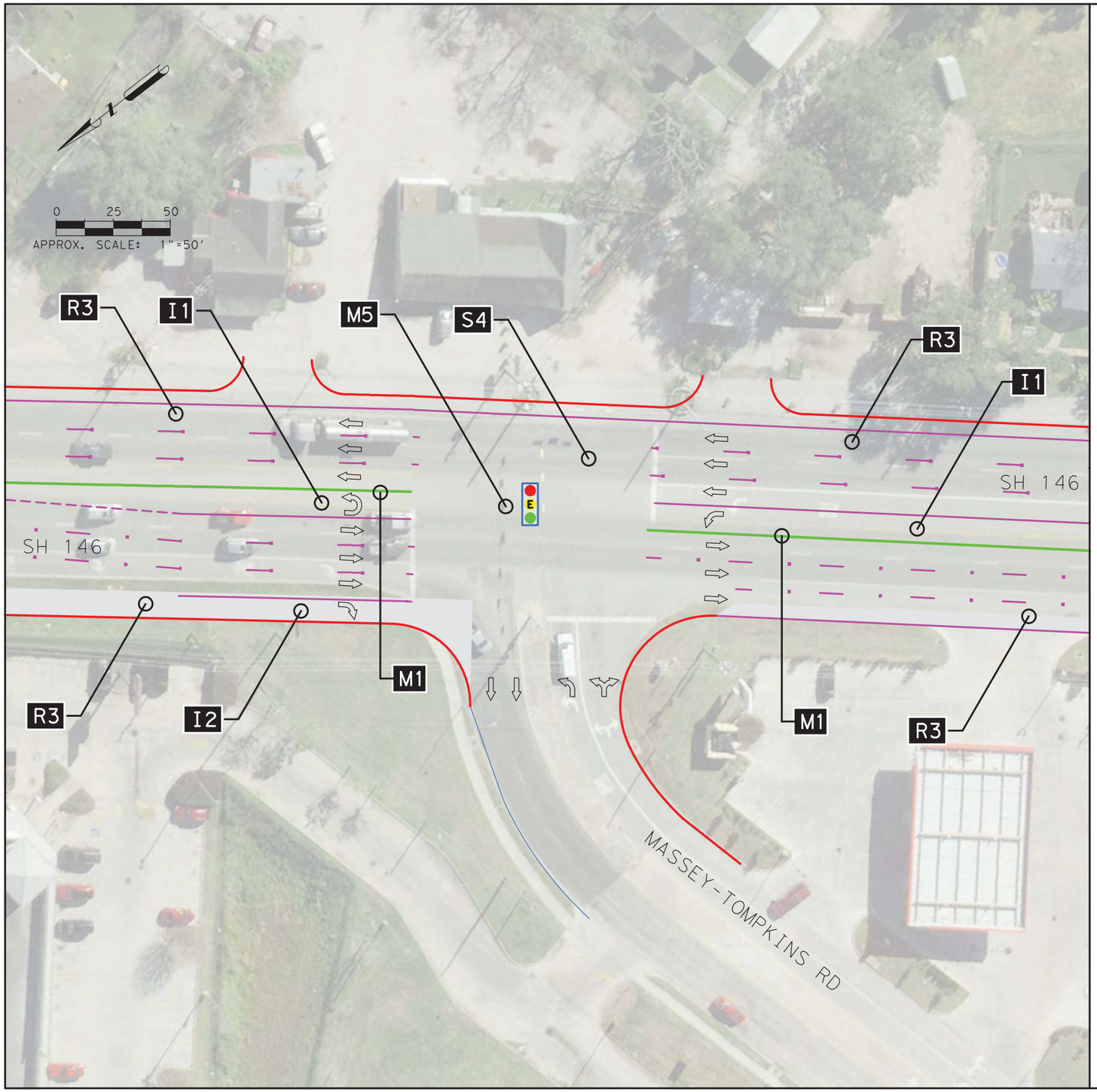
LEGEND
- EXISTING PAVEMENT EDGE
- PROPOSED PAVEMENT EDGE
- PROPOSED MEDIAN
- PROPOSED IMPROVEMENT
- OVERPASS OR REALIGNMENT

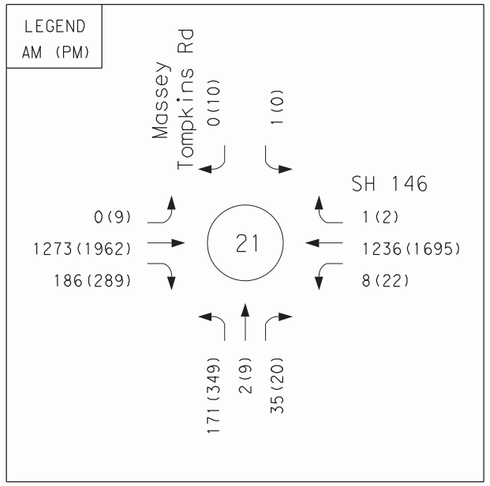
Cost Estimate: $ 25,000

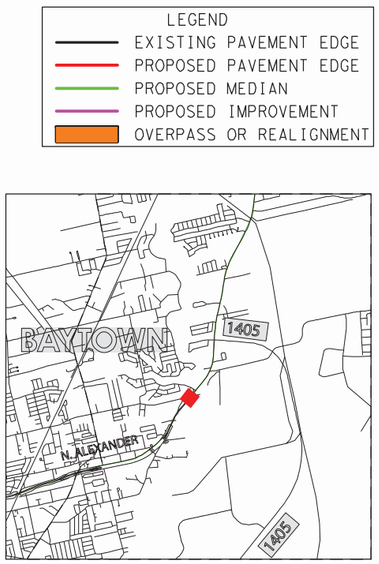
Objective Group	Improvement Group	ID	Near-Term Improvements
Mobility	(R) Roadway	R1	Close Roadway
		R2	Provide Island (Painted or Raised)
		R3	Widen Roadway
		R4	Realign Roadway
		R5	Construct New Roadway
	(I) Intersection	I1	Construct (Or Stripe) Left-Turn Lane
		I2	Construct (Or Stripe) Right-Turn Lane
		I3	Construct Acceleration Lane
		I4	Align Curve (Reduce Angle)
		I5	Align Travelway (Reduce Offset)
	(S) Signal	S1	Remove Traffic Signal
		S2	Install Stop Sign Control (Conduct Warrant Study)
		S3	Review Signal Timings
		S4	Modify Traffic Signal
		S5	Install Traffic Signal (or Conduct TSWA)
Access	(M) Median	M1	Construct Raised Median (RI/RO Access)
		M2	Provide Left-In Access
		M3	Construct Reverse S-Median (LO Access)
		M4	Construct Turbo-T (LI/LO Access)
		M5	Provide Full Access
		M6	TWLTL To Remain (Full Access)
	(D) Driveway	D1	Close Driveway
		D2	Provide Shared Access (Consolidate Driveways)
		D3	Driveway Modification (RI Access Only)
		D4	Driveway Modification (RO Access Only)

Peripheral Intersection 1: SH 146 @ Tompkins Dr

DATE: 3/28/2018





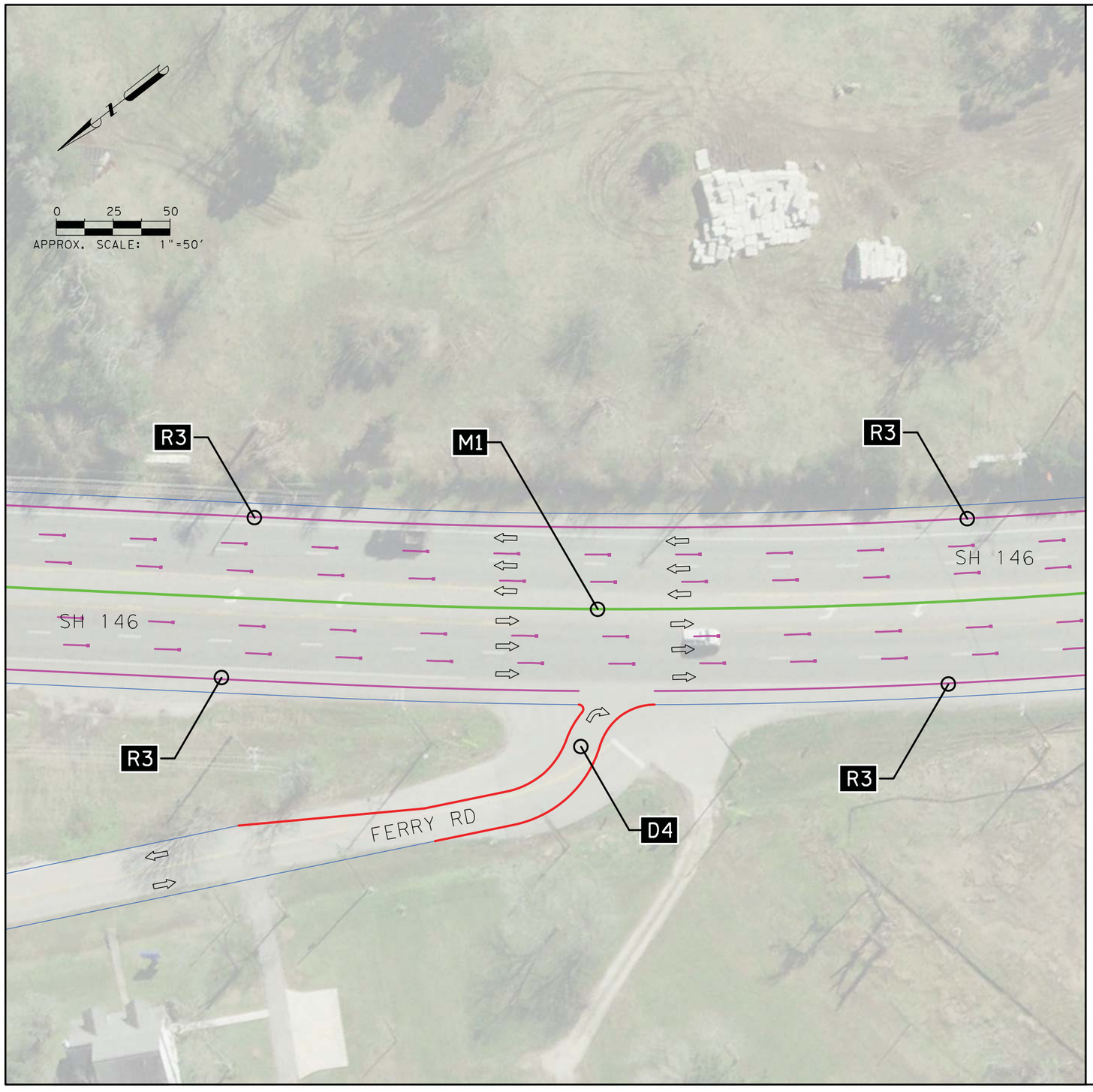


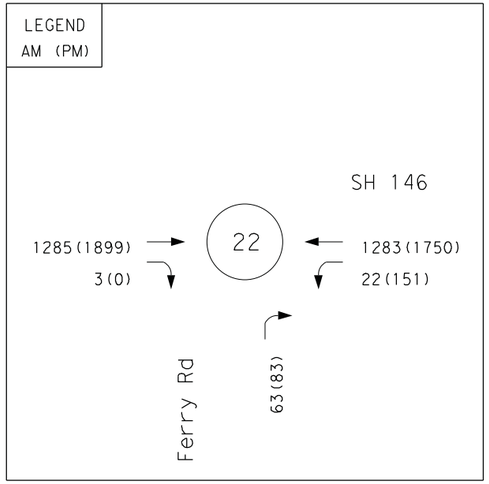
Cost Estimate: $ 250,000

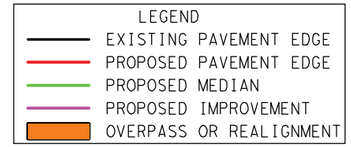
Objective Group	Improvement Group	ID	Near-Term Improvements
Mobility	(R) Roadway	R1	Close Roadway
		R2	Provide Island (Painted or Raised)
		R3	Widen Roadway
		R4	Realign Roadway
		R5	Construct New Roadway
	(I) Intersection	I1	Construct (Or Stripe) Left-Turn Lane
		I2	Construct (Or Stripe) Right-Turn Lane
		I3	Construct Acceleration Lane
		I4	Align Curve (Reduce Angle)
		I5	Align Travelway (Reduce Offset)
	(S) Signal	S1	Remove Traffic Signal
		S2	Install Stop Sign Control (Conduct Warrant Study)
		S3	Review Signal Timings
		S4	Modify Traffic Signal
		S5	Install Traffic Signal (or Conduct TSWA)
Access	(M) Median	M1	Construct Raised Median (RI/RO Access)
		M2	Provide Left-In Access
		M3	Construct Reverse S-Median (LO Access)
		M4	Construct Turbo-T (LI/LO Access)
		M5	Provide Full Access
		M6	TWLTL To Remain (Full Access)
	(D) Driveway	D1	Close Driveway
		D2	Provide Shared Access (Consolidate Driveways)
		D3	Driveway Modification (RI Access Only)
		D4	Driveway Modification (RO Access Only)

Peripheral Intersection 2: SH 146 @ Massey Tompkins Rd

DATE: 3/5/2016





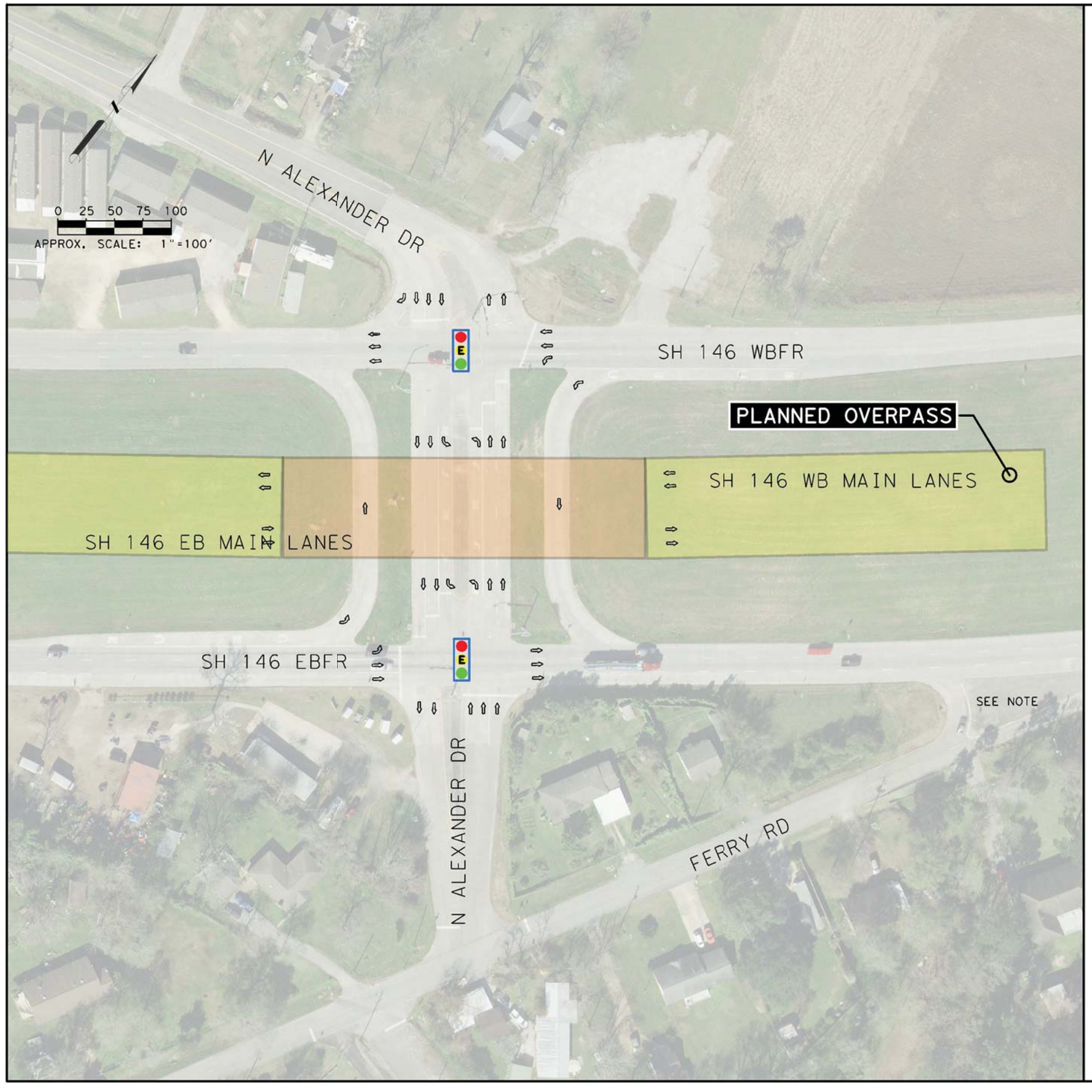


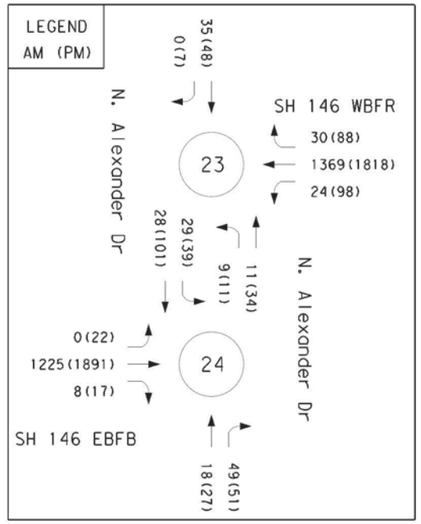
Cost Estimate: $ 50,000

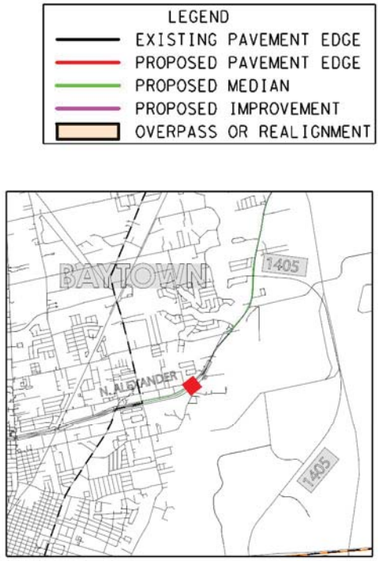
Objective Group	Improvement Group	ID	Near-Term Improvements
Mobility	(R) Roadway	R1	Close Roadway
		R2	Provide Island (Painted or Raised)
		R3	Widen Roadway
		R4	Realign Roadway
		R5	Construct New Roadway
	(I) Intersection	I1	Construct (Or Stripe) Left-Turn Lane
		I2	Construct (Or Stripe) Right-Turn Lane
		I3	Construct Acceleration Lane
		I4	Align Curve (Reduce Angle)
		I5	Align Travelway (Reduce Offset)
	(S) Signal	S1	Remove Traffic Signal
		S2	Install Stop Sign Control (Conduct Warrant Study)
		S3	Review Signal Timings
		S4	Modify Traffic Signal
		S5	Install Traffic Signal (or Conduct TSWA)
Access	(M) Median	M1	Construct Raised Median (RI/RO Access)
		M2	Provide Left-In Access
		M3	Construct Reverse S-Median (LO Access)
		M4	Construct Turbo-T (LI/LO Access)
		M5	Provide Full Access
		M6	TWLTL To Remain (Full Access)
	(D) Driveway	D1	Close Driveway
		D2	Provide Shared Access (Consolidate Driveways)
		D3	Driveway Modification (RI Access Only)
		D4	Driveway Modification (RO Access Only)

Peripheral Intersection 3: SH 146 @ Ferry Rd

DATE: 5/10/2018







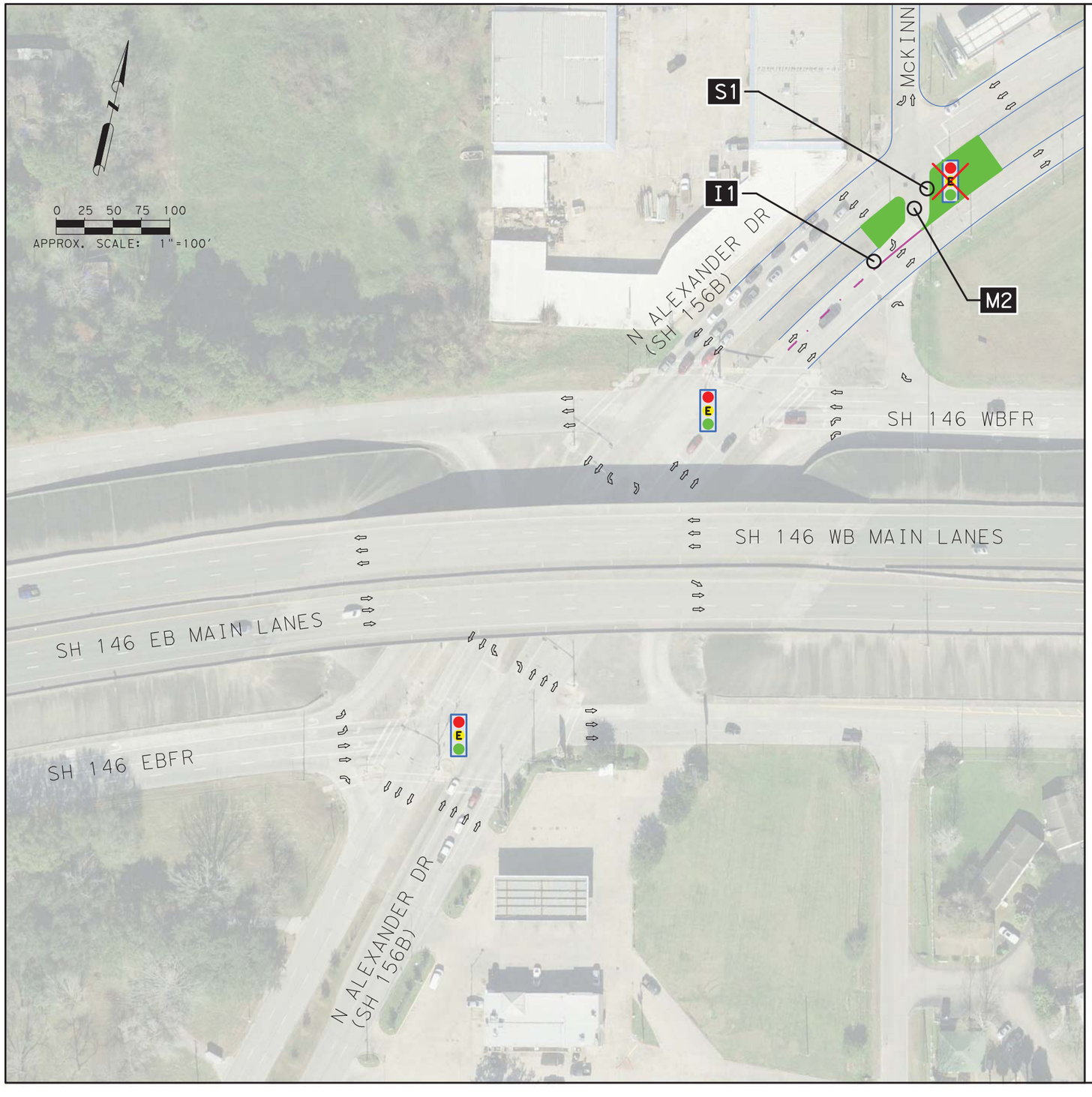
NOTE:
CITY OF BAYTOWN HAS PHYSICALLY CLOSED FERRY RD WITH BARRICADES AT SH146. TXDOT TO CONSIDER MOIFYING PAVEMENT AND CURB & GUTTER TO MAKE THIS CLOSURE PERMANENT.

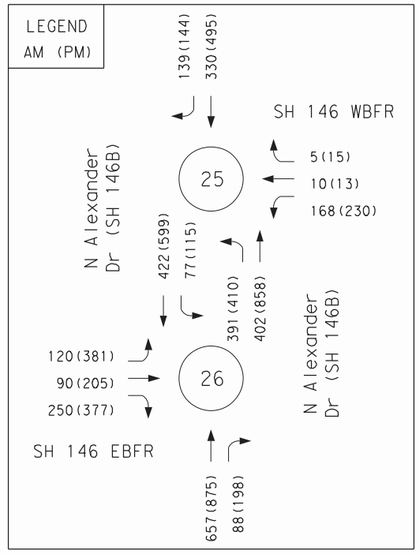
Cost Estimate: $ **FUNDED**

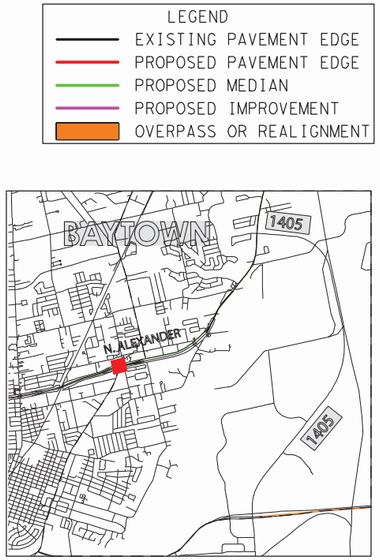
Objective Group	Improvement Group	ID	Near-Term Improvements
Mobility	(R) Roadway	R1	Close Roadway
		R2	Provide Island (Painted or Raised)
		R3	Widen Roadway
		R4	Realign Roadway
		R5	Construct New Roadway
	(I) Intersection	I1	Construct (Or Stripe) Left-Turn Lane
		I2	Construct (Or Stripe) Right-Turn Lane
		I3	Construct Acceleration Lane
		I4	Align Curve (Reduce Angle)
		I5	Align Travelway (Reduce Offset)
	(S) Signal	S1	Remove Traffic Signal
		S2	Install Stop Sign Control (Conduct Warrant Study)
		S3	Review Signal Timings
		S4	Modify Traffic Signal
		S5	Install Traffic Signal (or Conduct TSWA)
Access	(M) Median	M1	Construct Raised Median (RI/RO Access)
		M2	Provide Left-In Access
		M3	Construct Reverse S-Median (LO Access)
		M4	Construct Turbo-T (LI/LO Access)
		M5	Provide Full Access
		M6	TWLTL To Remain (Full Access)
	(D) Driveway	D1	Close Driveway
		D2	Provide Shared Access (Consolidate Driveways)
		D3	Driveway Modification (RI Access Only)
		D4	Driveway Modification (RO Access Only)

Peripheral Intersection 4: SH 146 @ N. Alexander Dr

DATE: 3/5/2018





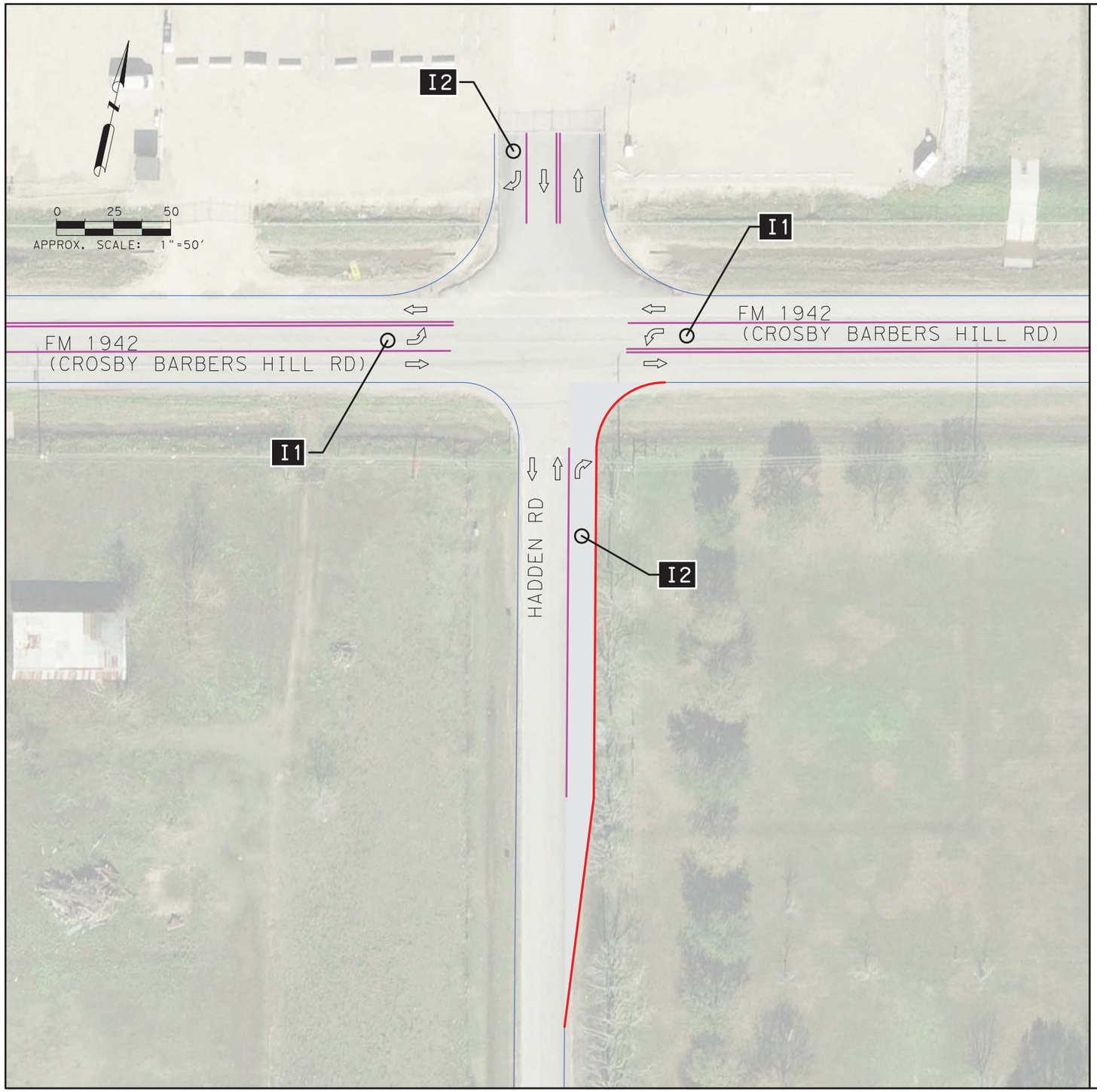


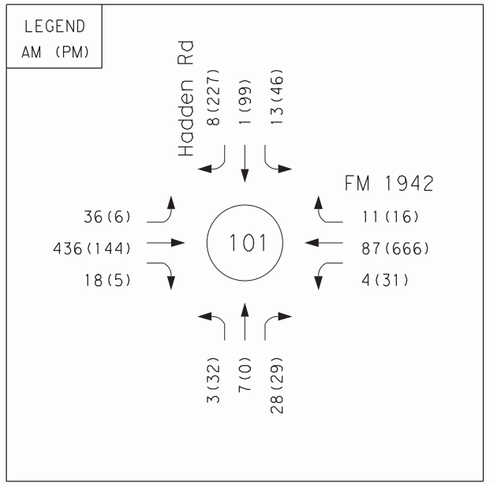
Cost Estimate: $ 35,000

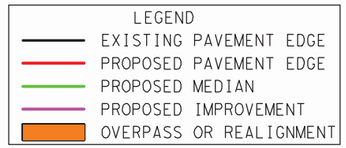
Objective Group	Improvement Group	ID	Near-Term Improvements
Mobility	(R) Roadway	R1	Close Roadway
		R2	Provide Island (Painted or Raised)
		R3	Widen Roadway
		R4	Realign Roadway
		R5	Construct New Roadway
	(I) Intersection	I1	Construct (Or Stripe) Left-Turn Lane
		I2	Construct (Or Stripe) Right-Turn Lane
		I3	Construct Acceleration Lane
		I4	Align Curve (Reduce Angle)
		I5	Align Travelway (Reduce Offset)
	(S) Signal	S1	Remove Traffic Signal
		S2	Install Stop Sign Control (Conduct Warrant Study)
		S3	Review Signal Timings
		S4	Modify Traffic Signal
		S5	Install Traffic Signal (or Conduct TSWA)
Access	(M) Median	M1	Construct Raised Median (RI/RO Access)
		M2	Provide Left-In Access
		M3	Construct Reverse S-Median (LO Access)
		M4	Construct Turbo-T (LI/LO Access)
		M5	Provide Full Access
		M6	TWLTL To Remain (Full Access)
	(D) Driveway	D1	Close Driveway
		D2	Provide Shared Access (Consolidate Driveways)
		D3	Driveway Modification (RI Access Only)
		D4	Driveway Modification (RO Access Only)

