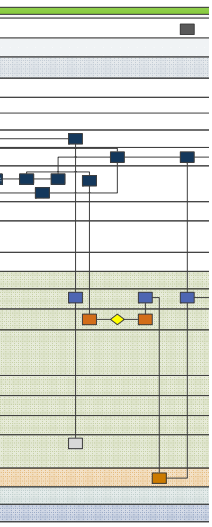
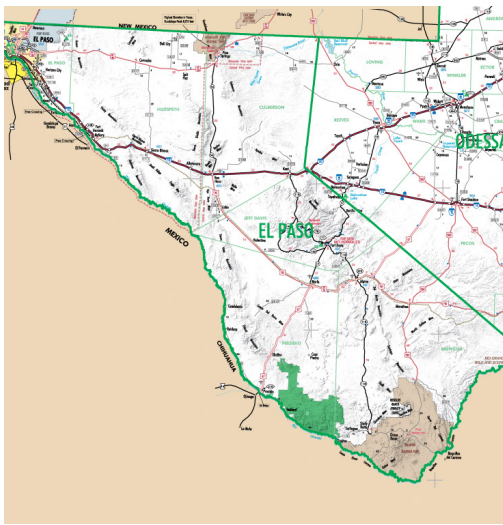
TRANSPORTATION SYSTEMS MANAGEMENT AND OPERATIONS (TSMO)





EL PASO DISTRICT ITS MASTER IMPLEMENTATION PLAN

April 2021

Texas Department of Transportation

Document Control

Version	Date	Description of Change	Author
1.0	4-24-2020	Final plan submitted to TxDOT ELP	AECOM
1.1	2-25-2021	Formatted version to fit TxDOT Template	AECOM

Disclaimer: ITS Master Plan represents recommended improvements. ITS will be deployed as funding is secured, project prioritization may change without notice.

Executive Summary

To maximize the benefits of Transportation Systems Management and Operations (TSMO), the El Paso District of the Texas Department of Transportation (TxDOT) developed an Intelligent Transportation System (ITS) Master Implementation Plan for the El Paso District. This plan provides ITS strategies to be implemented as part of roadway improvement projects during the next 10 years in the El Paso District. ITS strategies such as software integrations, fiber optic communication, lane management systems (LMS), dynamic message signs (DMS), closed-circuit television (CCTV) cameras, wrong-way driver detectors (WWDD), roadway weather information systems (RWIS), and signal phasing and timing (SPaT) are to be installed on designated TxDOT roadway segments.

TxDOT selected ITS strategies based on the needs and requirements of the region. These strategies were developed into projects and targeted installations of equipment along key roadway segments. Key projects were prioritized, such as upgrades to the district's Traffic Management Center (TMC). Impacts of these strategies and technologies include adding further customization to TMC software to integrate incident data from third party applications into TxDOT's LoneStar System; installation of additional fiber communications networks along corridors; and improvements to roadway monitoring to identify and/or confirm congestion or incidents resulting in faster response and clearance times. Various TSMO strategies such as emergency response routing, inter-agency integration, traffic incident and work zone management, connected vehicle integration, roadway monitoring, traffic signal operations, and managed lanes apply to different ITS projects.

Over the next 10 years, the El Paso District's ITS Master Implementation Plan includes recommendations for the installation of 1,379 new devices, 227 miles of new fiber optic cable, upgrades to the TMC, and the implementation and/or expansion of work zone management, traffic incident management, and information dissemination programs. The total estimated capital cost for these projects is about $337 million with the estimated design and study cost at about $53 million. The estimated cost of priority projects is about $59 million with a design cost of about $7 million.

The Master Implementation Plan includes Geographic Information System (GIS) and Keyhole Mark-up Zipped (KMZ) files with georeferenced project information for the projects recommended in the plan. TxDOT will use these files, along with the tables in this report, as a starting point for programming the ITS projects. The El Paso District will update its Regional ITS Architecture in an upcoming effort that will address projects developed in this plan.

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Introduction

The ITS Master Implementation Plan identifies traffic management and safety strategies that will help to increase driver's safety on roadways and corridors in the El Paso District. The primary objective of this plan is to document all El Paso's ITS needs, requirements, and priorities that TxDOT could include on its roadways during the next 10 years. From this, TxDOT developed a list of ITS projects to be implemented to meet those needs and requirements.

This document presents an inventory of the TxDOT ITS program containing existing, under- construction, and proposed transportation infrastructure. The study defines the recommended solutions and requirements for the next 10 years of each state and county roadway within El Paso County and Interstate Highway 10 from the New Mexico State line to Culberson County. See **Figure 1** for the study area, with study project segments in blue, which encompasses the City of El Paso and surrounding counties. By collaborating with partner agencies and implementing data-driven decisions as a result of this ITS Master Plan, TxDOT will improve the safety and mobility of the traveling public in the El Paso District.

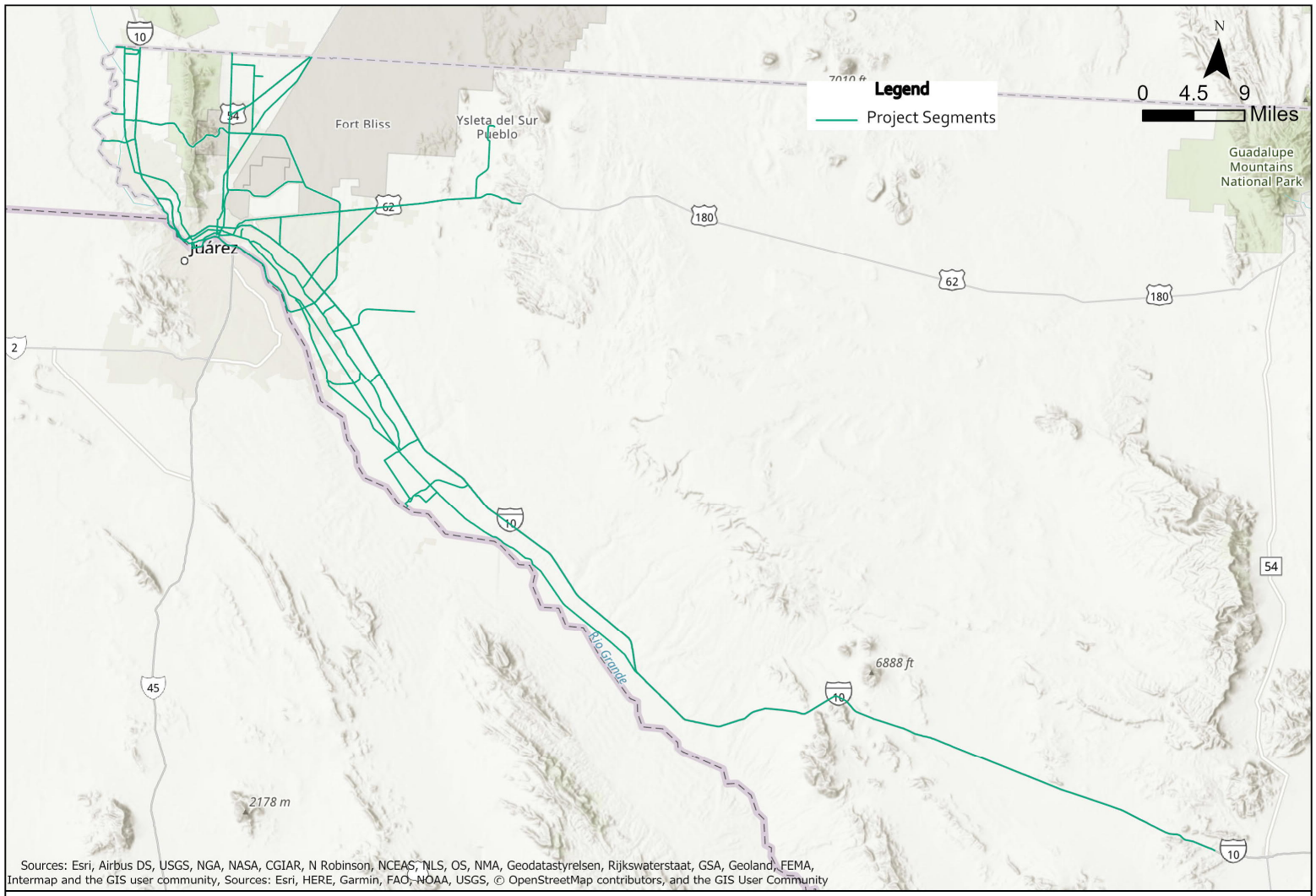

Figure 1: Study Area

Existing Conditions

Understanding existing conditions of the system is key to effectively proposing ITS traffic management and safety strategies for the El Paso District. The existing conditions were documented in three distinct ways. First, stakeholder feedback, collected through an existing conditions workshop, highlighted City of El Paso and TxDOT goals to improve the current system and gather concerns about everyday operation of existing ITS devices. Second, through the development of an inventory, which identified and quantified the current ITS devices deployed in the study area. Third, was to recognize the areas of opportunity for the deployment of ITS traffic management and safety strategies by identifying traffic accident clusters in the El Paso area.

Existing Conditions Workshop

Identifying and addressing stakeholders' needs and opportunities is an important factor for the success of ITS traffic management strategies. An existing condition workshop was conducted on September 20, 2019 and attended by the different traffic operation groups from the El Paso District. Stakeholders in the meeting identified the data currently collected thorough the existing ITS devices, current operations issues, and challenges. The group determined the significant goals of what proposed project upgrades and ITS initiatives should be implemented in the region. The following summarizes the major findings identified in this meeting:

- ITS inventory should focus on closed-circuit television (CCTV) cameras, dynamic message signs (DMS), vehicle detectors (radar/microwave), lane management systems (LMS), roadway weather information systems (RWIS), traffic signals, and fiber optic cable.
- Speed and travel time data is collected through a third-party system, INRIX, through a statewide plan currently used by TxDOT.
- The report should assess the use of Bluetooth equipment which is not currently being used as a data collection system since travel time is calculated by INRIX.
- Communication systems will consolidate to an Ethernet system that will eliminate the use of SONET and T1 equipment currently used in some areas.
- ITS equipment and infrastructure should be consolidated and minimized inside TxDOT cabinets for easier troubleshooting and maintenance.
- All CCTV cameras in the system should be digital.
- Opportunities should be identified to share fiber optic cable with the City of El Paso.

ITS Equipment Inventory

Database

Based on stakeholder feedback during the existing conditions workshop, the inventory prioritized the analysis of the following ITS devices: CCTV cameras, DMS, radar vehicle detectors, RWIS, LMS, and traffic signals.

The existing ITS equipment inventory database, provided by TxDOT, was reviewed and evaluated. This inventory was then updated based on the proposed and under-construction TxDOT projects, which identified 137 additional ITS devices that were then added to the database. The City of El Paso provided a list of ITS equipment which were also added to the inventory.

ITS Device and Transportation Matrix

The database was then summarized into an ITS device and transportation matrix. This matrix accounts for each of the CCTV cameras, DMS, vehicle detectors, Bluetooth readers, and traffic signals currently owned and maintained by TxDOT. The ITS devices list is categorized by existing and under construction devices and grouped by state roads segmented by major exits. The complete matrix, categorized by roadway, can be found in **Appendix A. Table 1** shows the totals of each ITS device categories identified in the matrix.

Table 1: ITS Device Matrix Summary

	Existing	Under Construction	Total
Cameras	169	31	200
DMS	77	17	94
Detectors	180	34	214
Bluetooth	126	14	140
Traffic Signals	56	-	56

Georeferenced Maps

A Keyhole Markup Zipped (KMZ) file was developed showing all fiber optic cable networks supplementing the ITS network/transportation matrix. The ITS Inventory database, existing and proposed construction projects, and fiber maps were used to populate the original KMZ file provided by the City of El Paso. The KMZ file was updated to include fiber optic cable, CCTV cameras, DMS, radar detectors, Bluetooth readers, and traffic signals. Concurrently, a GIS file was developed with all ITS equipment and fiber that was existing, proposed, or under construction. **Figure 2, Figure 3**, and **Figure 4** show screenshots from the GIS file with existing, under construction, and proposed ITS, as well as existing and proposed fiber locations.

The figures are screenshots from the full GIS and KMZ files and are for illustration purposes only. In these figures, the resolution of the map does not allow for the display of all the equipment existing, under construction, or proposed ITS equipment. The KMZ and GIS files include equipment for the entire district. Some locations have multiple devices, and in these cases, more than one point is layered over another. These points can be expanded in the GIS or KMZ file. For more information, including the project name, associated segment, equipment involved at each point, the GIS file or KMZ should be used.

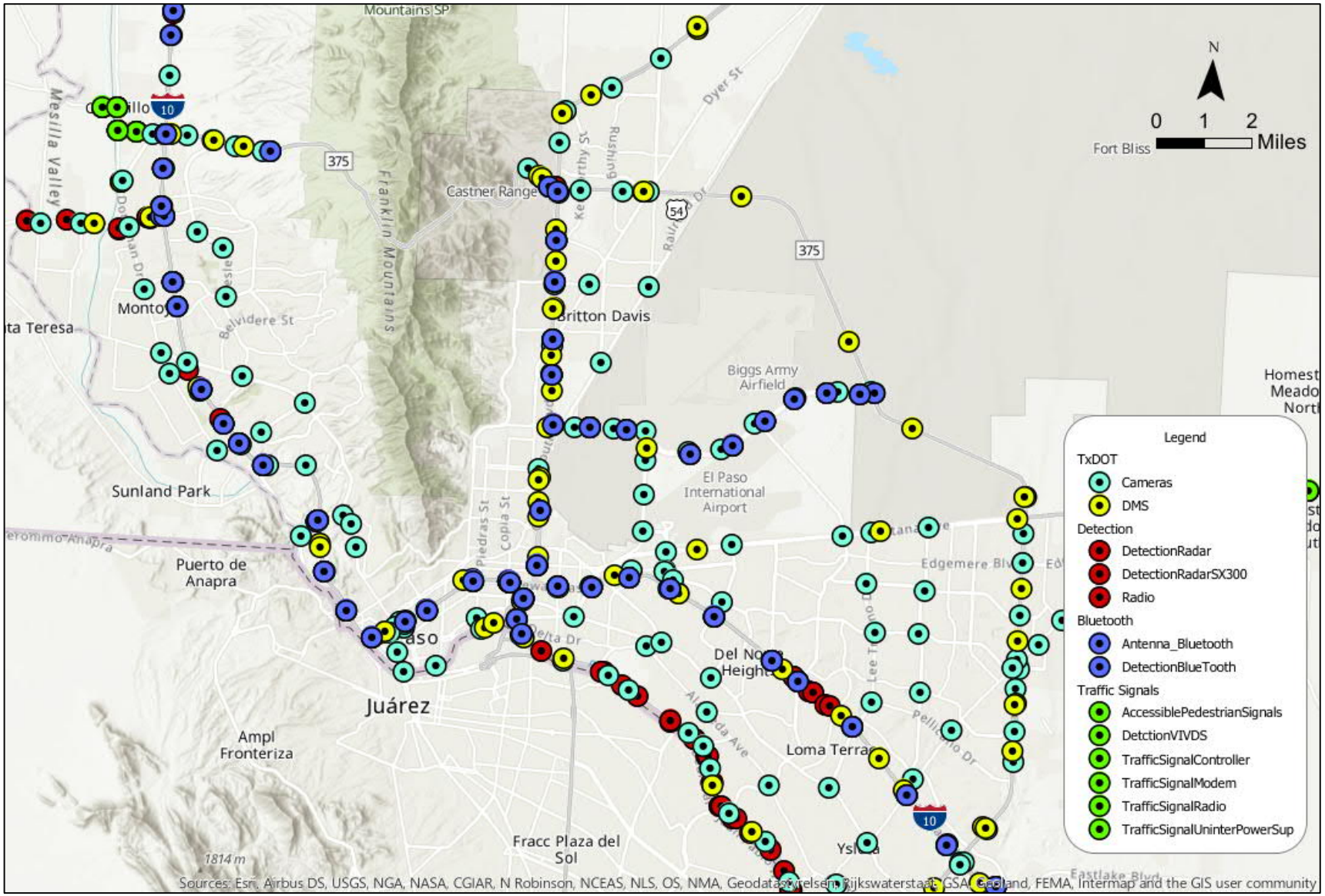

Figure 2: Existing ITS Device

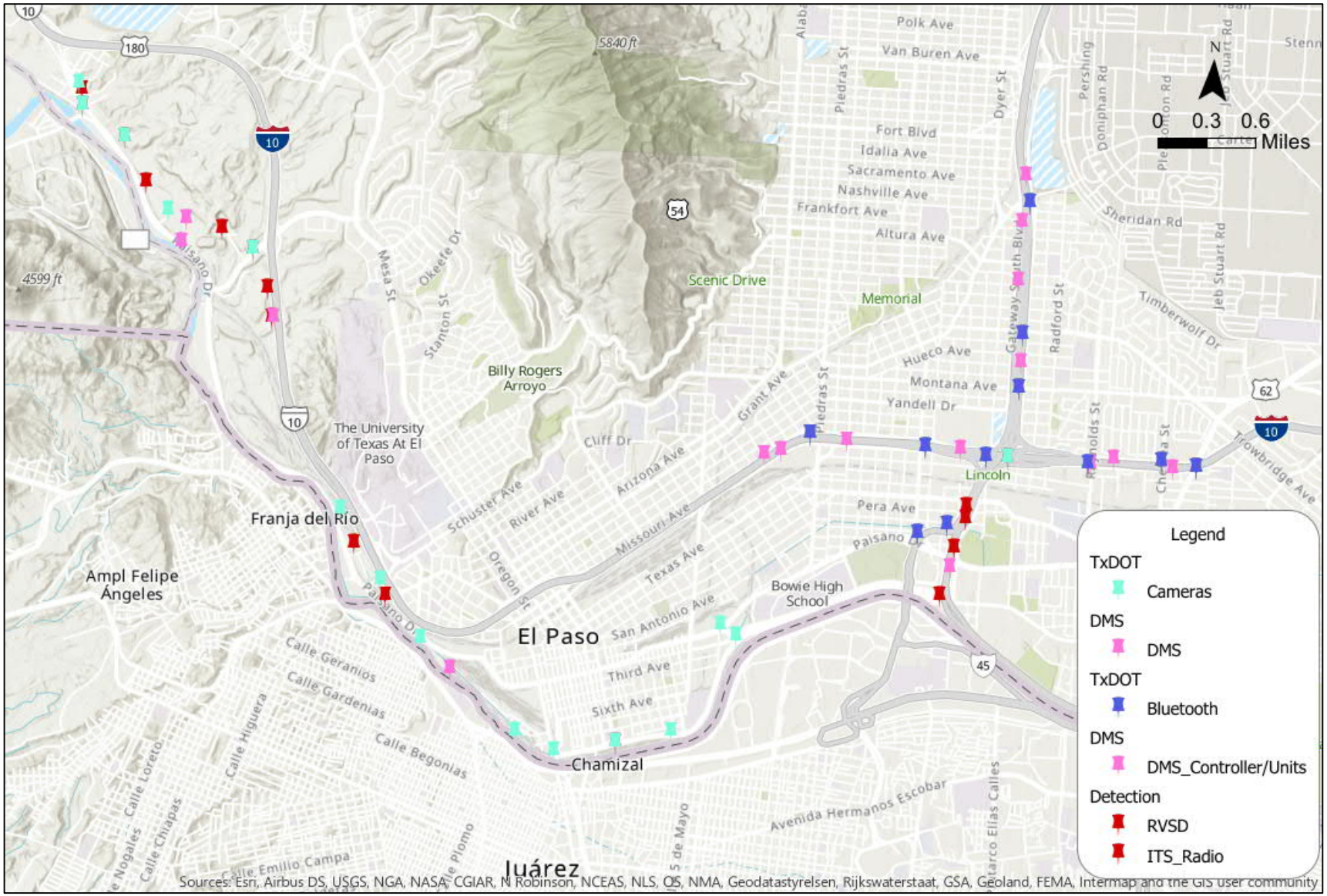

Figure 3: Under Construction ITS Devices

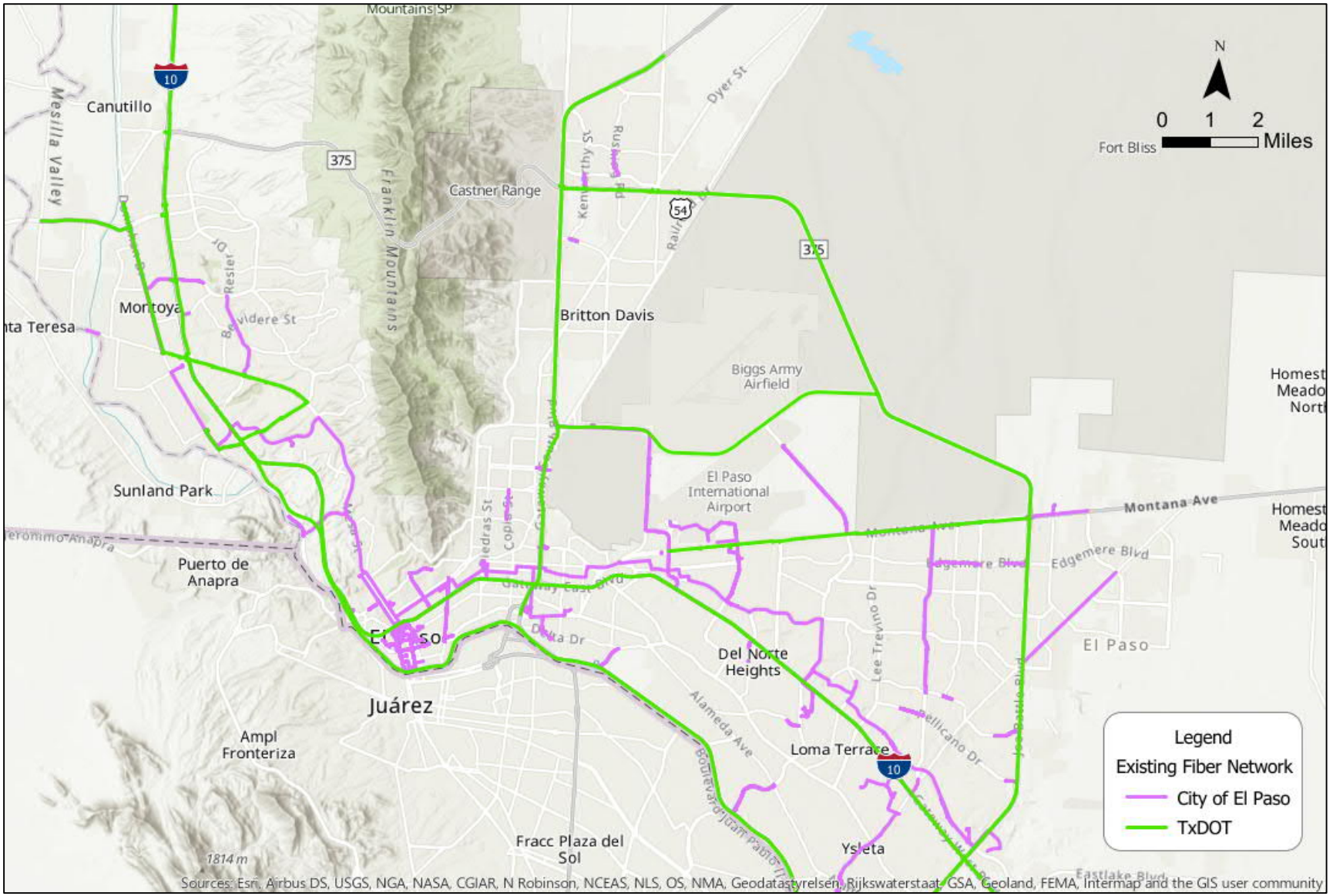

Figure 4: Existing El Paso Fiber Network

Assessment of Traffic Accidents

ITS traffic management and safety strategies can be applied to reduce the number of accidents and congestion along the roadways. Areas with a high density of traffic accidents were identified using the latest reported crash data from the police department in the El Paso District.

The crash data were obtained from the TxDOT Crash Records Information System (CRIS) for the years 2016 through 2019. The crash records were further refined by querying the data sets to show records related to specific crash factors (e.g., severity, type of crashes). Once queried, the data was converted into a heat map. All crash maps are available in the GIS file submitted with this report.

Figure 5 shows all the reported crashes in the El Paso region. The downtown areas show major concentration of accidents, as well as the area along IH-10 between Cotton and Trowbridge. The major clusters of crashes can be found at major highway intersections:

- FM 659 (Zaragoza Blvd) at Loop 375
- US 62/180 (Montana Ave) at Loop 375
- Loop 375 (Joe Battle Ave) at IH-10
- Loop 375 at FM 76 (North Loop Dr)
- IH-10 at FM 659 (Zaragoza Blvd)
- IH-10 at Hawkins Blvd
- US-54 at IH 10 (NB and SB main lanes)
- US-54 at BUS 54 (Dyer St)
- US-54 at LP375 (Woodrow Bean Transmountain Dr)
- BUS-54 (Dyer St) at LP 375
- IH-10 at SH-20 (Mesa St).

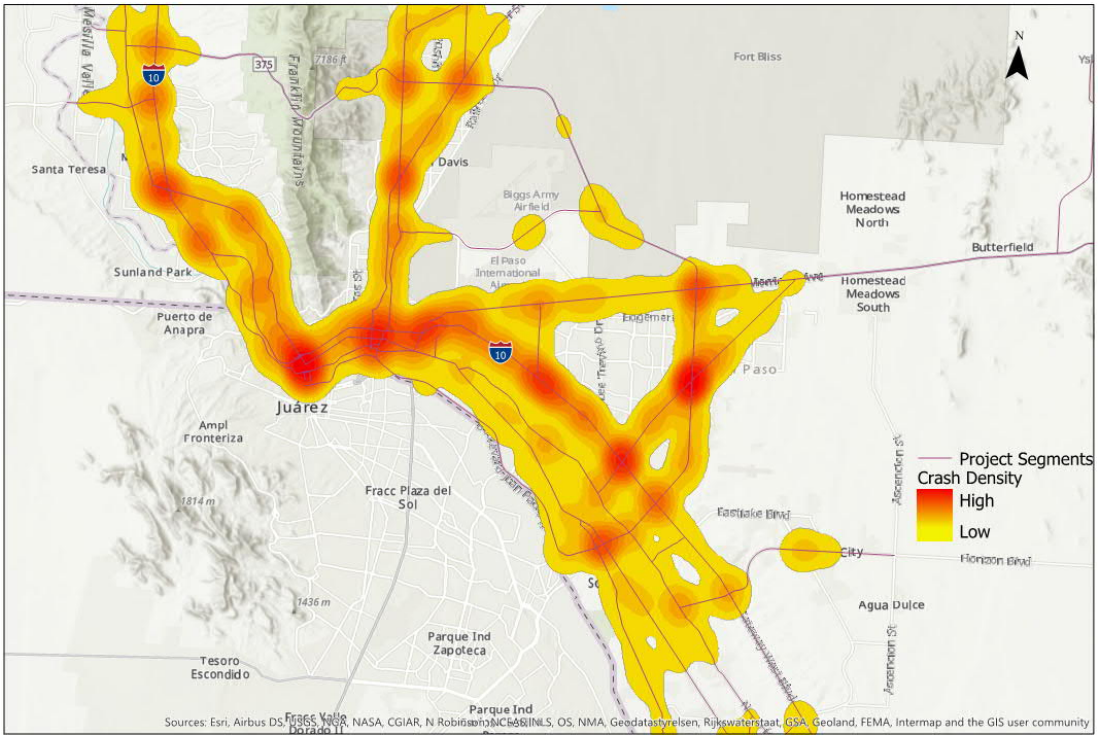

Figure 5: Crash Density - All Crashes (2016-2019)

The data for all crashes were queried further to identify the areas with a high concentration of crashes where people were killed or seriously injured.

Figure 6 shows the crash density of the fatal or incapacitating injury crashes. The figure shows the highest density of crashes in or at proximity to the intersections of:

BUS 54 (Dyer St) at US 54

- LP375 at FM 659 (Zaragoza Rd)
- IH-10 at SH-20 (Mesa St)
- IH-10 at the downtown area
- IH-10 at US 54
- IH-10 at US 62 (Paisano Dr)
- IH-10 at Hawkins Blvd
- IH-10 at Lee Trevino St
- IH-10 at FM 659 (Zaragoza Rd)
- IH-10 at FM 1281 (Horizon Blvd)

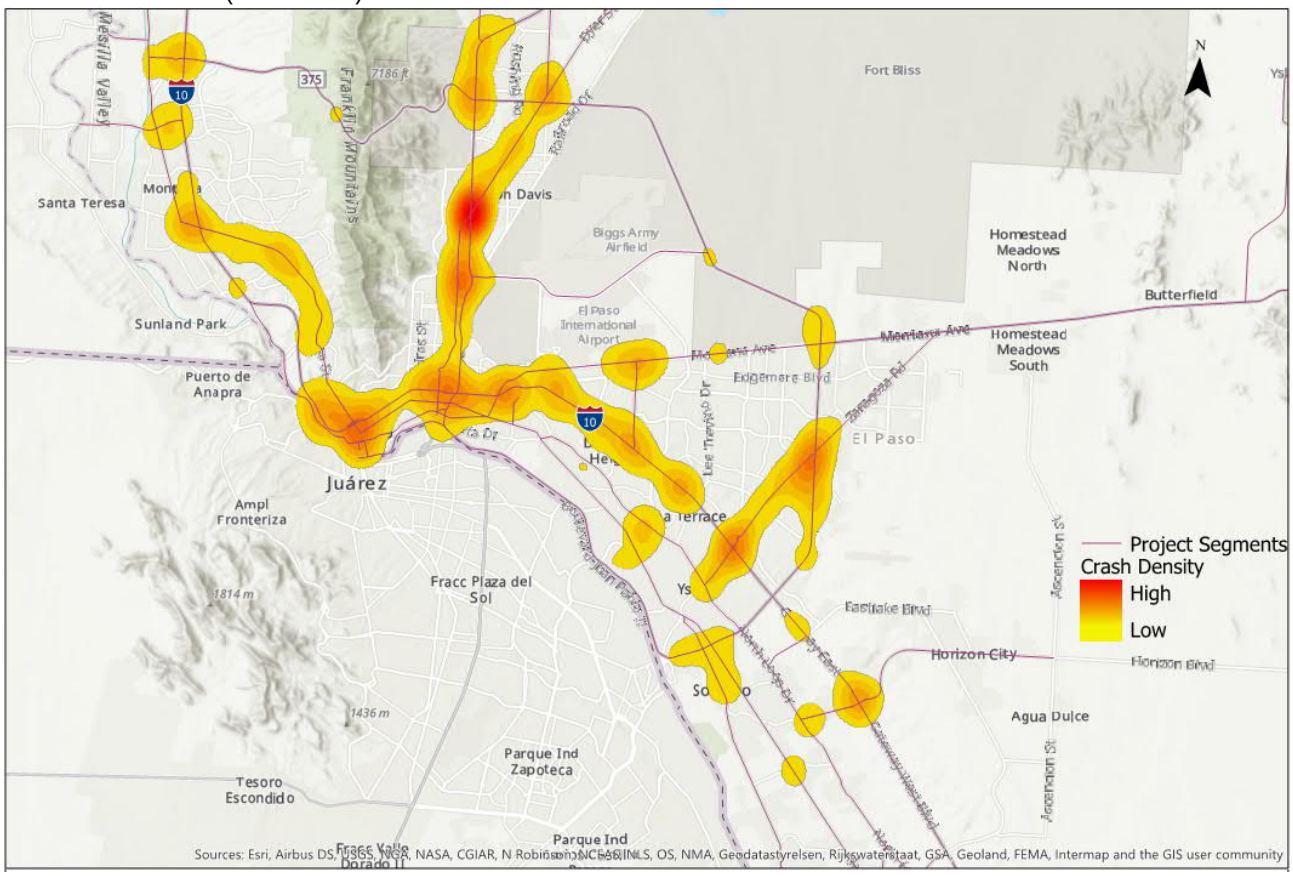

Figure 6: Crash Density - Crashes Causing Fatalities or Incapacitating Injury (2016-2019)

Figure 7 shows the density of crashes of vehicles traveling in opposite directions. This type of accident included crashes along undivided highways, wrong-way turns, entrances to parking lots, and vehicles traveling the wrong direction on freeway ramps.

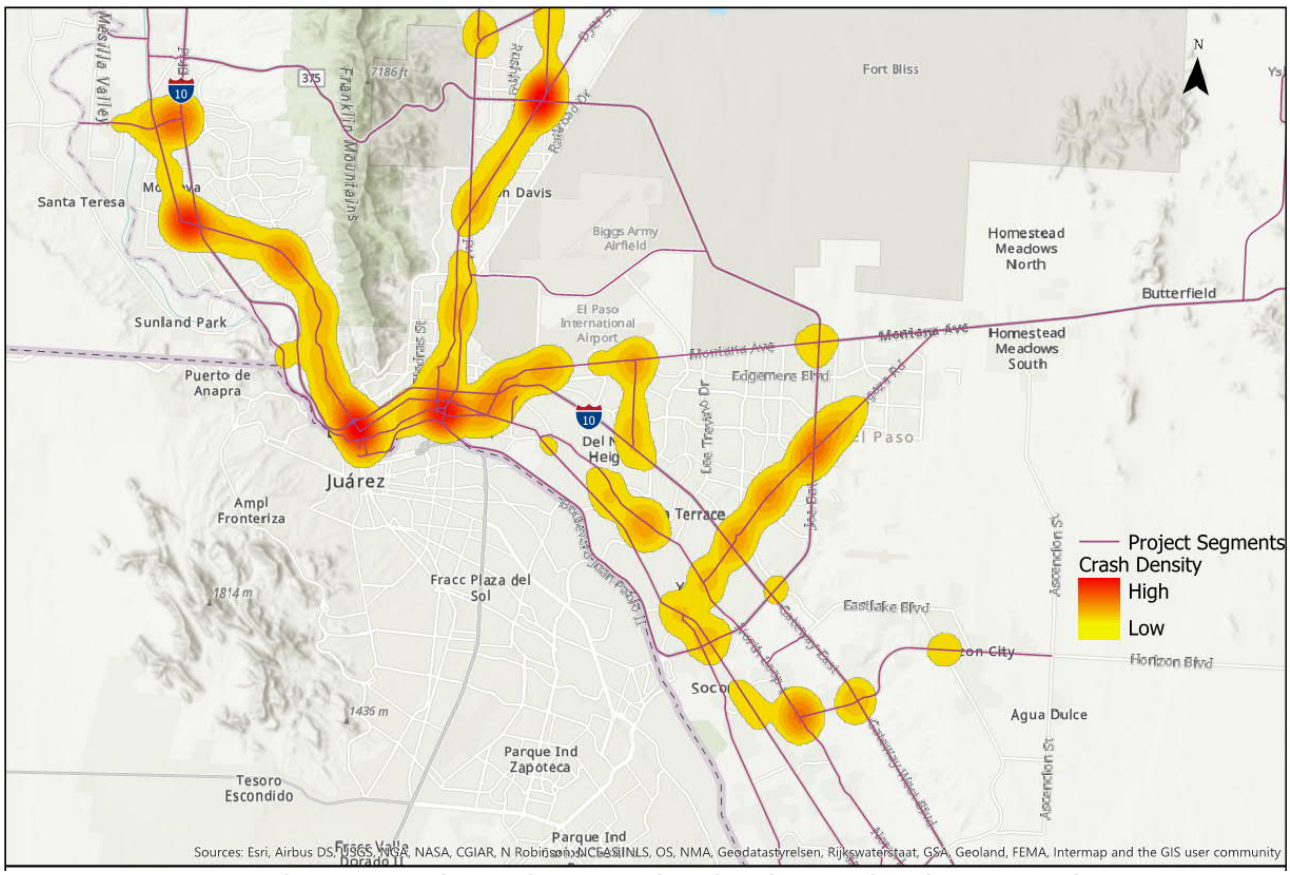

Figure 7: Crash Density - Opposite Direction Crashes (2016-2019)

The data were further refined to identify the crashes that occurred due to vehicles traveling the wrong way on interstate highways; **Figure 8** shows these incidents. Based on the crash locations outlined in this section, ITS strategies were targeted to areas with high potential to see improvement. In the following section, maps are introduced that show the selected project locations. Projects and heat maps may be overlaid with these maps in the submitted GIS file as they were done in the project selection phase to see the method of locating certain ITS implementation projects.

