State of Texas
Regional ITS Architectures and Deployment Plans

Waco Region

Regional ITS Deployment Plan

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REGIONAL ITS DEPLOYMENT PLAN

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LIST OF ACRONYMS

APC	Automated Passenger Counter
ATIS	Advanced Travel Information System
ATMS	Advanced Traffic Management System
AVL	Automated Vehicle Location
CAD	Computer-Aided Dispatch
CCTV	Closed-Circuit Television
COG	Council of Governments
DMS	Dynamic Message Sign
DPS	Department of Public Safety
EMS	Emergency Medical Services
EOC	Emergency Operations Center
FHWA	Federal Highway Administration
HAR	Highway Advisory Radio
HAZMAT	Hazardous Materials
HCRS	Highway Condition Reporting System
HOTCOG	Heart of Texas Council of Governments
HRI	Highway-Rail Intersections
ISP	Information Service Provider
ITS	Intelligent Transportation System
MDT	Mobile Data Terminal
MPO	Metropolitan Planning Organization
NAFTA	North America Free Trade Agreement
NTCIP	National Transportation Communications for ITS Protocol
PTZ	Pan/Tilt/Zoom
RFID	Radio Frequency Identification
RWIS	Road Weather Information System

LIST OF ACRONYMS

TEA-21	Transportation Equity Act for the 21st Century
TMC	Transportation Management Center
TOC	Traffic Operations Center Transit Operations Center
TxDOT	Texas Department of Transportation
VIVDS	Video Image Vehicle Detector System

SUMMARY

In January 2001, the Federal Highway Administration (FHWA) issued a final rule to implement Section 5206(e) of the Transportation Equity Act for the 21st Century (TEA-21) requiring that Intelligent Transportation System (ITS) projects funded through the Highway Trust Fund conform to the National ITS Architecture and applicable standards.

To meet these requirements the Texas Department of Transportation (TxDOT) initiated the development of regional ITS architectures and deployment plans throughout the State of Texas. Although not required by the FHWA final rule, TxDOT took the opportunity to also develop an ITS deployment plan for each Region. The Waco Regional ITS Architecture and Regional ITS Deployment Plan was prepared as part of this initiative.

The Waco Regional ITS Deployment Plan outlines a vision for ITS deployment, and identifies and prioritizes projects that are needed to implement the ITS architecture on a short, medium, and long-term basis. In doing so, this plan also helps the Region to prioritize funding decisions. As infrastructure is incrementally built-out over a 20-year horizon, integration among key foundation systems in the Region can occur as the system grows and expands.

Stakeholders from throughout the Region participated in the development of the Regional ITS Deployment Plan. Participants included representatives from FHWA, TxDOT, cities, counties, the metropolitan planning organizations, council of governments, and transit agencies.

Building on the dialogue, consensus, and vision outlined in the Regional ITS Architecture, stakeholders in the Waco Region prioritized market packages and potential ITS projects for deployment in the Region. Projects were identified to correspond to the needs and priorities identified by the regional stakeholders, and were categorized into 5-year, 10-year, and 20-year timeframes.

The majority of ITS projects recommended for the Waco Region were identified in the following key areas:

- Travel and Traffic Management;
- Emergency Management; and
- Public Transportation Management.

Recommended ITS projects in the 5-year, 10-year, and 20-year deployment timeframes were summarized in tables for each deployment horizon. This summary included the project name and a brief description, primary responsible agency, a planning level estimate of probable cost, an indication of whether funding had been identified for that project, as well as an estimated duration for implementation. For each recommended ITS project, more detailed project descriptions were developed which mapped each project back to applicable market packages and also identified any prerequisite project requirements.

With the substantial amount of effort invested by stakeholders in the Waco Region to develop both the Regional ITS Architecture and the Deployment Plan, developing a plan for maintaining these important tools was a key component of the process.

1. INTRODUCTION

1.1 Project Overview

The FHWA final rule to implement Section 5206(e) of the TEA-21 requires that ITS projects funded through the Highway Trust Fund conform to the National ITS Architecture and applicable standards. The rule requests that the National ITS Architecture be used to develop a local implementation of the National ITS Architecture, which is referred to as a "Regional ITS Architecture."

In order to meet these requirements, TxDOT initiated the development of regional ITS architectures and deployment plans throughout the State of Texas. Although not required by the FHWA final rule, TxDOT sought to have an ITS deployment plan developed for each Region. The ITS Deployment Plan outlines a vision for ITS deployment in the Region and identifies and prioritizes projects that are needed to implement the ITS architecture on a short, medium, and long-term basis. In doing so, this plan also helps the Region to prioritize funding decisions by having a comprehensive, phased approach to the regional ITS programs, so that the infrastructure can be incrementally built-out over a 20-year horizon, and integration among key foundation systems in the Region can occur as the system grows and expands.

The Waco Regional ITS Deployment Plan was developed using the Regional ITS Architecture developed in 2003. Through the architecture development process, stakeholders reached consensus on the transportation needs in the Region that could be addressed with ITS, worked with the architecture team to customize and prioritize market packages that formed the basis for the ITS Deployment Plan, and identified the required interfaces to provide the desired level of integration of systems and agencies within the Waco Region.

The Waco Regional ITS Architecture provided the framework and prioritized the key functions and services desired by stakeholders in the Region. The ITS Deployment Plan builds on the architecture by outlining specific ITS project recommendations and strategies for the Region, and identifying deployment timeframes so that the recommended projects and strategies can be implemented over time. Agency responsibilities for implementing and operating the systems also are a key component of the ITS Deployment Plan.

1.2 Document Overview

The Waco Regional ITS Deployment Plan is organized into four key sections:

Section 1 – Introduction

This section provides a brief overview of the Waco Regional ITS Deployment Plan, as well as an overview of some of the key features and stakeholders in the Waco Region.

Section 2 – Prioritization of Market Packages

Section 2 contains the prioritized market packages for the Waco Region. Included in this section is an overview of the prioritization process and detailed descriptions of the high, medium and low priority market packages.

Section 3 – Prioritization of Projects

Project recommendations have been developed for the Waco Region to provide an incremental, phased build-out of the Region's ITS. These projects are categorized into 5-year, 10-year, and 20-year deployment timeframes. Each project recommendation includes a brief description, responsible agency, associated market packages, pre-requisite projects or systems, and an estimate of probable cost.

Section 4 – Maintaining the Regional ITS Architecture and Deployment Plan

A procedure for maintaining the ITS Deployment Plan and submitting new projects to add to the plan is recommended in this section.

1.3 The Waco Region

1.3.1 Geography and Regional Characteristics

The Waco Region is bordered by the TxDOT Dallas and Fort Worth Districts to the north, the TxDOT Austin District to the south, the TxDOT Bryan District to the east, and the TxDOT Brownwood District to the west. For the Waco Regional ITS Architecture and Deployment Plan, the study area included all eight counties that comprise the TxDOT Waco District as well as Freestone County which is part of the Bryan District.

The counties included in the Waco Region are:

- Bell;
- Bosque;
- Coryell;
- Falls;
- Freestone;
- Hamilton;
- Hill;
- Limestone; and
- McLennan.

TxDOT partners with local governments for roadway construction, maintenance, and traffic operations support and serves as the responsible agency for on-system roadways in cities with populations less than 50,000. The Cities of Waco, Temple, and Killeen are the only cities in the project Region with populations that exceed the 50,000 threshold.

1.3.2 Transportation Infrastructure

The Waco Region has an extensive transportation infrastructure. The primary roadway facilities include I-35, US-77, US-84, US-190, SH-6, and SH-95.

I-35 is a north-south, divided interstate highway. The effective operation of this highway is critical to the movement of goods and people through the State of Texas and the United States. I-35 is a North America Free Trade Agreement (NAFTA) corridor and extends from the border with Mexico in Laredo, Texas to the Canadian border. Blockages along I-35 can have serious implications for drive-time for commercial vehicles and motorists alike due to

the lack of obvious alternate routes. Knowing the road and travel conditions within this transportation corridor and having the ability to disseminate this information to motorists are important elements for this project. For example, if I-35 has been closed due to a major incident or weather, and motorists are informed of the closure in advance, they can alter their travel plans with an alternate route or wait to begin their travels.

1.3.3 Existing ITS in the Waco Region

Within the Waco Region there are currently several ITS applications in place. TxDOT has several portable dynamic message signs (DMS) that are used primarily for displaying construction and delay information.

Video Image Vehicle Detection Systems (VIVDS) have been installed at several intersections in the Region by TxDOT.

Signal preemption for emergency vehicles is in place within the City of Waco for fire vehicles, and several emergency management agencies are utilizing computer aided dispatch systems.

1.3.4 Waco Stakeholders

Stakeholder coordination and involvement is one of the key elements to the development of a regional ITS architecture and deployment plan. Because ITS often transcends traditional transportation infrastructure, it is important to involve non-traditional stakeholders in the architecture development and visioning process. Input from these stakeholders, both public and private, is a critical part of defining the interfaces, integration needs, and overall vision for ITS in the Waco Region.

The following is a list of stakeholders in the Waco Region who have participated in the project workshops or provided input to the study team as to the needs and issues that should be considered as part of the Waco Regional ITS Architecture and Deployment Plan:

- Bell County;
- City of Waco;
- Federal Highway Administration;
- Fort Hood;
- Heart of Texas Council of Governments;
- Hill Country Transit District;
- Killeen-Temple Urban Transportation Study (K-TUTS)/Central Texas Council of Governments;
- McLennan County;
- TxDOT Public Transportation Division (Austin);
- TxDOT Traffic Operations Division (Austin);
- TxDOT Waco District;
- Waco MPO; and
- Waco/McLennan County Emergency Management.

Stakeholder agencies that are participating in the development of the Waco Regional ITS Deployment Plan are listed in **Table 1** along with contact information for agency representatives that have participated.

Table 1 – Waco Stakeholder Agencies and Contacts

Stakeholder Agency	Contact	Address	Phone Number	E-Mail
Bell County	Richard Macchi	P.O. Box 264 Belton, Texas 76513-0568	254-933-5275	rmacchi@vvm.com
City of Waco	Rick Charlton	P.O. Box 2570 Waco, Texas 76702	254-750-6634	rickc@ci.waco.tx.us
City of Waco Transit	Matt Penney	421 Columbus Avenue Waco, Texas 76701-1417	254-750-1617	N/A
Federal Highway Administration Texas Division	Mark Olson	300 East 8th Street Room 826 Austin, Texas 78701	512-536-5972	mark.olson@fhwa.dot.gov
Federal Highway Administration Texas Division	Kevin Spohrer	300 East 8th Street Room 826 Austin, Texas 78701	512-536-5958	kevin.spohrer@fhwa.dot.gov
Fort Hood Master Planning	Philip Marley	Fort Hood, Texas 76544	254-287-3528	philip.marley@hood.army.mil
Heart of Texas Council of Governments	Lee Ann Donaldson	300 Franklin Avenue Waco, Texas 76701	254-756-7822	leann@hot.cog.tx.us
Heart of Texas Council of Governments/Rural Transportation District	Russ Harman	300 Franklin Avenue Waco, Texas 76701-2297	254-756-7822	russ@hot.cog.tx.us
Hill Country Transit District	Robert Ator	5200 S General Bruce Dr Temple, Texas 76502	254-791-0252	rator@takethehop.com
Hill Country Transit District	Carole Warlick	P.O. Box 217 San Saba, Texas 76877	325-372-4677	hctd@hccaa.com
K-TUTS	Technical Committee	550 East Second Avenue Courthouse Annex, Box 729 Belton, Texas 76513	254-933-7075	N/A
K-TUTS/Central Texas Council of Governments	Shannon Mattingly	550 East Second Avenue Courthouse Annex, Box 729 Belton, Texas 76513	254-933-7075	smattingly@ctcogmpo.org
K-TUTS/Central Texas Council of Governments	Steve Smith	550 East Second Avenue Courthouse Annex, Box 729 Belton, Texas 76513	254-933-7075 (ext. 210)	ssmith@ctcogmpo.org
McLennan County	Steve Hendrick	P.O. Box 648 Waco, Texas 76703-1728	254-757-5028	steve.hendrick@co.mclennan.tx.us
TxDOT Public Transportation Division	Ben Herr	125 E. 11th Street Austin, Texas 78701-2483	512-416-2812	lherr@dot.state.tx.us
TxDOT Waco District	James Bailey	100 South Loop Drive Waco, Texas 76704	254-867-2802	jbailey@dot.state.tx.us

Table 1 – Waco Stakeholder Agencies and Contacts (continued)

Stakeholder Agency	Contact	Address	Phone Number	E-Mail
TxDOT Waco District	Larry Colclasure	100 South Loop Drive Waco, Texas 76704	254-867-2800	lcolcla@dot.state.tx.us
TxDOT Waco District	Edward Kabobel	100 South Loop Drive Waco, Texas 76704	254-867-2731	ekabobe@dot.state.tx.us
TxDOT Traffic Operations Division	Fabian Kalapach	Attn: TRF-Cedar Park #51 125 E. 11th Street Austin, Texas 78701-2483	512-506-5112	fkalapa@dot.state.tx.us
TxDOT Traffic Operations Division	Roland Merz	Attn: TRF-Cedar Park #51 125 E. 11th Street Austin, Texas 78701-2483	512-506-5152	rmerz@dot.state.tx.us
Waco/McLennan County Emergency Mgmt	Frank Patterson	P.O. Box 2570 Waco, Texas 76702	254-750-5911	frankp@ci.waco.tx.us
Waco MPO	Christopher Evilia	P.O. Box 2570 Waco, Texas 76702	254-750-5666	cevilia@ci.waco.tx.us

2. PRIORITIZATION OF MARKET PACKAGES

2.1 Prioritization Process

Of the 75 available market packages in the National ITS Architecture version 4.0, 33 were selected and customized for deployment in the Waco Region. Two additional market packages, Red Light Running and Military Base Entrance Electronic Clearance, which do not currently exist in the National ITS Architecture, were created for the Waco Region to address the needs of stakeholders. Stakeholders were asked to prioritize the market packages into high, medium, and low priorities, based on regional needs, feasibility and likelihood of deployment, and overall contribution of the market package to the goals and vision for ITS functionality in the Region. A summary of these prioritized market packages is shown in **Table 2**.

The market package prioritization was a key factor in developing recommendations for ITS deployment and integration in the Waco Region. These priorities identified the key needs and services that are desired in the Waco Region, as well as the interfaces that need to be established to provide integrated functionality and establish communication between elements.

This section includes detailed descriptions of the prioritized market packages for the Waco Region. The market packages are organized into high, medium, and low priorities. It is important to note that the high, medium, and low prioritization does not necessarily correspond to any specific time frame (such as five, ten, or twenty year deployment horizon). For example, a market package can be a high priority, but because of funding or prerequisite project requirements, it might not be feasible for deployment for several years. Maturity and availability of technology were other factors for prioritizing the market packages. Other considerations included whether or not the market package was better suited for private deployment and operations rather than public. As an example, ISP-based Route Guidance might be viewed as a valuable traveler information service for motorists in the Region, but stakeholders felt this market package was best suited for deployment by a private service provider, and as such, deemed it a low priority for agencies in the Region.

Each market package in the following subsections includes:

- A brief definition of the market package (which have been modified from the National ITS Architecture definitions);
- Any existing infrastructure from that market package that is already deployed in the Waco Region;
- Agencies currently operating or maintaining systems that apply to that market package;
- Planned projects that will address some or all of the services that are contained in the market package; and
- Any additional needs to bring the market package to the desired level of deployment or functionality.

Table 2 – Summary of Prioritized Market Packages for the Waco Region

High Priority	Medium Priority	Low Priority
▪ Network Surveillance ▪ Surface Street Control ▪ Traffic Information Dissemination ▪ Regional Traffic Control ▪ Incident Management System ▪ Speed Monitoring ▪ Emergency Response ▪ Road Weather Data Collection ▪ Weather Information Processing and Distribution ▪ Work Zone Management ▪ Maintenance and Construction Activity Coordination ▪ Transit Vehicle Tracking ▪ Transit Fixed-Route Operations ▪ Demand Response Transit Operations ▪ Transit Passenger and Fare Management ▪ Transit Security ▪ Broadcast Traveler Information ▪ ITS Data Mart	▪ Probe Surveillance ▪ Freeway Control ▪ Standard Railroad Grade Crossing ▪ Railroad Operations Coordination ▪ Red Light Running ▪ Military Base Entrance Electronic Clearance ▪ Emergency Vehicle Routing ▪ Roadway Maintenance and Construction ▪ Work Zone Safety Monitoring ▪ Transit Maintenance ▪ Transit Traveler Information ▪ HAZMAT Management ▪ ITS Data Warehouse	▪ Maintenance and Construction Vehicle Tracking ▪ Maintenance and Construction Vehicle Maintenance ▪ Multi-Modal Coordination ▪ ISP Based Route Guidance

2.2 High Priority Market Packages

Market packages that were selected as high priorities for the Waco Region are listed and described in **Table 3**. These market packages typically represent systems or functions that serve as foundations on which to build regional ITS programs. Listed in this section are market packages that address baseline control, monitoring and coordination technologies for surface streets and freeways, road/weather conditions data gathering, transit, incident management, and emergency response.