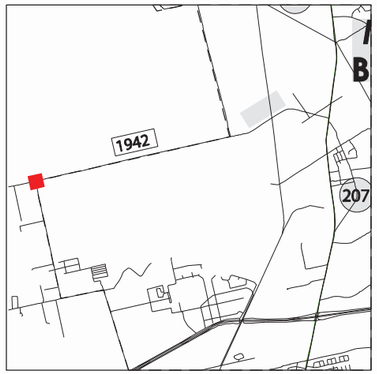
Peripheral Intersection 5: N Alexander Dr (SH 146B) @ SH 146

DATE: 3/5/2018







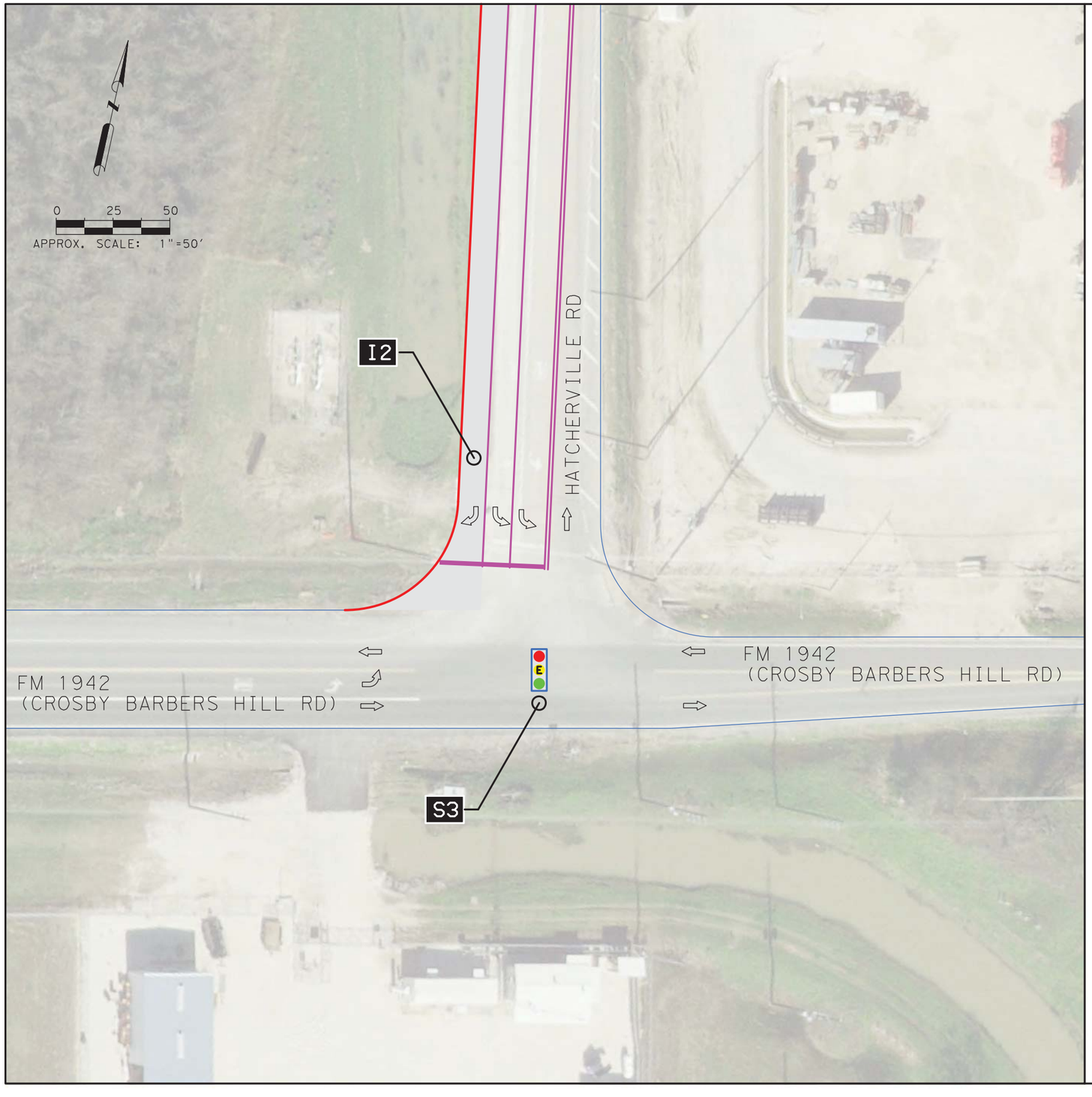


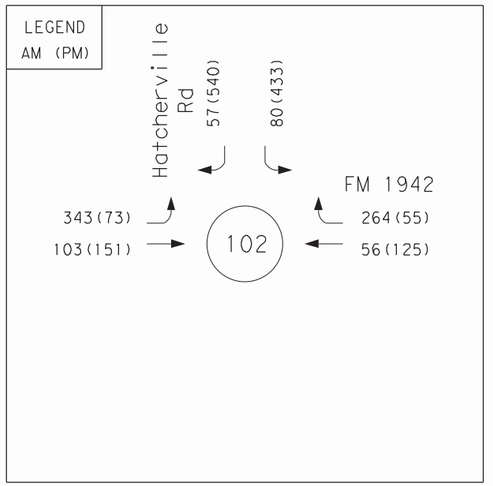
Cost Estimate: $ 120,000

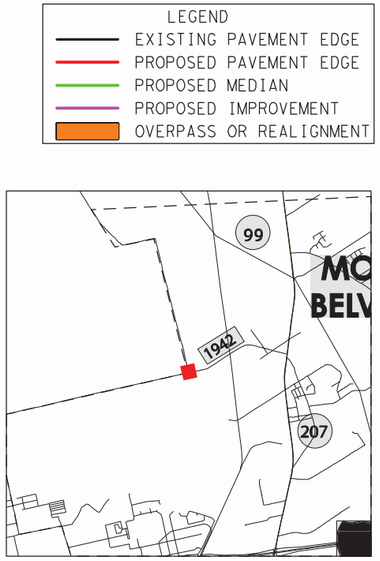
Objective Group	Improvement Group	ID	Near-Term Improvements
Mobility	(R) Roadway	R1	Close Roadway
		R2	Provide Island (Painted or Raised)
		R3	Widen Roadway
		R4	Realign Roadway
		R5	Construct New Roadway
	(I) Intersection	I1	Construct (Or Stripe) Left-Turn Lane
		I2	Construct (Or Stripe) Right-Turn Lane
		I3	Construct Acceleration Lane
		I4	Align Curve (Reduce Angle)
		I5	Align Travelway (Reduce Offset)
	(S) Signal	S1	Remove Traffic Signal
		S2	Install Stop Sign Control (Conduct Warrant Study)
		S3	Review Signal Timings
		S4	Modify Traffic Signal
		S5	Install Traffic Signal (or Conduct TSWA)
Access	(M) Median	M1	Construct Raised Median (RI/RO Access)
		M2	Provide Left-In Access
		M3	Construct Reverse S-Median (LO Access)
		M4	Construct Turbo-T (LI/LO Access)
		M5	Provide Full Access
		M6	TWLTL To Remain (Full Access)
	(D) Driveway	D1	Close Driveway
		D2	Provide Shared Access (Consolidate Driveways)
		D3	Driveway Modification (RI Access Only)
		D4	Driveway Modification (RO Access Only)

Peripheral Intersection 6: FM 1942 @ Hadden Rd

DATE: 3/5/2018





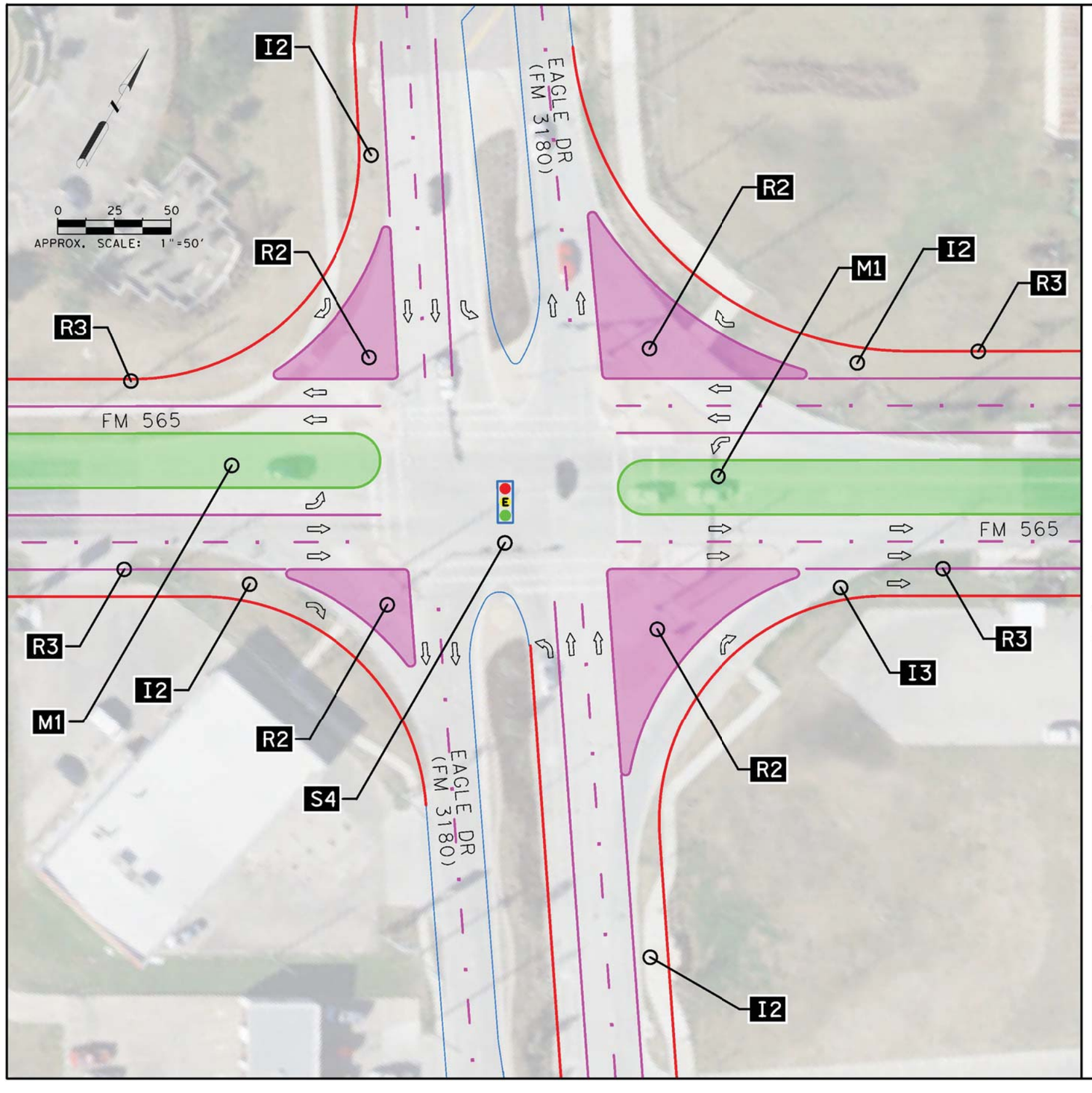


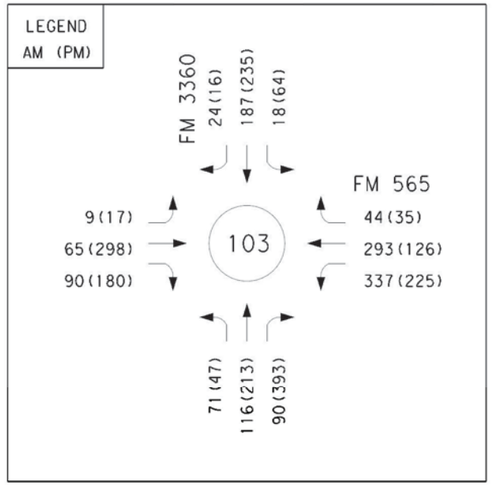
Cost Estimate: $ 110,000

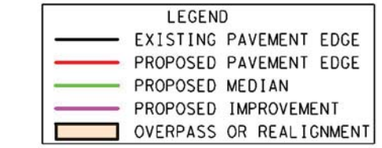
Objective Group	Improvement Group	ID	Near-Term Improvements
Mobility	(R) Roadway	R1	Close Roadway
		R2	Provide Island (Painted or Raised)
		R3	Widen Roadway
		R4	Realign Roadway
		R5	Construct New Roadway
	(I) Intersection	I1	Construct (Or Stripe) Left-Turn Lane
		I2	Construct (Or Stripe) Right-Turn Lane
		I3	Construct Acceleration Lane
		I4	Align Curve (Reduce Angle)
		I5	Align Travelway (Reduce Offset)
	(S) Signal	S1	Remove Traffic Signal
		S2	Install Stop Sign Control (Conduct Warrant Study)
		S3	Review Signal Timings
		S4	Modify Traffic Signal
		S5	Install Traffic Signal (or Conduct TSWA)
Access	(M) Median	M1	Construct Raised Median (RI/RO Access)
		M2	Provide Left-In Access
		M3	Construct Reverse S-Median (LO Access)
		M4	Construct Turbo-T (LI/LO Access)
		M5	Provide Full Access
		M6	TWLTL To Remain (Full Access)
	(D) Driveway	D1	Close Driveway
		D2	Provide Shared Access (Consolidate Driveways)
		D3	Driveway Modification (RI Access Only)
		D4	Driveway Modification (RO Access Only)

Peripheral Intersection 7: FM 1942 @ Hatcherville Rd

DATE: 3/5/2018





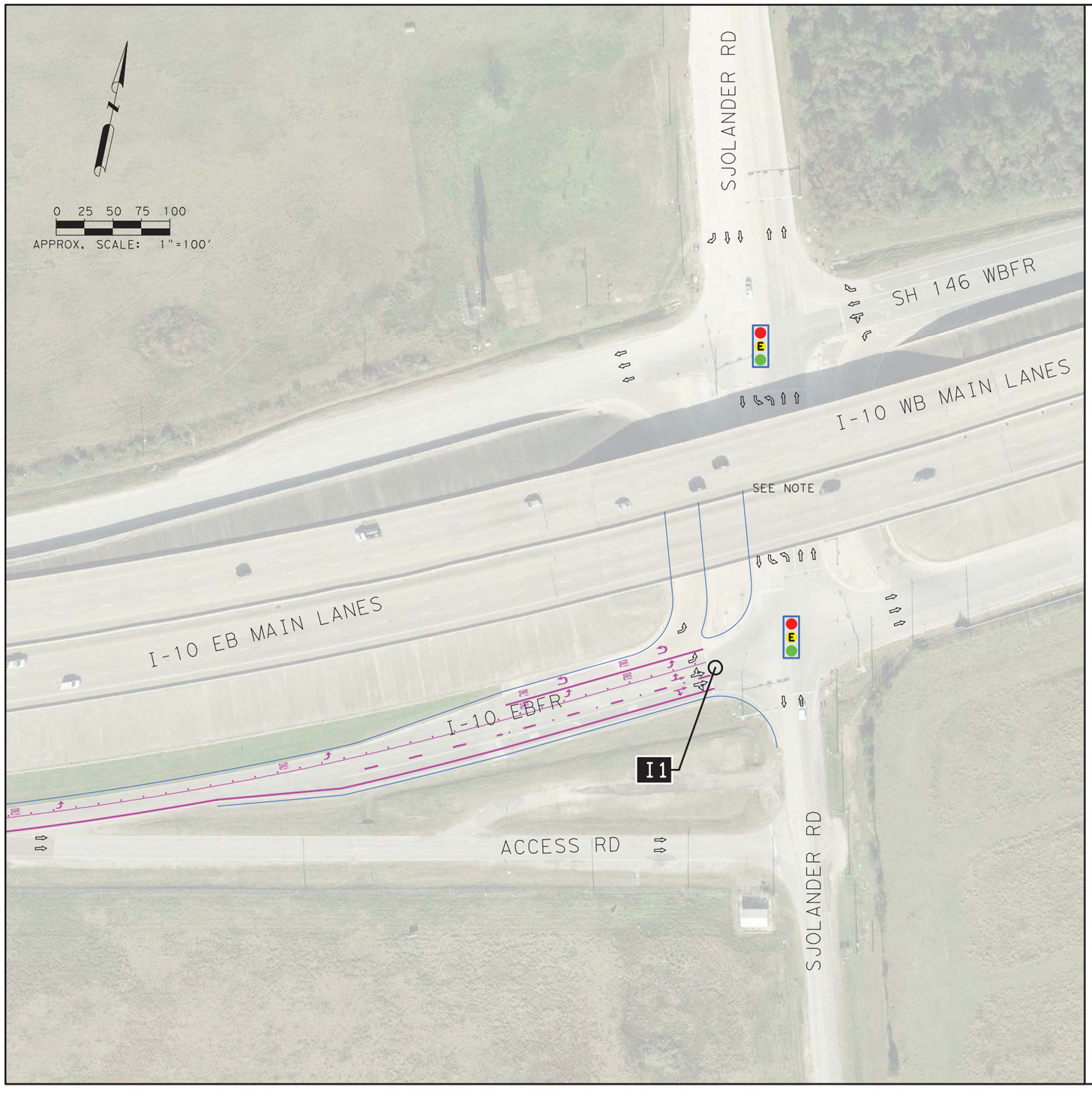


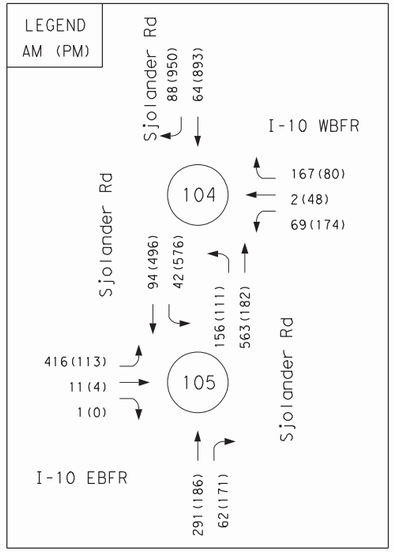
Cost Estimate: $ 1,200,000

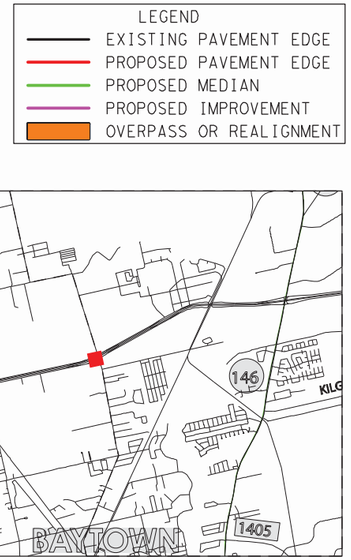
Objective Group	Improvement Group	ID	Near-Term Improvements
Mobility	(R) Roadway	R1	Close Roadway
		R2	Provide Island (Painted or Raised)
		R3	Widen Roadway
		R4	Realign Roadway
		R5	Construct New Roadway
	(I) Intersection	I1	Construct (Or Stripe) Left-Turn Lane
		I2	Construct (Or Stripe) Right-Turn Lane
		I3	Construct Acceleration Lane
		I4	Align Curve (Reduce Angle)
		I5	Align Travelway (Reduce Offset)
	(S) Signal	S1	Remove Traffic Signal
		S2	Install Stop Sign Control (Conduct Warrant Study)
		S3	Review Signal Timings
		S4	Modify Traffic Signal
		S5	Install Traffic Signal (or Conduct TSWA)
Access	(M) Median	M1	Construct Raised Median (RI/RO Access)
		M2	Provide Left-In Access
		M3	Construct Reverse S-Median (LO Access)
		M4	Construct Turbo-T (LI/LO Access)
		M5	Provide Full Access
		M6	TWLTL To Remain (Full Access)
	(D) Driveway	D1	Close Driveway
		D2	Provide Shared Access (Consolidate Driveways)
		D3	Driveway Modification (RI Access Only)
		D4	Driveway Modification (RO Access Only)

Peripheral Intersection 8: FM 565 @ Eagle Drive

DATE: 3/5/2018







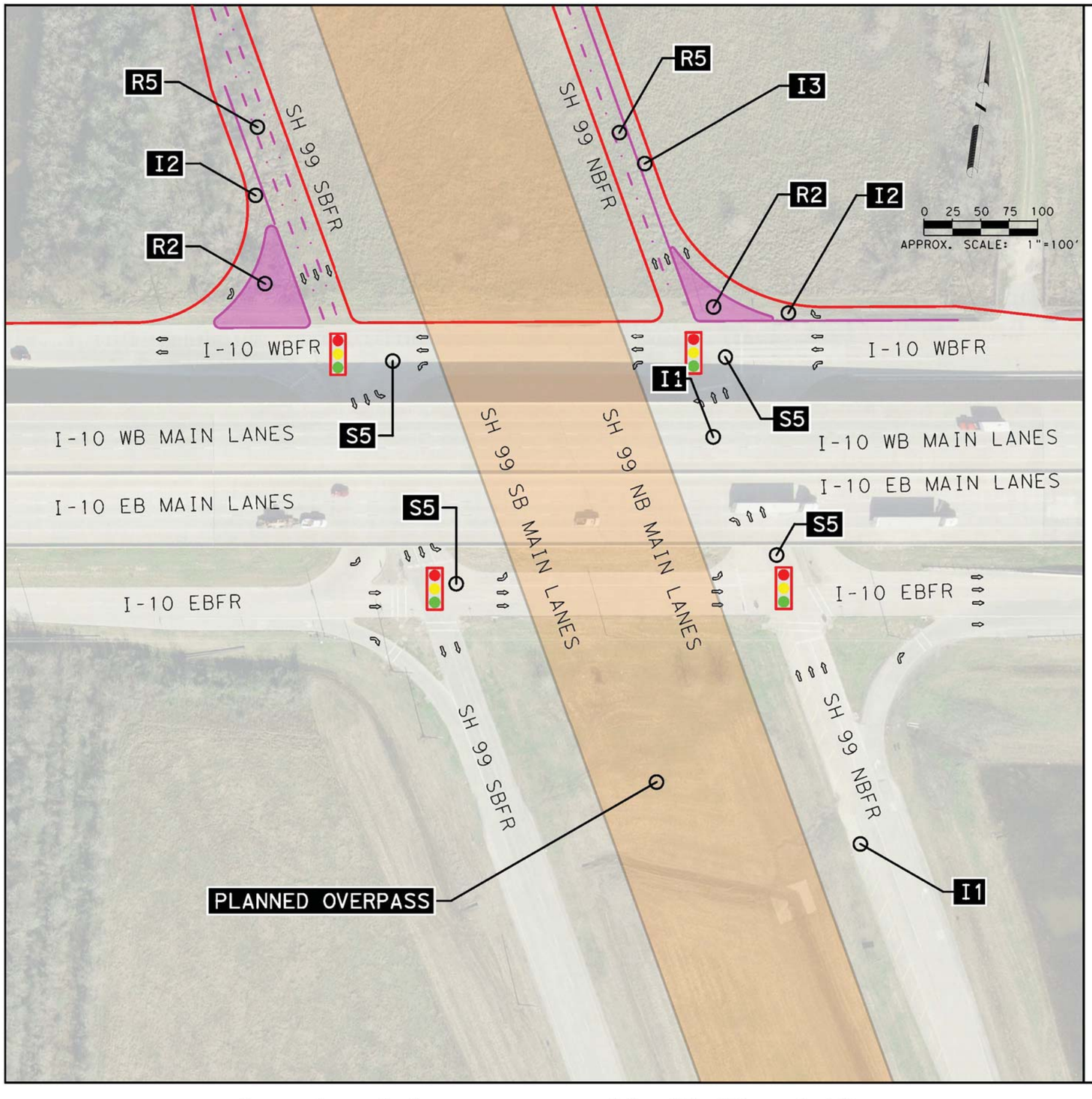
NOTE:
CURRENTLY THERE IS A HORIZONTAL MISALIGNMENT OF LANES ON SJOLANDER RD, BOTH FROM NB AND SB APPROACHES UNDER THE STRUCTURE. TXDOT TO CONSIDER CORRECTING THIS MISALIGNMENT THRU A COMBINATION OF STRIPING AND LOCAL PAVEMENT WIDENING ACROSS THE INTERCHANGE.

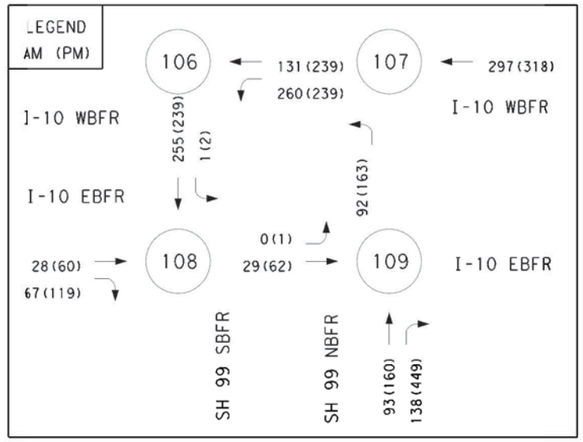
Cost Estimate: $ 10,000

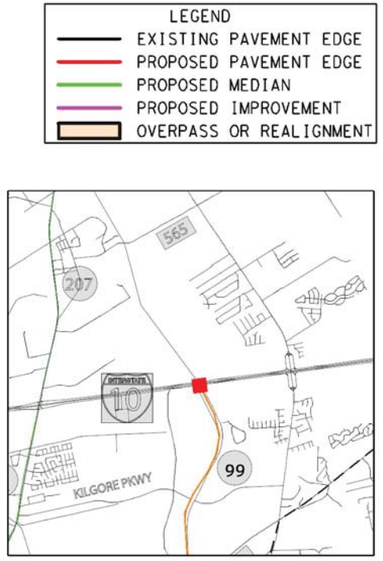
Objective Group	Improvement Group	ID	Near-Term Improvements
Mobility	(R) Roadway	R1	Close Roadway
		R2	Provide Island (Painted or Raised)
		R3	Widen Roadway
		R4	Realign Roadway
		R5	Construct New Roadway
	(I) Intersection	I1	Construct (Or Stripe) Left-Turn Lane
		I2	Construct (Or Stripe) Right-Turn Lane
		I3	Construct Acceleration Lane
		I4	Align Curve (Reduce Angle)
		I5	Align Travelway (Reduce Offset)
	(S) Signal	S1	Remove Traffic Signal
		S2	Install Stop Sign Control (Conduct Warrant Study)
		S3	Review Signal Timings
		S4	Modify Traffic Signal
		S5	Install Traffic Signal (or Conduct TSWA)
Access	(M) Median	M1	Construct Raised Median (RI/RO Access)
		M2	Provide Left-In Access
		M3	Construct Reverse S-Median (LO Access)
		M4	Construct Turbo-T (LI/LO Access)
		M5	Provide Full Access
		M6	TWLTL To Remain (Full Access)
	(D) Driveway	D1	Close Driveway
		D2	Provide Shared Access (Consolidate Driveways)
		D3	Driveway Modification (RI Access Only)
		D4	Driveway Modification (RO Access Only)

Peripheral Intersection 9: Sjolander Rd @ I-10

DATE: 3/5/2018





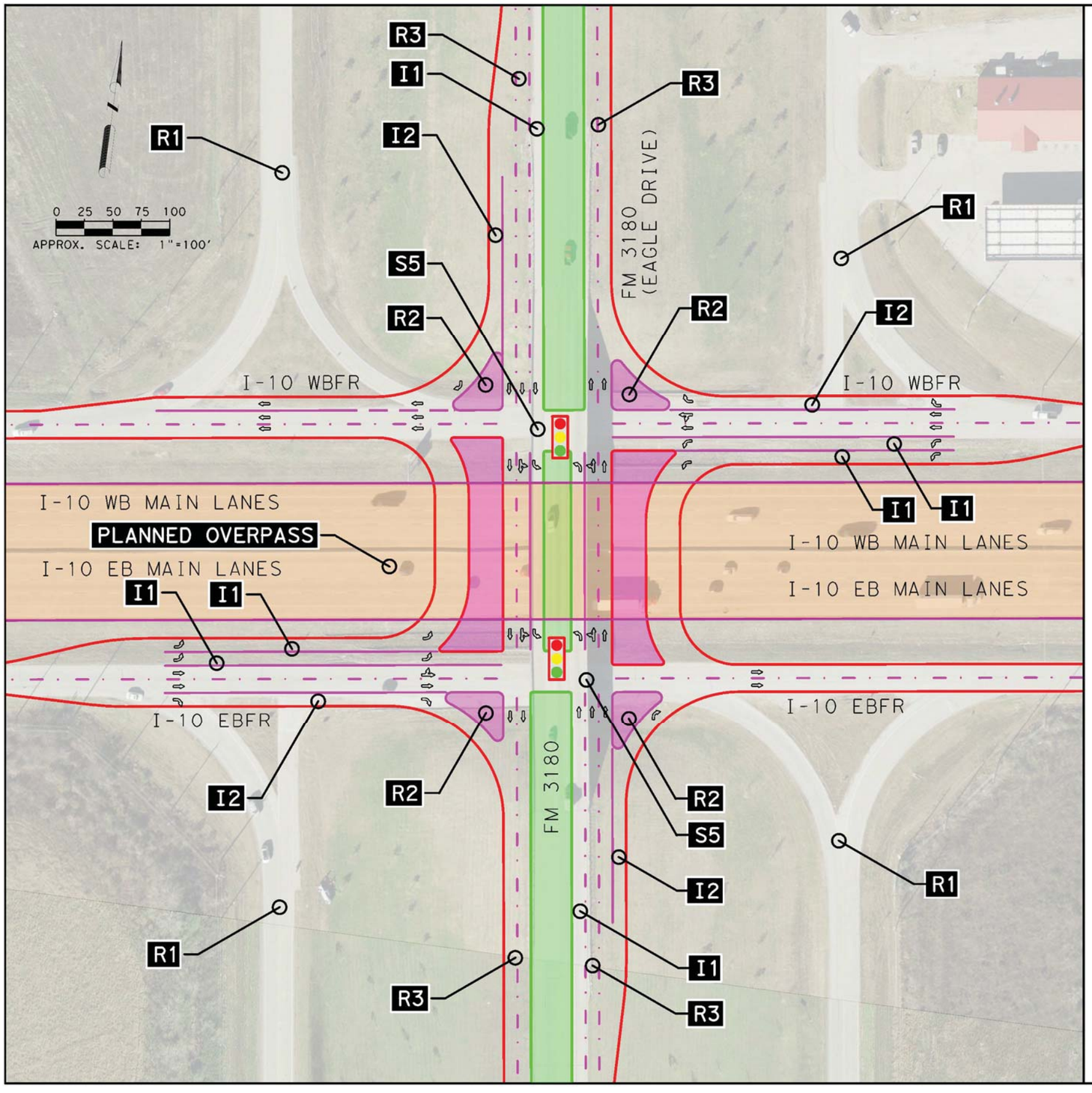


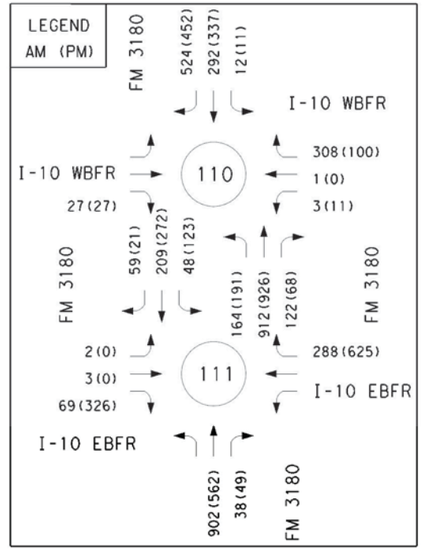
Cost Estimate: $ **FUNDED**

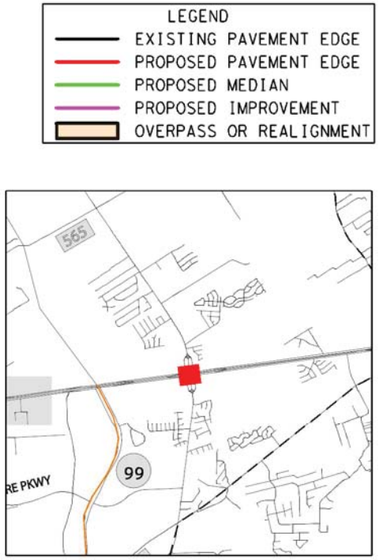
Objective Group	Improvement Group	ID	Near-Term Improvements
Mobility	(R) Roadway	R1	Close Roadway
		R2	Provide Island (Painted or Raised)
		R3	Widen Roadway
		R4	Realign Roadway
		R5	Construct New Roadway
	(I) Intersection	I1	Construct (Or Stripe) Left-Turn Lane
		I2	Construct (Or Stripe) Right-Turn Lane
		I3	Construct Acceleration Lane
		I4	Align Curve (Reduce Angle)
		I5	Align Travelway (Reduce Offset)
	(S) Signal	S1	Remove Traffic Signal
		S2	Install Stop Sign Control (Conduct Warrant Study)
		S3	Review Signal Timings
		S4	Modify Traffic Signal
		S5	Install Traffic Signal (or Conduct TSWA)
Access	(M) Median	M1	Construct Raised Median (RI/RO Access)
		M2	Provide Left-In Access
		M3	Construct Reverse S-Median (LO Access)
		M4	Construct Turbo-T (LI/LO Access)
		M5	Provide Full Access
		M6	TWLTL To Remain (Full Access)
	(D) Driveway	D1	Close Driveway
		D2	Provide Shared Access (Consolidate Driveways)
		D3	Driveway Modification (RI Access Only)
		D4	Driveway Modification (RO Access Only)