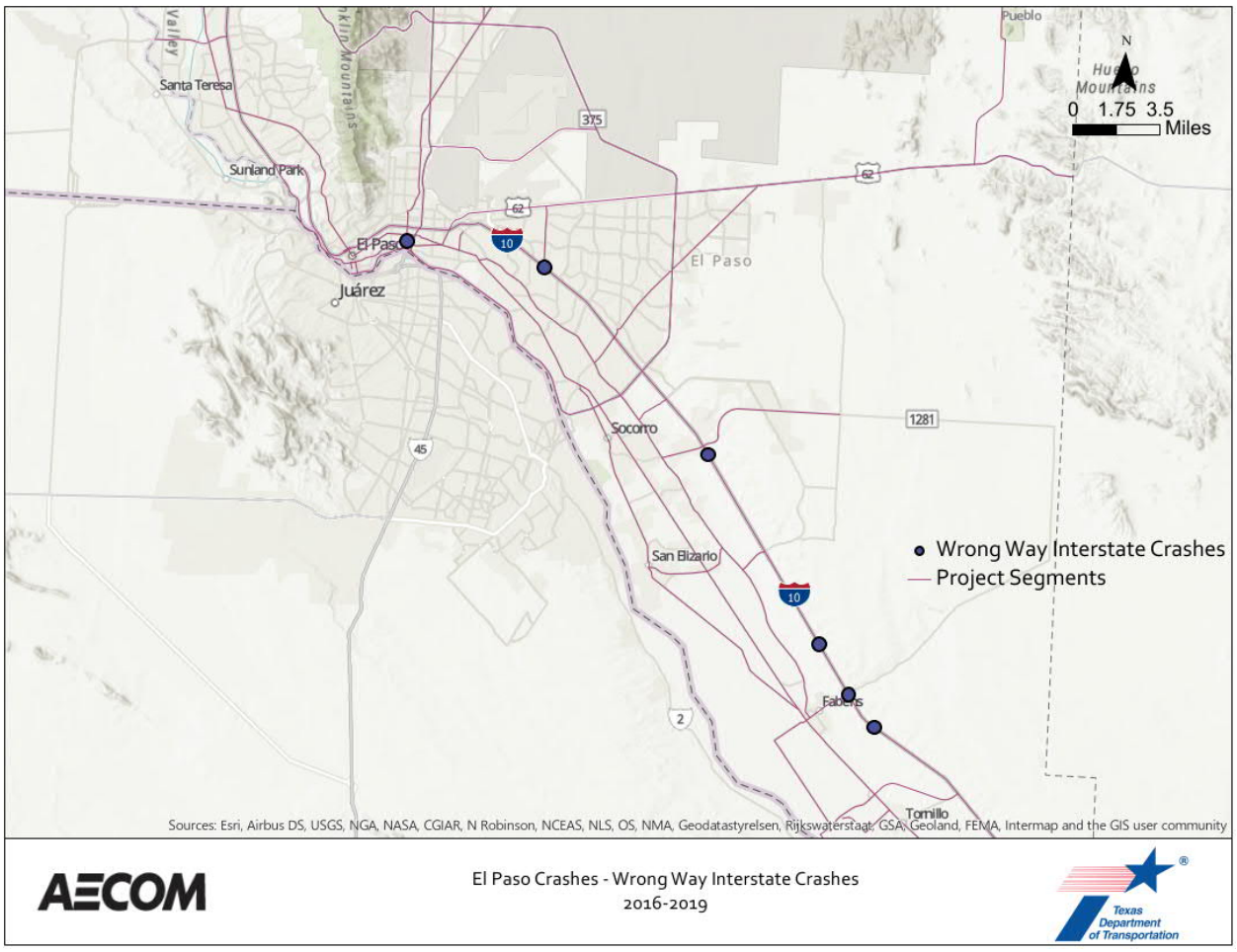

Figure 8: Wrong Way Crashes on IH-10 (2016-2019)

Assessment of Congestion

TxDOT has access to INRIX data that can be used to monitor traffic conditions, projected travel times, and areas of congestion. This report does not include an analysis of these data, but INRIX data will be essential to many ITS strategies indicated in this report. Strategies utilizing the data include, but are not limited to, traffic incident management, traffic detectors, and emergency response routing. To get a snapshot of congestion conditions during the AM and PM peak, Google Maps congestion figures were produced. By analyzing these maps along with crash data and existing locations of ITS infrastructure, this analysis targets some ITS strategies involving managing traffic congestion to areas that experience the most congestion. **Figure 10** shows the congestion map for a typical AM peak period and **Figure 9** shows the same map for a typical PM peak period.

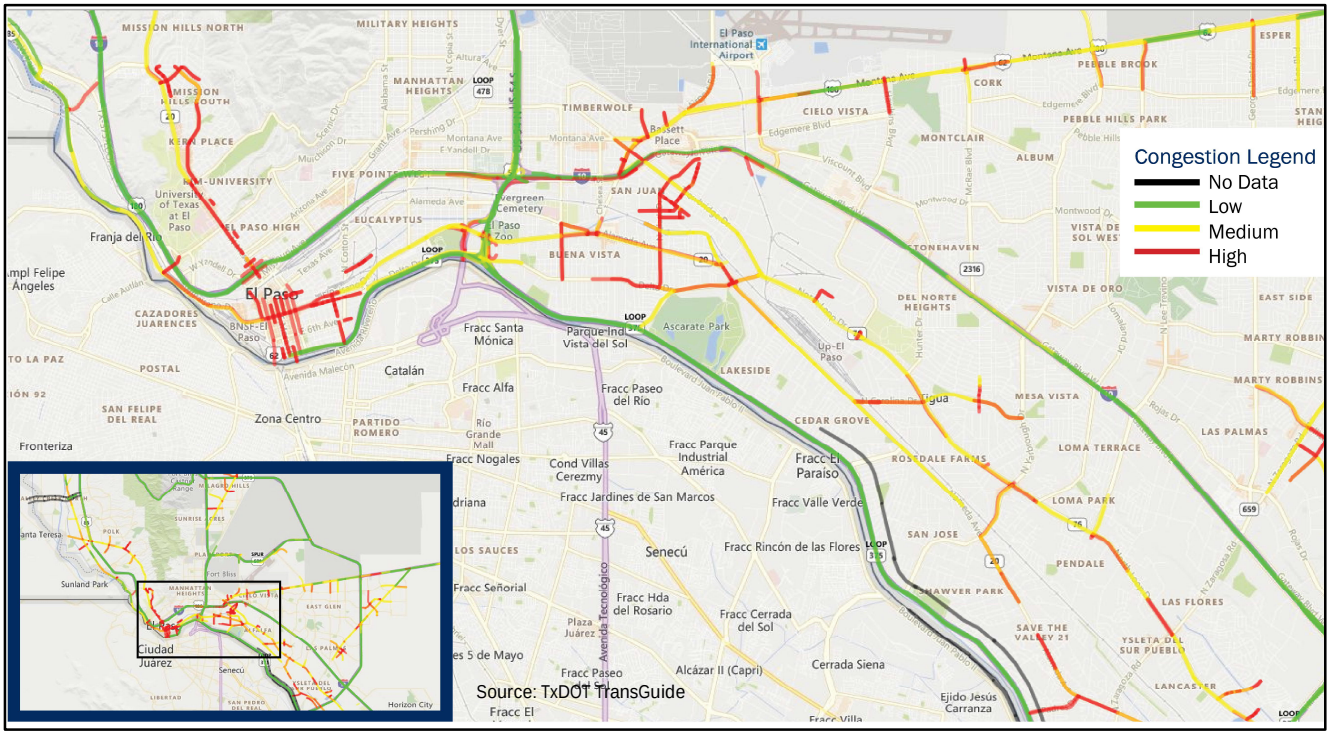

Figure 9: Typical Congestion AM

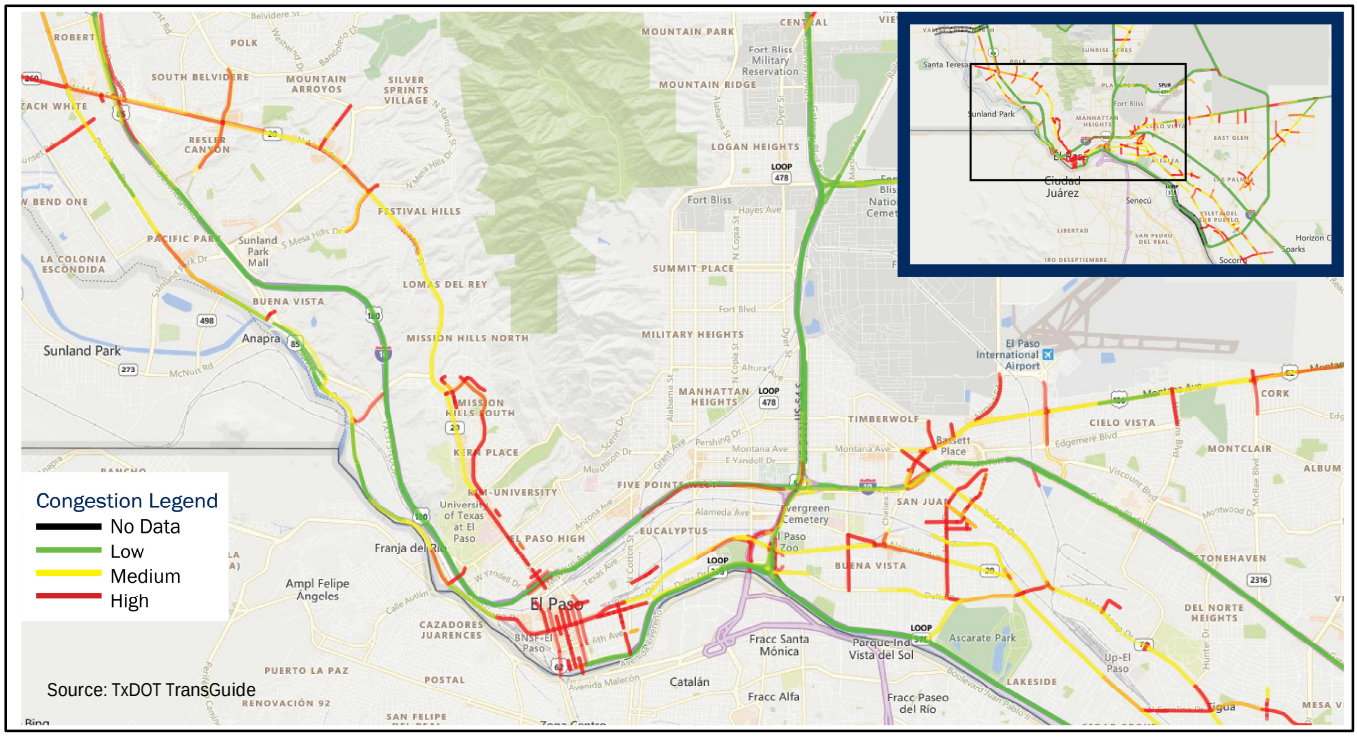

Figure 10: Typical Congestion PM

ITS Strategies

Project Segments

TxDOT identified corridors throughout the district with potential to add or update ITS equipment. TxDOT identified most of the roadways they own and operate and other City of El Paso assets for this study.

Table 2 and **Table 3** present a list of the study project segments corresponding with the study area map.

Table 2: El Paso District Project Segments Maintained by TxDOT

Segment ID	Route Name	Street	From	To	Total Miles
1	BU 54A	Dyer St.	Patriot Freeway	New Mexico State Line	12.5
2	FM 1109	Lower Island Rd.	Alameda Ave.	Fabens International Bridge	3.7
3	FM 1110	San Elizario Rd	Socorro Rd	IH 10	4.9
4	FM 1281	Horizon Blvd	North Loop Dr.	Ascencion St.	8.1
5	FM 1505	Clark Dr.	Trowbridge Dr.	Alameda Ave.	0.8
6	FM 1905	Washington St/Franklin St.	New Mexico State Line	IH 10	2.2
7	FM 2316	McRae Blvd	Montana Ave.	IH 10	2.4
8	FM 2529	Stan Roberts Sr. Ave/McCombs St.	Dyer St.	Martin Luther King Jr. Blvd	7.8
9	FM 258	Socorro Rd	Alameda Ave.	Alameda Ave.	16.5
10	FM 259	Canutillo La Union Ave.	New Mexico State Line	Doniphan Dr.	1.2
11	FM 2637	El Paso Natural Gas Co.	McCombs St.	End of Road	0.8
12	FM 3255	Martin Luther King Blvd.	New Mexico State Line	Patriot Freeway	5.8
13	FM 3380	M.F. Aguilera Rd	Tornillo Port of Entry	IH-10	6.1
14	FM 659	Zaragoza Rd	Montana Ave.	North Loop Dr.	9.7
15	FM 76	North Loop Dr.	Alameda Ave.	Loop 375	8.2
16	FM 76	North Loop Dr.	Loop 375	Lower Island Rd.	21.2
17	FM 793	Fabens St	IH 10	North Loop Dr.	2.2
18	IH 10	IH 10	New Mexico State Line	US 54	22.4
19	IH 10	IH 10	US 54	SL 375	11.4
20	IH 10	IH 10	SL 375	FM 3380	21.5
21	IH 10	IH 10	FM 3380	SH 20	23.2
22	IH 10	IH 10	SH 20	Culberson County	56.4
23	IH 10 Frontage Rd	Wyoming Ave.	Santa Fe St.	Kansas St.	0.3

Segment ID	Route Name	Street	From	To	Total Miles
25	IH 110	IH 110	Bridge of the Americas	IH-10	1.1
26	Loop 375	Talbot Ave. (Canutillo)	Doniphan Dr.	El Paso City Limits (West)	0.6
27	Loop 375	Talbot Ave.	El Paso City Limits (West)	IH-10	0.4
28	Loop 375	Transmountain/Woodrow Bean	IH-10	Railroad Dr.	13.5
29	Loop 375	Purple Heart Memorial Hwy	Railroad Dr	Montana Ave.	10.7
30	Loop 375	Joe Battle Blvd.	Montana Ave.	IH-10	7.5
31	Loop 375	Americas Ave.	IH-10	Zaragoza International Bridge	3.8
32	Loop 375	Cesar Chavez Border Highway	Zaragoza International Bridge	Santa Fe St.	12.4
36	PR 68	Hueco Tanks Rd	Hueco Tanks Park	Hueco Tanks Rd	2.4
37	RM 2775	Hueco Tanks Rd	Hueco Tanks Exit	Montana Ave.	5.4
38	SH 178	Artcraft Rd	New Mexico State Line	IH-10	3
39	SH 20	Doniphan Dr.	New Mexico State Line	Country Club Rd.	11.2
40	SH 20	Mesa St.	Country Club Rd.	Texas Ave.	8.8
42	SH 20	Alameda Ave.	Texas Ave.	Loop 375	11.7
43	SH 20	Alameda Ave.	Loop 375	IH-10	44.5
44	Spur 37	Vinton Rd.	Doniphan Dr.	Desert Blvd. North	1.3
45	Spur 6	Wildcat Dr.	Doniphan Dr.	Franklin St.	1.5
46	Spur 601	Spur 601	US 54	Purple Heart Memorial Hwy	7.2
47	US 54	Patriot Freeway	Cesar Chavez Border Highway	New Mexico State Line	19.7
48	US 62	Montana Ave.	Paisano Dr.	El Paso County Limits	25.3
49	US 62	Paisano Dr.	El Paso St.	Montana Ave.	5.1
52	US 85	Paisano Dr.	Sunland Park Dr.	Stanton St.	5.5
53	-	Nuevo Hueco Tanks	IH-10	Northloop Dr.	1.4

Table 3: El Paso District Project Segments Maintained by City of El Paso

Segment ID	Route No.	Street	From	To	Total Miles
24	IH 10 Frontage Rd	Yandell Dr	Kansas St.	Santa Fe St.	0.3
33	Loop 478	Copia St.	Paisano Dr.	Pershing Dr.	1.1
34	Loop 478	Pershing Dr.	Copia St.	Dyer St.	0.9
35	Loop 478	Dyer St.	Pershing Dr.	Patriot Freeway	3.7
41	SH 20	Texas Ave.	Mesa St.	Alameda Ave.	1.8
50	US 62/85	El Paso St.	Sixth Ave.	Paisano Dr.	0.2
51	US 62/85	Stanton St.	Stanton International Bridge	Paisano Dr.	0.4

ITS Strategies

By collaborating with the City of El Paso, TxDOT developed a list of ITS strategies and identified project segments that could be implemented during the next 10 years in the El Paso District. In alignment with TSMO goals, these strategies leverage existing or developing technologies to provide information to the traveling public, enhance safety, and manage traffic. TxDOT will implement many of these ITS strategies as projects adjacent to or along major corridors in the district. Based on the district's priorities and professional judgement, TxDOT selected 17 strategies to implement in the study area at the concept workshop on November 5, 2019.

Table 4 presents ITS Strategies TxDOT selected for implementation in El Paso. TxDOT selected strategies that will optimize the system performance by increasing the flow of traffic and improving both vehicular and pedestrian safety, and that El Paso will implement during the next 10 years.

Table 4: Recommended TSMO Strategies

Strategy	Explanation	Components/System Requirements
Wrong-Way Driver Detection	Wrong-Way Driver Detection is a safety improvement for exit ramps to identify wrong-way drivers and to activate a warning signal notifying the driver of the wrong-way violation. This system can be tied to DMS to warn oncoming motorists.	Wrong-Way Driver Detection system • Automated Ramp Detection System o Radar detection o CCTV verification o Automated message to TMC • DMS o Use upstream signs to disseminate oncoming vehicle notice (may be automated) • Intersection wrong-way detection via CCTV video analytics (emerging technology requiring further research)
Work Zone Management	Managing traffic during construction to minimize traffic delays, maintain motorist and worker safety, complete the construction project on time, and maintain residential and business access.[i] This strategy includes creating a Transportation Management Plan (TMP) utilizing the current vehicular patterns to analyze the corridor for optimal construction times. This reduces road closures and construction operations during peak periods which reduces traffic congestion. This strategy is low-cost but requires a high level of collaboration between governmental and local agencies.	- Temporary ITS trailers may be installed near work zones to collect data and monitor traffic and safety around the work zone. - Queue management/detection may be implemented with the inclusion of sensors and cameras. - Travel time information provided to the public through different communication methods (Bluetooth, Wi-Fi, etc.).
Traffic Incident Management (TIM)	A planned multidisciplinary process to detect, respond to, and clear traffic incidents.[ii]This reduces the amount of traffic due to first responders, clears the travel lanes, enhances the safety of the traveling public, and restores the flow of traffic to decrease the likelihood of secondary collisions. TIM requires high collaboration and communication between state and local transportation departments, TMCs, fire and rescue services, law enforcement agencies, and others who play a primary role in traffic incidents to improve the transportation system.	Field detection • Radar and CCTV • Video analytics • Lidar, magnetic field sensors, passive, and/or active infrared - First responder training - Route management - Utilize Connect Vehicle data - Automated Incident Detection (AID) uses a combination of hardware such as CCTV and infrared and an incident detection algorithm (IDA) to determine whether an accident has occurred. IDAs may be applied to existing CCTV systems using a video decoder.

Strategy	Explanation	Components/System Requirements
Automated Performance Metrics	Automatically tracking measures of effectiveness for operations that capture the TMC's activities. Monitoring the performance of the system in real-time can enable decision making at the TMC and measure the effectiveness of certain strategies compared to others.[iii]	- TMC software should be capable of monitoring travel time, number of incidents, incident response times, lane closure durations, etc. - Performance data can be used to influence better signal timing decisions, where to allocate resources to leverage other ITS strategies, identify areas of excessive speeding and/or road violations to divert enforcement
Inter-Agency Integration	This strategy requires both technical and institutional integration. Technical integration of systems includes methods to store and provide access to electronic systems among different organizations. Institutional integration involves coordination between various agencies and jurisdictions to achieve seamless operations and/or interoperability.[iv]	- Utilize center-to-center protocols. - E.g., the Veoci software is a platform for emergency management that El Paso area agencies can use to centrally manage emergencies and send information to the public - Share performance measures and other data with agencies such as law enforcement, fire department, emergency management, City of El Paso Transportation Department, etc.
Traffic Signal Operations	Planning, maintenance, design, and operation of signalized intersections and traffic signal systems. Assessing the efficacy of traffic signal operations strategies and a traffic signal program management plan may be enabled using Automated Traffic Signal Performance Measures (ATSPM).	- ATC controllers capable of collecting and analyzing high resolution data (e.g., ATSPMs) • Provides agencies the ability to monitor and correct deficiencies in traffic signal operations • Problems may be addressed before they become complaints • Can contribute to safety by addressing congestion

Strategy	Explanation	Components/System Requirements
Connected Vehicles	Vehicles enabled with interoperable networked wireless communications to connect to other vehicles, infrastructure, and the passengers' communication devices. Connected vehicles technology may include sharing safety and mobility information through in-vehicle or aftermarket communications devices. They can also "talk" to traffic signals, work zones, toll booths, school zones, and other types of infrastructure.[v]	- Install Vehicle-to-infrastructure (V2I) technologies • Fiber communication • Signal Phase and Timing (SPaT) messages o Including Map data – the physical geometry of one or more intersections o Radio Technical Commission for Maritime Services (RTCM) o Field devices ▪ Connected traffic signal controllers ▪ Field communication ▪ Dedicated Short Range Communications, Road Side Units (RSU), Fifth generation wireless communications (5G), Central Signal Phasing and Timing (SPaT) Device -Traffic Management Center upgrades • Connected vehicle functionality • Capacity to handle data flow
Information Dissemination	Providing up-to-date travel conditions to the traveling public via the ITS infrastructure. This strategy encompasses many of the previously defined strategies and may include implementing performance measures to ensure information is accurately, timely, and efficiently shared with the public in order to influence their decisions, such as the selections of mode, route, departure time, driving behavior, and trip deferral.	- TxDOT website - DMS messaging - Construction project websites - Highway Advisory Radio (HAR) - Social Media - Third-party applications
Traffic Management Center (TMC) Upgrades	Upgrade TMC video wall, workstations, hardware, etc. to improve real-time situational awareness and management of system from the TMC. Support 24-hour operations for increased effectiveness of TMS at all hours.	- TMC upgrades • Video wall • Workstations • Hardware • Video Analytics - 24-hour staff operation of TMC

Strategy	Explanation	Components/System Requirements
Emergency Response Routing	Work with local agencies to "facilitate the movement of vehicles and equipment before, during, and after major emergencies to enhance response and recovery efforts.[vi] This can include integrating Computer-Aided Dispatch (CAD) systems and Traffic Management systems. Integrate system with third-party applications such as Google Maps and Waze. This can aid in reducing secondary incidents and decrease congestion.	- Integrate traveler info system (511) with 3rd party partners (Waze) and leverage Connected Vehicle technology into these systems.
Lane Management System	Lane Management Systems provide guidance to drivers about lane information, including routing, speed, and closures. Based on real-time traffic information, traffic incident and congestion date can be used to control lane usage ahead of lane closures to reduce the incidence of rear-end and secondary crashes.[vii]	- DMS lane control signs (LCS) - Radar and CCTV to operate effectively - Connectivity to TMC
Roadway Monitoring	Monitoring the roadway system using cameras to identify traffic incidents, congestion, and system performance.	- Additional CCTV • CCTV mounted under overpasses and at top of highest high mast to reduce "blind spots" in system - Video analytics to detect lane closures, stalled vehicles, incidents, wrong-way vehicles, etc.
Traffic Detectors	Traffic detectors collect data about the current traffic conditions so that transportation management and operation decisions can be made. Data collected includes traffic volumes, speeds, distribution, truck weight, etc. This information can be further used to implement other TSMO strategies such as ramp metering, work zone management, etc. Data from traffic detectors is also utilized for travel time management by monitoring origin and destination, and to identify queueing.	- Radar, third party data (INRIX, HERE), etc. - Possible detection using video processing from existing CCTV - TransVista upgrades to process data received

Strategy	Explanation	Components/System Requirements
U.S. Customs and Border Protection (CBP) Checkpoint Queue Detection	Strategy includes monitoring roadway conditions to detect vehicle queuing at or near the CBP checkpoint. System can use upstream DMS to warn motorists of upcoming queues to reduce the risk of traffic incidents. Using at CBP checkpoint locations can monitor congestion volumes leading to the station and whether queueing vehicles are adversely impacting main lane volumes.	- Radar detection - DMS - Remote communications – wireless (e.g., antennas, cellular) due to CBP checkpoint locations.
Roadway Weather Information Systems (RWIS)	RWIS include a roadside field component, environmental sensor stations (ESS), to collect atmospheric data such as temperature, humidity, visibility, wind speed and direction, and lightning detection. ESS are also capable of collecting pavement data. Central RWIS hardware processes data from the field units to display data at the TMC, where it can be publicly disseminated.[viii]	- Environmental Sensor Stations - Pavement temperature sensors • Radar or in-pavement - Disseminate adverse weather conditions to traveling public • DMS, TxDOT, and project websites; social media, Highway Advisory Radio (HAR), third-party applications
Travel Time Estimation and Prediction	This strategy uses traffic data to estimate and predict freeway travel times and relay information to motorists. Travel time information may encourage motorists to use alternate routes to relieve congestion on corridors.	- INRIX data - Communication to traveling public • DMS, HAR, social media, websites, third-party applications
Managed Lanes	Managed lanes are highway facilities or a set of lanes where operational strategies are proactively implemented and managed in response to changing conditions. Managed lanes may improve road conditions and reduce congestion.[ix]	- Managed lanes may include: - HOV lanes - Express Lanes - Reversible lanes - Bus-only lanes - Truck-only lanes -Radar and CCTV for monitoring roadway -Optional DMS

Table 5 presents other strategies that TxDOT considered but did not select for implementation within the next 10 years across the study area.

Table 5: Other TSMO Strategies

Strategy	Explanation	Components/System Requirements
Managed Lane Congestion Pricing	Congestion pricing is an operational strategy that implements and adjusts tolls to maintain free-flow speeds in the managed lanes.	- Tolling systems and software
Lane Control System (LCS)	Lane control system is a safety improvement developed to warn drivers when maintenance, road work, or lane closures exist. Closed lanes are marked with an overhead red cross while a green arrow shows drivers which lane(s) should be used. This strategy increases safety and aids in decreasing traffic congestion.	- DMS LCS signs - Radar and CCTV to operate effectively - LED light bars on guide signs to identify level of congestion (requires further TxDOT research on emerging technology and potential MUTCD changes)
Ramp Metering	Ramp metering applies traffic signals on ramps to control the frequency of traffic that enters an interstate or freeway during peak hours to alleviate congestion. The vehicles are then released in a way that reduces mainline congestion and overall delay while increasing mobility and effectiveness though the network.	The direct result of ramp meters is merging assistance. This can be achieved with a decentralized algorithm using DSRC technology. By monitoring the freeway ramp with CCTV, radar, infrared, and/or other sensors, speed and traffic volume data can be collected and analyzed to provide drivers on the on-ramp with messages such as, “maintain speed,” “slow down,” and “merge behind.”
Transportation Demand Management Incentives	Incentives modify traveler behavior by creating opportunities that would motivate the traveler to make alternative choices that reduce traffic. This method would require the involvement of employers to create rewards or prizes as an incentive for their employees to choose alternative modes of transportation such as trains, bikes, or carpooling to benefit other employers, employees, and the community at large.	- City, state, and/or employer provided (further study needed to determine potential funding sources) - Employer-based carsharing - Commuter financial incentives including parking cash-out; travel allowance; transit, ride-share, and transportation network company benefits. - Parking pricing that shifts the cost of parking to employees, encouraging use of other modes - Guaranteed ride home that provides multimodal commuters with an option of a subsidized ride if in need, or in an emergency
Air Pollution	Monitoring of air pollution through sensors installed in the field.	- Field sensors installed on luminaires, signal infrastructure, or ITS infrastructure

Smart Light Fixtures	ITS technologies included with illumination infrastructure.	- Luminaire mounted CCTV and detection - Luminaire mounted audio detection
Freight Management	Freight management strategies focus on the improvement of truck traffic flow along interstate highways and freeways as well as prolonging prolong pavement life and reducing maintenance costs.	- Size and weight restrictions - Truck lanes - Weigh-in-motion
Transit Management	Helps to achieve schedule reliability ultimately making transit a more attractive travel option, thereby freeing up capacity on roadways.	- Bus priority - Computer-Aided dispatch - Station enhancement - Advanced fare payment options that reduce ridership cost for routes affected by work zones - Special transit rides for elderly or disabled

Project Selection

A list of projects was developed to implement ITS strategies along the project segments identified in Section 4.1 of this report. Engineering judgement was used to determine the location of the ITS projects, with the goal of implementing as many of the ITS strategies as possible across the study area project segment. **Figure 11** shows a map of the proposed ITS project locations. A KMZ and a GIS file of these projects are attached to this report. Note that the figure below does not show all ITS equipment and projects at the resolution provided. Many of the locations represented on the map will have several different pieces of equipment implemented at the same location. In the GIS and KMZ files produced in conjunction with this report, project locations may be viewed at a smaller scale and each location with multiple projects may be expanded to see every piece of equipment recommended to be installed.

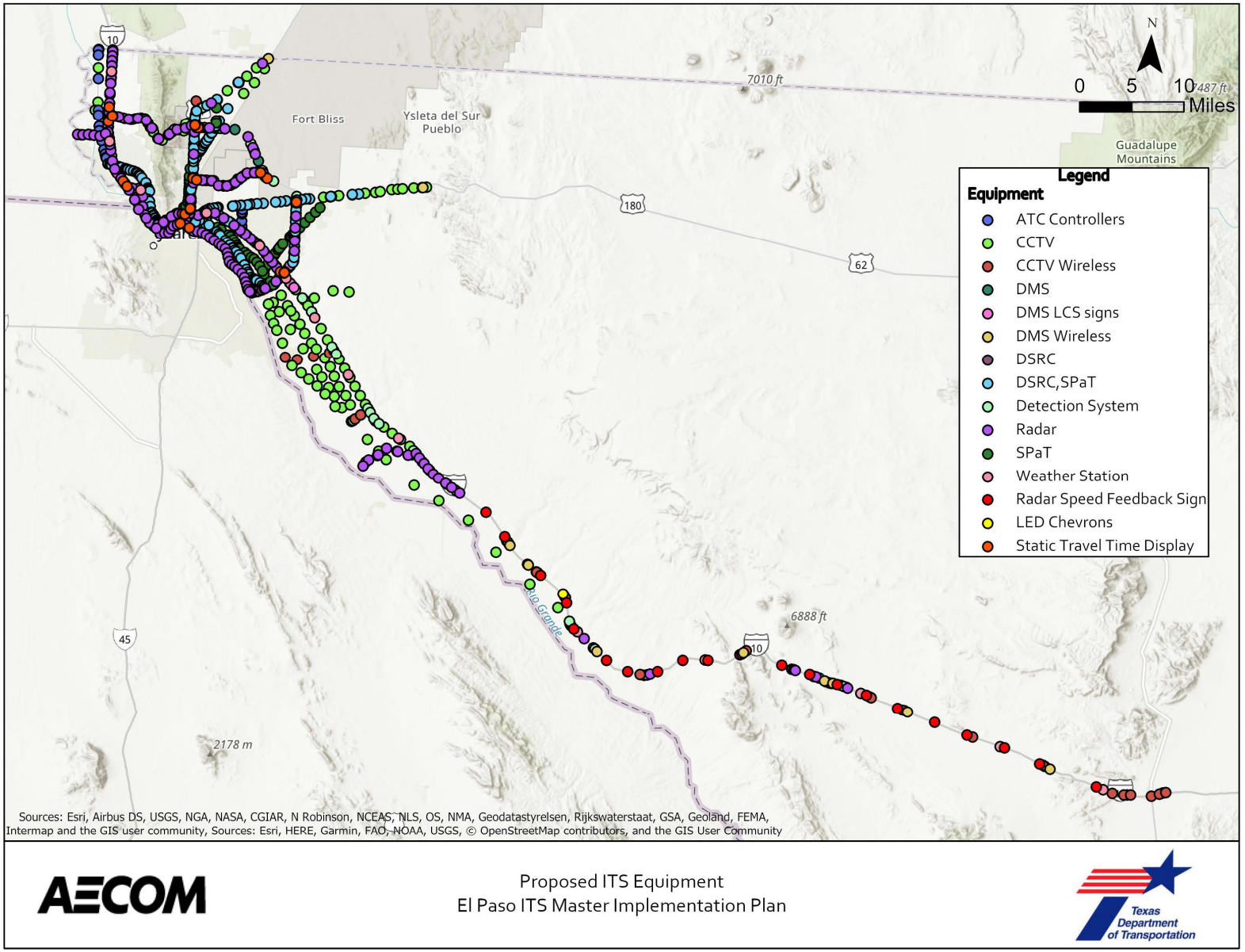

Figure 11: Proposed ITS Equipment

Table 6 shows a summary of the devices recommended for installation in the El Paso District for the next 10 years. For some equipment, such as "Additional Hardware (routers, firewalls), software integrations," there are zero new physical devices recommended to be implemented, but new computer programs, contracts, studies, and planning may be required to implement the project listed. Associated capital and design/study cost estimates are also listed. Over the next 10 years, the El Paso ITS Master Implementation Plan includes 1,366 new devices and 227 miles of fiber with an estimated capital cost of about $337 million and $53 million in design and study costs.