Many of these high priority market packages have components that are in various stages of deployment and operation in the Waco Region; that is, there are already systems and technologies deployed to deliver some of these high priority services and functions. For example, the Waco closed loop signal systems and VIVDS have already been deployed, and these are key components of the Surface Street Control market package. Although these devices are in place, this market package is still listed as a high priority. There are additional capabilities and functionality contained in this market package that are planned for implementation in the near-term, thus building on the existing infrastructure and expanding the services of this particular market package in the Waco Region.

Table 3 – High Priority Market Packages for the Waco Region

Network Surveillance (ATMS01)	**High Priority**
This market package includes traffic detectors, other surveillance equipment, the supporting field equipment, and wireline communications to transmit the collected data back to the Traffic Management Subsystem. The derived data can be used locally or remotely. The data generated by this market package enables traffic managers to monitor traffic and road conditions, identify and verify incidents, detect equipment faults, and collect census data for traffic strategy development and long range planning. The collected data can also be analyzed and made available to users and the Information Service Provider Subsystem.	
Existing Infrastructure ▪ TxDOT VIVDS ▪ City of Waco Closed Loop Signal System ▪ City of Waco Environmental Monitoring Stations	**Agency** ▪ TxDOT ▪ City of Waco
Planned Projects ▪ TxDOT ATMS Implementation	
Additional Needs ▪ City of Harker Heights Closed Loop Signal System Phase 1 ▪ City of Harker Heights Closed Loop Signal System Phase 2 ▪ City of Harker Heights Closed Loop Signal System Phase 3 ▪ City of Killeen Closed Loop Signal System Continued Development Phase 1 ▪ City of Killeen Closed Loop Signal System Implementation Phase 2 ▪ City of Killeen Closed Loop Signal System Implementation Phase 3 ▪ City of Killeen TOC ▪ City of Temple Closed Loop Signal System Continued Development Phase 1	

Table 3 – High Priority Market Packages for the Waco Region (continued)

Network Surveillance (ATMS01) (continued)	High Priority
Additional Needs (continued)	
▪ City of Temple Closed Loop Signal System Implementation Phase 2	
▪ City of Temple Closed Loop Signal System Implementation Phase 3	
▪ City of Waco CCTV Camera Implementation	
▪ City of Waco Closed Loop Signal System Expansion Phase 1	
▪ City of Waco Closed Loop Signal System Expansion Phase 2	
▪ City of Waco Closed Loop Signal System Expansion Phase 3	
▪ City of Waco School Zone Speed Monitoring Implementation	
▪ City of Waco TOC Expansion	
▪ TxDOT CCTV	
▪ TxDOT Closed Loop Signal System Expansion Phase 1	
▪ TxDOT Closed Loop Signal System Expansion Phase 2	
▪ TxDOT Closed Loop Signal System Expansion Phase 3	
▪ TxDOT Flood Monitoring	
▪ TxDOT RWIS Stations	
▪ TxDOT School Zone Speed Monitoring Expansion	
▪ TxDOT Waco District Traffic Office Capability Expansion	
▪ TxDOT Waco Vehicle Detection on I-35	

Table 3 – High Priority Market Packages for the Waco Region (continued)

Surface Street Control (ATMS03)	**High Priority**
This market package provides the central control and monitoring equipment, communication links, and the signal control equipment that support local surface street control and/or arterial traffic management. A range of traffic signal control systems are represented by this market package ranging from static pre-timed control systems to fully traffic responsive systems that dynamically adjust control plans and strategies based on current traffic conditions and priority requests. This market package is consistent with typical urban traffic signal control systems.	
Existing Infrastructure ▪ TxDOT Closed Loop Signal System ▪ TxDOT VIVDS ▪ TxDOT School Zone Pager System ▪ Railroad Preemption ▪ City of Waco Closed Loop Signal System ▪ City of Waco School Zone Pager System ▪ Fort Hood Closed Loop Signal System	**Agency** ▪ TxDOT ▪ City of Waco ▪ Fort Hood
Planned Projects None identified at this time	
Additional Needs ▪ City of Copperas Cove Emergency Vehicle Signal Preemption Implementation ▪ City of Harker Heights Closed Loop Signal System Phase 1 ▪ City of Harker Heights Closed Loop Signal System Phase 2 ▪ City of Harker Heights Closed Loop Signal System Phase 3 ▪ City of Harker Heights Emergency Vehicle Signal Preemption Implementation ▪ City of Killeen Closed Loop Signal System Continued Development Phase 1 ▪ City of Killeen Closed Loop Signal System Implementation Phase 2 ▪ City of Killeen Closed Loop Signal System Implementation Phase 3 ▪ City of Killeen Emergency Vehicle Signal Preemption Implementation ▪ City of Killeen TOC ▪ City of Temple Closed Loop Signal System Continued Development Phase 1 ▪ City of Temple Closed Loop Signal System Implementation Phase 2 ▪ City of Temple Closed Loop Signal System Implementation Phase 3 ▪ City of Temple Emergency Vehicle Signal Preemption Implementation ▪ City of Waco CCTV Camera Implementation ▪ City of Waco Closed Loop Signal System Expansion Phase 1 ▪ City of Waco Closed Loop Signal System Expansion Phase 2 ▪ City of Waco Closed Loop Signal System Expansion Phase 3 ▪ City of Waco DMS ▪ City of Waco School Zone Speed Monitoring Implementation	

Table 3 – High Priority Market Packages for the Waco Region (continued)

Surface Street Control (ATMS03)	High Priority
Additional Needs (continued) ▪ City of Waco TOC Expansion ▪ Detour Planning ▪ Fort Hood Event Management Plans ▪ Municipal Traffic Signal Preemption ▪ TxDOT Closed Loop Signal System Expansion Phase 1 ▪ TxDOT Closed Loop Signal System Expansion Phase 2 ▪ TxDOT Closed Loop Signal System Expansion Phase 3 ▪ TxDOT School Zone Speed Monitoring Expansion ▪ TxDOT Waco District Traffic Office Capability Expansion	

Traffic Information Dissemination (ATMS06)	High Priority
This market package allows traffic information and road/bridge closures due to construction, maintenance, and weather, to be disseminated to drivers and vehicles using roadway equipment such as dynamic message signs or highway advisory radio. This package also covers the equipment and interfaces that provide traffic information from a traffic management center to the media (for instance via a direct tie-in between a traffic management center and radio or television station computer systems), Transit Management, Emergency Management, and Information Service Providers.	
Existing Infrastructure ▪ TxDOT Existing DMS	**Agency** ▪ TxDOT
Planned Projects ▪ TxDOT ATMS Implementation ▪ TxDOT Center-to-Center Communication (Statewide) ▪ TxDOT DMS ▪ TxDOT HCRS Enhancement	
Additional Needs ▪ Bell County EOC/TxDOT Waco District Traffic Office Communications Connection ▪ City of Harker Heights Portable DMS ▪ City of Killeen EOC/TxDOT Waco District Traffic Office Communications Connection ▪ City of Killeen Portable DMS ▪ City of Killeen TOC ▪ City of Temple EOC/TxDOT Waco District Traffic Office Communications Connection ▪ City of Temple Portable DMS ▪ City of Waco DMS ▪ City of Waco Portable DMS	

Table 3 – High Priority Market Packages for the Waco Region (continued)

Traffic Information Dissemination (ATMS06)	**High Priority**
Additional Needs (continued) ▪ City of Waco TOC Expansion ▪ Hill Country Transit Operations Center/TxDOT Waco District Traffic Office Coordination ▪ HOTCOG Transit Operations Center/TxDOT Waco District Traffic Office Connection ▪ ISP Based Route Guidance ▪ Media Liaison and Coordination ▪ Regional 511 Advanced Traveler Information System Server ▪ TxDOT Additional DMS ▪ TxDOT Additional Portable DMS ▪ TxDOT Waco District Traffic Office Capability Expansion ▪ Waco Traffic Information Website ▪ Waco Transit Operations Center/City of Waco TOC Connection ▪ Waco Transit Operations Center/TxDOT Waco District Traffic Office Connection ▪ Waco-McLennan County EOC/TxDOT Waco District Traffic Office Communications Connection	

Regional Traffic Control (ATMS07)	**High Priority**
This market package provides for the sharing of traffic information and control among traffic management centers to support a regional control strategy. This package relies on roadside instrumentation supported by the Surface Street Control and Freeway Control Market Packages and adds hardware, software, and communications capabilities to implement traffic management strategies that are coordinated between allied traffic management centers. The extent of information and control sharing is determined through working arrangements between jurisdictions.	
Existing Infrastructure None identified	**Agency**
Planned Projects ▪ TxDOT ATMS Implementation ▪ TxDOT Center-to-Center Communication (Statewide)	
Additional Needs ▪ City of Waco TOC Expansion ▪ Fort Hood/TxDOT Waco District Traffic Office Coordination ▪ TxDOT Waco District Traffic Office Capability Expansion ▪ TxDOT Waco District Traffic Office/City Killeen Communications Connection ▪ TxDOT Waco District Traffic Office/City of Temple Communications Connection ▪ TxDOT Waco District Traffic Office/City of Waco TOC Communications Connection	

Table 3 – High Priority Market Packages for the Waco Region (continued)

Incident Management System (ATMS08)	**High Priority**
This market package manages both unexpected incidents and planned events so that the impact to the transportation network and traveler safety is minimized. The market package includes incident detection capabilities through roadside surveillance devices (e.g. CCTV) and through regional coordination with other traffic management, maintenance and construction management, and emergency management centers as well as weather service entities and event promoters. Information from these diverse sources is collected and correlated by this market package to detect and verify incidents and implement an appropriate response. The response may include traffic control strategy modifications or resource coordination between center subsystems. The coordination with emergency management might be through a CAD system or through other communication with emergency field personnel. The coordination can also extend to tow trucks and other allied response agencies and field service personnel. Incident response also includes presentation of information to affected travelers using the Traffic Information Dissemination, Broadcast Traveler Information, or Interactive Traveler Information market packages.	
Existing Infrastructure ▪ TxDOT Emergency Vehicle Signal Preemption ▪ TxDOT Existing DMS ▪ TxDOT Portable DMS ▪ City of Waco Emergency Vehicle Signal Preemption ▪ City of Waco Emergency Vehicle MDTs ▪ Bell County Emergency Vehicles MDTs ▪ City of Killeen Emergency Vehicles MDTs ▪ City of Temple Emergency Vehicles MDTs	**Agency** ▪ TxDOT ▪ City of Waco ▪ Bell County ▪ City of Killeen ▪ City of Temple
Planned Projects ▪ TxDOT ATMS Implementation ▪ TxDOT Center-to-Center Communication (Statewide) ▪ TxDOT DMS ▪ TxDOT HCRS Enhancement	
Additional Needs ▪ Bell County EOC/TxDOT Waco District Traffic Office Communications Connection ▪ City of Harker Heights Portable DMS ▪ City of Killeen EOC/TxDOT Waco District Traffic Office Communication Connection ▪ City of Killeen Portable DMS ▪ City of Killeen TOC ▪ City of Temple EOC/TxDOT Waco District Traffic Office Communication Connection ▪ City of Temple Portable DMS ▪ City of Waco Portable DMS ▪ City of Waco CCTV Implementation ▪ City of Waco DMS ▪ City of Waco TOC Expansion ▪ Detour Planning	

Table 3 – High Priority Market Packages for the Waco Region (continued)

Incident Management System (ATMS08)	High Priority
Additional Needs (continued) ▪ Fort Hood Event Management Plans ▪ Fort Hood/TxDOT Waco District Traffic Office Coordination ▪ Regional 511 Advanced Traveler Information System Server ▪ TxDOT Additional DMS ▪ TxDOT Additional Portable DMS ▪ TxDOT CCTV ▪ TxDOT Waco District Traffic Office Capability Expansion ▪ TxDOT Waco District Traffic Office/City Killeen Communications Connection ▪ TxDOT Waco District Traffic Office/City of Temple Communications Connection ▪ TxDOT Waco District Traffic Office/City of Waco TOC Communications Connection ▪ TxDOT Waco District Vehicle Detection on I-35 ▪ Waco Traffic Information Website ▪ Waco-McLennan County EOC/TxDOT Waco District Traffic Office Communications Connection	

Speed Monitoring (ATMS19)	High Priority
This market package monitors the speeds of vehicles traveling through a roadway system. If the speed is determined to be excessive, roadside equipment can suggest a safe driving speed. Environmental conditions may be monitored and factored in to the safe speed advisories that are provided to the motorist. This service can also support notifications to an enforcement agency to enforce the speed limit on a roadway system.	
Existing Infrastructure ▪ TxDOT School Zone Speed Detection ▪ City of Waco Portable Speed Trailer ▪ Bell County Portable Speed Trailer ▪ City of Killeen Portable Speed Trailer ▪ City of Temple Portable Speed Trailer	**Agency** ▪ TxDOT ▪ City of Waco ▪ Bell County ▪ City of Killeen ▪ City of Temple
Planned Projects None identified at this time	
Additional Needs ▪ TxDOT School Zone Speed Monitoring Expansion ▪ City of Waco School Zone Speed Monitoring Implementation	

Table 3 – High Priority Market Packages for the Waco Region (continued)

Emergency Response (EM01)	**High Priority**
This market package includes emergency vehicle equipment, equipment used to receive and route emergency calls, and wireless communications that enable safe and rapid deployment of appropriate resources to an emergency. Coordination between Emergency Management Subsystems supports emergency notification and coordinated response between agencies.	
Existing Infrastructure ▪ TxDOT Emergency Vehicle Signal Preemption ▪ City of Waco Emergency Vehicle Signal Preemption ▪ City of Waco CAD ▪ City of Waco Emergency Vehicle MDTs ▪ Bell County Emergency Vehicles MDTs ▪ City of Killeen Emergency Vehicles MDTs ▪ City of Temple Emergency Vehicles MDTs	**Agency** ▪ TxDOT ▪ City of Waco ▪ Bell County ▪ City of Killeen ▪ City of Temple
Planned Projects None identified at this time	
Additional Needs ▪ Bell County Sheriff Vehicle AVL ▪ City of Copperas Cove Emergency Vehicle Signal Preemption Implementation ▪ City of Harker Heights Emergency Vehicle Signal Preemption Implementation ▪ City of Killeen Emergency Vehicle Signal Preemption Implementation ▪ City of Temple Emergency Vehicle Signal Preemption Implementation ▪ City of Waco Emergency Vehicle AVL ▪ McLennan County Sheriff AVL and MDTs ▪ Municipal Traffic Signal Preemption ▪ Waco-McLennan County EOC/DPS Communications Connection ▪ Waco-McLennan County EOC/State EOC Communications Connection	

Table 3 – High Priority Market Packages for the Waco Region (continued)

Road Weather Data Collection (MC03)	**High Priority**
This market package collects current road and weather conditions using data collected from environmental sensors deployed on and about the roadway. In addition to fixed road weather information system (RWIS) stations at the roadside, sensing of the roadway environment can also occur from sensor systems located on Maintenance and Construction Vehicles. The collected environmental data is used by the Weather Information Processing and Distribution Market Package to process the information and help operators make decisions on operations.	
Existing Infrastructure ▪ City of Waco Environmental Monitoring Stations	**Agency** ▪ City of Waco
Planned Projects None identified at this time	
Additional Needs ▪ TxDOT Flood Monitoring ▪ TxDOT RWIS Stations	

Weather Information Processing and Distribution (MC04)	**High Priority**
This market package processes and distributes the environmental information collected from the Road Weather Data Collection market package. This market package uses the environmental data to detect environmental hazards such as icy road conditions, high winds, and dense fog, so system operators and decision support systems can make decisions on corrective actions to take. The continuing updates of road condition information and current temperatures can be used by system operators to more effectively deploy road maintenance resources, issue general traveler advisories, issue location specific warnings to drivers using the Traffic Information Dissemination market package, and aid operators in scheduling work activity.	
Existing Infrastructure None identified	**Agency**
Planned Projects ▪ TxDOT ATMS Implementation ▪ TxDOT Center-to-Center Communication (Statewide) ▪ TxDOT HCRS Enhancement	
Additional Needs ▪ Media Liaison and Coordination ▪ Regional 511 Advanced Traveler Information System Server	

Table 3 – High Priority Market Packages for the Waco Region (continued)

Work Zone Management (MC08)	**High Priority**
This market package directs activity in work zones, controlling traffic through portable DMS and informing other groups of activity (e.g., ISP, TM, other maintenance and construction centers) for better coordination management. Work zone speeds and delays are provided to the motorist prior to the work zones.	
Existing Infrastructure ▪ TxDOT Existing DMS ▪ TxDOT Portable DMS ▪ City of Waco Portable Speed Trailer	**Agency** ▪ TxDOT ▪ City of Waco
Planned Projects ▪ TxDOT Center-to-Center Communication (Statewide) ▪ TxDOT DMS ▪ TxDOT HCRS Enhancement	
Additional Needs ▪ City of Harker Heights Portable DMS ▪ City of Killeen Portable DMS ▪ City of Temple Portable DMS ▪ City of Waco DMS ▪ City of Waco Portable DMS ▪ Regional 511 Advanced Traveler Information System Server ▪ TxDOT Additional DMS ▪ TxDOT Additional Portable DMS ▪ Waco Traffic Information Website	