Peripheral Intersection 10: SH 99 @ I-10

DATE: 3/5/2018





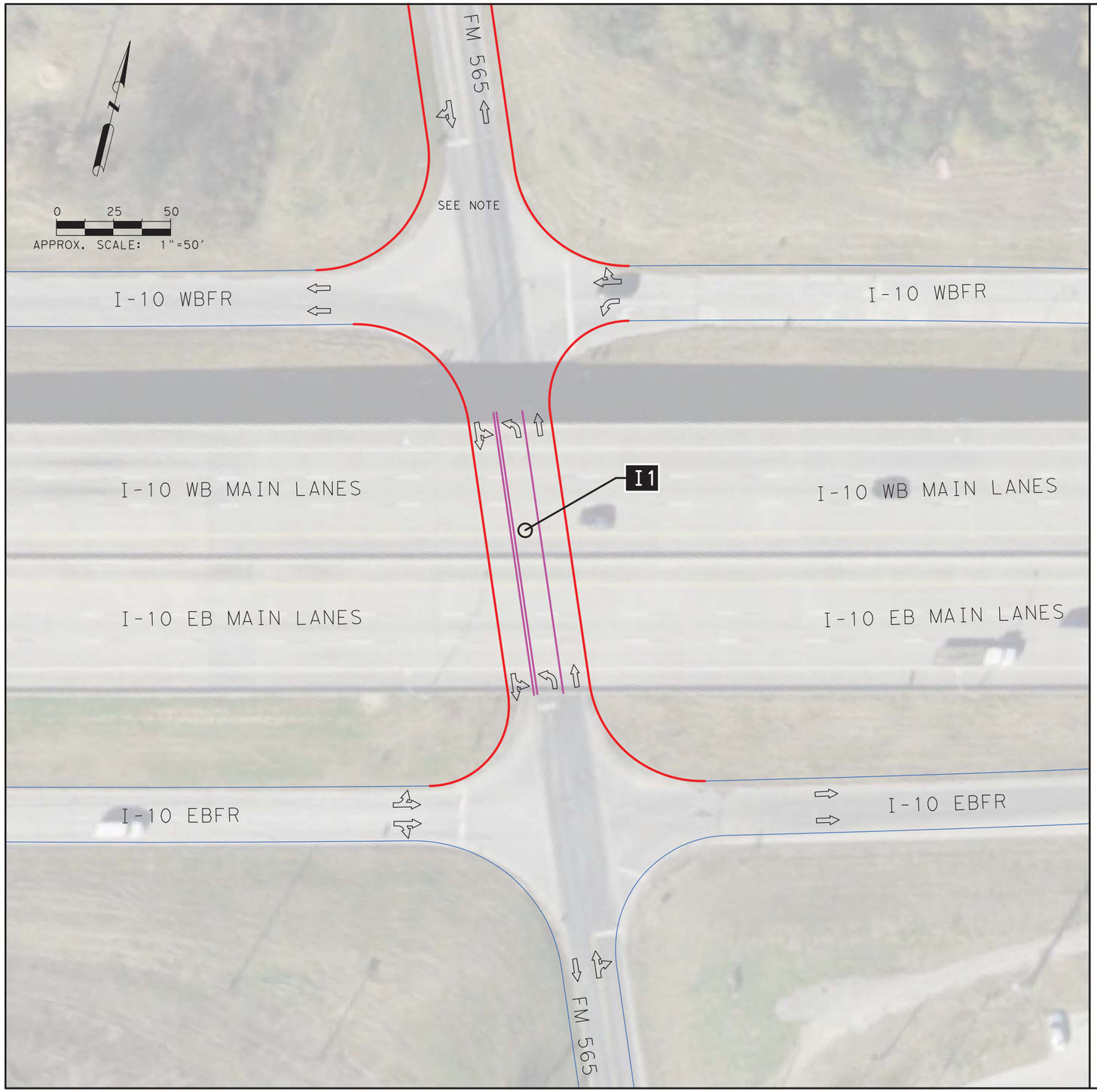


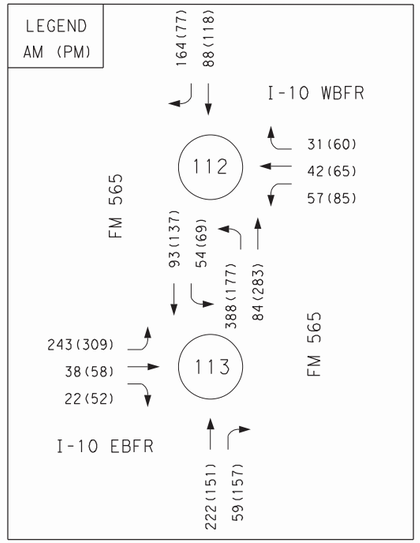
Cost Estimate: $ **FUNDED**

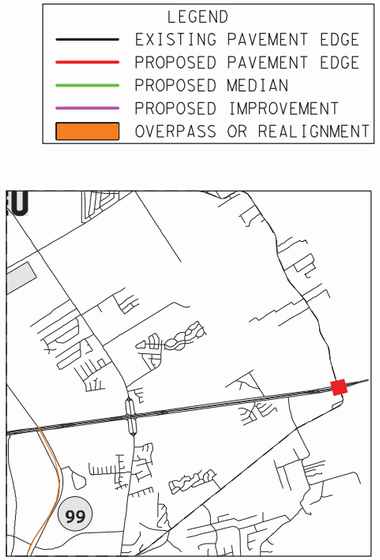
Objective Group	Improvement Group	ID	Near-Term Improvements
Mobility	(R) Roadway	R1	Close Roadway
		R2	Provide Island (Painted or Raised)
		R3	Widen Roadway
		R4	Realign Roadway
		R5	Construct New Roadway
	(I) Intersection	I1	Construct (Or Stripe) Left-Turn Lane
		I2	Construct (Or Stripe) Right-Turn Lane
		I3	Construct Acceleration Lane
		I4	Align Curve (Reduce Angle)
		I5	Align Travelway (Reduce Offset)
	(S) Signal	S1	Remove Traffic Signal
		S2	Install Stop Sign Control (Conduct Warrant Study)
		S3	Review Signal Timings
		S4	Modify Traffic Signal
		S5	Install Traffic Signal (or Conduct TSWA)
Access	(M) Median	M1	Construct Raised Median (RI/RO Access)
		M2	Provide Left-In Access
		M3	Construct Reverse S-Median (LO Access)
		M4	Construct Turbo-T (LI/LO Access)
		M5	Provide Full Access
		M6	TWLTL To Remain (Full Access)
	(D) Driveway	D1	Close Driveway
		D2	Provide Shared Access (Consolidate Driveways)
		D3	Driveway Modification (RI Access Only)
		D4	Driveway Modification (RO Access Only)

Peripheral Intersection 11: FM 3180 @ I-10

DATE: 3/5/2018







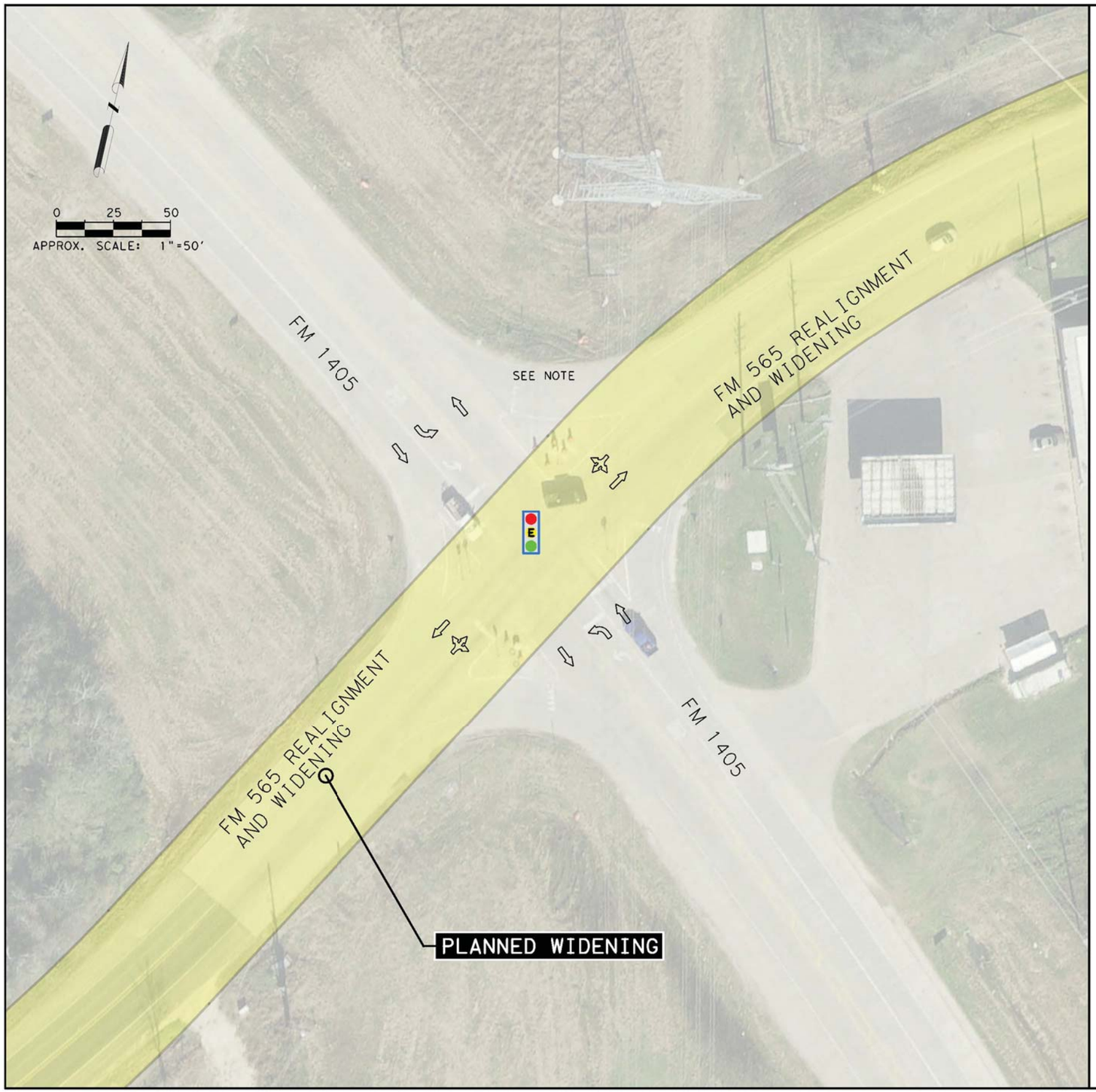
NOTE:
TXDOT TO CONSIDER ADDING A DEDICATED SB LEFT-TURN LANE WITH A DEDICATED SB THROUGH LANE. ADDITIONALLY, CONSIDER WIDENING PAVEMENT UNDER THE I-10 OVERPASS AS THERE ARE MANY WHEEL TRACKS OFF THE PAVEMENT WITH BROKEN CURB.

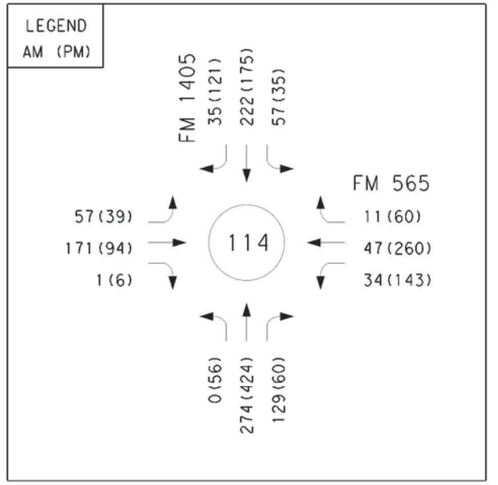
Cost Estimate: $ 10,000

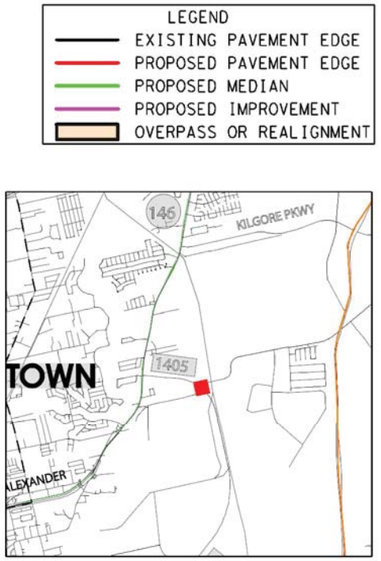
Objective Group	Improvement Group	ID	Near-Term Improvements
Mobility	(R) Roadway	R1	Close Roadway
		R2	Provide Island (Painted or Raised)
		R3	Widen Roadway
		R4	Realign Roadway
		R5	Construct New Roadway
	(I) Intersection	I1	Construct (Or Stripe) Left-Turn Lane
		I2	Construct (Or Stripe) Right-Turn Lane
		I3	Construct Acceleration Lane
		I4	Align Curve (Reduce Angle)
		I5	Align Travelway (Reduce Offset)
	(S) Signal	S1	Remove Traffic Signal
		S2	Install Stop Sign Control (Conduct Warrant Study)
		S3	Review Signal Timings
		S4	Modify Traffic Signal
		S5	Install Traffic Signal (or Conduct TSWA)
Access	(M) Median	M1	Construct Raised Median (RI/RO Access)
		M2	Provide Left-In Access
		M3	Construct Reverse S-Median (LO Access)
		M4	Construct Turbo-T (LI/LO Access)
		M5	Provide Full Access
		M6	TWLTL To Remain (Full Access)
	(D) Driveway	D1	Close Driveway
		D2	Provide Shared Access (Consolidate Driveways)
		D3	Driveway Modification (RI Access Only)
		D4	Driveway Modification (RO Access Only)

Peripheral Intersection 12: FM 565 @ I-10

DATE: 3/5/2018







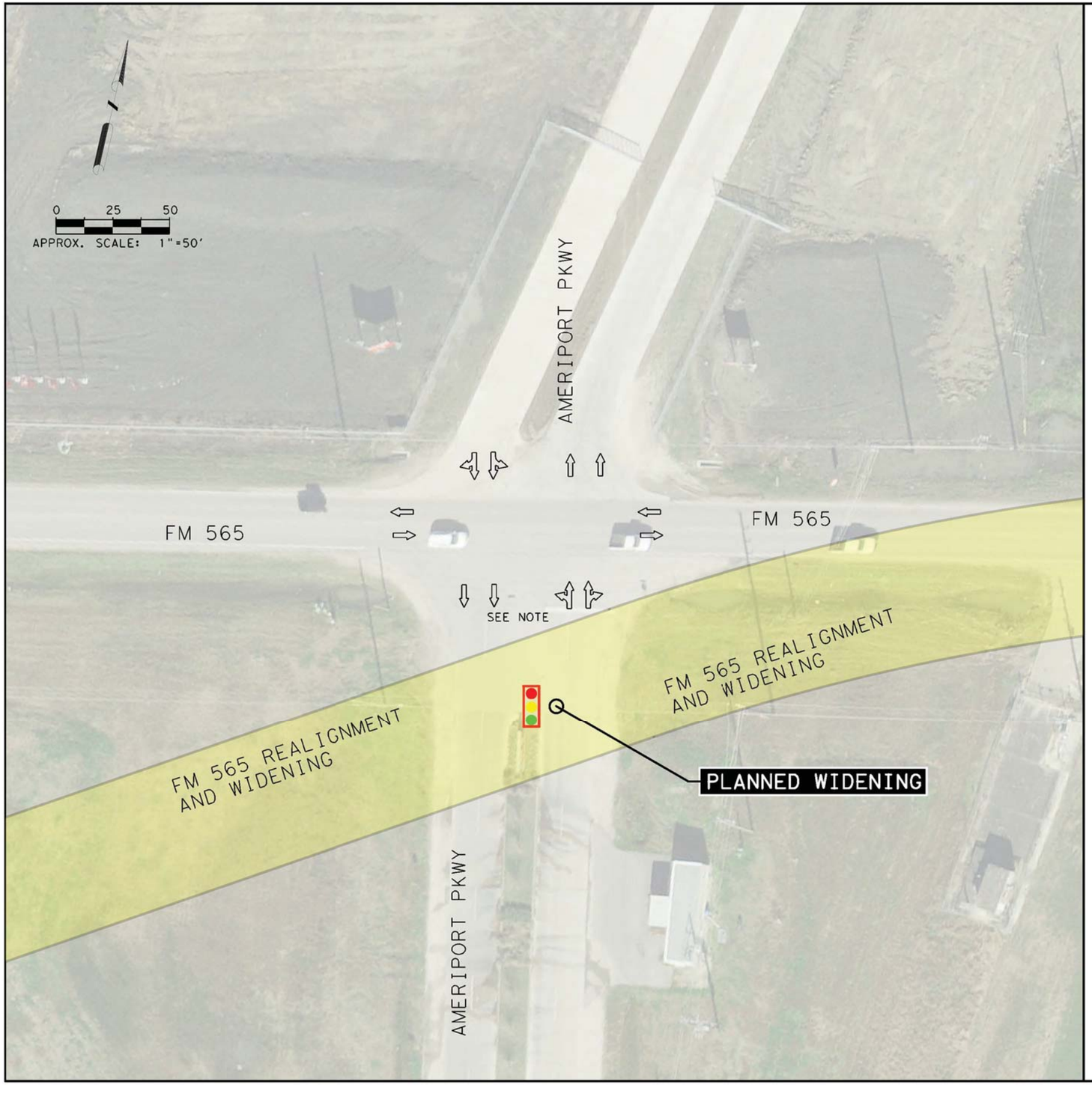
NOTE:
TXDOT TO CONSIDER ELIMINATING CURRENTLY STRIPED CHANNELIZED RIGHT TURNS IN FAVOR OF PROVIDING CENTER LEFT-TURN LANES AT ALL APPROACHES AS LEFT-TURN LANES ARE NEEDED FOR STORAGE CAPACITY. ADDITIONALLY, COSIDER INCREASING INTERSECTION CORNER RADII TO ACCOMMODATE TRUCK RIGHT TURNS.

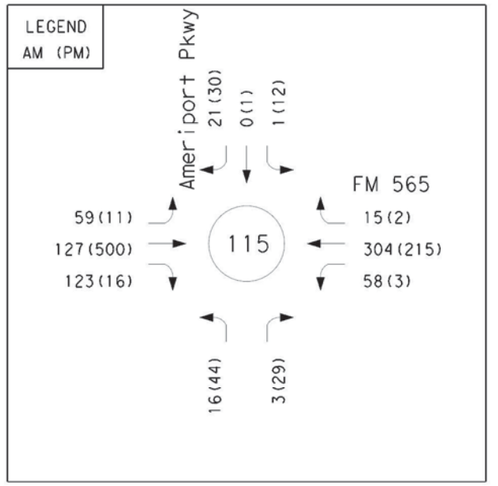
Cost Estimate: $ **FUNDED**

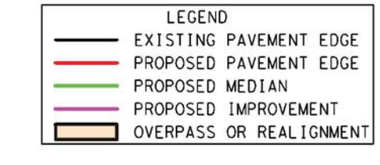
Objective Group	Improvement Group	ID	Near-Term Improvements
Mobility	(R) Roadway	R1	Close Roadway
		R2	Provide Island (Painted or Raised)
		R3	Widen Roadway
		R4	Realign Roadway
		R5	Construct New Roadway
	(I) Intersection	I1	Construct (Or Stripe) Left-Turn Lane
		I2	Construct (Or Stripe) Right-Turn Lane
		I3	Construct Acceleration Lane
		I4	Align Curve (Reduce Angle)
		I5	Align Travelway (Reduce Offset)
	(S) Signal	S1	Remove Traffic Signal
		S2	Install Stop Sign Control (Conduct Warrant Study)
		S3	Review Signal Timings
		S4	Modify Traffic Signal
		S5	Install Traffic Signal (or Conduct TSWA)
Access	(M) Median	M1	Construct Raised Median (RI/RO Access)
		M2	Provide Left-In Access
		M3	Construct Reverse S-Median (LO Access)
		M4	Construct Turbo-T (LI/LO Access)
		M5	Provide Full Access
		M6	TWLTL To Remain (Full Access)
	(D) Driveway	D1	Close Driveway
		D2	Provide Shared Access (Consolidate Driveways)
		D3	Driveway Modification (RI Access Only)
		D4	Driveway Modification (RO Access Only)

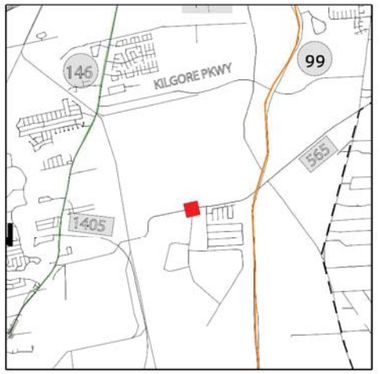
Peripheral Intersection 13: FM 565 @ FM 1405

DATE: 3/5/2018









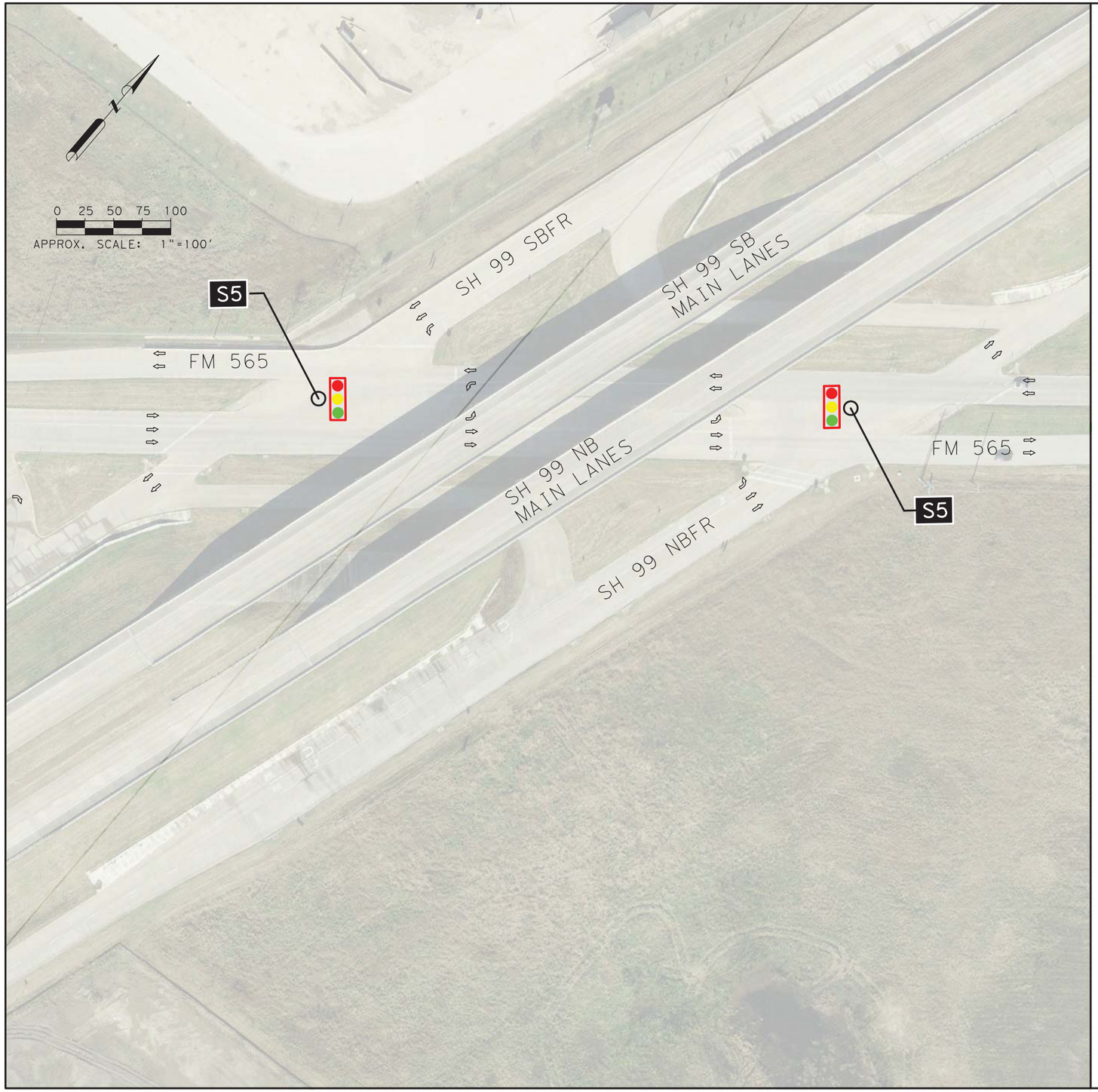
NOTE:
THE PROPOSED ALIGNMENT WILL CREATE A SKEW RELATIVE TO THE EXISTING INTERSECTION. CONSIDER REALIGNMENT OF AMERIPORT PKWY TO CREATE A 90 DEGREE INTERSECTION.

Cost Estimate: $ **FUNDED**

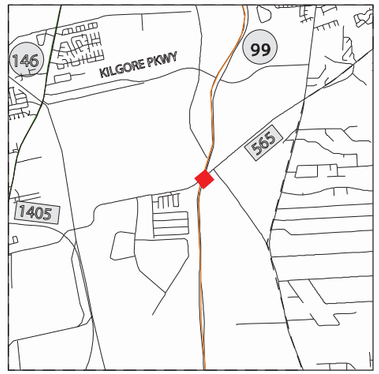
Objective Group	Improvement Group	ID	Near-Term Improvements
Mobility	(R) Roadway	R1	Close Roadway
		R2	Provide Island (Painted or Raised)
		R3	Widen Roadway
		R4	Realign Roadway
		R5	Construct New Roadway
	(I) Intersection	I1	Construct (Or Stripe) Left-Turn Lane
		I2	Construct (Or Stripe) Right-Turn Lane
		I3	Construct Acceleration Lane
		I4	Align Curve (Reduce Angle)
		I5	Align Travelway (Reduce Offset)
	(S) Signal	S1	Remove Traffic Signal
		S2	Install Stop Sign Control (Conduct Warrant Study)
		S3	Review Signal Timings
		S4	Modify Traffic Signal
		S5	Install Traffic Signal (or Conduct TSWA)
Access	(M) Median	M1	Construct Raised Median (RI/RO Access)
		M2	Provide Left-In Access
		M3	Construct Reverse S-Median (LO Access)
		M4	Construct Turbo-T (LI/LO Access)
		M5	Provide Full Access
		M6	TWLTL To Remain (Full Access)
	(D) Driveway	D1	Close Driveway
		D2	Provide Shared Access (Consolidate Driveways)
		D3	Driveway Modification (RI Access Only)
		D4	Driveway Modification (RO Access Only)

Peripheral Intersection 14: FM 565 @ Ameriport Pkwy

DATE: 3/5/2018



LEGEND
- EXISTING PAVEMENT EDGE
- PROPOSED PAVEMENT EDGE
- PROPOSED MEDIAN
- PROPOSED IMPROVEMENT
- OVERPASS OR REALIGNMENT

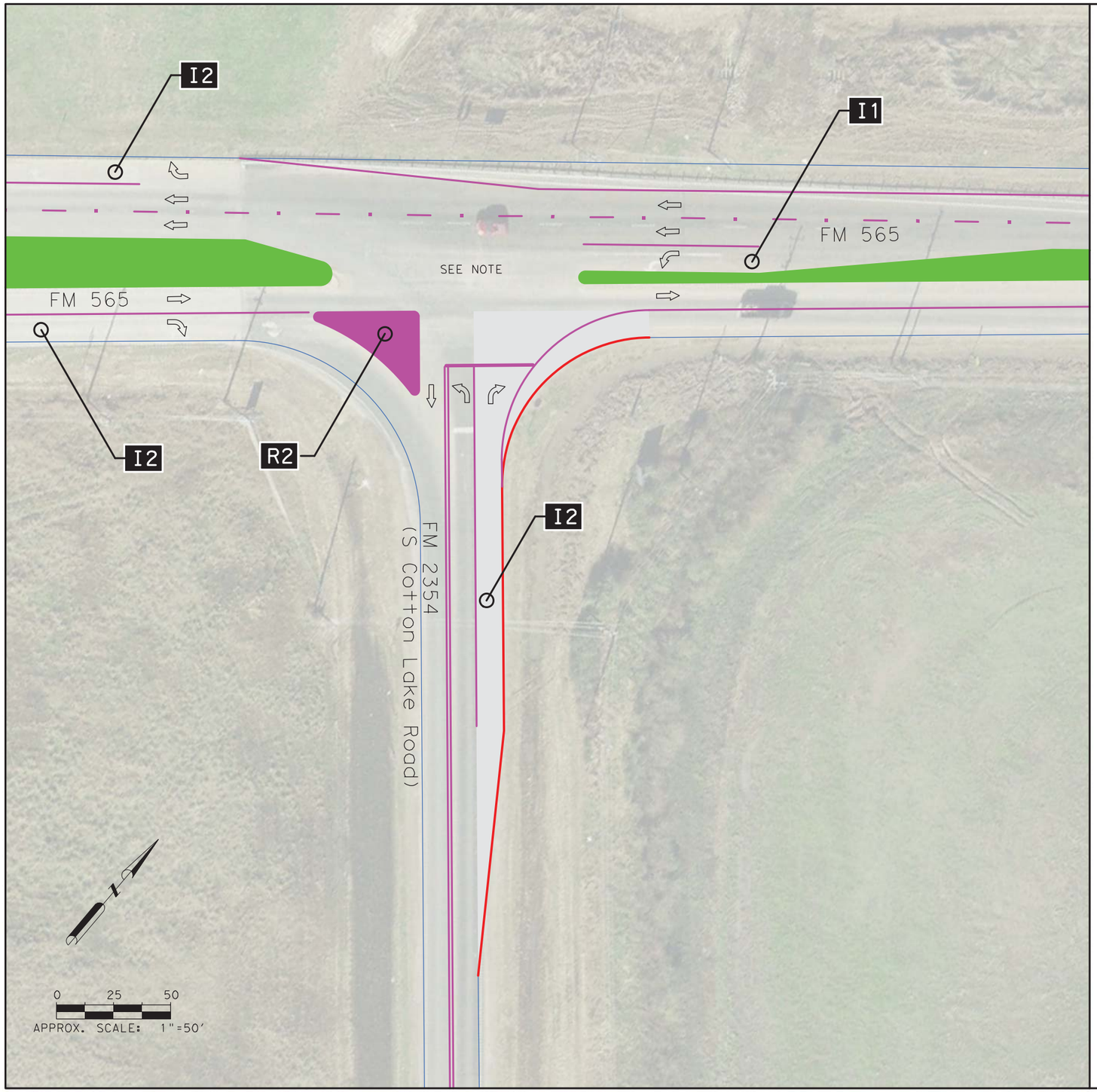


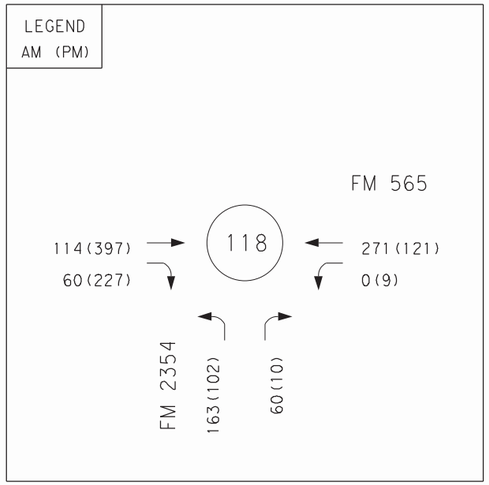
Cost Estimate: $ **FUNDED**

Objective Group	Improvement Group	ID	Near-Term Improvements
Mobility	(R) Roadway	R1	Close Roadway
		R2	Provide Island (Painted or Raised)
		R3	Widen Roadway
		R4	Realign Roadway
		R5	Construct New Roadway
	(I) Intersection	I1	Construct (Or Stripe) Left-Turn Lane
		I2	Construct (Or Stripe) Right-Turn Lane
		I3	Construct Acceleration Lane
		I4	Align Curve (Reduce Angle)
		I5	Align Travelway (Reduce Offset)
	(S) Signal	S1	Remove Traffic Signal
		S2	Install Stop Sign Control (Conduct Warrant Study)
		S3	Review Signal Timings
		S4	Modify Traffic Signal
		S5	Install Traffic Signal (or Conduct TSWA)
Access	(M) Median	M1	Construct Raised Median (RI/RO Access)
		M2	Provide Left-In Access
		M3	Construct Reverse S-Median (LO Access)
		M4	Construct Turbo-T (LI/LO Access)
		M5	Provide Full Access
		M6	TWLTL To Remain (Full Access)
	(D) Driveway	D1	Close Driveway
		D2	Provide Shared Access (Consolidate Driveways)
		D3	Driveway Modification (RI Access Only)
		D4	Driveway Modification (RO Access Only)