Table 6: Summary of ITS Devices, El Paso District 2020-2030

Equipment	Sum of Devices	Sum of Project Est. Cost Capital	Sum of Project Est. Cost Design/Study
TMC Improvements/Information Dissemination	0	$2,300,000	$1,250,000
Additional Hardware (routers, firewalls), Software integrations	0	$850,000	$127,500
ATC controllers	287	$5,510,400	$826,560
CCTV	298	$32,912,789	$4,936,918
CCTV wireless	53	$5,128,577	$769,287
Detection System	132	$12,529,123	$1,879,368
DMS	8	$2,647,085	$397,063
DMS LCS signs	38	$25,818,629	$3,872,794
DMS wireless	22	$7,160,683	$1,074,102
DSRC	25	$300,000	$45,000
DSRC, SPaT	194	$2,560,800	$385,160
Fiber	227	$157,720,690	$23,658,103
INRIX	0	$0	$1,100,000
Managed Lanes	0	$75,000,000	$11,250,000
Radar	170	$2,040,000	$305,600
Radar Speed Feedback Sign	22	$162,690	$24,404
Software integrations	0	$500,000	$250,000
SPaT	73	$87,600	$42,020
Weather Station	15	$469,170	$70,376
LED Chevrons	1	$37,135	$5,570
Static Travel Time Display	28	$3,761,923	$564,288
Sum	**1366 devices, 227 miles of fiber**	**$337,497,293**	**$52,834,114**

Table 7 displays the unit cost table used to estimate costs for the ITS equipment installations for each project in **Appendix B**. The breakdown of each unit cost is available in **Appendix C**.

Table 7: ITS Equipment Unit Costs

TSMO Strategy	ITS Equipment	Unit Cost	Unit
Traffic Signal Operations	ATC controllers	$19,200	EA
Roadway Monitoring	CCTV	$110,445	EA
Roadway Monitoring	CCTV wireless	$96,760	EA
Wrong Way Driver Detection	Detection System	$94,900	EA
Information Dissemination	DMS	$330,900	EA
Lane Control System	DMS LCS signs	$679,400	EA
Information Dissemination	DMS wireless	$325,500	EA
Connected Vehicles	DSRC	$12,000	EA
Connected Vehicles	DSRC, SPaT	$13,200	EA
Several Strategies	Fiber	$694,800	MI
Traffic Detectors	Radar	$12,000	EA
Connected Vehicles	SPaT	$1,200	EA
RWIS	Weather Station	$31,300	EA
Traffic Detectors	Radar Speed Feedback Sign	$7,395	EA
Information Dissemination	Static Travel Time Display	$134,350	EA

Figure 12 shows a map of the proposed fiber network extensions. It is recommended to consolidate the fiber network jurisdiction in the region. The proposed fiber map assumes that all future fiber will fall under one jurisdiction.

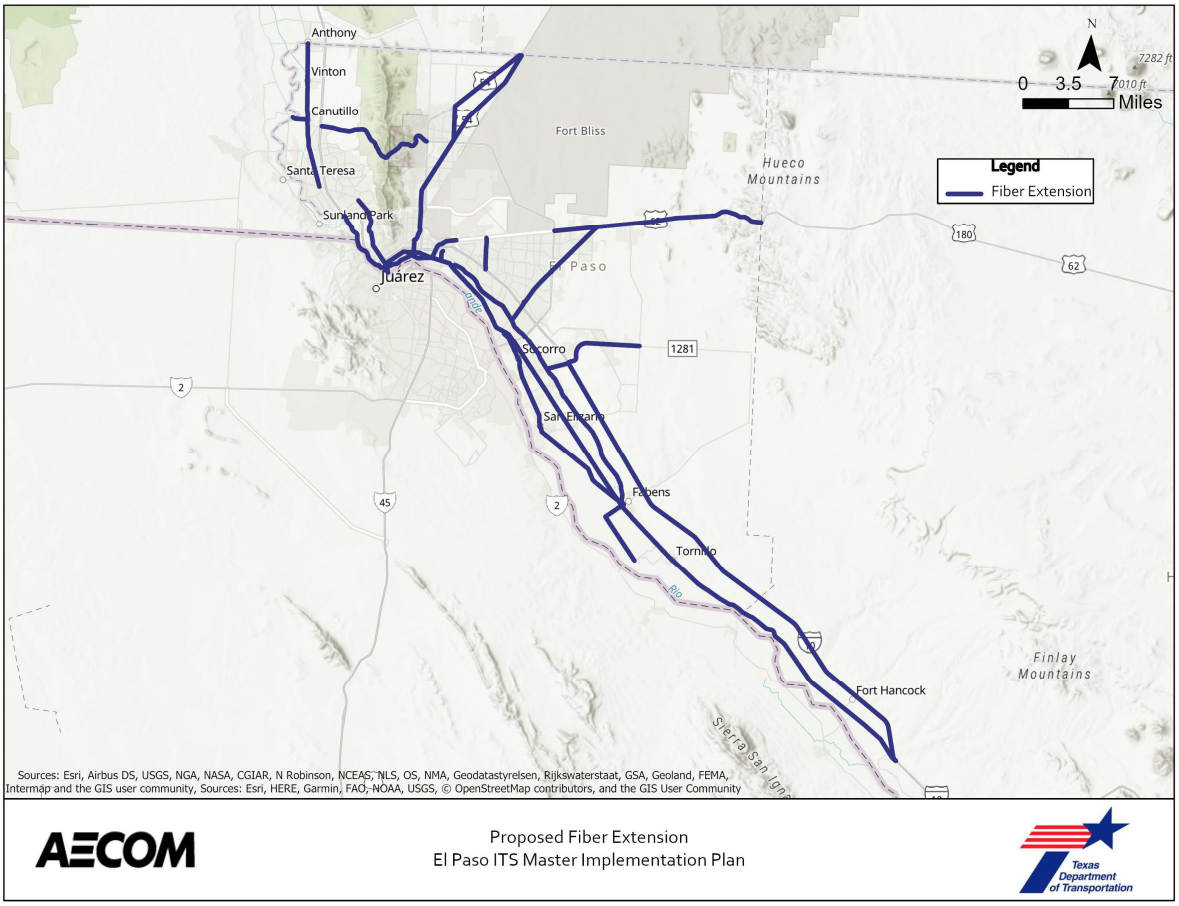

Figure 12: Proposed Fiber Extensions

Appendix B shows the project matrix. Each row in the matrix represents a single ITS project in a route segment. The first seven projects in the matrix are non-corridor specific projects representing upgrades to the TMC, technology investments, work zone management expansion, and upgrade of the Traffic Incident Management program.

If a project is listed in the current Unified Transportation Program (UTP), then the associated control-section-job (CSJ) is listed with the project. Each segment ID matches to a project segment from the initial list. The Route No. is the Texas, Interstate, or US Highway number of the route segment. This is followed by the alternate name of the street if applicable, and the limits of the route segment and mileage of the segment. Safety priority identified on a scale of 1 through 9 was developed to assist with project prioritization and proposed year. Projects ranked #1 were those deemed the highest priority for safety, and 9 the lowest. The explanation for the ranking of each safety ranking is given in **Table 8**.

Each project that is linked to a road segment in the GIS file has a GIS project ID associated with it in the table in **Appendix B**. This way, by looking at the table and GIS concurrently, projects can be spatially identified.

Table 8: Safety Prioritization Methodology

Safety Priority Ranking	Category	Explanation
1	Wrong-Way Detection	Wrong-Way Detection is a direct strategy aimed at exclusively preventing incidents. Usually wrong-way accidents are on higher speed roadways resulting in more severe incidents. Additional district-wide strategies were assigned a #1 ranking as they could be implemented to address safety concerns as well, such as TIM (prevent secondary incidents), Work Zone Management (protect worked safety and motoring public through work zones), and Inter-Agency Integration (better operations for all strategies, increase effectiveness).
2	Traffic Signal Operations, Connected Vehicles	Traffic signal operations improvements are strategies to improve driver awareness of roadway conditions and operations to help reduce incidents. Connected vehicles (CV) are ranked as #2 for potential impacts on safety. Uncertainty around the timeline of CV technology implementation may lower the prioritization of CV projects.
3	Information Dissemination, TMC Operational Improvements, and Emergency Response Routing	Information dissemination will improve driver awareness to help prevent incidents. TMC improvements are intended to improve TMC operations, both through capital improvements and staffing improvements. More active and improved monitoring will lead to more efficient roadways which can be expected to reduce incidents. Emergency response routing and priority systems enables emergency vehicles to reduce response times, incident clearance times and the potential of secondary incidents.
4	Lane Control Systems for Interchange Routing	Based on real-time traffic information, traffic incident and congestion data can be used to control lane usage ahead of interchanges to reduce the incidence of rear-end and secondary crashes when lanes are closed.
5	Roadway Monitoring and Traffic Detectors (e.g., CCTV cameras, microwave vehicle detection systems)	Improves real-time situational awareness in reducing incident detection, verification, response and clearance times.
6	Queue Detection at CBP Checkpoint Locations	Reduces rear-end collisions at checkpoint locations as well as provides wait time estimates.

Safety Priority Ranking	Category	Explanation
7	Road Weather Information Systems	Monitors weather conditions and disseminates information to motoring public for safer operations during inclement weather conditions.
8	Travel Time Estimation and Prediction	Utilizing INRIX data, this provides the motoring public with comparative travel time information allowing for potential route adjustments decreasing congestion and potentially decreasing incidents.
9	Managed Lanes	Managed lanes are highway facilities or a set of lanes where operational strategies are proactively implemented and managed in response to changing conditions. Managed lanes may improve road conditions and reduce congestion

The project matrix lists the TSMO Strategy supported by each project. Each project supports one or more of the strategies presented in

Table 4. Equipment and number of devices are listed, as well as a project description, estimated capital and project design cost, and any comments related to the project. At the initial recommendations workshop held on November 25, 2019, TxDOT was presented with the draft project matrix. From this workshop, it was recommended to include both a prioritization for safety and the corresponding Control Section Job (CSJ) number. **Appendix D** lists a table of the projects by route segment, including the number of devices and cost estimates.

Priority Projects

Eleven projects were selected as top-priority projects for the El Paso District. These were determined to be the seven non-corridor specific projects related to TMC upgrades and non-corridor specific programs, and others selected based on an examination of high-priority corridors and strategies that may have the greatest impact on congestion and safety. **Table 9** throughTable 19: Priority Projects - Static Travel Time Displays **Table 19** and the corresponding figures show a breakdown of these priority projects, advantages and disadvantages of each, and a cost estimate that includes estimated capital and design/study cost. The total estimated capital cost of priority projects is about $59 million and the total estimated design and study cost is about $7 million. The TMC-related projects are critical because they will enable other ITS projects to be deployed and monitored across the region. Most of these projects have a proposed timeframe of 2020 or 2021 to denote their urgency.

Table 9: Priority Projects – Wrong Way Driver Detection

Project(s)	Description	Advantages	Disadvantages	Est. Let. Date	Est. Capital Cost	Est. Design/Study Cost
Wrong-Way Driver Detection along Interstate Highway 10 Three segments: New Mexico SL to US 54, US 54 to SL 375; US 54 from Cesar Chavez Border Highway to New Mexico SL See Error! Reference source not found.	Install wrong way detection system for exit ramp locations along corridors. Radar detection with video verification. Automated notification system to TMC staff. Potential to automate response to post advisory messages on upstream DMS.	Can use existing CCTV and radar where available. This system has a direct impact on the safety of the traveling public. Wrong-Way Driver Detection can inform people when there is active danger. Future applications enabled by installing this technology include leveraging V2I technology when a driver is driving the wrong way to slow the driver to a stop or send a message to the vehicle advising the driver.	Wrong-way detection is a reactive measure that may help people realize they are going the wrong way, but it may not be able to prevent wrong-way driving entirely.	FY 2021	$5,220,468	$522,047

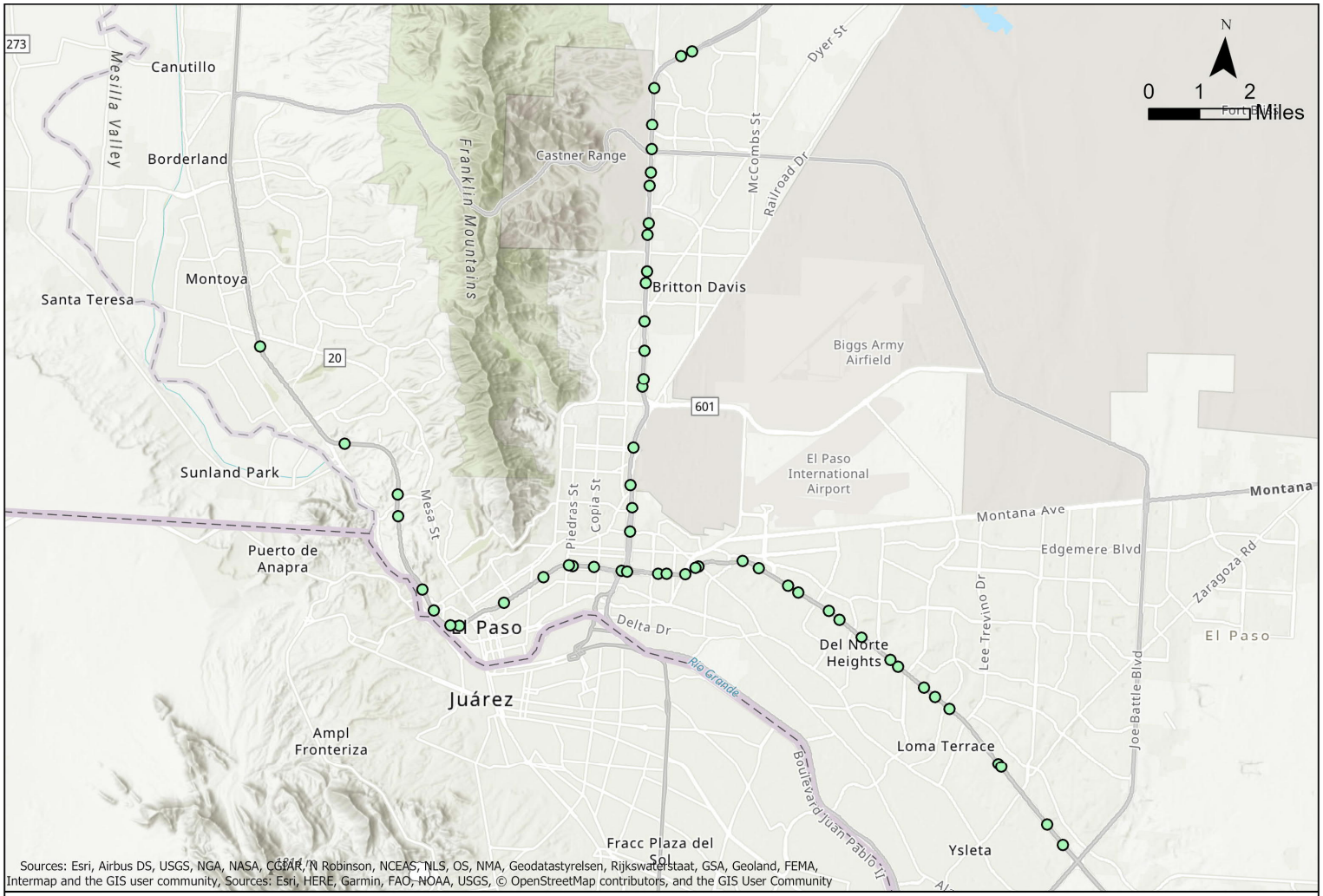

Figure 13: Priority Wrong Way Driver Detection

Table 10: Priority Projects – Radar Speed Feedback Signs

Project	Description	Advantages	Disadvantages	Est. Let. Date	Est. Capital Cost	Est. Design/Study Cost
Radar Speed Feedback Signs along Interstate Highway 10 Limits From: SH 20 Limits To: Culberson County Line See **Figure 14**	Install Radar Speed Feedback Signs	Signs will warn drivers traveling above the speed limit of their speed, prompting them to slow down in high crash-potential areas. Near the CBP checkpoint west of Sierra Blanca, there is a curve on IH-10 with a history of fatal crashes, potentially made fatal by the high speed of travel. Placing signs in that area may induce drivers to slow down and reduce the prevalence of fatal crashes.	It is difficult to track the performance of the Radar Speed Feedback Signs, and they are only a suggestion to drivers - they are not guaranteed to make speeding drivers slow down. Drivers may speed back up to speeds well over the speed limit when they travel away from the speed feedback sign.	2020	$48,000	$4,800

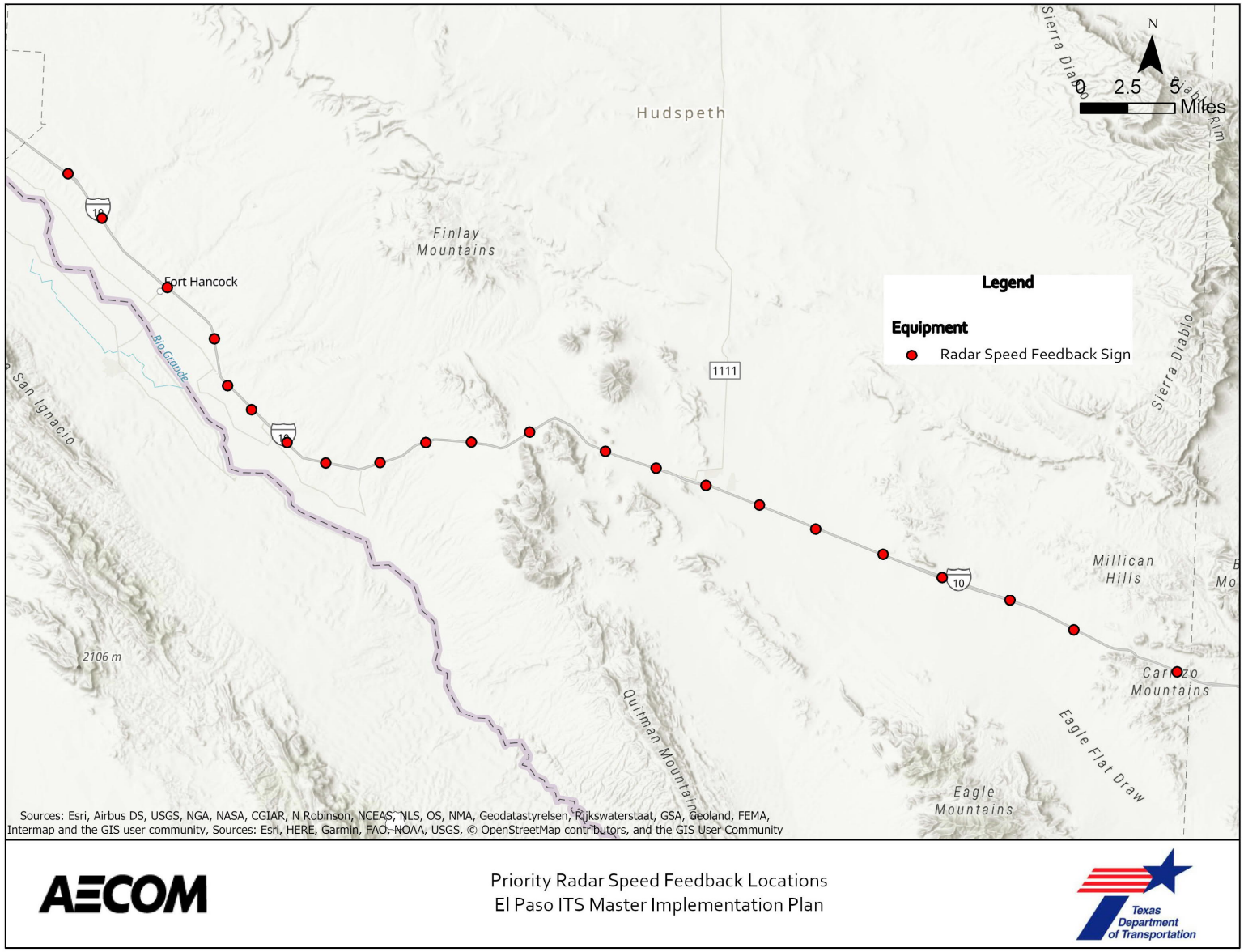

Figure 14: Priority Radar Speed Feedback Signs

Table 11: Priority Projects – Extend Fiber Network

Project	Description	Advantages	Disadvantages	Est. Let. Date	Est. Capital Cost	Est. Design/Study Cost
New Fiber - Multiple Segments: IH 10 From SL 375 to FM 3380; Patriot Freeway from McCombs St to New Mexico State Line; SH 20 from Mesa to Alameda; SH 20 from Texas Ave to SL 375; and SL 375 from IH 10 to Railroad Dr. See **Figure 15**	Install new fiber optics communication lines along the project corridors.	Enables the installation and operations of ITS equipment. More reliable, flexible, and durable than copper wire. Will accommodate future ITS equipment installations beyond 10 years in the future.	Installing fiber is estimated to be expensive with a unit cost of about $695,000 per mile. Money could be spent on wireless equipment that would cost less even if it were undesirably less reliable.	2021	$33,142,188	$3,314,219

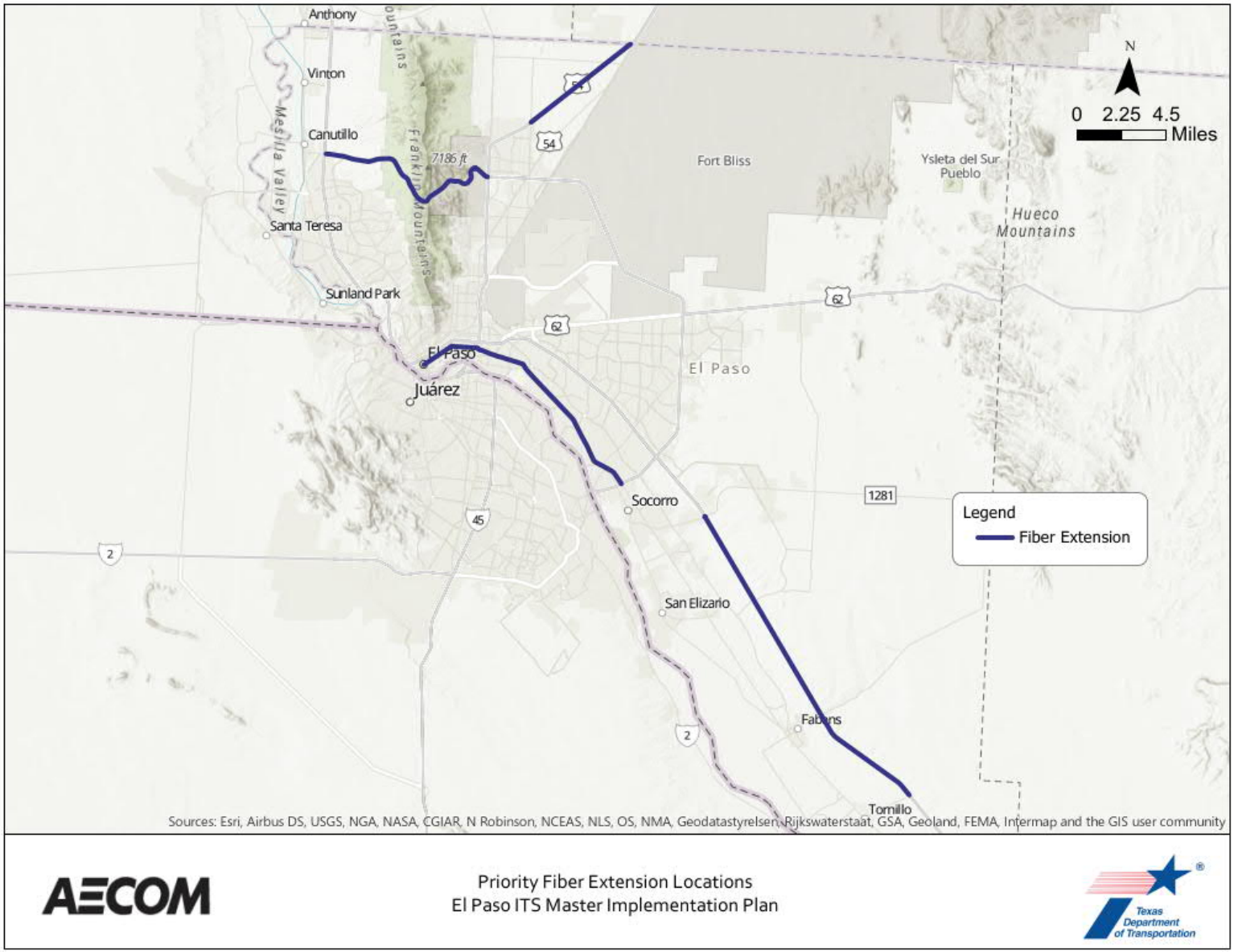

Figure 15: Priority Fiber Map

Table 12: Priority Projects – TMC Upgrades

Project	Description	Advantages	Disadvantages	Est. Let. Date	Est. Capital Cost	Est. Design/Study Cost
Non-Corridor Specific Strategy (System Wide) See **Figure 16**	TMC upgrades and improvements, include updating the physical TMC building with video wall, work stations, hardware, communications equipment, video analytics, etc. Software upgrades include additional programming to integrate incident data into third party application, e.g., Waze and real time performance measurement software. Performance metrics will be displayed on upgraded TMC video wall. May include ATSPM information from traffic signals, and performance metrics from other ITS devices. TMC staffing capacity can be increased to manage and operate the traffic management system 24/7.	Implementing these improvements creates a state-of-the-art TMC that is a good place for staff to work and enables system operability with other technologies; e.g., connected vehicles, automated performance measures, and other intelligent transportation systems such as wrong-way detection and communications systems. Traffic management becomes central to operations of the road network in El Paso. Emergency response routing may be improved, leading to better incident clearance times. Providing information to the traveling public can enable them to choose alternate routes and be updated on incident clearance progress. Software upgrades will help to elevate the TMC as the centralized source of information to streamline data collection, communications, and public messaging. Continuous monitoring of traffic on a 24/7 basis enables better responses to incidents that occur outside of normal operating hours and may lead to quicker incident clearance times in night-time or weekend hours.	TMC improvements have a high upfront cost. Many stakeholders and third-parties introduce the problem of system compatibility with all applications. Public adoption of consumption of data is not easy to measure. Operability is required with technologies that may be phased out in the future (e.g., Bluetooth). Retention and scheduling overnight staff may be a challenge. Continuous operations always assume six staff members. Uncertainty about technology changes – the investment may be partially obsolete after 10 years.	2021	$2,400,000	$560,000

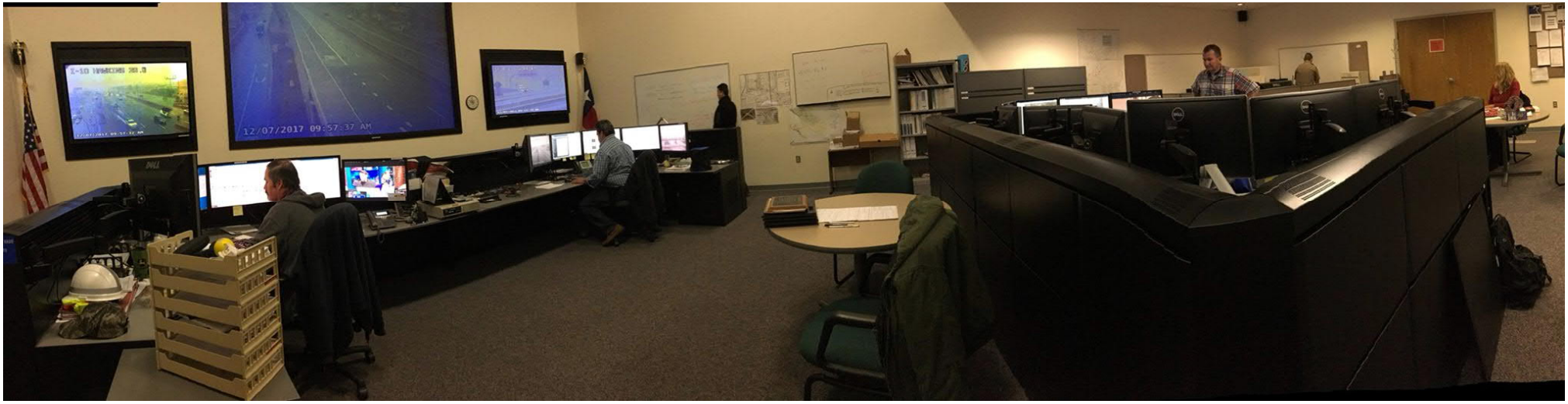

Figure 16: TransVista Traffic Management Center

Table 13: Priority Projects – Center-to-Center Protocol

Project	Description	Advantages	Disadvantages	Est. Let. Date	Est. Capital Cost	Est. Design/Study Cost
Non-Corridor Specific Strategy (System Wide) See **Figure 17**	Utilize the TxDOT Center-to-Center (C2C) Protocol to share information between TxDOT El Paso, City of El Paso, Sun Metro and other agencies including law enforcement and 911. The data streams can include real time traffic signal status and state, DMS message, CCTV snapshots, CCTV command and control, and other ITS hardware status and data. Option to utilize Open APIs for software system integration for data streams not included in the C2C protocol.	Aligns with the TSMO keys of communication and collaboration. Creates institutional arrangements to allow for system interoperability and data sharing. Data sharing enables better decision making and utilizing C2C protocol promotes transparency in emergencies and when making traffic management decisions. This provides future-readiness in the transportation management system.	Uncertainty in future technology landscape. C2C protocol may provide too much information. There must be a way for system users to access only the information/data they are interested in if desired.	2021	$850,000 – Each integration could be about $150,000 depending on the complexity. Assuming 5 intersections.	---

Image Courtesy of Walter P. Moore: https://www.walterpmoore.com/projects/city-el-paso-traffic-management-center-relocation

Figure 17: City of El Paso Traffic Management Center

Table 14: Priority Projects - CCTV

Project	Description	Advantages	Disadvantages	Est. Let. Date	Est. Capital Cost	Est. Design/Study Cost
New CCTV for three segments: Loop 375 from IH 10 to Railroad Dr; Loop 375 from Railroad Dr. to Montana Ave; and US 62 from Montana Ave to El Paso County Limits See **Figure 18**	Install additional CCTV coverage along corridor to improve roadway monitoring in order to identify and/or confirm congestion and incidents for faster response and clearance times.	CCTV increases roadway monitoring capacity of the TMC. Roadway monitoring can lead to faster response times, more accurate and reliable information sharing to the public and third-parties, and performance measurement.	CCTV installations may be difficult to maintain and may not be reliable at night or in foggy conditions.	2020	$4,086,487	$408,649

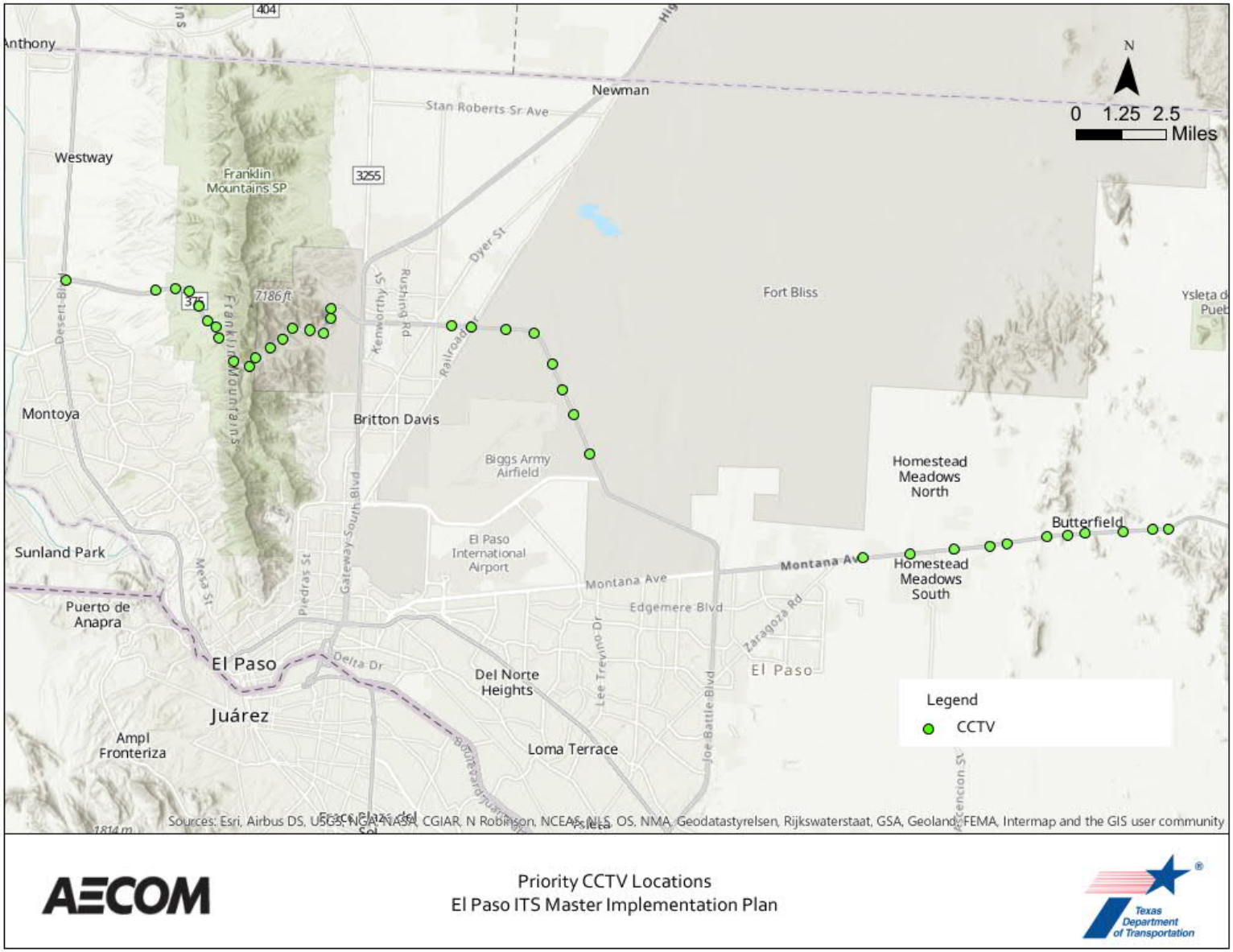

Figure 18: Priority CCTV Installations

Table 15: Priority Projects – Dynamic Message Signs for Lane Management System

Project	Description	Advantages	Disadvantages	Est. Let. Date	Est. Capital Cost	Est. Design/Study Cost
DMS for Lane Management System - Interchange Routing for three segments along IH 10: New Mexico State Line to US 54; US 54 to SL 375; and SL 375 to FM 3380 See **Figure 19**	Install dynamic lane use control system at interchange approaches for routing guidance. Utilize full color matrix small scale DMS capable of displaying route shields, advisory speeds, etc.	Provides information to the traveling public for easier routing at interchanges. Information can help drivers to make safer decisions and/or faster routing decisions and alert them to closures and other hazards at interchanges.	Must be continually updated. Too much information to drivers may be distracting. Signs must be large and bright enough to display shields with the proper roadways and route information and placed at a distance where merging conflicts influenced by the signs may be minimized.	2025	$9,512,126	$1,426,819