Maintenance and Construction Activity Coordination (MC10)	**High Priority**
This market package supports the dissemination of maintenance and construction activity information to centers which can utilize it as part of their operations, or to the Information Service Providers who can provide the information to travelers.	
Existing Infrastructure None identified	**Agency**
Planned Projects ▪ TxDOT HCRS Enhancement ▪ TxDOT Center-to-Center Communication (Statewide)	
Additional Needs ▪ Media Liaison and Coordination ▪ Regional 511 Advanced Traveler Information System Server ▪ Waco Traffic Information Website	

Table 3 – High Priority Market Packages for the Waco Region (continued)

Transit Vehicle Tracking (APTS1)	**High Priority**
This market package monitors current transit vehicle location using an Automated Vehicle Location System. The location data may be used to determine real time schedule adherence and update the transit system's schedule in real-time.	
Existing Infrastructure None identified	**Agency**
Planned Projects None identified at this time	
Additional Needs ▪ Hill Country Transit AVL and MDTs ▪ Hill Country Transit CAD ▪ HOTCOG AVL ▪ Waco Transit AVL	

Table 3 – High Priority Market Packages for the Waco Region (continued)

Transit Fixed-Route Operations (APTS2)	**High Priority**
This market package performs vehicle routing and scheduling, as well as automatic driver assignment and system monitoring for fixed-route transit services. This service determines current schedule performance using AVL data and provides information displays for the Transit Management Subsystem. Static and real time transit data is exchanged with Information Service Providers where it is integrated with that from other transportation modes (e.g. rail, ferry, air) to provide the public with integrated and personalized dynamic schedules.	
Existing Infrastructure ▪ Waco Transit Operations Center ▪ Waco Transit Electronic Fare Collection Boxes ▪ Baylor Fixed Route Schedules on Website ▪ Hill Country Transit Fixed Route Central Dispatch ▪ Hill Country Transit Security Cameras ▪ Hill Country Transit Route Information Website ▪ Hill Country Transit CAD	**Agency** ▪ Waco Transit ▪ Hill Country Transit
Planned Projects ▪ Hill Country Transit Fixed Route On-board Security Cameras ▪ Waco Transit Electronic Fare Collection	
Additional Needs ▪ Hill Country Transit Automated Vehicle Maintenance Tracking ▪ Hill Country Transit AVL and MDTs ▪ Hill Country Transit CAD ▪ Hill Country Transit Electronic Fare Collection ▪ Hill Country Transit Operations Center/TxDOT Waco District Traffic Office Connection ▪ Multi-Modal Coordination ▪ Waco Transit Automated Vehicle Maintenance Tracking ▪ Waco Transit AVL ▪ Waco Transit On-board Security Cameras ▪ Waco Transit Operations Center/City of Waco TOC Connection ▪ Waco Transit Operations Center/TxDOT Waco District Traffic Office Connection ▪ Waco Transit Real-time Bus Information Travel Kiosks	

Table 3 – High Priority Market Packages for the Waco Region (continued)

Demand Response Transit Operations (APTS3)	**High Priority**
This market package performs vehicle routing and scheduling as well as automatic driver assignment and monitoring for demand responsive transit services. This package monitors the current status of the transit fleet and supports allocation of these fleet resources to service incoming requests for transit service while also considering traffic conditions. The Transit Management Subsystem provides the necessary data processing and information display to assist the transit operator in making optimal use of the transit fleet. This service includes the capability for a traveler request for personalized transit services to be made through the Information Service Provider (ISP) Subsystem.	
Existing Infrastructure ▪ Waco Transit Operations Center ▪ Hill Country Transit CAD ▪ Hill Country Transit Security Cameras ▪ HOTCOG Computer Aided Scheduling and Dispatch	**Agency** ▪ Waco Transit ▪ Hill Country Transit ▪ HOTCOG
Planned Projects ▪ HOTCOG Web-based Ride Scheduling and Travel Data ▪ Waco Transit Electronic Fare Collection	
Additional Needs ▪ Hill Country Transit Automated Vehicle Maintenance Tracking ▪ Hill Country Transit AVL and MDTs ▪ Hill Country Transit CAD ▪ Hill Country Transit Demand Response On-board Security Cameras ▪ Hill Country Transit Electronic Fare Collection ▪ Hill Country Transit Operations Center/TxDOT Waco District Traffic Office Connection ▪ HOTCOG AVL ▪ HOTCOG Mobile Data Terminals ▪ HOTCOG Transit Automated Vehicle Maintenance Tracking ▪ HOTCOG Transit Operations Center/TxDOT Waco District Traffic Office Connection ▪ Multi-Modal Coordination ▪ Waco Transit Automated Vehicle Maintenance Tracking ▪ Waco Transit AVL ▪ Waco Transit On-board Security Cameras ▪ Waco Transit Operations Center/City of Waco TOC Connection ▪ Waco Transit Operations Center/TxDOT Waco District Traffic Office Connection	

Table 3 – High Priority Market Packages for the Waco Region (continued)

Transit Passenger and Fare Management (APTS4)	**High Priority**
This market package manages passenger loading and fare payments on-board vehicles using electronic means. It allows transit users to use a traveler card or other electronic payment device. Sensors mounted on the vehicle permit the driver and central operations to determine vehicle loads, and readers located either in the infrastructure or on-board the transit vehicle allow electronic fare payment. Data is processed, stored, and displayed on the transit vehicle and communicated as needed to the Transit Management Subsystem.	
Existing Infrastructure ▪ Waco Transit Electronic Fare Collection Boxes	**Agency** ▪ Waco Transit
Planned Projects ▪ Waco Transit Electronic Fare Collection	
Additional Needs ▪ Hill Country Transit Electronic Fare Collection ▪ Hill Country Transit Automated Passenger Counters	

Transit Security (APTS5)	**High Priority**
This market package provides for the physical security of transit passengers. An on-board security system is deployed to perform surveillance and warn of potentially hazardous situations. Public areas (e.g. stops, park and ride lots, stations) are also monitored. Information is communicated to the Transit Management Subsystem using wireless or wireline infrastructure. Security related information is also transmitted to the Emergency Management Subsystem when an emergency is identified that requires an external response. Incident information is communicated to the Information Service Provider.	
Existing Infrastructure ▪ Waco Transit Distress Button ▪ Hill Country Transit Security Cameras	**Agency** ▪ Waco Transit ▪ Hill Country Transit
Planned Projects ▪ Hill Country Transit Fixed Route On-board Security Cameras	
Additional Needs ▪ Hill Country Transit Demand Response On-board Security Cameras ▪ Waco Transit On-board Security Cameras	

Table 3 – High Priority Market Packages for the Waco Region (continued)

Broadcast Traveler Information (ATIS1)	**High Priority**
This market package collects traffic conditions, advisories, general public transportation information, toll and parking information, incident information, air quality and weather information, and broadly disseminates this information through existing infrastructure and low cost user equipment (e.g., FM subcarrier, cellular data broadcast). This market package differs from the Traffic Information Dissemination market package, which provides localized HAR and DMS information capabilities. The information may be provided directly to travelers by an information service provider (ISP) or other traveler service providers so that they can better inform travelers of conditions. Successful deployment of this market package relies on availability of real-time traveler information from roadway instrumentation, probe vehicles, or other sources.	
Existing Infrastructure None identified	**Agency**
Planned Projects ▪ TxDOT HCRS Enhancement	
Additional Needs ▪ ISP Based Route Guidance ▪ Media Liaison and Coordination ▪ Regional 511 Advanced Traveler Information System Server ▪ Waco Traffic Information Website	

ITS Data Mart (AD1)	**High Priority**
This market package provides a focused archive that houses data collected and owned by a single agency, district, private sector provider, research institution, or other organization. This focused archive typically includes data covering a single transportation mode and one jurisdiction that is collected from an operational data store and archived for future use. It provides general query and report access to archive data users.	
Existing Infrastructure ▪ City of Waco Traffic Accident Database ▪ Waco Transit Ridership Database ▪ Fort Hood Traffic Count Database ▪ Hill Country Transit Ridership Database ▪ HOTCOG Ridership Database	**Agency** ▪ City of Waco ▪ Waco Transit ▪ Fort Hood ▪ Hill Country Transit ▪ HOTCOG
Planned Projects None identified at this time	
Additional Needs ▪ City of Waco Automated Crash Record Database ▪ City of Waco Traffic Data Database ▪ TxDOT Traffic Data Database	

2.3 Medium Priority Market Packages

Table 4 outlines market packages that were deemed medium priority by stakeholders in the Waco Region. These market packages were identified as useful and desirable services and functions for the Region, although very few of these market packages have existing infrastructure in place or planned over the next few years. The feasibility of funding for these market packages was a factor in the prioritization. Availability and maturity of technology also was a consideration, particularly for the maintenance and construction management market packages. Many of these market packages were recently developed and added to the National ITS Architecture, and are not yet widely deployed.

Table 4 – Medium Priority Market Packages for the Waco Region

Probe Surveillance (ATMS02)	**Medium Priority**
This market package provides an alternative approach for surveillance of the roadway network. Two general implementation paths are supported by this market package: 1) wide-area wireless communications between the vehicle and Information Service Provider is used to communicate current vehicle location and status and 2) dedicated short range communications between the vehicle and roadside is used to provide equivalent information directly to the Traffic Management Subsystem. It requires either wide area or short-range communications equipment, roadside beacons and wireline communications for the short-range communications option, data reduction software, and utilizes wireline links between the Traffic Management Subsystem and Information Service Provider Subsystem to share the collected information. Both “Opt out” and “Opt in” strategies are available to ensure that the user has the ability to turn off the probe functions to ensure individual privacy.	
Existing Infrastructure None identified	**Agency**
Planned Projects None identified at this time	
Additional Needs None identified at this time	

Freeway Control (ATMS04)	**Medium Priority**
This market package provides the communications and roadside equipment to support ramp control, lane controls, and interchange control for freeways. This package is consistent with typical urban traffic freeway control systems. This package incorporates the instrumentation included in the Network Surveillance Market Package to support freeway monitoring and adaptive strategies as an option. This market package also includes the capability to utilize surveillance information for detection of incidents.	
Existing Infrastructure None identified	**Agency**
Planned Projects None identified at this time	
Additional Needs None identified at this time	

Table 4 – Medium Priority Market Packages for the Waco Region (continued)

Standard Railroad Grade Crossing/ Railroad Operations Coordination (ATMS13/ATMS15)	**Medium Priority**
This market package manages highway traffic at highway-rail intersections (HRIs) where rail operational speeds are less than 80 miles per hour. Both passive (e.g., the crossbuck sign) and active warning systems (e.g., flashing lights and gates) are supported. These traditional HRI warning systems may also be augmented with other standard traffic management devices. The warning systems are activated on notification by interfaced wayside equipment of an approaching train. The equipment at the HRI may also be interconnected with adjacent signalized intersections so that local control can be adapted to highway-rail intersection activities. Health monitoring of the HRI equipment and interfaces is performed; detected abnormalities are reported to both highway and railroad officials through wayside interfaces and interfaces to the traffic management subsystem. The Railroad Operations Coordination component provides an additional level of strategic coordination between rail operations and traffic management centers. Rail operations provide train schedules, maintenance schedules, and any other forecast events that will result in HRI closures. This information is used to develop forecast HRI closure times and durations that may be used in advanced traffic control strategies or to enhance the quality of traveler information.	
Existing Infrastructure ▪ TxDOT Railroad Signal Preemption	**Agency** ▪ TxDOT
Planned Projects None identified at this time	
Additional Needs None identified at this time	

Red Light Running (ATMS22)	**Medium Priority**
This market package provides the communications and roadside equipment to support red light running automated enforcement. This market package also includes the capability to coordinate with law enforcement agencies for ticketing.	
Existing Infrastructure None identified	**Agency**
Planned Projects None identified at this time	
Additional Needs None identified at this time	

Table 4 – Medium Priority Market Packages for the Waco Region (continued)

Military Base Entrance Electronic Clearance (ATMS23)	**Medium Priority**
This market package provides for automated clearance at military base entrance check facilities. The check facility maintains a database of cleared vehicles that may enter the base without waiting in the inspection queue.	
Existing Infrastructure None identified	**Agency**
Planned Projects None identified at this time	
Additional Needs ▪ Fort Hood Automated Vehicle Credentialing	

Emergency Vehicle Routing (EM02)	**Medium Priority**
This market package supports automated vehicle location and dynamic routing of emergency vehicles. The service also supports coordination with the Traffic Management Subsystem, collecting detailed road network conditions and requesting special priority or other specific emergency traffic control strategies on the selected route(s). The service provides for information exchange between care facilities and both the Emergency Management Subsystem and emergency vehicles.	
Existing Infrastructure ▪ TxDOT Emergency Vehicle Signal Preemption ▪ City of Waco Emergency Vehicle Signal Preemption ▪ City of Waco Emergency Vehicle MDTs ▪ Bell County Emergency Vehicles MDTs ▪ City of Killeen Emergency Vehicles MDTs ▪ City of Temple Emergency Vehicles MDTs	**Agency** ▪ TxDOT ▪ City of Waco ▪ Bell County ▪ City of Killeen ▪ City of Temple
Planned Projects None identified at this time	
Additional Needs ▪ Bell County Sheriff Vehicle AVL ▪ City of Copperas Cove Emergency Vehicle Signal Preemption Implementation ▪ City of Harker Heights Emergency Vehicle Signal Preemption Implementation ▪ City of Killeen Emergency Vehicle Signal Preemption Implementation ▪ City of Temple Emergency Vehicle Signal Preemption Implementation ▪ City of Waco Emergency Vehicle AVL ▪ McLennan County Sheriff AVL and MDTs ▪ Municipal Traffic Signal Preemption	

Table 4 – Medium Priority Market Packages for the Waco Region (continued)

Roadway Maintenance and Construction (MC07)	**Medium Priority**
This market package supports numerous services for scheduled and unscheduled maintenance and construction on a roadway system or right-of-way. Maintenance services would include landscape maintenance, hazard removal, routine maintenance activities, and repair and maintenance of both ITS and non-ITS equipment on the roadway. Environmental conditions information is also received from various weather sources to aid in scheduling maintenance and construction activities.	
Existing Infrastructure ▪ TxDOT Portable DMS ▪ City of Waco Portable Speed Trailer ▪ Bell County Portable Speed Trailer ▪ City of Killeen Portable Speed Trailer ▪ City of Temple Portable Speed Trailer	**Agency** ▪ TxDOT ▪ City of Waco ▪ Bell County ▪ City of Killeen ▪ City of Temple
Planned Projects ▪ TxDOT DMS ▪ TxDOT HCRS Enhancement	
Additional Needs ▪ City of Harker Heights Portable DMS ▪ City of Killeen Portable DMS ▪ City of Temple Portable DMS ▪ City of Waco DMS ▪ City of Waco Portable DMS ▪ Regional 511 Advanced Traveler Information System Server ▪ TxDOT Additional DMS ▪ TxDOT Additional Portable DMS ▪ TxDOT Flood Monitoring ▪ TxDOT RWIS Stations ▪ TxDOT Work Zone Safety Monitoring ▪ Waco Traffic Information Website	

Table 4 – Medium Priority Market Packages for the Waco Region (continued)

Work Zone Safety Monitoring (MC09)	**Medium Priority**
This market package includes systems and strategies to improve work crew safety and reduce collisions between the motoring public and maintenance vehicles and activities. Included in this market package is detection for vehicle intrusions to the work zone and warning systems to alert workers and drivers of potential safety hazards. This market package support both stationary and mobile work zones.	
Existing Infrastructure ▪ City of Waco Portable Speed Trailer ▪ Bell County Portable Speed Trailer ▪ City of Killeen Portable Speed Trailer ▪ City of Temple Portable Speed Trailer	**Agency** ▪ City of Waco ▪ Bell County ▪ City of Killeen ▪ City of Temple
Planned Projects None identified at this time	
Additional Needs ▪ TxDOT Work Zone Safety Monitoring	

Transit Maintenance (APTS6)	**Medium Priority**
This market package supports automatic transit maintenance scheduling and monitoring. On-board condition sensors monitor system status and transmit critical status information to the Transit Management Subsystem. Hardware and software in the Transit Management Subsystem processes this data and schedules preventative and corrective maintenance.	
Existing Infrastructure None identified	**Agency**
Planned Projects None identified at this time	
Additional Needs ▪ Hill Country Transit Automated Vehicle Maintenance Tracking ▪ HOTCOG Transit Automated Vehicle Maintenance Tracking ▪ Waco Transit Automated Vehicle Maintenance Tracking	

Table 4 – Medium Priority Market Packages for the Waco Region (continued)

Transit Traveler Information (APTS8)	**Medium Priority**
This market package provides transit users at transit stops and on-board transit vehicles with ready access to transit information. The information services include transit stop annunciation, imminent arrival signs, and real-time transit schedule displays that are of general interest to transit users. Systems that provide custom transit trip itineraries and other tailored transit information services are also represented by this market package.	
Existing Infrastructure None identified	**Agency**
Planned Projects ▪ HOTCOG Web-based Ride Scheduling and Travel Data	
Additional Needs ▪ Waco Transit Real-Time Bus Information Travel Kiosks	

HAZMAT Management (CVO10)	**Medium Priority**
This market package integrates incident management capabilities with commercial vehicle tracking to assure effective treatment of HAZMAT materials and incidents. HAZMAT tracking is performed by the Fleet and Freight Management Subsystem. The Emergency Management Subsystem is notified by the Commercial Vehicle if an incident occurs and coordinates the response. The response is tailored based on information that is provided as part of the original incident notification or derived from supplemental information provided prior to the beginning of the trip or gathered following the incident depending on the selected policy and implementation.	
Existing Infrastructure None identified	**Agency**
Planned Projects None identified at this time	
Additional Needs None identified at this time	

Table 4 – Medium Priority Market Packages for the Waco Region (continued)

ITS Data Warehouse (AD2)	Medium Priority
This market package includes all of the data collection and management capabilities provided by the ITS Data Mart, and adds the functionality and interface definitions that allow the collection of data from multiple agencies and data sources spanning across modal and jurisdictional boundaries. It performs the additional transformations and provides the additional data management features that are necessary so that all the data can be managed in a single repository. The potential for large volumes of carried data suggests additional on-line analysis and data mining features that are also included in this market package in addition to the basic query and reporting user access features offered by the ITS Data Mart.	
Existing Infrastructure ▪ Waco MPO Regional Traffic Count and Accident Database ▪ Killeen/Temple MPO Regional Traffic Count Database	**Agency** ▪ Waco MPO ▪ Killeen/Temple MPO
Planned Projects ▪ Waco MPO Data Warehouse	
Additional Needs ▪ Central Texas COG Data Warehouse ▪ HOTCOG Data Warehouse ▪ Killeen-Temple MPO Data Warehouse	

2.4 Low Priority Market Packages

Four of the market packages that were identified and customized for the Waco Region were ranked as low priority by stakeholders. These market packages are listed in **Table 5**. The services contained in these lower priority market packages were deemed useful and desirable for the Region, but stakeholders did not feel that public agencies should put a strong focus on these market packages in the near-term. These market packages were included as part of the Regional ITS Architecture so as not to preclude them from future deployment in the Region.