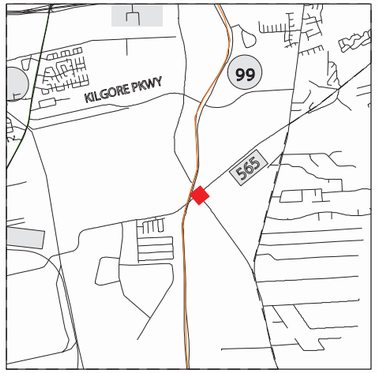
Peripheral Intersection 15: FM 565 @ SH 99

DATE: 3/5/2018





LEGEND
- EXISTING PAVEMENT EDGE
- PROPOSED PAVEMENT EDGE
- PROPOSED MEDIAN
- PROPOSED IMPROVEMENT
- OVERPASS OR REALIGNMENT



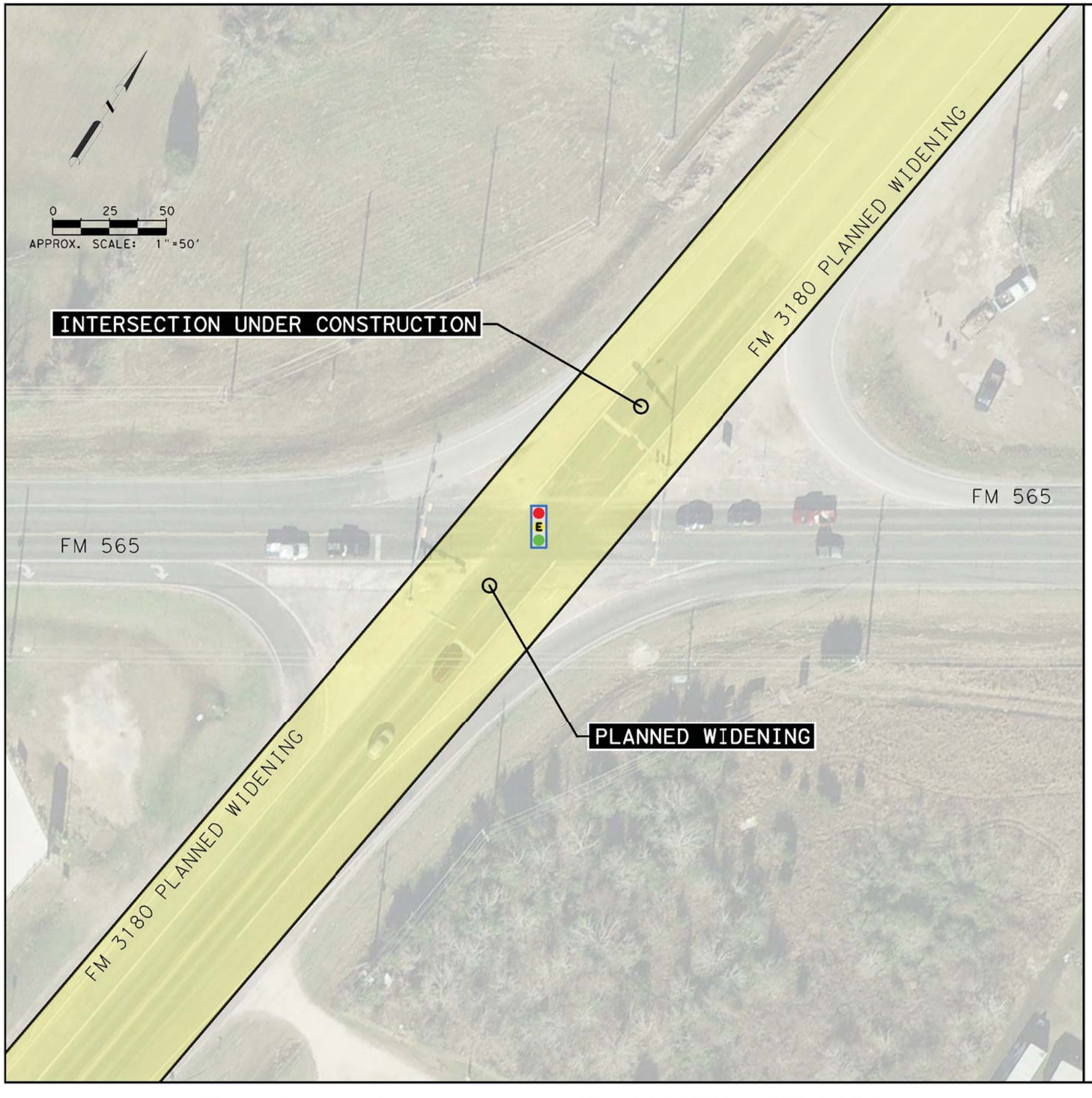
NOTE:
A TRAFFIC SIGNAL INSTALLATION WAS CONSIDERED BUT NOT RECOMMENED AS THE NEAREST SIGNAL IS APPROXIMATELY 600 FEET FROM THE INTERSECTION.

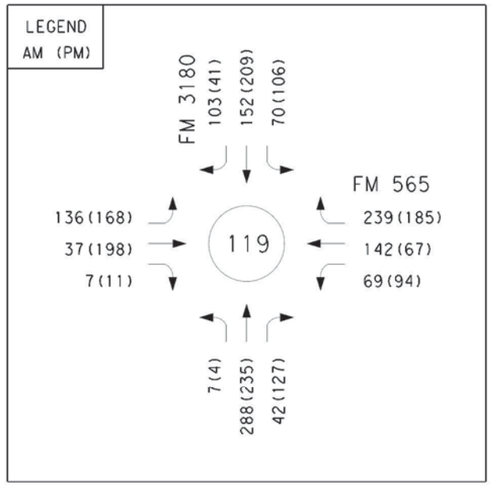
Cost Estimate: $ 100,000

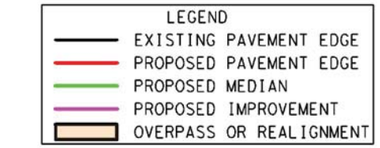
Objective Group	Improvement Group	ID	Near-Term Improvements
Mobility	(R) Roadway	R1	Close Roadway
		R2	Provide Island (Painted or Raised)
		R3	Widen Roadway
		R4	Realign Roadway
		R5	Construct New Roadway
	(I) Intersection	I1	Construct (Or Stripe) Left-Turn Lane
		I2	Construct (Or Stripe) Right-Turn Lane
		I3	Construct Acceleration Lane
		I4	Align Curve (Reduce Angle)
		I5	Align Travelway (Reduce Offset)
	(S) Signal	S1	Remove Traffic Signal
		S2	Install Stop Sign Control (Conduct Warrant Study)
		S3	Review Signal Timings
		S4	Modify Traffic Signal
		S5	Install Traffic Signal (or Conduct TSWA)
Access	(M) Median	M1	Construct Raised Median (RI/RO Access)
		M2	Provide Left-In Access
		M3	Construct Reverse S-Median (LO Access)
		M4	Construct Turbo-T (LI/LO Access)
		M5	Provide Full Access
		M6	TWLTL To Remain (Full Access)
	(D) Driveway	D1	Close Driveway
		D2	Provide Shared Access (Consolidate Driveways)
		D3	Driveway Modification (RI Access Only)
		D4	Driveway Modification (RO Access Only)

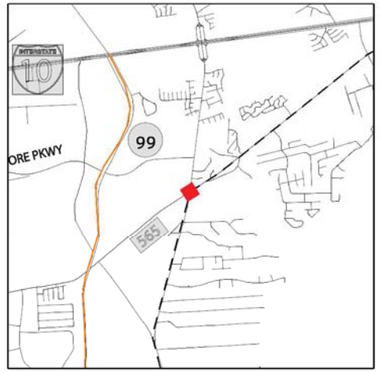
Peripheral Intersection 16: FM 565 @ FM 2354 (S Cotton Lake Road)

DATE: 3/5/2018







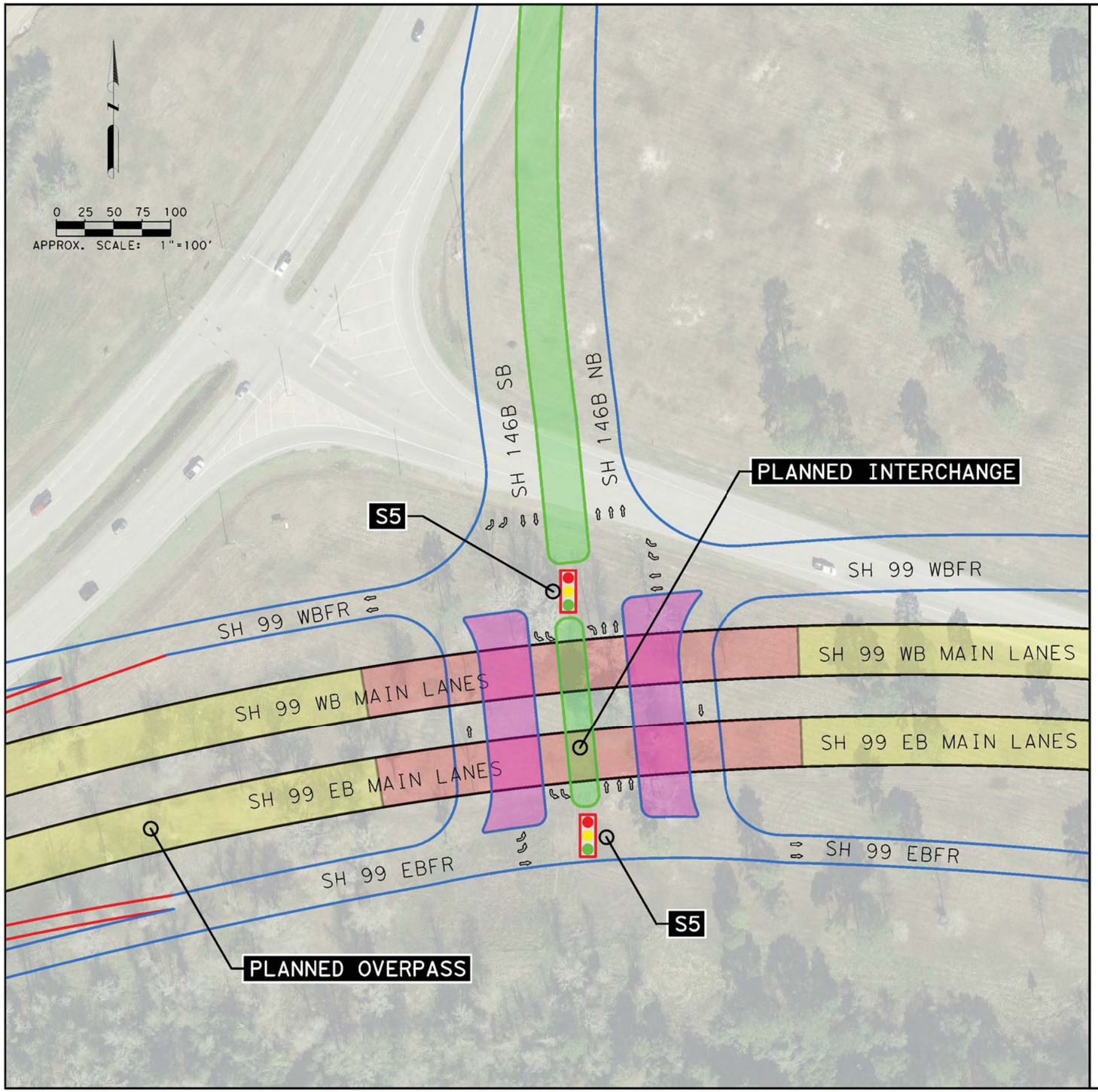


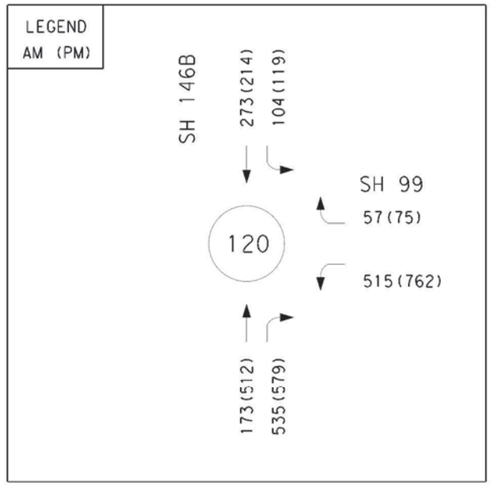
Cost Estimate: $ **FUNDED**

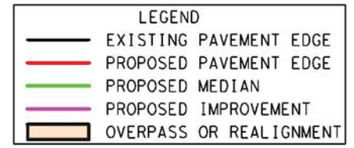
Objective Group	Improvement Group	ID	Near-Term Improvements
Mobility	(R) Roadway	R1	Close Roadway
		R2	Provide Island (Painted or Raised)
		R3	Widen Roadway
		R4	Realign Roadway
		R5	Construct New Roadway
	(I) Intersection	I1	Construct (Or Stripe) Left-Turn Lane
		I2	Construct (Or Stripe) Right-Turn Lane
		I3	Construct Acceleration Lane
		I4	Align Curve (Reduce Angle)
		I5	Align Travelway (Reduce Offset)
	(S) Signal	S1	Remove Traffic Signal
		S2	Install Stop Sign Control (Conduct Warrant Study)
		S3	Review Signal Timings
		S4	Modify Traffic Signal
		S5	Install Traffic Signal (or Conduct TSWA)
Access	(M) Median	M1	Construct Raised Median (RI/RO Access)
		M2	Provide Left-In Access
		M3	Construct Reverse S-Median (LO Access)
		M4	Construct Turbo-T (LI/LO Access)
		M5	Provide Full Access
		M6	TWLTL To Remain (Full Access)
	(D) Driveway	D1	Close Driveway
		D2	Provide Shared Access (Consolidate Driveways)
		D3	Driveway Modification (RI Access Only)
		D4	Driveway Modification (RO Access Only)

Peripheral Intersection 17: FM 565 @ FM 3180

DATE: 3/5/2018





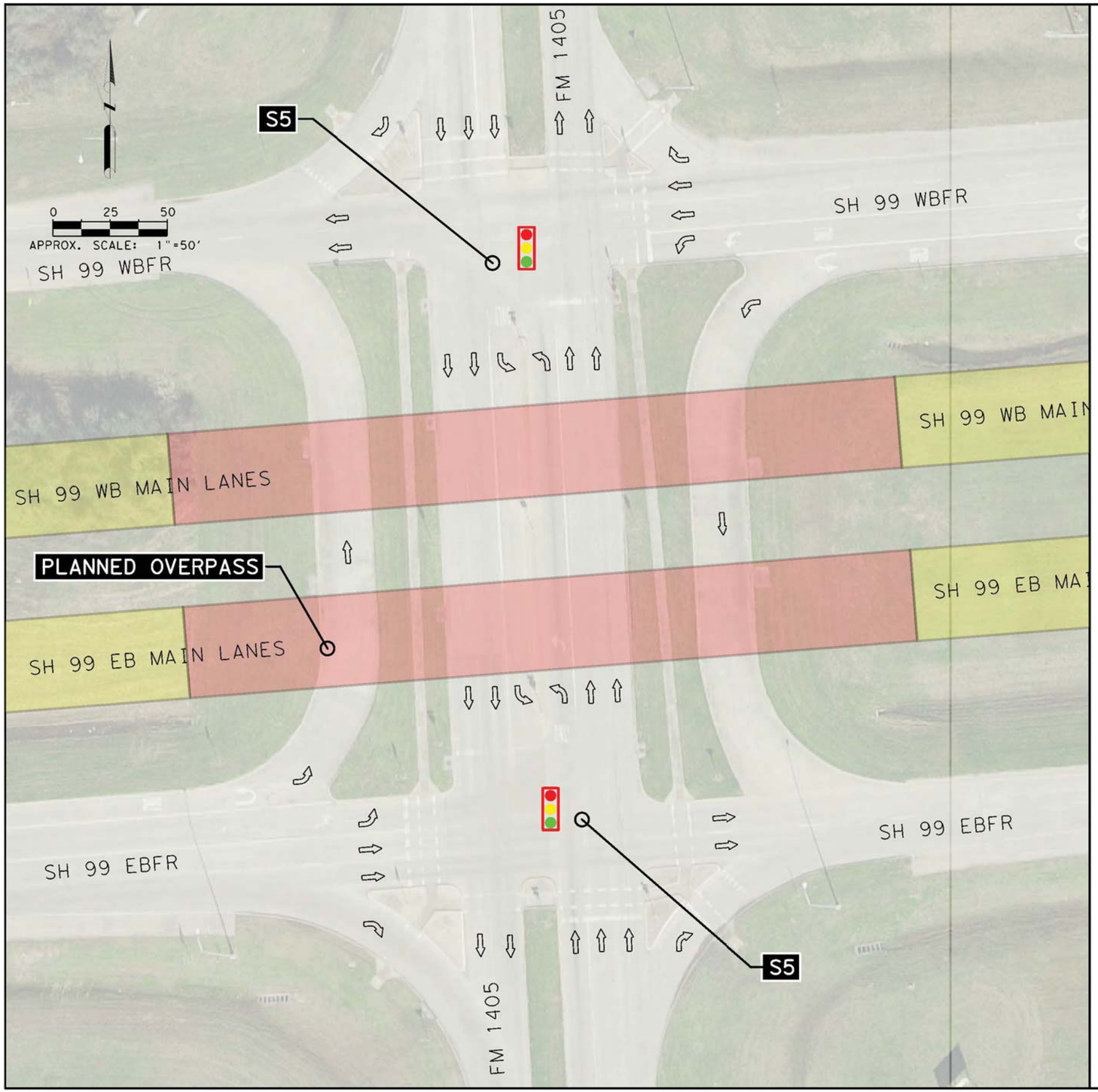


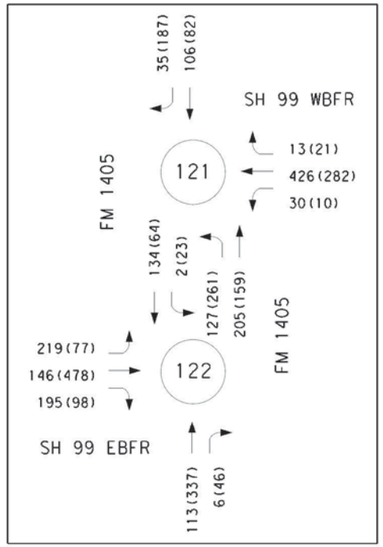
Cost Estimate: $ **FUNDED**

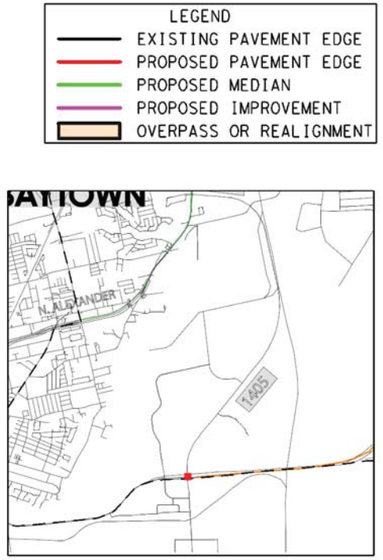
Objective Group	Improvement Group	ID	Near-Term Improvements
Mobility	(R) Roadway	R1	Close Roadway
		R2	Provide Island (Painted or Raised)
		R3	Widen Roadway
		R4	Realign Roadway
		R5	Construct New Roadway
	(I) Intersection	I1	Construct (Or Stripe) Left-Turn Lane
		I2	Construct (Or Stripe) Right-Turn Lane
		I3	Construct Acceleration Lane
		I4	Align Curve (Reduce Angle)
		I5	Align Travelway (Reduce Offset)
	(S) Signal	S1	Remove Traffic Signal
		S2	Install Stop Sign Control (Conduct Warrant Study)
		S3	Review Signal Timings
		S4	Modify Traffic Signal
		S5	Install Traffic Signal (or Conduct TSWA)
Access	(M) Median	M1	Construct Raised Median (RI/RO Access)
		M2	Provide Left-In Access
		M3	Construct Reverse S-Median (LO Access)
		M4	Construct Turbo-T (LI/LO Access)
		M5	Provide Full Access
		M6	TWLTL To Remain (Full Access)
	(D) Driveway	D1	Close Driveway
		D2	Provide Shared Access (Consolidate Driveways)
		D3	Driveway Modification (RI Access Only)
		D4	Driveway Modification (RO Access Only)

Peripheral Intersection 18: SH 146B @ SH 99

DATE: 3/5/2018







Cost Estimate: $ **FUNDED**

Objective Group	Improvement Group	ID	Near-Term Improvements
Mobility	(R) Roadway	R1	Close Roadway
		R2	Provide Island (Painted or Raised)
		R3	Widen Roadway
		R4	Realign Roadway
		R5	Construct New Roadway
	(I) Intersection	I1	Construct (Or Stripe) Left-Turn Lane
		I2	Construct (Or Stripe) Right-Turn Lane
		I3	Construct Acceleration Lane
		I4	Align Curve (Reduce Angle)
		I5	Align Travelway (Reduce Offset)
	(S) Signal	S1	Remove Traffic Signal
		S2	Install Stop Sign Control (Conduct Warrant Study)
		S3	Review Signal Timings
		S4	Modify Traffic Signal
		S5	Install Traffic Signal (or Conduct TSWA)
Access	(M) Median	M1	Construct Raised Median (RI/RO Access)
		M2	Provide Left-In Access
		M3	Construct Reverse S-Median (LO Access)
		M4	Construct Turbo-T (LI/LO Access)
		M5	Provide Full Access
		M6	TWLTL To Remain (Full Access)
	(D) Driveway	D1	Close Driveway
		D2	Provide Shared Access (Consolidate Driveways)
		D3	Driveway Modification (RI Access Only)
		D4	Driveway Modification (RO Access Only)

Peripheral Intersection 19: FM 1405 @ SH 99

146
TEXAS

Chapter 8

Long-Term Recommendations

SH 146 at Main Walmart Driveway (2016)

CHAPTER 8: LONG-TERM RECOMMENDATIONS

ROADWAY

Roadway Recommendations

One of the primary issues identified in the existing conditions analysis was the lack of connectivity which would provide increased route choice and reduce future strain on the SH 146 corridor. Considering that much of the study area is still developing, the cities of Baytown and Mont Belvieu have the ability to plan for needed new roadways prior to development occurring and dedicate the necessary ROW for thoroughfare improvements.

SH 146 and Grand Parkway (SH 99) are expected to accommodate much of the north-south traffic through the study area. Additional future major thoroughfare connections have been identified and would improve long-term north-south connectivity for developing areas along the eastern and western edges of the study area. A planned extension of FM 1409 will support development in eastern portions of Mont Belvieu and Baytown, as well as provide improved access to IH 10. Few connections have been planned for areas to the northwest of the corridor. An extension north from Main Street toward FM 486 and the City of Dayton could provide a secondary route for regional trips between Baytown, IH 10, future industrial development in Mont Belvieu, and areas to the north.

The realignment and widening of FM 565 is expected to improve connectivity between the southern end of the study area, Grand Parkway, and east to IH 10.

Additional thoroughfare connections have been identified that can support the distribution of local trips within the study area. Developing a supporting network of minor arterials and collectors in the area can provide additional circulation options and improve trip distribution to the major arterials. These recommended connections include east-west options across Cedar Bayou west of SH 146. Evaluation of these connections are included in this chapter.

A map of identified long-term roadway needs within the study area is shown in **Figure 33**. This map includes recommended major and minor connections, as well as potential future roadway widening projects, based on the cities' Comprehensive Plans and Mobility Plans. A matrix of roadway recommendations indicating roadway name and length is available on the following page.

New Road Corridors

18 new connections (shown in **Table 5**), for a total of approximately 32 miles, are recommended as long-term improvements.

Roadway Widening

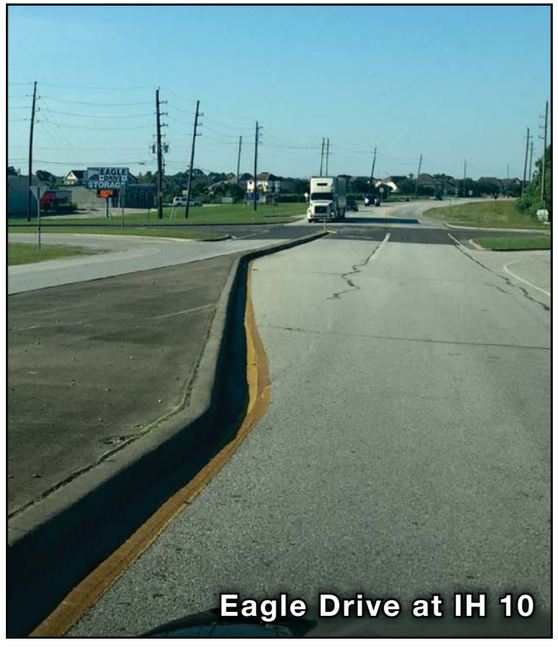
24 roadway widenings (shown in **Table 6**), for a total of approximately 61 miles, are recommended as long-term improvements.

Cedar Bayou Crossing Alternatives

The following Cedar Bayou crossing alternatives (**Table 7**) are recommended for further study and evaluation.

SH 146 Access Management Treatment

Concurrent with the future widening of SH 146, access management along the roadway should be revised to accommodate changes to traffic patterns and development.



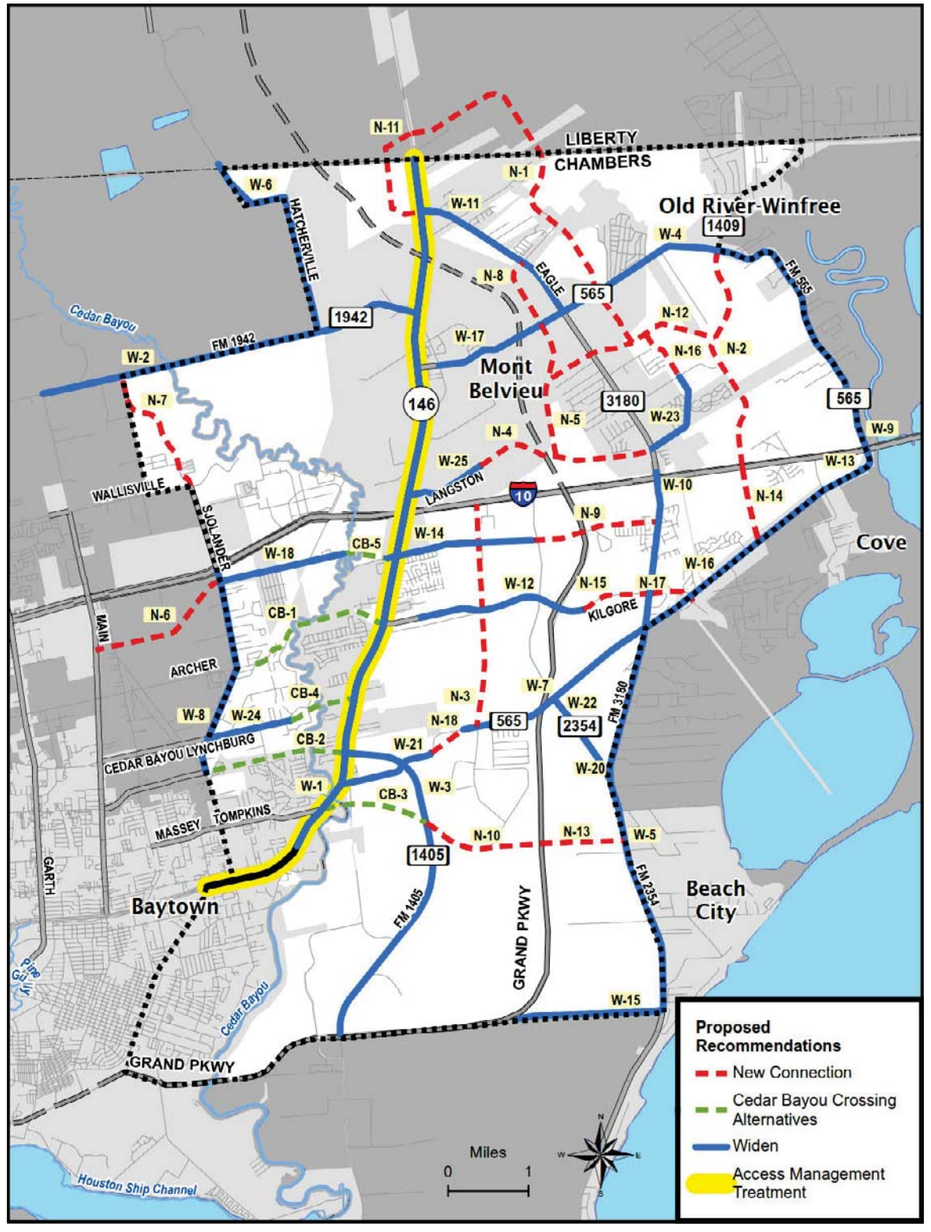


Figure 33 – Long-Term Roadway Recommendations

ID	STREET	Length (Miles)
N-1	New Road D ***	5
N-2	FM 1409	3
N-3	New Road G ***	3
N-4	Langston	2
N-5	New Road A ***	2
N-6	Needlepoint **	2
N-7	Sjolander	2
N-8	New Road B ***	2
N-9	Old Needlepoint	2
N-10	Massey Tomkins Road	2
N-11	New Road C ***	2
N-12	New Road E ***	1
N-13	Massey Tomkins Road	1
N-14	FM 1409	1
N-15	Kilgore Parkway	1
N-16	New Road F ***	1
N-17	Kilgore Parkway	1
N-18	FM 565 (South of I-10)	1
	Total Length	**34**

Table 5 – New Connections

ID	STREET	Length (Miles)
W-1	SH 146	9
W-2	FM 1942	5
W-3	FM 1405	5
W-4	FM 565 (North of I-10)	3
W-5	FM 3180	3
W-6	Hatcherville	3
W-7	FM 565 (South of I-10)	3
W-8	Sjolander	3
W-9	FM 565 (North of I-10)	3
W-10	FM 3180	3
W-11	Eagle Drive	2
W-12	Kilgore Parkway	2
W-13	FM 565 (South of I-10)	2
W-14	Old Needlepoint	2
W-15	Fisher	2
W-16	FM 565 (South of I-10)	2
W-17	FM 565 (North of I-10)	2
W-18	Needlepoint	2
W-19	FM 3180	1
W-20	FM 565 (South of I-10)	1
W-21	FM 2354	1
W-22	Lake Champions Blvd	1
W-23	E. Cedar Bayou Lynchburg	1
W-24	Langston	1
	Total Length	**62**

Table 6 – Roadway Widenings

ID	Street	Length (Miles)
CB-1	E. Archer Road	2
CB-2	Blue Heron Parkway	2
CB-3	Massey Tomkins Road	1
CB-4	E. Cedar Bayou Lynchburg	1
CB-5	Needlepoint Road	1
	Total Length	**7**

Table 7 – Cedar Bayou Crossing Alternatives

INTERSECTIONS

Summary

Based on future year 2035 analysis, several long-term intersection improvements are recommended to resolve foreseeable mobility issues in the study area. Intersection recommendations, in addition to short-term recommendations discussed previously, identified within the study area are shown in **Figure 34**.