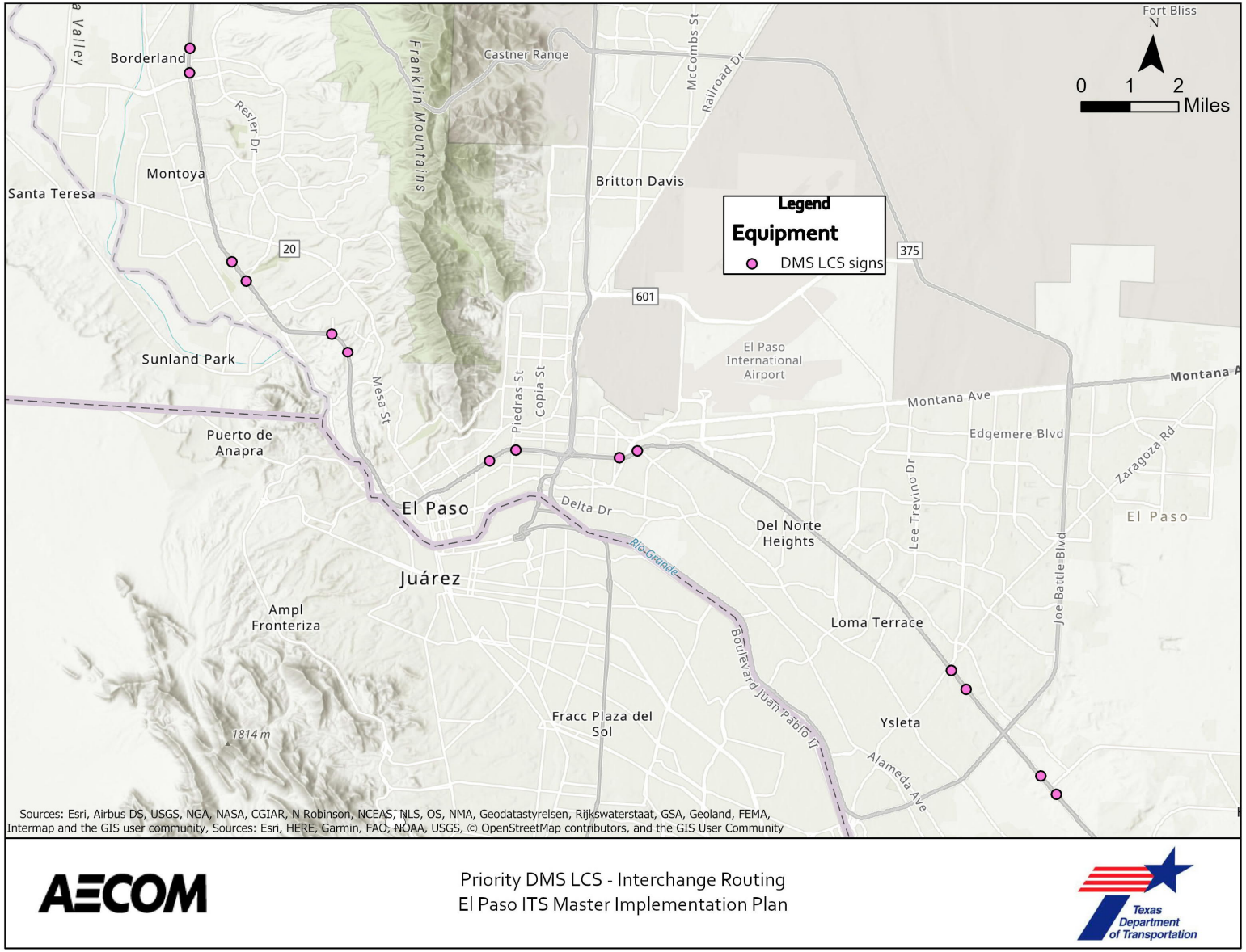

Figure 19: Priority DMS Lane Management Systems – Interchange Routing

Table 16: Priority Projects – Weather Stations

Project(s)	Description	Advantages	Disadvantages	Est. Let. Date	Est. Capital Cost	Est. Design/Study Cost
Weather Stations for two rural segments along IH 10: 375 to FM 3380; and SH 20 to Culberson County See **Figure 20**	Install weather station locations to monitor weather conditions along roadway corridors. Information can be used to inform public of adverse conditions via the information dissemination strategy and can be used to proactively deploy maintenance as needed.	Decentralized weather stations can provide weather information in a more targeted manner; e.g., by monitoring conditions along the whole interstate rather than just from one location can give the traveling public a more specific picture of road conditions.	More equipment may require more maintenance and may need to be updated as technology advances.	2022	$281,502	$42,225

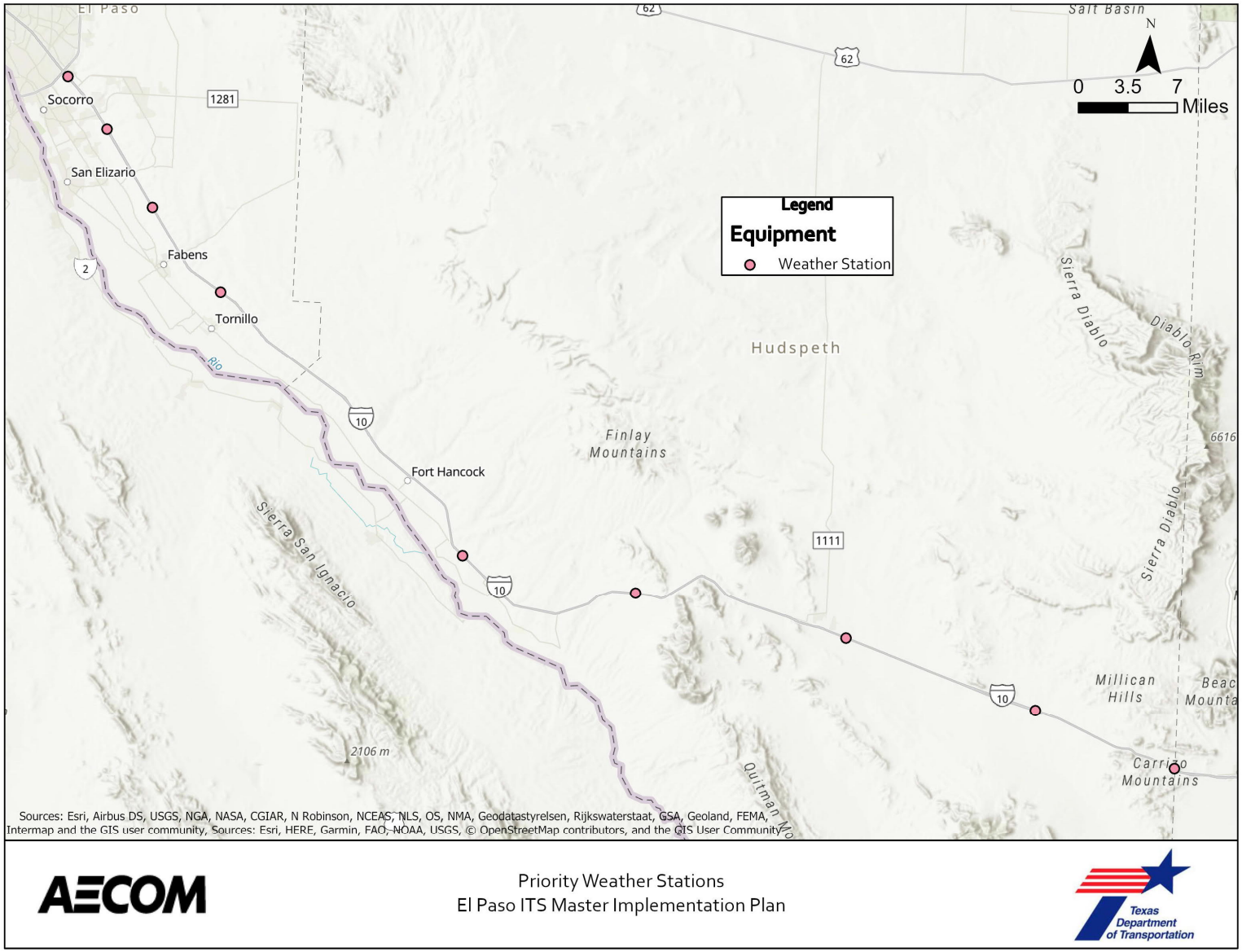

Figure 20: Priority Weather Station Installations

Table 17: Priority Projects – Traffic Incident Management

Project(s)	Description	Advantages	Disadvantages	Est. Let. Date	Est. Capital Cost	Est. Design/Study Cost
Non-Corridor Specific Strategy (System Wide) See **Figure 21**	Further study to refine and optimize Traffic Incident Management (TIM) program. Utilize performance metrics strategy to monitor performance of TIM program and adjust as needed. Identify potential training opportunities for emergency response personnel.	Streamline training process for staff involved in TIM. Performance tracking can help to adjust program where necessary, identify best practices and areas of improvement. Centralized standards for emergency response personnel can aid in incident clearance times, potentially limiting the secondary crash rate.	Accountability of using standards and performance measures across many stakeholders involved in TIM.	2021	---	$250,000

Figure 21: Traffic Incident Management in Action

Courtesy of El Paso Herald-Post https://elpasoheraldpost.com/videostory-txdot-eppd-remind-motorists-of-free-stranded-motorist-towing-program/

Table 18: Priority Projects – Work Zone Management

Project(s)	Description	Advantages	Disadvantages	Est. Let. Date	Est. Capital Cost	Est. Design/Study Cost
Non-Corridor Specific Strategy (System Wide) See **Figure 22**	Implement work zone management practice into all construction projects. Train staff to utilize work zone equipment to optimize work zone operations and to provide real time construction zone data (speeds, volumes, etc.). Integrate work zone equipment into TMC for real time monitoring. Further study to determine benefits to TxDOT purchasing equipment and handling work zone management for maintenance work and other items that are not developed from a PS&E set.	A dedicated project for work zone management can also include purchasing work zone equipment and establishing institutional arrangements to manage traffic around work zones that would not come about in a normal PS&E project. Training for work zone management will improve and reduce the time for new employees to become familiar with and learn the processes that are required to manage work zones. The public can be better informed about construction impacts on travel times and the location of work zones to plan alternate routes and to be aware when workers are present to improve worker safety.	General work zone management practices may not work for every project. There may be unique circumstances or arrangements around a work zone that require unique strategies or equipment.	2021	$1,000,000	$250,000

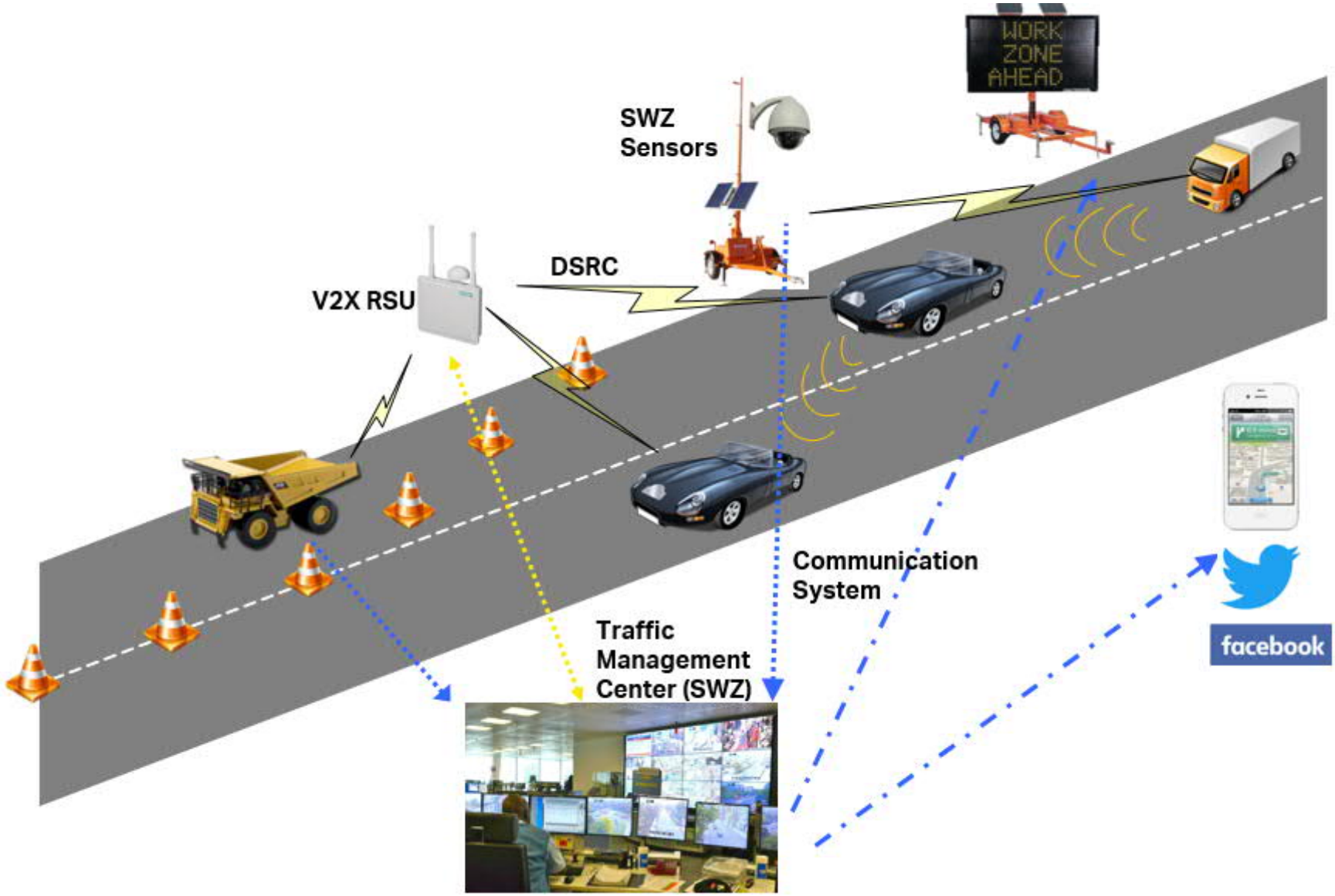

Figure 22: Smart Work Zone Example

TxDOT Smart Work Zone Guidelines, October 2018

Table 19: Priority Projects - Static Travel Time Displays

Project(s)	Description	Advantages	Disadvantages	Est. Let. Date	Est. Capital Cost	Est. Design/Study Cost
Travel Time Displays along: IH 10, SL 375, Spur 601, and US 54.	Static signs with small DMS panels installed to display Travel Time estimates approaching major interchanges from both directions. Eight project segments totaling 28 travel time displays.	Concise display limits driver distraction while disseminating real time travel time information to the public. Smaller DMS panel is less capital intensive and costs less to maintain than large DMS board. Cost decreases if able to install on existing signs/bridges.	Expensive if must build new dedicated sign pole to install. Cost estimate assumes worst case scenario of building new sign.	FY 2021	$3,761,923	$564,288

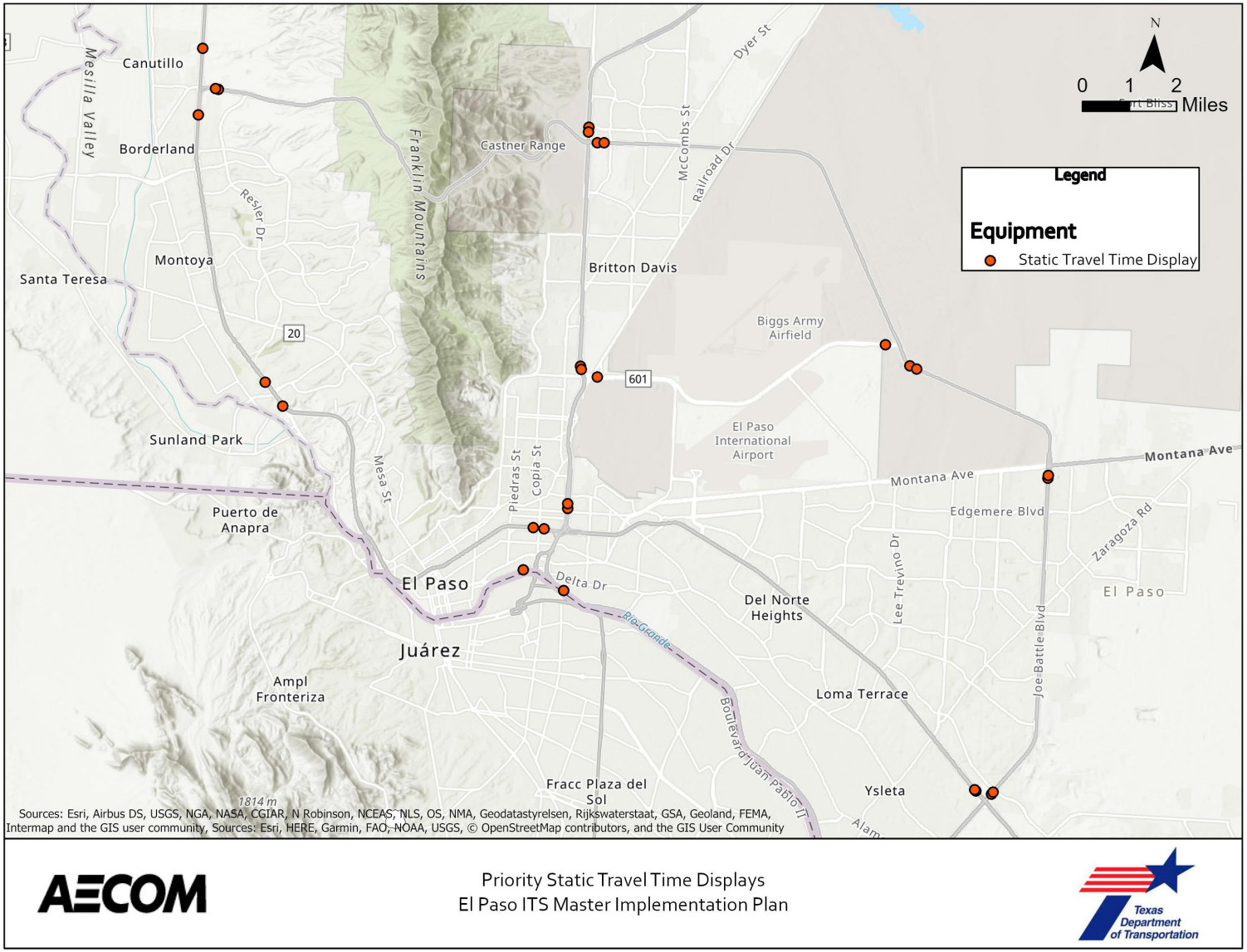

Figure 23: Priority Static Travel Time Displays

Conclusion

This plan used an analysis of the existing ITS devices and fiber in the El Paso District, crash data, and congestion data, along with engineering judgement and communication from TxDOT and the City of El Paso to develop an ITS strategy for the district.

Strategies were researched and developed into a list that the district agreed could meet ITS needs and requirements over the next 10 years. A comprehensive project list, accompanied by GIS and KMZ files, will assist the district in project programming, as many of the projects are not connected to road segments that are listed on the UTP. Fiber extensions in the district will be shared by the City of El Paso and the El Paso District of TxDOT, according to a recent agency agreement. Prioritized projects, as presented in the Master Plan, will upgrade the TMC into a state-of-the-art center capable of accommodating the strategies implemented in this plan as well as future technologies such as connected vehicle-to-infrastructure systems.

The El Paso District will also soon be updating its ITS architecture as part of the upcoming El Paso ITS Architecture Update. This plan will include a more detailed assessment of standards, performance measures, and systems requirements that align with the current National ITS Architecture Reference for Cooperative and Intelligent Transportation (ARC-IT) Version 8.3 as of January 2020.

The GIS and KMZ files submitted with the El Paso ITS Master Implementation Plan provide spatial references for the recommended projects in the project table. In these files, projects are coded by equipment type. It is possible, therefore, to query and view only certain types of equipment at the time, such as ATC controllers. Coupled with the project list table in **Appendix B**, TxDOT can classify and create exhibits that will assist in the implementation of the projects identified in this plan.

The El Paso ITS Master Implementation Plan developed projects that will enhance the safety and mobility of the traveling public in the district over the next 10 years and will continue to have benefits beyond this decade. This plan is one of many efforts in the El Paso District intended to aid in mainstreaming TSMO into TxDOT's core business practices and will complement the upcoming El Paso TSMO Program Plan.

Appendix A: Existing Device Matrix

	Existing					Under Construction			
	Cameras	DMS	Detectors	Bluetooth	Fiber Count	Cameras	DMS	Detectors	Bluetooth
IH-10									
Anthony to Vinton/Westway	2	-	2	-	72	-	-	-	-
Vinton/Westway to Transmountain	3	2	7	6	144	-	-	-	-
Transmountain to Artcraft	2	2	7	7	72	-	-	-	-
Artcraft to Redd	1	2	3	3	72	-	-	-	-
Redd to Mesa	1	-	5	4	72	-	-	-	-
Mesa to Sunland Park	2	1	7	4	72	-	-	-	-
Sunland to Executive	3	-	4	4	72	-	-	-	-
Executive to Shuster	2	1	6	6	72	-	-	-	-
Shuster to Porfirio Diaz	1	-	2	2	72	-	-	-	-
Porfirio Diaz to Mesa/Downtown	1	-	2	2	72	-	-	-	-
Mesa Downtown to Cotton	5	1	4	4	72	-	-	-	-
Cotton to Piedras	1	1	2	2	72	-	2	-	-
Piedras to Copia	-	-	-	-	72	1	1	2	1
Copia to Patriot Frwy	1	-	8	6	72	1	1	1	1
Patriot Frwy to Reynolds	-	-	-	-	72	2	-	2	1
Reynolds to Chelsea	1	1	2	2	96	1	2	2	1
Chelsea/Paisano to Trowbridge	1	-	2	2	96	2	1	3	2

	Existing					Under Construction			
	Cameras	DMS	Detectors	Bluetooth	Fiber Count	Cameras	DMS	Detectors	Bluetooth
Trowbridge to Geronimo	-	1	-	-	96	-	-	-	-
Geronimo to Airway	1	-	2	2	96	-	-	-	-
Airway to Hawkins	1	2	2	2	96	-	-	-	-
Hawkins to Hunter/Viscount	1	-	2	2	96	-	-	-	-
Viscount to McRae/Sumac	-	-	-	-	96	-	-	-	-
McRae/Sumac to Yarbrough	1	1	4	2	96	-	-	-	-
Yarbrough to Lomaland	1	-	6	2	96	-	-	-	-
Lomaland to Lee Trevino	-	1	-	-	96	-	-	-	-
Lee Trevino to Zaragoza/George Dieter	1	2	2	2	96	-	-	-	-
Zaragoza/George Dieter to Americas/Joe Battle	2	-	4	4	96	-	-	-	-
Joe Battle/Loop 375 to Bill Burnett	3	1	4	1	96	-	-	-	-
Eastlake to Horizon	3	2	4	4	48	-	-	-	-
IH 10 Totals	41	21	93	75	-	7	7	10	6
US 54									
McCombs to MLK Jr	2	3	-	-	72	-	-	-	-
MLK Jr to Woodrow Bean/Transmountain	2	1	-	-	72	-	-	-	-
Woodrow Bean/Transmountain to Diana	1	2	4	2	72	-	-	-	-
Diana to Hondo Pass	1	1	2	2	72	-	-	-	-

	Existing					Under Construction			
	Cameras	DMS	Detectors	Bluetooth	Fiber Count	Cameras	DMS	Detectors	Bluetooth
Hondo Pass to Hercules/Dyer	1	2	2	2	72	-	-	-	-
Hercules/Dyer to Ellerthorpe/Broaddus	1	1	2	2	72	-	-	-	-
Ellerthorpe/Broaddus to Fred Wilson/Liberty Expy	1	1	2	2	72	-	-	-	-
Fred Wilson/Liberty Expy to Cassidy	1	1	2	2	72	-	-	-	-
Cassidy to Pershing	1	3	-	-	72	-	1	-	-
Pershing to Trowbridge	1	1	2	2	72	1	2	1	1
Trowbridge to Montana	-	1	-	-	72	1	1	1	1
Montana to Yandell	1	-	4	4	72	1	-	2	1
Yandell to IH-10	-	-	-	-	72	-	-	-	-
IH-10 to Exit2B Juarez	1	2	4	4	72	-	-	-	-
Exit 20B Juarez to Paisano	-	-	-	-	72	3	-	3	2
Paisano to Delta	1	-	2	2	72	2	1	3	2
Delta to Loop 375	-	-	-	-	72	2	-	3	1
US 54 Totals	15	19	26	24	-	10	5	13	8
Loop 375									
Doniphan to IH-10	2	-	-	-	144	-	-	-	-
IH-10 to US 54	6	5	4	4	144	-	-	-	-
US 54 to Dyer/McCombs	2	2	-	-	144	-	-	-	-
Dyer/McCombs to Bomarc/Railroad	1	-	-	-	48	-	-	-	-

	Existing					Under Construction			
	Cameras	DMS	Detectors	Bluetooth	Fiber Count	Cameras	DMS	Detectors	Bluetooth
Bomarc/Railroad to Sergeant Major	-	1	-	-	48	-	-	-	-
Sergeant Major to Spur 61/Liberty Expy	-	1	-	-	48	-	-	-	-
Spur 601/Liberty Expy to Iron Medics	1	-	-	-	48	-	-	-	-
Iron Medics to Montana	1	2	-	-	48	-	-	-	-
Montana to Edgemere	1	1	-	-	144	-	-	-	-
Edgemere to Pebble Hills	2	1	-	-	144	-	-	-	-
Pebble Hills to Zaragoza/Montwood	1	1	-	-	144	-	-	-	-
Zaragoza/Montwood to Vista Del Sol	5	2	-	-	144	-	-	-	-
Vista Del Sol to Pellicano/Bob Hope	2	1	-	-	144	-	-	-	-
Pellicano/Bob Hope to Rojas/IH-10	1	2	-	-	144	-	-	-	-
Rojas/IH-10 to North Loop	-	1	-	-	144	-	-	-	-
North Loop to Alameda	1	1	-	-	144	-	-	-	-
Alameda to Exit 48/Zaragoza	2	2	-	-	144	-	-	-	-
Exit 48/Zaragoza to Padres	1	2	7	2	144	-	-	-	-
Padres to Yarbrough	2	1	5	-	144	-	-	-	-
Yarbrough to Midway	2	1	6	-	144	-	-	-	-
Midway to Fonseca	4	-	8	-	144	-	-	-	-
Fonseca to US 54	2	2	4	-	144	-	-	-	-
US 54 to Paisano	1	0	-	2	144	-	-	-	-

	Existing					Under Construction			
	Cameras	DMS	Detectors	Bluetooth	Fiber Count	Cameras	DMS	Detectors	Bluetooth
Paisano to Campbell	1	1	-	-	144	3	-	-	-
Campbell to Santa Fe	1	-	-	-	144	1	1	1	-
Santa Fe to Schuster	-	-	-	-	144	4	1	0	-
Schuster to Executive	-	-	-	-	144	1	-	3	-
Executive to Sunland Park	-	-	-	-	144	5	3	7	-
Loop 375 Totals	42	30	34	8	-	14	5	11	0
US 62 / US 180 Montana									
Airway to Hawkins	1	1	-	-	72	-	-	-	-
Hawkins to Yarbrough	1	-	-	-	72	-	-	-	-
Yarbrough to George Dieter	2	1	-	-	72	-	-	-	-
George Dieter to Loop 375	1	1	-	-	72	-	-	-	-
US 62 / US 180 Montana Total	5	3	0	0	-	0	0	0	0
Spur 601									
US 54 to Airport	2	-	6	6	144	-	-	-	-
Airport to Global Reach	3	-	4	4	144	-	-	-	-
Global Reach to Constitution	2	-	4	4	144	-	-	-	-
Constitution to Loop 375	1	-	6	5	144	-	-	-	-
Spur 601 Total	8	0	20	19	-	0	0	0	0
SH 20 Doniphan & Artcraft									
Sunland Park to Mesa	3	-	-	-	48*	-	-	-	-

	Existing					Under Construction			
	Cameras	DMS	Detectors	Bluetooth	Fiber Count	Cameras	DMS	Detectors	Bluetooth
Mesa to Artcraft	1	-	-	-	48*				
Doniphan to Westside	3	1	6	-	48	-	-	-	-
SH 20 Doniphan & Artcraft Total	7	1	6	0	-	0	0	0	0
Sunland									
Sunland	1	-	-	-	-	-	-	-	-
Sunland Total	1	0	0	0	-	0	0	0	0
Mesa									
Doniphan to Sunland Park	2	-	-	-	72	-	-	-	-
Mesa Total	2	0	0	0	-	0	0	0	0
Devices not on TxDOT Fiber									
Resler	3	-	-	-	-	-	-	-	-
Redd	-	2	-	-	-	-	-	-	-
Mesa (Executive to Sunbowl)	4	-	-	-	-	-	-	-	-
Executive	-	-	-	-	12*				
Missouri	2	-	-	-	-	-	-	-	-
Franklin	1	-	-	-	-	-	-	-	-
Santa Fe and Paisano	1	-	-	-	-	-	-	-	-
Paisano and Piedras	1	-	-	-	-	-	-	-	-
Alameda (Paisano to Zaragoza)	5	-	-	-	-	-	-	-	-
N Loop (Delta to Paisano)	4	-	-	-	-	-	-	-	-

	Existing					Under Construction			
	Cameras	DMS	Detectors	Bluetooth	Fiber Count	Cameras	DMS	Detectors	Bluetooth
Edgemere (Geronimo to Airway)	3	-	-	-	-	-	-	-	-
Viscount (Airway to Hawkins)	2	-	-	-	-	-	-	-	-
Lee Trevino	3	-	-	-	-	-	-	-	-
George Dieter	4	-	-	-	-	-	-	-	-
Zaragoza	6	-	-	-	48*	-	-	-	-
Railroad and Hondo Pass	3	-	-	-	-	-	-	-	-
Airway	-	-	-	-	96*				
Airport	3	-	-	-	48*	-	-	-	-
IH-20 and IH-10	2	-	-	-	-	-	-	-	-
US 62 MM130	1	-	-	-	-	-	-	-	-
IH-10 to Van Horn	-	1	-	-	-	-	-	-	-
Random Point in Hatch	-	-	1	-	-	-	-	-	-
Devices not on TxDOT Fiber Total	48	3	1	0	-	0	0	0	0
Grand Total	**169**	**77**	**180**	**126**	**-**	**31**	**17**	**34**	**14**

Appendix B: Project Matrix

CSJ	Segment ID	Route No.	Street	From	To	Total Miles	Safety Priority	Proposed Year	GIS Project ID	TSMO Strategy	Equipment	Devices	Project Description	Project Est. Cost Capital	Project Est. Cost Design/Study	Comments
-	0	Non-Corridor Specific Strategy (System Wide)	-	-	-	-	3	2020	-	TMC Operations Improvements	-	-	TMC staffing capacity to manage and operate traffic management system 24/7.	$300,000	NA	Assuming 6 staff at all times. The cost listed in the "Project Est. Cost Capital" column in this row is a yearly operational cost, not a capital cost.
-	0	Non-Corridor Specific Strategy (System Wide)	-	-	-	-	3	2021	-	Emergency Response Routing	Software integrations	-	Additional programming to TMC software to integrate incident data into third-party applications such as Waze.	$500,000	$250,000.00	-
-	0	Non-Corridor Specific Strategy (System Wide)	-	-	-	-	1	2021	-	Performance Metrics	Software integrations	-	TxDOT will purchase and implement additional software to the TMC to record and monitor assigned performance metrics in real time. Metrics can be displayed on the TMC video wall. ATSPM information from traffic signals, and performance metrics from other ITS devices such as Bluetooth, Radar, etc. will all be included in the performance metrics dashboard.	$800,000 Software Development	$250,000 Study	-

CSJ	Segment ID	Route No.	Street	From	To	Total Miles	Safety Priority	Proposed Year	GIS Project ID	TSMO Strategy	Equipment	Devices	Project Description	Project Est. Cost Capital	Project Est. Cost Design/Study	Comments
-	0	Non-Corridor Specific Strategy (System Wide)	-	-	-	-	1	2020	-	Inter-Agency Integration	Additional Hardware (routers, firewalls), Software integrations	-	This strategy requires both technical and institutional integration. TxDOT will utilize the TxDOT Center to Center (C2C) Protocol to share information between TxDOT El Paso, City of El Paso, Sun Metro and other agencies including law enforcement and 911. The data streams can include real time traffic signal status and state, DMS message, CCTV snapshots, CCTV command and control, and other ITS hardware status and data. Option to utilize Open APIs for software system integration for data streams not included in the C2C protocol.	$850,000	$127,500.00	Each integration could be about $150k depending upon the complexity. Assuming 5 integrations.
-	0	Non-Corridor Specific Strategy (System Wide)	-	-	-	-	1	2020	-	Work Zone Management	-	-	TxDOT will develop a plan to Implement work zone management practices into all construction projects. This includes a training program for staff to utilize work zone equipment to optimize work zone operations and to provide real time construction zone data (speeds, volumes, etc.). TxDOT can tie work zone equipment into the TMC for real time monitoring. TxDOT will study the benefits of purchasing equipment and handling work zone management for maintenance work and other items that are not developed from a PS&E set.	$1,000,000	$250,000.00	-

CSJ	Segment ID	Route No.	Street	From	To	Total Miles	Safety Priority	Proposed Year	GIS Project ID	TSMO Strategy	Equipment	Devices	Project Description	Project Est. Cost Capital	Project Est. Cost Design/Study	Comments
-	0	Non-Corridor Specific Strategy (System Wide)	-	-	-	-	3	2021	-	TMC Operations Improvements	-	-	Upgrade the Traffic Management Center with new equipment, including but not limited to the video wall, work stations, center communications equipment, hardware, and video analytics equipment.	$1,000,000	$150,000.00	-
-	0	Non-Corridor Specific Strategy (System Wide)	-	-	-	-	1	2021	-	Traffic Incident Management	-	-	Further study to refine and optimize the Traffic Incident Management program. Utilize performance metrics strategy to monitor performance of TIM program and adjust as needed. Identify and implement potential training opportunities for emergency response personnel.	-	$250,000.00	-
-	1	BU 54A	Dyer St.	Patriot Freeway	New Mexico State Line	12.5	2	2030	1-1	Connected Vehicles	DSRC, SPaT	18	Install DSRC communications and initiate SPaT programming on controller. DSRC will allow for DSRC compatible vehicles to communicate with the infrastructure (V2I). SPaT programming will allow for equipped vehicles to view signal timing data upon approach to increase signal efficiency	$237,600	$35,640.00	-
-	1	BU 54A	Dyer St.	Patriot Freeway	New Mexico State Line	12.5	5	2022	1-2	Roadway Monitoring	CCTV	7	Install additional CCTV coverage and replace existing CCTV along corridor to improve roadway monitoring in order to identify and/or confirm congestion and incidents for faster response and clearance times.	$773,119	$115,967.88	Existing CCTV @ US 54 and Hondo Pass Dr, Extend CCTV from SL 375 to New Mexico State line (8.7 mi)
-	1	BU 54A	Dyer St.	Patriot Freeway	New Mexico State Line	12.5	2	2030	1-3	Traffic Signal Operations	ATC controllers	18	Install ATC compatible controllers at traffic signal locations to allow for smart and connected vehicle technology applications.	$345,600	$51,840.00	-
-	1	BU 54A	Dyer St.	Patriot Freeway	New Mexico State Line	12.5	-	2030	-	Communications	Fiber	12.5	Install fiber communications network along corridor.	$8,685,060	$1,302,759.00	-