Some of these market packages were identified as candidates for private sector deployment and operations, such as ISP-Based Route Guidance. Others, such as Maintenance and Construction Vehicle Maintenance, are just more feasible for future implementation.

Table 5 – Low Priority Market Packages for the Waco Region

Market Package Name	Description	Comments
Maintenance and Construction Vehicle Tracking (MC01)	This market package will track the location of maintenance and construction vehicles and other equipment to ascertain the progress of their activities. These activities can include ensuring the correct roads are being plowed and work activity is being performed at the correct locations.	This market package was not deemed a high priority at this time, however, it was expected that the information from this market package may be useful to the Region some time in the future if maintenance activities were to become more automated. Included in this market package would be instrumentation of maintenance and construction vehicles with AVL.
Maintenance and Construction Vehicle Maintenance (MC02)	This market package performs vehicle maintenance scheduling and manages both routine and corrective maintenance activities on vehicles and other maintenance and construction equipment. It includes on-board sensors capable of automatically performing diagnostics for maintenance and construction vehicles, and the systems that collect this diagnostic information and use it to schedule and manage vehicle maintenance.	Based on the current state of technology, this market package was not identified as needed in the Waco Region at this time. As technology evolves, the Region may consider implementation of this market package in the future.

Table 5 – Low Priority Market Packages for the Waco Region (continued)

Market Package Name	Description	Comments
Multi-Modal Coordination (APTS7)	This market package establishes two-way communications between multiple transit and traffic agencies to improve service coordination. Multimodal coordination between transit agencies can increase traveler convenience at transfer points and also improve operating efficiency. Coordination between traffic and transit management is intended to improve on-time performance of the transit system to the extent that this can be accommodated without degrading overall performance of the traffic network. More limited local coordination between the transit vehicle and the individual intersection for signal priority is also supported by this package.	The Waco Region might want to consider this market package as a future deployment.
ISP-Based Route Guidance (ATIS5)	This market package offers the user pre-trip route planning and turn-by-turn route guidance services, which are generated by an Information Service Provider (ISP). Routes may be based on static information or reflect real-time network conditions. This approach simplifies the user equipment requirements and can provide the infrastructure better information on which to predict future traffic. The package includes two-way data communications and optionally also equips the vehicle with the databases, location determination capability, and display technology to support turn-by-turn route guidance.	This market package is best suited for deployment and ongoing operations by a private sector ISP. Fee-based subscription services are typically required for delivery of this service. Stakeholders recognized a need to support this market package but will not take an active role in its implementation.

3. PRIORITIZATION OF PROJECTS

In order to achieve the vision of the Regional ITS Architecture, a Region must deploy carefully developed projects that provide the functionality and interoperability identified in the architecture. A key step toward that vision is the development of an ITS Deployment Plan that identifies specific projects, timeframes, and responsible agencies.

Input from all stakeholders is required in order for the stakeholders to have ownership of the ITS Deployment Plan and also to be sure that the plan has realistically identified projects and timeframes for the Region. Cost is another important factor. Cost can vary a great deal for many ITS elements, depending on the level of deployment, maturity of the technology, type of communications, etc. For example, freeway network surveillance could be adequately achieved for one Region by the deployment of still frame CCTV cameras only at freeway interchanges. In another Region, there may be a desire for full motion cameras deployed at one mile intervals to provide complete coverage of the freeway. The infrastructure and telecommunications costs for these two projects would vary a great deal, yet either one could be suitable for a particular Region.

In order to achieve input from stakeholders, a workshop was held in the Waco Region on February 10, 2004 to present the draft Regional ITS Deployment Plan and discuss potential projects. Each project recommended for the Regional ITS Deployment Plan was discussed, and consensus was reached by the stakeholders on the project description and the timeframe for implementation.

In the following sections, projects are categorized into short-term projects (5-year deployment timeframe), mid-term projects (10-year deployment timeframe), and long-term projects (20-year deployment timeframe). For each timeframe, a summary table has been included that provides a brief project description, responsible agency, probable cost, an indication as to whether funding has been identified, and an estimated duration for the project to be designed and implemented. The agency identified as the responsible agency will be responsible for implementation, operations, and maintenance unless otherwise noted.

Following each table, a more detailed description of individual projects is included. This section also lists the market packages associated with each project and any pre-requisite projects that are required.

3.1 Short-Term Projects (5-Year)

Table 6 provides a description of projects for the Waco Region in the 5-year timeframe. These projects represent the highest priority for the Region and should be strongly considered for implementation in the short-term. Immediately following **Table 6** are project descriptions for each of the short-term recommendations.

3.2 Mid-Term Projects (10-Year)

Table 7 provides a description of projects in the 10-year timeframe. Several of these projects are continuations of projects that will begin in the 5-year timeframe. These projects are important to the Region, but will need further review at the time of their deployment to ensure they are still a priority for the Region. Immediately following **Table 7** are project descriptions for each of the mid-term recommendations.

3.3 Long-Term Projects (20-Year)

Table 8 provides a description of projects in the 20-year timeframe. While these projects represent market packages and anticipated future needs identified for the Region, they will need to be closely reviewed prior to implementation. It is expected that a major update to the Region's ITS Deployment Plan will occur prior to year 10 which would allow stakeholders to reassess these long-term projects to be sure that they are still feasible for the Region. Immediately following **Table 8** are project descriptions for each of the long-term recommendations.

Table 6 – Short-Term Projects (5-Year)

Program Area/Project	Description	Responsible Agency*	Probable Cost**	Funding Identified	Estimated Project Duration
Travel and Traffic Management					
TxDOT ATMS Implementation	Implement TxDOT Advanced Traffic Management System (ATMS) in TxDOT Waco District Traffic Office	TxDOT	N/A	Yes	2 years
TxDOT Center-to-Center Communication (Statewide)	Enhance coordination with other TxDOT Districts through implementation of center-to-center communications between TxDOT Traffic Management Centers (TMCs)	TxDOT	N/A	Yes	1 year
TxDOT DMS	Implement 9 dynamic message signs (DMS) along roadway facilities such as I-35 and US 190 in the Region for traffic information dissemination	TxDOT	$100,000/sign	Partial	2 years
TxDOT Waco Vehicle Detection on I-35	Implement vehicle detection capabilities along I-35 for the purpose of incident detection and travel time calculations	TxDOT	To Be Determined	No	2 years
TxDOT Closed Loop Signal System Expansion Phase 1	Expand TxDOT closed loop signal system at signalized intersections throughout the Region. Also includes the implementation of video image vehicle detector systems (VIVDS).	TxDOT	To Be Determined	No	2 years
City of Waco Closed Loop Signal System Expansion Phase 1	Expand City of Waco closed loop signal system at additional signalized intersections in the City of Waco. Also includes the implementation of VIVDS.	City of Waco	To Be Determined	No	2 years
City of Killeen Closed Loop Signal System Continued Development Phase 1	Continue to develop the City of Killeen closed loop signal system at additional signalized intersections in the City of Killeen. Also includes the implementation of VIVDS.	City of Killeen	To Be Determined	No	2 years
City of Temple Closed Loop Signal System Continued Development Phase 1	Continue to develop the City of Temple closed loop signal system at additional signalized intersections in the City of Temple. Also includes the implementation of VIVDS.	City of Temple	To Be Determined	No	2 years
City of Harker Heights Closed Loop Signal System Phase 1	Develop a closed loop signal system for the City of Harker Heights. Also includes the implementation of VIVDS.	City of Harker Heights	To Be Determined	No	2 years
City of Killeen TOC	Establish a Traffic Operations Center (TOC) in Killeen for the control of City of Killeen traffic signals and any other future ITS deployments	City of Killeen	To Be Determined	No	2 years

Table 6 – Short-Term Projects (5-Year) (continued)

Program Area/Project	Description	Responsible Agency*	Probable Cost**	Funding Identified	Estimated Project Duration
Travel and Traffic Management (continued)					
Fort Hood Automated Vehicle Credentialing	Implement an automated vehicle credentialing program so that frequent visitors to Fort Hood can be electronically cleared for entrance	Fort Hood	To Be Determined	No	2 years
Fort Hood/TxDOT Waco District Traffic Office Coordination	Establish procedures and methods for coordination of messages for DMS and other traffic related issues	TxDOT/Fort Hood	To Be Determined	No	6 months
Emergency Management					
City of Temple Emergency Vehicle Signal Preemption Implementation	Implement signal pre-emption for emergency vehicles in the City of Temple	City of Temple	To Be Determined	No	1 year
City of Killeen Emergency Vehicle Signal Preemption Implementation	Implement signal pre-emption for emergency vehicles in the City of Killeen	City of Killeen	To Be Determined	No	1 year
Maintenance and Construction Management					
TxDOT HCRS Enhancement	Implement enhancements to the Highway Conditions Reporting System (HCRS)	TxDOT	N/A	Yes (statewide initiative)	1 year
TxDOT Additional Portable DMS	Procure additional portable DMS for use by TxDOT maintenance crews	TxDOT	$30,000/sign	No	6 months
Public Transportation Management					
HOTCOG AVL	Implement automated vehicle location (AVL) to provide location information of buses and enable communication	HOTCOG	$10,000/vehicle (Includes software)	No	6 months
HOTCOG Web-based Ride Scheduling and Travel Data	Expand the existing scheduling system to provide web-based ride scheduling and real-time travel data via the internet	HOTCOG	$100,000	Yes	6 months
Hill Country Transit CAD	Implement a computer aided dispatch (CAD) system for Hill Country Transit	Hill Country Transit	$250,000	No	6 months

Table 6 – Short-Term Projects (5-Year) (continued)

Program Area/Project	Description	Responsible Agency*	Probable Cost**	Funding Identified	Estimated Project Duration
Public Transportation Management (continued)					
Hill Country Transit AVL and MDTs	Install AVL and mobile data terminals (MDTs) on Hill Country Transit vehicles	Hill Country Transit	$10,000/vehicle (Includes software)	No	6 months
Hill Country Transit Fixed Route On-board Security Cameras	Install security cameras on fixed route vehicles possibly with real time surveillance feed back to the transit operations center	Hill Country Transit	$85,000	Yes	6 months
Waco Transit AVL	Install AVL on Waco Transit vehicles	Waco Transit	$10,000/vehicle (Includes software)	No	6 months
Waco Transit Real-time Bus Information Travel Kiosks	Provide real-time bus information at transfer stations including time to next bus arrival	Waco Transit	$100,000	No	9 months
Waco Transit On-board Security Cameras	Install security cameras on fixed route buses for local record surveillance	Waco Transit	To Be Determined	No	6 months
Waco Transit Electronic Fare Collection	Implement smart card electronic fare collection for Waco Transit	Waco Transit	To Be Determined	Yes	6 months
Archived Data					
City of Waco Automated Crash Record Database	Using police department MDTs as the data source, create an automated crash record database where crash data is automatically archived directly from the reporting officer's MDT	City of Waco	To Be Determined	No	1 year
Waco MPO Data Warehouse	Expand the data warehouse to archive data from cities and transit agencies in the Waco Metropolitan Planning Organization (MPO) service area	Waco MPO	To Be Determined	Yes	3 years

*Agency listed is responsible for implementation, operations, and maintenance unless otherwise noted.

**The design has not been undertaken and thus this is only an opinion of probable cost for planning purposes.

Waco Region
Short-Term Projects (5-Year)

Travel and Traffic Management

TxDOT ATMS Implementation

Associated Market Packages:

- Network Surveillance (ATMS01)
- Traffic Information Dissemination (ATMS06)
- Regional Traffic Control (ATMS07)
- Incident Management System (ATMS08)
- Weather Information Processing and Distribution (MC04)

Prerequisite Projects: None

Description: This project involves the implementation of ATMS software to facilitate control of DMS, CCTV cameras and other TxDOT field equipment.

The TxDOT ATMS is a software and hardware based platform developed by the TxDOT Traffic Operations Division. The function of this software is to provide a platform for the integration of various subsystems. The high level functions of the TxDOT ATMS include:

- Collect traffic information (e.g., speed, incidents, lane closures) through a variety of collection methods such as loops, video image detection, etc.;
- Data archiving;
- Graphical map with traffic information;
- Status information, command and control for DMS, ramp metering and CCTV;
- Video switching; and
- User ID/password provided with each transaction for tracking use and establishing device control authority.

Future development efforts include software modules to provide status information and command/control of HAR and environmental sensors (such as flood detection systems). An integrated maintenance database management module is also under development. Lastly, several modules are currently being upgraded to support recently approved National Transportation Communications for ITS Protocol (NTCIP) standards for CCTV, Center-to-Center Communications, and data collection devices.

This ATMS implementation project will include the software and hardware necessary to have an operational central system to routinely poll devices and support archiving of data.

TxDOT Center-to-Center Communication (Statewide)

Associated Market Packages:

- Traffic Information Dissemination (ATMS06)
- Regional Traffic Control and Coordination (ATMS07)
- Incident Management System (ATMS08)
- Weather Information Processing and Distribution (MC04)
- Work Zone Management (MC08)
- Maintenance and Construction Activity Coordination (MC10)

Prerequisite Projects: TxDOT ATMS Implementation

Description: The Center-to-Center Communications project will enhance coordination with TxDOT Districts through connection to the statewide center-to-center core infrastructure. A communication backbone must be developed with sufficient capacity between the TxDOT Waco District Office and existing center-to-center infrastructure. Determination of whether the backbone should be TxDOT owned, leased, or a combination thereof will be determined at a later date. The software required to support center-to-center communications is integrated with the TxDOT developed ATMS, so significant software development efforts are not anticipated. Resources will be required to oversee installation of the communications backbone between the TxDOT Waco District Office and statewide center-to-center facilities. As part of connecting to the statewide center-to-center infrastructure, the Waco Region will provide data to the statewide web server and statewide data archiving database. In return, access to information from other TxDOT Districts (and potentially other agencies) will be available to enhance operations throughout the Region.

TxDOT DMS

Associated Market Packages:

- Traffic Information Dissemination (ATMS06)
- Incident Management System (ATMS08)
- Roadway Maintenance and Construction (MC07)
- Work Zone Management (MC08)

Prerequisite Projects: None

Description: This project consists of the deployment of permanent DMS along State roadway facilities in the Region such as I-35 and US 190 for purposes of traffic information dissemination and incident management. DMS also will be utilized in conjunction with emergency evacuation coordination (i.e., HAZMAT, weather, etc.). The estimated cost per sign is approximately $100,000.

TxDOT Waco Vehicle Detection on I-35

Associated Market Packages:

- Network Surveillance (ATMS01)
- Incident Management System (ATMS08)

Prerequisite Projects: None

Description: Implement vehicle detection along I-35 in the Waco Region for the purpose of incident detection and travel time calculations. Probe surveillance using transponders that already exist on many trucks passing through the Region is a potential method of data collection. Other detection methods could include in pavement loop detectors or VIVDS. The cost will vary based on the detection method chosen.

