Prepared For

Shreveport - Bossier City Regional ITS Architecture

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ITS ARCHITECTURE (NEW AND UPDATES)

SHREVEPORT-BOSSIER CITY REGIONAL ITS ARCHITECTURE

Presented to:

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1   Introduction

This document describes the Intelligent Transportation System (ITS) architecture for the Shreveport-Bossier City region. A Regional ITS Architecture is "a regional framework for ensuring institutional agreement and technical integration for the implementation of ITS projects or groups of projects". Paragraph 940.9 (a) states that:

> "A regional ITS architecture shall be developed to guide the development of ITS projects and programs and be consistent with ITS strategies and projects contained in applicable transportation plans. The National ITS Architecture shall be used as a resource in the development of the regional ITS architecture. The regional ITS architecture shall be on a scale commensurate with the scope of ITS investment in the region. Provision should be made to include participation from the following agencies, as appropriate, in the development of the regional ITS architecture: Highway agencies; public safety agencies (e.g., police, fire, emergency/medical); transit operators; Federal lands agencies; State motor carrier agencies; and other operating agencies necessary to fully address regional ITS integration."

This architecture conforms to Federal Highway Administration (FHWA) Final Rule 940 Part 11 which mandates that projects planning to use Federal Funds in their ITS deployments must have established an ITS Architecture for the region. ITS regional architectures have been promoted by the United States Department of Transportation (USDOT) as a tool for describing, using a standard vocabulary and set of concepts, regional deployments to aid in the integration of User Services and Service Packages to address regional transportation problems. Regional ITS Architectures are also used to constrain projects, funded by the FHWA using high technology products, to highway or transit applications.

1.1   Background

What are Intelligent Transportation Systems or ITS? Simply put, they are the application of technology to highway or transit applications. The formal description is as follows:

> "ITS improves transportation safety and mobility and enhances productivity through the use of advanced information and communications technologies. Intelligent transportation systems (ITS) encompass a broad range of wireless and wire line communications-based information and electronics technologies. When integrated into the transportation system's infrastructure, and in vehicles themselves, these technologies relieve congestion, improve safety and enhance American productivity."

To effectively apply ITS to highway and transit projects, the National ITS Architecture, initiated in 1991 and sponsored by USDOT, is used to describe a wide range of likely ITS applications, using high technology products, for highway and transit projects. In 2001, the FHWA and Federal Transit Administration (FTA) established 23 Code of Federal Regulations (CFR) 940 Part 11 which required agencies using federal funds to establish ITS Architectures for their regions. The architecture must contain the following elements:

1. Description of the region – **Section 3**

2. Identification of the participating agencies and other stakeholders – **Section 5**

3. Roles and responsibilities of the participating agencies and other stakeholders – **Section 9**

4. Agreements needed for operation – **Section 12**

5. System functional requirements – **Section 11** (also see the Shreveport-Bossier City Regional ITS Architecture Turbo Architecture source file)

6. Interface requirements and information exchanges with planned and existing systems – **Appendix B**

7. Identification of applicable standards (ITS Standards) – **Section 11**

8. Sequence of projects necessary for implementation traceable to a portion of the regional architecture – **Section 9**

Products derived from the architecture development process provide a number of benefits to the transportation planners and engineers. The following are examples of these benefits:

1. Establishes a common terminology for the various ITS elements needed to implement and operate ITS applications.

2. Defines those elements and the functions they perform, and identifies, in theory, all of the possible interrelationships among the ITS elements.

3. The National ITS Architecture does not dictate a specific approach to implementing or operating any ITS application. Rather, it provides a common set of terms and concepts that local ITS implementers are encouraged to utilize in describing their specific ITS activities.

4. Provides a "living" planning document that promotes modularity, integration, and minimizes impacts when needs to regional issues change.

5. Promotes a thorough, coordinated, and multi-jurisdictional "systems" approach to ITS and the use of a Systems Engineering process to its deployment.

6. Fosters the utilization of the "standards" that are being developed through the USDOT National ITS Architecture program.

2   Acronyms and Abbreviations

ATIS – Advanced Traveler Information System

CAD – Computer Aided Dispatch

CCTV – Closed Circuit Television

CFR – Code of Federal Regulations

CMP – Congestion Management Process

CMU – Conflict Monitor Units

CNG – Compressed Natural Gas

CORBA – Common Object Request Broker Architecture

DCM – Data Collection and Monitoring

DMS – Dynamic Message Signs

DOTD – Department of Transportation and Development

FHWA – Federal Highway Administration

FMS – Field Management Stations

HAR – Highway Advisory Radio

ICMS – Integrated Corridor Management System

ITS – Intelligent Transportation Systems

LADOTD – Louisiana Department of Transportation and Development

LSP – Louisiana State Police

MAP – Motorist Assistance Patrol

MPO – Metropolitan Planning Organization

MS/ETMCC – Message Sets for External Traffic Management Center Communications

NLCOG - Northwest Louisiana Council of Governments

NTCIP – National Transportation Communications for Intelligent Transportation System Protocol

O & M – Operations and Maintenance

PCMS – Portable Changeable Message Signs

RVD – Radar Vehicle Detector

RR – Roles and Responsibilities

SCP – Signal Control and Prioritization

SDO – Standards Development Organizations

SSL – Signal System Local

SSM – Signal System Master

TMA – Transportation Management Area

TIM – Traffic Incident Management

TIP – Transportation Improvement Program

TMC – Traffic Management Center

TMDD – Traffic Management Data Dictionary

TSS – Transportation Sensor Systems

USDOT – United States Department of Transportation

XML – Extensive Markup Language

3   Architecture Scope

The Shreveport-Bossier City Transportation Management Area (TMA) Regional ITS Architecture is a roadmap for transportation systems integration. The architecture was developed through a cooperative effort by the region's transportation agencies, covering all modes and all roads in the region. It represents a shared vision of how each agency's systems will work together in the future, sharing information and resources to provide a safer, more efficient, and more effective transportation system for travelers in the region.

The architecture provides an overarching framework that spans all of the region's transportation organizations and individual transportation projects. Using the architecture, each transportation project can be viewed as an element of the overall transportation system, providing visibility into the relationship between individual transportation projects and ways to cost-effectively build an integrated transportation system over time. This section establishes the scope of the architecture in terms of its geographic breadth, the scope of services that are covered, and the time horizon that is addressed.

3.1   Timeframe

The time frame for the Architecture is five years.

3.2   Geographic Scope

The region for which this ITS Architecture is being developed corresponds with the Shreveport-Bossier City Metropolitan Planning Organization (MPO) area defined by the Northwest Louisiana Council of Governments (NLCOG). See Figure 1 for the geographic scope limits.

3.3   Service Scope

This Regional ITS Architecture covers a range of ITS services intended to address transportation needs identified within the defined geographic scope. These transportation deficiencies in the region may be existing or emerging transportation issues. The national ITS architecture provides a common framework to address transportation issues using intelligent transportation systems. Service packages consist of several different subsystems that provide desired services. The transportation issues in the Shreveport-Bossier City area will therefore be addressed with the aid of specific service packages which can be deployed incrementally in various phases of projects. Section 7 of this document shows a range of existing and planned ITS services.

3.4   Maintainer

Louisiana Department of Transportation and Development (LADOTD) with the assistance of NLCOG will maintain the Shreveport-Bossier City Regional ITS Architecture.

Figure 1: Shreveport-Bossier City Regional Architecture Boundary
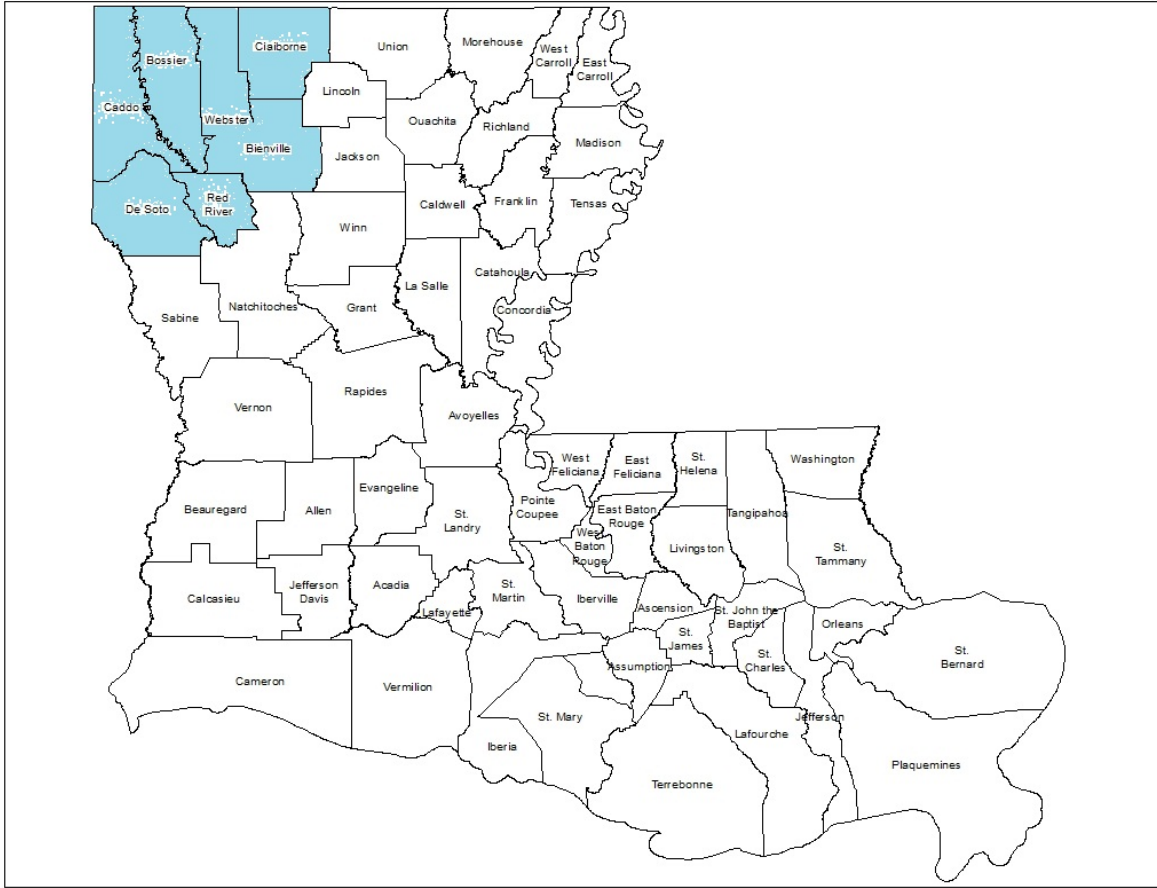
Figure 2: Parishes forming the Northwest Louisiana Council of Governments (NLCOG)

4   Relationship to Planning

The Shreveport-Bossier City TMA Regional ITS Architecture is an integral part of planning for the operations and maintenance strategies that are addressed by the regional transportation planning process. The architecture provides a framework that connects operations and maintenance objectives and strategies with the integrated transportation system improvements that are implemented as a progressive series of ITS projects. The architecture also is used to define the data needs associated with performance monitoring that supports an informed planning process. This section identifies the planning objectives, strategies, and associated performance measures from the regional plan. These planning elements are connected with ITS services in the Turbo Architecture database.