Intersection Modifications:

Intersection modifications (shown in blue), such as adding turn lanes, providing islands and modifying the traffic signal phasing, are recommended at the following locations:

- SH 146 at Targa Employee Parking/Sun Oil Rd
- SH 146 at Walmart Driveway
- SH 146 at Old Needlepoint Rd
- FM 1942 at Hadden Rd
- FM 1942 at Hatcherville Rd
- Sjolander Rd at IH 10 EBFR
- Eagle Drive (FM 3180) at IH 10 EBFR

Signal Installations

Signal installations (shown in green) are recommended at the following locations:

- FM 565 at IH 10 WBFR
- FM 565 at IH 10 EBFR
- SH 146 at Future SH 99 FR
- SH 146 at Tanglewide Subdivision
- SH 146 at Lynnwood Dr.
- Hadden Rd at FM1942

Railroad Grade Separations

Railroad grade separations (shown as RR crossing symbol) are recommended at the following locations:

- FM 1942
- IH 10 WBFR
- IH 10 EBFR
- Old Needlepoint Rd
- E Archer Rd
- SH 146
- E Cedar Bayou Lynchburg Rd
- Blue Heron Pkwy
- Massey-Tompkins Rd
- SH 146 WBFR
- SH 146 EBFR
- FM 565

Bridge Crossings

Bridge crossings (shown in brown) are recommended contingent upon the construction of potential Cedar Bayou crossings alternatives at the following locations:

- Old Needlepoint Rd
- E Archer Rd
- E Cedar Bayou Lynchburg Rd
- Blue Heron Pkwy
- Massey-Tompkins Rd

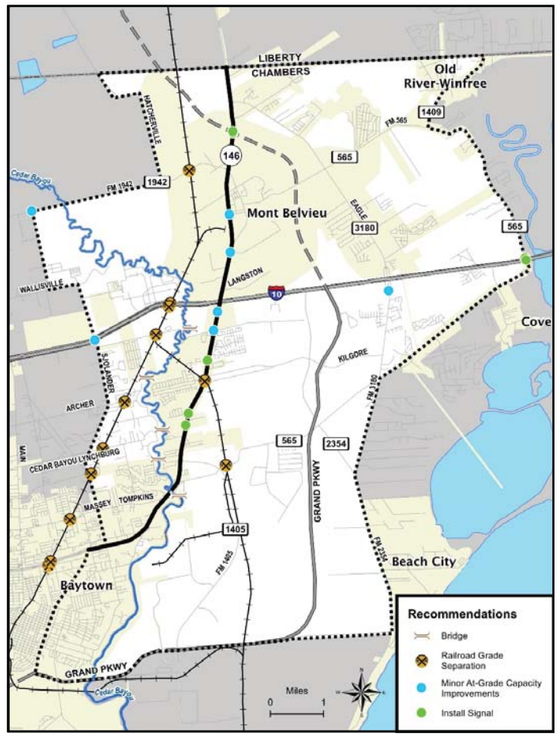


Figure 34 – Long-Term Intersection Recommendations

KEY INTERSECTION EXHIBITS

Concept-level exhibits that show long-term recommendations at key intersections are available as **Conceptual Exhibits** presented in subsequent pages. A key map of intersection improvements within the study area is shown in **Figure 35**.

1. SH 146 at IH 10 (LT1) – ROW has been reserved to allow for direct connectors.

2. SH 146 at Kilgore Parkway (LT2) – If E. Archer Road were to be extended to SH 146.

3. SH 146 at FM 1405/N Twisted Oak St (LT3) - If Blue Heron Parkway were to be extended to SH 146.

4. IH 10 at SH 99 (LT4) – The ultimate configuration of IH 10 at SH 99 includes eight direct connectors.

5. FM 565 at IH 10 (LT5) – Signal installation and interchange redesign should be considered concurrently with the widening of FM 565.

6. FM 565 at FM 1405 (LT6) - Construct FM 565 overpass, redesign at-grade signal to include right-turn lanes.

7. SH 146 at SH 99 (LT7) – Segment I-1 of SH 99 includes an overpass at the intersection of SH 99

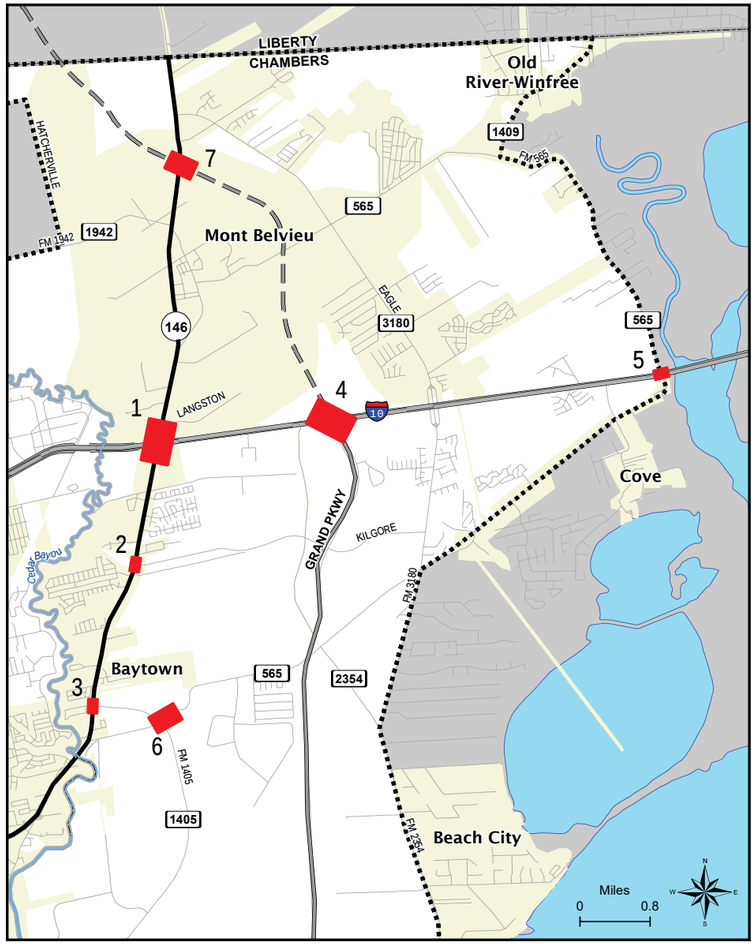
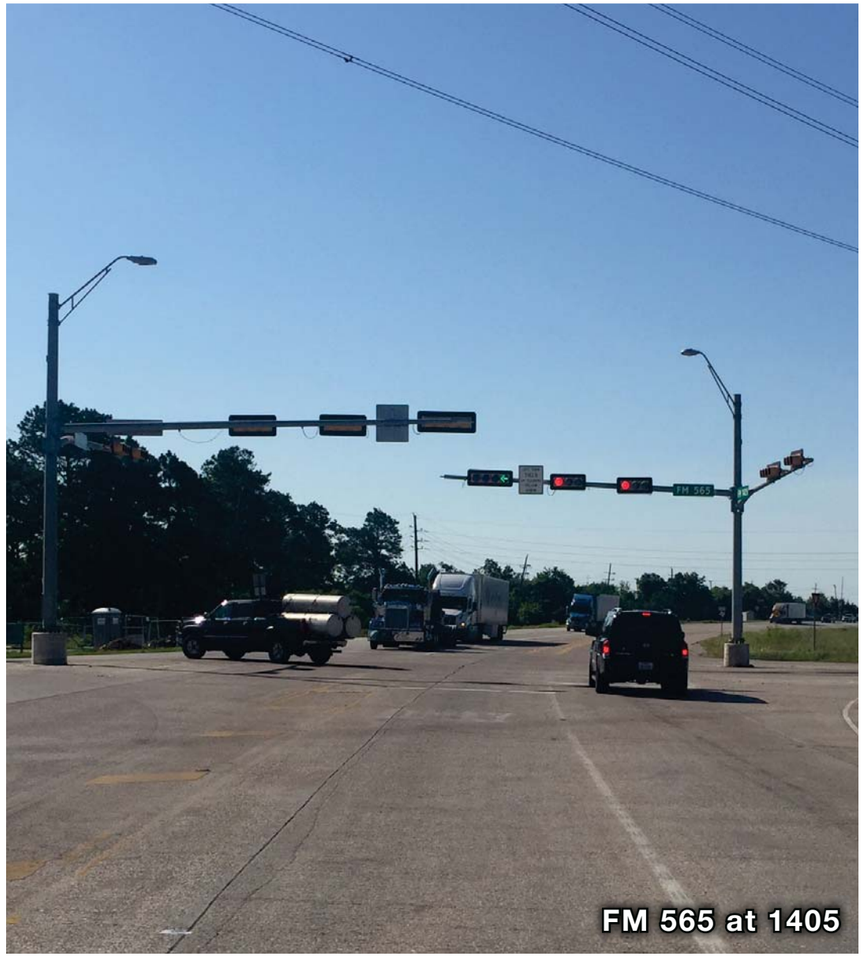


Figure 35 – Long-Term Intersection Improvements Key Map

Sheet	Intersection	Improvement Notes	Cost Estimate*
LT1	SH 146 @ IH 10	Direct Connect (Or Add 3-level)	$40-60M
LT2	SH 146 @ Kilgore Pkwy	EWC Intersection Redesign	$1-2M
LT3	SH 146 @ FM 1405/N Twisted Oak St	EWC Intersection Redesign	$1-2M
LT4	I-10 at SH 99	Direct Connectors	Funded
LT5	FM 565 @ I-10	Widening/U-Turn Lanes	$1.5M
LT6	FM 565 @ FM 1405	Overpass	$2M
LT7	SH 146 @ SH 99	Diamond	Funded

*2018 Local Construction Cost Estimate (Source: TxDOT Average Low Bid Unit Prices by District, District 20)

Table 8 – Long-Term Intersection Improvements Cost Estimate



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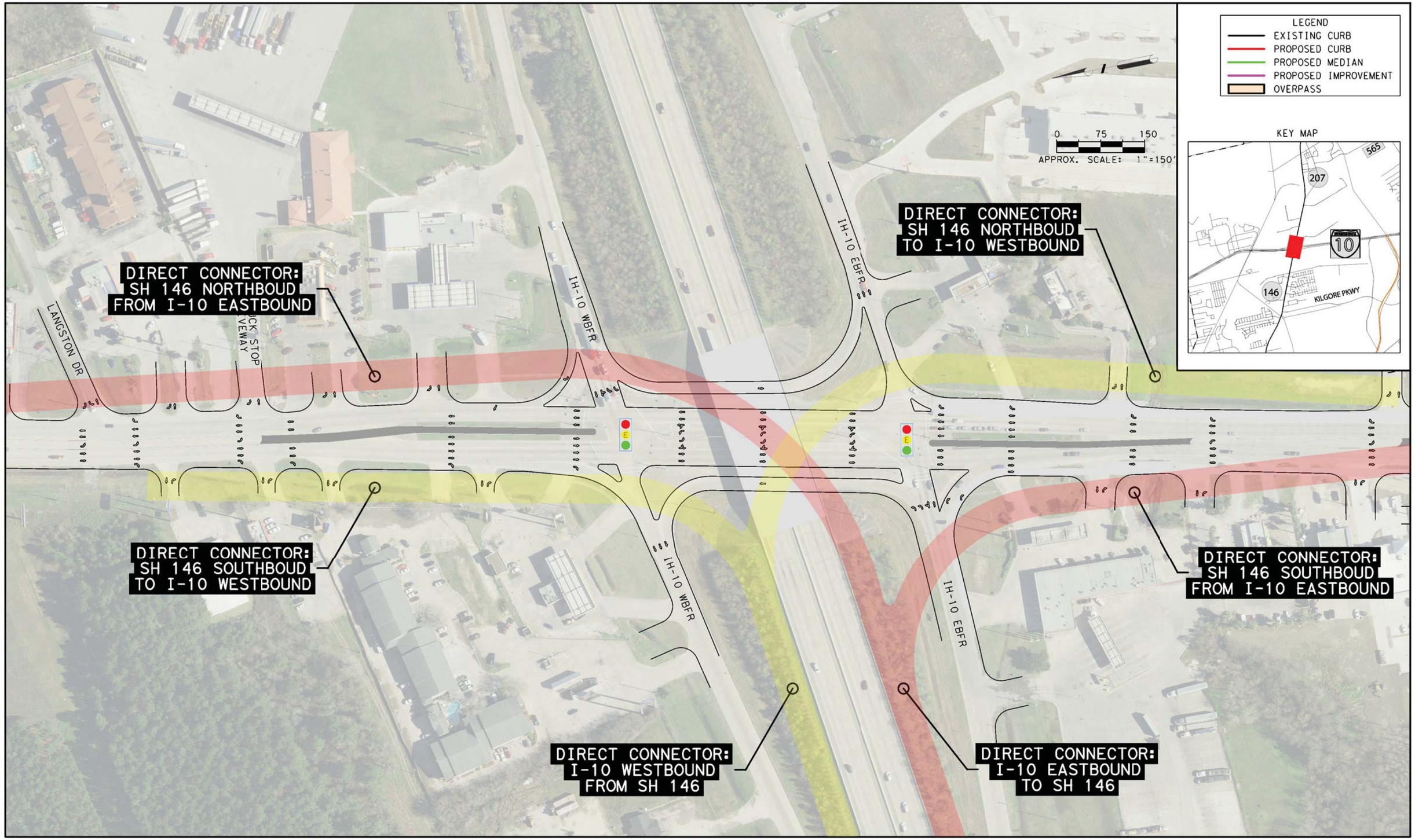
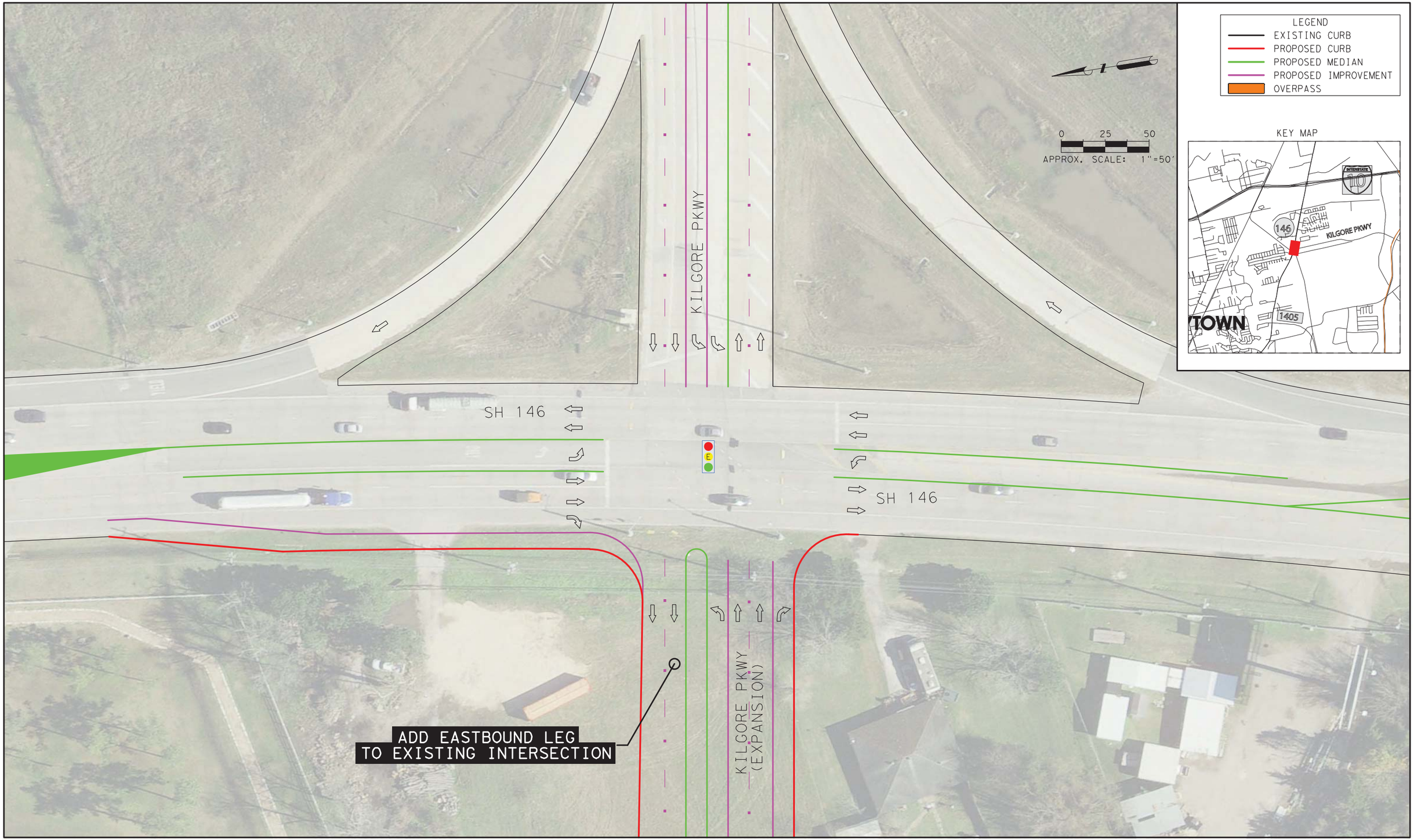


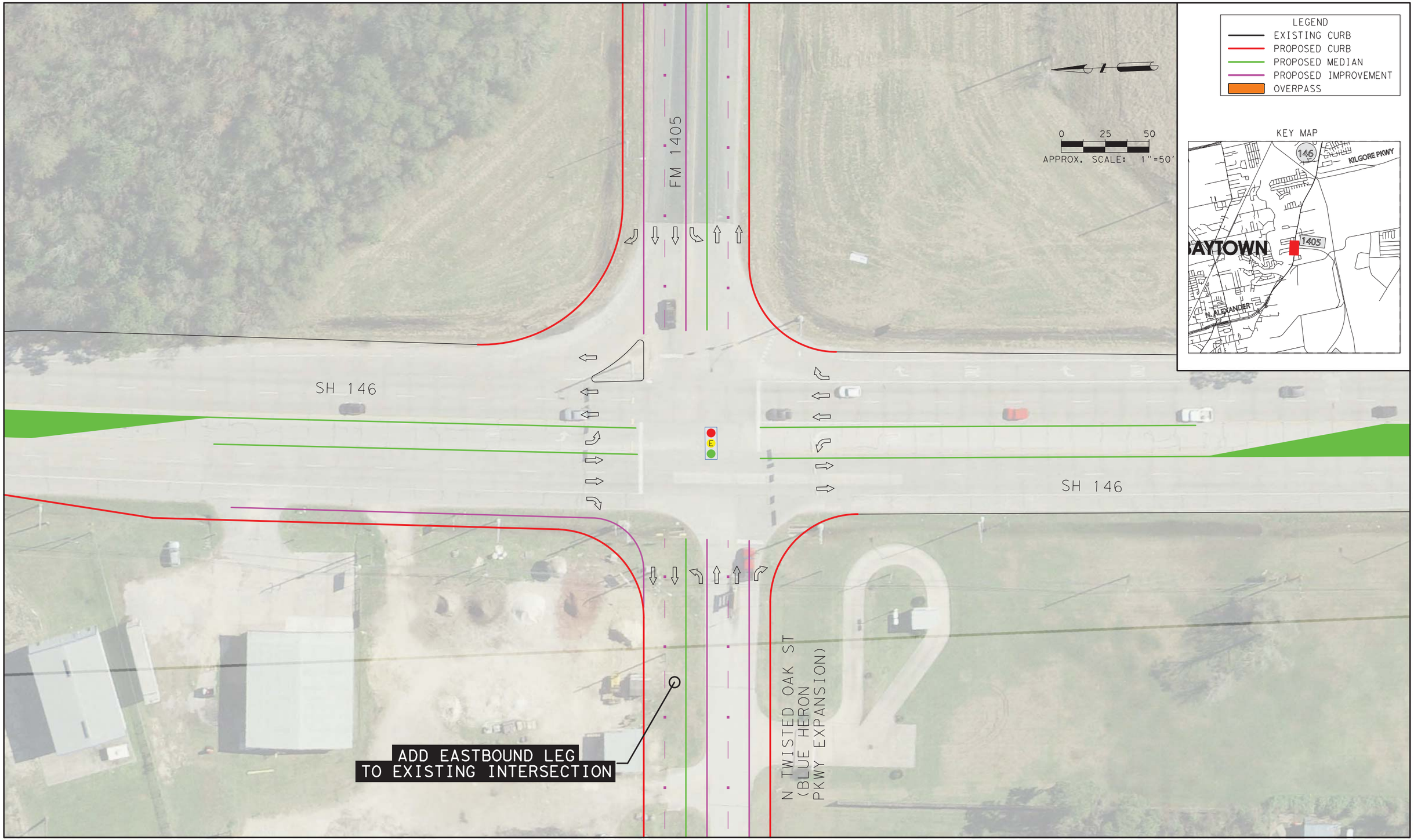
LT1: SH 146 @ IH 10

DATE: 1/10/2018



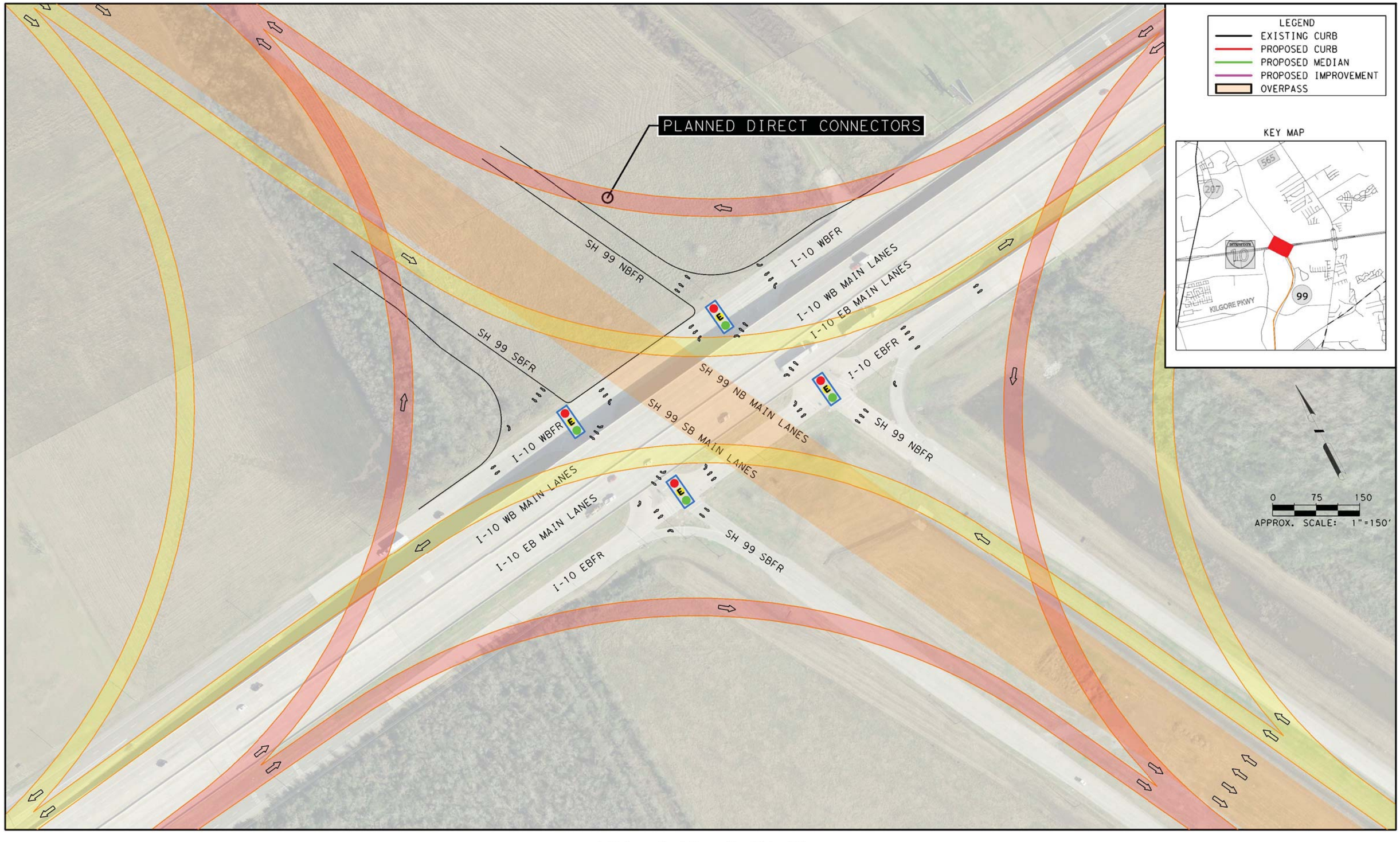
LT2: SH 146 @ Kilgore Pkwy

DATE: 1/10/2018



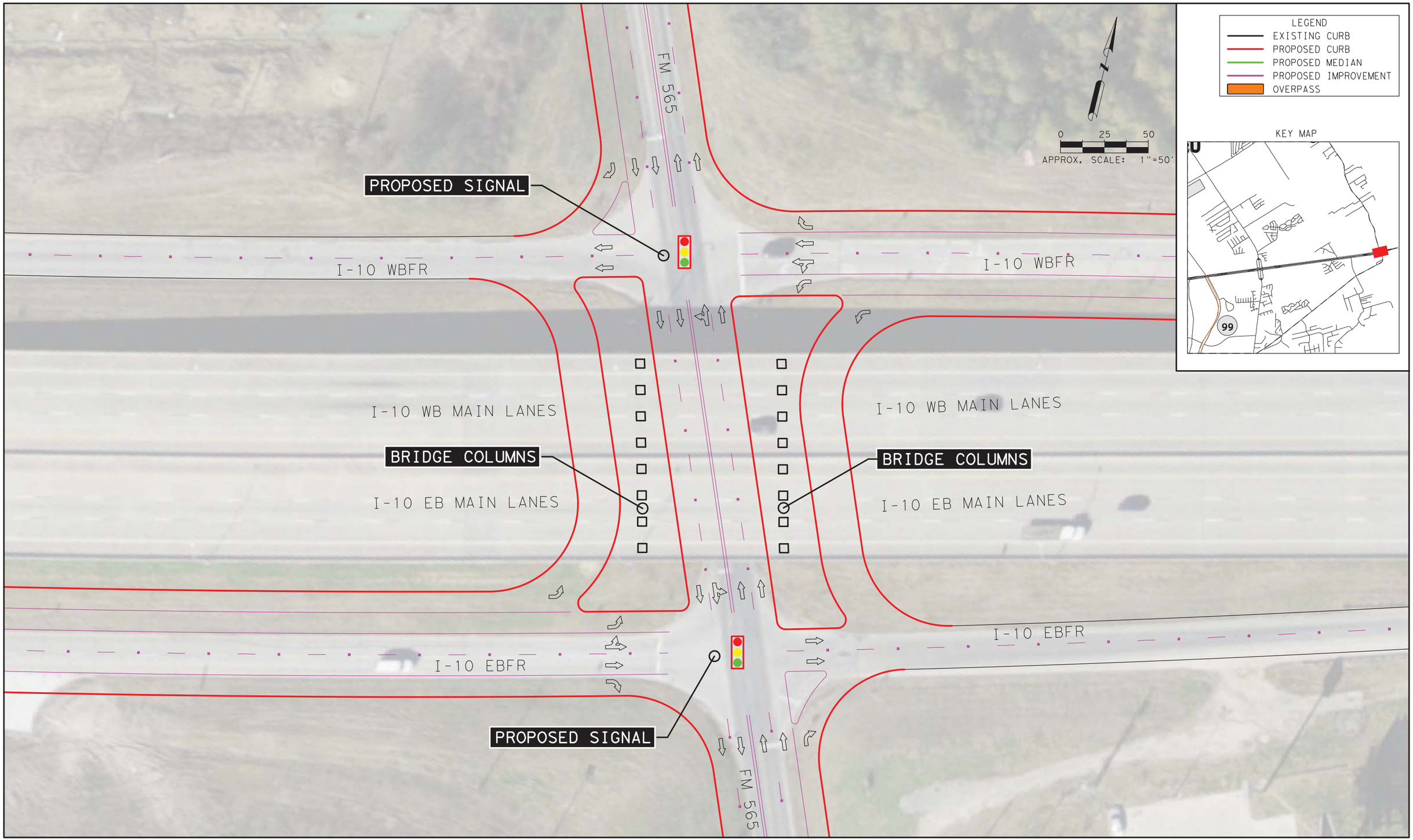
LT3: SH 146 @ FM 1405/N Twisted Oak St

DATE: 1/10/2018



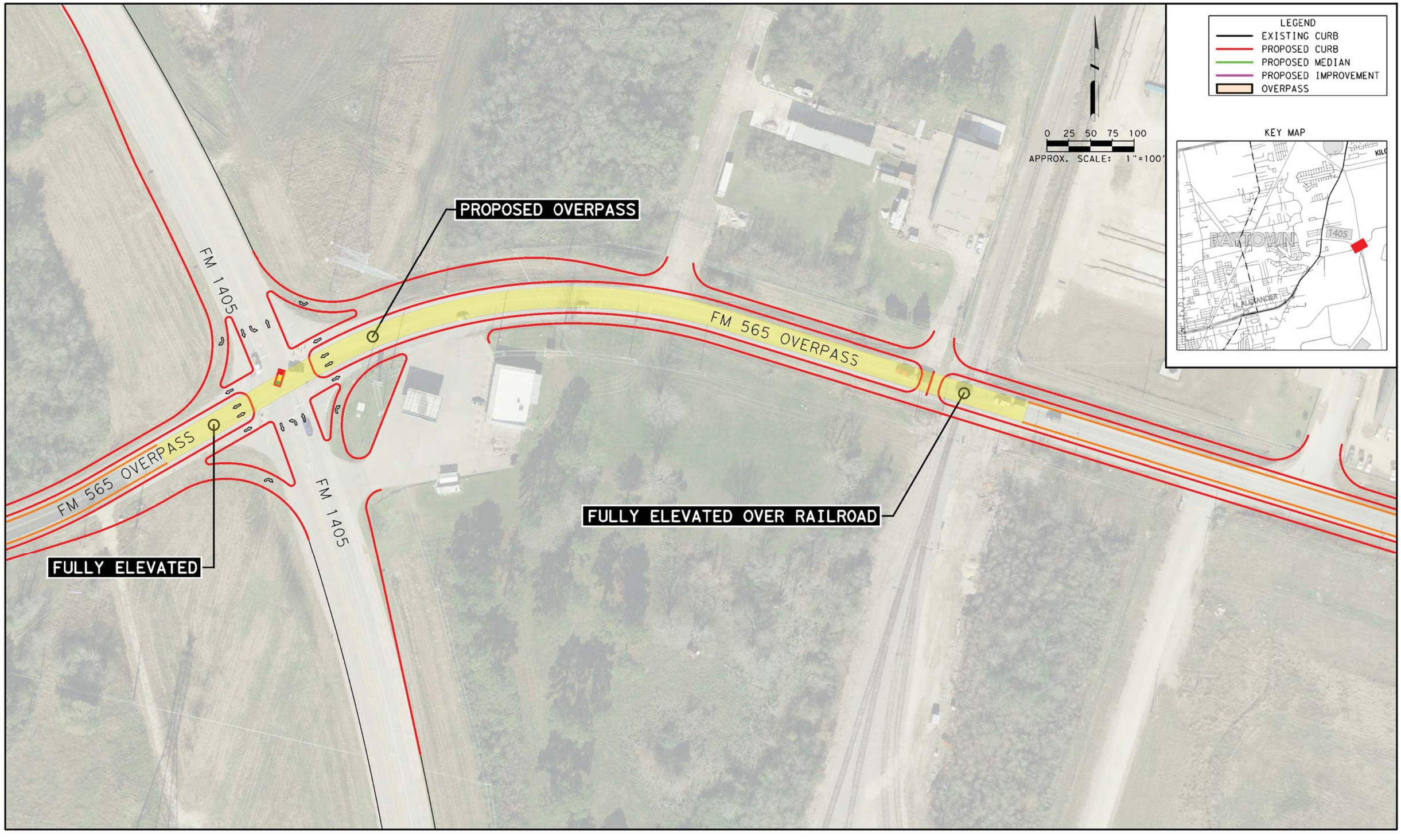
LT4: I-10 at SH 99

DATE: 1/10/2018



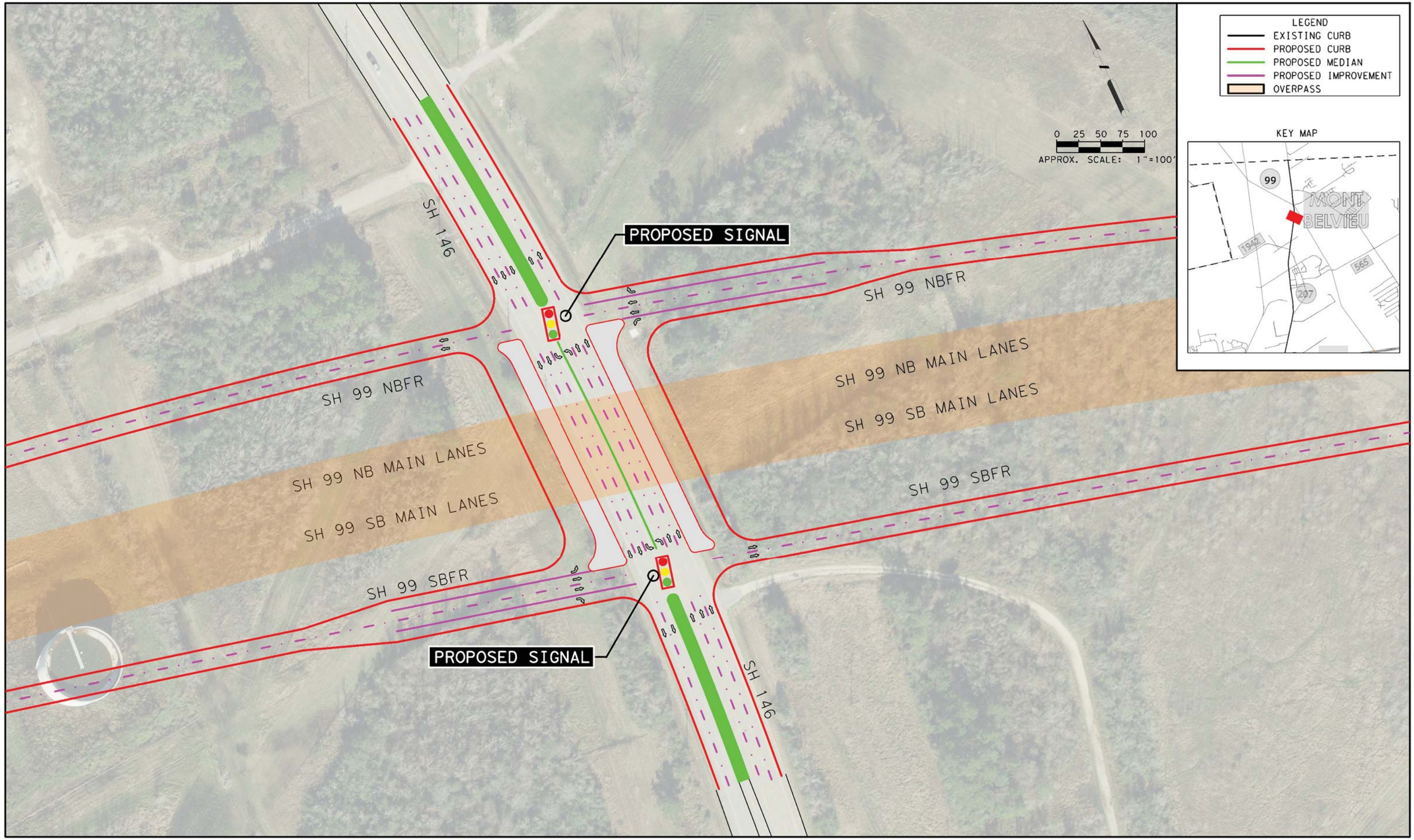
LT5: FM 565 @ I-10

DATE: 1/10/2018



LT6: FM 565 @ FM 1405

DATE: 1/10/2018



LT7: SH 146 @ SH 99

BIKE AND PEDESTRIAN

As Baytown and Mont Belvieu continue to develop within the SH 146 study area, it will be important to consider the transportation needs of non-motorized users when implementing roadway and other mobility improvements. One of the primary benefits of bicycle and pedestrian facilities is that they can support reduced vehicular travel demand on strained roadways by providing trip mode options. However, these facilities also support community desirability and quality of life, recreational opportunities, and economic development.