CSJ	Segment ID	Route No.	Street	From	To	Total Miles	Safety Priority	Proposed Year	GIS Project ID	TSMO Strategy	Equipment	Devices	Project Description	Project Est. Cost Capital	Project Est. Cost Design/Study	Comments
-	3	FM 1110	San Elizario Rd	Socorro Rd	IH 10	4.9	5	2028	3-1	Roadway Monitoring	CCTV wireless	4	Install additional CCTV coverage along corridor to improve roadway monitoring in order to identify and/or confirm congestion and incidents for faster response and clearance times.	$387,062	$58,059.36	-
-	4	FM 1281	Horizon Blvd	North Loop Dr.	Ascencion St.	8.1	5	2028	4-1	Roadway Monitoring	CCTV	4	Install additional CCTV coverage along corridor to improve roadway monitoring in order to identify and/or confirm congestion and incidents for faster response and clearance times.	$441,782	$66,267.36	Add CCTV from IH-10 to Ascencion St (6.4 mi)
-	4	FM 1281	Horizon Blvd	North Loop Dr.	Ascencion St.	8.2	-	2028	-	Communications	Fiber	8.2	Install fiber communications network along corridor.	$5,697,399	$854,609.90	-
-	5	FM 1505	Clark Dr.	Trowbridge Dr.	Alameda Ave.	0.8	5	2030	5-1	Roadway Monitoring	CCTV	2	Install additional CCTV coverage along corridor to improve roadway monitoring in order to identify and/or confirm congestion and incidents for faster response and clearance times.	$220,891	$33,133.68	Position one on each end of corridor @ Trowbridge and Alameda
-	5	FM 1505	Clark Dr.	Trowbridge Dr.	Alameda Ave.	0.8	-	2030	-	Communications	Fiber	0.8	Install fiber communications network along corridor.	$555,844	$83,376.58	-
-	7	FM 2316	McRae Blvd	Montana Ave.	IH 10	2.4	5	2022	7-1	Roadway Monitoring	CCTV	3	Install additional CCTV coverage along corridor to improve roadway monitoring in order to identify and/or confirm congestion and incidents for faster response and clearance times.	$331,337	$49,700.52	-
-	7	FM 2316	McRae Blvd	Montana Ave.	IH 10	2.4	2	2030	7-2	Traffic Signal Operations	ATC controllers	8	Install ATC compatible controllers at traffic signal locations to allow for smart and connected vehicle technology applications.	$153,600	$23,040.00	-
-	7	FM 2316	McRae Blvd	Montana Ave.	IH 10	2.4	-	2022	-	Communications	Fiber	2.4	Install fiber communications network along corridor.	$1,667,532	$250,129.73	-
-	8	FM 2529	Stan Roberts Sr. Ave/McCombs St.	Dyer St.	Martin Luther King Jr. Blvd	7.8	2	2030	8-1	Connected Vehicles	SPaT	3	Initiate SPaT programming on controller. SPaT programming will allow for equipped vehicles to view signal timing data upon approach increasing efficiency of signal operations.	$3,600	$5,000.00	-

CSJ	Segment ID	Route No.	Street	From	To	Total Miles	Safety Priority	Proposed Year	GIS Project ID	TSMO Strategy	Equipment	Devices	Project Description	Project Est. Cost Capital	Project Est. Cost Design/Study	Comments
-	8	FM 2529	Stan Roberts Sr. Ave/McCombs St.	Dyer St.	Martin Luther King Jr. Blvd	7.8	5	2023	8-2	Roadway Monitoring	CCTV	3	Install additional CCTV coverage along corridor to improve roadway monitoring in order to identify and/or confirm congestion and incidents for faster response and clearance times.	$331,337	$49,700.52	CCTV only added from US 54 to Dyer St (2.6 mi)
-	8	FM 2529	Stan Roberts Sr. Ave/McCombs St.	Dyer St.	Martin Luther King Jr. Blvd	7.8	-	2023	-	Communications	Fiber	2.6	Install fiber communications network along corridor.	$1,806,492	$270,973.87	Fiber only proposed from Dyer St to US 54 (2.57 mi)
-	9	FM 258	Socorro Rd	Alameda Ave.	Alameda Ave.	16.5	5	2029	9-1	Roadway Monitoring	CCTV	12	Install additional CCTV coverage along corridor to improve roadway monitoring in order to identify and/or confirm congestion and incidents for faster response and clearance times.	$1,325,347	$198,802.08	CCTV added from SL 375 to SH 20 (15 mi)
-	9	FM 258	Socorro Rd	Alameda Ave.	Alameda Ave.	16.5	-	2029	-	Communications	Fiber	16.5	Install fiber communications network along corridor.	$11,464,279	$1,719,641.88	-
-	10	FM 259	Canutillo La Union Ave.	New Mexico State Line	Doniphan Dr.	1.2	5	2029	10-1	Roadway Monitoring	CCTV	1	Install additional CCTV coverage along corridor to improve roadway monitoring in order to identify and/or confirm congestion and incidents for faster response and clearance times.	$110,446	$16,566.84	CCTV at Bosque Rd
-	10	FM 259	Canutillo La Union Ave.	New Mexico State Line	Doniphan Dr.	1.2	-	2029	-	Communications	Fiber	1.2	Install fiber communications network along corridor.	$833,766	$125,064.86	-
-	12	FM 3255	Martin Luther King Blvd.	New Mexico State Line	Patriot Freeway	5.8	5	2029	12-1	Roadway Monitoring	CCTV wireless	1	Install additional CCTV coverage along corridor to improve roadway monitoring in order to identify and/or confirm congestion and incidents for faster response and clearance times.	$96,766	$14,514.84	Place one at Marcus Uribe Dr
-	13	FM 3380	M.F. Aguilera Rd	Tornillo Port of Entry	IH-10	6.1	5	2023	13-1	Roadway Monitoring	CCTV wireless	6	Install additional CCTV coverage along corridor to improve roadway monitoring in order to identify and/or confirm congestion and incidents for faster response and clearance times.	$580,594	$87,089.04	-

CSJ	Segment ID	Route No.	Street	From	To	Total Miles	Safety Priority	Proposed Year	GIS Project ID	TSMO Strategy	Equipment	Devices	Project Description	Project Est. Cost Capital	Project Est. Cost Design/Study	Comments
-	13	FM 3380	M.F. Aguilera Rd	Tornillo Port of Entry	IH-10	6.1	5	2023	13-2	Traffic Detectors	Radar	6	Install additional radar locations to monitor travel lanes for speed, volume, and other metrics to have a better understanding of real time conditions on roadway. Radar is used to operate other strategies efficiently.	$72,000	$10,800.00	-
-	14	FM 659	Zaragoza Rd	Montana Ave.	North Loop Dr.	9.7	2	2030	14-1	Connected Vehicles	SPaT	19	Initiate SPaT programming on controller. SPaT programming will allow for equipped vehicles to view signal timing data upon approach increasing efficiency of signal operations.	$22,800	$3,420.00	-
-	14	FM 659	Zaragoza Rd	Montana Ave.	North Loop Dr.	9.7	5	2022	14-2	Roadway Monitoring	CCTV	8	Replace existing CCTV with digital IP based cameras, utilizing existing infrastructure	$883,565	$132,534.72	Existing CCTV replacement
-	14	FM 659	Zaragoza Rd	Montana Ave.	North Loop Dr.	9.7	2	2030	14-3	Traffic Signal Operations	ATC controllers	19	Install ATC compatible controllers at traffic signal locations to allow for smart and connected vehicle technology applications.	$364,800	$54,720.00	-
-	14	FM 659	Zaragoza Rd	Montana Ave.	North Loop Dr.	9.7	-	2022	-	Communications	Fiber	9.7	Install fiber communications network along corridor.	$6,739,607	$1,010,940.98	Existing City fiber (from North Loop to Escobar), Existing TxDOT fiber (from IH 10 to George Dieter and from Loop 375 to Rich Beem Blvd)
-	15	FM 76	North Loop Dr.	Alameda Ave.	Loop 375	8.2	2	2030	15-1	Connected Vehicles	SPaT	20	Initiate SPaT programming on controller. SPaT programming will allow for equipped vehicles to view signal timing data upon approach increasing efficiency of signal operations.	$24,000	$3,600.00	-
-	15	FM 76	North Loop Dr.	Alameda Ave.	Loop 375	8.2	5	2022	15-2	Roadway Monitoring	CCTV	4	Replace existing CCTV with digital IP based cameras, utilizing existing infrastructure	$441,782	$66,267.36	Existing CCTV replacement
-	15	FM 76	North Loop Dr.	Alameda Ave.	Loop 375	8.2	2	2030	15-3	Traffic Signal Operations	ATC controllers	20	Install ATC compatible controllers at traffic signal locations to allow for smart and connected vehicle technology applications.	$384,000	$57,600.00	-
-	15	FM 76	North Loop Dr.	Alameda Ave.	Loop 375	8.2	-	2022	-	Communications	Fiber	8.2	Install fiber communications network along corridor.	$5,697,399	$854,609.90	-

CSJ	Segment ID	Route No.	Street	From	To	Total Miles	Safety Priority	Proposed Year	GIS Project ID	TSMO Strategy	Equipment	Devices	Project Description	Project Est. Cost Capital	Project Est. Cost Design/Study	Comments
-	16	FM 76	North Loop Dr.	Loop 375	Lower Island Rd.	21.2	5	2028	16-1	Roadway Monitoring	CCTV	14	Install additional CCTV coverage along corridor to improve roadway monitoring in order to identify and/or confirm congestion and incidents for faster response and clearance times.	$1,546,238	$231,935.76	Existing CCTV from SH 20 to SL 375, extend to FM 793 (15.5 mi)
-	16	FM 76	North Loop Dr.	Loop 375	Lower Island Rd.	21.2	-	2028	-	Communications	Fiber	21.1	Install fiber communications network along corridor.	$14,660,381	$2,199,057.19	-
-	17	FM 793	Fabens St	IH 10	North Loop Dr.	2.2	5	2028	17-1	Roadway Monitoring	CCTV wireless	2	Install additional CCTV coverage along corridor to improve roadway monitoring in order to identify and/or confirm congestion and incidents for faster response and clearance times.	$193,531	$29,029.68	-
2121-01-094	18	IH 10	IH 10	New Mexico State Line	US 54	22.4	2	2030	18-1	Connected Vehicles	DSRC, SPaT	11	Install DSRC communications and initiate SPaT programming on controller. DSRC will allow for DSRC compatible vehicles to communicate with the infrastructure (V2I). SPaT programming will allow for equipped vehicles to view signal timing data upon approach to increase signal efficiency	$145,200	$21,780.00	Fiber existing
2121-01-094	18	IH 10	IH 10	New Mexico State Line	US 54	22.4	1	2021	18-10	Wrong Way Driver Detection	Detection System	14	Install wrong way detection system for exit ramp locations along corridor. Radar detection with video verification. Automated notification system to TMC staff. Potential to automate response to post advisory messages on upstream DMS.	$1,328,846	$199,326.96	CCTV and Radar existing, DMS existing
2121-01-094	18	IH 10	IH 10	New Mexico State Line	US 54	22.4	4	2025	18-3	Lane Management System	DMS LCS signs	8	Install dynamic lane use control system at interchange approaches for routing guidance. Utilize full color matrix small scale DMS capable of displaying route shields, advisory speeds, etc.	$5,435,501	$815,325.12	-
2121-01-094	18	IH 10	IH 10	New Mexico State Line	US 54	22.4	5	2022	18-5	Roadway Monitoring	CCTV	27	Replace existing CCTV with digital IP based cameras, utilizing existing infrastructure	$2,982,031	$447,304.68	Existing CCTV replacement

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2121-01-094	18	IH 10	IH 10	New Mexico State Line	US 54	22.4	7	2022	18-6	RWIS	Weather Station	4	Install weather station locations to monitor weather conditions along roadway corridors. Information can be used to inform public of adverse conditions via the information dissemination strategy and can be used to proactively deploy maintenance as needed.	$125,112	$18,766.80	-
2121-01-094	18	IH 10	IH 10	New Mexico State Line	US 54	22.4	5	2023	18-7	Traffic Detectors	Radar	30	Replace existing Radar units, utilizing existing infrastructure	$360,000	$54,000.00	Existing Radar
2121-01-094	18	IH 10	IH 10	New Mexico State Line	US 54	22.4	2	2030	18-8	Traffic Signal Operations	ATC controllers	11	Install ATC compatible controllers at traffic signal locations to allow for smart and connected vehicle technology applications.	$211,200	$31,680.00	-
2121-01-094	18	IH 10	IH 10	New Mexico State Line	US 54	22.4	3	2020	18-9	Information Dissemination	DMS	2	Install additional DMS and utilize existing DMS, websites, social media, and third-party applications to disseminate information to the motoring public.	$661,771	$99,265.68	Gap Analysis Study proposed project to install 2 additional DMS just south of State line
2121-01-094	18	IH 10	IH 10	New Mexico State Line	US 54	22.4	3	2021	18-11	Information Dissemination	Static Travel Time Display	6	Install static travel time displays at both approaches to major interchanges to disseminate information to the motoring public.	$806,126	$120,918.96	
2121-01-094	18	IH 10	IH 10	New Mexico State Line	US 54	22.4	9	2030	-	Managed Lanes	Managed Lanes	-	Evaluate roadway and install HOV managed lanes along corridor.	$30,000,000	$4,500,000.00	-
2121-01-094	18	IH 10	IH 10	New Mexico State Line	US 54	22.4	8	2023	-	Travel Time Estimation and Prediction	INRIX	-	Utilize INRIX data to predict travel times from major destination points/corridors on roadway system. Utilize existing DMS and other information dissemination techniques to relay travel time information to traveling public.	-	$100,000.00	-

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2121-03-146	19	IH 10	IH 10	US 54	SL 375	11.4	2	2030	19-1	Connected Vehicles	DSRC, SPaT	14	Install DSRC communications and initiate SPaT programming on controller. DSRC will allow for DSRC compatible vehicles to communicate with the infrastructure (V2I). SPaT programming will allow for equipped vehicles to view signal timing data upon approach to increase signal efficiency	$184,800	$27,720.00	Fiber existing
2121-03-146	19	IH 10	IH 10	US 54	SL 375	11.4	1	2021	19-10	Wrong Way Driver Detection	Detection System	22	Install wrong way detection system for exit ramp locations along corridor. Radar detection with video verification. Automated notification system to TMC staff. Potential to automate response to post advisory messages on upstream DMS.	$2,088,187	$313,228.08	CCTV and Radar existing, DMS existing
2121-03-146	19	IH 10	IH 10	US 54	SL 375	11.4	4	2025	19-3	Lane Management System	DMS LCS signs	4	Install dynamic lane use control system at interchange approaches for routing guidance. Utilize full color matrix small scale DMS capable of displaying route shields, advisory speeds, etc.	$2,717,750	$407,662.56	-
2121-03-146	19	IH 10	IH 10	US 54	SL 375	11.4	5	2022	19-5	Roadway Monitoring	CCTV	14	Replace existing CCTV with digital IP based cameras, utilizing existing infrastructure	$1,546,238	$231,935.76	Existing CCTV replacement
2121-03-146	19	IH 10	IH 10	US 54	SL 375	11.4	7	2022	19-6	RWIS	Weather Station	2	Install weather station locations to monitor weather conditions along roadway corridors. Information can be used to inform public of adverse conditions via the information dissemination strategy and can be used to proactively deploy maintenance as needed.	$62,556	$9,383.40	-
2121-03-146	19	IH 10	IH 10	US 54	SL 375	11.4	5	2023	19-7	Traffic Detectors	Radar	15	Replace existing Radar units, utilizing existing infrastructure	$180,000	$27,000.00	Existing Radar

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2121-03-146	19	IH 10	IH 10	US 54	SL 375	11.4	2	2030	19-8	Traffic Signal Operations	ATC controllers	14	Install ATC compatible controllers at traffic signal locations to allow for smart and connected vehicle technology applications.	$268,800	$40,320.00	-
2121-03-146	19	IH 10	IH 10	US 54	SL 375	11.4	2	2021	19-11	Information Dissemination	Static Travel Time Display	2	Install static travel time displays at both approaches to major interchanges to disseminate information to the motoring public.	$268,709	$40,306.32	
2121-03-146	19	IH 10	IH 10	US 54	SL 375	11.4	9	2030	-	Managed Lanes	Managed Lanes	-	Evaluate roadway and install HOV managed lanes along corridor.	$15,000,000	$2,250,000.00	-
2121-03-146	19	IH 10	IH 10	US 54	SL 375	11.4	3	2021	-	Information Dissemination	-	-	Utilize existing DMS, websites, social media, and third-party applications to disseminate information to the motoring public.	-	$100,000.00	-
2121-03-146	19	IH 10	IH 10	US 54	SL 375	11.4	8	2023	-	Travel Time Estimation and Prediction	INRIX	-	Utilize INRIX data to predict travel times from major destination points/corridors on roadway system. Utilize existing DMS and other information dissemination techniques to relay travel time information to traveling public.	-	$100,000.00	-
-	20	IH 10	IH 10	SL 375	FM 3380	21.5	4	2025	20-2	Lane Management System	DMS LCS signs	2	Install dynamic lane use control system at interchange approaches for routing guidance. Utilize full color matrix small scale DMS capable of displaying route shields, advisory speeds, etc.	$1,358,875	$203,831.28	-
-	20	IH 10	IH 10	SL 375	FM 3380	21.5	5	2022	20-3	Roadway Monitoring	CCTV	6	Replace existing CCTV with digital IP based cameras, utilizing existing infrastructure	$662,674	$99,401.04	Existing CCTV replacement
-	20	IH 10	IH 10	SL 375	FM 3380	21.5	7	2022	20-4	RWIS	Weather Station	4	Install weather station locations to monitor weather conditions along roadway corridors. Information can be used to inform public of adverse conditions via the information dissemination strategy and can be used to proactively deploy maintenance as needed.	$125,112	$18,766.80	-

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-	20	IH 10	IH 10	SL 375	FM 3380	21.5	1	2021	20-6	Wrong Way Driver Detection	Detection System	14	Install wrong way detection system for exit ramp locations along corridor. Radar detection with video verification. Automated notification system to TMC staff. Potential to automate response to post advisory messages on upstream DMS.	$1,328,846	$199,326.96	CCTV, Radar, and DMS existing to FM 1281
-	20	IH 10	IH 10	SL 375	FM 3380	21.5	5	2020	20-7	Roadway Monitoring	CCTV Wireless	17	Install additional CCTV coverage along corridor to improve roadway monitoring in order to identify and/or confirm congestion and incidents for faster response and clearance times.	$1,645,015	$246,752.28	Gap Analysis Study proposed project to install 17 additional CCTV locations.
-	20	IH 10	IH 10	SL 375	FM 3380	21.5	-	2022	-	Communications	Fiber	17.6	Install fiber communications network along corridor.	$12,228,564	$1,834,284.67	Existing TxDOT fiber from Loop 375 to Horizon Blvd extend from Horizon to FM 3380 (17.62 mi)
-	20	IH 10	IH 10	SL 375	FM 3380	21.5	3	2021	-	Information Dissemination	-	-	Utilize existing DMS, websites, social media, and third-party applications to disseminate information to the motoring public.	-	$100,000.00	-
-	20	IH 10	IH 10	SL 375	FM 3380	21.5	8	2024	-	Travel Time Estimation and Prediction	INRIX	-	Utilize INRIX data to predict travel times from major destination points/corridors on roadway system. Utilize existing DMS and other information dissemination techniques to relay travel time information to traveling public.	-	$100,000.00	-
-	21	IH 10	IH 10	FM 3380	SH 20	23.2	5	2025	21-1	Roadway Monitoring	CCTV wireless	5	Install additional CCTV coverage along corridor to improve roadway monitoring in order to identify and/or confirm congestion and incidents for faster response and clearance times.	$483,828	$72,574.20	-

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-	21	IH 10	IH 10	FM 3380	SH 20	23.2	5	2025	21-2	Traffic Detectors	Radar	5	Install additional radar locations and replace existing radar to monitor travel lanes for speed, volume, and other metrics to have a better understanding of real time conditions on roadway. Radar is used to operate other strategies efficiently.	$60,000	$9,000.00	3 existing Radar
-	21	IH 10	IH 10	FM 3380	SH 20	23.2	3	2020	21-3	Information Dissemination	DMS wireless	5	Install wireless DMS locations to be utilized for information dissemination to the motoring public.	$1,627,428	$244,114.20	-
-	21	IH 10	IH 10	FM 3380	SH 20	23.2	1	2021	21-4	Wrong Way Driver Detection	Detection System	3	Install wrong way detection system for exit ramp locations along corridor. Radar detection with video verification. Automated notification system to TMC staff. Potential to automate response to post advisory messages on upstream DMS.	$284,753	$42,712.92	-
-	21	IH 10	IH 10	FM 3380	SH 20	23.2	1	2020	21-5	Traffic Detectors	Radar Speed Feedback Sign	4	Install Radar Speed Feedback Sign.	$29,580	$4,437.00	-
-	21	IH 10	IH 10	FM 3380	SH 20	23.2	1	2020	21-6	Traffic Detectors	LED Chevrons	1	Install Chevrons	$37,135	$5,570.21	-
-	22	IH 10	IH 10	SH 20	Culberson County	56.4	7	2025	22-1	RWIS	Weather Station	5	Install weather station locations to monitor weather conditions along roadway corridors. Information can be used to inform public of adverse conditions via the information dissemination strategy and can be used to proactively deploy maintenance as needed.	$156,390	$23,458.50	-
-	22	IH 10	IH 10	SH 20	Culberson County	56.4	3	2020	22-2	Information Dissemination	DMS wireless	13	Install wireless DMS locations to be utilized for information dissemination to the motoring public.	$4,231,313	$634,696.92	Gap Analysis Study proposed projects; Van Horn (2 DMS), Sierra Blanca (2 DMS)

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-	22	IH 10	IH 10	SH 20	Culberson County	56.4	5	2020	22-3	Roadway Monitoring	CCTV wireless	13	Install additional CCTV coverage along corridor to improve roadway monitoring in order to identify and/or confirm congestion and incidents for faster response and clearance times.	$1,257,953	$188,692.92	-
-	22	IH 10	IH 10	SH 20	Culberson County	56.4	1	2020	22-4	Traffic Detectors	Radar Speed Feedback Sign	18	Install Radar Speed Feedback Sign.	$133,110	$19,966.50	-
-	22	IH 10	IH 10	SH 20	Culberson County	56.4	5	2025	22-5	Traffic Detectors	Radar	13	Install additional radar locations and replace existing radar to monitor travel lanes for speed, volume, and other metrics to have a better understanding of real time conditions on roadway. Radar is used to operate other strategies efficiently.	$156,000	$23,400.00	-
-	22	IH 10	IH 10	SH 20	Culberson County	56.4	1	2020	22-6	Wrong Way Driver Detection	Detection System	8	Install wrong way detection system for exit ramp locations along corridor. Radar detection with video verification. Automated notification system to TMC staff. Potential to automate response to post advisory messages on upstream DMS.	$759,341	$113,901.12	-
-	23	IH 10 Frontage Rd	Wyoming Ave.	Santa Fe St.	Kansas St.	0.3	2	2030	23-1	Connected Vehicles	SPaT	5	Initiate SPaT programming on controller. SPaT programming will allow for equipped vehicles to view signal timing data upon approach increasing efficiency of signal operations.	$6,000	$5,000.00	-
-	23	IH 10 Frontage Rd	Wyoming Ave.	Santa Fe St.	Kansas St.	0.3	2	2030	23-2	Traffic Signal Operations	ATC controllers	5	Install ATC compatible controllers at traffic signal locations to allow for smart and connected vehicle technology applications.	$96,000	$14,400.00	-
-	24	IH 10 Frontage Rd	Yandell Dr	Kansas St.	Santa Fe St.	0.3	2	2030	24-1	Connected Vehicles	SPaT	6	Initiate SPaT programming on controller. SPaT programming will allow for equipped vehicles to view signal timing data upon approach increasing efficiency of signal operations.	$7,200	$5,000.00	-

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-	24	IH 10 Frontage Rd	Yandell Dr	Kansas St.	Santa Fe St.	0.3	2	2030	24-2	Traffic Signal Operations	ATC controllers	6	Install ATC compatible controllers at traffic signal locations to allow for smart and connected vehicle technology applications.	$115,200	$17,280.00	-
-	25	IH 110	IH 110	Bridge of the Americas	IH-10	1.1	2	2030	25-1	Connected Vehicles	DSRC	4	Install DSRC communications at existing ITS device locations. DSRC will allow for DSRC compatible vehicles to communicate with the infrastructure (V2I).	$48,000	$7,200.00	-
-	25	IH 110	IH 110	Bridge of the Americas	IH-10	1.1	4	2025	25-3	Lane Management System	DMS LCS signs	2	Install dynamic lane use control system at interchange approaches for routing guidance. Utilize full color matrix small scale DMS capable of displaying route shields, advisory speeds, etc.	$1,358,875	$203,831.28	-
-	25	IH 110	IH 110	Bridge of the Americas	IH-10	1.1	5	2022	25-4	Roadway Monitoring	CCTV	2	Replace existing CCTV with digital IP based cameras, utilizing existing infrastructure	$220,891	$33,133.68	Existing CCTV replacement
-	25	IH 110	IH 110	Bridge of the Americas	IH-10	1.1	5	2020	25-5	Traffic Detectors	Radar	5	Install additional radar locations and replace existing radar to monitor travel lanes for speed, volume, and other metrics to have a better understanding of real time conditions on roadway. Radar is used to operate other strategies efficiently.	$60,000	$9,000.00	1 existing Radar
-	25	IH 110	IH 110	Bridge of the Americas	IH-10	1.1	3	2021	-	Information Dissemination	-	-	Utilize existing DMS, websites, social media, and third-party applications to disseminate information to the motoring public.	-	$100,000.00	-
-	26	Loop 375	Talbot Ave. (Canutillo)	Doniphan Dr.	El Paso City Limits (West)	0.6	5	2029	26-1	Roadway Monitoring	CCTV	1	Install additional CCTV coverage along corridor to improve roadway monitoring in order to identify and/or confirm congestion and incidents for faster response and clearance times.	$110,446	$16,566.84	-

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-	27	Loop 375	Talbot Ave.	El Paso City Limits (West)	IH-10	0.4	4	2025	27-1	Lane Management System	DMS LCS signs	2	Install dynamic lane use control system at interchange approaches for routing guidance. Utilize full color matrix small scale DMS capable of displaying route shields, advisory speeds, etc.	$1,358,875	$203,831.28	-
-	27	Loop 375	Talbot Ave.	El Paso City Limits (West)	IH-10	0.4	5	2029	27-2	Roadway Monitoring	CCTV	1	Install additional CCTV coverage along corridor to improve roadway monitoring in order to identify and/or confirm congestion and incidents for faster response and clearance times.	$110,446	$16,566.84	-
-	28	Loop 375	Transmountain/Woodrow Bean	IH-10	Railroad Dr.	13.5	4	2025	28-1	Lane Management System	DMS LCS signs	6	Install dynamic lane use control system at interchange approaches for routing guidance. Utilize full color matrix small scale DMS capable of displaying route shields, advisory speeds, etc.	$4,076,626	$611,493.84	-
-	28	Loop 375	Transmountain/Woodrow Bean	IH-10	Railroad Dr.	13.5	5	2022	28-2	Roadway Monitoring	CCTV	9	Replace existing CCTV with digital IP based cameras, utilizing existing infrastructure	$994,010	$149,101.56	Existing CCTV replacement
-	28	Loop 375	Transmountain/Woodrow Bean	IH-10	Railroad Dr.	13.5	5	2021	28-3	Traffic Detectors	Radar	15	Install additional radar locations and replace existing radar to monitor travel lanes for speed, volume, and other metrics to have a better understanding of real time conditions on roadway. Radar is used to operate other strategies efficiently.	$180,000	$27,000.00	3 existing Radar, One existing radar @ Paseo Del Norte
-	28	Loop 375	Transmountain/Woodrow Bean	IH-10	Railroad Dr.	13.5	1	2021	28-5	Wrong Way Driver Detection	Detection System	10	Install wrong way detection system for exit ramp locations along corridor. Radar detection with video verification. Automated notification system to TMC staff. Potential to automate response to post advisory messages on upstream DMS.	$949,176	$142,376.40	-

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-	28	Loop 375	Transmountain/Woodrow Bean	IH-10	Railroad Dr.	13.5	5	2020	28-6	Roadway Monitoring	CCTV	18	Install additional CCTV and replace existing CCTV with digital IP based cameras, utilizing existing infrastructure	$1,988,021	$298,203.12	Gap Analysis Study proposed project to install 18 CCTV (cost calculated because estimate provided is for only 16 CCTV)
	28	Loop 375	Transmountain/Woodrow-Bean	IH 10	Railroad Dr.	13.5	5	2021	28-7	Information Dissemination	Static Travel Time Display	4	Install static travel time displays at both approaches to major interchanges to disseminate information to the motoring public.	$537,418	$80,612.64	
-	28	Loop 375	Transmountain/Woodrow Bean	IH-10	Railroad Dr.	13.5	-	2021	-	Communications	Fiber	10.4	Install fiber communications network along corridor.	$7,225,970	$1,083,895.49	Existing fiber from Loop 375 to Railroad Dr (extend from Loop 375 to IH 10 10.44 mi)
-	28	Loop 375	Transmountain/Woodrow Bean	IH-10	Railroad Dr.	13.5	8	2022	-	Travel Time Estimation and Prediction	INRIX	-	Utilize INRIX data to predict travel times from major destination points/corridors on roadway system. Utilize existing DMS and other information dissemination techniques to relay travel time information to traveling public.	-	$100,000.00	-
2552-02-028	29	Loop 375	Purple Heart Memorial Hwy	Railroad Dr	Montana Ave.	10.7	5	2023	29-2	Roadway Monitoring	CCTV	4	Install additional CCTV coverage and replace existing CCTV along corridor to improve roadway monitoring in order to identify and/or confirm congestion and incidents for faster response and clearance times.	$441,782	$66,267.36	2 existing CCTV
2552-02-028	29	Loop 375	Purple Heart Memorial Hwy	Railroad Dr	Montana Ave.	10.7	5	2023	29-3	Traffic Detectors	Radar	10	Install additional radar locations to monitor travel lanes for speed, volume, and other metrics to have a better understanding of real time conditions on roadway. Radar is used to operate other strategies efficiently.	$120,000	$18,000.00	-

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2552-02-028	29	Loop 375	Purple Heart Memorial Hwy	Railroad Dr	Montana Ave.	10.7	1	2021	29-5	Wrong Way Driver Detection	Detection System	8	Install wrong way detection system for exit ramp locations along corridor. Radar detection with video verification. Automated notification system to TMC staff. Potential to automate response to post advisory messages on upstream DMS.	$759,341	$113,901.12	-
2552-02-028	29	Loop 375	Purple Heart Memorial Hwy	Railroad Dr	Montana Ave.	10.7	3	2020	29-6	Information Dissemination	DMS	2	Install additional DMS locations and utilize existing DMS, websites, social media, and third-party applications to disseminate information to the motoring public.	$661,771	$99,265.68	Gap Analysis Study proposed project to install 2 additional DMS
2552-02-028	29	Loop 375	Purple Heart Memorial Hwy	Railroad Dr	Montana Ave.	10.7	5	2020	29-7	Roadway Monitoring	CCTV	8	Install additional CCTV coverage along corridor to improve roadway monitoring in order to identify and/or confirm congestion and incidents for faster response and clearance times.	$883,565	$132,534.72	Gap Analysis Study proposed project to install 8 CCTV
2552-02-028	29	Loop 375	Purple Heart Memorial Hwy	Railroad Dr	Montana Ave.	10.7	5	2021	29-8	Information Dissemination	Static Travel Time Display	2	Install static travel time displays at both approaches to major interchanges to disseminate information to the motoring public.	$268,709	$40,306.32	
2552-02-028	29	Loop 375	Purple Heart Memorial Hwy	Railroad Dr	Montana Ave.	10.7	8	2023	-	Travel Time Estimation and Prediction	INRIX	-	Utilize INRIX data to predict travel times from major destination points/corridors on roadway system. Utilize existing DMS and other information dissemination techniques to relay travel time information to traveling public.	-	$100,000.00	-
-	30	Loop 375	Joe Battle Blvd.	Montana Ave.	IH-10	7.5	2	2030	30-1	Connected Vehicles	DSRC, SPaT	8	Install DSRC communications and initiate SPaT programming on controller. DSRC will allow for DSRC compatible vehicles to communicate with the infrastructure (V2I). SPaT programming will allow for equipped vehicles to view signal timing data upon approach to increase signal efficiency	$105,600	$15,840.00	-

CSJ	Segment ID	Route No.	Street	From	To	Total Miles	Safety Priority	Proposed Year	GIS Project ID	TSMO Strategy	Equipment	Devices	Project Description	Project Est. Cost Capital	Project Est. Cost Design/Study	Comments
-	30	Loop 375	Joe Battle Blvd.	Montana Ave.	IH-10	7.5	4	2025	30-3	Lane Management System	DMS LCS signs	2	Install dynamic lane use control system at interchange approaches for routing guidance. Utilize full color matrix small scale DMS capable of displaying route shields, advisory speeds, etc.	$1,358,875	$203,831.28	-
-	30	Loop 375	Joe Battle Blvd.	Montana Ave.	IH-10	7.5	5	2022	30-4	Roadway Monitoring	CCTV	11	Replace existing CCTV with digital IP based cameras, utilizing existing infrastructure	$1,214,902	$182,235.24	Existing CCTV replacement
-	30	Loop 375	Joe Battle Blvd.	Montana Ave.	IH-10	7.5	5	2021	30-5	Traffic Detectors	Radar	7	Install additional radar locations to monitor travel lanes for speed, volume, and other metrics to have a better understanding of real time conditions on roadway. Radar is used to operate other strategies efficiently.	$84,000	$12,600.00	Fiber existing
-	30	Loop 375	Joe Battle Blvd.	Montana Ave.	IH-10	7.5	2	2030	30-6	Traffic Signal Operations	ATC controllers	8	Install ATC compatible controllers at traffic signal locations to allow for smart and connected vehicle technology applications.	$153,600	$23,040.00	-
-	30	Loop 375	Joe Battle Blvd.	Montana Ave.	IH-10	7.5	1	2021	30-8	Wrong Way Driver Detection	Detection System	12	Install wrong way detection system for exit ramp locations along corridor. Radar detection with video verification. Automated notification system to TMC staff. Potential to automate response to post advisory messages on upstream DMS.	$1,139,011	$170,851.68	-
	30	Loop 375	Joe Battle Blvd.	Montana Ave.	IH 10	7.5	2	2021	30-9	Information Dissemination	Static Travel Time Display	4	Install static travel time displays at both approaches to major interchanges to disseminate information to the motoring public.	$537,418	$80,612.64	
-	30	Loop 375	Joe Battle Blvd.	Montana Ave.	IH-10	7.5	3	2021	-	Information Dissemination	-	-	Utilize existing DMS, websites, social media, and third-party applications to disseminate information to the motoring public.	-	$100,000.00	-