Table 1: Relationship to Planning

Name	Description	Source	PM Category	Performance Measure
Increase mobility	Invest in the development of a regional transportation system that serves to increase the mobility and efficiency of the movement of persons and freight in and through the region. This is to improve things such as: quality of life, economy, and environmental impacts on the region.	Shreveport-Bossier City Metropolitan Transportation Plan Update (July 2003, 2009)	Increase mobility	Vehicle hours traveled (VHT)
				Vehicle miles traveled (VMT)
				Transit Trips
Enhance Safety	Enhance the safety of the transportation system during both normal travel patterns and emergency evacuations. Enhance the security of the transportation system especially related to emergency evacuation from either natural or manmade disasters.	Shreveport-Bossier City Metropolitan Transportation Plan Update (July 2003)	Enhance Safety	Crashes per year
				Number of Fatalities
Maintain Existing Infrastructure	Support systematic and coordinated maintenance programs, and make available the adequate resources to preserve existing roadways and transit systems as well as future expansions.	Shreveport-Bossier City Metropolitan Transportation Plan Update (July 2003)	Maintain Existing Infrastructure	Maintenance hours

5 ITS Stakeholders

Effective ITS involves the integration of multiple stakeholders and their transportation systems. This section describes the stakeholders who either participated in the creation of the Shreveport-Bossier City TMA Regional ITS Architecture or whom the participating stakeholders felt needed to be included in the architecture. Some stakeholders have been grouped in order to better reflect mutual participation or involvement in transportation services and elements. Stakeholders in this section may be related to one or more of the transportation inventory elements described in **Section 6** either as an individual stakeholder or as a member of a stakeholder group.

Table 2: ITS Stakeholders

Stakeholder Name	Stakeholder Description
Bossier City	As of the 2010 Census, the city had a total population of 61,315. Bossier City is closely tied to its larger sister city Shreveport, located on the western bank of the Red River. The Shreveport-Bossier City metropolitan area is the center of the region known as the Ark-La-Tex. The parish courthouse is located in Benton about 12 miles (19 km) to the north of Bossier City.
Bossier Parish	Bossier Parish has a population of 116,979 as of 2010 census. The principal city is Bossier City, which is located east of the Red River from Shreveport, the seat of Caddo Parish. Bossier Parish is part of the Shreveport–Bossier City Metropolitan Statistical Area as well as the Shreveport–Bossier City–Minden Combined Statistical Area. The parish seat is Benton.
Caddo Parish	As of the 2010 Census, the population was 254,969. Caddo Parish seat is Shreveport. It is part of the larger Shreveport–Bossier City–Minden Combined Statistical Area, and the largest parish in the Shreveport–Bossier City Metropolitan Statistical Area and the third largest parish in Louisiana.
Caddo Parish Communications District 911/Emergency Management Agencies	This facility had approximately 9,900 square feet of space. During the original design of the ECC in 1986-87, it was planned that all three public safety agencies would be co-located in one facility: Shreveport Police, Fire Communications Divisions and the Caddo Parish Sheriff's Communications operations. However, in late 1987, it was decided that an alternate or back up PSAP (Public Safety Answering Point) would be constructed within the Courthouse. As a result the ECC design was altered to exclude the Sheriff's Operations. However, space was allocated for future growth and the possibility of additional equipment and staff. In addition to the public safety communications personnel, the ECC also houses the 9-1-1 Administrative Staff. The facility also serves as an Emergency Operations Center for use by the Caddo/Bossier Office of Emergency Preparedness to be activated during a natural disaster or major emergency. Currently this office is occupied by Shreveport Police, the Sherriff's Office and Emergency Service.
Caddo Parish Sheriff's office	Caddo Parish Sheriff's office is a stand-alone governmental entity, separate and apart from the Parish Council. The Sheriff's position is reaffirmed by Article V, Section 27 of the Louisiana Constitution of 1974. The Sheriff is a separately elected official by the citizens of the parish in a general popular election every four years.
City of Shreveport	Shreveport is the third largest city in Louisiana. It is the principal city of the third largest metropolitan area in the state of Louisiana and is the 109th-largest city in the United States. It is the seat of Caddo Parish and extends along the Red River (most notably at Wright Island, the Charles and Marie Hamel Memorial Park, and Bagley Island) into neighboring Bossier Parish. Bossier City is separated from Shreveport by the Red River. The population was 199,311 at the 2010 census, and the Shreveport-Bossier City Metropolitan Area population exceeds 398,604.
LADOTD	Louisiana Department of Transportation and Development (LADOTD) is an arm of the Louisiana government responsible for state-wide transportation. The LADOTD responsibilities include statewide transportation system operations. This stakeholder group includes all DOTD units (ITS, Office of Planning Programming, Highway Safety, Weights and Standards, Traffic Services, and Traffic Engineering) involved in transportation planning, operations, and maintenance. Some of the typical responsibilities include incident detection and response, evacuation planning and management, transportation data collection, management, and distribution for the local region as well as for the entire state. The specific systems/facilities included in this group are ATM/EOC Center, 511 System, etc.
Local Emergency Medical Providers	This includes local hospitals and emergency medical service providers (i.e., ambulance, air vac, etc) that are components of emergency management.

Stakeholder Name	Stakeholder Description
Local Public Safety Agencies	Responsible for operating local police, fire, and EMS offices and vehicles throughout region. This stakeholder group includes all the regional agencies that are involved in emergency, fire, police, and other public safety/emergency response activities.
Local Railroad	Burlington Northern Santa Fe (BNSF) and Kansas City Railroad operate in Shreveport and Bossier City. Mainly shipping cargo in and through the area.
Louisiana State Police	Louisiana State Police agency is responsible for operating Louisiana State Police Troops. Includes Computer Aided Dispatch database, which collects incident/emergency detection, dispatch, response, and status information related to the Louisiana State Police officers/equipment. Also responsible for Louisiana State Police vehicles. Troop G is conveniently located in Bossier Parish at the intersection of Industrial Drive and Interstate 20. Troop G encompasses seven (7) individual Louisiana parishes. These are Bienville, Bossier, Caddo, Claiborne, De Soto, Red River and Webster.
Media	This stakeholder group includes local TV/Radio Channels and print media. It is responsible for receiving and distributing transportation information like traffic conditions, incidents and road weather conditions.
Northwest Louisiana Council of Governments (NLCOG)	The Northwest Louisiana Council of Governments (NLCOG) is an intergovernmental association of local governments established to assist in planning for common needs, cooperating for the mutual benefit, and coordinating for sound regional development. NLCOG serves as the Regional Planning Council and its purpose is to strengthen both the individual and collective power of local governments and to help them recognize regional opportunities, eliminate unnecessary duplication, and make joint decisions for the benefit of the community. This is achieved by developing and implementing constructive and workable policies and programs for solving area wide problems. These issues include, but are not limited to, matters affecting transportation, economic, health, safety, welfare, education, and regional development issues.
Public	Members of the general public own and operate various devices/systems to access ITS information, including PDAs, cell phones, and personal computers.
Shreveport Airport Authority	The Shreveport Airport Authority is responsible for the maintenance and operation of the airport in the Shreveport area. There are two airports: Shreveport Regional Airport and Shreveport Downtown Airport. These airports serve residents of Shreveport, North Louisiana, Southwest Arkansas, East Texas and beyond.
Shreveport-Bossier Port Commission	Shreveport-Bossier Port Commission The Port of Caddo-Bossier is a "smart" industrial park that works exceptionally well for business relocation, business expansion and business startup. It is one of the most "accessible" inland ports because of its ideal location. It's also a multi-modal transportation and distribution center that links customers throughout the region to domestic and international markets. The Port of Caddo-Bossier encompasses more than 2,300 acres of prime industrial real estate with large tracts of greenfield sites immediately available for industrial development. As one of the fastest growing inland ports in the nation, The Port of Caddo-Bossier is known for its ease of doing business and for having some of the lowest utility rates in the country.
Tourism and Traveler Information Service Providers	Various tourism agencies, chambers of commerce, hotel associations, motorist services, and Mapquest.

6 ITS Inventory

An inventory of existing and planned transportation systems is the basis for the Shreveport/Bossier City TMA Regional ITS Architecture. The transportation system inventory was developed based on input from stakeholders throughout the region. The inventory includes a list of ITS elements and the associated stakeholder responsible for system operation.

Table 3 describes the surface transportation inventory elements for the region. A transportation element can be a center, vehicle, traveler or field equipment. Each transportation element listed below has one or more stakeholders associated with it from **Section 5**. In order to reduce the complexity of the architecture, some transportation elements with like functionality have been grouped together. Each transportation inventory element is mapped to at least one National ITS Architecture entity.

Table 3: ITS Inventory

Element Name	Element Description	Stakeholder	Element Status
Bossier City Traffic Operations	This element represents traffic operations or traffic engineering for the parish that is responsible for traffic management activities. The typical activities include traffic monitoring, traffic data collection, traffic signal operations, and other traffic management related activities. This also includes communicating with Traffic Management Centers (TMCs) and other departments, such as maintenance, for roadway maintenance activities.	Bossier City	Existing
Bossier City Traffic Signal System	Roadside equipment includes any and all equipment distributed on and along the roadway which monitors and controls traffic.	Bossier City	Existing
Bossier Parish Communications District 911	This element represents the City of Bossier emergency response operations including City fire, police, 911, and any other emergency response operators. This element is responsible for the emergency response operations and management within the City of Bossier.	Bossier Parish	
Bossier Parish Police Jury	Bossier Parish Police Jury is made up of 12 jurors who represent various districts throughout the parish. This group is responsible for the government of the parish.	Bossier Parish y	
Caddo Parish Commission	The Caddo Parish Commission (the "Commission") is the governing authority for the Parish of Caddo and is a political subdivision of the State of Louisiana. The Commission consists of twelve members called commissioners who are elected to four-year terms from single member districts. The Commission sets policy and establishes programs in such fields as criminal and juvenile justice, highways and streets, sanitation, planning and zoning, public health and welfare, libraries, culture and recreational facilities, economic development and general administrative services.	Caddo Parish	
Caddo-Bossier Office of Homeland Security and Emergency Preparedness (CBOHSEP)	This element is an emergency management planning agency for Caddo and Bossier parishes.	Bossier Parish/Caddo Parish	
City of Shreveport Office of Public Works Traffic Engineering Division	This element represents City of Shreveport Office of Public Works Traffic Engineering Division. The traffic engineering division is responsible for traffic operations management within the city jurisdiction.	City of Shreveport	
City of Shreveport Police Department	This element represents City of Shreveport Police Department dispatch center.	City of Shreveport	Existing

Element Name	Element Description	Stakeholder	Element Status
DOTD District 04 Traffic Operations	This element represents traffic operations or traffic engineering within the district office that is responsible for traffic management activities within the district jurisdiction. The typical activities include traffic monitoring, traffic data collection, operation of traffic signal operations, and other traffic management related activities. This also includes communicating with TMCs and other departments like maintenance for roadway maintenance activities.	LADOTD	
DOTD District 04 Traffic Data Archive	This element includes the traveler information from LADOTD in conjunction with a private partner.	LADOTD	Planned
DOTD District 04 Traffic Signal System	This element represents traffic signals operated and maintained by the District	LADOTD	Existing
DOTD ITS Field Equipment	This element includes the equipment distributed on and along the roadway that monitors and controls traffic and monitors and manages the roadway itself. Equipment includes traffic signals, traffic detectors, environmental sensors, highway advisory radios, dynamic message signs, CCTV cameras and video image processing systems, and grade crossing warning systems.	LADOTD	
DOTD ITS Section	This element represents ITS Section (Section 56) under the LADOTD. The ITS section is responsible for state-wide operations center located in DOTD headquarters. Also, the ITS section is responsible for management information system for transportation; state-wide ITS elements operations, and maintenance. The ITS section is also responsible for maintenance of all ITS equipment in the state.	LADOTD	
DOTD MAP	This element represents the Motorist Assistance Patrol (MAP) vehicles contracted and managed by DOTD's ITS Section.	LADOTD	
DOTD Social Media	Facebook and Twitter	LADOTD	
DOTD Statewide TMC	This element represents traffic operations center that is responsible for traffic management activities throughout the state. The typical activities include traffic monitoring, traffic data collection, operation of ITS elements (CCTV, DMS, etc.), detection and verification of incidents, traffic signal monitoring, and other traffic management related activities. This also includes communicating with other agencies, districts, TMCs, and DOTD departments like maintenance for roadway maintenance activities.	LADOTD	
Local Emergency Medical	Local hospitals as well as local emergency medical service providers (e.g. emergency rescue, ambulance, etc)	Local Emergency Medical Providers	
Local Emergency Operations Centers	This element represents emergency dispatch centers operated by local agencies including 911, emergency, and fire response dispatch center.	Local Public Safety Agencies	
Local Police/Sheriff's Departments	This element represents the parish sheriff's office including its dispatch, patrol vehicles, communications, and the CAD system.	Caddo Parish Sheriff's office	
Local Print and Broadcast Channels	Local Newspapers as well as radio and television broadcast providing transportation information	Media	
Local Public Safety Agencies	This element represents the city/town (local) police, sheriff, fire, and other emergency operations within the Shreveport-Bossier area.	Local Public Safety Agencies	
Louisiana 511/Website	This element provides traveler information service provided by the LA DOTD in conjunction with a private partner.	LADOTD	