TxDOT Closed Loop Signal System Expansion Phase 1

Associated Market Packages:

- Network Surveillance (ATMS01)
- Surface Street Control (ATMS03)

Prerequisite Projects: None

Description: Expand the TxDOT closed loop signal system by converting existing signalized intersections to the closed-loop signal system. New signals that are installed as part of other projects will become part of the closed loop signal system. This project also includes the installation of VIVDS.

City of Waco Closed Loop Signal System Expansion Phase 1

Associated Market Packages:

- Network Surveillance (ATMS01)
- Surface Street Control (ATMS03)

Prerequisite Projects: None

Description: Expand the closed loop signal system in the City of Waco. This project also includes the implementation of VIVDS.

City of Killeen Closed Loop Signal System Continued Development Phase 1

Associated Market Packages:

- Network Surveillance (ATMS01)
- Surface Street Control (ATMS03)

Prerequisite Projects: None

Description: Continue to develop the closed loop signal system in the City of Killeen through incorporating additional intersections into the system. This project also includes the implementation of VIVDS.

City of Temple Closed Loop Signal System Continued Development Phase 1

Associated Market Packages:

- Network Surveillance (ATMS01)
- Surface Street Control (ATMS03)

Prerequisite Projects: None

Description: Continue to develop the closed loop signal system in the City of Temple through incorporating additional intersections into the system. This project also includes the implementation of VIVDS.

City of Harker Heights Closed Loop Signal System Phase 1

Associated Market Packages:

- Network Surveillance (ATMS01)
- Surface Street Control (ATMS03)

Prerequisite Projects: None

Description: Develop a closed loop signal system in the City of Harker Heights. This project also includes the implementation of VIVDS.

City of Killeen TOC

Associated Market Packages:

- Network Surveillance (ATMS01)
- Surface Street Control (ATMS03)
- Traffic Information Dissemination (ATMS06)
- Incident Management System (ATMS08)

Prerequisite Projects: None

Description: Installation of equipment needed to monitor and manage traffic flow in the City of Killeen. Control of closed loop signal systems in the City of Killeen as well as operations of any future ITS deployments within the city will occur from the TOC.

Fort Hood Automated Vehicle Credentialing

Associated Market Packages:

- Military Base Entrance Electronic Clearance (ATMS23)

Prerequisite Projects: None

Description: Implement an electronic credentialing system for vehicles entering Fort Hood. Electronic credentialing will enable vehicles with prior security clearance to enter the base without waiting in general entrance queues, thus reducing congestion and delay.

Fort Hood/TxDOT Waco District Traffic Office Coordination

Associated Market Packages:

- Regional Traffic Control (ATMS07)
- Incident Management System (ATMS08)

Prerequisite Projects: None

Description: Establish procedures and methods for coordination of messages for DMS and other traffic related issues. Special consideration should be given to event management coordination between Fort Hood and TxDOT Waco.

Emergency Management

City of Temple Emergency Vehicle Signal Preemption Implementation

Associated Market Packages:

- Surface Street Control (ATMS03)
- Emergency Response (EM01)
- Emergency Vehicle Routing (EM02)

Prerequisite Projects: None

Description: Equip traffic signals in the City of Temple with traffic signal preemption equipment. Typical installations include mounting hardware at the intersection and on each vehicle authorized to preempt the signal. The intersection equipment includes a detector(s) positioned at the intersection approach(es) connected to the traffic signal controller. As a vehicle equipped with a preemption emitter approaches an intersection, the detector activates a change in signal timing to allow fast and safe passage. Preemption systems have proven to improve safety of emergency personnel and vehicles en-route to an incident.

City of Killeen Emergency Vehicle Signal Preemption Implementation

Associated Market Packages:

- Surface Street Control (ATMS03)
- Emergency Response (EM01)
- Emergency Vehicle Routing (EM02)

Prerequisite Projects: None

Description: Equip traffic signals in the City of Killeen with traffic signal preemption equipment. Typical installations include mounting hardware at the intersection and on each vehicle authorized to preempt the signal. The intersection equipment includes a detector(s) positioned at the intersection approach(es) connected to the traffic signal controller. As a vehicle equipped with a preemption emitter approaches an intersection, the detector activates a change in signal timing to allow fast and safe passage. Preemption systems have proven to improve safety of emergency personnel and vehicles en-route to an incident.

Maintenance and Construction Management

TxDOT HCRS Enhancement

Associated Market Packages:

- Traffic Information Dissemination (ATMS06)
- Incident Management System (ATMS08)
- Weather Information Processing and Distribution (MC04)
- Roadway Maintenance and Construction (MC07)
- Work Zone Management (MC08)
- Maintenance and Construction Activity Coordination (MC10)
- Broadcast Traveler Information (ATIS1)

Prerequisite Projects: None

Description: TxDOT's HCRS will be enhanced on a statewide basis. The HCRS will use data from the Waco District Office, both automated (ATMS) and manually entered. It is envisioned that the ATMS software will enhance the data collection and consolidation processes for automated information. This is a statewide effort; the Waco District will be affected by this project, and will contribute information to the HCRS, but will not be responsible for funding the enhancements or for the implementation schedule.

TxDOT Additional Portable DMS

Associated Market Packages:

- Traffic Information Dissemination (ATMS06)
- Incident Management System (ATMS08)
- Roadway Maintenance and Construction (MC07)
- Work Zone Management (MC08)

Prerequisite Projects: None

Description: Portable DMS are a valuable tool to communicate existing and future closures, restrictions, detours, alternate routes, and other important information to motorists while they are en-route. These signs can be used at or near work zones to notify motorists of activity and appropriate measures to take (i.e., detour, slow down), but also can be mobilized at specific locations as conditions warrant, such as flooding or other closures. Portable DMS can be stand-alone signs or mounted to the back of a maintenance vehicle. Programming is typically done manually at the sign. The TxDOT Waco District Office currently has access to portable DMS that can be used in the Region. This project will procure additional portable DMS. The estimated cost is $30,000 a sign.

Public Transportation Management

HOTCOG AVL

Associated Market Packages:

- Transit Vehicle Tracking (APTS1)
- Demand-Response Transit Operations (APTS3)

Prerequisite Projects: None

Description: Install AVL units on HOTCOG transit vehicles. The AVL system will convey information regarding real-time vehicle location to the Transit Operations Center, which will allow for enhanced system monitoring, scheduling, routing (or re-routing), as well as provide for precise bus location information in the event of a breakdown or emergency situation. AVL systems measure actual, real-time position of transit vehicles, and relay that information back to a transit operations center, usually via global positioning system. Used with a geographic information system map, bus locations can be displayed for any vehicles in the fleet equipped with the on-board AVL unit. AVL, in conjunction with CAD, allows for improved bus tracking capability, as well as archiving and managing historical data. AVL systems also can be equipped with additional features, including tie-ins to alarm/security systems, vehicle component monitoring, and automated passenger counter and fare payment systems. Information from the AVL/CAD system can be used by transit managers for real-time operations and management as well as for transit traveler information. In areas where AVL technology has been installed on buses, agencies report a 5 to 25 percent increase in on-time performance, which translates directly to improved efficiency and operations.

Cost will vary depending on the number of vehicles equipped with AVL systems, as well as the functions and features designed into the systems. The estimated cost is $10,000 per vehicle.

HOTCOG Web-based Ride Scheduling and Travel Data

Associated Market Packages:

- Demand Response Transit Operations (APTS3)
- Transit Traveler Information (APTS8)

Prerequisite Projects: HOTCOG AVL

Description: This project will include the publishing of real-time transit data on the HOTCOG website. Patrons of HOTCOG transit operations will benefit from real-time as well as static information presented on this website. Users of the system will be able to enter their origination and destination addresses and the system will identify the best routes and times for arrivals for the trip. Web-based ride scheduling for demand-response transit is included in this project. The estimated cost for the project is $100,000.

Hill Country Transit CAD

Associated Market Packages:

- Transit Vehicle Tracking (APTS1)
- Transit Fixed-Route Operations (APTS2)
- Demand-Response Transit Operations (APTS3)

Prerequisite Projects: None

Description: Implement CAD for Hill Country Transit to monitor and manage transit operations. The CAD system will provide data processing support to assist the dispatchers in managing communications with vehicles and generate management reports. The main goal of this project is to use automation to plan daily optimal routes where origins, destinations, common locations, and client requested times and equipment needs are grouped so that the most efficient routes with the maximum number of shared rides (several clients sharing a vehicle) are created for the paratransit services.

This CAD system will provide reporting functions, by automatically logging all communications between the dispatch center and the driver, including time, vehicle/driver ID, nature of the communication, and response.

Hill Country Transit AVL and MDTs

Associated Market Packages:

- Transit Vehicle Tracking (APTS1)
- Transit Fixed-Route Operations (APTS2)
- Demand-Response Transit Operations (APTS3)

Prerequisite Projects: None

Description: Install AVL and Mobile Data Terminal (MDT) units on Hill Country Transit vehicles. The AVL system will convey information regarding real-time vehicle location to the Transit Operations Center, which will allow for enhanced system monitoring, scheduling, routing (or re-routing), as well as provide for precise bus location information in the event of a breakdown or emergency situation. AVL systems measure actual, real-time position of transit vehicles, and relay that information back to a transit operations center, usually via global positioning system. Used with a geographic information system map, bus locations can be displayed for any vehicles in the fleet equipped with the on-board AVL unit. AVL, in conjunction with CAD, allows for improved bus tracking capability, as well as archiving and managing historical data. AVL systems also can be equipped with additional features, including tie-ins to alarm/security systems, vehicle component monitoring, and automated passenger counter and fare payment systems. Information from the AVL/CAD system can be used by transit managers for real-time operations and management as well as for transit traveler information. In areas where AVL technology has been installed on buses, agencies report a 5 to 25 percent increase in on-time performance, which translates directly to improved efficiency and operations.

Mobile data terminals allow bus operators to send and receive digital messages. Mobile data terminals can be used by dispatchers to notify drivers of adverse conditions, route changes, or other impacts to the route. MDTs can also transmit information from the driver to the dispatch center, including status,

disruptions, or silent alarms. An additional feature that can be built-in to the MDT is the ability for vehicle-to-vehicle digital communications, in addition to the vehicle-to-center communications.

Cost will vary depending on the number of vehicles equipped with AVL/MDT systems, as well as the functions and features designed into the systems (above the basic location and digital communication functions). The estimated cost is $10,000 per vehicle.

Hill Country Transit Fixed Route On-board Security Cameras

Associated Market Packages:

- Transit Fixed Route Operations (APTS2)
- Transit Security (APTS5)

Prerequisite Projects: None

Description: This project will install security cameras on Hill Country Transit fixed-route vehicles. It is a possibility that the security cameras would provide video feed from the buses to the transit operations center for monitoring.

Waco Transit AVL

Associated Market Packages:

- Transit Vehicle Tracking (APTS1)
- Transit Fixed-Route Operations (APTS2)
- Demand-Response Transit Operations (APTS3)

Prerequisite Projects: None

Description: Install AVL units on Waco Transit vehicles. The AVL system will convey information regarding real-time vehicle location to the Transit Operations Center, which will allow for enhanced system monitoring, scheduling, routing (or re-routing), as well as provide for precise bus location information in the event of a breakdown or emergency situation. AVL systems measure actual, real-time position of transit vehicles, and relay that information back to a transit operations center, usually via global positioning system. Used with a geographic information system map, bus locations can be displayed for any vehicles in the fleet equipped with the on-board AVL unit. AVL, in conjunction with CAD, allows for improved bus tracking capability, as well as archiving and managing historical data. AVL systems also can be equipped with additional features, including tie-ins to alarm/security systems, vehicle component monitoring, and automated passenger counter and fare payment systems. Information from the AVL/CAD system can be used by transit managers for real-time operations and management as well as for transit traveler information. In areas where AVL technology has been installed on buses, agencies report a 5 to 25 percent increase in on-time performance, which translates directly to improved efficiency and operations.

Cost will vary depending on the number of vehicles equipped with AVL systems, as well as the functions and features designed into the systems. The estimated cost is $10,000 per vehicle.

Waco Transit Real-time Bus Information Travel Kiosks

Associated Market Packages:

- Transit Fixed Route Operations (APTS2)
- Transit Traveler Information (APTS8)

Prerequisite Projects: Waco Transit AVL

Description: Install static and real-time transit and traveler information devices at transit transfer stations in the Region. The project will build on information available from the transit AVL project. Kiosks, monitors, or dynamic signs will relay information on current bus operating conditions (e.g., Next bus – 5 minutes, on schedule, delayed 10 minutes, etc.).

Waco Transit On-board Security Cameras

Associated Market Packages:

- Transit Fixed Route Operations (APTS2)
- Demand Response Transit Operations (APTS3)
- Transit Security (APTS5)

Prerequisite Projects: None

Description: This project will install security cameras on Waco Transit vehicles. The cameras will be for local recording only.

Waco Transit Electronic Fare Collection

Associated Market Packages

- Transit Fixed Route Operations (APTS2)
- Demand Response Transit Operations (APTS3)
- Transit Passenger and Fare Management (APTS4)

Prerequisite Projects: None

Description: Implement electronic fare collection systems on Waco Transit vehicles. There are three primary benefits of these collection systems. The first is enhanced revenue collection ability. The second is increased security by not having large amounts of cash or tokens on the vehicle. The third is the increased convenience and security for the transit patron. These systems are often implemented in conjunction with AVL or mobile data terminals, or are implemented as an add-on to those systems. To enable automated fare collection, fare boxes would need to be upgraded to accept smart cards (i.e., cards with passive radio frequency identification (RFID) technology or a magnetic information strip, such as a credit card) with rider and account information. Electronic fare payment and passenger information technology is rapidly advancing, and there will be several technological considerations that will need to be examined, such as standards for smart cards and interoperability issues.

Archived Data Management

City of Waco Automated Crash Record Database

Associated Market Packages:

- ITS Data Mart (AD1)

Prerequisite Projects: None

Description: Create an automated crash record database for the City of Waco using data from police department MDTs. This project will implement a system to collect, store and process the data downloaded from the MDTs. This project will design the frequency, quantity, and quality of data to be collected and stored. It will be necessary to work in coordination with the police department and potential database users (traffic department, etc.) to determine the appropriate accident report format to collect all needed information.

Waco MPO Data Warehouse

Associated Market Packages:

- ITS Data Warehouse (AD2)

Prerequisite Projects: None

Description: Implement a system to collect, store and process transportation data from selected locations. This project will design the frequency, quantity, and quality of data to be collected and stored. User interfaces will be required at each local agency to be able to access, search, and upload archived data as needed. The interface will likely be web-based.