CSJ	Segment ID	Route No.	Street	From	To	Total Miles	Safety Priority	Proposed Year	GIS Project ID	TSMO Strategy	Equipment	Devices	Project Description	Project Est. Cost Capital	Project Est. Cost Design/Study	Comments
-	30	Loop 375	Joe Battle Blvd.	Montana Ave.	IH-10	7.5	8	2022	-	Travel Time Estimation and Prediction	INRIX	-	Utilize INRIX data to predict travel times from major destination points/corridors on roadway system. Utilize existing DMS and other information dissemination techniques to relay travel time information to traveling public.	-	$100,000.00	-
2552-03-066	31	Loop 375	Americas Ave.	IH-10	Zaragoza International Bridge	3.8	2	2030	31-1	Connected Vehicles	DSRC	4	Install DSRC communications at existing ITS device locations. DSRC will allow for DSRC compatible vehicles to communicate with the infrastructure (V2I).	$48,000	$7,200.00	-
2552-03-066	31	Loop 375	Americas Ave.	IH-10	Zaragoza International Bridge	3.8	4	2025	31-3	Lane Management System	DMS LCS signs	2	Install dynamic lane use control system at interchange approaches for routing guidance. Utilize full color matrix small scale DMS capable of displaying route shields, advisory speeds, etc.	$1,358,875	$203,831.28	-
2552-03-066	31	Loop 375	Americas Ave.	IH-10	Zaragoza International Bridge	3.8	5	2022	31-4	Roadway Monitoring	CCTV	9	Replace existing CCTV with digital IP based cameras, utilizing existing infrastructure	$994,010	$149,101.56	Existing CCTV replacement
2552-03-066	31	Loop 375	Americas Ave.	IH-10	Zaragoza International Bridge	3.8	5	2021	31-5	Traffic Detectors	Radar	3	Install additional radar locations to monitor travel lanes for speed, volume, and other metrics to have a better understanding of real time conditions on roadway. Radar is used to operate other strategies efficiently.	$36,000	$5,000.00	Fiber existing
2552-03-066	31	Loop 375	Americas Ave.	IH-10	Zaragoza International Bridge	3.8	1	2021	31-7	Wrong Way Driver Detection	Detection System	5	Install wrong way detection system for exit ramp locations along corridor. Radar detection with video verification. Automated notification system to TMC staff. Potential to automate response to post advisory messages on upstream DMS.	$474,588	$71,188.20	-
2552-03-066	31	Loop 375	Americas Ave.	IH-10	Zaragoza International Bridge	3.8	3	2021	-	Information Dissemination	-	-	Utilize existing DMS, websites, social media, and third-party applications to disseminate information to the motoring public.	-	$100,000.00	-

CSJ	Segment ID	Route No.	Street	From	To	Total Miles	Safety Priority	Proposed Year	GIS Project ID	TSMO Strategy	Equipment	Devices	Project Description	Project Est. Cost Capital	Project Est. Cost Design/Study	Comments
2552-03-066	31	Loop 375	Americas Ave.	IH-10	Zaragoza International Bridge	3.8	8	2022	-	Travel Time Estimation and Prediction	INRIX	-	Utilize INRIX data to predict travel times from major destination points/corridors on roadway system. Utilize existing DMS and other information dissemination techniques to relay travel time information to traveling public.	-	$100,000.00	-
-	32	Loop 375	Cesar Chavez Border Highway	Zaragoza International Bridge	Santa Fe St.	12.4	2	2030	32-2	Connected Vehicles	SPaT	1	Initiate SPaT programming on controller. SPaT programming will allow for equipped vehicles to view signal timing data upon approach increasing efficiency of signal operations.	$1,200	$5,000.00	-
-	32	Loop 375	Cesar Chavez Border Highway	Zaragoza International Bridge	Santa Fe St.	12.4	2	2030	32-2	Connected Vehicles	DSRC	13	Install DSRC communications at existing ITS device locations. DSRC will allow for DSRC compatible vehicles to communicate with the infrastructure (V2I).	$156,000	$23,400.00	-
-	32	Loop 375	Cesar Chavez Border Highway	Zaragoza International Bridge	Santa Fe St.	12.4	5	2022	32-3	Traffic Detectors	Radar	31	Install additional radar locations and replace existing radar to monitor travel lanes for speed, volume, and other metrics to have a better understanding of real time conditions on roadway. Radar is used to operate other strategies efficiently.	$372,000	$55,800.00	28 existing Radar, Gap in Radar from Santa Fe St to IH-110 (2.9 mi)
-	32	Loop 375	Cesar Chavez Border Highway	Zaragoza International Bridge	Santa Fe St.	12.4	5	2022	32-4	Roadway Monitoring	CCTV	18	Replace existing CCTV with digital IP based cameras, utilizing existing infrastructure	$1,988,021	$298,203.12	Existing CCTV replacement
-	32	Loop 375	Cesar Chavez Border Highway	Zaragoza International Bridge	Santa Fe St.	12.4	1	2021	32-7	Wrong Way Driver Detection	Detection System	10	Install wrong way detection system for exit ramp locations along corridor. Radar detection with video verification. Automated notification system to TMC staff. Potential to automate response to post advisory messages on upstream DMS.	$949,176	$142,376.40	-

CSJ	Segment ID	Route No.	Street	From	To	Total Miles	Safety Priority	Proposed Year	GIS Project ID	TSMO Strategy	Equipment	Devices	Project Description	Project Est. Cost Capital	Project Est. Cost Design/Study	Comments
	32	Loop 375	Cesar Chavez Border Highway	Zaragoza International Bridge	Santa Fe St.	12.4	2	2021	32-8	Information Dissemination	Static Travel Time Display	2	Install static travel time displays at both approaches to major interchanges to disseminate information to the motoring public.	$268,709	$40,306.32	
-	32	Loop 375	Cesar Chavez Border Highway	Zaragoza International Bridge	Santa Fe St.	12.4	3	2021	-	Information Dissemination	-	-	Utilize existing DMS, websites, social media, and third-party applications to disseminate information to the motoring public.	-	$100,000.00	-
-	32	Loop 375	Cesar Chavez Border Highway	Zaragoza International Bridge	Santa Fe St.	12.4	8	2022	-	Travel Time Estimation and Prediction	INRIX	-	Utilize INRIX data to predict travel times from major destination points/corridors on roadway system. Utilize existing DMS and other information dissemination techniques to relay travel time information to traveling public.	-	$100,000.00	-
-	33	Loop 478	Copia St.	Paisano Dr.	Pershing Dr.	1.1	2	2030	33-1	Connected Vehicles	SPaT	6	Initiate SPaT programming on controller. SPaT programming will allow for equipped vehicles to view signal timing data upon approach increasing efficiency of signal operations.	$7,200	$5,000.00	-
-	33	Loop 478	Copia St.	Paisano Dr.	Pershing Dr.	1.1	5	2023	33-2	Roadway Monitoring	CCTV	2	Install additional CCTV coverage along corridor to improve roadway monitoring in order to identify and/or confirm congestion and incidents for faster response and clearance times.	$220,891	$33,133.68	-
-	33	Loop 478	Copia St.	Paisano Dr.	Pershing Dr.	1.1	2	2030	33-3	Traffic Signal Operations	ATC controllers	6	Install ATC compatible controllers at traffic signal locations to allow for smart and connected vehicle technology applications.	$115,200	$17,280.00	-
-	33	Loop 478	Copia St.	Paisano Dr.	Pershing Dr.	1.2	-	2023	-	Communications	Fiber	1.2	Install fiber communications network along corridor.	$833,766	$125,064.86	-
-	34	Loop 478	Pershing Dr.	Copia St.	Dyer St.	0.9	2	2030	34-1	Connected Vehicles	SPaT	3	Initiate SPaT programming on controller. SPaT programming will allow for equipped vehicles to view signal timing data upon approach increasing efficiency of signal operations.	$3,600	$5,000.00	-

CSJ	Segment ID	Route No.	Street	From	To	Total Miles	Safety Priority	Proposed Year	GIS Project ID	TSMO Strategy	Equipment	Devices	Project Description	Project Est. Cost Capital	Project Est. Cost Design/Study	Comments
-	34	Loop 478	Pershing Dr.	Copia St.	Dyer St.	0.9	5	2023	34-2	Roadway Monitoring	CCTV	1	Install additional CCTV coverage along corridor to improve roadway monitoring in order to identify and/or confirm congestion and incidents for faster response and clearance times.	$110,446	$16,566.84	-
-	34	Loop 478	Pershing Dr.	Copia St.	Dyer St.	0.9	2	2030	34-3	Traffic Signal Operations	ATC controllers	3	Install ATC compatible controllers at traffic signal locations to allow for smart and connected vehicle technology applications.	$57,600	$8,640.00	-
-	34	Loop 478	Pershing Dr.	Copia St.	Dyer St.	0.9	-	2023	-	Communications	Fiber	0.9	Install fiber communications network along corridor.	$625,324	$93,798.65	-
-	35	Loop 478	Dyer St.	Pershing Dr.	Patriot Freeway	3.7	2	2030	35-1	Connected Vehicles	SPaT	10	Initiate SPaT programming on controller. SPaT programming will allow for equipped vehicles to view signal timing data upon approach increasing efficiency of signal operations.	$12,000	$5,000.00	-
-	35	Loop 478	Dyer St.	Pershing Dr.	Patriot Freeway	3.7	5	2023	35-2	Roadway Monitoring	CCTV	3	Install additional CCTV coverage along corridor to improve roadway monitoring in order to identify and/or confirm congestion and incidents for faster response and clearance times.	$331,337	$49,700.52	-
-	35	Loop 478	Dyer St.	Pershing Dr.	Patriot Freeway	3.7	2	2030	35-3	Traffic Signal Operations	ATC controllers	10	Install ATC compatible controllers at traffic signal locations to allow for smart and connected vehicle technology applications.	$192,000	$28,800.00	-
-	35	Loop 478	Dyer St.	Pershing Dr.	Patriot Freeway	3.7	-	2023	-	Communications	Fiber	3.7	Install fiber communications network along corridor.	$2,570,778	$385,616.66	-
3592-01-009	38	SH 178	Artcraft Rd	New Mexico State Line	IH-10	3	5	2022	38-1	Roadway Monitoring	CCTV	3	Replace existing CCTV with digital IP based cameras, utilizing existing infrastructure	$331,337	$49,700.52	Existing CCTV replacement
3592-01-009	38	SH 178	Artcraft Rd	New Mexico State Line	IH-10	3	5	2023	38-2	Traffic Detectors	Radar	6	Replace existing Radar units, utilizing existing infrastructure	$72,000	$10,800.00	Existing Radar
3592-01-009	38	SH 178	Artcraft Rd	New Mexico State Line	IH-10	3	2	2030	38-3	Traffic Signal Operations	ATC controllers	3	Install ATC compatible controllers at traffic signal locations to allow for smart and connected vehicle technology applications.	$57,600	$8,640.00	CCTV and Radar existing

CSJ	Segment ID	Route No.	Street	From	To	Total Miles	Safety Priority	Proposed Year	GIS Project ID	TSMO Strategy	Equipment	Devices	Project Description	Project Est. Cost Capital	Project Est. Cost Design/Study	Comments
3592-01-009	38	SH 178	Artcraft Rd	New Mexico State Line	IH-10	3	-	2022	-	Communications	Fiber	3	Install fiber communications network along corridor.	$2,084,414	$312,662.16	Existing City fiber
-	39	SH 20	Doniphan Dr.	New Mexico State Line	Country Club Rd.	11.2	5	2025	39-1	Roadway Monitoring	CCTV	9	Install additional CCTV coverage and replace existing CCTV along corridor to improve roadway monitoring in order to identify and/or confirm congestion and incidents for faster response and clearance times.	$994,010	$149,101.56	2 existing CCTV, Extend from Spur 16 Blvd to New Mexico State line (7.4 mi)
-	39	SH 20	Doniphan Dr.	New Mexico State Line	Country Club Rd.	11.2	2	2030	39-2	Traffic Signal Operations	ATC controllers	13	Install ATC compatible controllers at traffic signal locations to allow for smart and connected vehicle technology applications.	$249,600	$37,440.00	-
-	39	SH 20	Doniphan Dr.	New Mexico State Line	Country Club Rd.	11.2	-	2025	-	Communications	Fiber	11.2	Install fiber communications network along corridor.	$7,781,814	$1,167,272.06	Existing City fiber from Mesa St to Borderland St
-	40	SH 20	Mesa St.	Country Club Rd.	Texas Ave.	8.8	2	2030	40-1	Connected Vehicles	DSRC, SPaT	39	Install DSRC communications and initiate SPaT programming on controller. DSRC will allow for DSRC compatible vehicles to communicate with the infrastructure (V2I). SPaT programming will allow for equipped vehicles to view signal timing data upon approach to increase signal efficiency	$514,800	$77,220.00	Fiber existing
-	40	SH 20	Mesa St.	Country Club Rd.	Texas Ave.	8.8	5	2022	40-2	Roadway Monitoring	CCTV	9	Install additional CCTV coverage and replace existing CCTV along corridor to improve roadway monitoring in order to identify and/or confirm congestion and incidents for faster response and clearance times.	$994,010	$149,101.56	7 existing CCTV, Add one CCTV @ N Festival and one CCTV @ Kerbey Ave to fill gaps
-	40	SH 20	Mesa St.	Country Club Rd.	Texas Ave.	8.8	2	2030	40-3	Traffic Signal Operations	ATC controllers	39	Install ATC compatible controllers at traffic signal locations to allow for smart and connected vehicle technology applications.	$748,800	$112,320.00	-

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-	40	SH 20	Mesa St.	Country Club Rd.	Texas Ave.	8.8	-	2022	-	Communications	Fiber	5.6	Install fiber communications network along corridor.	$3,890,907	$583,636.03	Existing TxDOT Fiber from Doniphan Dr. to Sunland Park Dr. extend to Mesa St (5.6 mi), Existing City Fiber
-	41	SH 20	Texas Ave.	Mesa St.	Alameda Ave.	1.8	2	2030	41-1	Connected Vehicles	DSRC, SPaT	5	Install DSRC communications and initiate SPaT programming on controller. DSRC will allow for DSRC compatible vehicles to communicate with the infrastructure (V2I). SPaT programming will allow for equipped vehicles to view signal timing data upon approach to increase signal efficiency	$66,000	$9,900.00	-
-	41	SH 20	Texas Ave.	Mesa St.	Alameda Ave.	1.8	5	2021	41-2	Roadway Monitoring	CCTV	2	Install additional CCTV coverage along corridor to improve roadway monitoring in order to identify and/or confirm congestion and incidents for faster response and clearance times.	$220,891	$33,133.68	-
-	41	SH 20	Texas Ave.	Mesa St.	Alameda Ave.	1.8	2	2030	41-3	Traffic Signal Operations	ATC controllers	5	Install ATC compatible controllers at traffic signal locations to allow for smart and connected vehicle technology applications.	$96,000	$14,400.00	-
-	41	SH 20	Texas Ave.	Mesa St.	Alameda Ave.	1.7	-	2021	-	Communications	Fiber	1.7	Install fiber communications network along corridor.	$1,181,168	$177,175.22	Existing City fiber
-	42	SH 20	Alameda Ave.	Texas Ave.	Loop 375	11.7	2	2030	42-1	Connected Vehicles	DSRC, SPaT	36	Install DSRC communications and initiate SPaT programming on controller. DSRC will allow for DSRC compatible vehicles to communicate with the infrastructure (V2I). SPaT programming will allow for equipped vehicles to view signal timing data upon approach to increase signal efficiency	$475,200	$71,280.00	-
-	42	SH 20	Alameda Ave.	Texas Ave.	Loop 375	11.7	5	2022	42-2	Roadway Monitoring	CCTV	4	Replace existing CCTV with digital IP based cameras, utilizing existing infrastructure	$441,782	$66,267.36	Existing CCTV replacement

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-	42	SH 20	Alameda Ave.	Texas Ave.	Loop 375	11.7	2	2030	42-3	Traffic Signal Operations	ATC controllers	36	Install ATC compatible controllers at traffic signal locations to allow for smart and connected vehicle technology applications.	$691,200	$103,680.00	-
-	42	SH 20	Alameda Ave.	Texas Ave.	Loop 375	11.7	-	2022	-	Communications	Fiber	11.7	Install fiber communications network along corridor.	$8,129,216	$1,219,382.42	-
-	43	SH 20	Alameda Ave.	Loop 375	IH-10	44.5	5	2024	43-1	Roadway Monitoring	CCTV	20	Install additional CCTV coverage along corridor to improve roadway monitoring in order to identify and/or confirm congestion and incidents for faster response and clearance times.	$2,208,912	$331,336.80	Add CCTV from Mesa to US 54 (2.8 mi), Add CCTV from SL 375 to FM 793 (21.2 mi)
-	43	SH 20	Alameda Ave.	Loop 375	IH-10	44.5	-	2024	-	Communications	Fiber	44.5	Install fiber communications network along corridor.	$30,918,814	$4,637,822.04	-
-	46	Spur 601	Spur 601	US 54	Purple Heart Memorial Hwy	7.2	2	2030	46-1	Connected Vehicles	DSRC	4	Install DSRC communications at existing ITS device locations. DSRC will allow for DSRC compatible vehicles to communicate with the infrastructure (V2I).	$48,000	$7,200.00	Fiber existing
-	46	Spur 601	Spur 601	US 54	Purple Heart Memorial Hwy	7.2	5	2022	46-3	Roadway Monitoring	CCTV	8	Replace existing CCTV with digital IP based cameras, utilizing existing infrastructure	$883,565	$132,534.72	Existing CCTV replacement
-	46	Spur 601	Spur 601	US 54	Purple Heart Memorial Hwy	7.2	5	2023	46-4	Traffic Detectors	Radar	10	Replace existing Radar units, utilizing existing infrastructure	$120,000	$18,000.00	Existing Radar
-	46	Spur 601	Spur 601	US 54	Purple Heart Memorial Hwy	7.2	1	2021	46-5	Wrong Way Driver Detection	Detection System	7	Install wrong way detection system for exit ramp locations along corridor. Radar detection with video verification. Automated notification system to TMC staff. Potential to automate response to post advisory messages on upstream DMS.	$664,423	$99,663.48	-
-	46	Spur 601	Spur 601	US 54	Purple Heart Memorial Hwy	7.2	3	2020	46-6	Information Dissemination	DMS	4	Install DMS locations to be utilized for information dissemination to the motoring public.	$1,323,542	$198,531.36	Gap Analysis Study proposed project to install 4 DMS locations.
	46	Spur 601	Spur 601	US 54	Purple Heart Memorial Hwy	7.2	3	2021	46-7	Information Dissemination	Static Travel Time Display	2	Install static travel time displays at both approaches to major interchanges to disseminate information to the motoring public.	$268,709	$40,306.32	

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0167-01-122	47	US 54	Patriot Freeway	Cesar Chavez Border Highway	New Mexico State Line	19.7	2	2030	47-1	Connected Vehicles	DSRC, SPaT	20	Install DSRC communications and initiate SPaT programming on controller. DSRC will allow for DSRC compatible vehicles to communicate with the infrastructure (V2I). SPaT programming will allow for equipped vehicles to view signal timing data upon approach to increase signal efficiency	$264,000	$39,600.00	From IH-10 to SL 375 (9.4 mi)
0167-01-122	47	US 54	Patriot Freeway	Cesar Chavez Border Highway	New Mexico State Line	19.7	4	2025	47-3	Lane Management System	DMS LCS signs	10	Install dynamic lane use control system at interchange approaches for routing guidance. Utilize full color matrix small scale DMS capable of displaying route shields, advisory speeds, etc.	$6,794,376	$1,019,156.40	-
0167-01-122	47	US 54	Patriot Freeway	Cesar Chavez Border Highway	New Mexico State Line	19.7	5	2022	47-5	Roadway Monitoring	CCTV	15	Replace existing CCTV with digital IP based cameras, utilizing existing infrastructure	$1,656,684	$248,502.60	Existing CCTV replacement
0167-01-122	47	US 54	Patriot Freeway	Cesar Chavez Border Highway	New Mexico State Line	19.7	5	2023	47-6	Traffic Detectors	Radar	9	Replace existing Radar units, utilizing existing infrastructure	$108,000	$16,200.00	Existing Radar
0167-01-122	47	US 54	Patriot Freeway	Cesar Chavez Border Highway	New Mexico State Line	19.7	2	2030	47-7	Traffic Signal Operations	ATC controllers	20	Install ATC compatible controllers at traffic signal locations to allow for smart and connected vehicle technology applications.	$384,000	$57,600.00	-
0167-01-122	47	US 54	Patriot Freeway	Cesar Chavez Border Highway	New Mexico State Line	19.7	1	2021	47-9	Wrong Way Driver Detection	Detection System	19	Install wrong way detection system for exit ramp locations along corridor. Radar detection with video verification. Automated notification system to TMC staff. Potential to automate response to post advisory messages on upstream DMS.	$1,803,434	$270,515.16	-
0167-01-122	47	US 54	Patriot Freeway	Cesar Chavez Border Highway	New Mexico State Line	19.7	5	2020	47-10	Roadway Monitoring	CCTV Wireless	5	Install additional CCTV coverage along corridor to improve roadway monitoring in order to identify and/or confirm congestion and incidents for faster response and clearance times.	$483,828	$72,574.20	Gap Analysis Study project to install 5 additional CCTV between McCombs and State line.

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0167-01-122	47	US 54	Patriot Freeway	Cesar Chavez Border Highway	New Mexico State Line	19.7	3	2020	47-11	Information Dissemination	DMS wireless	2	Install additional DMS and utilize existing DMS, websites, social media, and third-party applications to disseminate information to the motoring public.	$650,971	$97,645.68	Gap Analysis Study proposed project for 2 additional DMS south of State line
0167-01-122	47	US 54	Patriot Freeway	Cesar Chavez Border Highway	New Mexico State Line	19.7	3	2021	47-12	Information Dissemination	Static Travel Time Display	6	Install static travel time displays at both approaches to major interchanges to disseminate information to the motoring public.	$806,126	$120,918.96	
0167-01-122	47	US 54	Patriot Freeway	Cesar Chavez Border Highway	New Mexico State Line	19.7	-	2022	-	Communications	Fiber	6.3	Install fiber communications network along corridor.	$4,377,270	$656,590.54	Extend to state line (6.34 mi), Existing TxDOT fiber from Cesar Chavez Border Hwy to McCombs St
0167-01-122	47	US 54	Patriot Freeway	Cesar Chavez Border Highway	New Mexico State Line	19.7	9	2030	-	Managed Lanes	Managed Lanes	-	Evaluate roadway and install HOV managed lanes along corridor.	$30,000,000	$4,500,000.00	-
0167-01-122	47	US 54	Patriot Freeway	Cesar Chavez Border Highway	New Mexico State Line	19.7	8	2024	-	Travel Time Estimation and Prediction	INRIX	-	Utilize INRIX data to predict travel times from major destination points/corridors on roadway system. Utilize existing DMS and other information dissemination techniques to relay travel time information to traveling public.	-	$100,000.00	-
0374-02-100	48	US 62	Montana Ave.	Paisano Dr.	El Paso County Limits	25.3	2	2030	48-1	Connected Vehicles	DSRC, SPaT	23	Install DSRC communications and initiate SPaT programming on controller. DSRC will allow for DSRC compatible vehicles to communicate with the infrastructure (V2I). SPaT programming will allow for equipped vehicles to view signal timing data upon approach to increase signal efficiency	$303,600	$45,540.00	-

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0374-02-100	48	US 62	Montana Ave.	Paisano Dr.	El Paso County Limits	25.3	5	2022	48-3	Roadway Monitoring	CCTV	14	Install additional CCTV coverage and replace existing CCTV along corridor to improve roadway monitoring in order to identify and/or confirm congestion and incidents for faster response and clearance times.	$1,546,238	$231,935.76	12 existing CCTV, Add CCTV from Airway Blvd to Paisano Dr (1.5 mi)
0374-02-100	48	US 62	Montana Ave.	Paisano Dr.	El Paso County Limits	25.3	2	2030	48-4	Traffic Signal Operations	ATC controllers	23	Install ATC compatible controllers at traffic signal locations to allow for smart and connected vehicle technology applications.	$441,600	$66,240.00	-
0374-02-100	48	US 62	Montana Ave.	Paisano Dr.	El Paso County Limits	25.3	3	2020	48-5	Information Dissemination	DMS wireless	2	Install additional DMS and utilize existing DMS, websites, social media, and third-party applications to disseminate information to the motoring public.	$650,971	$97,645.68	Gap Analysis Study proposed project for 2 additional DMS near 659 and 2775
0374-02-100	48	US 62	Montana Ave.	Paisano Dr.	El Paso County Limits	25.3	6	2020	48-6	Roadway Monitoring	CCTV	11	Install additional CCTV coverage along corridor to improve roadway monitoring in order to identify and/or confirm congestion and incidents for faster response and clearance times.	$1,214,902	$182,235.24	Gap Analysis Study proposed project to install 11 CCTV from Zaragoza to Hueco Tanks
0374-02-100	48	US 62	Montana Ave.	Paisano Dr.	El Paso County Limits	25.3	-	2022	-	Communications	Fiber	17.7	Install fiber communications network along corridor.	$12,298,045	$1,844,706.74	Existing TxDOT fiber from Airway Blvd to Loop 375. Existing City fiber
0374-02-100	48	US 62	Montana Ave.	Paisano Dr.	El Paso County Limits	25.3	8	2025	-	Travel Time Estimation and Prediction	INRIX	-	Utilize INRIX data to predict travel times from major destination points/corridors on roadway system. Utilize existing DMS and other information dissemination techniques to relay travel time information to traveling public.	-	$100,000.00	-

CSJ	Segment ID	Route No.	Street	From	To	Total Miles	Safety Priority	Proposed Year	GIS Project ID	TSMO Strategy	Equipment	Devices	Project Description	Project Est. Cost Capital	Project Est. Cost Design/Study	Comments
-	49	US 62	Paisano Dr.	El Paso St.	Montana Ave.	5.1	2	2030	49-1	Connected Vehicles	DSRC, SPaT	15	Install DSRC communications and initiate SPaT programming on controller. DSRC will allow for DSRC compatible vehicles to communicate with the infrastructure (V2I). SPaT programming will allow for equipped vehicles to view signal timing data upon approach to increase signal efficiency	$198,000	$29,700.00	-
-	49	US 62	Paisano Dr.	El Paso St.	Montana Ave.	5.1	5	2022	49-2	Roadway Monitoring	CCTV	4	Replace existing CCTV with digital IP based cameras, utilizing existing infrastructure	$441,782	$66,267.36	Existing CCTV replacement
-	49	US 62	Paisano Dr.	El Paso St.	Montana Ave.	5.1	2	2030	49-3	Traffic Signal Operations	ATC controllers	15	Install ATC compatible controllers at traffic signal locations to allow for smart and connected vehicle technology applications.	$288,000	$43,200.00	-
-	49	US 62	Paisano Dr.	El Paso St.	Montana Ave.	5.1	-	2022	-	Communications	Fiber	5.1	Install fiber communications network along corridor.	$3,543,504	$531,525.67	Some existing City fiber along segment
-	50	US 62/85	El Paso St.	Sixth Ave.	Paisano Dr.	0.2	2	2030	50-1	Connected Vehicles	DSRC, SPaT	2	Install DSRC communications and initiate SPaT programming on controller. DSRC will allow for DSRC compatible vehicles to communicate with the infrastructure (V2I). SPaT programming will allow for equipped vehicles to view signal timing data upon approach to increase signal efficiency	$26,400	$5,000.00	-
-	50	US 62/85	El Paso St.	Sixth Ave.	Paisano Dr.	0.2	5	2021	50-2	Roadway Monitoring	CCTV	2	Install additional CCTV coverage along corridor to improve roadway monitoring in order to identify and/or confirm congestion and incidents for faster response and clearance times.	$220,891	$33,133.68	-
-	50	US 62/85	El Paso St.	Sixth Ave.	Paisano Dr.	0.2	2	2030	50-3	Traffic Signal Operations	ATC controllers	2	Install ATC compatible controllers at traffic signal locations to allow for smart and connected vehicle technology applications.	$38,400	$5,760.00	-

CSJ	Segment ID	Route No.	Street	From	To	Total Miles	Safety Priority	Proposed Year	GIS Project ID	TSMO Strategy	Equipment	Devices	Project Description	Project Est. Cost Capital	Project Est. Cost Design/Study	Comments
-	50	US 62/85	El Paso St.	Sixth Ave.	Paisano Dr.	0.2	-	2021	-	Communications	Fiber	0.2	Install fiber communications network along corridor.	$138,961	$20,844.14	Existing City fiber
-	51	US 62/85	Stanton St.	Stanton International Bridge	Paisano Dr.	0.4	2	2030	51-1	Connected Vehicles	DSRC, SPaT	3	Install DSRC communications and initiate SPaT programming on controller. DSRC will allow for DSRC compatible vehicles to communicate with the infrastructure (V2I). SPaT programming will allow for equipped vehicles to view signal timing data upon approach to increase signal efficiency	$39,600	$5,940.00	-
-	51	US 62/85	Stanton St.	Stanton International Bridge	Paisano Dr.	0.4	5	2021	51-2	Roadway Monitoring	CCTV	2	Install additional CCTV coverage along corridor to improve roadway monitoring in order to identify and/or confirm congestion and incidents for faster response and clearance times.	$220,891	$33,133.68	-
-	51	US 62/85	Stanton St.	Stanton International Bridge	Paisano Dr.	0.4	2	2030	51-3	Traffic Signal Operations	ATC controllers	3	Install ATC compatible controllers at traffic signal locations to allow for smart and connected vehicle technology applications.	$57,600	$8,640.00	-
-	51	US 62/85	Stanton St.	Stanton International Bridge	Paisano Dr.	0.4	-	2021	-	Communications	Fiber	0.5	Install fiber communications network along corridor.	$347,402	$52,110.36	Existing City Fiber
-	52	US 85	Paisano Dr.	Sunland Park Dr.	Stanton St.	5.5	5	2022	52-1	Roadway Monitoring	CCTV	3	Replace existing CCTV with digital IP based cameras, utilizing existing infrastructure	$331,337	$49,700.52	Existing CCTV replacement
-	52	US 85	Paisano Dr.	Sunland Park Dr.	Stanton St.	5.5	5	2027	52-2	Traffic Detectors	Radar	5	Install additional radar locations to monitor travel lanes for speed, volume, and other metrics to have a better understanding of real time conditions on roadway. Radar is used to operate other strategies efficiently.	$60,000	$9,000.00	-
-	52	US 85	Paisano Dr.	Sunland Park Dr.	Stanton St.	5.5	-	2022	-	Communications	Fiber	5.5	Install fiber communications network along corridor.	$3,821,426	$573,213.96	-

CSJ	Segment ID	Route No.	Street	From	To	Total Miles	Safety Priority	Proposed Year	GIS Project ID	TSMO Strategy	Equipment	Devices	Project Description	Project Est. Cost Capital	Project Est. Cost Design/Study	Comments
-	52	US 85	Paisano Dr.	Sunland Park Dr.	Stanton St.	5.5	8	2027	-	Travel Time Estimation and Prediction	INRIX	-	Utilize INRIX data to predict travel times from major destination points/corridors on roadway system. Utilize existing DMS and other information dissemination techniques to relay travel time information to traveling public.	-	$100,000.00	-

Radar (Traffic Monitoring) **Total** **$12,000.00**

ITEM CODE	DESCRIPTION	UNIT	QTY	UNIT COST	TOTAL
04166004	DRILL SHAFT (36 IN)	LF		$350.00	$0.00
04166005	DRILL SHAFT (42 IN)	LF		$480.00	$0.00
04166006	DRILL SHAFT (48 IN)	LF		$540.00	$0.00
04166007	DRILL SHAFT (54 IN)	LF		$600.00	$0.00
05006001	MOBILIZATION (5%)	LS	1		$500.00
05026001	BARRICADES, SIGNS AND TRAFFIC HANDLING (5%)	MO	1		$500.00
06186029	CONDT (PVC) (SCH 40) (3")	LF		$20.00	$0.00
06206002	ELEC CONDR (NO.14) INSULATED	LF		$1.55	$0.00
06206016	ELEC CONDR (NO.2) INSULATED	LF		$4.00	$0.00
06246002	GROUND BOX TY A (122311)W/APRON	EA		$1,300.00	$0.00
06246022	GROUND BOX TY 2 (366048)W/APRON	EA		$6,900.00	$0.00
06286225	ELC SRV TY D 120/240 100(NS)GS(N)GC(O)	EA		$6,000.00	$0.00
06506007	INS OH SN SUP(15 FT BAL TEE)	EA		$15,000.00	$0.00
06506018	INS OH SN SUP(20 FT CANT)	EA		$17,000.00	$0.00
06506025	INS OH SN SUP(25 FT CANT)	EA		$19,000.00	$0.00
06506032	INS OH SN SUP(30 FT CANT)	EA		$22,000.00	$0.00
06506038	INS OH SN SUP(35 FT CANT)	EA		$23,000.00	$0.00
06506045	INS OH SN SUP(40 FT CANT)	EA		$26,000.00	$0.00
06506079	INS OH SN SUP(70 FT BRDG)	EA		$30,000.00	$0.00
06506089	INS OH SN SUP(80 FT BRDG)	EA		$33,000.00	$0.00
06506099	INS OH SN SUP(90 FT BRDG)	EA		$40,000.00	$0.00
06506109	INS OH SN SUP(100 FT BRDG)	EA		$44,000.00	$0.00
06506119	INS OH SN SUP(110 FT BRDG)	EA		$50,000.00	$0.00
60076011	FIBER OPTIC CBL (SNGLE-MODE)(12 FIBER)	LF		$8.00	$0.00
60076023	FIBER OPTIC PATCH PANEL (12 POSITION)	EA		$1,000.00	$0.00
60076087	FO SPLICE ENCLOSURE (TYPE 1)	EA		$4,500.00	$0.00
60086043	ITS GRND MNT CAB (TY 6) (CONF 2)	EA		$13,000.00	$0.00
60106002	CCTV FIELD EQUIPMENT (DIGITAL)	EA		$10,000.00	$0.00
60296001	RADAR VEHICLE SENSING DEVICE	EA	1	$10,000.00	$10,000.00
60326001	SYSTEM INTEGRATION	LS			$0.00
60626024	ITS RADIO (SNGL)(5 GHZ)-C-P	EA		$5,000.00	$0.00
60646037	ITS POLE (50 FT)(90 MPH)	EA		$10,000.00	$0.00
60646046	ITS POLE (55 FT)(90 MPH)	EA		$15,000.00	$0.00
60646055	ITS POLE (60 FT)(90 MPH)	EA		$18,000.00	$0.00
62556004	HARDENED ETHERNET SWITCH	EA		$4,000.00	$0.00
63206002	INSTALL OF CELLULAR MODEM	EA		$4,500.00	$0.00
63226001	Color DMS (Pole MNT Cabinet)	EA		$164,000.00	$0.00
63226002	Color DMS (Foundation MNT Cabinet)	EA		$169,000.00	$0.00
63396001	Bluetooth Detection system	EA		$2,000.00	$0.00
	ATC Traffic Signal Controller	EA		$2,500.00	$0.00
	DSRC Radio	EA		$10,000.00	$0.00
	CONTINGENCY (10%)	LS	1		$1,000.00