Given the commercial, industrial, and suburban residential context of the area, most bicycle and pedestrian activity will be best served on off-street facilities separate from vehicular traffic and heavy trucks. Figure 36 identifies recommended connections for both recreational and commuting trip options. 25 miles of bike and trail corridors and 10 miles of pedestrian corridors are recommended throughout the study area.

Routes identified for bikeway and trail connectivity are recommended to develop a core spine network that connects existing parks, natural areas, and major activity centers. These facilities would likely consist of off-street trails along Cedar Bayou or other easements, as well as shared-use paths adjacent to roadways. Sidewalk facility improvements are also recommended along SH 146 and FM 3180 to improve access for pedestrians. Retrofitting SH 146 for non-motorized travel could consist of a multi-use path along one side of the roadway to accommodate both pedestrians and bicycles.

This recommended system of facilities can provide the basis for the start of an active transportation network; however, Baytown and Mont Belvieu are encouraged to pursue other strategies to further study, plan, and implement bicycle and pedestrian facilities in their region. This may include developing a local long-range pedestrian/bicycle plan or partnering with H-GAC to develop a subregional active transportation plan that prioritizes effective ways to build new facilities, improve existing roadways, and promote multimodal travel through safety and education initiatives.

THROUGHFARE PLAN

A county-wide thoroughfare plan should be developed for Chambers County that aligns with the thoroughfare plans developed by Baytown and Mont Belvieu and meets the needs of their residents. Recommendations stated in this plan can serve as a framework for the western portion of this plan.

TRANSIT

Chambers County does not have a designated public transit provider and providing its own public transportation system would be a strain on its capabilities given its lack of technical background in public transit. One effective strategy for providing transit service to the SH 146 area in the near- to mid-term would be partnering with an existing adjacent transit provider such as Harris County Transit. Rural areas would be best served by the Brazos Transit District. Local fixed-route or flexible bus service between residential areas, major employment centers, and local retail and community services is possible in the future, should growth and density continue in Baytown and Mont Belvieu. It would provide needed transportation options for transit-dependent segments of the local population, as well as local commuters, occasional riders, and those who want an alternative to vehicular travel. This transit service under appropriate circumstances could be effective in providing service to the SH 146 corridor and access to the local city centers, while also connecting to existing Harris County Transit service. An addition of a limited “Action Study” of these issues allowing a targeted implementation of the transit service would be needed to maximize the likelihood of success.

Long-term transit service considerations should include studying the feasibility of park-and-ride service to connect Baytown and Mont Belvieu to urban centers within the region, such as westbound toward Houston or eastbound toward Beaumont/Port Arthur. Unlike local routes, park-and-ride routes tend to be focused on providing longer-distance commuter express service to major employment centers as an alternative to commuting by car. The 2009 H-GAC Chambers County Transit Plan proposed a potential intermodal transfer center near the IH 10 and SH 146 intersection and suggested that the facility could also function as a transfer point to local transit service.

As Mont Belvieu and Baytown/Chambers County continue to expand (along with areas further east), additional transit service, including more fixed route and flexible route service, may become needed. The inevitable growth of autonomous vehicles in the coming decades may provide an additional mobility alternative in the form of shuttles, vans, and buses. Harris County Transit has undertaken an analysis of the Chambers County population and determined that there is a high number of elderly and/or disabled individuals who need assistance getting to medical appointments and shopping opportunities (Figure 37). As a result of the review, Chambers County is viewed as a likely candidate for Demand Response service such as that conducted by Harris County RIDES.

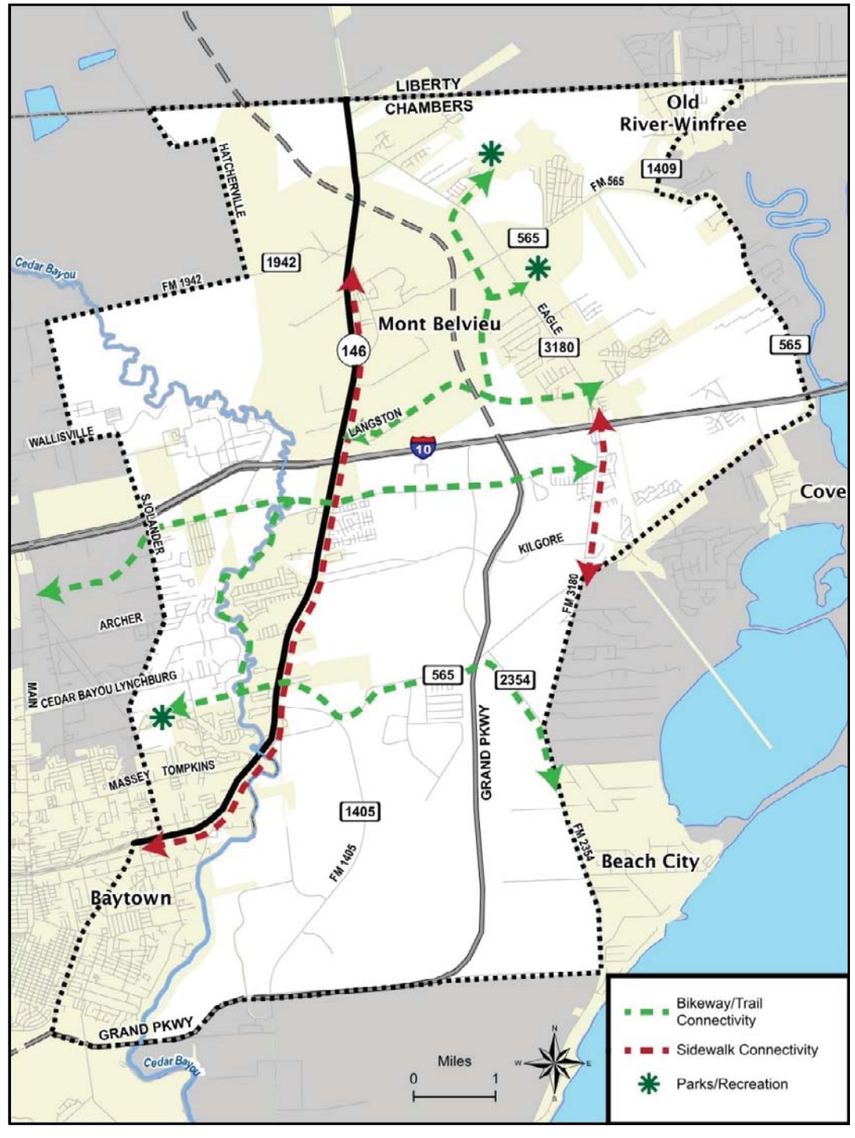


Figure 36 – Long-Term Bike/Pedestrian Recommendations

Chambers County Elderly/Disabled Census 2010

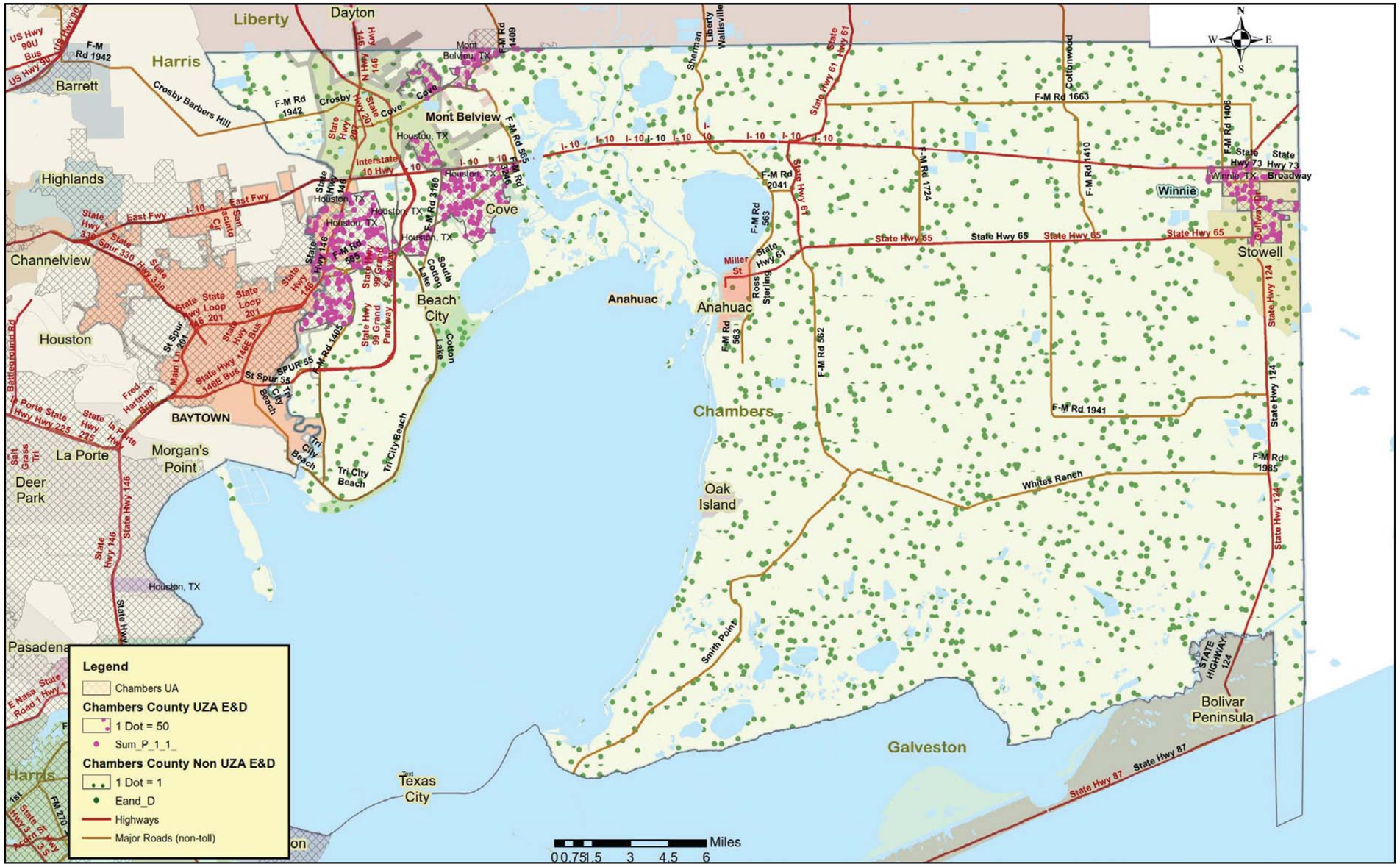


Figure 37 – Chambers County Elderly/Disabled Census 2010

CEDAR BAYOU CROSSING

Purpose and Need

Based on feedback from the steering committee, stakeholders, and public, a limited analysis was performed to evaluate the feasibility of an east-west crossing over Cedar Bayou between IH 10 and Massey-Tompkins. An additional study will be required.

As Baytown continues to experience significant growth in population and business, there is an increased need for safety, mobility, and access improvements. Five preliminary options were considered for the east-west roadway: Needlepoint Road, Archer Road, Cedar Bayou Lynchburg Road, Blue Heron Parkway, and Massey-Tompkins Road. Needlepoint Road was not considered for further evaluation because Old Needlepoint Road is far north (approximately 1/2-mile south of IH 10), and it would not alleviate traffic in the southern portion of SH 146. Similarly, Massey-Tompkins Road was not considered for further evaluation because of the proximity to the existing SH 146 Cedar Bayou crossing.

Three alternatives were selected for further evaluation: E. Archer Road, E. Cedar Bayou Lynchburg Road, and Blue Heron Parkway. Preliminary alignment concepts of the three alternatives are shown in **Figure 38**. A comparison of the three alternatives is shown in **Table 9**, and the following sections enumerate the pros/cons specific to each alternative.

	Option A E. Archer Rd	Option B E Cedar Bayou Lynchburg Rd	Option C Blue Heron Pkwy
Roadway estimated cost*	$36 M	$25 M	$23 M

* 2017 Local Construction Cost Estimate (Source: TxDOT Average Low Bid Unit Prices by District, District 20)

Table 9 – East-West Connection Cost Estimate Comparison

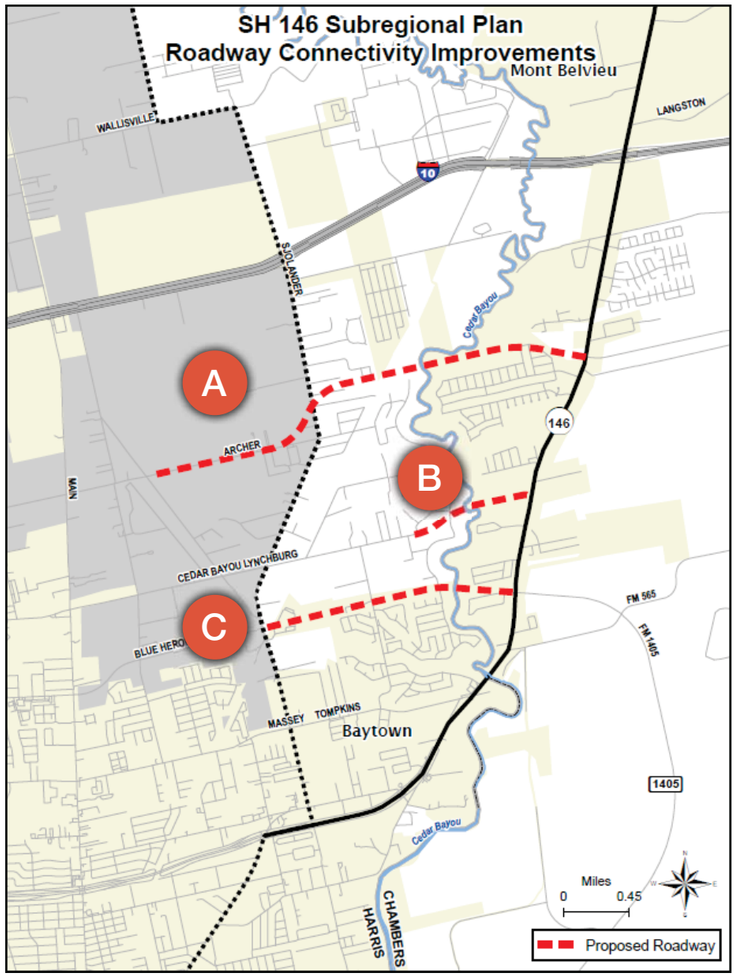


Figure 38 – East-West Connection Alignments

Option A – E. Archer Road

Option A (**Figure 39**) is a two-mile extension of E. Archer Road from west of the Union Pacific Railroad (UPRR) to SH 146. This extension would provide benefits as well as present potential challenges, as outlined below.

Pros:

- Provide connectivity across Cedar Bayou to SH 146 and Kilgore Parkway intersection
- Continuing eastbound on Kilgore Parkway, traffic would have direct access to SH 99
- The new boulevard section, consisting of two lanes on each direction with a raised median, would accommodate future traffic demands in the area

Cons:

- Possible conflicts and costs associated with crossing five existing pipeline easements
- Residential and commercial property owners from both Harris and Chambers counties would be affected
- For this recommendation, approximately one mile of roadway (about 50% of the total length) falls within FEMA's 100-year and 500-year flood hazard zones, which would require large volumes of fill and potentially a high-clearance Cedar Bayou Bridge to prevent flooding
- Costs associated with the acquisition of new ROW
- Costs associated with grade separated permit to cross UPRR ROW
- Cost of constructing three bridges: two UPRR and one Cedar Bayou
- Costs associated with Cedar Bayou crossing permit application with the U.S. Army Corps of Engineers (USACE)

Option B – E. Cedar Bayou Lynchburg Road

Option B (**Figure 40**) is a one-mile extension of E. Cedar Bayou Lynchburg Road from the existing eastern terminus in Harris County to SH 146. This extension would provide benefits as well as present potential challenges as outlined below.

Pros:

- Direct connection to SH 146
- A boulevard section would accommodate future traffic demands
- No pipeline crossings

Cons:

- Residential and commercial property owners from both Harris County would be affected
- Approximately two-thirds of the total roadway length falls within FEMA's 100-year and 500-year flood hazard zones, which would require large volumes of fill and potentially high-clearance Cedar Bayou Bridge to prevent flooding
- Costs associated with acquisition of new ROW
- Costs associated with grade separated crossing of UPRR ROW
- Costs associated with constructing UPRR and Cedar Bayou bridges
- Costs associated with Cedar Bayou crossing permit application with the (USACE)

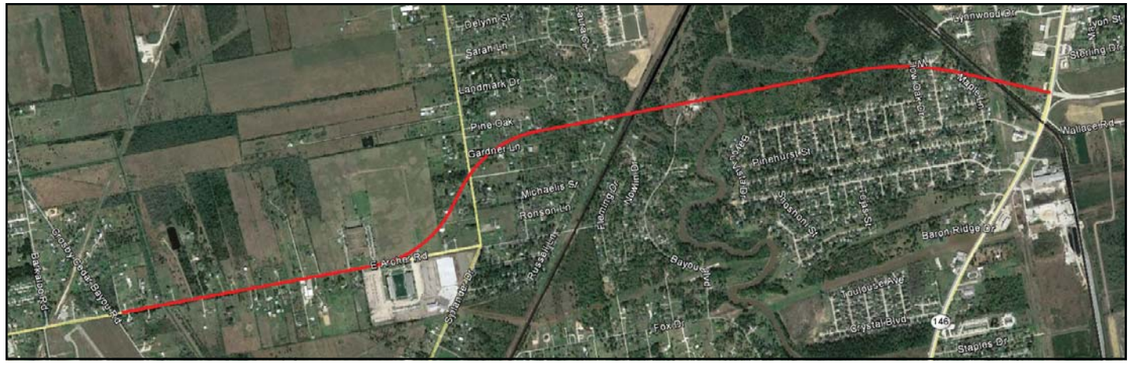


Figure 39 – Option A - E. Archer Road

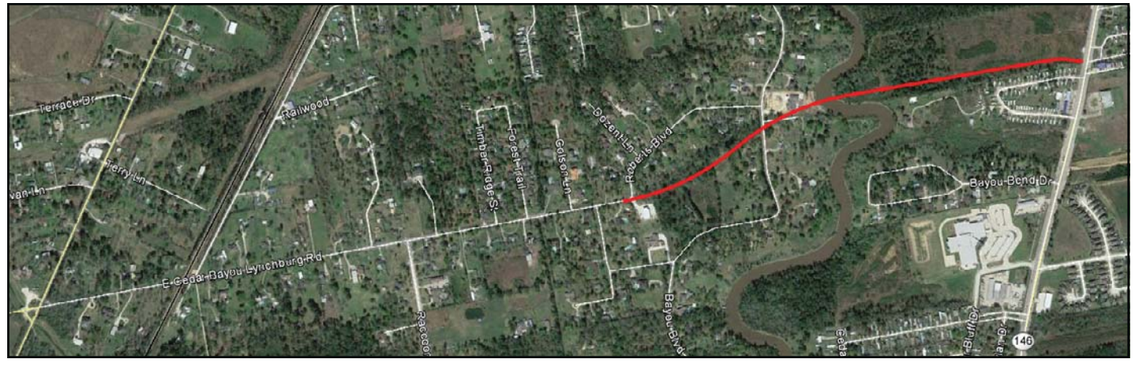


Figure 40 – Option B - E. Cedar Bayou Lynchburg Road

Option C – Blue Heron Parkway

Option C (**Figure 41**) is a 1.75-mile extension of Blue Heron Parkway from Sjolander Road to SH 146. The roadway would be a continuation of the existing Blue Heron boulevard section due east to provide direct connection with SH 146 at the intersection with FM 1405. This extension would provide benefits as well as present potential challenges as outlined below.

Pros:

- Provide direct connection with SH 146 and FM 1405, thus improving mobility
- Connection with FM 1405 would facilitate access to FM 565, which also provides direct access to SH 99
- A continuation of a boulevard section would accommodate future traffic demands
- No pipeline crossings

Cons:

- Residential and commercial property owners from both Harris and Chambers counties would be affected
- Approximately a 0.6-mile segment of this recommended option (approximately 35% of the total roadway length) falls within FEMA's 100-year and 500-year flood hazard zones, which would require large volumes of fill and potentially a high-clearance Cedar Bayou Bridge to prevent flooding
- Costs associated with acquisition of new ROW
- Grade separation crossing of UPRR ROW
- Constructing UPRR and Cedar Bayou bridges
- Cedar Bayou crossing permit application with the (USACE)

Figure 41 – Option C - Blue Heron Parkway

Results Summary

Several comments were received regarding an east-west connection across Cedar Bayou. The pros and cons of each alignment will continue to be evaluated and no decisions will be made without an opportunity for public comment. Further study is recommended which will provide a detailed analysis and comparison of multiple alignments. As part of this study, preliminary analysis was performed to identify the roadway constraints and parcels impacted by each alignment option. A summary of the pertinent roadway quantities and parcel impacts of the east-west connections is shown in **Table 10**. Additional information regarding the east-west connection analysis is available as an **Appendix**.

Evaluation Criteria	Option A – E. Archer Rd	Option B - E Cedar Bayou Lynchburg Rd	Option C - Blue Heron Pkwy
Criteria	**Quantity**	**Quantity**	**Quantity**
Length of roadway (at-grade) (feet)	20,000	20,000	20,000
Square-feet of ROW needed (assuming 100' ROW boulevard section with raised median) (square feet)	1,400,000	1,300,000	1,300,000
Area of bridge structure (over floodplain) (square feet)	360,000	240,000	200,000
Area of bridge structure (over RR/bayou) (square feet)	90,000	60,000	60,000
Pipeline crossings	Y	N	N
Residential parcels impacted	Y	Y	Y
Commercial parcels impacted	Y	Y	Y
Institutional parcels impacted	Y	Y	Y
Other parcels impacted	Y	N	N

*2017 Local Construction Cost Estimate (Source: TxDOT Average Low Bid Unit Prices by District, District 20)

**Source: Chambers County and Harris County Appraisal District Records

Table 10 – East-West Connection Analysis Comparison

POLICY

Economic Development Solutions

Economic development solutions can overlap cities and counties and include the use of multiple tools to creatively address a variety of transportation needs. There are tools and incentives, coupled with updated regulatory standards, that can successfully be deployed along SH 146 to accelerate growth and development along the corridor.

The City of Baytown Future Land Use Plan identifies the SH 146 corridor as a commercial corridor surrounded by low-medium density residential property. Current conditions in the City of Baytown along the target area of SH 146 include multiple property types and land uses that are the result of the annexation of unincorporated areas that lacked building codes, as well as subsequent construction of structures under an evolving set of municipal land use ordinances. This combination of land uses can have a limiting effect on the highest and best redevelopment potential of a corridor because of a relative lack of density to support retail and office absorption.

Conversely, the City of Mont Belvieu has seen much of its industrial growth concentrate along the SH 146 corridor, thus absorbing most of the developable land between IH 10 and FM 1942. These heavy industrial land uses each offer very specific challenges to their individual redevelopment, and (as a group) create a complex barrier to redevelopment and limit the type and intensity of new developments in surrounding areas. The portion of Mont Belvieu situated along FM 1942 west of SH 146 offers more development potential. A more comprehensive economic development approach can be taken to attract development and redevelopment that benefits the businesses along the SH 146 corridor while improving and expanding infrastructure improvements along both corridors.

Actionable Improvements

Multimodal Mobility Options

- Develop and implement Complete Streets design standards for arterials and collector streets for western Chambers County.
  - Require an “impact fee” from developers based on projected traffic for new developments.
- Develop and implement a comprehensive hike/bike plan for western Chambers County.
  - Require an “impact/parks fee” from all new developments, regardless of use.
  - The fee can be based off the number of residential units, amount of square feet for commercial, office, retail, etc. and amount of traffic generated for industrial.
  - The fee can be used to fund the planning and construction of the hike / bike shared-use trail system.

Connectivity and Access

- Develop and implement access management standards along major and minor arterials for western Chambers County.
- Require “stub” streets (minimum block lengths) in residential subdivisions to ensure connectivity between subdivisions.
- Require shared access agreements or other cross-access provisions for commercial developments to reduce the number of driveways on major arterials.
- Allow only right turns once access management standards are put into place
  - Implement minimum driveway spacing based off posted speed limits
- Require cross streets to align.
- Chambers County needs to develop a Thoroughfare Plan with subdivision regulations.
- Keep thoroughfare plans up to date.
- Corridor Identity
- Develop and implement a Corridor Identity Plan for western Chambers County.
  - Require irrigation, parking lot shrubs and trees, sidewalks along all ROWs, and street trees for all new developments and all developments improving over 50% of the value of the current development
- Only allow commercial, light industrial, office, and retail along major arterials such as SH 146 and IH 10.
  - Require shared access to reduce the number of driveways
  - Driveways will be based off “first come first served” process
  - Enforce TxDOT access management standards
  - Require acceleration/deceleration lanes for all driveways along major thoroughfares
- Establish development requirements to enhance corridor aesthetics and community identity.
  - Landscaping and screening of parking areas, outside storage, and industrial uses adjacent to corridor frontage
  - Enhanced architectural standards for nonresidential development
  - Improved sign standards to reduce corridor visual clutter

380/381 Agreements

Tools such as those provided under Chapter 380 and 381 of the Local Government Code allow for a developer to advance funding for on-site and off-site public improvements, and allow reimbursement for on-site private improvements. The cities of Baytown and Mont Belvieu could implement aggressive public-private partnerships to incentivize and leverage new growth and investment along SH 146 to finance significant off-site improvements by using joint Chapter 381 Agreements with business operators and/or land developers. Under the terms of such an agreement, the private-sector partner would agree to provide private funding and management of the design and construction of the project(s) in exchange for the repayment of those funds over time via annual grants funded by the incremental tax revenues generated by their new investment along SH 146 within a Revitalization Incentive Zone.

Post Hurricane Harvey Concerns

Significant flooding and resulting damage occurred across the study area as a result of Hurricane Harvey. Currently, state and local entities are determining how best to improve resiliency and minimize damage from future storms. Harris County recently approved new building code regulations to require homes and business located within the 100-year floodplain to be built two feet above the 500-year floodplain to mitigate flooding to structures – this regulation does not apply to Harris County lands located within municipalities such as Houston or Tomball. These local jurisdictions are considering improved regulations similar to those recently passed by Harris County. Measures that Chambers and Harris Counties and the Cities of Baytown and Mont Belvieu should consider include:

- Adjusting building code to require higher finished floor elevation
- Examining maintenance procedures/schedules to ensure obstructions to drainage facilities (i.e. inlets, grates, culverts) are removed routinely
- Infrastructure hardening where feasible (i.e. raising traffic signal controllers)
- Review of existing evacuation routes for elevation and capacity
- Conducting City and Countywide resiliency studies
- Working with the State of Texas and appropriate Federal agencies such as FEMA to determine best practices for implementing resiliency, emergency response measures and updates to the existing FEMA flood maps (similar to what was done after Tropical Storm Allison)

SH 99 Toll Policy

The public and several stakeholders firmly believe that reducing or eliminating tolls on the currently underutilized SH 99 would reduce traffic on SH 146. In 2017, TxDOT awarded a contract to begin constructing the remainder of Section I and Section H of the Grand Parkway which will extend the existing toll facility to connect to US 90 and IH 69. This connection should increase traffic volumes along the existing section of SH 99; however, a Pilot Project could be undertaken to examine the effect of reducing SH 99 tolls on relieving SH 146 traffic.

Through a contract with the Federal Highway Administration, tolls could be reduced or eliminated along SH 99 for a predetermined time period to examine the amount of traffic shifting from SH 146. Traffic data would be collected prior to, during and after the Pilot Project to determine the relationship between toll levels and SH 146 traffic. Coordination with FHWA and TxDOT would be required and TxDOT would need to be reimbursed (FHWA grant) for any lost revenue during the pilot project.

Innovative Technology

Given current innovations in transportation technology, opportunities exist to explore this technology within the study area, including:

- Pilot program to operate autonomous/connected freight vehicles along SH 146 for non-hazardous loads
- Employ innovative technology to further enhance safety and improved mobility in the corridor."
- Harness ride share applications to supplement formal transit systems, particularly demand response routes

SH 146 Elevated

The proposed long- and short-term solutions will provide acceptable mobility in future years. Neither the steering nor stakeholder committees suggested elevation SH 146 through the study area; however, several comments were received at the public meetings inquiring if this would be advisable. The project team qualitatively examined the benefits and impacts of constructing elevated SH 146 mainlines and providing ground level access roads through the study area. ROW to elevate SH 146 and provide access roads is extremely limited north of IH 10 in Mont Belvieu due to the numerous pipelines adjacent to and crossing SH 146. The proximity of industrial plants to the SH 146 and the associated number of pipelines effectively renders this option unfeasible. To the south of IH 10 in Baytown, retail, residential and community development is located close to the ROW. The number of pipelines along and crossing SH 146 in Baytown is lower than in Mont Belvieu, but would still require considerable cost to relocate.

No recommendation was made to elevate SH 146 through the study area for the following reasons:

- Proposed long- and short-term solutions will provide acceptable mobility in future years
- Numerous pipelines adjacent to and crossing SH 146 in Mont Belvieu
  - Cost
  - Industrial facility disruption
- Business and community impacts in Baytown

Chapter 9

Plan Cost and Benefit

FM 565 at Ameriport Parkway (2010)

CHAPTER 9: PLAN COST AND BENEFIT

COST ESTIMATES

Short-Term Cost Estimate

Preliminary construction cost estimates of short-term improvements were developed based on the quantity of materials and unit price of materials. Cost estimates provided are based on the known information at this time and are expected to vary from actual construction costs. Cost estimates (by sheet) for short-term improvements are shown in Table 11 and Table 12.