Element Name	Element Description	Stakeholder	Element Status
LSP Troop G	Troop G is conveniently located in Bossier Parish at the intersection of Industrial Drive and Interstate 20. Troop G encompasses seven (7) individual Louisiana parishes. These are Bienville, Bossier, Caddo, Claiborne, De Soto, Red River and Webster.	Louisiana State Police	
Personal Devices	Primarily PDA, pagers, smartphones, etc.	Public	
RR Grade Crossing Controller	Railroad at grade crossing controllers identify if a train is currently present at the intersection. This status allows for systems to be aware of for active traffic management.	Local Railroad	Planned
Shreveport Area Transit System	The Shreveport Area Transit System, commonly known as SporTran, is a public transportation bus system based in Shreveport. It runs bus routes in Shreveport and Bossier City, Louisiana. All bus routes converge at the Downtown Terminal in Downtown Shreveport. SporTran provides public transportation in the form of buses and lift vans. SporTran operates seven days a week on 17 bus routes from 6:00 a.m. to 8:00 p.m., with shorter operations on the weekends. SporTran operates night service on five routes (mostly supplementing daytime service after end of service) between 8:00 p.m. and midnight Monday through Saturday with no service on Sundays. SporTran has a fleet of over 50 buses equipped to handle all passengers, including those with disabilities. Some buses were equipped with the emission reduction systems and an experimental dual-fuel (Hybrid) bus was placed in service in 2005. Recently 14 CNG vehicles were added to the fleet.	City of Shreveport	Existing
Shreveport Airports	There are two airports in the area: the Shreveport Regional Airport and the Shreveport Downtown Airport. The Shreveport Downtown Airport is a general aviation airport and the Shreveport Regional Airport is a commercial small hub airport. These airports provide service to residents of Shreveport and beyond including North Louisiana, East Texas, and Southwest Arkansas. The Shreveport Airport Authority is responsible for the maintenance and operation of the airports.	Shreveport Airport Authority	Existing
Shreveport Police	The Shreveport Police Department is a customer service oriented agency dedicated to serving and protecting the citizens of Shreveport, Louisiana. Its mission is to provide outstanding police services by working in partnership with the community and to maintain a safe environment that contributes to the quality of life for all citizens in the Shreveport area. The Shreveport Police Department handles more than 250,000 calls for service each year. Roughly 575 sworn police officers are employed, handling everything from patrol to investigations to traffic enforcement.	City of Shreveport	
Shreveport Traffic Engineering	Shreveport Traffic Engineering is responsible for the design, installation, and maintenance of traffic signs and signals throughout the City. It maintains the City's computerized traffic signal system and conducts traffic surveys where modifications are being proposed. It responds to requests for street lights, one-way streets, restricted parking, maintains parking meters, speed limits, provides street striping, and handles barricade requests for all departments. The Traffic Engineer is responsible for an operating budget of $3.6 million. Traffic Engineering is comprised of 39 employees.	City of Shreveport	
Shreveport Traffic Operations	This element represents traffic operations or traffic engineering for the City of Shreveport that is responsible for traffic management activities. The typical activities include traffic monitoring, traffic data collection, traffic signal operations, and other traffic management related activities. This also includes communicating with Traffic Management Centers (TMCs) and other departments, such as maintenance, for roadway maintenance activities.	City of Shreveport	
Shreveport Traffic Signal System	This element represents traffic signals operated and maintained by Shreveport.	City of Shreveport	

Element Name	Element Description	Stakeholder	Element Status
Shreveport/Bossier City Regional TMC	Centralized regional TMC to be operated jointly by LADOTD/Shreveport/Bossier City/LSP/NLCOG.. Current TMC operated by DOTD.	LADOTD	
SporTran Transit Archive	This is the transit operations data collected by SporTran	City of Shreveport	

6.1 Existing Regional ITS and Operations

Currently, Shreveport has a Regional Architecture and several ITS elements that service the area. These elements have been compiled in **Table 4,** which serves as a systems level summary of existing elements and complements the ITS inventory (**Table 3**), which uses a broader organizational level approach. The following sections further describe the existing equipment.

Table 4: Existing ITS

ITS Equipment	Description	Stakeholder	Element Name*
Transportation Management Center (TMC)	The TMC is located at 3357 Industrial Drive, Bossier City. Hours of operation are 6:45am-6:45pm Monday through Friday. Afterhours and weekend operation is handled by Statewide TMC. The center has its own ICX Chameleon server for center operations however it is slated to be replaced by Delcan in 2013. Statewide TMC Operator can access the Shreveport/Bossier City ITS via a remote desktop client. TMC communications with field devices and other TMCs includes both fiber optic and wireless.	LADOTD	Shreveport/Bossier City Regional TMC
Closed Circuit Television (CCTV) Cameras	CCTV cameras • Interstate 20 (19) • Interstate 220 (8) • Route 3132 (2)	LADOTD	DOTD ITS Field Equipment
Dynamic Message Signs (DMS) including fog warning signs	18 DMS • Interstate 20 (12) • Interstate 220 (4) • Interstate 49 (1) • Route 3132 (1)	LADOTD	DOTD ITS Field Equipment
Portable Changeable Message Signs (PCMS) District 04	9 PCMS(Remote Controlled)	LADOTD	DOTD ITS Field Equipment
Portable Changeable Message Signs (PCMS) Shreveport	2 PCMS	City of Shreveport	DOTD Field Equipment
Motorist Assistance Patrol (MAP) Vehicles and Equipment	Provide assistance to disabled vehicles and occupants. Support incident management.	LADOTD	DOTD MAP
Louisiana 511/ Website	Posting information about construction, major incidents, and freeway speed using Google speed data within the MPO. Covers I-20, I-220, I-49.	LADOTD ITS, District 04	Louisiana 511/ Website

ITS Equipment	Description	Stakeholder	Element Name*
Communications Hubs	4 communications Hubs • Interstate 20 (3) • Interstate 49 (1)	LADOTD	DOTD Field Equipment
Radar Vehicle Detection sites	69 RVDS RVD have been mostly deployed on I-20. A few have been installed on a limited segment of about 3.5miles on I-220 from the interchange with I-20 and LA 3132	LADOTD	DOTD Field Equipment
Wireless Communications	5 Links • Interstate 220 (4) • Inner Loop (1)	LADOTD	DOTD Field Equipment
Fiber Optic Communications	Along • Interstate 20 (Route 526 – I-220)* • Route 526 (E 70th Street – Route 3132, Route 3132 – I-20) • Youree Drive (E Flournoy Lucas Road – Lake Street) • Interstate 220 (I-20-US 80) and (I-20 to Route 3132) • 70th Street (Route 526-Crestwell Road) *Fiber optic on I-20 between the two I-220 interchanges has minimum dark fiber strands available but does have vacant conduit available. Existing fiber in the area can support additional ITS devices.	LADOTD	DOTD Field Equipment
DOTD District 04 Traffic Signal System (Shreveport)	227 Signals on state routes	LADOTD	DOTD Field Equipment
DOTD District 04 Traffic Signal System (Bossier City)	66 Signals on state routes (maintained by city) All signals in Bossier City communicate via twisted pair wires with telephone drops and are managed with Streetwise Lite.	LADOTD	DOTD Field Equipment
Shreveport Signals	119 Signals. 45 Signals are part of an interconnected system which communicates either via twisted and are centrally managed with Streetwise.	City of Shreveport	DOTD Field Equipment
Bossier City Signals	7 Signals on non-state routes (city owned) and interconnected	Bossier City	DOTD Field Equipment

6.1.1 Video Surveillance

The closed circuit television (CCTV) cameras are controlled and monitored by the Statewide Transportation Management Center (TMC) in Baton Rouge and the Shreveport TMC. District 04 does not have operating control of the cameras in their District. To pan, tilt, or zoom any of the cameras, District 04 requests the Statewide TMC to perform this operation.

6.1.2   Message Signs

DOTD District 04 currently has 21 dynamic message signs (DMS) at various locations (see inventory in **Table** 4). DOTD District 04 has nine (9) portable changeable message signs (PCMS) that are used primarily for special events, incident management, and evacuation purposes. These PCMS have remote control capabilities which are controlled by the district staff.

6.1.3   Motorist Assistance Patrol (MAP)

The Shreveport-Bossier City area has a Motorist Assistance Patrol program operating in the region. The program is jointly funded by DOTD and NLCOG. The limits of MAP have been illustrated in Figure 3. The general services currently provided by the MAP program are listed below:

- Change tires
- Inflate tires
- Provide fuel
- Perform first aid
- Clear travel lanes
- Traffic control
- Cell phone use
- Support incident management

Shreveport - Bossier City Motorist Assistance Patrol Area

Shreveport-Bossier City Patrol Area

I-20 - LA 526 to I-220 in Bossier City

I-49 - LA 3132 to I-20

LA 3132/I-220 - Loop I-49 to I-20 in Bossier City

Legend
- Motorist Assistance Highways
- Local Streets
- Interstate Highways
- Principal Highways
- Other Highways
- Parish Boundary
- Water

Figure 3: Shreveport-Bossier City Motorist Assistance Patrol Limits

6.1.4   Traveler Information System:

The Louisiana 511/ Website is a traveler information system which allows drivers to actively engage in smart travel by choosing less congested routes and also avoid routes with incidents. 511 can be reached by most cell phones and landlines or accessed on the internet at www.511LA.org. The information broadcasted/displayed for Shreveport contains construction information, lane closures, speed information, and reported incidents on state routes. All information for entry to 511 is provided to the Statewide TMC. The lane closure and construction information is communicated from DOTD District 04 via email. Incidents that occur on the state routes are communicated from the State Police and municipal police/sheriff departments. The speed information for the Shreveport area is extracted from Google speed database.

6.1.5   Interconnected Signal System

The majority of the traffic signals within the architecture boundary are owned, operated, and maintained by the DOTD. District 04 traffic engineering staff operates a total of 227 intersections within the district, including 45 intersections interconnected and managed by a Streetwise system. City of Shreveport owns and operates 119 signalized intersections.

6.2   Transportation Issues

6.2.1   Congested Corridors

According to the 2009 Congestion Management Process (CMP), the following 9 locations were identified as needing improvement:

1.   Hearne Avenue southbound from Kings Hwy to I-20 EB ramp
2.   Airline Drive southbound from I-220 WB Ramp to Viking Drive
3.   Bert Kouns Industrial Loop westbound from E Kings Hwy to Youree Drive
4.   Hearne Avenue southbound from Greenwood Road to Kings Hwy
5.   J. Davis Hwy westbound from Barksdale Blvd to East Foot J. Davis Bridge
6.   Bert Kouns Industrial Loop eastbound from Business Park to Youree Drive
7.   Airline Drive southbound from Douglas Drive to Shed Road
8.   N. Market Street southbound MLK Jr. Drive to I-220 WB ramp
9.   Industrial Loop eastbound from Walker Road to Mansfield Road

Furthermore, other stakeholders in the region such as law enforcement agencies, City of Shreveport, District Traffic Engineer have recommended the following corridors for congestion mitigation:

1.   Benton Road
2.   Youree Drive (any incident south of 70th Street is a challenge to respond to in reasonable time)
3.   Bert Kouns Industrial Loop Expressway: from 70th Street to Lindwood Avenue
4.   Teague Parkway
5.   Kings Highway
6.   Barksdale Boulevard
7.   Clyde Fant Parkway

In addition to the physical improvements recommended in the CMP, ITS technologies such as improved coordinated signals, DMS and CCTV along these routes may add benefits to these corridors in effect creating an integrated corridor management system (ICMS) for the most congested segments. Benton Road has significant congestion and improved signal coordination, DMS and CCTV would help to alleviate congestion and improve mobility.