Assumptions: Installation on Existing ITS Pole

Weather Station Fiber **Total** **$31,278.00**

ITEM CODE	DESCRIPTION	UNIT	QTY	UNIT COST	TOTAL
04166004	DRILL SHAFT (36 IN)	LF		$350.00	$0.00
04166005	DRILL SHAFT (42 IN)	LF		$480.00	$0.00
04166006	DRILL SHAFT (48 IN)	LF		$540.00	$0.00
04166007	DRILL SHAFT (54 IN)	LF		$600.00	$0.00
05006001	MOBILIZATION (5%)	LS	1		$1,303.25
05026001	BARRICADES, SIGNS AND TRAFFIC HANDLING (5%)	MO	1		$1,303.25
06186029	CONDT (PVC) (SCH 40) (3")	LF		$20.00	$0.00
06206002	ELEC CONDR (NO.14) INSULATED	LF		$1.55	$0.00
06206015	ELEC CONDR (NO.2) BARE	LF	500	$3.33	$1,665.00
06206016	ELEC CONDR (NO.2) INSULATED	LF	1000	$4.00	$4,000.00
06246002	GROUND BOX TY A (122311)W/APRON	EA		$1,300.00	$0.00
06246022	GROUND BOX TY 2 (366048)W/APRON	EA	1	$6,900.00	$6,900.00
06286225	ELC SRV TY D 120/240 100(NS)GS(N)GC(O)	EA		$6,000.00	$0.00
06506007	INS OH SN SUP(15 FT BAL TEE)	EA		$15,000.00	$0.00
06506018	INS OH SN SUP(20 FT CANT)	EA		$17,000.00	$0.00
06506025	INS OH SN SUP(25 FT CANT)	EA		$19,000.00	$0.00
06506032	INS OH SN SUP(30 FT CANT)	EA		$22,000.00	$0.00
06506038	INS OH SN SUP(35 FT CANT)	EA		$23,000.00	$0.00
06506045	INS OH SN SUP(40 FT CANT)	EA		$26,000.00	$0.00
06506079	INS OH SN SUP(70 FT BRDG)	EA		$30,000.00	$0.00
06506089	INS OH SN SUP(80 FT BRDG)	EA		$33,000.00	$0.00
06506099	INS OH SN SUP(90 FT BRDG)	EA		$40,000.00	$0.00
06506109	INS OH SN SUP(100 FT BRDG)	EA		$44,000.00	$0.00
06506119	INS OH SN SUP(110 FT BRDG)	EA		$50,000.00	$0.00
60076011	FIBER OPTIC CBL (SNGLE-MODE)(12 FIBER)	LF	500	$8.00	$4,000.00
60076023	FIBER OPTIC PATCH PANEL (12 POSITION)	EA	1	$1,000.00	$1,000.00
60076087	FO SPLICE ENCLOSURE (TYPE 1)	EA	1	$4,500.00	$4,500.00
60086043	ITS GRND MNT CAB (TY 6) (CONF 2)	EA		$13,000.00	$0.00
60106002	CCTV FIELD EQUIPMENT (DIGITAL)	EA		$10,000.00	$0.00
60256001	RADAR PRESENCE DETECTOR	EA		$10,000.00	$0.00
60326001	SYSTEM INTEGRATION	LS			$0.00
60626024	ITS RADIO (SNGL)(5 GHZ)-C-P	EA		$5,000.00	$0.00
60646037	ITS POLE (50 FT)(90 MPH)	EA		$10,000.00	$0.00
60646046	ITS POLE (55 FT)(90 MPH)	EA		$15,000.00	$0.00
60646055	ITS POLE (60 FT)(90 MPH)	EA		$18,000.00	$0.00
62556004	HARDENED ETHERNET SWITCH	EA	1	$4,000.00	$4,000.00
63206002	INSTALL OF CELLULAR MODEM	EA		$4,500.00	$0.00
63226001	Color DMS (Pole MNT Cabinet)	EA		$164,000.00	$0.00
63226002	Color DMS (Foundation MNT Cabinet)	EA		$169,000.00	$0.00
63396001	Bluetooth Detection system	EA		$2,000.00	$0.00
	Weather Station	EA		$12,000.00	$0.00
	ATC Traffic Signal Controller	EA		$2,500.00	$0.00
	DSRC Radio	EA		$10,000.00	$0.00
	CONTINGENCY (10%)	LS	1		$2,606.50

Assumptions: assume existing pole; assume existing power source

CCTV location fiber **Total** **$110,445.60**

ITEM CODE	DESCRIPTION	UNIT	QTY	UNIT COST	TOTAL
04166004	DRILL SHAFT (36 IN)	LF		$350.00	$0.00
04166005	DRILL SHAFT (42 IN)	LF		$480.00	$0.00
04166006	DRILL SHAFT (48 IN)	LF	21	$540.00	$11,340.00
04166007	DRILL SHAFT (54 IN)	LF		$600.00	$0.00
05006001	MOBILIZATION (5%)	LS	1		$4,601.90
05026001	BARRICADES, SIGNS AND TRAFFIC HANDLING (5%)	MO	1		$4,601.90
06186029	CONDT (PVC) (SCH 40) (3")	LF	500	$20.00	$10,000.00
06206002	ELEC CONDR (NO.14) INSULATED	LF		$1.55	$0.00
06206015	ELEC CONDR (NO.2) BARE	LF	600	$3.33	$1,998.00
06206016	ELEC CONDR (NO.2) INSULATED	LF	1200	$4.00	$4,800.00
06246002	GROUND BOX TY A (122311)W/APRON	EA	3	$1,300.00	$3,900.00
06246022	GROUND BOX TY 2 (366048)W/APRON	EA	1	$6,900.00	$6,900.00
06286225	ELC SRV TY D 120/240 100(NS)GS(N)GC(O)	EA	1	$6,000.00	$6,000.00
06506007	INS OH SN SUP(15 FT BAL TEE)	EA		$15,000.00	$0.00
06506018	INS OH SN SUP(20 FT CANT)	EA		$17,000.00	$0.00
06506025	INS OH SN SUP(25 FT CANT)	EA		$19,000.00	$0.00
06506032	INS OH SN SUP(30 FT CANT)	EA		$22,000.00	$0.00
06506038	INS OH SN SUP(35 FT CANT)	EA		$23,000.00	$0.00
06506045	INS OH SN SUP(40 FT CANT)	EA		$26,000.00	$0.00
06506079	INS OH SN SUP(70 FT BRDG)	EA		$30,000.00	$0.00
06506089	INS OH SN SUP(80 FT BRDG)	EA		$33,000.00	$0.00
06506099	INS OH SN SUP(90 FT BRDG)	EA		$40,000.00	$0.00
06506109	INS OH SN SUP(100 FT BRDG)	EA		$44,000.00	$0.00
06506119	INS OH SN SUP(110 FT BRDG)	EA		$50,000.00	$0.00
60076011	FIBER OPTIC CBL (SNGLE-MODE)(12 FIBER)	LF	500	$8.00	$4,000.00
60076023	FIBER OPTIC PATCH PANEL (12 POSITION)	EA	1	$1,000.00	$1,000.00
60076087	FO SPLICE ENCLOSURE (TYPE 1)	EA	1	$4,500.00	$4,500.00
60086043	ITS GRND MNT CAB (TY 6) (CONF 2)	EA		$13,000.00	$0.00
60106002	CCTV FIELD EQUIPMENT (DIGITAL)	EA	1	$10,000.00	$10,000.00
60256001	RADAR PRESENCE DETECTOR	EA		$10,000.00	$0.00
60326001	SYSTEM INTEGRATION	LS			$0.00
60626024	ITS RADIO (SNGL)(5 GHZ)-C-P	EA		$5,000.00	$0.00
60646037	ITS POLE (50 FT)(90 MPH)	EA		$10,000.00	$0.00
60646046	ITS POLE (55 FT)(90 MPH)	EA		$15,000.00	$0.00
60646055	ITS POLE (60 FT)(90 MPH)	EA	1	$18,000.00	$18,000.00
60646088	ITS POLE MNT CAB (TY 3)(CONF 1)	EA	1	$5,600.00	$5,600.00
62556004	HARDENED ETHERNET SWITCH	EA	1	$4,000.00	$4,000.00
63206002	INSTALL OF CELLULAR MODEM	EA		$4,500.00	$0.00
63226001	Color DMS (Pole MNT Cabinet)	EA		$164,000.00	$0.00
63226002	Color DMS (Foundation MNT Cabinet)	EA		$169,000.00	$0.00
63396001	Bluetooth Detection system	EA		$2,000.00	$0.00
	ATC Traffic Signal Controller	EA		$2,500.00	$0.00
	DSRC Radio	EA		$10,000.00	$0.00
	CONTINGENCY (10%)	LS	1		$9,203.80

Assumptions: worst case scenario on Pole and foundation depth

CCTV location wireless **Total** **$96,765.60**

ITEM CODE	DESCRIPTION	UNIT	QTY	UNIT COST	TOTAL
04166004	DRILL SHAFT (36 IN)	LF		$350.00	$0.00
04166005	DRILL SHAFT (42 IN)	LF		$480.00	$0.00
04166006	DRILL SHAFT (48 IN)	LF	21	$540.00	$11,340.00
04166007	DRILL SHAFT (54 IN)	LF		$600.00	$0.00
05006001	MOBILIZATION (5%)	LS	1		$4,031.90
05026001	BARRICADES, SIGNS AND TRAFFIC HANDLING (5%)	MO	1		$4,031.90
06186029	CONDT (PVC) (SCH 40) (3")	LF	500	$20.00	$10,000.00
06206002	ELEC CONDR (NO.14) INSULATED	LF		$1.55	$0.00
06206015	ELEC CONDR (NO.2) BARE	LF	600	$3.33	$1,998.00
06206016	ELEC CONDR (NO.2) INSULATED	LF	1200	$4.00	$4,800.00
06246002	GROUND BOX TY A (122311)W/APRON	EA	3	$1,300.00	$3,900.00
06246022	GROUND BOX TY 2 (366048)W/APRON	EA		$6,900.00	$0.00
06286225	ELC SRV TY D 120/240 100(NS)GS(N)GC(O)	EA	1	$6,000.00	$6,000.00
06506007	INS OH SN SUP(15 FT BAL TEE)	EA		$15,000.00	$0.00
06506018	INS OH SN SUP(20 FT CANT)	EA		$17,000.00	$0.00
06506025	INS OH SN SUP(25 FT CANT)	EA		$19,000.00	$0.00
06506032	INS OH SN SUP(30 FT CANT)	EA		$22,000.00	$0.00
06506038	INS OH SN SUP(35 FT CANT)	EA		$23,000.00	$0.00
06506045	INS OH SN SUP(40 FT CANT)	EA		$26,000.00	$0.00
06506079	INS OH SN SUP(70 FT BRDG)	EA		$30,000.00	$0.00
06506089	INS OH SN SUP(80 FT BRDG)	EA		$33,000.00	$0.00
06506099	INS OH SN SUP(90 FT BRDG)	EA		$40,000.00	$0.00
06506109	INS OH SN SUP(100 FT BRDG)	EA		$44,000.00	$0.00
06506119	INS OH SN SUP(110 FT BRDG)	EA		$50,000.00	$0.00
60076011	FIBER OPTIC CBL (SNGLE-MODE)(12 FIBER)	LF		$8.00	$0.00
60076023	FIBER OPTIC PATCH PANEL (12 POSITION)	EA		$1,000.00	$0.00
60076087	FO SPLICE ENCLOSURE (TYPE 1)	EA		$4,500.00	$0.00
60086043	ITS GRND MNT CAB (TY 6) (CONF 2)	EA		$13,000.00	$0.00
60106002	CCTV FIELD EQUIPMENT (DIGITAL)	EA	1	$10,000.00	$10,000.00
60256001	RADAR PRESENCE DETECTOR	EA		$10,000.00	$0.00
60326001	SYSTEM INTEGRATION	LS			$0.00
60626024	ITS RADIO (SNGL)(5 GHZ)-C-P	EA	1	$5,000.00	$5,000.00
60646037	ITS POLE (50 FT)(90 MPH)	EA		$10,000.00	$0.00
60646046	ITS POLE (55 FT)(90 MPH)	EA		$15,000.00	$0.00
60646055	ITS POLE (60 FT)(90 MPH)	EA	1	$18,000.00	$18,000.00
60646088	ITS POLE MNT CAB (TY 3)(CONF 1)	EA	1	$5,600.00	$5,600.00
62556004	HARDENED ETHERNET SWITCH	EA	1	$4,000.00	$4,000.00
63206002	INSTALL OF CELLULAR MODEM	EA		$4,500.00	$0.00
63226001	Color DMS (Pole MNT Cabinet)	EA		$164,000.00	$0.00
63226002	Color DMS (Foundation MNT Cabinet)	EA		$169,000.00	$0.00
63396001	Bluetooth Detection system	EA		$2,000.00	$0.00
	ATC Traffic Signal Controller	EA		$2,500.00	$0.00
	DSRC Radio	EA		$10,000.00	$0.00
	CONTINGENCY (10%)	LS	1		$8,063.80

Assumptions: Worst Case scenario on pole height and foundation depth

Queue Detection Wireless **Total** **$75,597.60**

ITEM CODE	DESCRIPTION	UNIT	QTY	UNIT COST	TOTAL
04166004	DRILL SHAFT (36 IN)	LF	12	$350.00	$4,200.00
04166005	DRILL SHAFT (42 IN)	LF		$480.00	$0.00
04166006	DRILL SHAFT (48 IN)	LF		$540.00	$0.00
04166007	DRILL SHAFT (54 IN)	LF		$600.00	$0.00
05006001	MOBILIZATION (5%)	LS	1		$3,149.90
05026001	BARRICADES, SIGNS AND TRAFFIC HANDLING (5%)	MO	1		$3,149.90
06186029	CONDT (PVC) (SCH 40) (3")	LF	500	$20.00	$10,000.00
06206002	ELEC CONDR (NO.14) INSULATED	LF		$1.55	$0.00
06206015	ELEC CONDR (NO.2) BARE	LF	600	$3.33	$1,998.00
06206016	ELEC CONDR (NO.2) INSULATED	LF	1200	$4.00	$4,800.00
06246002	GROUND BOX TY A (122311)W/APRON	EA	3	$1,300.00	$3,900.00
06246022	GROUND BOX TY 2 (366048)W/APRON	EA		$6,900.00	$0.00
06286225	ELC SRV TY D 120/240 100(NS)GS(N)GC(O)	EA	1	$6,000.00	$6,000.00
06506007	INS OH SN SUP(15 FT BAL TEE)	EA		$15,000.00	$0.00
06506018	INS OH SN SUP(20 FT CANT)	EA		$17,000.00	$0.00
06506025	INS OH SN SUP(25 FT CANT)	EA		$19,000.00	$0.00
06506032	INS OH SN SUP(30 FT CANT)	EA		$22,000.00	$0.00
06506038	INS OH SN SUP(35 FT CANT)	EA		$23,000.00	$0.00
06506045	INS OH SN SUP(40 FT CANT)	EA		$26,000.00	$0.00
06506079	INS OH SN SUP(70 FT BRDG)	EA		$30,000.00	$0.00
06506089	INS OH SN SUP(80 FT BRDG)	EA		$33,000.00	$0.00
06506099	INS OH SN SUP(90 FT BRDG)	EA		$40,000.00	$0.00
06506109	INS OH SN SUP(100 FT BRDG)	EA		$44,000.00	$0.00
06506119	INS OH SN SUP(110 FT BRDG)	EA		$50,000.00	$0.00
60076011	FIBER OPTIC CBL (SNGLE-MODE)(12 FIBER)	LF		$8.00	$0.00
60076023	FIBER OPTIC PATCH PANEL (12 POSITION)	EA		$1,000.00	$0.00
60076087	FO SPLICE ENCLOSURE (TYPE 1)	EA		$4,500.00	$0.00
60086043	ITS GRND MNT CAB (TY 6) (CONF 2)	EA		$13,000.00	$0.00
60106002	CCTV FIELD EQUIPMENT (DIGITAL)	EA		$10,000.00	$0.00
60256001	RADAR PRESENCE DETECTOR	EA		$10,000.00	$0.00
60296001	RADAR VEHICLE SENSING DEVICE	EA	1	$10,000.00	$10,000.00
60626024	ITS RADIO (SNGL)(5 GHZ)-C-P	EA	1	$5,000.00	$5,000.00
60646001	ITS POLE (20 FT)(90 MPH)	EA	1	$7,500.00	$7,500.00
60646037	ITS POLE (50 FT)(90 MPH)	EA		$10,000.00	$0.00
60646046	ITS POLE (55 FT)(90 MPH)	EA		$15,000.00	$0.00
60646055	ITS POLE (60 FT)(90 MPH)	EA		$18,000.00	$0.00
60646088	ITS POLE MNT CAB (TY 3)(CONF 1)	EA	1	$5,600.00	$5,600.00
62556004	HARDENED ETHERNET SWITCH	EA	1	$4,000.00	$4,000.00
63206002	INSTALL OF CELLULAR MODEM	EA		$4,500.00	$0.00
63226001	Color DMS (Pole MNT Cabinet)	EA		$164,000.00	$0.00
63226002	Color DMS (Foundation MNT Cabinet)	EA		$169,000.00	$0.00
63396001	Bluetooth Detection system	EA		$2,000.00	$0.00
	ATC Traffic Signal Controller	EA		$2,500.00	$0.00
	DSRC Radio	EA		$10,000.00	$0.00
	CONTINGENCY (10%)	LS	1		$6,299.80

Assumptions: worst case scenario on pole height and foundation depth

Wrong-Way Detection **Total** **$94,917.60**

ITEM CODE	DESCRIPTION	UNIT	QTY	UNIT COST	TOTAL
04166004	DRILL SHAFT (36 IN)	LF		$350.00	$0.00
04166005	DRILL SHAFT (42 IN)	LF		$480.00	$0.00
04166006	DRILL SHAFT (48 IN)	LF		$540.00	$0.00
04166007	DRILL SHAFT (54 IN)	LF		$600.00	$0.00
05006001	MOBILIZATION (5%)	LS	1		$3,954.90
05026001	BARRICADES, SIGNS AND TRAFFIC HANDLING (5%)	MO	1		$3,954.90
06186029	CONDT (PVC) (SCH 40) (3")	LF	500	$20.00	$10,000.00
06206002	ELEC CONDR (NO.14) INSULATED	LF		$1.55	$0.00
06206015	ELEC CONDR (NO.2) BARE	LF	600	$3.33	$1,998.00
06206016	ELEC CONDR (NO.2) INSULATED	LF	1200	$4.00	$4,800.00
06246002	GROUND BOX TY A (122311)W/APRON	EA	3	$1,300.00	$3,900.00
06246022	GROUND BOX TY 2 (366048)W/APRON	EA		$6,900.00	$0.00
06286225	ELC SRV TY D 120/240 100(NS)GS(N)GC(O)	EA	1	$6,000.00	$6,000.00
06506007	INS OH SN SUP(15 FT BAL TEE)	EA		$15,000.00	$0.00
06506018	INS OH SN SUP(20 FT CANT)	EA		$17,000.00	$0.00
06506025	INS OH SN SUP(25 FT CANT)	EA		$19,000.00	$0.00
06506032	INS OH SN SUP(30 FT CANT)	EA		$22,000.00	$0.00
06506038	INS OH SN SUP(35 FT CANT)	EA		$23,000.00	$0.00
06506045	INS OH SN SUP(40 FT CANT)	EA		$26,000.00	$0.00
06506079	INS OH SN SUP(70 FT BRDG)	EA		$30,000.00	$0.00
06506089	INS OH SN SUP(80 FT BRDG)	EA		$33,000.00	$0.00
06506099	INS OH SN SUP(90 FT BRDG)	EA		$40,000.00	$0.00
06506109	INS OH SN SUP(100 FT BRDG)	EA		$44,000.00	$0.00
06506119	INS OH SN SUP(110 FT BRDG)	EA		$50,000.00	$0.00
60076011	FIBER OPTIC CBL (SNGLE-MODE)(12 FIBER)	LF	500	$8.00	$4,000.00
60076023	FIBER OPTIC PATCH PANEL (12 POSITION)	EA	1	$1,000.00	$1,000.00
60076087	FO SPLICE ENCLOSURE (TYPE 1)	EA	1	$4,500.00	$4,500.00
60086027	ITS GRND MNT CAB (TY 4) (CONF 2)	EA	1	$8,900.00	$8,900.00
60086043	ITS GRND MNT CAB (TY 6) (CONF 2)	EA		$13,000.00	$0.00
60106002	CCTV FIELD EQUIPMENT (DIGITAL)	EA		$10,000.00	$0.00
60256001	RADAR PRESENCE DETECTOR	EA		$10,000.00	$0.00
60326001	SYSTEM INTEGRATION	LS			$0.00
60626024	ITS RADIO (SNGL)(5 GHZ)-C-P	EA		$5,000.00	$0.00
60646037	ITS POLE (50 FT)(90 MPH)	EA		$10,000.00	$0.00
60646046	ITS POLE (55 FT)(90 MPH)	EA		$15,000.00	$0.00
60646055	ITS POLE (60 FT)(90 MPH)	EA		$18,000.00	$0.00
62556004	HARDENED ETHERNET SWITCH	EA	1	$4,000.00	$4,000.00
63206002	INSTALL OF CELLULAR MODEM	EA		$4,500.00	$0.00
63226001	Color DMS (Pole MNT Cabinet)	EA		$164,000.00	$0.00
63226002	Color DMS (Foundation MNT Cabinet)	EA		$169,000.00	$0.00
63396001	Bluetooth Detection system	EA		$2,000.00	$0.00
	ITS Wrong Way Detection Hardware	EA	1	$30,000.00	$30,000.00
	ATC Traffic Signal Controller	EA		$2,500.00	$0.00
	DSRC Radio	EA		$10,000.00	$0.00
	CONTINGENCY (10%)	LS	1		$7,909.80

Assumptions: standalone system package, plus conduit, wiring

	DMS wireless			Total	$325,485.60
ITEM CODE	DESCRIPTION	UNIT	QTY	UNIT COST	TOTAL
04166004	DRILL SHAFT (36 IN)	LF		$350.00	$0.00
04166005	DRILL SHAFT (42 IN)	LF		$480.00	$0.00
04166006	DRILL SHAFT (48 IN)	LF	51	$540.00	$27,540.00
04166007	DRILL SHAFT (54 IN)	LF		$600.00	$0.00
05006001	MOBILIZATION (5%)	LS	1		$13,561.90
05026001	BARRICADES, SIGNS AND TRAFFIC HANDLING (5%)	MO	1		$13,561.90
06186029	CONDT (PVC) (SCH 40) (3")	LF	500	$20.00	$10,000.00
06206002	ELEC CONDR (NO.14) INSULATED	LF		$1.55	$0.00
06206015	ELEC CONDR (NO.2) BARE	LF	600	$3.33	$1,998.00
06206016	ELEC CONDR (NO.2) INSULATED	LF	1200	$4.00	$4,800.00
06246002	GROUND BOX TY A (122311)W/APRON	EA	3	$1,300.00	$3,900.00
06246022	GROUND BOX TY 2 (366048)W/APRON	EA		$6,900.00	$0.00
06286225	ELC SRV TY D 120/240 100(NS)GS(N)GC(O)	EA	1	$6,000.00	$6,000.00
06506007	INS OH SN SUP(15 FT BAL TEE)	EA		$15,000.00	$0.00
06506018	INS OH SN SUP(20 FT CANT)	EA		$17,000.00	$0.00
06506025	INS OH SN SUP(25 FT CANT)	EA		$19,000.00	$0.00
06506032	INS OH SN SUP(30 FT CANT)	EA		$22,000.00	$0.00
06506038	INS OH SN SUP(35 FT CANT)	EA		$23,000.00	$0.00
06506045	INS OH SN SUP(40 FT CANT)	EA	1	$26,000.00	$26,000.00
06506079	INS OH SN SUP(70 FT BRDG)	EA		$30,000.00	$0.00
06506089	INS OH SN SUP(80 FT BRDG)	EA		$33,000.00	$0.00
06506099	INS OH SN SUP(90 FT BRDG)	EA		$40,000.00	$0.00
06506109	INS OH SN SUP(100 FT BRDG)	EA		$44,000.00	$0.00
06506119	INS OH SN SUP(110 FT BRDG)	EA		$50,000.00	$0.00
60076011	FIBER OPTIC CBL (SNGLE-MODE)(12 FIBER)	LF		$8.00	$0.00
60076023	FIBER OPTIC PATCH PANEL (12 POSITION)	EA		$1,000.00	$0.00
60076087	FO SPLICE ENCLOSURE (TYPE 1)	EA		$4,500.00	$0.00
60086043	ITS GRND MNT CAB (TY 6) (CONF 2)	EA	1	$13,000.00	$13,000.00
60106002	CCTV FIELD EQUIPMENT (DIGITAL)	EA		$10,000.00	$0.00
60256001	RADAR PRESENCE DETECTOR	EA		$10,000.00	$0.00
60326001	SYSTEM INTEGRATION	LS			$0.00
60626024	ITS RADIO (SNGL)(5 GHZ)-C-P	EA	1	$5,000.00	$5,000.00
60646037	ITS POLE (50 FT)(90 MPH)	EA		$10,000.00	$0.00
60646046	ITS POLE (55 FT)(90 MPH)	EA		$15,000.00	$0.00
60646055	ITS POLE (60 FT)(90 MPH)	EA		$18,000.00	$0.00
62556004	HARDENED ETHERNET SWITCH	EA	1	$4,000.00	$4,000.00
63206002	INSTALL OF CELLULAR MODEM	EA		$4,500.00	$0.00
63226001	Color DMS (Pole MNT Cabinet)	EA		$164,000.00	$0.00
63226002	Color DMS (Foundation MNT Cabinet)	EA	1	$169,000.00	$169,000.00
63396001	Bluetooth Detection system	EA		$2,000.00	$0.00
	ATC Traffic Signal Controller	EA		$2,500.00	$0.00
	DSRC Radio	EA		$10,000.00	$0.00
	CONTINGENCY (10%)	LS	1		$27,123.80

Assumptions: 40 cantilevered monotube sign supports; worst case drill shaft; DMS provided by TxDOT

	DMS fiber			Total	$330,885.60
ITEM CODE	DESCRIPTION	UNIT	QTY	UNIT COST	TOTAL
04166004	DRILL SHAFT (36 IN)	LF		$350.00	$0.00
04166005	DRILL SHAFT (42 IN)	LF		$480.00	$0.00
04166006	DRILL SHAFT (48 IN)	LF	51	$540.00	$27,540.00
04166007	DRILL SHAFT (54 IN)	LF		$600.00	$0.00
05006001	MOBILIZATION (5%)	LS	1		$13,786.90
05026001	BARRICADES, SIGNS AND TRAFFIC HANDLING (5%)	MO	1		$13,786.90
06186029	CONDT (PVC) (SCH 40) (3")	LF	500	$20.00	$10,000.00
06206002	ELEC CONDR (NO.14) INSULATED	LF		$1.55	$0.00
06206015	ELEC CONDR (NO.2) BARE	LF	600	$3.33	$1,998.00
06206016	ELEC CONDR (NO.2) INSULATED	LF	1200	$4.00	$4,800.00
06246002	GROUND BOX TY A (122311)W/APRON	EA	3	$1,300.00	$3,900.00
06246022	GROUND BOX TY 2 (366048)W/APRON	EA		$6,900.00	$0.00
06286225	ELC SRV TY D 120/240 100(NS)GS(N)GC(O)	EA	1	$6,000.00	$6,000.00
06506007	INS OH SN SUP(15 FT BAL TEE)	EA		$15,000.00	$0.00
06506018	INS OH SN SUP(20 FT CANT)	EA		$17,000.00	$0.00
06506025	INS OH SN SUP(25 FT CANT)	EA		$19,000.00	$0.00
06506032	INS OH SN SUP(30 FT CANT)	EA		$22,000.00	$0.00
06506038	INS OH SN SUP(35 FT CANT)	EA		$23,000.00	$0.00
06506045	INS OH SN SUP(40 FT CANT)	EA	1	$26,000.00	$26,000.00
06506079	INS OH SN SUP(70 FT BRDG)	EA		$30,000.00	$0.00
06506089	INS OH SN SUP(80 FT BRDG)	EA		$33,000.00	$0.00
06506099	INS OH SN SUP(90 FT BRDG)	EA		$40,000.00	$0.00
06506109	INS OH SN SUP(100 FT BRDG)	EA		$44,000.00	$0.00
06506119	INS OH SN SUP(110 FT BRDG)	EA		$50,000.00	$0.00
60076011	FIBER OPTIC CBL (SNGLE-MODE)(12 FIBER)	LF	500	$8.00	$4,000.00
60076023	FIBER OPTIC PATCH PANEL (12 POSITION)	EA	1	$1,000.00	$1,000.00
60076087	FO SPLICE ENCLOSURE (TYPE 1)	EA	1	$4,500.00	$4,500.00
60086043	ITS GRND MNT CAB (TY 6) (CONF 2)	EA	1	$13,000.00	$13,000.00
60106002	CCTV FIELD EQUIPMENT (DIGITAL)	EA		$10,000.00	$0.00
60256001	RADAR PRESENCE DETECTOR	EA		$10,000.00	$0.00
60326001	SYSTEM INTEGRATION	LS			$0.00
60626024	ITS RADIO (SNGL)(5 GHZ)-C-P	EA		$5,000.00	$0.00
60646037	ITS POLE (50 FT)(90 MPH)	EA		$10,000.00	$0.00
60646046	ITS POLE (55 FT)(90 MPH)	EA		$15,000.00	$0.00
60646055	ITS POLE (60 FT)(90 MPH)	EA		$18,000.00	$0.00
62556004	HARDENED ETHERNET SWITCH	EA	1	$4,000.00	$4,000.00
63206002	INSTALL OF CELLULAR MODEM	EA		$4,500.00	$0.00
63226001	Color DMS (Pole MNT Cabinet)	EA		$164,000.00	$0.00
63226002	Color DMS (Foundation MNT Cabinet)	EA	1	$169,000.00	$169,000.00
63396001	Bluetooth Detection system	EA		$2,000.00	$0.00
	ATC Traffic Signal Controller	EA		$2,500.00	$0.00
	DSRC Radio	EA		$10,000.00	$0.00
	CONTINGENCY (10%)	LS	1		$27,573.80

Assumptions: 40 cantilevered monotube sign supports; worst case drill shaft; DMS provided by TxDOT

DMS Lane Control fiber **Total** **$679,437.60**

ITEM CODE	DESCRIPTION	UNIT	QTY	UNIT COST	TOTAL
04166004	DRILL SHAFT (36 IN)	LF		$350.00	$0.00
04166005	DRILL SHAFT (42 IN)	LF		$480.00	$0.00
04166006	DRILL SHAFT (48 IN)	LF	100	$540.00	$54,000.00
04166007	DRILL SHAFT (54 IN)	LF		$600.00	$0.00
05006001	MOBILIZATION (5%)	LS	1		$28,309.90
05026001	BARRICADES, SIGNS AND TRAFFIC HANDLING (5%)	MO	1		$28,309.90
06186029	CONDT (PVC) (SCH 40) (3")	LF	500	$20.00	$10,000.00
06206002	ELEC CONDR (NO.14) INSULATED	LF		$1.55	$0.00
06206015	ELEC CONDR (NO.2) BARE	LF	600	$3.33	$1,998.00
06206016	ELEC CONDR (NO.2) INSULATED	LF	1200	$4.00	$4,800.00
06246002	GROUND BOX TY A (122311)W/APRON	EA	3	$1,300.00	$3,900.00
06246022	GROUND BOX TY 2 (366048)W/APRON	EA		$6,900.00	$0.00
06286225	ELC SRV TY D 120/240 100(NS)GS(N)GC(O)	EA	1	$6,000.00	$6,000.00
06506007	INS OH SN SUP(15 FT BAL TEE)	EA		$15,000.00	$0.00
06506018	INS OH SN SUP(20 FT CANT)	EA		$17,000.00	$0.00
06506025	INS OH SN SUP(25 FT CANT)	EA		$19,000.00	$0.00
06506032	INS OH SN SUP(30 FT CANT)	EA		$22,000.00	$0.00
06506038	INS OH SN SUP(35 FT CANT)	EA		$23,000.00	$0.00
06506045	INS OH SN SUP(40 FT CANT)	EA		$26,000.00	$0.00
06506079	INS OH SN SUP(70 FT BRDG)	EA		$30,000.00	$0.00
06506089	INS OH SN SUP(80 FT BRDG)	EA		$33,000.00	$0.00
06506099	INS OH SN SUP(90 FT BRDG)	EA		$40,000.00	$0.00
06506109	INS OH SN SUP(100 FT BRDG)	EA		$44,000.00	$0.00
06506119	INS OH SN SUP(110 FT BRDG)	EA	1	$50,000.00	$50,000.00
60076011	FIBER OPTIC CBL (SNGLE-MODE)(12 FIBER)	LF	500	$8.00	$4,000.00
60076023	FIBER OPTIC PATCH PANEL (12 POSITION)	EA	1	$1,000.00	$1,000.00
60076087	FO SPLICE ENCLOSURE (TYPE 1)	EA	1	$4,500.00	$4,500.00
60086043	ITS GRND MNT CAB (TY 6) (CONF 2)	EA	1	$13,000.00	$13,000.00
60106002	CCTV FIELD EQUIPMENT (DIGITAL)	EA		$10,000.00	$0.00
60256001	RADAR PRESENCE DETECTOR	EA		$10,000.00	$0.00
60326001	SYSTEM INTEGRATION	LS			$0.00
60626024	ITS RADIO (SNGL)(5 GHZ)-C-P	EA		$5,000.00	$0.00
60646037	ITS POLE (50 FT)(90 MPH)	EA		$10,000.00	$0.00
60646046	ITS POLE (55 FT)(90 MPH)	EA		$15,000.00	$0.00
60646055	ITS POLE (60 FT)(90 MPH)	EA		$18,000.00	$0.00
62556004	HARDENED ETHERNET SWITCH	EA	1	$4,000.00	$4,000.00
63206002	INSTALL OF CELLULAR MODEM	EA		$4,500.00	$0.00
63226001	Color DMS (Pole MNT Cabinet)	EA		$164,000.00	$0.00
63226002	Color DMS (Foundation MNT Cabinet)	EA	1	$169,000.00	$169,000.00
	Color DMS Lane Control Signage	EA	4	$60,000.00	$240,000.00
63396001	Bluetooth Detection system	EA		$2,000.00	$0.00
	ATC Traffic Signal Controller	EA		$2,500.00	$0.00
	DSRC Radio	EA		$10,000.00	$0.00
	CONTINGENCY (10%)	LS	1		$56,619.80