Short-Term Improvements Peripheral Intersection (By Sheet)		
Sheet	Intersection	Cost Estimate*
1	SH 146 at Tompkins Dr	$ 25,000
2	SH 146 at Massey Tompkins Rd	$ 250,000
3	SH 146 at Ferry Rd	$ 50,000
4	SH 146 at N. Alexander Dr	Funded
5	N Alexander Dr (SH 146B) at SH 146	$ 35,000
6	FM 1942 at Hadden Rd	$ 120,000
7	FM 1942 at Hatcherville Rd	$ 110,000
8	FM 565 at Eagle Drive	$ 1,200,000
9	Sjolander Rd at I-10	$ 10,000
10	SH 99 at I-10	Funded
11	FM 3180 at I-10	Funded
12	FM 565 at I-10	$ 10,000
13	FM 565 at FM 1405	Funded
14	FM 565 at Ameriport Pkwy	Funded
15	FM 565 at SH 99	Funded
16	FM 565 at FM 2354 (S Cotton Lake Road)	$ 100,000
17	FM 565 at FM 3180	Funded
18	SH 146B at SH 99	Funded
19	FM 1405 at SH 99	Funded
	Contingency (~20%)	**$ 390,000**
	Total (Unfunded)	**$ 2,300,000**

*2017 Local Construction Cost Estimate
(Source: TxDOT Average Low Bid Unit Prices by District, District 20)

Table 11 – Short-Term Construction Cost Estimates: Peripheral Intersections

Short-Term Improvements - SH 146 Corridor (By Sheet)		
Sheet	Intersection	Cost Estimate*
1	No Intersections	$15,000
2	Kings Point Road	$23,000
3	Eagle Drive	$610,000
4	Placid Dr., Cherry Point	$280,000
5	No Intersections	$290,000
6	No Intersections	$270,000
7	Fitzgerald Road	$240,000
8	FM 1942, Loop 207 N	$580,000
9	Equistar Chemical Driveway, Winfree Road	$180,000
10	FM 565	$375,000
11	Williams St., Chevron Truck Driveway	$220,000
12	No Intersections	$240,000
13	Loop 207S, Targa Driveway, Targa Employee Parking, Sun Oil Rd	$310,000
14	Warren	$340,000
15	Cedar Hill	$330,000
16	Langston, Truck Stop Driveway, IH 10 WBFR	$1,490,000
17	IH 10 EBFR & SH 146, Walmart Driveway	$1,890,000
18	Main Walmart Driveway	$770,000
19	Old Needlepoint Rd., Pine Meadows	$765,000
20	Country Squire Blvd.	$220,000
21	Lynnwood Sterling Dr.	$200,000
22	Kilgore Pkwy, Pinehurst St	$260,000
23	El Chaco, Baron Ridge	$260,000
24	Shell Rd., Crystal Blvd.	$180,000
25	Staples	$280,000
26	Bayou Bend, Clark Elementary School Driveway, Devinwood Dr.	$280,000
27	Cedar Landing	$390,000
28	FM 1405, N Twisted Oak St	$400,000
29	Lincoln Cedars, FM 565	$750,000
30	No Intersections	$6,000
	Contingency (Approx. 20%)	**$2,556,000**
	Total (Unfunded)	**$15,000,000**

*2018 Local Construction Cost Estimate (Source: TxDOT Average Low Bid Unit Prices by District, District 20)

Table 12 – Short-Term Construction Cost Estimates: SH 146 Corridor

SHORT-TERM IMPROVEMENT SUMMARY

SH 146 Corridor and Peripheral Intersections

Sheet	Intersection	Number of Improvements	Estimated Cost *	MOBILITY															ACCESS									
				Roadway					Intersection					Signal					Median						Driveway			
				Close Road	Install Island	Widen Road	Realign Road	New Road	Left Turn Lane	Right Turn Lane	Acceleration Lane	Align Curve	Align Travelway	Remove Signal	Install Stop Sign	Revise Signal Timing	Modify Traffic Signal	Install Signal	Raised Median	S-Median	Reverse S-Median	Turbo T Median	Median Opening	No Median	Close Driveway	Provide Share Access	Add Sidewalk	Driveway Modification
SH 146 Access Management Treatments																												
1	No Intersections	1	15,000																				1				
2	Kings Point Road	1	23,000																				1				
3	Eagle Drive	8	610,000		2				1	2								1	1				1				
4	Placid Drive, Cherry Point Road	4	280,000						1										2	1								
5	No Intersections	3	290,000																2				1					
6	No Intersections	4	270,000						1										2	1								
7	Fitzgerald Road	9	240,000						3										3	3								
8	FM 1942, Loop 207 N	9	580,000	1	1				1	1				1			1		2				1					
9	Equistar Chemical Driveway, Winfree Road	7	180,000						3										2	1			1					
10	FM 565	7	375,000						1	2								1	2				1					
11	Williams Street, Chevron Truck Driveway	8	220,000						2										2	1			2		1			
12	No Intersections	3	240,000						2										1									
13	Loop 207S, Targa Driveway, Targa Employee Parking, Sun Oil Road	9	310,000		1		1		3							1			1				2					
14	Warren Road	16	340,000						3										2	1			1		2	5	2	
15	Cedar Hill Drive	15	330,000						1	1	1								2			1				5	4	
16	Langston, Truck Stop Driveway, IH 10 WBFR	31	1,490,000		4	1			4	3	1								2	2			1		1	8	4	
18	Main Walmart Driveway	16	770,000			4			3	1									2				2				4	
19	Old Needlepoint Road, Pine Meadows Blvd	19	765,000			4			2	1	1		2					1	1				1		3		2	1
20	Country Squire Blvd.	10	220,000						3										2	1			1		2			1
21	Lynnwood Sterling Drive	6	200,000						1		1								1			1			2			
22	Kilgore Parkway, Pinehurst Street	10	260,000						4										2	1			1		1			1
23	El Chaco Drive, Baron Ridge Drive	4	260,000						1										1				1		1			
24	Shell Road, Crystal Blvd.	11	180,000			2			3		1								1			1			3			
25	Staples Drive	10	280,000						3										2	1					2	2		
26	Bayou Bend, Clark Elementary School Driveway, Devinwood Drive	10	280,000						3	1									2	2			1			1		
27	Cedar Landing Drive	8	390,000						2	1									2	1						1		1
28	FM 1405, N Twisted Oak Street	8	400,000		1				3	1	1								1				1					
29	Lincoln Cedars Drive, FM 565	15	750,000		1			1	3	2							1		2	1			1		1	2		
30	No Intersections	1	$6,000																1									

Short-Term Improvement Summary

SH 146 Corridor and Peripheral Intersections

Sheet	Intersection	Number of Improvements	Estimated Cost *	MOBILITY															ACCESS									
				Roadway					Intersection					Signal					Median						Driveway			
				Close Road	Install Island	Widen Road	Realign Road	New Road	Left Turn Lane	Right Turn Lane	Acceleration Lane	Align Curve	Align Travelway	Remove Signal	Install Stop Sign	Revise Signal Timing	Modify Traffic Signal	Install Signal	Raised Median	S-Median	Reverse S-Median	Turbo T Median	Median Opening	No Median	Close Driveway	Provide Share Access	Add Sidewalk	Driveway Modification
Peripheral Intersection Improvements																												
1	SH 146 at Tompkins Drive	3	25,000			2													1									
2	SH 146 at Massey Tompkins Road	11	250,000			4			2	1							1		2				1					
3	SH 146 at Ferry Road	6	50,000			4													1									1
4	SH 146 at N. Alexander Drive	0	Funded																									
5	N Alexander Drive (SH 146B) at SH 146	3	35,000						1					1						1								
6	FM 1942 at Hadden Road	4	120,000						2	2																		
7	FM 1942 at Hatcherville Road	2	110,000							1						1												
8	FM 565 at Eagle Drive	16	1,200,000		4	4				4	1						1		2									
9	Sjolander Road at I-10	1	10,000						1																			
10	SH 99 at I-10	13	Funded		2			2	2	2	1							4										
11	FM 3180 at I-10	24	Funded	4	4	4			6	4								2										
12	FM 565 at I-10	1	10,000						1																			
13	FM 565 at FM 1405	0	Funded																									
14	FM 565 at Ameriport Parkway	0	Funded																									
15	FM 565 at SH 99	2	Funded															2										
16	FM 565 at FM 2354 (S Cotton Lake Road)	5	100,000		1				1	3																		
17	FM 565 at FM 3180	0	Funded																									
18	SH 146B at SH 99	2	Funded															2										
19	FM 1405 at SH 99	2	Funded															2										
	Contingency (Approx. 20%)		2,900,000																									
	Total	**389**	**17,300,000**	**5**	**25**	**32**	**1**	**3**	**79**	**35**	**9**	**0**	**2**	**2**	**0**	**2**	**4**	**15**	**54**	**20**	**0**	**3**	**20**	**3**	**19**	**31**	**20**	**5**

Long-Term Recommendations

High-level, preliminary construction cost estimates of long-term improvements were developed for each capital improvement. The quantities and unit costs for each improvement type are shown in the **Table 13**. Cost estimates (by sheet) for key intersection long-term improvements are shown in **Table 14**.

Long-Term Improvement Type	Quantity	Unit	Unit Cost	Cost Estimate* (In Millions)
Install Signal	8	Each	$325,000	2.6M
Bridge Crossing	5	Each	$1,500,000	7.5M
Railroad Grade Separation	12	Each	$1,750,000	21M
Intersection Modification	8	Each	$100,000	0.8M
New Major Roadway	26	Mile	$10,000,000	260M
New Minor Roadway	15	Mile	$5,000,000	75M
Widen Roadway	63	Mile	$4,500,000	283.5M
New, Bike Corridor	25	Mile	$750,000	18.75M
New, Sidewalk Corridor	10	Mile	$150,000	1.5M
Key Intersection Improvements	7	Each	Varies	60M

*2018 Local Construction Cost Estimate (Source: TxDOT Average Low Bid Unit Prices by District, District 20)

Table 13 – Long-Term Improvement Cost Estimates

Sheet	Intersection	Improvement Notes	Cost Estimate*
LT1	SH 146 @ IH 10	Direct Connect (Or Add 3-level)	40-60M
LT2	SH 146 @ Kilgore Pkwy	EWC Intersection Redesign	1-2M
LT3	SH 146 @ FM 1405/N Twisted Oak St	EWC Intersection Redesign	1-2M
LT4	I-10 at SH 99	Direct Connectors	Funded
LT5	FM 565 @ I-10	Widening/U-Turn Lanes	1.5M
LT6	FM 565 @ FM 1405	Overpass	2M
LT7	SH 146 @ SH 99	Diamond	Funded

*2018 Local Construction Cost Estimate (Source: TxDOT Average Low Bid Unit Prices by District, District 20)

Table 14 – Long-Term Intersection Improvement Cost Estimate: Key Intersections

Estimated Plan Costs Summary

Estimated plan costs were divided between short-term and long-term recommendations. Short term recommendations can be implemented within five years and long-term recommendations within six years or greater. The total plan costs are as follows:

Short Term	$15-20 Million
Long Term	$600-720 Million
Total	**$615-740 Million**

ANTICIPATED PLAN BENEFITS

Benefits Summary

Benefits of short-term recommendations include improvements to mobility, safety, and air quality. Based on a comparison of year 2025 traffic operations along SH 146 with and without short-term recommendations, the following benefits are anticipated:

- **Reduction in the number of crashes:**
  - Annual crash cost savings of $4.2 million
- **Enhancement to traffic operations:**
  - Reduce travel time during peak periods by 22%
  - Improve speed during peak periods by 32%
  - Annual travel time savings of $5.5 million during peak periods
- **Improvements to air quality**
  - Reduction of 16% of Volatile Organic Compounds (VOC), carbon monoxide (CO), and nitrogen oxides (NOx) levels.

The long-term recommendations also improve mobility, safety, and air quality. However, these improvements are more difficult to quantify due to the uncertainty of traffic projects, the timeline of improvement construction, and changes in technology Benefits of long-term improvements, described in a general sense, are as follows:

- Enhancement to safety and streetscapes by improved bike and pedestrian facilities
- Congestion mitigation, increased connectivity, and reduced mobility barriers by constructing roadway and intersection improvements
- Address commercial vehicle issues by construction of railroad overpasses and implementing new policy
- Implement transit services for elderly and disabled

Crash Cost Savings

Discussed at length in **Chapter 3**, crash data for the five-year period from 2011 through 2015 was analyzed. During the five-year period, 688 crashes occurred along SH 146. The estimated annual crash costs along SH 146 in the study area is approximately $70 million ($14 million per year). Therefore, if a 25% reduction in crashes is realized because of the raised median installation, the annual benefit is approximately $3.5 million. Crash occurrences and costs associated with each crash type is shown in **Table 15**.

Crash Type	SH 146 Crashes	Cost*	SH 146 Crash Cost
Fatal	10	$ 4,538,000	$ 45,380,000
Incapacitating Injury	30	$ 230,000	$ 6,900,000
Non-Incapacitating Injury	72	$ 58,700	$ 4,226,400
Possible Injury	484	$ 28,000	$ 13,552,000
No Injury	92	$ 2,500	$ 230,000
Total	**688**		**$ 70,288,400**

*Source: Estimating the Costs of Unintentional Injuries, 2012, National Safety Council, 2013

Table 15 – Crash Cost Savings Along SH 146

Long-Term Improvement Summary - SH 146 Corridor and Peripheral Intersections

Street	From	To	Length (Miles)	Type of Improvement	Estimated Cost*
Blue Heron Parkway	Railroad Crossing			RR Grade Sep.	$1,750,000
Blue Heron Pkwy	Cedar Bayou			Bridge Crossing	$1,500,000
E Archer Rd	Cedar Bayou			Bridge Crossing	$1,500,000
E. Cedar Bayou Lynchburg Rd.	Cedar Bayou			Bridge Crossing	$1,500,000
E. Archer Road	Railroad Crossing			RR Grade Sep.	$1,750,000
E. Archer Road **	Main Street	Russell Lane	2	Widen Road	**
E. Cedar Bayou Lynchburg Rd.	Railroad Crossing			RR Grade Sep.	$1,750,000
E. Cedar Bayou Lynchburg Rd.	Sjolander	Roberts Road	1	Widen Road	$4,500,000
E. Wallisville Road**	Garth Road	W. of Main Street	1	Widen Road	**
E. Wallisville Road**	Main Street	Sjolander Road	2	Widen Road	**
Eagle Drive	SH 146	FM 565	2	Widen Road	$9,000,000
Eagle Drive/FM 3180	I-10 EB Frontage Road			Intersection Mod.	$100,000
Fisher	SH 99	FM 2354	2	Widen Road	$9,000,000
FM 1405	SH 146	SH 99	5	Widen Road	$22,500,000
FM 1409 ***	FM 565 (North of I-10)	I-10	3	New Road	$30,000,000
FM 1409 ***	I-10	FM 565 (South of I-10)	1	New Road	$10,000,000
FM 1942	Railroad Crossing			RR Grade Sep.	$1,750,000
FM 1942	Hadden Road			Signal	$325,000
FM 1942	Main Street	SH 146	5	Widen Road	$22,500,000
FM 2354	FM 565 (South of I-10)	FM 3180	1	Widen Road	$4,500,000
FM 3180	Dutton Lake	FM 2354	1	Widen Road	$9,000,000
FM 3180	FM 2354	Fisher Rd	3	Widen Road	$13,500,000
FM 3180	I-10	FM 2354	3	Widen Road	$13,500,000
FM 565	I-10			Widen and U-turns	$1,500,000
FM 565	RR/FM 1405			RR Grade Sep.	$2,000,000
FM 565	I-10 WB/EB Frontage Roads			Signal	$650,000
FM 565 (North of I-10)	Loop 207	Eagle Drive	2	Widen Road	$9,000,000
FM 565 (North of I-10)	BB Lane	I-10	3	Widen Road	$13,500,000
FM 565 (North of I-10)	Eagle Drive	East of FM 1409	3	Widen Road	$13,500,000
FM 565 (South of I-10)	Railroad Crossing			RR Grade Sep.	$1,750,000
FM 565 (South of I-10)	UPRR	Ameriport	1	Realignment	$10,000,000
FM 565 (South of I-10)	FM 3180	Future FM 1409	2	Widen Road	$9,000,000
FM 565 (South of I-10)	Future FM 1409	I-10	2	Widen Road	$9,000,000
FM 565 (South of I-10)	SH 146	East of FM 1405	1	Widen Road	$4,500,000
FM 565 (South of I-10)	Ameriport Parkway	FM 3180	3	Widen Road	$13,500,000
Garth	FM 1942	E. Wallisville Road	2	Widen Road	**
Hatcherville	FM 1942	CR 486	3	Widen Road	$13,500,000
Hatcherville	Smooth curves		1	Realignment	**
I-10	SH 99			Direct Connectors (8)	Funded

Table 16 – Long-Term Improvement Summary - SH 146 Corridor and Peripheral Intersections

Long-Term Improvement Summary - SH 146 Corridor and Peripheral Intersections (continued)

Street	From	To	Length (Miles)	Type of Improvement	Estimated Cost*
I-10 EBFR	Railroad Crossing			RR Grade Sep.	$1,750,000
I-10 WBFR	Railroad Crossing			RR Grade Sep.	$1,750,000
Kilgore Parkway ***	FM 3180	FM 565 (South of I-10)	1	New Road	$10,000,000
Kilgore Parkway ***	Kilgore (dead end)	FM 3180	1	New Road	$10,000,000
Kilgore Parkway	SH 146	East of SH 99	2	Widen Road	$9,000,000
Lakes of Champions Blvd ***	Eagle Drive	Perry Ave	1	Widen Road	$4,500,000
Lakes of Champions Blvd. ***	Perry	Road E	1	New Road	$5,000,000
Langston	Langston (dead end)	Eagle	2	New Road	$20,000,000
Langston	SH 146	Ball park	1	Widen Road	$4,500,000
Massey Tomkins Road ***	FM 1405	SH 99	2	New Road	$20,000,000
Massey Tomkins Road	Railroad Crossing			RR Grade Sep.	$1,750,000
Massey Tomkins Road ***	SH 99	FM 2354	1	New Road	$10,000,000
Massey-Tompkins Rd	Cedar Bayou			Bridge Crossing	$1,500,000
N. Main Street**	FM 1942	Liberty County	5	New Road	**
N. Main Street**	FM 1942	E. Wallisville Road	2	Widen Road	**
Needlepoint	Sjolander	Cedar Bayou	2	Widen Road	$9,000,000
Needlepoint ***	Sjolander	Main	2	New Road	$10,000,000
New Road A ***	Eagle Drive	Road F	2	New Road	$10,000,000
New Road B ***	Road F	Langston	2	New Road	$10,000,000
New Road C ***	SH 146 (N. of I-10)	Eagle Drive	2	New Road	$10,000,000
New Road D ***	SH 146 (N. of I-10)	N-12 (S. of FM 565)	5	New Road	$25,000,000
New Road E ***	Road A/B	FM 1409	1	New Road	$5,000,000
New Road G ***	I-10	FM 565 (South of I-10)	3	New Road	$30,000,000
Old Needlepoint	Old Needlepoint (dead end)	FM 3180	2	New Road	$20,000,000
Old Needlepoint	Railroad Crossing			RR Grade Sep.	$1,750,000
Old Needlepoint	SH 146	Needlepoint	2	Widen Road	$9,000,000
Old Needlepoint Rd	Cedar Bayou			Bridge Crossing	$1,500,000
SH 146	Baytown Loop	Liberty County line	9	Widen Road	$40,500,000
SH 146	Crystal Blvd (Tanglewide Sub.)			Signal	$325,000
SH 146	E Cedar Bayou Lynchburg Rd			Signal	$325,000
SH 146	FM 1405/N. Twisted Oak St.			Intersection Mod.	$1-2M
SH 146	I-10			Direct Connectors (2)	$40-60M
SH 146	Kilgore Parkway			Intersection Mod.	$1-2M
SH 146	Lynnwood Drive			Signal	$325,000
SH 146	Railroad Crossing			RR Grade Sep.	$1,750,000
SH 146	SH 99 (Future)			Diamond Interchange	Funded
SH 146	SH 99 (Future) Frontage Roads			Signal	$650,000
SH 146	Sun Oil Road			Intersection Mod.	$100,000
SH 146	Walmart Driveway			Intersection Mod.	$100,000

Long-Term Improvement Summary - SH 146 Corridor and Peripheral Intersections (continued)

Street	From	To	Length (Miles)	Type of Improvement	Estimated Cost*
SH 146	Williams St			Intersection Mod.	$100,000
SH 146	Old Needlepoint			Intersection Mod.	$100,000
SH 146 EBFR	Railroad Crossing			RR Grade Sep.	$1,750,000
SH 146 WBFR	Railroad Crossing			RR Grade Sep.	$1,750,000
SH 1942	Hatcherville			Intersection Mod.	$100,000
SH 1942	Hadden Road			Intersection Mod.	$100,000
Sjolander ***	E. Wallisville	Main	2	New Road	$20,000,000
Sjolander	I-10	Blue Heron Parkway	3	Widen Road	$13,500,000
Sjolander	I-10 EB Frontage Road			Intersection Mod.	$100,000
Throughout Study Area			25	New, Bike Corridors	$18,750,000
Throughout Study Area			10	New, Sidewalk Corridors	$1,500,000

Notes:

* 2018 Local Construction Cost Estimate, Does Not include ROW acquisition or utility relocation costs. (Source: TxDOT Average Low Bid Unit Prices by District, District 20)

** Not located in study area, facility was identified as a needed improvement based on analysis performed during this study.

*** Exact alignment to be determined

Travel Time Savings

The short-term improvements along SH 146 will reduce travel time for motorists by 22% during peak periods. Based on the comparison of year 2025 delays at intersections along SH 146 before and after improvements, the short-term improvements will create a savings of over $110,000 per week, which equates to an annual economic benefit of approximately $5.5 million per year for the motorists. Annual economic benefits due to the short-term improvements were calculated based on the realized travel time savings for each peak period using the following assumptions:

- TxDOT's 2017 calculated value of time at $22.40/per passenger vehicle.
- Two hours each of savings per AM and PM peak periods - no weekend savings were used.
- Five working days per week and 50 weeks per year = 250 working days per year.
- Peak-hour traffic volumes collected along the study corridor were used.
- Full savings realized for vehicles traversing the entire length of the corridor.

Traffic analyses of background and improved conditions are available as an **Appendix**.

Air Quality Savings

Recommended improvements along the SH 146 corridor will reduce emissions by 16% and have a direct benefit to air quality. These benefits will come in the form of reduced pollutants such as Nitric Oxide and Nitrogen Dioxide (NOx), Volatile Organic Compounds (VOCs), and Carbon Monoxide (CO). Emissions reductions are the result of improvements in vehicle travel time delay, speeds, and vehicle stops.

The recommended improvements will reduce unnecessary vehicle idling and allow vehicles to drive at optimal speeds. Emissions savings during the morning and evening peak hours were estimated based on the comparison of year 2025 delays at intersections along SH 146 before and after improvements.

Air quality benefits broaden the potential funding mechanisms. Measures taken to improve traffic flow and reduce delay in the corridor are eligible for Congestion Mitigation and Air Quality (CMAQ) funding. H-GAC prioritizes projects based upon daily emission reduction estimates.

FM 565 at FM 1405

Chapter 10

Implementing the Plan

FM 565 at Ameriport Parkway (2017)

CHAPTER 10: IMPLEMENTING THE PLAN

FUNDING

General

Texas provides three ways for cities and counties to implement physical improvements or changes for their jurisdictions:

- **Regulatory**
- **Financing**
- **Economic development**

These strategies should be incorporated into Comprehensive Plans and used for transportation, flood mitigation, parks, housing etc. Each strategy is unique and most effective if combine with other economic strategies.

Regulatory

The first strategy includes regulating the requirements through ordinances or regulations which, over time, require property owners to make necessary improvements to meet the imposed standards under provisions of the Texas Constitution and State Laws of Texas. These tools take time and may not be the fastest way to effectuate improvements. Examples of regulations that can be used for implementing SH 146 recommendations include the Comprehensive Plan and zoning ordinances, and/or the Major Thoroughfare Plan. Screening, signage, signalization or landscape ordinances or other development standards that fall within the cities, their ETJ, or counties' regulatory program should be adopted. As stated previously, the development standards between Chambers and Harris Counties and Cities within the study area should apply complementary development standards so a developer can't play one jurisdiction against another. Complementary standards will also ensure uniformity in safety standards and prepare the area for the continued forecast growth the area is facing.

Financing

There are basically three ways to finance capital improvements for cities and counties:

- Tax revenues
- Capital Improvement Programming (CIP) with the sale of bonds backed by either General Obligation (GO) Debt or Revenue Bonds
- Other revenues such as sales or hotel occupancy taxes (HOT), impact fees, fines, and grants such as funding through H-GAC/MPO or other State grants, could be used as a part of a capital stack of funds. NOTE: Counties are more limited in sales tax due to legislative limitations that should be addressed given the urban nature of the H-GAC Region.

These financial tools are more efficient in terms of time, but require financial capacity to pay for or service the debt on the bond for the improvements. Cities and counties often set up a five-year CIP for long-term or higher cost improvements and sell bonds based on a GO basis paid for by revenues from the City. GO bond issues generally require an election of the jurisdiction. Typically, a discretionary budget for ongoing maintenance is established in the annual budget process to pay for improvements involving transportation.

Impact fees are also allowed in Texas for transportation improvements, but that requires a separate ordinance and a study to determine the cost of any impact fee imposed for the new development. Impact fees can be considered a deterrent to economic development if the developers can simply move out of the jurisdiction to avoid the fee. Therefore, impact fees should be evaluated in the context of the region. In addition, impact fees should also be similar between the counties and cities to again ensure continuity.

Economic Development

Economic development agreements or incentives between the private sector and public sector have been perfected in Texas to allow the private sector to advance funding for on-site and off-site improvements to accelerate the implementation of transportation improvements. Economic development tools offer great flexibility in that they can be created based on either a broad geographic basis or project site specific bases. The use of these economic development tools is based on the performance of the reimbursement and scale of the project, and can be applied to both existing and new developments. The agreements must outline expectations and schedules of projected new value. The tax revenues gained from that new real property value are then used to reimburse the private sector for the advanced funding of public improvements including any lawful mobility improvements. Economic development agreements can be leveraged with other grant programs that are offered throughout the region, State or Federal government and can apply to public-to-public as well as public-to-private sector partnerships.

Economic Development Toolbox

These three implementation tools (regulatory, financing, and economic development) were established under the Texas Constitution, and later allowed through various pieces of enabling legislation. The Economic Development Toolbox outlines how they may generally be applied to the study area. Page one of the Economic Development Toolbox is shown as **Figure 42** and the entire toolbox is available as an **Appendix**. The use of these three tools should be linked to the recognized or adopted Comprehensive Plans of cities, or in the case of a county, through recognition or passage of minute orders by the Commissioner's Court and/or through the Major Thoroughfare Plan for the unincorporated portions of the county.

The use of economic development tools can be the key of success in revitalization and redevelopment of an area, regardless of the land use. The use of economic development strategies must take into consideration existing communities, residents and businesses, as well as projected growth. Both Mont Belvieu and Baytown are home rule cities that can apply these tools for mobility, land use, beautification, public service, etc. Both Harris and Chambers Counties can also use their tools in partnership with those cities to create more powerful partnerships with private sector industries within the Study Area.

Economic development is not a one-size-fits-all solution. Each economic development tool provides specific opportunities for application and requires a detailed analysis of the community. However, the private sector can join forces with the cities and counties to use a combination of the tools to implement the transportation improvements.

Economic Development Program Related to Development, Redevelopment including Transportation Improvements	Program Function	Statutory Authority	Applicable Jurisdiction	Project Type Includes Transportation and Mobility	Uses for Lawful Purposes including Transportation	PROs All of these tools can be leveraged with Other funding sources	CONS
Housing Initiatives	Created under Chapter 380/381 Powers under Local Government Code	This initiative allows cities or counties to incentivize are development of Housing which can include a requirement for on-site and off-site transportation improvements.	Created by City or County	Reimbursement can be tailored to the economics of the development including off-site transportation related improvements needed to make area improvements. Increment is generated by new housing within the area 380/381 district created. Can be used for housing codes.	The incentive is paid from new increment generated by the new real property housing revenues; term in determined by creating entity	This tool can be used to provide needed housing for the area due to resin boom construction and influx of construction and permanent employees.	This program has not been used in the area, but can be created by the cities or counties based on their future housing plans or needs.
Local Government Corporation (LGC)	An entity that provides an alter ego of the city & county that allows a separate board to be created to administer the approval of public improvements. Typically used in Gulf Coast Region to complement TIRZ/TIF operations.	Subchapter D of Chapter 431 Transportation Code	City or Counties	The LGC acts as the Board to implement a Plan which can include public works implementation, transportation improvements, acquisition; improvements are not subject to public bidding requirements; Board appointed entity: city council or county	Powers, as granted by the city or county and can be used for any lawful purpose including all transportation improvements. Can be created over large areas.	Flexible within the scope of the City Charter or within County Statutes	Does not provide additional sources of revenue unless created with other overlapping economic development entities. Most powerful when coupled with TIRZ, or PID, or MMD districts.
Community Development Block Grant (CDBG)	Funds can be used for public improvements for Low Mod Income Areas; should be part of the City or County CDBG Program	Housing and Community Development (HCD) Act of 1974, Part 570	Municipality / County	Infrastructure, ROW, road improvements as well as social programs, affordable housing and economic development programs	Compete with other small cities for available $ to benefit low-mod Census tracts	Properly structured application may provide wide benefits	Must meet Federal oversight requirements, project specific and not all cities or counties have CBDG entitlement funding. Therefore, grants may be competitive.
Municipal Management Districts (MMD)	Public Improvements include intersection, mobility improvements as well as water, sewer, drainage, landscape architecture, and monuments. Again, an area approach that imposes overlapping tax or assessment depending on the type of creation.	CH 375 Local Government Code	City, County or ETJ or In City	Public improvements in a specifically designated district	Created by Legislature and can be done by special legislative, (most common) or follow TCEQ process; provides for overlapping taxing authority, appointment of a Board	Districts ordinarily can do any lawful purpose within its geographic boundaries	Districts are used extensively throughout the Gulf Coast. The use has region wide success
Tax Increment Reinvestment Zone (TIRZ)	Tax Increment Reimbursement Zones (TIRZ or TIF) allows a portion of city or county tax revenue increment to be applied to an area or project improvement	CH 311 Tax Code	Municipalities create and counties can participate through interlocal agreements	Public improvements to promote new or re-development of specifically designated zones or projects including transportation.	An ordinance, a Project & Financing Plan, appointment of a Board, increment only available city or counties. If created with sales tax powers other revenue streams can be applied to the eligible project funding.	Works best with an active developer and catalyst project, County may participate or as an incentive for creating new development.	Limited to the increment, works best with an active developer and catalyst project

Figure 42a – Economic Development Toolbox

Economic Development Program Related to Development, Redevelopment including Transportation Improvements	Program Function	Statutory Authority	Applicable Jurisdiction	Project Type Includes Transportation and Mobility	Uses for Lawful Purposes including Transportation	PROs All of these tools can be leveraged with Other funding sources	CONS
Municipal Utility District (MUD)	Public Improvement Finance which can include transportation if RUD, Road Utility District Powers are also created	Chapters, 47, 49, 51, 53, 54 of Water Code	Within Cities, County or ETJ including In City	TCEQ or Legislature created taxing authority for water, sewer, drainage and park improvements; If Road Utility District Powers are granted can be used for transportation improvements	TCEQ or special legislation, Minimum acreage is necessary to realistically use MUD tools. Not as effective for developed areas but very good for greenfield.	Eligible costs fully reimbursed; typically advanced by the developer subject to an overlapping tax and reimbursed by bond issues of the MUD	Overlapping tax rate and typically requires legislative creation to be most effective versus TCEQ administrative process of approval
Public Improvement District (PID)	Public Improvement District, PID created over an area similar to a MMD, or MUD; Assessments are not taxes in this tool	CH 372 Local Government Code	City or County	Public Improvements in a specifically designated district including transportation, mobility, landscape architecture, landscape architecture and public art	Additional overlapping assessments are approved and can be used to pay transportation, development and redevelopment budget items that are considered public works . Overlapping assessments typically in the .10/$100 to .15/$100 range in Gulf Coast Region	Fund any public works including on going maintenance of projects including landscape architecture, signal maintenance,	Funded by overlapping assessments
Transportation Infrastructure Zone (TIZ)	Public Improvement Finance	CH 173 Transportation Code	City	Local match for right-of-way acquisition in local government's territory or design, construction, operation, or maintenance of transportation facilities.	District may enter interlocal interlocal agreement with local government member(s) for financing transportation infrastructure.	TIZ funding may include up to 30% of captured assessed value	Use of TIZ for transit is growing, but not common and can be implemented over areas or corridors
County Assistance District (CAD)	Public Service and Improvement Finance	CH 387 Local Government Code	County	Funds can be used for construction, maintenance or improvement of roads or highways; law enforcement; maintenance or improvement of libraries, museums, parks or recreational facilities; economic development and tourism and services that benefit the public welfare.	Any county may adopt this sales tax, in all or part of the county, if the new combined local sales tax rate would not exceed 2 percent at any location within the district. The Commissioner's Court is the Board.	Funds a wide array of public projects and services. This tool should be explored for area transportation improvements	Can't be created over a limited purpose annexation area such as Strategic Partnership Agreement, SPA
Chapter 380/381 Development Agreements	Can be used to reimburse property owners, developers who advance funding for property improvements including on site and off site improvements. To be reimbursed from new real property increment generated by increased new real property values.	CH 380 & CH 381 Local Government Code	Municipality/County	Programs to promote business development, commercial activity to promote local economic development	Developer Agreements pursuant to Sec. 380 of the Local Government Code (Sec 381 for Counties)	Ordinarily limited to "public" improvements	Westchase already has a Ch. 380 agreement, new tools are needed to establish additional sources of revenue