6.2.2   Improving Current Incident Management

The current incident reporting procedure has too many repetitive steps and needlessly burdens police officers who also have to coordinate with other emergency responders. The incident report can be designed to auto-populate some of the repetitive information and eliminate requests for information that are not readily available while processing a crash site, for instance requesting latitude and longitude of a crash site. The incident report process can therefore be streamlined and also if possible placed into a clearinghouse where all other stakeholders can access up-to-date information. A more streamlined process will free a dispatcher to attend to other emergencies.

In addition both LSP Troop G and Shreveport Police Departments requested fiber connections to enhance communication since web based video feeds are slow and often time out. Shreveport PD requested a video wall with live feed to enhance incident management. Shreveport PD shares the same space with the Sherriff's office and Emergency Services. LSP Troop G in addition requested a secure web based application to communicate with DOTD and if possible access to the 511 website to update incidents. A request was made for standalone radio communication with MAP, TMC and Statewide TMC to enhance communication and efficiency.
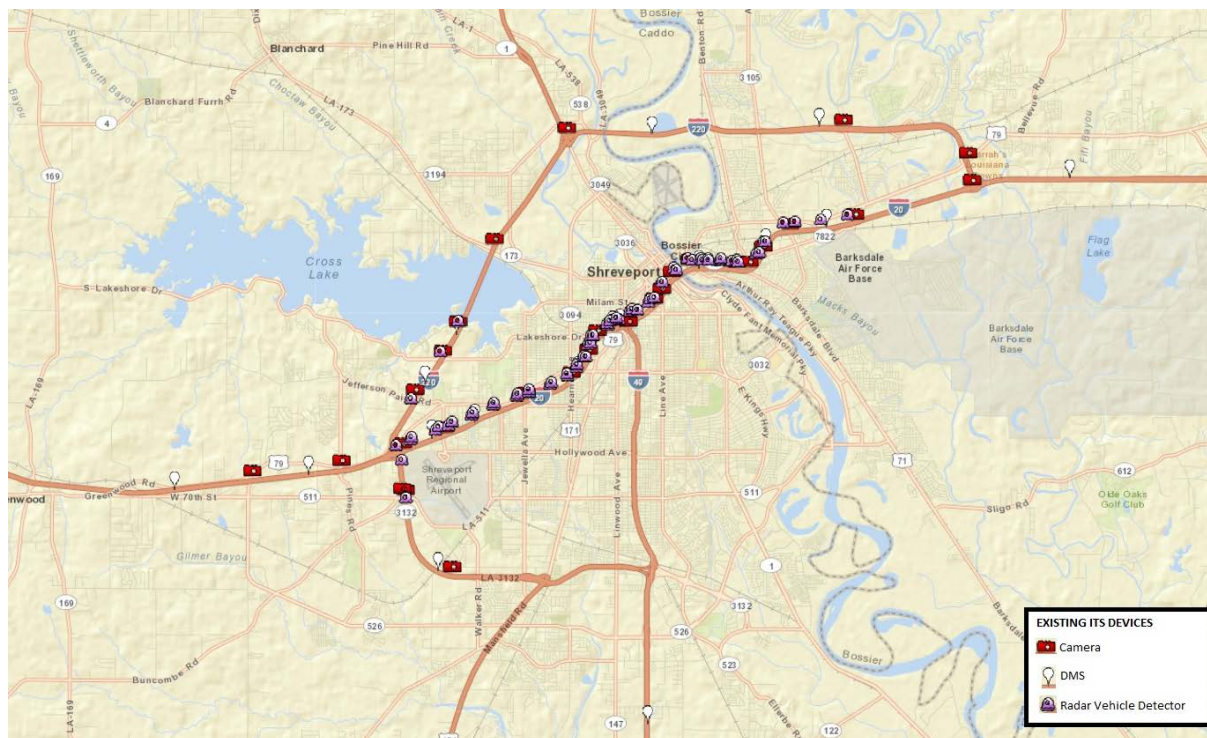

Figure 4: Existing ITS Elements in the Shreveport-Bossier City Area

Figure 4 shows the existing ITS elements in the Shreveport-Bossier City region. Gaps in CCTV coverage have been identified for the architecture as it exists and therefore provision of additional CCTV cameras within

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this region will be required for surveillance and incident verification. This is required to improve the current incident management of the system and to identify incidents within the existing coverage gaps.

6.2.3   Improved en-route Traveler Information

There is a need for additional DMS on I-49 heading into Shreveport to provide early advisories on incidents and congestion for commuters and others. If the DMS are strategically located, they will enable motorists to use alternate routes and avoid congested areas. The following locations were identified in a meeting with some stakeholders in July 2012 as good locations to place DMS:

1. I-49 needs a DMS for southbound traffic to LA 1

2. I-20 needs a DMS between Ruston and Minden: a critical location to inform and reroute traffic away from incidents or congestion. Eastbound diversions are sometimes done from Texas into Louisiana and this DMS will help reroute westbound traffic.

6.2.4   I-49 Extension

De-Icing Technology

The new I-49 extension into Arkansas will have a high potential for icing and some automatic de-icing technology would provide benefit to the project.

CCTV and DMS

Cameras will be required at I-220 Martin Luther King, and LA 1 interchanges. Two southbound DMS signs will also be deployed in advance of I-220

6.2.5   Expanded MAP Services

Shreveport-Bossier City Region currently has a motorist assistance patrol (MAP). There is a need to expand the program to include debris removal and also provide rapid tow service on I-20 from Airline Drive across the Red River Bridge to I-49 interchange.

6.2.6   Signal System Improvements

Currently a number of signal improvement projects are under way in the Shreveport-Bossier City Region. The following locations have also been identified as additional intersections that need signal system improvements:

- W 70th Street and Jewella Avenue

- W 70th and Linwood Avenue

- W 70th and Wyngate Blvd

- Route 3132 and Walker Road

- Route 3132 and Jewella Avenue

- N. Hearne Avenue and Lakeshore Drive

- N. Hearne Avenue and Murphy Street

- N. Hearne Avenue and Milam Street

6.2.7 ITS Coverage Improvements

As a result of several years of operation of the existing ITS, the TMC operators and the District Traffic Engineers have identified needs which will enhance system operation and performance. These updates may be either to address gaps in coverage or enhancements to existing coverage. The following is a list of ITS devices that are needed to address the issues mentioned above.

New CCTV cameras

- I-20 between Jewella Avenue and Monkhouse Drive, Shreveport
- I-20 under the I-49 interchange, Shreveport
- I-20 eastbound/westbound between I-49 and Fairfield Avenue (flyover ramps)
- I-20 between Linwood Avenue and Common Street, Shreveport
- I-20, Red River Bridge between Spring Street/Market Street in Shreveport and Traffic Street in Bossier City
- I-20 eastbound/westbound between Hamilton Road and Benton Road
- I-20 between Airline Drive and Industrial Drive, Bossier City
- I-220 between the I-20/I-220 interchange and Jefferson Paige Road, Shreveport. The preferred placement of this camera would be between the I-220 westbound through lane and the I-220 WB to I-20 WB ramp lane.
- I-220 between Cross Lake in Shreveport and US 80 in Bossier City. This is a section of interstate approximately 12 miles in length that includes the Red River Bridge, several horizontal curves, and four (4) busy interchanges. There are currently no cameras in this section
- I-49 northbound on-ramp to I-20 eastbound
- I-49 between LA 526 (Bert Kouns Industrial Loop Expy) to I-20 especially inner corridor of I-49 at 70th Street, Kings Highway, Hollywood Avenue interchanges
- LA 1 north of I-220
- Bert Kouns Industrial Loop (in the order of importance listed below)
  - o LA 526 @ LA 1
  - o LA 526 @ LA 171
  - o LA 526 @ E. Kings Highway
  - o LA 526 @ E. 70th St
  - o LA 526 @ LA 3132
  - o LA 526 @ I-49
- Mansfield Road (from LA 3132 to 70th Street)

New DMS

- I-20 eastbound between Airline Drive and Industrial Drive, Bossier City.
- I-220, westbound between Benton Road and the Red River Bridge, Bossier City.
- I-220, eastbound between LA 173 and I-49 north

Upgrades to Existing Devices

- All original FOG signs (complete upgrade)
    1. I-49 northbound, south of Shreveport at Southern Loop
    2. I-20 eastbound, west of Shreveport, just east of the Town of Greenwood
    3. I-20 westbound, east of Bossier City, near Louisiana Downs
- All DMS signs from SP 737-94-0028 (9 DMS along I-20) upgrade to LED technology

As upgrades are made to the field equipment, the Regional TMC must also be upgraded to keep in step with ITS device deployments. Another area of concern is the maintenance of the existing ITS devices. Timely repair of faulty devices will ensure better network surveillance and delivery of reliable information to the public with very little interruption. A proactive maintenance program will ensure a full return on investment for the regional ITS architecture.

7   ITS Services

ITS services describe what can be done to improve the efficiency, safety, and convenience of the regional transportation system through better information, advanced systems and new technologies. Some services are specific to one primary stakeholder while others require broad stakeholder participation. This section describes the ITS services that meet the transportation needs in the region.

Table 5: ITS Services

Service package	Service package Name	Service package Description	Service package Status	Included Elements
AD1	ITS Data Mart	This service 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 the basic data quality, data privacy, and meta data management common to all ITS archives and provides general query and report access to archive data users.	Planned	DOTD District 04 Traffic Operations Archive SporTran Transit Archive
AD2	ITS Data Warehouse	This service package includes all the data collection and management capabilities provided by the ITS Data Mart, and adds the functionality and interface definitions that allow collection of data from multiple agencies and data sources spanning across modal and jurisdictional boundaries. It performs the additional transformations and provides the additional meta data management features that are necessary so that all this data can be managed in a single repository with consistent formats. The potential for large volumes of varied data suggests additional on-line analysis and data mining features that are also included in this service package in addition to the basic query and reporting user access features offered by the ITS Data Mart.	Planned	Bossier City Traffic Operations DOTD District 04 Traffic Operations DOTD District 04 Traffic Operations Archive DOTD Statewide TMC LSP Troop G Shreveport Traffic Operations Shreveport/Bossier City Regional TMC SporTran Transit SporTran Transit Archive
APTS01	Transit Vehicle Tracking	This service 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. Vehicle position may be determined either by the vehicle (e.g., through GPS) and relayed to the infrastructure or may be determined directly by the communications infrastructure. A two-way wireless communication link with the Transit Management Subsystem is used for relaying vehicle position and control measures.	Existing	SporTran Transit

Service package	Service package Name	Service package Description	Service package Status	Included Elements
APTS02	Transit Fixed-Route Operations	This service package performs automated dispatch and system monitoring for fixed-route and flexible-route transit services. This service performs scheduling activities including the creation of schedules, blocks and runs, as well as operator assignment. This service determines the transit vehicle trip performance against the schedule using AVL data and provides information displays at 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.	Planned	SporTran Transit
APTS03	Demand Response Transit Operations	This service package performs automated dispatch and system monitoring for demand responsive transit services. This service performs scheduling activities as well as operator assignment. In addition, this service package performs similar functions to support dynamic features of flexible-route 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.	Planned	SporTran Transit
APTS04	Transit Fare Collection Management	This service package manages transit fare collection on-board transit vehicles and at transit stops using electronic means. It allows transit users to use a traveler card or other electronic payment device. 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. Two other service packages, ATMS10: Electronic Toll Collection and ATMS16: Parking Facility Management also provide electronic payment services. These three service packages in combination provide an integrated electronic payment system for transportation services.	Planned	SporTran Transit