Table 7 – Mid-Term Projects (10-Year)

Program Area/Project	Description	Responsible Agency*	Probable Cost**	Funding Identified	Estimated Project Duration
Travel and Traffic Management					
TxDOT Waco District Traffic Office Capability Expansion	Expand the TxDOT Waco District Traffic Office. Project includes the implementation of end equipment to allow video feed and control for VIVDS and closed-circuit television (CCTV) camera pan/tilt/zoom (PTZ).	TxDOT	$300,000	No	1 year
TxDOT Closed Loop Signal System Expansion Phase 2	Continue expansion of closed loop signal system at TxDOT intersections throughout the Region	TxDOT	To Be Determined	No	1 year
TxDOT Additional DMS	Implement additional DMS in the Region for traffic information dissemination	TxDOT	$100,000/sign	No	2 years
TxDOT CCTV	Implement CCTV cameras at select locations in the Region for traffic monitoring and incident detection	TxDOT	$20,000-$25,000/site	No	2 years
TxDOT School Zone Speed Monitoring Expansion	Expand the current school zone speed monitoring system to upgrade additional existing school zone flashers to flashers with speed monitoring and display capabilities	TxDOT/School Districts	To Be Determined	No	1 year
TxDOT Waco District Traffic Office/City of Waco TOC Communications Connection	Implement a connection between the City of Waco TOC and the TxDOT Waco District Traffic Office to allow video sharing, traffic data sharing, and other joint functions	TxDOT/City of Waco	To Be Determined	No	1 year
City of Waco TOC Expansion	Expand the City of Waco TOC. The expansion includes the implementation of end equipment to allow video feed and control for VIVDS and CCTV camera PTZ.	City of Waco	$300,000	No	2 years
Media Liaison and Coordination	Develop agreements/enhanced coordination with local media to improve information sharing and dissemination. Provide CCTV camera feeds to media.	TxDOT/City of Waco/City of Temple/City of Killeen/Bell County	N/A	N/A	6 months
Detour Planning	Develop detour plans for major thoroughfares in the Waco Region, including I-35, to prepare a potential detour due to an incident or construction	TxDOT/City of Waco/City of Killeen/City of Temple	To Be Determined	No	2 years
Fort Hood Event Management Plans	Develop event management plans that include alternate signal timings, evacuation routes, and general traffic management planning for major events held at Fort Hood	Fort Hood/City of Temple/City of Killeen/TxDOT	To Be Determined	No	1 year

Table 7 – Mid-Term Projects (10-Year) (continued)

Program Area/Project	Description	Responsible Agency*	Probable Cost**	Funding Identified	Estimated Project Duration
Travel and Traffic Management (continued)					
City of Waco Closed Loop Signal System Expansion Phase 2	Expand City of Waco closed loop signal system at additional signalized intersections in the City of Waco. Also includes the implementation of VIVDS.	City of Waco	To Be Determined	No	2 years
City of Killeen Closed Loop Signal System Implementation Phase 2	Expand City of Killeen closed loop signal system at additional signalized intersections in the City of Killeen. Also includes the implementation of VIVDS.	City of Killeen	To Be Determined	No	2 years
City of Temple Closed Loop Signal System Implementation Phase 2	Expand City of Temple closed loop signal system at additional signalized intersections in the City of Temple. Also includes the implementation of VIVDS.	City of Temple	To Be Determined	No	2 years
City of Harker Heights Closed Loop Signal System Phase 2	Continue to develop a closed loop signal system for the City of Harker Heights. Also includes the implementation of VIVDS.	City of Harker Heights	To Be Determined	No	2 years
City of Waco School Zone Speed Monitoring Implementation	Upgrade existing school zone flashers to flashers with speed monitoring and display capabilities	City of Waco	To Be Determined	No	1 year
Waco Traffic Information Website	Establish a website for traffic information that will include information on current roadway conditions	City of Waco/Waco MPO	$100,000	No	1 year
Regional 511 Advanced Traveler Information System Server	Implement advanced traveler information system (ATIS) server in the TxDOT Waco District Traffic Office that will collect, consolidate, and distribute traveler information to a 511 based phone system, web, and private Information Service Providers (ISPs)	TxDOT	To Be Determined	No	1 year
Emergency Management					
Waco-McLennan County EOC/DPS Communications Connection	Install connection between Department of Public Safety (DPS) and the Waco-McLennan County Emergency Operations Center (EOC) for data sharing	Waco-McLennan County EOC/DPS	To Be Determined	No	3 months
City of Waco Emergency Vehicle AVL	Implement AVL on fire, emergency medical services (EMS), and police vehicles for real-time location information	City of Waco	$10,000/vehicle (Includes software)	No	2 years

Table 7 – Mid-Term Projects (10-Year) (continued)

Program Area/Project	Description	Responsible Agency*	Probable Cost**	Funding Identified	Estimated Project Duration
Emergency Management (continued)					
Waco-McLennan County EOC/TxDOT Waco District Traffic Office Communications Connection	Establish a connection between the Waco-McLennan County EOC and the TxDOT Waco District Traffic Office for coordination and sharing of incident and traffic information	Waco-McLennan County EOC/TxDOT	To Be Determined	No	1 year
Waco-McLennan County EOC/State EOC Communications Connection	Establish a connection between the Waco-McLennan County EOC and the State EOC for coordination and sharing of incident information	Waco-McLennan County EOC/State EOC	To Be Determined	No	1 year
Bell County EOC/TxDOT Waco District Traffic Office Communications Connection	Establish a connection between the Bell County EOC and the TxDOT Waco District Traffic Office for coordination and sharing of incident and traffic information	Bell County/TxDOT	To Be Determined	No	1 year
Bell County Sheriff Vehicle AVL	Implement AVL on Bell County Sheriff vehicles for real-time location information	Bell County	$10,000/vehicle (includes software)	No	2 years
City of Harker Heights Emergency Vehicle Signal Preemption Implementation	Implement signal pre-emption for emergency vehicles in the City of Harker Heights	City of Harker Heights	To Be Determined	No	1 year
City of Copperas Cove Emergency Vehicle Signal Preemption Implementation	Implement signal pre-emption for emergency vehicles in the City of Copperas Cove	City of Copperas Cove	To Be Determined	No	1 year
McLennan County Sheriff AVL and MDTs	Implement AVL and MDTs on McLennan County Sheriff vehicles for real time vehicle location information and improved communication	McLennan County	$10,000/vehicle (includes software)	No	2 years
Municipal Traffic Signal Preemption	Implement signal pre-emption at intersections for emergency vehicles in other cities as needed. Project includes equipment for emergency vehicles.	Waco Region Cities/TxDOT	To Be Determined	No	1 year

Table 7 – Mid-Term Projects (10-Year) (continued)

Program Area/Project	Description	Responsible Agency*	Probable Cost**	Funding Identified	Estimated Project Duration
Maintenance and Construction Management					
TxDOT RWIS Stations	Install RWIS stations to collect road weather information in the Waco District	TxDOT	$25,000/ station	No	6 months
TxDOT Flood Monitoring	Install flood monitoring stations in areas of the Waco District that are prone to flooding	TxDOT	To Be Determined	No	6 months
City of Waco Portable DMS	Procure portable DMS for use by City of Waco maintenance crews	City of Waco	$30,000/sign	No	6 months
City of Harker Heights Portable DMS	Procure portable DMS for use by City of Harker Heights maintenance crews	City of Harker Heights	$30,000/sign	No	6 months
TxDOT Work Zone Safety Monitoring	Implement portable work zone safety monitoring equipment at work zones	TxDOT	$500,000	No	1 year
Public Transportation Management					
Waco Transit Operations Center/City of Waco TOC Connection	Implement a connection between the Waco Transit dispatch center and the City of Waco TOC	Waco Transit/City of Waco	To Be Determined	No	1 year
HOTCOG Mobile Data Terminals	Install mobile data terminals on Heart of Texas Council of Governments (HOTCOG) transit vehicles for route guidance, route changes, and general communication with the driver	HOTCOG	To Be Determined	No	6 months
Hill Country Transit Demand Response On-board Security Cameras	Install security cameras on demand response vehicles possibly with real time surveillance feed back to the transit operations center	Hill Country Transit	To Be Determined	No	6 months
Hill Country Transit Electronic Fare Collection	Implement smart card electronic fare collection for Hill Country Transit	Hill Country Transit/Service Providers (Texas Department of Health)	To Be Determined	No	6 months
Waco Transit Operations Center/TxDOT Waco District Traffic Office Connection	Implement a connection between the Waco Transit dispatch center and the TxDOT Waco District Traffic Office	Waco Transit/TxDOT	To Be Determined	No	1 year

Table 7 – Mid-Term Projects (10-Year) (continued)

Program Area/Project	Description	Responsible Agency*	Probable Cost**	Funding Identified	Estimated Project Duration
Public Transportation Management (continued)					
Hill Country Transit Operations Center/TxDOT Waco District Traffic Office Connection	Implement a connection between the Hill Country Transit dispatch center and the TxDOT Waco District Traffic Office	Hill Country Transit/TxDOT	To Be Determined	No	1 year
HOTCOG Transit Operations Center/TxDOT Waco District Traffic Office Connection	Implement a connection between the HOTCOG Transit dispatch center and the TxDOT Waco District Traffic Office	HOTCOG/TxDOT	To Be Determined	No	1 year
Hill Country Transit Automated Passenger Counters	Implement passive system to accurately count ridership	Hill Country Transit	$2,000/vehicle	No	6 months
Archived Data					
TxDOT Traffic Data Database	Establish a traffic data database for the TxDOT Waco District to store information such as traffic counts and make it available to users at different agencies in the District	TxDOT	$200,000	No	3 years
City of Waco Traffic Data Database	Establish a traffic data database for the City of Waco to store information such as traffic counts and make it available to users at different agencies in the Region	City of Waco	$200,000	No	3 years
HOTCOG Data Warehouse	Implement a data warehouse to archive data from cities and transit agencies in the HOTCOG service area	HOTCOG	$100,000	No	3 years
Central Texas COG Data Warehouse	Implement a data warehouse to archive data from cities and transit agencies in the Central Texas COG service area	Central Texas COG	$100,000	No	3 years
Killeen-Temple MPO Data Warehouse	Expand the data warehouse to archive data from cities and transit agencies in the Killeen-Temple MPO service area	Killeen-Temple MPO	To Be Determined	No	3 years

*Agency listed is responsible for implementation, operations, and maintenance unless otherwise noted.

**The design has not been undertaken and thus this is only an opinion of probable cost for planning purposes.

Waco Region
Mid-Term Projects (10-Year)

Travel and Traffic Management

TxDOT Waco District Traffic Office Capability Expansion

Associated Market Packages:

- Network Surveillance (ATMS01)
- Surface Street Control (ATMS03)
- Traffic Information Dissemination (ATMS06)
- Regional Traffic Control (ATMS07)
- Incident Management System (ATMS08)

Prerequisite Projects: None

Description: This project includes the expansion of the capabilities of the TxDOT Waco District Traffic Office. Currently, the Transportation Management Center (TMC) is used primarily to monitor the operations of the controllers and detectors at signalized intersections. Additionally, VIVDS video images are not currently being transmitted to the TMC. The planned expansion of the TMC would include the implementation of end equipment to allow the transmission of the video feed from the VIVDS in the field back to the TMC. This project would also include the capabilities to control the VIVDS remotely from the TMC as well as control of the PTZ of the planned CCTV cameras.

The estimated cost associated with this expansion is $300,000.

TxDOT Closed Loop Signal System Expansion Phase 2

Associated Market Packages:

- Network Surveillance (ATMS01)
- Surface Street Control (ATMS03)

Prerequisite Projects: TxDOT Closed Loop Signal System Expansion Phase 1

Description: Expand the TxDOT closed loop signal system by integrating additional signals and implementing VIVDS at select TxDOT intersections throughout the Region.

TxDOT Additional DMS

Associated Market Packages:

- Traffic Information Dissemination (ATMS06)
- Incident Management System (ATMS08)
- Roadway Maintenance and Construction (MC07)
- Work Zone Management (MC08)

Prerequisite Projects: TxDOT DMS

Description: This project continues the deployment of permanent DMS at locations along roadways in the Region for purposes of traffic information dissemination and incident management. The estimated cost per sign is approximately $100,000.

TxDOT CCTV

Associated Market Packages:

- Network Surveillance (ATMS01)
- Incident Management (ATMS08)

Prerequisite Projects: None

Description: This project includes the deployment of CCTV cameras along key segments of roadway in the Waco Region. The CCTV cameras can be used for incident detection and verification, to monitor congestion and to aid in the dispatch of emergency vehicles. The information gathered by the CCTV cameras (video feed) can be shared with the area emergency management agencies.

TxDOT School Zone Speed Monitoring Expansion

Associated Market Packages:

- Network Surveillance (ATMS01)
- Surface Street Control (ATMS03)
- Speed Monitoring (ATMS19)

Prerequisite Projects: None

Description: This project includes the expansion of the existing TxDOT school zone speed monitoring system. Each installation includes a radar detector and speed display to inform drivers of their speed in relation to the posted school zone speed limit.

TxDOT Waco District Traffic Office/City of Waco TOC Communications Connection

Associated Market Packages:

- Regional Traffic Control (ATMS07)
- Incident Management System (ATMS08)

Prerequisite Projects: TxDOT Waco District Traffic Office Capability Expansion, City of Waco TOC Expansion

Description: Install a connection between the City of Waco TOC and the TxDOT Waco District Traffic Office to allow video sharing, traffic data sharing and other joint functions. The type of connection (fiber, wireless, leased line) will need to be determined prior to implementation of this project based on desired band width and cost of technologies available.

City of Waco TOC Expansion

Associated Market Packages:

- Network Surveillance (ATMS01)
- Surface Street Control (ATMS03)
- Traffic Information Dissemination (ATMS06)
- Regional Traffic Control (ATMS07)
- Incident Management System (ATMS08)

Prerequisite Projects: None

Description: This project includes the expansion of the capabilities of the City of Waco TOC. Currently, the City of Waco TOC is used primarily to monitor the operations of the controllers and detectors at signalized intersections. Additionally, VIVDS video images are not currently being transmitted to the TMC. The planned expansion of the TMC would include the implementation of end equipment to allow the transmission of the video feed from the VIVDS in the field back to the TMC. This project would also include the capabilities to control the VIVDS remotely from the TMC as well as control of the PTZ of the CCTV cameras.

The estimated cost associated with this expansion is $300,000.

Media Liaison and Coordination

Associated Market Packages:

- Traffic Information Dissemination (ATMS06)
- Weather Information Processing and Distribution (MC04)
- Maintenance and Construction Activity Coordination (MC10)
- Broadcast Traveler Information (ATIS1)

Prerequisite Projects: None

Description: Develop stronger liaison and coordination with local media to disseminate traveler information. Develop a link for local media to tap into CCTV camera images for dissemination of traffic and weather advisories to the public via television and radio news broadcasts. Most television and radio stations typically already have microwave licenses and infrastructure in place to support wireless transmission of video. Therefore, TxDOT should provide a connection point at the Traffic Office for media providers (e.g., video switch including video images and traffic conditions map), but not design and install the entire connection between the Traffic Office and the media. An initial task in the project will be to meet with interested news providers to determine information needs to support media interface design activities. Each agency that will be sharing information directly with the media will likely need an agreement or policy in place to determine what type of information will be shared. A subgroup of the stakeholders will need to work on the process of sharing data with the media and what broadcasts will be allowed to attempt to provide similar data to the media from each individual stakeholder.

Detour Planning

Associated Market Packages:

- Surface Street Control (ATMS03)
- Incident Management (ATMS08)

Prerequisite Projects: None

Description: This project will identify detour routes for the interstate, state, and local arterials to be used during times of major incidents on the respective roadways. Once an incident has been detected and verified, the Waco District Traffic Office can post a message to a DMS along the subject roadway providing information not only on the incident (expected duration and delay) but also provide potential alternate routes. Additionally, if the detour routes are designated, the owning agency can provide alternate signal timing (from the typical timing plans) that will help move detoured traffic efficiently through the detour route.

Fort Hood Event Management Plans

Associated Market Packages:

- Surface Street Control (ATMS03)
- Incident Management (ATMS08)

Prerequisite Projects: None

Description: This project will develop event management plans for the area surrounding Fort Hood to help mitigate congestion during special events or incidents. The plans could include alternate signal timing plans, evacuation routes, and general traffic management planning.

City of Waco Closed Loop Signal System Expansion Phase 2

Associated Market Packages:

- Network Surveillance (ATMS01)
- Surface Street Control (ATMS03)

Prerequisite Projects: City of Waco Closed Loop Signal System Expansion Phase 1

Description: Continue to expand the closed loop signal system in the City of Waco. This project includes the implementation of VIVDS.

City of Killeen Closed Loop Signal System Implementation Phase 2

Associated Market Packages:

- Network Surveillance (ATMS01)
- Surface Street Control (ATMS03)

Prerequisite Projects: City of Killeen Closed Loop Signal System Continued Development Phase 1

Description: Continue to implement the closed loop signal system in the City of Killeen. This project includes the implementation of VIVDS.

City of Temple Closed Loop Signal System Implementation Phase 2

Associated Market Packages:

- Network Surveillance (ATMS01)
- Surface Street Control (ATMS03)

Prerequisite Projects: City of Temple Closed Loop Signal System Continued Development Phase 1

Description: Continue to implement the closed loop signal system in the City of Temple. This project includes the implementation of VIVDS.

City of Harker Heights Closed Loop Signal System Phase 2

Associated Market Packages:

- Network Surveillance (ATMS01)
- Surface Street Control (ATMS03)

Prerequisite Projects: City of Harker Heights Closed Loop Signal System Phase 1

Description: Continue to develop a closed loop signal system in the City of Harker Heights. This project also includes the implementation of VIVDS.

City of Waco School Zone Speed Monitoring Implementation

Associated Market Packages:

- Network Surveillance (ATMS01)
- Surface Street Control (ATMS03)
- Speed Monitoring (ATMS19)

Prerequisite Projects: None

Description: This project includes the upgrade of standard school zone flasher installations to include a radar detector and speed display to inform drivers of their speed in relation to the posted school zone speed limit.

Waco Traffic Information Website

Associated Market Packages:

- Traffic Information Dissemination (ATMS06)
- Incident Management System (ATMS08)
- Roadway Maintenance and Construction (MC07)
- Work Zone Management (MC08)
- Maintenance and Construction Activity Coordination (MC10)
- Broadcast Traveler Information (ATIS1)
- ISP-Based Route Guidance Support (ATIS5)

Prerequisite Projects: TxDOT ATMS Implementation, TxDOT Waco Vehicle Detection on I-35

Description: Establish a website for the dissemination of traffic information for the Waco area. Information will be included on current roadway conditions, construction, roadway closures, and incidents that could impact travel times. The estimated cost for developing this website will vary based on the type and quantity of information included as well as any automated features that are integrated.

Regional 511 Advanced Traveler Information System Server

Associated Market Packages:

- Traffic Information Dissemination (ATMS06)
- Incident Management System (ATMS08)
- Weather Information Processing and Distribution (MC04)
- Roadway Maintenance and Construction (MC07)
- Work Zone Management (MC08)
- Maintenance and Construction Activity Coordination (MC10)
- Broadcast Traveler Information (ATIS1)
- ISP-Based Route Guidance Support (ATIS5)

Prerequisite Projects: TxDOT ATMS Implementation, TxDOT Center-to-Center Communications, TxDOT HCRS Enhancements

Description: Install a server dedicated to ATIS in the TxDOT Waco District Office. This server would be installed as part of a 511 rollout in Texas and would provide a gateway for public and private entities to access current conditions, closures, restrictions, weather, and other valuable travel information. Relevant data from the ATMS and HCRS would be sent to the ATIS server where it would be consolidated and 'packaged' for distribution via phone (511), the internet, and to private partners who desire access to information in the Waco Region. These private partners could include local media and information service providers, which would link to the ATIS server to download information, or obtain real-time feeds, depending on the link provided by the private partner. Appropriate security measures and firewalls could be designed into the server to allow or restrict access to registered, authorized users. By fusing various types of data from a variety of sources (traffic management, incident management, and others), the data can be converted to usable information for travelers as well as other agencies.