Assumptions: 110 foot sign bridge; worst case drill shaft x 2; 4 signs per bridge

DSRC & SPaT for Traffic Signals **Total** **$13,200.00**

ITEM CODE	DESCRIPTION	UNIT	QTY	UNIT COST	TOTAL
04166004	DRILL SHAFT (36 IN)	LF		$350.00	$0.00
04166005	DRILL SHAFT (42 IN)	LF		$480.00	$0.00
04166006	DRILL SHAFT (48 IN)	LF		$540.00	$0.00
04166007	DRILL SHAFT (54 IN)	LF		$600.00	$0.00
05006001	MOBILIZATION (5%)	LS	1		$550.00
05026001	BARRICADES, SIGNS AND TRAFFIC HANDLING (5%)	MO	1		$550.00
06186029	CONDT (PVC) (SCH 40) (3")	LF		$20.00	$0.00
06206002	ELEC CONDR (NO.14) INSULATED	LF		$1.55	$0.00
06206016	ELEC CONDR (NO.2) INSULATED	LF		$4.00	$0.00
06246002	GROUND BOX TY A (122311)W/APRON	EA		$1,300.00	$0.00
06246022	GROUND BOX TY 2 (366048)W/APRON	EA		$6,900.00	$0.00
06286225	ELC SRV TY D 120/240 100(NS)GS(N)GC(O)	EA		$6,000.00	$0.00
06506007	INS OH SN SUP(15 FT BAL TEE)	EA		$15,000.00	$0.00
06506018	INS OH SN SUP(20 FT CANT)	EA		$17,000.00	$0.00
06506025	INS OH SN SUP(25 FT CANT)	EA		$19,000.00	$0.00
06506032	INS OH SN SUP(30 FT CANT)	EA		$22,000.00	$0.00
06506038	INS OH SN SUP(35 FT CANT)	EA		$23,000.00	$0.00
06506045	INS OH SN SUP(40 FT CANT)	EA		$26,000.00	$0.00
06506079	INS OH SN SUP(70 FT BRDG)	EA		$30,000.00	$0.00
06506089	INS OH SN SUP(80 FT BRDG)	EA		$33,000.00	$0.00
06506099	INS OH SN SUP(90 FT BRDG)	EA		$40,000.00	$0.00
06506109	INS OH SN SUP(100 FT BRDG)	EA		$44,000.00	$0.00
06506119	INS OH SN SUP(110 FT BRDG)	EA		$50,000.00	$0.00
60076011	FIBER OPTIC CBL (SNGLE-MODE)(12 FIBER)	LF		$8.00	$0.00
60076023	FIBER OPTIC PATCH PANEL (12 POSITION)	EA		$1,000.00	$0.00
60076087	FO SPLICE ENCLOSURE (TYPE 1)	EA		$4,500.00	$0.00
60086043	ITS GRND MNT CAB (TY 6) (CONF 2)	EA		$13,000.00	$0.00
60106002	CCTV FIELD EQUIPMENT (DIGITAL)	EA		$10,000.00	$0.00
60256001	RADAR PRESENCE DETECTOR	EA		$10,000.00	$0.00
60326001	SYSTEM INTEGRATION	LS			$0.00
60626024	ITS RADIO (SNGL)(5 GHZ)-C-P	EA		$5,000.00	$0.00
60646037	ITS POLE (50 FT)(90 MPH)	EA		$10,000.00	$0.00
60646046	ITS POLE (55 FT)(90 MPH)	EA		$15,000.00	$0.00
60646055	ITS POLE (60 FT)(90 MPH)	EA		$18,000.00	$0.00
62556004	HARDENED ETHERNET SWITCH	EA		$4,000.00	$0.00
63206002	INSTALL OF CELLULAR MODEM	EA		$4,500.00	$0.00
63226001	Color DMS (Pole MNT Cabinet)	EA		$164,000.00	$0.00
63226002	Color DMS (Foundation MNT Cabinet)	EA		$169,000.00	$0.00
63396001	Bluetooth Detection system	EA		$2,000.00	$0.00
	ATC Traffic Signal Controller	EA		$2,500.00	$0.00
	SPaT device	EA	1	$1,000.00	$1,000.00
	DSRC Radio	EA	1	$10,000.00	$10,000.00
	CONTINGENCY (10%)	LS	1		$1,100.00

Assumptions: Traffic signal already has communications; Ethernet switch cost is with ATC; cost estimate for DSRC based upon 2019 project SwRI is performing for Georgia DOT; DSRC radio is installed in signal pole

	DSRC			Total	$12,000.00
ITEM CODE	DESCRIPTION	UNIT	QTY	UNIT COST	TOTAL
04166004	DRILL SHAFT (36 IN)	LF		$350.00	$0.00
04166005	DRILL SHAFT (42 IN)	LF		$480.00	$0.00
04166006	DRILL SHAFT (48 IN)	LF		$540.00	$0.00
04166007	DRILL SHAFT (54 IN)	LF		$600.00	$0.00
05006001	MOBILIZATION (5%)	LS	1		$500.00
05026001	BARRICADES, SIGNS AND TRAFFIC HANDLING (5%)	MO	1		$500.00
06186029	CONDT (PVC) (SCH 40) (3")	LF		$20.00	$0.00
06206002	ELEC CONDR (NO.14) INSULATED	LF		$1.55	$0.00
06206016	ELEC CONDR (NO.2) INSULATED	LF		$4.00	$0.00
06246002	GROUND BOX TY A (122311)W/APRON	EA		$1,300.00	$0.00
06246022	GROUND BOX TY 2 (366048)W/APRON	EA		$6,900.00	$0.00
06286225	ELC SRV TY D 120/240 100(NS)GS(N)GC(O)	EA		$6,000.00	$0.00
06506007	INS OH SN SUP(15 FT BAL TEE)	EA		$15,000.00	$0.00
06506018	INS OH SN SUP(20 FT CANT)	EA		$17,000.00	$0.00
06506025	INS OH SN SUP(25 FT CANT)	EA		$19,000.00	$0.00
06506032	INS OH SN SUP(30 FT CANT)	EA		$22,000.00	$0.00
06506038	INS OH SN SUP(35 FT CANT)	EA		$23,000.00	$0.00
06506045	INS OH SN SUP(40 FT CANT)	EA		$26,000.00	$0.00
06506079	INS OH SN SUP(70 FT BRDG)	EA		$30,000.00	$0.00
06506089	INS OH SN SUP(80 FT BRDG)	EA		$33,000.00	$0.00
06506099	INS OH SN SUP(90 FT BRDG)	EA		$40,000.00	$0.00
06506109	INS OH SN SUP(100 FT BRDG)	EA		$44,000.00	$0.00
06506119	INS OH SN SUP(110 FT BRDG)	EA		$50,000.00	$0.00
60076011	FIBER OPTIC CBL (SNGLE-MODE)(12 FIBER)	LF		$8.00	$0.00
60076023	FIBER OPTIC PATCH PANEL (12 POSITION)	EA		$1,000.00	$0.00
60076087	FO SPLICE ENCLOSURE (TYPE 1)	EA		$4,500.00	$0.00
60086043	ITS GRND MNT CAB (TY 6) (CONF 2)	EA		$13,000.00	$0.00
60106002	CCTV FIELD EQUIPMENT (DIGITAL)	EA		$10,000.00	$0.00
60256001	RADAR PRESENCE DETECTOR	EA		$10,000.00	$0.00
60326001	SYSTEM INTEGRATION	LS			$0.00
60626024	ITS RADIO (SNGL)(5 GHZ)-C-P	EA		$5,000.00	$0.00
60646037	ITS POLE (50 FT)(90 MPH)	EA		$10,000.00	$0.00
60646046	ITS POLE (55 FT)(90 MPH)	EA		$15,000.00	$0.00
60646055	ITS POLE (60 FT)(90 MPH)	EA		$18,000.00	$0.00
62556004	HARDENED ETHERNET SWITCH	EA		$4,000.00	$0.00
63206002	INSTALL OF CELLULAR MODEM	EA		$4,500.00	$0.00
63226001	Color DMS (Pole MNT Cabinet)	EA		$164,000.00	$0.00
63226002	Color DMS (Foundation MNT Cabinet)	EA		$169,000.00	$0.00
63396001	Bluetooth Detection system	EA		$2,000.00	$0.00
	ATC Traffic Signal Controller	EA		$2,500.00	$0.00
	SPaT device	EA		$1,000.00	$0.00
	DSRC Radio	EA	1	$10,000.00	$10,000.00
	CONTINGENCY (10%)	LS	1		$1,000.00

Assumptions: Traffic Signal already has communications; ethernet switch cost is with ATC; Cost estimate for DSRC based upon 2019 project SwRI is performing for Georgia DOT; DSRC radio is installed in signal pole

SPaT for Traffic Signals **Total** **$1,200.00**

ITEM CODE	DESCRIPTION	UNIT	QTY	UNIT COST	TOTAL
04166004	DRILL SHAFT (36 IN)	LF		$350.00	$0.00
04166005	DRILL SHAFT (42 IN)	LF		$480.00	$0.00
04166006	DRILL SHAFT (48 IN)	LF		$540.00	$0.00
04166007	DRILL SHAFT (54 IN)	LF		$600.00	$0.00
05006001	MOBILIZATION (5%)	LS	1		$50.00
05026001	BARRICADES, SIGNS AND TRAFFIC HANDLING (5%)	MO	1		$50.00
06186029	CONDT (PVC) (SCH 40) (3")	LF		$20.00	$0.00
06206002	ELEC CONDR (NO.14) INSULATED	LF		$1.55	$0.00
06206016	ELEC CONDR (NO.2) INSULATED	LF		$4.00	$0.00
06246002	GROUND BOX TY A (122311)W/APRON	EA		$1,300.00	$0.00
06246022	GROUND BOX TY 2 (366048)W/APRON	EA		$6,900.00	$0.00
06286225	ELC SRV TY D 120/240 100(NS)GS(N)GC(O)	EA		$6,000.00	$0.00
06506007	INS OH SN SUP(15 FT BAL TEE)	EA		$15,000.00	$0.00
06506018	INS OH SN SUP(20 FT CANT)	EA		$17,000.00	$0.00
06506025	INS OH SN SUP(25 FT CANT)	EA		$19,000.00	$0.00
06506032	INS OH SN SUP(30 FT CANT)	EA		$22,000.00	$0.00
06506038	INS OH SN SUP(35 FT CANT)	EA		$23,000.00	$0.00
06506045	INS OH SN SUP(40 FT CANT)	EA		$26,000.00	$0.00
06506079	INS OH SN SUP(70 FT BRDG)	EA		$30,000.00	$0.00
06506089	INS OH SN SUP(80 FT BRDG)	EA		$33,000.00	$0.00
06506099	INS OH SN SUP(90 FT BRDG)	EA		$40,000.00	$0.00
06506109	INS OH SN SUP(100 FT BRDG)	EA		$44,000.00	$0.00
06506119	INS OH SN SUP(110 FT BRDG)	EA		$50,000.00	$0.00
60076011	FIBER OPTIC CBL (SNGLE-MODE)(12 FIBER)	LF		$8.00	$0.00
60076023	FIBER OPTIC PATCH PANEL (12 POSITION)	EA		$1,000.00	$0.00
60076087	FO SPLICE ENCLOSURE (TYPE 1)	EA		$4,500.00	$0.00
60086043	ITS GRND MNT CAB (TY 6) (CONF 2)	EA		$13,000.00	$0.00
60106002	CCTV FIELD EQUIPMENT (DIGITAL)	EA		$10,000.00	$0.00
60256001	RADAR PRESENCE DETECTOR	EA		$10,000.00	$0.00
60326001	SYSTEM INTEGRATION	LS			$0.00
60626024	ITS RADIO (SNGL)(5 GHZ)-C-P	EA		$5,000.00	$0.00
60646037	ITS POLE (50 FT)(90 MPH)	EA		$10,000.00	$0.00
60646046	ITS POLE (55 FT)(90 MPH)	EA		$15,000.00	$0.00
60646055	ITS POLE (60 FT)(90 MPH)	EA		$18,000.00	$0.00
62556004	HARDENED ETHERNET SWITCH	EA		$4,000.00	$0.00
63206002	INSTALL OF CELLULAR MODEM	EA		$4,500.00	$0.00
63226001	Color DMS (Pole MNT Cabinet)	EA		$164,000.00	$0.00
63226002	Color DMS (Foundation MNT Cabinet)	EA		$169,000.00	$0.00
63396001	Bluetooth Detection system	EA		$2,000.00	$0.00
	ATC Traffic Signal Controller	EA		$2,500.00	$0.00
	SPaT Device	EA	1	$1,000.00	$1,000.00
	Roadside Unit (DSRC Radio)	EA		$10,000.00	$0.00
	CONTINGENCY (10%)	LS	1		$100.00

Assumptions: Traffic signal already has communications; ethernet switch cost is with ATC; cost estimate is based on project SwRI is performing for Georgia DOT

	ATC with Fiber			Total	$19,200.00
ITEM CODE	DESCRIPTION	UNIT	QTY	UNIT COST	TOTAL
04166004	DRILL SHAFT (36 IN)	LF		$350.00	$0.00
04166005	DRILL SHAFT (42 IN)	LF		$480.00	$0.00
04166006	DRILL SHAFT (48 IN)	LF		$540.00	$0.00
04166007	DRILL SHAFT (54 IN)	LF		$600.00	$0.00
05006001	MOBILIZATION (5%)	LS	1		$800.00
05026001	BARRICADES, SIGNS AND TRAFFIC HANDLING (5%)	MO	1		$800.00
06186029	CONDT (PVC) (SCH 40) (3")	LF		$20.00	$0.00
06206002	ELEC CONDR (NO.14) INSULATED	LF		$1.55	$0.00
06206016	ELEC CONDR (NO.2) INSULATED	LF		$4.00	$0.00
06246002	GROUND BOX TY A (122311)W/APRON	EA		$1,300.00	$0.00
06246022	GROUND BOX TY 2 (366048)W/APRON	EA		$6,900.00	$0.00
06286225	ELC SRV TY D 120/240 100(NS)GS(N)GC(O)	EA		$6,000.00	$0.00
06506007	INS OH SN SUP(15 FT BAL TEE)	EA		$15,000.00	$0.00
06506018	INS OH SN SUP(20 FT CANT)	EA		$17,000.00	$0.00
06506025	INS OH SN SUP(25 FT CANT)	EA		$19,000.00	$0.00
06506032	INS OH SN SUP(30 FT CANT)	EA		$22,000.00	$0.00
06506038	INS OH SN SUP(35 FT CANT)	EA		$23,000.00	$0.00
06506045	INS OH SN SUP(40 FT CANT)	EA		$26,000.00	$0.00
06506079	INS OH SN SUP(70 FT BRDG)	EA		$30,000.00	$0.00
06506089	INS OH SN SUP(80 FT BRDG)	EA		$33,000.00	$0.00
06506099	INS OH SN SUP(90 FT BRDG)	EA		$40,000.00	$0.00
06506109	INS OH SN SUP(100 FT BRDG)	EA		$44,000.00	$0.00
06506119	INS OH SN SUP(110 FT BRDG)	EA		$50,000.00	$0.00
60076011	FIBER OPTIC CBL (SNGLE-MODE)(12 FIBER)	LF	500	$8.00	$4,000.00
60076023	FIBER OPTIC PATCH PANEL (12 POSITION)	EA	1	$1,000.00	$1,000.00
60076087	FO SPLICE ENCLOSURE (TYPE 1)	EA	1	$4,500.00	$4,500.00
60086043	ITS GRND MNT CAB (TY 6) (CONF 2)	EA		$13,000.00	$0.00
60106002	CCTV FIELD EQUIPMENT (DIGITAL)	EA		$10,000.00	$0.00
60256001	RADAR PRESENCE DETECTOR	EA		$10,000.00	$0.00
60326001	SYSTEM INTEGRATION	LS			$0.00
60626024	ITS RADIO (SNGL)(5 GHZ)-C-P	EA		$5,000.00	$0.00
60646037	ITS POLE (50 FT)(90 MPH)	EA		$10,000.00	$0.00
60646046	ITS POLE (55 FT)(90 MPH)	EA		$15,000.00	$0.00
60646055	ITS POLE (60 FT)(90 MPH)	EA		$18,000.00	$0.00
62556004	HARDENED ETHERNET SWITCH	EA	1	$4,000.00	$4,000.00
63206002	INSTALL OF CELLULAR MODEM	EA		$4,500.00	$0.00
63226001	Color DMS (Pole MNT Cabinet)	EA		$164,000.00	$0.00
63226002	Color DMS (Foundation MNT Cabinet)	EA		$169,000.00	$0.00
63396001	Bluetooth Detection system	EA		$2,000.00	$0.00
					$0.00
	ATC Traffic Signal Controller	EA	1	$2,500.00	$2,500.00
	DSRC Radio	EA		$10,000.00	$0.00
	ATMS Traffic server	EA	1		
	CONTINGENCY (10%)	LS	1		$1,600.00

Fiber - Trunk **Total** **$694,804.80**

ITEM CODE	DESCRIPTION	UNIT	QTY	UNIT COST	TOTAL
04166004	DRILL SHAFT (36 IN)	LF		$350.00	$0.00
04166005	DRILL SHAFT (42 IN)	LF		$480.00	$0.00
04166006	DRILL SHAFT (48 IN)	LF		$540.00	$0.00
04166007	DRILL SHAFT (54 IN)	LF		$600.00	$0.00
05006001	MOBILIZATION (5%)	LS	1		$28,950.20
05026001	BARRICADES, SIGNS AND TRAFFIC HANDLING (5%)	MO	1		$28,950.20
06186029	CONDT (PVC) (SCH 40) (3")	LF	10560	$20.00	$211,200.00
06186033	CONDT (PVC) (SCH 40) (4")	LF	10560	$27.00	$285,120.00
06206002	ELEC CONDR (NO.14) INSULATED	LF	5280	$1.55	$8,184.00
06206016	ELEC CONDR (NO.2) INSULATED	LF		$4.00	$0.00
06246002	GROUND BOX TY A (122311)W/APRON	EA		$1,300.00	$0.00
06246018	GROUND BOX TY 1 (362422)W/APRON	EA	4	$2,700.00	$10,800.00
06246022	GROUND BOX TY 2 (366048)W/APRON	EA	2	$6,900.00	$13,800.00
06286225	ELC SRV TY D 120/240 100(NS)GS(N)GC(O)	EA		$6,000.00	$0.00
06506007	INS OH SN SUP(15 FT BAL TEE)	EA		$15,000.00	$0.00
06506018	INS OH SN SUP(20 FT CANT)	EA		$17,000.00	$0.00
06506025	INS OH SN SUP(25 FT CANT)	EA		$19,000.00	$0.00
06506032	INS OH SN SUP(30 FT CANT)	EA		$22,000.00	$0.00
06506038	INS OH SN SUP(35 FT CANT)	EA		$23,000.00	$0.00
06506045	INS OH SN SUP(40 FT CANT)	EA		$26,000.00	$0.00
06506079	INS OH SN SUP(70 FT BRDG)	EA		$30,000.00	$0.00
06506089	INS OH SN SUP(80 FT BRDG)	EA		$33,000.00	$0.00
06506099	INS OH SN SUP(90 FT BRDG)	EA		$40,000.00	$0.00
06506109	INS OH SN SUP(100 FT BRDG)	EA		$44,000.00	$0.00
06506119	INS OH SN SUP(110 FT BRDG)	EA		$50,000.00	$0.00
60076011	FIBER OPTIC CBL (SNGLE-MODE)(12 FIBER)	LF		$8.00	$0.00
60076017	FIBER OPTIC CBL (SNGLE-MODE)(144 FIBER)	LF	6000	$4.00	$24,000.00
60076023	FIBER OPTIC PATCH PANEL (12 POSITION)	EA		$1,000.00	$0.00
60076027	FIBER OPTIC PATCH PANEL (144 POSITION)	EA	1	$4,400.00	$4,400.00
60076087	FO SPLICE ENCLOSURE (TYPE 1)	EA	1	$4,500.00	$4,500.00
60086043	ITS GRND MNT CAB (TY 6) (CONF 2)	EA	1	$13,000.00	$13,000.00
60106002	CCTV FIELD EQUIPMENT (DIGITAL)	EA		$10,000.00	$0.00
60256001	RADAR PRESENCE DETECTOR	EA		$10,000.00	$0.00
60326001	SYSTEM INTEGRATION	LS			$0.00
60626024	ITS RADIO (SNGL)(5 GHZ)-C-P	EA		$5,000.00	$0.00
60646037	ITS POLE (50 FT)(90 MPH)	EA		$10,000.00	$0.00
60646046	ITS POLE (55 FT)(90 MPH)	EA		$15,000.00	$0.00
60646055	ITS POLE (60 FT)(90 MPH)	EA		$18,000.00	$0.00
62556004	HARDENED ETHERNET SWITCH	EA	1	$4,000.00	$4,000.00
63206002	INSTALL OF CELLULAR MODEM	EA		$4,500.00	$0.00
63226001	Color DMS (Pole MNT Cabinet)	EA		$164,000.00	$0.00
63226002	Color DMS (Foundation MNT Cabinet)	EA		$169,000.00	$0.00
63396001	Bluetooth Detection system	EA		$2,000.00	$0.00
	ATC Traffic Signal Controller	EA		$2,500.00	$0.00
	DSRC Radio	EA		$10,000.00	$0.00
	CONTINGENCY (10%)	LS	1		$57,900.40

Assumptions: 1 mile of fiber - rounded up to 6,000 feet for slack; ground box every 500 feet plus 1

Static Travel Time Displays

Total $134,354.40

ITEM CODE	DESCRIPTION	UNIT	QTY	UNIT COST	TOTAL
04166004	DRILL SHAFT (36 IN)	LF		$350.00	$0.00
04166005	DRILL SHAFT (42 IN)	LF		$480.00	$0.00
04166006	DRILL SHAFT (48 IN)	LF	51	$540.00	$27,540.00
04166007	DRILL SHAFT (54 IN)	LF		$600.00	$0.00
05006001	MOBILIZATION (5%)	LS	1		$5,598.10
05026001	BARRICADES, SIGNS AND TRAFFIC HANDLING (5%)	MO	1		$5,598.10
06186029	CONDT (PVC) (SCH 40) (3")	LF		$20.00	$0.00
06206002	ELEC CONDR (NO.14) INSULATED	LF	600	$1.55	$930.00
06206016	ELEC CONDR (NO.2) INSULATED	LF	1200	$4.00	$4,800.00
06246002	GROUND BOX TY A (122311)W/APRON	EA	3	$1,300.00	$3,900.00
06246022	GROUND BOX TY 2 (366048)W/APRON	EA		$6,900.00	$0.00
06286225	ELC SRV TY D 120/240 100(NS)GS(N)GC(O)	EA	1	$6,000.00	$6,000.00
06506007	INS OH SN SUP(15 FT BAL TEE)	EA		$15,000.00	$0.00
06506018	INS OH SN SUP(20 FT CANT)	EA		$17,000.00	$0.00
06506025	INS OH SN SUP(25 FT CANT)	EA		$19,000.00	$0.00
06506032	INS OH SN SUP(30 FT CANT)	EA		$22,000.00	$0.00
06506038	INS OH SN SUP(35 FT CANT)	EA		$23,000.00	$0.00
06506045	INS OH SN SUP(40 FT CANT)	EA	1	$26,000.00	$26,000.00
06506079	INS OH SN SUP(70 FT BRDG)	EA		$30,000.00	$0.00
06506089	INS OH SN SUP(80 FT BRDG)	EA		$33,000.00	$0.00
06506099	INS OH SN SUP(90 FT BRDG)	EA		$40,000.00	$0.00
06506109	INS OH SN SUP(100 FT BRDG)	EA		$44,000.00	$0.00
06506119	INS OH SN SUP(110 FT BRDG)	EA		$50,000.00	$0.00
60076011	FIBER OPTIC CBL (SNGLE-MODE)(12 FIBER)	LF	500	$8.00	$4,000.00
60076023	FIBER OPTIC PATCH PANEL (12 POSITION)	EA		$1,000.00	$0.00
60076087	FO SPLICE ENCLOSURE (TYPE 1)	EA	1	$4,500.00	$4,500.00
60086043	ITS GRND MNT CAB (TY 6) (CONF 2)	EA	1	$13,000.00	$13,000.00
60106002	CCTV FIELD EQUIPMENT (DIGITAL)	EA		$10,000.00	$0.00
60296001	RADAR VEHICLE SENSING DEVICE	EA		$10,000.00	$0.00
62556004	HARDENED ETHERNET SWITCH	EA	1	$4,000.00	$4,000.00
63206002	INSTALL OF CELLULAR MODEM	EA		$4,500.00	$0.00
63226001	Color DMS (Pole MNT Cabinet)	EA		$164,000.00	$0.00
06366003	ALUMINUM SIGNS (TY O)	SF	200	$26.46	$5,292.00
	Color DMS Travel Time Signage	EA	2	$6,000.00	$12,000.00
					$0.00
	ATC Traffic Signal Controller	EA		$2,500.00	$0.00
	DSRC Radio	EA		$10,000.00	$0.00
	CONTINGENCY (10%)	LS	1		$11,196.20

Assumptions: 40 cantilevered monotube sign supports; worst case drill shaft; DMS provided by TxDOT

Appendix D: Summary by Route Segment

Summary of Devices by Segment

Route No.	From	To	Device Breakdown	Number of Devices	Miles of Fiber	Estimated Design/Study Cost	Estimated Capital Cost	Estimated Total Cost
US 54	Cesar Chavez Border Highway	New Mexico State Line	ATC controllers - 20; CCTV - 15; CCTV wireless - 5; Detection System - 19; DMS LCS signs - 10; DMS wireless - 2; DSRC, SPaT - 20; Radar - 9; Static Travel Time Display - 6	106	6.3	$7,204,704	$47,364,690	$54,569,394
IH 10	New Mexico State Line	US 54	ATC controllers - 11; CCTV - 27; Detection System - 27; DMS - 2; DMS LCS signs - 8; DSRC, SPaT - 11; Radar - 30; Weather Station - 4; Static Travel Time Display - 6	126	0.0	$6,598,858	$43,325,717	$49,924,574
SH 20	Loop 375	IH-10	CCTV - 20	20	44.5	$4,969,159	$33,127,726	$38,096,884
IH 10	US 54	SL 375	ATC controllers - 14; CCTV - 14; Detection System - 22; DMS LCS signs - 4; DSRC, SPaT - 14; Radar - 15; Weather Station - 2; Static Travel Time Display - 2	87	0.0	$3,549,356	$22,329,041	$25,878,397

IH 10	SL 375	FM 3380	CCTV - 6; CCTV wireless - 17; Detection System - 14; DMS LCS signs - 2; Weather Station - 4	43	17.6	$2,802,363	$17,349,087	$20,151,450
US 62	Paisano Dr.	El Paso County Limits	ATC controllers - 23; CCTV - 25; DMS wireless - 2; DSRC, SPaT - 23	73	17.7	$2,568,303	$16,455,356	$19,023,660
FM 76	Loop 375	Lower Island Rd.	CCTV - 14	14	21.1	$2,430,993	$16,206,620	$18,637,613
Loop 375	IH-10	Railroad Dr.	CCTV - 27; Detection System - 10; DMS LCS signs - 6; Radar - 15; Static Travel Time Display - 4	62	10.4	$2,496,283	$15,975,220	$18,471,503
FM 258	Alameda Ave.	Alameda Ave.	CCTV - 12	12	16.5	$12,789,626	$1,918,444	$14,708,070
BU 54A	Patriot Freeway	New Mexico State Line	ATC controllers - 18; CCTV - 7; DSRC, SPaT - 18	43	12.5	$1,506,207	$10,041,379	$11,547,586
SH 20	Texas Ave.	Loop 375	ATC controllers - 36; CCTV - 4; DSRC, SPaT - 36	76	11.7	$1,460,610	$9,737,399	$11,198,008
SH 20	New Mexico State Line	Country Club Rd.	ATC controllers - 13; CCTV - 9	22	11.2	$1,353,814	$9,025,424	$10,379,238
FM 659	Montana Ave.	North Loop Dr.	ATC controllers - 19; CCTV - 8; SPaT - 19	46	9.7	$1,201,616	$8,010,771	$9,212,387

IH 10	SH 20	Culberson County	CCTV wireless - 13; Detection System - 8; DMS wireless - 13; Radar - 13; Radar Speed Feedback Sign - 18; Weather Station - 5	70	0.0	$1,004,116	$6,694,106	$7,698,222
FM 76	Alameda Ave.	Loop 375	ATC controllers - 20; CCTV - 4; SPaT - 20	44	8.2	$982,077	$6,547,182	$7,529,259
SH 20	Country Club Rd.	Texas Ave.	ATC controllers - 39; CCTV - 9; DSRC, SPaT - 39	87	5.6	$922,278	$6,148,517	$7,070,795
FM 1281	North Loop Dr.	Ascencion St.	CCTV - 4	4	8.2	$920,877	$6,139,182	$7,060,059
Loop 375	Montana Ave.	IH-10	ATC controllers - 8; CCTV - 11; Detection System - 12; DMS LCS signs - 2; DSRC, SPaT - 8; Radar - 7; Static Travel Time Display - 4	52	0.0	$892,611	$4,617,406	$5,510,016

US 62	El Paso St.	Montana Ave.	ATC controllers - 15; CCTV - 4; DSRC, SPaT - 15	34	5.1	$670,693	$4,471,287	$5,141,980
US 85	Paisano Dr.	Stanton St.	CCTV - 3; Radar - 5	8	5.5	$731,914	$4,212,763	$4,944,678
Loop 375	Zaragoza International Bridge	Santa Fe St.	CCTV - 18; Detection System - 10; DSRC - 13; Radar - 31; SPaT - 1; Static Travel Time Display - 2	75	0.0	$766,886	$3,747,106	$4,513,991
Spur 601	US 54	Purple Heart Memorial Hwy	CCTV - 8; Detection System - 7; DMS - 4; DSRC - 4; Radar - 10; Static Travel Time Display - 2	35	0.0	$498,036	$3,320,239	$3,818,275
Loop 375	Railroad Dr	Montana Ave.	CCTV - 12; Detection System - 8; DMS - 2; Radar - 10; Static Travel Time Display - 2	34	0.0	$572,075	$3,147,168	$3,719,243
Loop 478	Pershing Dr.	Patriot Freeway	ATC controllers - 10; CCTV - 3; SPaT - 10	23	3.7	$469,117	$3,106,115	$3,575,232
Loop 375	IH-10	Zaragoza International Bridge	CCTV - 9; Detection System - 5; DMS LCS signs - 2; DSRC - 4; Radar - 3	23	0.0	$636,321	$2,911,474	$3,547,795

SH 178	New Mexico State Line	IH-10	ATC controllers - 3; CCTV - 3; Radar - 6	12	3.0	$381,803	$2,545,351	$2,927,154
IH 10	FM 3380	SH 20	CCTV wireless - 5; Detection System - 3; DMS wireless - 5; LED Chevrons - 1; Radar - 5; Radar Speed Feedback Sign - 4	23	0.0	$378,409	$2,522,724	$2,901,132
FM 2316	Montana Ave.	IH 10	ATC controllers - 8; CCTV - 3	11	2.4	$322,870	$2,152,468	$2,475,339
FM 2529	Dyer St.	Martin Luther King Jr. Blvd	CCTV - 3; SPaT - 3	6	2.6	$325,674	$2,141,429	$2,467,104
IH 110	Bridge of the Americas	Bridge of the Americas	CCTV - 2; DMS LCS signs - 2; DSRC - 4; Radar - 5	13	0.0	$353,165	$1,687,766	$2,040,931
SH 20	Mesa St.	Alameda Ave.	ATC controllers - 5; CCTV - 2; DSRC, SPaT - 5	12	1.7	$234,609	$1,564,059	$1,798,668
Loop 375	El Paso City Limits (West)	IH-10	CCTV - 1; DMS LCS signs - 2	3	0.0	$220,398	$1,469,321	$1,689,719
Loop 478	Paisano Dr.	Pershing Dr.	ATC controllers - 6; CCTV - 2; SPaT - 6	14	1.2	$180,479	$1,177,057	$1,357,536

FM 259	New Mexico State Line	Doniphan Dr.	CCTV - 1	1	1.2	$141,632	$944,211	$1,085,843
Loop 478	Copia St.	Dyer St.	ATC controllers - 3; CCTV - 1; SPaT - 3	7.9	0.9	$124,005	$796,970	$920,975
FM 1505	Trowbridge Dr.	Alameda Ave.	CCTV - 2	2	0.8	$116,510	$776,735	$893,245
US 62/85	Stanton International Bridge	Paisano Dr.	ATC controllers - 3; CCTV - 2; DSRC, SPaT - 3	8	0.5	$99,824	$665,494	$765,318
FM 3380	Tornillo Port of Entry	IH-10	CCTV wireless - 6; Radar - 6	12	0.0	$97,889	$652,594	$750,483
US 62/85	Sixth Ave.	Paisano Dr.	ATC controllers - 2; CCTV - 2; DSRC, SPaT - 2	6	0.2	$64,738	$424,652	$489,390
FM 1110	San Elizario Rd	Socorro Rd	CCTV wireless - 4	4	0.0	$58,059	$387,062	$445,122
FM 793	IH 10	North Loop Dr.	CCTV wireless - 2	2	0.0	$29,030	$193,531	$222,561

IH 10 Frontage Rd	Kansas St.	Santa Fe St.	ATC controllers - 6; SPaT - 6	12	0.0	$22,280	$122,400	$144,680
Loop 375	Doniphan Dr.	El Paso City Limits (West)	CCTV - 1	1	0.0	$16,567	$110,446	$127,012
IH 10 Frontage Rd	Santa Fe St.	Kansas St.	ATC controllers - 5; SPaT - 5	10	0.0	$19,400	$102,000	$121,400
FM 3255	New Mexico State Line	Patriot Freeway	CCTV wireless - 1	1	0.0	$14,515	$96,766	$111,280

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