Service package	Service package Name	Service package Description	Service package Status	Included Elements
APTS05	Transit Security	This service package provides for the physical security of transit passengers and transit vehicle operators. On-board equipment is deployed to perform surveillance and sensor monitoring in order to warn of potentially hazardous situations. The surveillance equipment includes video (e.g., CCTV cameras), audio systems and/or event recorder systems. The sensor equipment includes threat sensors (e.g., chemical agent, toxic industrial chemical, biological, explosives, and radiological sensors) and object detection sensors (e.g., metal detectors). Transit user or transit vehicle operator activated alarms are provided on-board. Public areas (e.g., transit stops, park and ride lots, stations) are also monitored with similar surveillance and sensor equipment and provided with transit user activated alarms.	Planned	SporTran Transit
APTS06	Transit Fleet Management	This service 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. The service package also supports the day to day management of the transit fleet inventory, including the assignment of specific transit vehicles to blocks.	Planned	SporTran Transit
APTS07	Multi-modal Coordination	This service 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 transit transfer points and clusters (a collection of stops, stations, or terminals where transfers can be made conveniently) and also improve operating efficiency. Transit transfer information is shared between Multimodal Transportation Service Providers and Transit Agencies.	Planned	Bossier City Traffic Operations
				Shreveport Traffic Operations
				Shreveport/Bossier City Regional TMC
				SporTran Transit
APTS08	Transit Traveler Information	This service 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 service package.	Planned	Personal Devices
				SporTran Transit
APTS09	Transit Signal Priority	This service package determines the need for transit priority on routes and at certain intersections and	Planned	DOTD District 04 Traffic Signal System

Service package	Service package Name	Service package Description	Service package Status	Included Elements
		requests transit vehicle priority at these locations. The signal priority may result from limited local coordination between the transit vehicle and the individual intersection for signal priority or may result from coordination between transit management and traffic management centers. 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.		SporTran Transit
APTS10	Transit Passenger Counting	This service package counts the number of passengers entering and exiting a transit vehicle using sensors mounted on the vehicle and communicates the collected passenger data back to the management center. The collected data can be used to calculate reliable ridership figures and measure passenger load information at particular stops.	Planned	SporTran Transit
ATIS01	Broadcast Traveler Information	This service package collects traffic conditions, advisories, general public transportation, toll and parking information, incident information, roadway maintenance and construction information, air quality and weather information, and broadcasts the information to travelers using technologies such as FM subcarrier, satellite radio, cellular data broadcasts, and Internet web casts. The information may be provided directly to travelers or provided to merchants and other traveler service providers so that they can better inform their customers of travel conditions.	Existing	Bossier City Traffic Operations
				Local Police/Sheriff's Departments
				LSP Troop G
				Personal Devices
				Shreveport Traffic Operations
				Shreveport/Bossier City Regional TMC
				SporTran Transit
ATIS02	Interactive Traveler Information	This service package provides tailored information in response to a traveler request. Both real-time interactive request/response systems and information systems that "push" a tailored stream of information to the traveler based on a submitted profile are supported. The traveler can obtain current information regarding traffic conditions, roadway maintenance and construction, transit services, ride share/ride match, parking management, detours and pricing information. Although the Internet is the predominate network used for traveler information dissemination, a range of two-way wide-area wireless and fixed-point to fixed-point communications systems may be used to support the required data communications between the traveler and Information Service Provider.	Planned	Personal Devices
ATMS01	Network Surveillance	This service package includes traffic detectors, other surveillance equipment, the supporting field equipment, and fixed-point to fixed-point communications to transmit the collected data back to the Traffic Management Subsystem. The derived data can be used locally such as when traffic detectors are connected directly to a signal control system or remotely (e.g., when a CCTV system sends data back to	Existing	Bossier City Traffic Operations
				DOTD District 04 Traffic Operations
				DOTD District 04 Traffic Signal System

Service package	Service package Name	Service package Description	Service package Status	Included Elements
		the Traffic Management Subsystem). The data generated by this service package enables traffic managers to monitor traffic and road conditions, identify and verify incidents, detect faults in indicator operations, 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.		DOTD ITS Field Equipment
				DOTD Statewide TMC
				Shreveport Traffic Operations
				Shreveport/Bossier City Regional TMC
				Bossier City Traffic Signal System
				DOTD District 04 Traffic Operations
				DOTD District 04 Traffic Signal System
				Shreveport Traffic Operations
				Shreveport Traffic Signal System
				Shreveport/Bossier City Regional TMC
				DOTD ITS Field Equipment
				DOTD Statewide TMC
				Shreveport/Bossier City Regional TMC
ATMS06	Traffic Information Dissemination	This service package provides driver information using roadway equipment such as dynamic message signs or highway advisory radio. A wide range of information can be disseminated including traffic and road conditions, closure and detour information, incident information, and emergency alerts and driver advisories. This package provides information to drivers at specific equipped locations on the road network. Careful placement of the roadway equipment provides the information at points in the network where the drivers have recourse and can tailor their routes to account for the new information. 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. A link to the Maintenance and Construction Management subsystem allows real time information on road/bridge closures due to maintenance and construction activities to be disseminated.	Existing	DOTD ITS Field Equipment
				DOTD Statewide TMC
				Shreveport/Bossier City Regional TMC

Service package	Service package Name	Service package Description	Service package Status	Included Elements
ATMS07	Regional Traffic Management	This service package provides for the sharing of traffic information and control among traffic management centers to support regional traffic management strategies. Regional traffic management strategies that are supported include coordinated signal control in a metropolitan area and coordination between freeway operations and arterial signal control within a corridor. This service package advances the Surface Street Control and Freeway Control Service packages by adding the communications links and integrated control strategies that enable integrated inter-jurisdictional traffic management. The nature of optimization and extent of information and control sharing is determined through working arrangements between jurisdictions.	Planned	Bossier City Traffic Operations
				DOTD District 04 Traffic Operations
				DOTD Statewide TMC
				Shreveport Traffic Operations
				Shreveport/Bossier City Regional TMC
ATMS08	Traffic Incident Management System	This service package manages both unexpected incidents and planned events so that the impact to the transportation network and traveler safety is minimized. The service 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 rail operations and event promoters. Information from these diverse sources is collected and correlated by this service package to detect and verify incidents and implement an appropriate response. This service package supports traffic operations personnel in developing an appropriate response in coordination with emergency management, maintenance and construction management, and other incident response personnel to confirmed incidents. The response may include traffic control strategy modifications or resource coordination between center subsystems. Incident response also includes presentation of information to affected travelers using the Traffic Information Dissemination service package and dissemination of incident information to travelers through the Broadcast Traveler Information or Interactive Traveler Information service packages. The roadside equipment used to detect and verify incidents also allows the operator to monitor incident status as the response unfolds. 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.	Existing	Bossier City Traffic Operations
				Caddo Parish Communications District 911/Emergency Management Agencies
				DOTD District 04 Traffic Operations
				DOTD ITS Field Equipment
				DOTD MAP
				DOTD Statewide TMC
				Local Emergency Medical
				Local Emergency Operations Centers
				Local Police/Sheriff's Departments
				Louisiana 511/Website
				LSP Troop G
				Shreveport Traffic Operations
				Shreveport/Bossier City Regional TMC
				Bossier City Traffic Operations
				DOTD Statewide TMC
				Shreveport Traffic Operations
				Shreveport/Bossier City Regional TMC

Service package	Service package Name	Service package Description	Service package Status	Included Elements
ATMS13	Standard Railroad Grade Crossing	This service package manages highway traffic at highway-rail intersections (HRIs) where operational requirements do not dictate more advanced features (e.g., 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. (Note that passive systems exercise only the single interface between the roadway subsystem and the driver in the architecture definition.) 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.	Planned	Bossier City Traffic Operations
				Bossier City Traffic Signal System
				DOTD District 04 Traffic Operations
				DOTD District 04 Traffic Signal System
				DOTD ITS Field Equipment
				RR Grade Crossing Controller
				Shreveport Traffic Operations
				Shreveport/Bossier City Regional TMC
ATMS15	Railroad Operations Coordination	This service package provides an additional level of strategic coordination between freight rail operations and traffic management centers. Rail operations provide train schedules, maintenance schedules, and any other forecast events that will result in highway-rail intersection (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.	Planned	Bossier City Traffic Operations
				DOTD District 04 Traffic Operations
				Shreveport Traffic Operations
ATMS19	Speed Monitoring	This service package monitors the speeds of vehicles traveling through a roadway system. If the speed is determine to be excessive, roadside equipment can suggest a safe driving speed. Environmental conditions may be monitored and factored into 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.	Planned	DOTD ITS Field Equipment
				DOTD Statewide TMC
				Shreveport/Bossier City Regional TMC
EM01	Emergency Call-Taking and Dispatch	This service package provides basic public safety call-taking and dispatch services. It 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 between agencies. Wide area wireless communications between the Emergency Management Subsystem and an Emergency Vehicle supports dispatch and provision of information to responding personnel.	Existing	Caddo Parish Communications District 911/Emergency Management Agencies
				DOTD MAP
				DOTD Statewide TMC
				Local Emergency Medical
				Local Emergency Operations Centers
				Local Police/Sheriff's Departments

Service package	Service package Name	Service package Description	Service package Status	Included Elements
				LSP Troop G
				Shreveport/Bossier City Regional TMC
EM02	Emergency Routing	This service package supports automated vehicle location and dynamic routing of emergency vehicles. Traffic information, road conditions, and suggested routing information are provided to enhance emergency vehicle routing. Special priority or other specific emergency traffic control strategies can be coordinated to improve the safety and time-efficiency of responding vehicle travel on the selected route(s). The Emergency Management Subsystem provides the routing for the emergency fleet based on real-time conditions and has the option of requesting a route from the Traffic Management subsystem. The Emergency Vehicle may also be equipped with dedicated short range communications for local signal preemption and the transmission of alerts to surrounding vehicles. The service provides for information exchange between care facilities and both the Emergency Management Subsystem and emergency vehicles.	Planned	Bossier City Traffic Signal System
				Caddo Parish Communications District 911/Emergency Management Agencies
				DOTD District 04 Traffic Operations
				DOTD District 04 Traffic Signal System
				Local Police/Sheriff's Departments
				LSP Troop G
				Shreveport/Bossier City Regional TMC
EM04	Roadway Service Patrols	This service package supports roadway service patrol vehicles that monitor roads that aid motorists, offering rapid response to minor incidents (flat tire, accidents, out of gas) to minimize disruption to the traffic stream. If problems are detected, the roadway service patrol vehicles will provide assistance to the motorist (e.g., push a vehicle to the shoulder or median). The service package monitors service patrol vehicle locations and supports vehicle dispatch to identified incident locations. Incident information collected by the service patrol is shared with traffic, maintenance and construction, and traveler information systems.	Existing	Bossier City Traffic Operations
				DOTD MAP
				DOTD Statewide TMC
				Shreveport Traffic Operations
				Shreveport/Bossier City Regional TMC
EM05	Transportation Infrastructure Protection	This service package includes the monitoring of transportation infrastructure (e.g., bridges, tunnels and management centers) for potential threats using sensors and surveillance equipment and barrier and safeguard systems to control access, preclude an incident, and mitigate the impact of an incident if it occurs. Threats can result from acts of nature (e.g., hurricanes, earthquakes), terrorist attacks or other incidents causing damage to the infrastructure (e.g., stray barge hitting a bridge support). Infrastructure may be monitored with acoustic, environmental threat (such as nuclear, biological, chemical, and explosives), infrastructure condition and integrity, motion and object sensors and video and audio surveillance equipment. Data from such sensors and surveillance equipment may be processed in the field or sent to a center for processing. The data enables operators at the center to detect and verify threats.	Planned	DOTD ITS Field Equipment