Emergency Management

Waco-McLennan County EOC/DPS Communications Connection

Associated Market Packages:

- Emergency Response (EM01)

Prerequisite Projects: None

Description: Install a telecommunications connection between the Waco-McLennan County EOC and DPS Communications to facilitate emergency management coordination. Cost of this connection will be determined based on the communications method chosen.

City of Waco Emergency Vehicle AVL

Associated Market Packages:

- Emergency Response (EM01)
- Emergency Vehicle Routing (EM02)

Prerequisite Projects: None

Description: Install AVL on City of Waco fire, police, and EMS vehicles. The AVL system will convey information regarding real-time vehicle location to the dispatch centers, which will allow for enhanced dispatch, routing (or re-routing), as well as provide for precise vehicle location information in the event of a breakdown or emergency situation. AVL systems measure actual, real-time position of vehicles, and relay that information back to a dispatch center, usually via global positioning system.

Costs will vary depending on the number of vehicles equipped with the units. For planning purposes, it is estimated that the cost per vehicle is approximately $10,000.

Waco-McLennan County EOC/TxDOT Waco District Traffic Office Communications Connection

Associated Market Packages:

- Traffic Information Dissemination (ATMS06)
- Incident Management System (ATMS08)

Prerequisite Projects: TxDOT Waco District Traffic Office Capability Expansion

Description: Install telecommunications connection between the Waco-McLennan County EOC and TxDOT Waco District Traffic Office to allow for CCTV camera shared monitoring and control and data sharing. Cost of this connection will be determined based on the communications method chosen.

Waco-McLennan County EOC/State EOC Communications Connection

Associated Market Packages:

- Emergency Response (EM01)

Prerequisite Projects: None

Description: Install a telecommunications connection between the Waco-McLennan County EOC and the State EOC to facilitate emergency management coordination. Cost of this connection will be determined based on the communications method chosen.

Bell County EOC/TxDOT Waco District Traffic Office Communications Connection

Associated Market Packages:

- Traffic Information Dissemination (ATMS06)
- Incident Management System (ATMS08)

Prerequisite Projects: TxDOT Waco District Traffic Office Capability Expansion

Description: Install telecommunications connection between the Bell County EOC and TxDOT Waco District Traffic Office to allow for CCTV camera shared monitoring and control and data sharing. Cost of this connection will be determined based on the communications method chosen.

Bell County Sheriff Vehicle AVL

Associated Market Packages:

- Emergency Response (EM01)
- Emergency Vehicle Routing (EM02)

Prerequisite Projects: None

Description: Install AVL on Bell County Sheriff vehicles. The AVL system will convey information regarding real-time vehicle location to the dispatch centers, which will allow for enhanced dispatch, routing (or re-routing), as well as provide for precise vehicle location information in the event of a breakdown or emergency situation. AVL systems measure actual, real-time position of vehicles, and relay that information back to a dispatch center, usually via global positioning system.

Costs will vary depending on the number of vehicles equipped with the units. For planning purposes, it is estimated that the cost per vehicle is approximately $10,000.

City of Harker Heights Emergency Vehicle Signal Preemption Implementation

Associated Market Packages:

- Surface Street Control (ATMS03)
- Emergency Response (EM01)
- Emergency Vehicle Routing (EM02)

Prerequisite Projects: None

Description: Equip traffic signals in the City of Harker Heights with traffic signal preemption equipment. Typical installations include mounting hardware at the intersection and on each vehicle authorized to preempt the signal. The intersection equipment includes a detector(s) positioned at the intersection approach(es) connected to the traffic signal controller. As a vehicle equipped with a preemption emitter approaches an intersection, the detector activates a change in signal timing to allow fast and safe passage. Preemption systems have proven to improve safety of emergency personnel and vehicles en-route to an incident.

City of Copperas Cove Emergency Vehicle Signal Preemption Implementation

Associated Market Packages:

- Surface Street Control (ATMS03)
- Emergency Response (EM01)
- Emergency Vehicle Routing (EM02)

Prerequisite Projects: None

Description: Equip traffic signals in the City of Copperas Cove with traffic signal preemption equipment. Typical installations include mounting hardware at the intersection and on each vehicle authorized to preempt the signal. The intersection equipment includes a detector(s) positioned at the intersection approach(es) connected to the traffic signal controller. As a vehicle equipped with a preemption emitter approaches an intersection, the detector activates a change in signal timing to allow fast and safe passage. Preemption systems have proven to improve safety of emergency personnel and vehicles en-route to an incident.

McLennan County Sheriff AVL and MDTs

Associated Market Packages:

- Emergency Response (EM01)
- Emergency Vehicle Routing (EM02)

Prerequisite Projects: None

Description: Install AVL and mobile data terminals on McLennan County sheriff vehicles. The AVL system will convey information regarding real-time vehicle location to the dispatch centers, which will allow for enhanced dispatch, routing (or re-routing), as well as provide for precise vehicle location information in the event of a breakdown or emergency situation. AVL systems measure actual, real-time position of vehicles, and relay that information back to a dispatch center, usually via global positioning system.

Mobile data terminals allow deputies to send and receive digital messages. Mobile data terminals can be used by dispatchers to notify drivers of adverse conditions and recommended routes. MDTs can also transmit information from the driver to the dispatch center, including status, disruptions, or silent alarms. An additional feature that can be built-in to the MDT is the ability for vehicle-to-vehicle digital communications, in addition to the vehicle to dispatch communications.

Costs will vary depending on the number of vehicles equipped with the units. For planning purposes, it is estimated that the cost per vehicle is approximately $10,000.

Municipal Traffic Signal Preemption

Associated Market Packages:

- Surface Street Control (ATMS03)
- Emergency Response (EM01)
- Emergency Vehicle Routing (EM02)

Prerequisite Projects: None

Description: Equip traffic signals in municipalities in the Waco Region with traffic signal preemption equipment. Typical installations include mounting hardware at the intersection and on each vehicle authorized to preempt the signal. The intersection equipment includes a detector(s) positioned at the intersection approach(es) connected to the traffic signal controller. As a vehicle equipped with a preemption emitter approaches an intersection, the detector activates a change in signal timing to allow fast and safe passage. Preemption systems have proven to improve safety of emergency personnel and vehicles en-route to an incident.

Maintenance and Construction Management

TxDOT RWIS Stations

Associated Market Packages:

- Network Surveillance (ATMS01)
- Road Weather Data Collection (MC03)
- Roadway Maintenance and Construction (MC07)

Prerequisite Projects: None

Description: Install RWIS stations in the Waco Region. The RWIS will be remotely monitored by the TxDOT Waco District. Real time weather information improves response time, increases winter maintenance efficiency, and minimizes the traveling public's exposure to hazardous weather-related roadway conditions. Archived RWIS information also provides valuable historic information for planning purposes. Data including temperature (atmospheric and pavement), precipitation, wind, humidity, visibility (white out/heavy fog) and even pavement surface conditions (i.e., snow, chemical) are collected by sensors placed at the roadside (typically on a 30 foot tower) and embedded in the roadway. Remote processing units placed along the roadway communicate with various types of road and weather sensors. Data from the units are transmitted to the central ATMS server, via dial-up modem or other low bandwidth telecommunications methods, which will be located at the TxDOT Waco District Traffic Office. A future module for the ATMS software will support environmental sensor data and provides collection, archiving, and distribution of the data.

The estimated cost for one RWIS station is $25,000.

TxDOT Flood Monitoring

Associated Market Packages:

- Network Surveillance (ATMS01)
- Road Weather Data Collection (MC03)
- Roadway Maintenance and Construction (MC07)

Prerequisite Projects: None

Description: Implement flood detection systems on flood-prone segments of Interstates and state routes in the Waco Region. This will enable faster response times by maintenance crews to close flooded or near flooded roadway segments as necessary. The typical flood detection station is composed of a stream gauge, a rain gauge, a temperature sensor, a wind speed sensor, and a wind direction sensor and remote communications support. Other upgrades that may support operational decision-making include sensors to measure relative humidity, soil moisture content, solar radiation, and air and water quality. The flood detection systems will be monitored from the TxDOT Waco District Office. Communications between the flood detection stations and the District Office can be achieved through a variety of wireless and wireline telemetry methods. There is a future module of the ATMS software planned to support environmental sensors, and development of this module could be extended to include the needs of flood detection stations.

Costs for this project will vary based on the number of locations and detection stations installed, as well as communications.

City of Waco Portable DMS

Associated Market Packages:

- Traffic Information Dissemination (ATMS06)
- Incident Management System (ATMS08)
- Roadway Maintenance and Construction (MC07)
- Work Zone Management (MC08)

Prerequisite Projects: None

Description: This project would procure portable DMS for the City of Waco maintenance crews. Portable DMS are a valuable tool to communicate existing and future closures, restrictions, detours, alternate routes, and other important information to motorists while they are en-route. These signs can be used at or near work zones to notify motorists of activity and appropriate measures to take (i.e., detour, slow down), but also can be mobilized at specific locations as conditions warrant, such as flooding or other closures. Portable DMS can be stand-alone signs or mounted to the back of a maintenance vehicle. Programming is typically done manually at the sign. The estimated cost is $30,000 per sign.

City of Harker Heights Portable DMS

Associated Market Packages:

- Traffic Information Dissemination (ATMS06)
- Incident Management System (ATMS08)
- Roadway Maintenance and Construction (MC07)
- Work Zone Management (MC08)

Prerequisite Projects: None

Description: This project would procure portable DMS for the City of Harker Heights maintenance crews. Portable DMS are a valuable tool to communicate existing and future closures, restrictions, detours, alternate routes, and other important information to motorists while they are en-route. These signs can be used at or near work zones to notify motorists of activity and appropriate measures to take (i.e., detour, slow down), but also can be mobilized at specific locations as conditions warrant, such as flooding or other closures. Portable DMS can be stand-alone signs or mounted to the back of a maintenance vehicle. Programming is typically done manually at the sign. The estimated cost is $30,000 per sign.

TxDOT Work Zone Safety Monitoring

Associated Market Packages:

- Roadway Maintenance and Construction (MC07)
- Work Zone Safety Monitoring (MC09)

Prerequisite Projects: None

Description: This project will include the use of advanced warning systems to detect unauthorized vehicles that have entered the perimeter of the work zone. The intent of such systems is to help decrease the number of accidents in work zones due to motorists getting too close to workers or their equipment. Intrusion detection devices can alert construction workers and the motorist that the motorist has entered the safe zone and should take evasive action. It is anticipated that this project will be conducted on, and possibly required by TxDOT on, a per-project basis.

Public Transportation Management

Waco Transit Operations Center/City of Waco TOC Connection

Associated Market Packages:

- Traffic Information Dissemination (ATMS06)
- Transit Fixed-Route Operations (APTS2)
- Demand-Response Transit Operations (APTS3)
- Multi-modal Coordination (APTS7)

Prerequisite Projects: City of Waco TOC Expansion

Description: Implement communications link between the City of Waco TOC and Waco Transit. This center-to-center application area supports coordination with traffic management centers to obtain near real-time traffic conditions on transit routes in order to generate optimum schedules and alternate routes when necessary. In addition, information on service/fleet performance and transit incident information and schedules will be provided to the TOC.

The extent to which information and coordination are shared between the centers will be determined through working arrangements among the agencies/jurisdictions involved.

HOTCOG Mobile Data Terminals

Associated Market Packages:

- Demand-Response Transit Operations (APTS3)

Prerequisite Projects: None

Description: Install MDT units on HOTCOG transit vehicles. Mobile data terminals allow bus operators to send and receive digital messages. Mobile data terminals can be used by dispatchers to notify drivers of adverse conditions, route changes, or other impacts to the route. MDTs can also transmit information from the driver to the dispatch center, including status, disruptions, or silent alarms. An additional feature that can be built-in to the MDT is the ability for vehicle-to-vehicle digital communications, in addition to the vehicle-to-center communications.

Hill Country Transit Demand Response On-board Security Cameras

Associated Market Packages:

- Demand Response Transit Operations (APTS3)
- Transit Security (APTS5)

Prerequisite Projects: None

Description: This project will install security cameras on Hill Country Transit demand response vehicles. It is a possibility that the security cameras would provide video feed from the buses to the transit operations center for monitoring.

Hill Country Transit Electronic Fare Collection

Associated Market Packages

- Transit Fixed Route Operations (APTS2)
- Demand Response Transit Operations (APTS3)
- Transit Passenger and Fare Management (APTS4)

Prerequisite Projects: None

Description: Implement electronic fare collection systems on Hill Country Transit vehicles. There are three primary benefits of these collection systems. The first is enhanced revenue collection ability. The second is increased security by not having large amounts of cash or tokens on the vehicle. The third is the increased convenience and security for the transit patron. These systems are often implemented in conjunction with AVL or mobile data terminals, or are implemented as an add-on to those systems. To enable automated fare collection, fare boxes would need to be upgraded to accept smart cards (i.e., cards with passive RFID technology or a magnetic information strip, such as a credit card) with rider and account information. Electronic fare payment and passenger information technology is rapidly advancing, and there will be several technological considerations that will need to be examined, such as standards for smart cards and interoperability issues.

Waco Transit Operations Center/TxDOT Waco District Traffic Office Connection

Associated Market Packages:

- Traffic Information Dissemination (ATMS06)
- Transit Fixed-Route Operations (APTS2)
- Demand-Response Transit Operations (APTS3)
- Multi-Modal Coordination (APTS7)

Prerequisite Projects: TxDOT Waco District Traffic Office Capability Expansion, City of Waco TOC Expansion

Description: Implement communications link between the TxDOT Waco District Traffic Office and Waco Transit. This center-to-center application area supports coordination with traffic management centers to obtain near real-time traffic conditions on transit routes in order to generate optimum schedules and alternate routes when necessary.

The extent to which information and coordination are shared between the centers will be determined through working arrangements among the agencies/jurisdictions involved.

Hill Country Transit Operations Center/TxDOT Waco District Traffic Office Connection

Associated Market Packages:

- Traffic Information Dissemination (ATMS06)
- Transit Fixed-Route Operations (APTS2)
- Demand-Response Transit Operations (APTS3)
- Multi-Modal Coordination (APTS7)

Prerequisite Projects: TxDOT Waco District Traffic Office Capability Expansion

Description: Implement communications link between the TxDOT Waco District Traffic Office and Hill Country Transit. This center-to-center application area supports coordination with traffic management centers to obtain near real-time traffic conditions on transit routes in order to generate optimum schedules and alternate routes when necessary.

The extent to which information and coordination are shared between the centers will be determined through working arrangements among the agencies/jurisdictions involved.

HOTCOG Transit Operations Center/TxDOT Waco District Traffic Office Connection

Associated Market Packages:

- Traffic Information Dissemination (ATMS06)
- Demand-Response Transit Operations (APTS3)
- Multi-Modal Coordination (APTS7)

Prerequisite Projects: TxDOT Waco District Traffic Office Capability Expansion

Description: Implement communications link between the TxDOT Waco District Traffic Office and HOTCOG Transit. This center-to-center application area supports coordination with traffic management centers to obtain near real-time traffic conditions on transit routes in order to generate optimum schedules and alternate routes when necessary.

The extent to which information and coordination are shared between the centers will be determined through working arrangements among the agencies/jurisdictions involved.

Hill Country Transit Automated Passenger Counters

Associated Market Packages:

- Transit Passenger and Fare Management (APTS4)

Prerequisite Projects: None

Description: Install Automated Passenger Counter (APC) systems on transit vehicles to accurately count ridership. APC systems collect ridership information and can determine total boardings and alightings at each stop through the use of AVL to determine where those boardings and alightings take place.

This project is estimated to cost $2,000 per vehicle.

Archived Data Management

TxDOT Traffic Data Database

Associated Market Packages:

- ITS Data Mart (AD1)

Prerequisite Projects: None

Description: Create a database for TxDOT traffic data gathered from ITS equipment deployed in the Region as well as traffic counts collected from the annual count program. This project will implement a system to collect, store and process the data. This project will design the frequency, quantity, and quality of data to be collected and stored.

City of Waco Traffic Data Database

Associated Market Packages:

- ITS Data Mart (AD1)

Prerequisite Projects: None

Description: Create a database for City of Waco traffic data. This project will implement a system to collect, store and process the data. This project will design the frequency, quantity, and quality of data to be collected and stored.

HOTCOG Data Warehouse

Associated Market Packages:

- ITS Data Warehouse (AD2)

Prerequisite Projects: None

Description: Implement a system to collect, store and process transportation data from selected locations. This project will design the frequency, quantity, and quality of data to be collected and stored. User interfaces will be required at each local agency to be able to access, search, and upload archived data as needed. The interface will likely be web-based.