Figure 42b – Economic Development Toolbox

Economic Development Program Related to Development, Redevelopment including Transportation Improvements	Program Function	Statutory Authority	Applicable Jurisdiction	Project Type Includes Transportation and Mobility	Uses for Lawful Purposes including Transportation	PROs All of these tools can be leveraged with Other funding sources	CONS
Tax Abatement	Abatement of real property taxes for private business in support of the development and redevelopment based on new increment	CH 312 Tax Code	City/County	Redevelopment & New Development for business retention and business attraction	Requirements for investment and job creation established by the City, granted to individual business interest	Created by City and /or County for a term of 10 years	Targets individual business, not area
Neighborhood Empowerment Zone	Redevelopment	CH 378 Local Government Code	City	Revitalization, relocation, job creation and retention, affordable housing: May include waiving development and permit fees related to construction of buildings including impact fees, may refund municipal sales tax related to improvements which can include transportation related improvements	Much like a TIRZ or development agreement and may include tax abatement	Limited to 10 year term	May funds wide variety of economic development projects but can support transportation, but not used exclusively for transportation improvements
Texas Enterprise Zone	Business Development	CH 2303 Local Government Code	Governor's Office, but requires municipal application	Encourage job creation and capital investment in areas of economic distress by removing governmental regulatory barriers to economic growth and to provide tax incentives and economic development benefits.	Must apply for and receive a nomination by the City for designation. The State Office of Economic Development which designates Enterprise Projects.	Enterprise Projects receive priority for Smart Job Funds. As an Enterprise Project, a business is eligible for both state and local incentives for a five year period. Local incentives include a property tax abatement and a small business revolving loan fund.	Not a locally administered program and has a highly competitive state-wide applicant pool.
HOT Tax, Hotel Occupancy Tax	City or Counties can collect HOT tax from hotels located within their jurisdiction to be used for promoting tourism, or development of facilities.	Chapter 351 of Tax Code	Hotel Occupancy Taxes; Houston is 6% : Harris County is 2% and Harris County Sports Corporation is 2%;	Revenues taxed on room rental, limited to tourism promotion including physical improvements related to the city or county	Funding for advertising or promotional materials for redevelopment	Must have hotel rooms or rental such as condo's or B&B to generate a HOT to collect the HOT	Not specifically used for transportation related improvements but can be used to promote redevelopment or development of new hotels which can include on site transportation improvements
Comprehensive Plans, Zoning, & Development Regulations	Regulations and ordinances are a method for changing land use, guiding physical development of the city. Rules and regulations can be designed to affect existing and new development.	Texas Statutes for governing planning and land development Texas Local Government Code: Chapter 42 Municipal Boundaries, Chapter 43 Annexation, Chapter 211 Zoning, Chapter 212 Subdivision Platting, Chapter 213 Comprehensive Planning, Chapter 216 Signs, Chapter 243 Sexually Oriented Businesses, Chapter 245 Vested Rights, Chapter 395 Impact Fee	Cities	The City's Comprehensive Plan & Zoning Ordinance are powerful tools to correct local ordinances to address transportation related necessary approvals.	The Comprehensive Plan identifies the proposed land uses that the community ultimately desires to achieve for all land uses. It is the basis for the creation of ALL local ordinances by a community. The cities should insure, if the Comprehensive Plan or the local ordinances do not reflect the acceptable recommendations of the SH 146 Study; the cities should engage in appropriate amendments at a future date.	While the Comprehensive Plan or accompanying ordinances such as the Zoning Ordinance or Major Thoroughfare Plan are not funding sources specifically, these tools do represent one of the three ways a community can influence development patterns and transportation standards for all new development for the area. Counties have general powers to regulate transportation or road improvements based on life safety concerns and similar amendments should be undertaken as recommendations are adopted.	Not a direct funding source, but needed to ensure any future development is designed and constructed in a manner consistent with the recommendations of the SH 146 study for both cities and counties.
County Authority for Unincorporated Areas	Counties are limited to legislative authority allowed by State Law	Local Government Code Chapter 232 Subdivision Review, Chapter 242 Resolves conflicts between city and county regulations of subdivisions	Counties	Counties in Texas are limited to the land development authority it is granted by the Texas Legislature. However, the Special Districts created in Texas such management districts can create additional rules and guidelines to require compliance with goals and visions of the management district creation in exchange for qualifying for reimbursement. Examples such as the West Fort Bend Management District is a recent successful district that illustrates this connection	Beautification, signage, transportation and transit improvements, monuments, public art, marketing, and many similar public works allowed by cities or counties	Creates a special district that allows unincorporated county areas to be better planned and organized to encourage thoughtful development. Typically requires strong development partners that control the real estate or land areas.	Typically works only for larger scale projects that cover 500 acres or more.

Figure 42c – Economic Development Toolbox

Economic Development Agreement Example

One of the most successful examples of a public-private partnership (3P) is the Chevron economic development agreement for the construction of Sjolander Road. This partnership between Baytown and Chevron should be an example of how to leverage private sector financing of public transportation improvements. This economic development tool allowed the road improvements to be financed by Chevron, with construction management by Harris County Engineering. This 3P should be an alternative for the Study Area to accelerate mobility improvements.

Unfortunately, the region was hit by Hurricane Harvey on August 25, 2017. However, this is an opportunity to apply for and implement transportation improvements that could be made with the disaster recovery funds that each County and community is receiving. The images shared at the last workshop illustrated the flood-related issues. As regulatory changes are considered, the design criteria should be a centerpiece of that analysis. The study partners should consider similar amendments. As previously discussed, the regulations between both Harris and Chambers counties should be complementary, if not identical.

Disaster recovery funds should also leverage the recommended solutions of this study so the Counties and Cities are demonstrating that changes will benefit the area and provide resiliency solutions for the implemented mobility improvements.

What about these funding sources?

- Tax increment financing (Tax code, Chapter 311)
- Local government code chapter 387
- Chapters 380/381
- Public improvement districts
- Impact fees

Proactive

Proactive approaches could help to move projects forward in H-GAC's Transportation Improvement Program. Examples include:

- County and/or local jurisdictions acquiring ROW in advance.
- Encourage landowners and developers to donate ROW
- County and/or local governments can fund feasibility and traffic studies, environmental studies and preliminary engineering and design
- County and/or local governments could pay the full cost of relocating utilities and pipelines and constructing drainage improvements

Transit

Federal - Chambers County is divided by the Federal Transit Administration (FTA)/Census into two areas. The larger area to the east and central part of the county (along with part of the west) are considered rural according to the 2010 Census. Operating funding could be provided from the federal 5311 rural programs. A designated recipient does not currently exist for Chambers County.

Portions of Mont Belvieu and Baytown are designated as part of the Houston Urbanized Area (UZA). Operating/capital funding is potentially available from the 5307 Urban program. The Harris County - METRO - is the designated recipient of 5307 funds. However, given that METRO does not service the entire Houston UZA, designated recipients of other portions of the UZA can apply for funding for their portion of the Houston Urbanized Area.

The 2020 Census will likely incorporate most or all of Mont Belvieu, Baytown and perhaps other areas of Western Chambers County so that most of Chambers County's population will reside in the Houston Urbanized Area. If Chambers County wishes to leverage federal 5307 dollars for transit services, it will need to actively apply for the funding (it could through a provider).

As Chambers County grows more urban in percentage of population in coming decades (and perhaps area), 5307 revenues could become more important in the funding of services.

There are many grants sources of funding available within FTA and other agencies and departments of the federal government. However, the sources indicated below are primary sources, that Chambers County could utilize.

5307 Urban – This is officially known as the Urbanized Area Formula Grant Program (5307). As the name indicates, funds are allocated based on a designated formula. It is designed for urban areas with a population above 50,000 or below 200,000. Normally in urban areas above 200,000 population, operating funding is not permitted. However, there is what is known as the "100 bus rule" in urban areas over 200,000. An urban transit system in an urban area over 200,000 (such as Harris County Transit) with fewer than 100 buses in revenue service is eligible to receive operating funding at 50% of total expenses, passed through the designated recipient (METRO).

5311 Rural - This is officially known as the Formula Grants for Rural Areas (5311). It does not apply now in Chambers County since it lacks a designated recipient for 5311 funds. A designated recipient would need to be identified and necessary procedures to be complied with the Federal Transit Administration and TxDOT prior to any release of 5311 federal funds. Of course, to receive 5307 or 5311 funds, Chambers County will need to match funding in the following manner – align itself with an entity that is receiving rural funding from multiple counties. The only multicounty rural agency in the region close to Chambers County that meets those requirements is The District (formerly Brazos Transit District, located in Bryan, Texas) – which operates in neighboring Liberty County.

Funding Type	Federal Contribution	Local Contribution
Operating funding	50%	50%
Capital Funds	80%	20%
Planning	80%	20%
Administrative	80%	20%

Table 17 – Contribution Allocation by Funding Type

5310 Enhanced Mobility of Seniors and Individuals with Disabilities – Funded as both a discretionary pilot program and a successor to the New Freedom and Reverse Commute Program, 5310 provides limited services in Chambers County. The Brazos Transit District (Bryan) is the designated recipient and "passes through" the funds to the Senior Citizen's Project of Chambers County. Ridership was 4,384 unlinked trips in Calendar 2014.

State Assistance – Thirty-eight rural operators receive funding from TxDOT for state operation and capital assistance. Requirements are similar to federal rural 5311 funding in that the county or entity must be part of a multi-county or county agency (such as the Brazos Transit District). State funding is similar to local funding in that it can be used to offset federal funds for capital, operating, administrative or planning expenses.

General Fund – Local or County Government Funding – Federal funding must be matched to be used. Using municipal or local funding is a common means of matching federal funding.

Targeted Local Fees (ex. Hotel, Car Rental) – Local or County - Less common but also used, this is the designation of various local or county fees to fund the local match of service.

Vehicle Advertising – Transit vehicles using outside advertising can be mobile billboards. Revenues received from advertising can be used as local match.

In-Kind Match – Contributions in terms of non-allocated administrative services or contribution of facility space can be deemed local match. Their designated value can be counted toward the local match.

POLICY AND ORDINANCE NEXT STEPS

1. Consider creating region wide 380/381 districts that tee up the use of economic development solutions for the recommendations in this study. Include advancement and partnership with the petrochemical industry to advance funding with repayment similar to Chevron.

2. Require a meeting with all plat applicants during submission to inquire about project, financing, traffic generation, values, and timing. This meeting should flush out what impact that proposed plat has on the corridors and area. These meetings should include both county and city representatives and their consultants. Create a database in GIS that allows cities and counties to track growth and proposed development/plats/permits; use a common platform for the design of the GIS architecture of the database and shape files. Incorporate the CIP in GIS and share amongst your public partners.

3. Make sure the plat and permit information is shared among the common members of the study area to allow power in collaboration for the necessary improvements. Set up plat sharing with each submission of plats related to the industrial growth and make sure the plat sharing reaches the correct and appropriate division of the cities and counties.

4. Ordinance amendments for local regulations should be shared with the counties and cities to insure complementary standards.

5. Hold at least two meetings per year with public partners and the private industry to discuss the private sector plans. Invite the H-GAC transportation and planning group to these meetings; H-GAC is the major funding source.

SHORT- AND LONG-TERM IMPROVEMENTS IMPLEMENTATION NEXT STEPS

The steps below outline the key actions to be undertaken and the agencies responsible to implement the recommended improvements in the SH 146 Subregional Study. TxDOT, Chambers and Harris Counties and the Cities of Baytown and Mont Belvieu should form a working group to coordinate improvements and policies in the coming years

Implementation Step	Responsible Agency
Accept SH 146 Subregional Plan	Baytown & Mount Belvieu
Transportation Policy Council acceptance of SH 146 Subregional Plan	H-GAC
Implement system-wide signal retiming	TxDOT
Secure funding for short-term improvements	H-GAC and TxDOT
Coordinate with TxDOT for median and intersection aesthetics	Baytown & Mount Belvieu Chamber of Commerce
Perform design for short-term improvements	TxDOT
Implement short-term improvements	TxDOT
Secure funding for long-term improvements	Baytown & Mount Belvieu Chamber of Commerce & TXDOT
Perform environmental documentation and schematic design	TxDOT
Perform detailed design of long term-improvements	TxDOT
Implement long-term improvements	TxDOT
Program long range thoroughfare improvements and update thoroughfare plans	Cities and Counties
Conduct route alignment and preliminary engineering studies for Cedar Bayou crossing	Baytown
Conduct environmental and hydrologic/hydraulic studies for Cedar Bayou crossing	Baytown
Coordinate with United States Army Corps of Engineers on Cedar Bayou crossing	Baytown
Perform detailed design of Cedar Bayou crossing	Baytown
Implement Cedar Bayou Crossing	Baytown

Chapter 11

Summary

146 TEXAS

CHAPTER 11: SUMMARY

The study area is experiencing a growing amount of commuter, residential, and industrial traffic as petrochemical and manufacturing plants continue to expand. These expansions have added thousands of short-term workers to the area as well as hundreds of new permanent employees. In addition to shift change traffic, major industrial and manufacturing companies located within the area contribute to growing traffic and safety issues. Current and foreseeable safety and mobility issues are a priority for citizens and public officials these concerns should be addressed.

Recommended physical improvements (Figure 43) were focused primarily on two distinct groups: along the SH 146 Corridor and at Peripheral Intersections.

Short-term (0-5 years):

- 8.2 miles of safety improvements
- 56 left-turn lanes
- 18 right-turn lanes
- 7 accelerations lanes
- 3 signal installations
- 7.5 miles of medians

Peripheral intersection:

- 16 Left-Turn Lanes
- 16 Right-Turn Lanes
- 10 Signal Installations

Other:

- Develop a Chambers County Thoroughfare Plan
- Develop a SH 146 Transit Action Study

Long-term (6+ years):

Roadways:

- 34 Miles of New Connections
- 63 Miles of Widened Roadway
- 5 Cedar Bayou Crossings Options

Intersections:

- 5 Bridges
- 12 Railroad Grade Separations
- 8 Signal Installations
- Turn Lanes at 8 Intersections

Bike/Pedestrian:

- 25 Miles, Bike/Trail Corridors
- 10 Miles, Pedestrian Corridors

Benefits Summary:

- Reduce the number of crashes:
- Enhance traffic operations:
- Improve Air Quality
- Enhance safety and enhance streetscapes by improving bike and pedestrian facilities
- Mitigate congestion, increase connectivity, and reduce mobility barriers by constructing roadway and intersection improvements
- Address commercial vehicle issues by constructing railroad overpasses and implementing new policy
- Improve transit services for elderly and disabled

Estimated Plan Costs

Short Term	$15-20 Million
Long Term	$725-825 Million
Total	**$740-845 Million**

Proposed Improvements	SH 146	Peripheral Intersections	Total
Close Roadway	1	4	5
Construct Island (Raised)	14	11	25
Widen Roadway	14	18	32
Construct New Road	1	2	3
Construct Left Turn Lane	63	16	79
Construct Right Turn Lane	18	17	35
Construct Acceleration Lane	7	2	9
Align Roadway	2	0	2
Remove Traffic Signal	1	1	2
Revise Signal Timing	1	1	2
Modify Traffic Signal	2	2	4
Install Traffic Signal	3	12	15
Construct Raised Median	48	6	54
Construct S-Median	19	1	20
Construct Turbo -T	3	0	3
Construct Median Opening	19	1	20
No Median	3	0	3
Close Driveway	19	0	19
Provide share access	31	0	31
Add Sidewalk	20	0	20
Driveway modification	4	1	5
Total	**293**	**95**	**388**

Table 18 – Summary of Short-Term Improvements

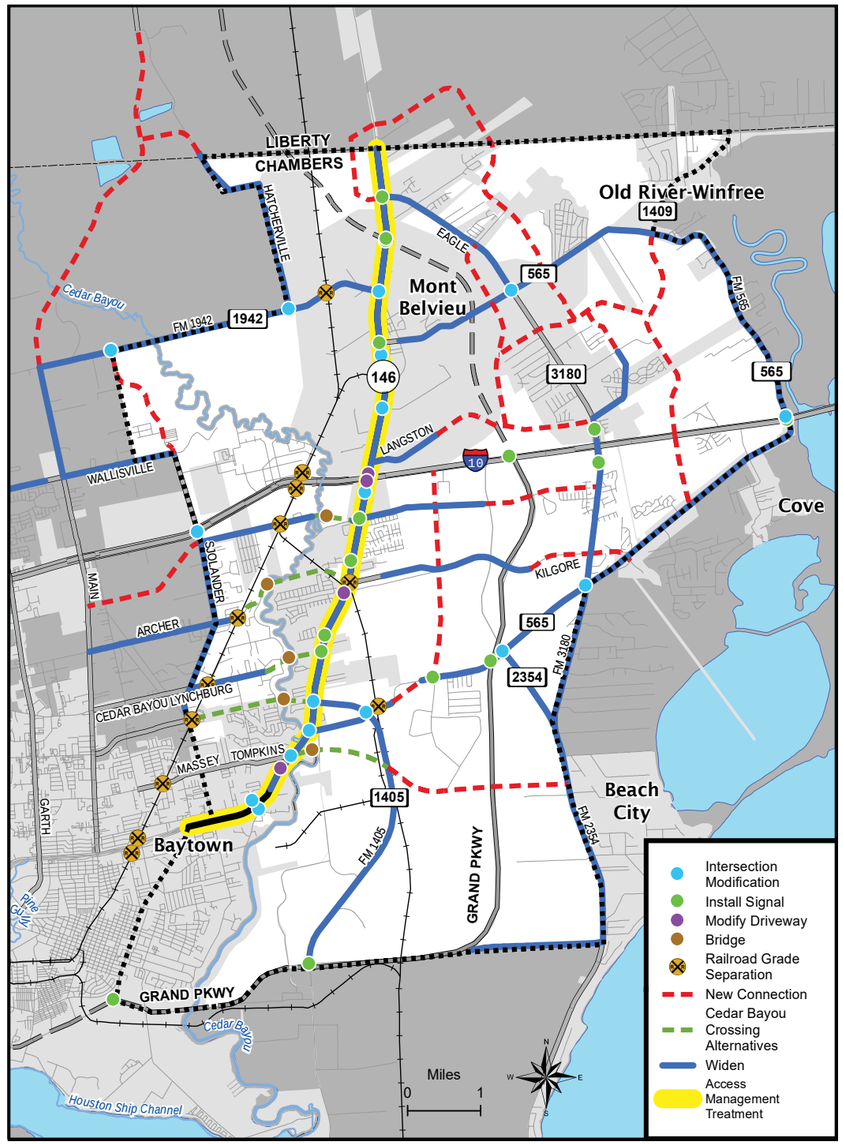


Figure 43 – Recommended Physical Improvements

SHORT-TERM IMPROVEMENT SUMMARY

SH 146 Corridor and Peripheral Intersections

Sheet	Intersection	Number of Improvements	Estimated Cost *	MOBILITY															ACCESS									
				Roadway					Intersection					Signal					Median						Driveway			
				Close Road	Install Island	Widen Road	Realign Road	New Road	Left Turn Lane	Right Turn Lane	Acceleration Lane	Align Curve	Align Travelway	Remove Signal	Install Stop Sign	Revise Signal Timing	Modify Traffic Signal	Install Signal	Raised Median	S-Median	Reverse S-Median	Turbo T Median	Median Opening	No Median	Close Driveway	Provide Share Access	Add Sidewalk	Driveway Modification
SH 146 Access Management Treatments																												
1	No Intersections	1	15,000																				1				
2	Kings Point Road	1	23,000																				1				
3	Eagle Drive	8	610,000		2				1	2								1	1				1				
4	Placid Drive, Cherry Point Road	4	280,000						1										2	1								
5	No Intersections	3	290,000																2				1					
6	No Intersections	4	270,000						1										2	1								
7	Fitzgerald Road	9	240,000						3										3	3								
8	FM 1942, Loop 207 N	9	580,000	1	1				1	1				1			1		2				1					
9	Equistar Chemical Driveway, Winfree Road	7	180,000						3										2	1			1					
10	FM 565	7	375,000						1	2								1	2				1					
11	Williams Street, Chevron Truck Driveway	8	220,000						2										2	1			2		1			
12	No Intersections	3	240,000						2										1									
13	Loop 207S, Targa Driveway, Targa Employee Parking, Sun Oil Road	9	310,000		1		1		3							1			1				2					
14	Warren Road	16	340,000						3										2	1			1		2	5	2	
15	Cedar Hill Drive	15	330,000						1	1	1								2			1				5	4	
16	Langston, Truck Stop Driveway, IH 10 WBFR	31	1,490,000		4	1			4	3	1								2	2			1		1	8	4	
18	Main Walmart Driveway	16	770,000			4			3	1									2				2				4	
19	Old Needlepoint Road, Pine Meadows Blvd	19	765,000			4			2	1	1		2					1	1				1		3		2	1
20	Country Squire Blvd.	10	220,000						3										2	1			1		2			1
21	Lynnwood Sterling Drive	6	200,000						1		1								1			1			2			
22	Kilgore Parkway, Pinehurst Street	10	260,000						4										2	1			1		1			1
23	El Chaco Drive, Baron Ridge Drive	4	260,000						1										1				1		1			
24	Shell Road, Crystal Blvd.	11	180,000			2			3		1								1			1			3			
25	Staples Drive	10	280,000						3										2	1					2	2		
26	Bayou Bend, Clark Elementary School Driveway, Devinwood Drive	10	280,000						3	1									2	2			1			1		
27	Cedar Landing Drive	8	390,000						2	1									2	1						1		1
28	FM 1405, N Twisted Oak Street	8	400,000		1				3	1	1								1				1					
29	Lincoln Cedars Drive, FM 565	15	750,000		1			1	3	2							1		2	1			1		1	2		
30	No Intersections	1	$6,000																1									

Sheet	Intersection	Number of Improvements	Estimated Cost *	MOBILITY															ACCESS									
				Roadway					Intersection					Signal					Median						Driveway			
				Close Road	Install Island	Widen Road	Realign Road	New Road	Left Turn Lane	Right Turn Lane	Acceleration Lane	Align Curve	Align Travelway	Remove Signal	Install Stop Sign	Revise Signal Timing	Modify Traffic Signal	Install Signal	Raised Median	S-Median	Reverse S-Median	Turbo T Median	Median Opening	No Median	Close Driveway	Provide Share Access	Add Sidewalk	Driveway Modification
Peripheral Intersection Improvements																												
1	SH 146 at Tompkins Drive	3	25,000			2													1									
2	SH 146 at Massey Tompkins Road	11	250,000			4			2	1							1		2				1					
3	SH 146 at Ferry Road	6	50,000			4													1									1
4	SH 146 at N. Alexander Drive	0	Funded																									
5	N Alexander Drive (SH 146B) at SH 146	3	35,000						1					1						1								
6	FM 1942 at Hadden Road	4	120,000						2	2																		
7	FM 1942 at Hatcherville Road	2	110,000							1						1												
8	FM 565 at Eagle Drive	16	1,200,000		4	4				4	1						1		2									
9	Sjolander Road at I-10	1	10,000						1																			
10	SH 99 at I-10	13	Funded		2			2	2	2	1							4										
11	FM 3180 at I-10	24	Funded	4	4	4			6	4								2										
12	FM 565 at I-10	1	10,000						1																			
13	FM 565 at FM 1405	0	Funded																									
14	FM 565 at Ameriport Parkway	0	Funded																									
15	FM 565 at SH 99	2	Funded															2										
16	FM 565 at FM 2354 (S Cotton Lake Road)	5	100,000		1				1	3																		
17	FM 565 at FM 3180	0	Funded																									
18	SH 146B at SH 99	2	Funded															2										
19	FM 1405 at SH 99	2	Funded															2										
Contingency (Approx. 20%)			2,900,000																									
Total		**389**	**17,300,000**	**5**	**25**	**32**	**1**	**3**	**79**	**35**	**9**	**0**	**2**	**2**	**0**	**2**	**4**	**15**	**54**	**20**	**0**	**3**	**20**	**3**	**19**	**31**	**20**	**5**

Long-Term Improvement Summary - SH 146 Corridor and Peripheral Intersections

Street	From	To	Length (Miles)	Type of Improvement	Estimated Cost*
Blue Heron Parkway	Railroad Crossing			RR Grade Sep.	$1,750,000
Blue Heron Pkwy	Cedar Bayou			Bridge Crossing	$1,500,000
E Archer Rd	Cedar Bayou			Bridge Crossing	$1,500,000
E. Cedar Bayou Lynchburg Rd.	Cedar Bayou			Bridge Crossing	$1,500,000
E. Archer Road	Railroad Crossing			RR Grade Sep.	$1,750,000
E. Archer Road **	Main Street	Russell Lane	2	Widen Road	**
E. Cedar Bayou Lynchburg Rd.	Railroad Crossing			RR Grade Sep.	$1,750,000
E. Cedar Bayou Lynchburg Rd.	Sjolander	Roberts Road	1	Widen Road	$4,500,000
E. Wallisville Road**	Garth Road	W. of Main Street	1	Widen Road	**
E. Wallisville Road**	Main Street	Sjolander Road	2	Widen Road	**
Eagle Drive	SH 146	FM 565	2	Widen Road	$9,000,000
Eagle Drive/FM 3180	I-10 EB Frontage Road			Intersection Mod.	$100,000
Fisher	SH 99	FM 2354	2	Widen Road	$9,000,000
FM 1405	SH 146	SH 99	5	Widen Road	$22,500,000
FM 1409 ***	FM 565 (North of I-10)	I-10	3	New Road	$30,000,000
FM 1409 ***	I-10	FM 565 (South of I-10)	1	New Road	$10,000,000
FM 1942	Railroad Crossing			RR Grade Sep.	$1,750,000
FM 1942	Hadden Road			Signal	$325,000
FM 1942	Main Street	SH 146	5	Widen Road	$22,500,000
FM 2354	FM 565 (South of I-10)	FM 3180	1	Widen Road	$4,500,000
FM 3180	Dutton Lake	FM 2354	1	Widen Road	$9,000,000
FM 3180	FM 2354	Fisher Rd	3	Widen Road	$13,500,000
FM 3180	I-10	FM 2354	3	Widen Road	$13,500,000
FM 565	I-10			Widen and U-turns	$1,500,000
FM 565	RR/FM 1405			RR Grade Sep.	$2,000,000
FM 565	I-10 WB/EB Frontage Roads			Signal	$650,000
FM 565 (North of I-10)	Loop 207	Eagle Drive	2	Widen Road	$9,000,000
FM 565 (North of I-10)	BB Lane	I-10	3	Widen Road	$13,500,000
FM 565 (North of I-10)	Eagle Drive	East of FM 1409	3	Widen Road	$13,500,000
FM 565 (South of I-10)	Railroad Crossing			RR Grade Sep.	$1,750,000
FM 565 (South of I-10)	UPRR	Ameriport	1	Realignment	$10,000,000
FM 565 (South of I-10)	FM 3180	Future FM 1409	2	Widen Road	$9,000,000
FM 565 (South of I-10)	Future FM 1409	I-10	2	Widen Road	$9,000,000
FM 565 (South of I-10)	SH 146	East of FM 1405	1	Widen Road	$4,500,000
FM 565 (South of I-10)	Ameriport Parkway	FM 3180	3	Widen Road	$13,500,000
Garth	FM 1942	E. Wallisville Road	2	Widen Road	**
Hatcherville	FM 1942	CR 486	3	Widen Road	$13,500,000
Hatcherville	Smooth curves		1	Realignment	**
I-10	SH 99			Direct Connectors (8)	Funded

Table 16 – Long-Term Improvement Summary - SH 146 Corridor and Peripheral Intersections

Long-Term Improvement Summary - SH 146 Corridor and Peripheral Intersections (continued)

Street	From	To	Length (Miles)	Type of Improvement	Estimated Cost*
I-10 EBFR	Railroad Crossing			RR Grade Sep.	$1,750,000
I-10 WBFR	Railroad Crossing			RR Grade Sep.	$1,750,000
Kilgore Parkway ***	FM 3180	FM 565 (South of I-10)	1	New Road	$10,000,000
Kilgore Parkway ***	Kilgore (dead end)	FM 3180	1	New Road	$10,000,000
Kilgore Parkway	SH 146	East of SH 99	2	Widen Road	$9,000,000
Lakes of Champions Blvd ***	Eagle Drive	Perry Ave	1	Widen Road	$4,500,000
Lakes of Champions Blvd. ***	Perry	Road E	1	New Road	$5,000,000
Langston	Langston (dead end)	Eagle	2	New Road	$20,000,000
Langston	SH 146	Ball park	1	Widen Road	$4,500,000
Massey Tomkins Road ***	FM 1405	SH 99	2	New Road	$20,000,000
Massey Tomkins Road	Railroad Crossing			RR Grade Sep.	$1,750,000
Massey Tomkins Road ***	SH 99	FM 2354	1	New Road	$10,000,000
Massey-Tompkins Rd	Cedar Bayou			Bridge Crossing	$1,500,000
N. Main Street**	FM 1942	Liberty County	5	New Road	**
N. Main Street**	FM 1942	E. Wallisville Road	2	Widen Road	**
Needlepoint	Sjolander	Cedar Bayou	2	Widen Road	$9,000,000
Needlepoint ***	Sjolander	Main	2	New Road	$10,000,000
New Road A ***	Eagle Drive	Road F	2	New Road	$10,000,000
New Road B ***	Road F	Langston	2	New Road	$10,000,000
New Road C ***	SH 146 (N. of I-10)	Eagle Drive	2	New Road	$10,000,000
New Road D ***	SH 146 (N. of I-10)	N-12 (S. of FM 565)	5	New Road	$25,000,000
New Road E ***	Road A/B	FM 1409	1	New Road	$5,000,000
New Road G ***	I-10	FM 565 (South of I-10)	3	New Road	$30,000,000
Old Needlepoint	Old Needlepoint (dead end)	FM 3180	2	New Road	$20,000,000
Old Needlepoint	Railroad Crossing			RR Grade Sep.	$1,750,000
Old Needlepoint	SH 146	Needlepoint	2	Widen Road	$9,000,000
Old Needlepoint Rd	Cedar Bayou			Bridge Crossing	$1,500,000
SH 146	Baytown Loop	Liberty County line	9	Widen Road	$40,500,000
SH 146	Crystal Blvd (Tanglewide Sub.)			Signal	$325,000
SH 146	E Cedar Bayou Lynchburg Rd			Signal	$325,000
SH 146	FM 1405/N. Twisted Oak St.			Intersection Mod.	$1-2M
SH 146	I-10			Direct Connectors (2)	$40-60M
SH 146	Kilgore Parkway			Intersection Mod.	$1-2M
SH 146	Lynnwood Drive			Signal	$325,000
SH 146	Railroad Crossing			RR Grade Sep.	$1,750,000
SH 146	SH 99 (Future)			Diamond Interchange	Funded
SH 146	SH 99 (Future) Frontage Roads			Signal	$650,000
SH 146	Sun Oil Road			Intersection Mod.	$100,000
SH 146	Walmart Driveway			Intersection Mod.	$100,000

Long-Term Improvement Summary - SH 146 Corridor and Peripheral Intersections (continued)

Street	From	To	Length (Miles)	Type of Improvement	Estimated Cost*
SH 146	Williams St			Intersection Mod.	$100,000
SH 146	Old Needlepoint			Intersection Mod.	$100,000
SH 146 EBFR	Railroad Crossing			RR Grade Sep.	$1,750,000
SH 146 WBFR	Railroad Crossing			RR Grade Sep.	$1,750,000
SH 1942	Hatcherville			Intersection Mod.	$100,000
SH 1942	Hadden Road			Intersection Mod.	$100,000
Sjolander ***	E. Wallisville	Main	2	New Road	$20,000,000
Sjolander	I-10	Blue Heron Parkway	3	Widen Road	$13,500,000
Sjolander	I-10 EB Frontage Road			Intersection Mod.	$100,000
Throughout Study Area			25	New, Bike Corridors	$18,750,000
Throughout Study Area			10	New, Sidewalk Corridors	$1,500,000

Notes:

* 2018 Local Construction Cost Estimate, Does Not include ROW acquisition or utility relocation costs. (Source: TxDOT Average Low Bid Unit Prices by District, District 20)

** Not located in study area, facility was identified as a needed improvement based on analysis performed during this study.

*** Exact alignment to be determined