Service package	Service package Name	Service package Description	Service package Status	Included Elements
EM06	Wide-Area Alert	This service package uses ITS driver and traveler information systems to alert the public in emergency situations such as child abductions, severe weather events, civil emergencies, and other situations that pose a threat to life and property. The alert includes information and instructions for transportation system operators and the traveling public, improving public safety and enlisting the public's help in some scenarios. The ITS technologies will supplement and support other emergency and homeland security alert systems such as the Emergency Alert System (EAS). When an emergency situation is reported and verified and the terms and conditions for system activation are satisfied, a designated agency broadcasts emergency information to traffic agencies, transit agencies, information service providers, toll operators, and others that operate ITS systems.	Existing	Caddo Parish Communications District 911/Emergency Management Agencies Local Emergency Medical Local Emergency Operations Centers LSP Troop G Shreveport/Bossier City Regional TMC
EM08	Disaster Response and Recovery	This service package enhances the ability of the surface transportation system to respond to and recover from disasters. It addresses the most severe incidents that require an extraordinary response from outside the local community. All types of disasters are addressed including natural disasters (hurricanes, earthquakes, floods, winter storms, tsunamis, etc.) and technological and man-made disasters (hazardous materials incidents, nuclear power plant accidents, and national security emergencies such as nuclear, chemical, biological, and radiological weapons attacks).	Planned	Caddo Parish Communications District 911/Emergency Management Agencies DOTD Statewide TMC Local Emergency Medical Local Emergency Operations Centers LSP Troop G Shreveport/Bossier City Regional TMC
EM09	Evacuation and Reentry Management	This service package supports evacuation of the general public from a disaster area and manages subsequent reentry to the disaster area. The service package addresses evacuations for all types of disasters, including disasters like hurricanes that are anticipated and occur slowly, allowing a well-planned orderly evacuation, as well as disasters like terrorist acts that occur rapidly, without warning, and allow little or no time for preparation or public warning.	Existing	DOTD District 04 Traffic Operations DOTD Statewide TMC Local Emergency Medical Local Emergency Operations Centers LSP Troop G Shreveport/Bossier City Regional TMC
EM10	Disaster Traveler Information	This service package uses ITS to provide disaster-related traveler information to the general public, including evacuation and reentry information and other information concerning the operation of the transportation system during a disaster. This service package collects information from multiple sources including traffic, transit, public safety, emergency management, shelter provider, and travel service provider organizations. The collected information is processed and the public is provided with real-time disaster and evacuation information using ITS traveler	Existing	Caddo Parish Communications District 911/Emergency Management Agencies Local Emergency Operations Centers Local Print and Broadcast Channels

Service package	Service package Name	Service package Description	Service package Status	Included Elements
		information systems.		Shreveport/Statewide TMCs
MC03	Road Weather Data Collection	This service package collects current road and weather conditions using data collected from environmental sensors deployed on and about the roadway (or guide way in the case of transit related rail systems). In addition to fixed sensor 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 service package to process the information and make decisions on operations. The collected environmental data may be aggregated, combined with data attributes and sent to meteorological systems for data qualification and further data consolidation. The service package may also request and receive qualified data sets from meteorological systems.	Planned	DOTD ITS Field Equipment DOTD ITS Section Shreveport/Bossier City Regional TMC
MC04	Weather Information Processing and Distribution	This service package processes and distributes the environmental information collected from the Road Weather Data Collection service package. This service package uses the environmental data to detect environmental hazards such as icy road conditions, high winds, dense fog, etc. so system operators and decision support systems can make decision 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 service package, and aid operators in scheduling work activity.	Planned	Bossier City Traffic Operations DOTD District 04 Traffic Operations Local Emergency Operations Centers Shreveport Traffic Operations Shreveport/Bossier City Regional TMC
MC07	Roadway Maintenance and Construction	This service 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 (roadway debris, dead animals), routine maintenance activities (roadway cleaning, grass cutting), and repair and maintenance of both ITS and non-ITS equipment on the roadway (e.g., signs, traffic controllers, traffic detectors, dynamic message signs, traffic signals, CCTV, etc.). Environmental conditions information is also received from various weather sources to aid in scheduling maintenance and construction activities.	Existing	DOTD District 04 Traffic Operations DOTD ITS Section DOTD Statewide TMC Shreveport/Bossier City Regional TMC
MC08	Work Zone Management	This service package manages work zones, controlling traffic in areas of the roadway where maintenance, construction, and utility work activities are underway. Traffic conditions are monitored using CCTV cameras and controlled using dynamic message signs (DMS), Highway Advisory Radio (HAR), gates and barriers.	Existing	DOTD District 04 Traffic Operations DOTD ITS Field Equipment DOTD Statewide TMC

Service package	Service package Name	Service package Description	Service package Status	Included Elements
		Work zone information is coordinated with other groups (e.g., ISP, traffic management, and other maintenance and construction centers). Work zone speeds and delays are provided to the motorist prior to the work zones.		Shreveport/Bossier City Regional TMC
MC09	Work Zone Safety Monitoring	This service package includes systems that improve work crew safety and reduce collisions between the motoring public and maintenance and construction vehicles. This service package detects vehicle intrusions in work zones and warns crew workers and drivers of imminent encroachment or other potential safety hazards. Crew movements are also monitored so that the crew can be warned of movement beyond the designated safe zone. The service package supports both stationary and mobile work zones. The intrusion detection and alarm systems may be collocated or distributed, allowing systems that detect safety issues far upstream from a work zone (e.g., detection of over dimension vehicles before they enter the work zone).	Planned	DOTD ITS Field Equipment
				Shreveport/Bossier City Regional TMC
MC10	Maintenance and Construction Activity Coordination	This service package supports the dissemination of maintenance and construction activity to centers that can utilize it as part of their operations, or to the Information Service Providers who can provide the information to travelers.	Existing	Bossier City Traffic Operations
				City of Shreveport Office of Public Works Traffic Engineering Division
				DOTD District 04 Traffic Operations
				DOTD ITS Section
				DOTD Statewide TMC
MC12	Infrastructure Monitoring	This service package monitors the condition of pavement, bridges, tunnels, associated hardware, and other transportation-related infrastructure (e.g., culverts) using both fixed and vehicle-based infrastructure monitoring sensors. Fixed sensors monitor vibration, stress, temperature, continuity, and other parameters and mobile sensors and data logging devices collect information on current infrastructure condition. This service package also monitors vehicle probes for vertical acceleration data and other probe data that may be used to determine current pavement condition.	Planned	DOTD ITS Field Equipment
				DOTD ITS Section

8   Interfaces between System

The interfaces of the transportation systems in the architecture are based on the National ITS Architecture and tailored to reflect the plan for this region. Architecture diagrams display the transportation systems in the Shreveport-Bossier City Regional ITS Architecture and, more importantly, how these systems are and will be connected with one another so that information can be exchanged and transportation services can be coordinated. Stakeholders may use these diagrams to identify integration opportunities. Each system in the region can be represented with two types of diagrams: an overall interconnect diagram and element specific architecture flow context diagrams, both described below.

The interconnect context diagram shows the connections between systems (i.e., Elements). Interconnects are represented as single lines and indicate information sharing without specifying the type of information being shared or the direction of the information movement, shown as planned or existing. An architecture flow context diagram shows a particular system and all other systems with which it is interconnected, the information being shared (i.e. architecture flows), and the direction of the flow. Descriptions of the architecture flows are included in **Appendix A**. The architecture flow context diagrams have been included within this document as part of **Appendix B**. Information about the interfaces of the systems in the region is contained in the Turbo Architecture™ database. Turbo Architecture™ can be used to create tailored interconnect and architecture flow diagrams for any system in the database.

9   Operational Concept

The Operational Concept lists the Roles and Responsibilities (RR) that each participating agency must take on to provide the ITS services included in the ITS Architecture. Changing needs may arise that defines new or additional roles and will require an agreement to be formed between all affected parties. Defining the roles and responsibilities of the participating stakeholders in the region and the willingness of agencies to accept their roles and responsibilities is an important step in realizing the common goal of an interoperable ITS throughout the region.

Table 6: Operational Concept

RR Area Name	Stakeholder	RR Description	RR Status
Archived Data Systems for Shreveport/Bossier City TMA Regional ITS Architecture	Bossier City Traffic Engineering	Crash data collection	Existing.
	Caddo Parish 9-1-1	Incident calls	
	Caddo Parish Sheriff's office	Incident report collection	
	LADOTD	Collect and archive incident data	
	Local Emergency Medical Providers	Incident report collection	
	Local Public Safety Agencies	Incident data collection	
	Louisiana State Police (Troop G)	Incident data collection	
Emergency Management for Shreveport/Bossier City TMA Regional ITS Architecture	Bossier City Traffic Engineering	Emergency planning	Existing
	Caddo Parish 9-1-1	Incident alert and notification	
	Caddo Parish Sheriff's office	Emergency planning	
		Emergency response	
	LADOTD	Emergency planning	
		Emergency monitoring	
		Emergency response	
	Local Emergency Medical Providers	Emergency planning	
		Emergency response	
	Local Public Safety Agencies	Emergency planning	
		Emergency Response	

RR Area Name	Stakeholder	RR Description	RR Status
	Louisiana State Police (Troop G)	Emergency planning	
		Emergency response	
	Public	Emergency reporting	
	Shreveport Area Transit System	Emergency planning	
		Emergency notification	
		Emergency response	
	Tourism and Traveler Information Service Providers	Emergency notification	
Freeway Management for Shreveport/Bossier City TMA Regional ITS Architecture	Bossier City Traffic Engineering	Diversion planning	Existing
		Implementation of diversion routes	
		Traffic control	
	Caddo Parish 9-1-1	Incident notification	
	Caddo Parish Sheriff's office	Incident planning	
		Incident response	
	LADOTD	Freeway management planning	
		Incident planning	
		Incident response support	
		Incident clearing	
	Local Emergency Medical Providers	Incident Response and support	
	Local Public Safety Agencies	Incident response and support	
	Louisiana State Police (Troop G)	Incident planning	
		Incident response	
		Incident investigation	

RR Area Name	Stakeholder	RR Description	RR Status
	Media	Motorist information	
	Tourism and Traveler Information Service Providers	Transit information dissemination	
Incident Management for Shreveport/Bossier City TMA Regional ITS Architecture	Bossier City Traffic Engineering	Incident planning	Existing
		Incident response	
	Caddo Parish 9-1-1	Incident notification	
	Caddo Parish Sheriff's office	Incident planning	
		Incident response	
	LADOTD	Collect and archive incident data	
		Incident planning	
		Incident response support	
		Incident clearing	
	Local Emergency Medical Providers	Emergency planning	
		Emergency response	
	Local Public Safety Agencies	Incident data collection	
		Incident response and support	
	Local Railroad	Incident reporting	
		Incident response	
	Louisiana State Police (Troop G)	Incident data collection	
		Incident response	
		Incident investigation	
		Incident planning	Planned
	Media	Motorist information	Existing

RR Area Name	Stakeholder	RR Description	RR Status
Maintenance and Construction for Shreveport/Bossier City TMA Regional ITS Architecture	Bossier City Traffic Engineering	Construction planning	Existing
		Traffic data collection	
	LADOTD	Construction planning	Planned
		Construction monitoring	
		Perform maintenance	
	Local Emergency Medical Providers	Incident response and support	
	Louisiana State Police (Troop G)	Construction workzone violation enforcement	
	Media	Motorist information	
Surface Street Management for Shreveport/Bossier City TMA Regional ITS Architecture	Bossier City Traffic Engineering	Construction planning	Planned
	Caddo Parish 9-1-1	Incident notification	
	Caddo Parish Sheriff's office	Incident response	
	LADOTD	Incident response support	
	Local Emergency Medical Providers	Incident response and support	
	Local Public Safety Agencies	Incident response and support	
	Local Railroad	Incident response	
	Louisiana State Police (Troop G)	Incident response	
	Media	Motorist information	
	Tourism and Traveler Information Service Providers	Transit information dissemination	
Transit Services for Shreveport/Bossier City TMA Regional ITS Architecture	Bossier City Traffic Engineering	Incident Planning	Planned
	Bossier City Traffic Engineering	Incident Response	

RR Area Name	Stakeholder	RR Description	RR Status
	Caddo Parish 9-1-1	Incident notification	
	Caddo Parish Sheriff's office	Incident response	
	LADOTD	Incident response support	
	Local Emergency Medical Providers	Incident response and support	
	Local Public Safety Agencies	Incident response and support	
	Local Railroad	Incident response	
	Louisiana State Police (Troop G)	Incident response	
	Media	Motorist information	
	Public	Transit user	Existing
	Shreveport Area Transit System	Ridership information	Planned
	Tourism and Traveler Information Service Providers	Transit information dissemination	
Traveler Information for Shreveport/Bossier City TMA Regional ITS Architecture	Bossier City Traffic Engineering	Incident reporting	Planned
	Caddo Parish 9-1-1	Incident alert and notification	
	Caddo Parish Sheriff's office	incident response	
	LADOTD	Incident Reporting	Existing
		Traffic Condition Reporting	
	Local Emergency Medical Providers	Emergency response	Planned
	Local Public Safety Agencies	Emergency response	
		Incident response	
	Louisiana State Police (Troop G)	Incident response	
		Incident data collection	
	Media	Incident reporting	Existing

RR Area Name	Stakeholder	RR Description	RR Status
	Public	End user	
	Shreveport Area Transit System	Transit schedule information	
	Tourism and Traveler Information Service Providers	Traveler information	

9.1 ITS Deployment Plan – Sequence of Planned Projects

The Shreveport-Bossier City Regional ITS Architecture is implemented as funding is made available. This section lists the projects that have been identified as part of the regional ITS architecture. Additional detail for each of these ITS projects is included in the Turbo Architecture database.