Central Texas COG Data Warehouse

Associated Market Packages:

- ITS Data Warehouse (AD2)

Prerequisite Projects: None

Description: Implement a system to collect, store and process transportation data from selected locations. This project will design the frequency, quantity, and quality of data to be collected and stored. User interfaces will be required at each local agency to be able to access, search, and upload archived data as needed. The interface will likely be web-based.

Killeen-Temple MPO Data Warehouse

Associated Market Packages:

- ITS Data Warehouse (AD2)

Prerequisite Projects: None

Description: Implement a system to collect, store and process transportation data from selected locations. This project will design the frequency, quantity, and quality of data to be collected and stored. User interfaces will be required at each local agency to be able to access, search, and upload archived data as needed. The interface will likely be web-based.

Table 8 – Long-Term Projects (20-Year)

Program Area/Project	Description	Responsible Agency*	Probable Cost**	Funding Identified	Estimated Project Duration
Travel and Traffic Management					
TxDOT Closed Loop Signal System Expansion Phase 3	Continue expansion of closed loop signal system at TxDOT intersections throughout the Region. Also includes the implementation of VIVDS.	TxDOT	To Be Determined	No	1 year
City of Waco Closed Loop Signal System Expansion Phase 3	Continue implementation of closed loop signal systems in the City of Waco. Also includes the implementation of VIVDS.	City of Waco	To Be Determined	No	2 years
City of Killeen Closed Loop Signal System Implementation Phase 3	Continue implementation of closed loop signal systems in the City of Killeen. Also includes the implementation of VIVDS.	City of Killeen	To Be Determined	No	2 years
City of Temple Closed Loop Signal System Implementation Phase 3	Continue implementation of closed loop signal systems in the City of Temple. Also includes the implementation of VIVDS.	City of Temple	To Be Determined	No	2 years
City of Harker Heights Closed Loop Signal System Phase 3	Continue to develop a closed loop signal system for the City of Harker Heights. Also includes the implementation of VIVDS.	City of Harker Heights	To Be Determined	No	2 years
City of Waco DMS	Implement DMS in the City of Waco for traffic information dissemination	City of Waco	$100,000/sign	No	2 years
City of Waco CCTV Camera Implementation	Implement CCTV cameras at major intersections in the City of Waco	City of Waco	$20,000-$25,000/site	No	2 years
TxDOT Waco District Traffic Office/City of Temple Communications Connection	Implement a connection between the City of Temple and the TxDOT Waco District Traffic Office to allow video sharing, traffic data sharing, and other joint functions	TxDOT/City of Temple	To Be Determined	No	1 year
TxDOT Waco District Traffic Office/City of Killeen Communications Connection	Implement a connection between the City of Killeen and the TxDOT Waco District Traffic Office to allow video sharing, traffic data sharing, and other joint functions	TxDOT/City of Killeen	To Be Determined	No	1 year
ISP-based Route Guidance	Provided direct support to ISP-based route guidance systems through sharing of traveler information	Public Agencies/Private Sector	Public: $100,000	No	1 year

Table 8 – Long-Term Projects (20-Year) (continued)

Program Area/Project	Description	Responsible Agency*	Probable Cost**	Funding Identified	Estimated Project Duration
Emergency Management					
City of Temple EOC/TxDOT Waco District Traffic Office Communications Connection	Establish a connection between the City of Temple EOC and the TxDOT Waco District Traffic Office for coordination and sharing of incident and traffic information	City of Temple EOC/TxDOT	To Be Determined	No	1 year
City of Killeen EOC/TxDOT Waco District Traffic Office Communications Connection	Establish a connection between the City of Killeen EOC and the TxDOT Waco District Traffic Office for coordination and sharing of incident and traffic information	City of Killeen EOC/TxDOT	To Be Determined	No	1 year
Maintenance and Construction Management					
City of Killeen Portable DMS	Procure portable DMS for use by City of Killeen maintenance crews	City of Killeen	$30,000/sign	No	6 months
City of Temple Portable DMS	Procure portable DMS for use by City of Temple maintenance crews	City of Temple	$30,000/sign	No	6 months
Public Transportation Management					
Multi-modal Coordination	Implement connections necessary for transit agencies in the Region to coordinate with one another for regional schedule coordination for transfers	Waco Transit/Hill Country Transit/HOTCOG Transit	To Be Determined	No	6 months
Hill Country Transit Automated Vehicle Maintenance Tracking	Implement a system to monitor the maintenance status of Hill Country Transit vehicles and alert the driver and dispatch center when maintenance is required or preventative maintenance needs to be scheduled	Hill Country Transit	To Be Determined	No	1 year
HOTCOG Transit Automated Vehicle Maintenance Tracking	Implement a system to monitor the maintenance status of HOTCOG Transit vehicles and alert the driver and dispatch center when maintenance is required or preventative maintenance needs to be scheduled	HOTCOG	To Be Determined	No	1 year

Table 8 – Long-Term Projects (20-Year) (continued)

Program Area/Project	Description	Responsible Agency*	Probable Cost**	Funding Identified	Estimated Project Duration
Public Transportation Management (continued)					
Waco Transit Automated Vehicle Maintenance Tracking	Implement a system to monitor the maintenance status of Waco Transit vehicles and alert the driver and dispatch center when maintenance is required or preventative maintenance needs to be scheduled	Waco Transit	To Be Determined	No	1 year

*Agency listed is responsible for implementation, operations, and maintenance unless otherwise noted.

**The design has not been undertaken and thus this is only an opinion of probable cost for planning purposes.

Waco Region
Long-Term Projects (20-Year)

Travel and Traffic Management

TxDOT Closed Loop Signal System Expansion Phase 3

Associated Market Packages:

- Network Surveillance (ATMS01)
- Surface Street Control (ATMS03)

Prerequisite Projects: TxDOT Closed Loop Signal System Expansion Phase 1, TxDOT Closed Loop Signal System Expansion Phase 2

Description: Expand the closed loop signal system by integrating additional signals and implementing VIVDS at select TxDOT intersections throughout the Region.

City of Waco Closed Loop Signal System Expansion Phase 3

Associated Market Packages:

- Network Surveillance (ATMS01)
- Surface Street Control (ATMS03)

Prerequisite Projects: City of Waco Closed Loop Signal System Expansion Phase 1, City of Waco Closed Loop Signal System Expansion Phase 2

Description: Continue to expand the closed loop signal system in the City of Waco. This project also includes the implementation of VIVDS.

City of Killeen Closed Loop Signal System Implementation Phase 3

Associated Market Packages:

- Network Surveillance (ATMS01)
- Surface Street Control (ATMS03)

Prerequisite Projects: City of Killeen Closed Loop Signal System Continued Development Phase 1, City of Killeen Closed Loop Signal System Implementation Phase 2

Description: Continue to expand the closed loop signal system in the City of Killeen. This project includes the implementation of VIVDS.

City of Temple Closed Loop Signal System Implementation Phase 3

Associated Market Packages:

- Network Surveillance (ATMS01)
- Surface Street Control (ATMS03)

Prerequisite Projects: City of Temple Closed Loop Signal System Continued Development Phase 1, City of Temple Closed Loop Signal System Implementation Phase 2

Description: Continue to expand the closed loop signal system in the City of Temple. This project includes the implementation of VIVDS.

City of Harker Heights Closed Loop Signal System Phase 3

Associated Market Packages:

- Network Surveillance (ATMS01)
- Surface Street Control (ATMS03)

Prerequisite Projects: City of Harker Heights Closed Loop Signal System Phase 1, City of Harker Heights Signal System Phase 2

Description: Continue to develop a closed loop signal system in the City of Harker Heights. This project also includes the implementation of VIVDS.

City of Waco DMS

Associated Market Packages:

- Surface Street Control (ATMS03)
- Traffic Information Dissemination (ATMS06)
- Incident Management System (ATMS08)
- Roadway Maintenance and Construction (MC07)
- Work Zone Management (MC08)

Prerequisite Projects: None

Description: This project includes the deployment of DMS along major arterials in the City of Waco for traffic information dissemination.

City of Waco CCTV Camera Implementation

Associated Market Packages:

- Network Surveillance (ATMS01)
- Surface Street Control (ATMS03)
- Incident Management System (ATMS08)

Prerequisite Projects: None

Description: This project includes the deployment of CCTV cameras at selected intersections in the City of Waco. The CCTV cameras can be used to monitor congestion associated with recurring events and signal control adjusted according to the vehicular demand. The information gathered by the CCTV cameras (video feed) can be shared with the TxDOT District Office for shared or after-hours viewing/monitoring.

TxDOT Waco District Traffic Office/City of Temple Communications Connection

Associated Market Packages:

- Regional Traffic Control (ATMS07)
- Incident Management System (ATMS08)

Prerequisite Projects: TxDOT Waco District Traffic Office Capability Expansion

Description: Install a connection between the City of Temple and the TxDOT Waco District Traffic Office to allow video sharing, traffic data sharing and other joint functions. The type of connection (fiber, wireless, leased line) will need to be determined prior to implementation of this project based on desired band width and cost of technologies available.

TxDOT Waco District Traffic Office/City of Killeen Communications Connection

Associated Market Packages:

- Regional Traffic Control (ATMS07)
- Incident Management System (ATMS08)

Prerequisite Projects: TxDOT Waco District Traffic Office Capability Expansion,

Description: Install a connection between the City of Killeen and the TxDOT Waco District Traffic Office to allow video sharing, traffic data sharing and other joint functions. The type of connection (fiber, wireless, leased line) will need to be determined prior to implementation of this project based on desired band width and cost of technologies available.

ISP-Based Route Guidance

Associated Market Packages:

- Traffic Information Dissemination (ATMS06)
- Broadcast Traveler Information (ATIS1)
- ISP-Based Route Guidance (ATIS5)

Prerequisite Projects: TxDOT ATMS Implementation

Description: Provide ISPs with data relative to current travel conditions. The project extends current static capabilities of the OnStar, in-vehicle route guidance systems (or equivalent) currently being equipped in new vehicles (OnStar is equipped on some GM, Acura, Audi, Saab, and Subaru models). Currently, the OnStar system will help guide a motorist to a location based on static information. By providing real-time traveler information to ISPs, the guidance systems could modify the recommended route based on dynamic roadway conditions (e.g., variation on congestion levels, accidents, roadwork, etc.). The project will require a public/private sector partnership, because route guidance and navigation services are typically subscription services.

Emergency Management

City of Temple EOC/TxDOT Waco District Traffic Office Communications Connection

Associated Market Packages:

- Traffic Information Dissemination (ATMS06)
- Incident Management System (ATMS08)

Prerequisite Projects: TxDOT Waco District Traffic Office Capability Expansion

Description: Install telecommunications connection and end equipment from the City of Temple EOC to the TxDOT Waco District Traffic Office to share CCTV and incident data/images and provide information on current road conditions that could assist with incident/emergency management. The cost for this project will depend on the communications used to implement the connection (i.e., fiber connection or leased lines).

City of Killeen EOC/TxDOT Waco District Traffic Office Communications Connection

Associated Market Packages:

- Traffic Information Dissemination (ATMS06)
- Incident Management System (ATMS08)

Prerequisite Projects: TxDOT Waco District Traffic Office Capability Expansion

Description: Install telecommunications connection and end equipment from the City of Killeen EOC to the TxDOT Waco District Traffic Office to share CCTV and incident data/images and provide information on current road conditions that could assist with incident/emergency management. The cost

for this project will depend on the communications used to implement the connection (i.e., fiber connection or leased lines).

Maintenance and Construction Management

City of Killeen Portable DMS

Associated Market Packages:

- Traffic Information Dissemination (ATMS06)
- Incident Management System (ATMS08)
- Roadway Maintenance and Construction (MC07)
- Work Zone Management (MC08)

Prerequisite Projects: None

Description: This project would procure portable DMS for the City of Killeen maintenance crews. Portable DMS are a valuable tool to communicate existing and future closures, restrictions, detours, alternate routes, and other important information to motorists while they are en-route. These signs can be used at or near work zones to notify motorists of activity and appropriate measures to take (i.e., detour, slow down), but also can be mobilized at specific locations as conditions warrant, such as flooding or other closures. Portable DMS can be stand-alone signs or mounted to the back of a maintenance vehicle. Programming is typically done manually at the sign. The estimated cost is $30,000 per sign.

City of Temple Portable DMS

Associated Market Packages:

- Traffic Information Dissemination (ATMS06)
- Incident Management System (ATMS08)
- Roadway Maintenance and Construction (MC07)
- Work Zone Management (MC08)

Prerequisite Projects: None

Description: This project would procure portable DMS for the City of Temple maintenance crews. Portable DMS are a valuable tool to communicate existing and future closures, restrictions, detours, alternate routes, and other important information to motorists while they are en-route. These signs can be used at or near work zones to notify motorists of activity and appropriate measures to take (i.e., detour, slow down), but also can be mobilized at specific locations as conditions warrant, such as flooding or other closures. Portable DMS can be stand-alone signs or mounted to the back of a maintenance vehicle. Programming is typically done manually at the sign. The estimated cost is $30,000 per sign.

Public Transportation Management

Multi-modal Coordination

Associated Market Packages:

- Transit Fixed Route Operations (APTS2)
- Demand Response Transit Operations (APTS3)
- Multi-modal Coordination (APTS7)

Prerequisite Projects: None

Description: Implement connections necessary for Waco Region transit agencies to coordinate with each other for regional schedule coordination, especially to facilitate passenger transfers. It is envisioned that by linking the CAD systems and electronic schedules, that a passenger traveling through the Region that needed to use multiple agencies to complete their trip could arrange those transfers by contacting one of the agencies who would be able to request the necessary transfers through the CAD system.

Hill Country Transit Automated Vehicle Maintenance Tracking

Associated Market Packages:

- Transit Fixed-Route Operations (APTS2)
- Demand-Response Transit Operations (APTS3)
- Transit Maintenance (APTS6)

Prerequisite Projects: None

Description: Implement a system to monitor the maintenance status of Hill Country Transit vehicles and alert the driver and dispatch center when maintenance is required or preventative maintenance needs to be scheduled. Such a system will enable maintenance issues to be addressed as soon as possible, hopefully preventing a break down and unplanned down time for a transit vehicle.

HOTCOG Automated Vehicle Maintenance Tracking

Associated Market Packages:

- Demand-Response Transit Operations (APTS3)
- Transit Maintenance (APTS6)

Prerequisite Projects: None

Description: Implement a system to monitor the maintenance status of HOTCOG transit vehicles and alert the driver and dispatch center when maintenance is required or preventative maintenance needs to be scheduled. Such a system will enable maintenance issues to be addressed as soon as possible, hopefully preventing a break down and unplanned down time for a transit vehicle.

Waco Transit Automated Vehicle Maintenance Tracking

Associated Market Packages:

- Transit Fixed-Route Operations (APTS2)
- Demand-Response Transit Operations (APTS3)
- Transit Maintenance (APTS6)

Prerequisite Projects: None

Description: Implement a system to monitor the maintenance status of Waco Transit vehicles and alert the driver and dispatch center when maintenance is required or preventative maintenance needs to be scheduled. Such a system will enable maintenance issues to be addressed as soon as possible, hopefully preventing a break down and unplanned down time for a transit vehicle.

4. MAINTAINING THE REGIONAL ITS ARCHITECTURE AND DEPLOYMENT PLAN

The Waco Regional ITS Deployment Plan is a living document. The recommended projects and their timeframes for implementation reflect the needs of the Region at the time the plan was developed. It is expected that the needs of the Region will change as ITS deployments are put into place, population and travel patterns change, and as new technology is developed. In order for the ITS Deployment Plan to remain a useful document for Regional stakeholders, the plan must be updated over time.

TxDOT will serve as the lead agency for maintaining both the Waco Regional ITS Architecture and the ITS Deployment Plan, however, these plans will continue to be driven by stakeholder consensus rather than a single stakeholder.

At the ITS Deployment Plan Meeting in February 2004, stakeholders recommended that a meeting be held on an annual basis to review the existing Regional ITS Deployment Plan to update project status and include any new projects. These updates will be documented and included in the next formal revision of the plans. It was recommended that the group meet every two years to correspond with the Transportation Improvement Plan update process to review the Regional ITS Architecture. Any new market packages that have been added to the National Architecture should be reviewed to see if they are applicable to the Waco Region. Data flows in existing market packages should also be reviewed to determine if any planned/future flows have been implemented. The Deployment Plan will also be updated at that time to reflect projects that have been deployed, new projects that are necessary, and to reprioritize projects currently shown in the plan. Projects that are added to the ITS Deployment Plan should also be reviewed closely to determine if they fit into the ITS Architecture for the Waco Region. If a new project does not fit into the ITS Architecture, then the ITS Architecture will need to be revised to include the necessary links and data flows for the project. Any changes to the geographic scope of the Region should be agreed upon by the stakeholders.

Both the Waco Regional ITS Architecture and the ITS Deployment Plan were developed with a consensus approach from the stakeholders. In order for these documents to continue to reflect the needs of the Region, changes in the documents will need to be driven by consensus of all of the stakeholders.