Table 7: Project Sequence

Name	Description	Service Scope	Geographic Scope	Time Frame	Market Packages	Design Cost			Capital Cost			O&M			Total Cost		
Bert Kouns Industrial Loop Expy Traffic Signal System and Communications Upgrades	Upgrade signals and communication	Project to include signal upgrades and connection to existing fiber and integration with the, DOTD District 04 office, and City of Shreveport Traffic Engineer's office.	LA 526 from I-20 to LA 3132	1-3 years	ATMS01 ATMS03 ATMS07	$ 140,000.00	-	$ 312,000.00	$ 2,800,000.00	-	$ 3,900,000.00	$ 420,000.00	-	$ 975,000.00	$ 3,360,000.00	-	$ 5,187,000.00
Shreveport/Bossier City ITS - DMS Replacement	Replace DMS	This project will replace antiquated DMS with new DMS	I-20 from Greenwood Rd. to LA 614 (W. McKinley Ave.) I-49 from I-20 to Southern Loop	1-3 years	ATMS06	$ 62,500.00	-	$ 5,400,000.00	$ 1,250,000.00		$ 1,350,000.00	$ 187,500.00	-	$ 337,500.00	$ 1,500,000.00	-	$ 7,087,500.00
Shreveport/Bossier City TMC	Local Traffic Management Center (TMC) Upgrade/Expansion	TMC Operations includes: -Active monitoring of traffic conditions on state and federal routes -Disseminating information for emergencies, incidents and amber alerts -Coordination for Traffic Incident Management -Agency outreach -Dispatching MAP	Shreveport/Bossier City area - Coverage to include state and federal routes from the TX state line to LA 157 (Haughton)	2-3 years	AD1 AD2 APTS08 ATOS01 ATOS02 ATMS03 ATMS04 ATMS06 ATMS07 ATMS19 ATMS20 EM01 EM04 EM06 EM08 EM09 EM10 MC07 MC08	$ 5,000.00	-	$ 16,000.00	$ 100,000.00	-	$ 200,000.00	$ 15,000.00	-	$ 50,000.00	$ 120,000.00	-	$ 266,000.00
Rapid Tow Program	A contracted tow company stations a tow truck at strategic locations and rapidly removes stalled vehicles to a drop point/storage area which is close enough to enable tow truck return and be ready for service. Vehicle at storage point can be assisted by any other regular towing company	Quick removal of stranded vehicles	I-20 from I-49 to Airline Drive	2-3 years	ATMS08 EM04	$ 3,500.00	-	$ 6,000.00	$ 70,000.00	-	$ 75,000.00	$ 55,000.00	-	$ 55,000.00	$ 128,500.00	-	$ 136,000.00
Shreveport ITS Deployment Phase 2B	Deploy ITS equipment and communications.	The project is envisioned to include closed circuit television cameras, dynamic message signs, and communications, whether wireless or fiber optic. Also included is integration with the TMC.	LA 526 from I-20 to LA 3132 I-49 from LA 526 to LA 3132 LA 3132 from I-49 to LA 526	2-3 years	ATMS01 ATMS03 ATMS05 ATMS23	$ 112,500.00	-	$ 220,000.00	$ 2,250,000.00	-	$ 2,750,000.00	$ 337,500.00	-	$ 687,500.00	$ 2,700,000.00	-	$ 3,657,500.00

Name	Description	Service Scope	Geographic Scope	Time Frame	Market Packages	Design Cost			Capital Cost			O&M			Total Cost		
Traffic Signal System and Communications Upgrades (Project #1)	Upgrade signals and communication	Project to include fiber optic cable installation and communication integration with the traffic signals, DOTD District 04 office, and the ITS communications network. This project will include surveillance and detection and other control devices.	US 171 from Baird Road to 70th Street (15 Signals) LA 3132/Lindwood Avenue (1 Signal) 70th St / Jewella Ave 70th St / Linwood Ave 70th St/WyngateBlvd LA 3132 / Walker Road LA 3132 / Jewella Ave Hearne Ave / Lakeshore Drive Hearne Ave / Murphy Street Hearne Ave / Milan Street	2-4 years	ATMS01 ATMS03	$ 258,252.50	-	$ 486,660.00	$ 5,165,050.00	-	$ 6,083,250.00	$ 774,757.50	-	$ 1,520,812.50	$ 6,198,060.00	-	$ 8,090,722.50
Shreveport ITS Deployment Phase 4	Deploy ITS equipment and communications.	The project is envisioned to include closed circuit television cameras, fiber optic connection and integration with the TMC.	I-20 from Monkhouse Dr. to Benton Rd. (enhance existing coverage)	3-4 years	ATMS01	$ 9,000.00	-	$ 17,600.00	$ 180,000.00	-	$ 220,000.00	$ 27,000.00	-	$ 55,000.00	$ 216,000.00	-	$ 292,600.00
Traffic Signal System and Communications Upgrades (Project # 2)	Upgrade signals and communication	Project to include fiber optic cable installation and communication integration with the traffic signals, DOTD District 04 office, and the ITS communications network. This project will include surveillance and detection and other control devices.	US 171 @ Midway LA 3094 @ LA 173 US 171 @ Hollywood Ave LA 173 @ Russell Road	3-5 years	ATMS01 ATMS03	$ 33,000.00	-	$ 59,200.00	$ 660,000.00	-	$ 740,000.00	$ 99,000.00	-	$ 185,000.00	$ 792,000.00	-	$ 984,200.00
Shreveport ITS Deployment Phase 5	Deploy ITS equipment and communications.	The project is envisioned to include closed circuit television cameras, dynamic message signs, and communications, whether wireless or fiber optic. Also included is integration with the TMC. The City will have PTZ capability to pan, tilt and zoom cameras.	Provision of CCTV and DMS along LA 3132 from Walker Road to Flournoy Lucas Road	4-5 years	ATMS01 ATMS06	$ 40,000.00	-	$ 73,600.00	$ 800,000.00	-	$ 920,000.00	$ 120,000.00	-	$ 230,000.00	$ 960,000.00	-	$ 1,223,600.00
Fiber Optic	Upgrade Communications	Installation of fiber optic and integration with TMC	I-220: S. Lakeshore Dr. to US 80	5+ years	ATMS01	$ 2,750.00	-	$ 5,360.00	$ 55,000.00	-	$ 67,000.00	$ 8,250.00	-	$ 16,750.00	$ 66,000.00	-	$ 89,110.00
Shreveport ITS Deployment Phase 6	Deploy ITS equipment and communications.	The project is envisioned to include closed circuit television cameras, dynamic message signs, and communications, whether wireless or fiber optic. Also included is integration with the TMC.	Northern I-49 segment from Dixie Blanchard Rd. to I-220	5+ years	ATMS01 ATMS03	$ 100,000.00	-	$ 480,000.00	$ 2,000,000.00	-	$ 6,000,000.00	$ 300,000.00	-	$ 1,500,000.00	$ 2,400,000.00	-	$ 7,980,000.00

9.2   Operations and Maintenance of Regional ITS

Currently, LADOTD ITS Section (Section 56) is responsible for providing statewide ITS equipment O&M support for equipment on state and federal routes. LADOTD O&M for DOTD Traffic Signals are maintained by the district office or by a municipality through an agreement. On other routes, the agency responsible for the ITS is the facility owner. Typically, ITS maintenance activities are performed on an as-needed basis. The Shreveport-Bossier City region does not have dedicated funding source/structure for periodic maintenance of the ITS system. As the transportation funding resources struggle to keep up with the demand, it is critical to understand the capital cost versus O&M cost balance over the life-cycle of any ITS. As the Shreveport-Bossier City region prepares to expand and enhance existing ITS, it is critical to identify which agency will be responsible for a proposed ITS and how much resources will be required for O&M of the system. Considering a dedicated annual budget for ITS deployment in the region, it is understandable that the more ITS deployment in the region, the less money will be available for new ITS deployment in successive time periods.

In this document, subject O&M resource/responsibilities have been covered under two different sections: one defining agency O&M responsibilities and the other specifying O&M funding requirements. In **Table 6,** maintenance responsibilities have been identified/assigned to a particular agency for each applicable service package. Although, such O&M arrangements may differ at a project level based on specific agencies involved, the operations and maintenance requirements section under each service package provides guidelines on which agency should assume the maintenance responsibilities for each ITS component.

There is currently no dedicated long term maintenance funding for any ITS in the region. LADOTD currently has a statewide maintenance budget of $2 million, which serves for both routine and emergency maintenance. **Table 7** above not only identifies capital cost requirements for ITS but also provides O&M funding requirements for all the planned ITS. For most systems, an estimated dollar figure is provided as the O&M cost; in the case where a dollar value is not provided, 10% of capital cost shall be assumed as the O&M cost per year.

9.3   ITS Funding

LADOTD ITS Section has a capital budgeted of $10 million each year as part of highway funding program, which is allocated statewide on a prioritized basis depending on immediate need. Ideally, each region receives portions of this money to apply toward ITS needs; however there is currently no dedicated funding source in the associated Transportation Improvement Program (TIP) for the Shreveport-Bossier region. As part of the follow-up to this architecture effort, it is recommended that Northwest Louisiana Council of Governments (NLCOG), being the regional planning entity, work together with LADOTD and the other Shreveport-Bossier City stakeholders to pursue funding sources for the ITS deployment within the region.

10   Architecture Maintenance Plan

This section discusses the proposed Maintenance Plan for the regional ITS Architecture. FHWA's Final Rule on ITS Architecture and Standards (23 CFR Part 940) requires development of an architecture maintenance plan. Paragraph 940.9 (f) states that:

"The agencies and other stakeholders participating in the development of the regional ITS architecture shall develop and implement procedures and responsibilities for maintaining it, as needs evolve within the region."

In January 2004, FHWA issued guidance[1] on what should be contained in an architecture maintenance plan in order to be compliant with FHWA requirements. The White Paper on this subject is available at http://ops.fhwa.dot.gov/its_arch_imp/guidance.htm. The Maintenance Plan for the Shreveport-Bossier City Regional ITS Architecture is based on the guidelines provided by FHWA's White Paper.

This report provides some background on the need for architecture maintenance and addresses key issues under the following headings:

- Why maintain a Regional ITS Architecture?
- Who will maintain the Architecture?
- When will the Architecture be updated?
- What will be maintained?
- How will the Architecture be maintained?

10.1   Why Maintain a Regional ITS Architecture?

As ITS projects are implemented, the regional ITS architecture will need to be updated to reflect new ITS priorities and strategies that emerge through the transportation planning process. It will also need to be updated to account for expansion in ITS scope and to allow for the evolution and incorporation of new ideas. The goal of the maintenance plan is to guide controlled updates to the regional ITS architecture baseline so that it continues to accurately reflect the region's existing ITS capabilities and future plans.

10.2   Who Will Maintain the Architecture?

To maintain a consensus regional ITS architecture, ideally all stakeholders should participate in the process. In practice, typically, one or two agencies take the lead responsibility to maintain the regional ITS architecture. The primary requirements of the regional architecture maintainer are the mission/authority to perform such functions and the necessary skills to perform the same. The mission of the ITS architecture maintainer most closely resembles a regional planning body that, as consistent with its mission, has the authority to initiate, update, and document changes in regional planning documents. For the Shreveport-Bossier City Regional ITS Architecture, the LADOTD will assume the role of the ITS Architecture keeper and maintainer as indicated in **Section 3.4**.

Like the regional transportation plans, architecture maintenance is recurring, and is a necessary long-term effort. To be effective in ITS architecture maintenance, LADOTD will need to have staff that:

- Is knowledgeable of the existing regional ITS architecture. This implies a detailed technical understanding of the various parts of the architecture and how changes would affect each part.
- Has an understanding of transportation systems in the region. This understanding can reside jointly in the group of agencies/ stakeholders who participate in the maintenance process.
- Has an understanding of the tools used to create (and to update) the architecture. This might include, for example, knowledge of the Turbo Architecture™ tool, if that is used to hold some of the architecture information.

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[1] FHWA-HOP-04-004, Regional ITS Architecture Maintenance White Paper, prepared by the National ITS Architecture Team, January 31, 2004

As the agency responsible for maintaining the architecture, the LADOTD needs to have the skills within its own organization and/or use a qualified consultant. In either case, the agency needs the necessary funding to support the maintenance effort. The following are the recommended minimum resources for ITS architecture maintenance management:

- One individual to be the ITS architecture manager
- Two individuals trained in Turbo Architecture™ and ITS Planning (Considering this is a new functional/skill area, the training will need to be comprehensive and will require resources: three work days for Turbo™ training and four weeks to study regional and national architecture documents)
- Approximately 16 man-hours per month for ITS architecture maintenance activities. This may be performed by the manager or designee.
- Manage the update of the Regional ITS Architecture Turbo Architecture source file with project level ITS architectures
- Facilitate ITS Steering Committee meetings annually. The ITS Steering Committee is made up of representatives from each stakeholder in the region.

- A qualified consultant to assist with the ITS architecture maintenance activities. (LADOTD has on a retainer contract a professional engineer consulting firm to provide ITS TIM Program, TMC Operations Staffing and Systems Engineering Support).

Although LADOTD will lead the architecture maintenance activities, like all other regional planning activities, ITS architecture maintenance will take close coordination between several agencies. LADOTD will need to coordinate with other major stakeholders* in the region, including:

- Louisiana Department of Transportation and Development (LADOTD) District 04
- Louisiana Department of Transportation and Development (LADOTD) ITS Section
- Louisiana State Police (Troop G)
- Northwest Louisiana Council of Governments (NLCOG)
- Shreveport Traffic Engineering
- SporTran
- City of Shreveport
- Bossier City

*Note – Other stakeholders may be included as necessary based on ITS development and deployment activities.

As LADOTD takes responsibility for architecture maintenance, they will use agreements to create a management/oversight function (e.g. a "Regional ITS Architecture Maintenance Committee") to oversee regional ITS architecture maintenance work, which would have representation from the key stakeholders to the agreement as listed above. At a minimum, such a committee will include two LADOTD representatives, one NLCOG representative, and one FHWA representative.

It is proposed that such a Regional ITS Architecture Maintenance Committee will be responsible for recommending/presenting the proposed changes to the MPO Technical Advisory Committee. (Same committee that approves regional planning documents). The Regional ITS Architecture Maintenance Committee will meet annually to report/discuss any changes to ITS in the region. All the regional stakeholders will be responsible for informing/updating the regional maintenance committee about new ITS deployments in their region. The architecture maintenance committee will also be responsible for following up with all of the regional stakeholders to ensure that any and all ITS deployments are reported and documented in the regional plan.

Following this architecture adoption by the MPO, it is recommended that the Regional ITS Architecture Maintenance Committee meet at least once a year to:

- Review progress in ITS implementation projects

- Verify that the regional ITS architecture Turbo Architecture™ source file is kept up to date with the region's ITS projects
- Update plans for future deployments by each regional stakeholder
- Review changes in State and National ITS Architectures, regulations, and requirements, if any
- Determine any needs for an update to the Shreveport-Bossier City Regional ITS Architecture

10.3 When Will the Architecture be Updated?

The regional ITS architecture is not static. It must change as plans change, as ITS projects are implemented, and as the ITS needs and services evolve in the region. At a minimum, the regional ITS architecture will be reviewed annually by the Regional ITS Architecture Maintenance Committee. The Regional ITS Architecture Maintenance Committee may meet and perform architecture updates more frequently to keep with the pace of the region's ITS implementation. Annual or more frequent updates will include integrating completed projects into the regional ITS architecture Turbo Architecture™ source file. A one page summary of the change will be added as an appendix to the regional ITS architecture document.

Regardless of the frequency selected for periodic updates, it is recommended that the Committee recognize the potential need for "Exception Maintenance" to occur in the event of major project implementations, major revisions to the National ITS Architecture, or to meet the requirements of future regulations. It is recommended that the regional ITS architecture is fully updated every five years, prior to the periodic updating of the Regional Transportation Improvement Program, which occurs once a year.

Upon recommendation of the Regional Architecture Maintenance Committee, the MPO Technical Advisory Committee will make a resolution to accept any revisions/changes/updates to the ITS architecture. The following list includes many of the events that may cause change to a regional ITS architecture:

10.3.1 Changes in Regional Needs

Regional ITS architectures are created to support transportation planning in addressing regional needs. Over time these needs can change and the corresponding aspects of the regional ITS architecture that addresses these needs may need to be updated. These changes in needs should be expressed in updates to planning documents such as the Regional Transportation Plan.

10.3.2 New Stakeholders

New stakeholders become active in ITS and the regional ITS architecture should be updated to reflect their place in the regional view of ITS elements, interfaces, and information flows. New stakeholders might represent new organizations that were not in place during the original development of the regional ITS architecture.

10.3.3 Changes in Scope of Services Considered

The range of services considered by the regional ITS architecture expands. This might happen because the National ITS Architecture has been expanded and updated to include new user services or to better define how existing elements satisfy the user services. The National ITS Architecture may have expanded to include a user service that has been discussed in a region, but not in the regional ITS architecture, or was included in only a very cursory manner. Changes in the National ITS Architecture are not of themselves a reason to update a regional ITS architecture, but a region may want to consider any new services in the context of their regional needs.

10.3.4 Changes in Stakeholder or Element Names

An agency's name or the name used to describe their element(s) undergoes change. Transportation agencies occasionally merge, split, or just rename themselves. In addition, element names may evolve as projects are defined. The regional ITS architecture should be updated to use the current, correct names for both stakeholders and elements.

10.3.5 Changes in Other Architectures

A regional ITS architecture covers not only elements and interfaces within a region, but also interfaces to elements in adjoining regions. Changes in the regional ITS architecture in one region may necessitate changes in the architecture in an adjoining region to maintain consistency between the two. Architectures may also overlap (e.g. a statewide ITS architecture and a regional ITS architecture for a region within the state) and a change in one might necessitate a change in the other.

10.3.6 Changes due to Project Definition or Implementation

There are several changes relating to project definition that will cause the need for updates to the regional ITS architecture. When actually defined or implemented, a project may add, subtract or modify elements, interfaces, or information flows from the regional ITS architecture. Because the regional ITS architecture is meant to describe the current, as well as future, regional implementation of ITS, it must be updated to correctly reflect how the developed projects integrate into the region.

10.3.7 Changes due to Project Addition/Deletion

Occasionally a project will be added or deleted through the planning process, or through project delivery, and some aspects of the regional ITS architecture that are associated with the project may be expanded, changed, or removed.

10.3.8 Changes in Project Priority

Due to funding constraints, or other considerations, the planned project sequencing may change. Delaying a project may have a ripple effect on other projects that depend on it. Raising the priority for a project's implementation may impact other projects that are related to it.

10.4 What Will be Maintained?

Those constituent parts of a regional ITS architecture that will be maintained are referred to as the "baseline". This section considers the different "parts" of the regional ITS architecture and whether they should be a part of the baseline. Baseline parts are annually updated within the regional ITS architecture Turbo file and every five years within the document. The parts discussed are:

- Description of Region
- List of Stakeholders
- Operational Concepts
- List of ITS Elements
- List of Agreements
- Interfaces between Elements
- System Functional Requirements
- Applicable ITS Standards
- Project Sequencing

One of the benefits of a regional ITS architecture is to enable the efficient exchange of information between ITS elements in a region and with elements outside the region. Efficiency refers to the economical deployment of ITS elements and their interfaces. The result of these ITS deployments should be contributions to the safe and efficient operation of the surface transportation network. Each of the components in the regional ITS architecture below have a role in this economy and an appropriate effort should be levied to maintain them.

10.4.1 Description of Region

This description includes the geographic scope, functional scope, and architecture timeframe, and helps frame each of the following parts of a regional ITS architecture. Geographic scope defines the ITS elements

that are "in" the region, although additional ITS elements outside the region may be need to be described if they communicate ITS information to elements inside the region. Functional scope defines which services are included in a regional ITS architecture. Architecture timeframe is the distance (in years) into the future that the regional ITS architecture will consider. The description of the region is usually contained in an architecture document, but may reside in a database containing aspects of the regional ITS architecture, and should certainly be a part of the baseline.

10.4.2 List of Stakeholders

Stakeholders are of great importance to the definition of the architecture. Within a region, they may consolidate or separate and such changes should be reflected in the architecture. Furthermore, stakeholders that have not been engaged in the past may be approached through outreach to be sure that the regional ITS architecture represents their ITS requirements as well. The stakeholders should be described in architecture documentation (and may also reside in a database representing aspects of the regional ITS architecture). Their listing and description should be part of the baseline.

10.4.3 Operational Concepts

It is crucial that the operational concepts represented as roles and responsibilities or as customized service packages in a regional ITS architecture accurately represent the consensus vision of how the stakeholders want their ITS to operate for the benefit of surface transportation users. These should be reviewed and, if necessary, changed to represent both what has been deployed (which may have been shown as "planned" in the earlier version of the regional ITS architecture) and the current consensus view of the stakeholders. Many of the remaining maintenance efforts will depend on the outcome of the changes made here. The operational concept will reside in the architecture documentation and possibly in a diagramming tool if a customized service package approach is used, and should be part of the baseline.

10.4.4 List of ITS Elements

The inventory of ITS elements is a key aspect of the regional ITS architecture. Changes in stakeholders as well as operational concepts may impact the inventory of ITS elements. Furthermore, recent implementation of ITS elements may change their individual status (e.g. from planned to existing). The list of elements is often contained in architecture documentation and is key information in any architecture database. It is a key aspect of the baseline.

10.4.5 List of Agreements

One of the greatest values of a regional ITS architecture is to identify where information will cross an agency boundary, which may indicate a need for an agency agreement. An update to the list of agreements can follow the update to the Operational Concept and/or interfaces between elements. The list of agreements will usually be found in the architecture documentation. This listing should be a part of the baseline.

10.4.6 Interfaces between Elements

Interfaces between elements define the "details" of the architecture. They are the detailed description of how the various ITS are or will be integrated throughout the timeframe of the architecture. These details are usually held in an architecture database. They are a key aspect of the architecture baseline and one that will likely see the greatest amount of change during the maintenance process.

10.4.7 System Functional Requirements

High-level functions are allocated to ITS elements as part of the regional ITS architecture. These can serve as a starting point for the functional definition of projects that map to portions of the regional ITS

architecture. Usually this information is held in spreadsheets or databases, but may be included in the architecture document. They are a part of the baseline.

10.4.8   Applicable ITS Standards

The selection of standards depends on the information exchange requirements. But in addition, the maintenance process should consider how ITS standards may have evolved and matured since the last update and consider how any change in the "standards environment" may impact previous regional standards choices (especially where competing standards exist). For example, if Extensive Markup Language (XML) based Center-To-Center standards reach a high level of maturity, reliability, and cost-effectiveness, then a regional standards technology decision may be made to transition from investments in other standards technologies (e.g. Common Object Request Broker Architecture (CORBA) to XML). The description of the standards environment for the region, as well as the details of which standards apply to the architecture, should be part of the baseline.

10.4.9   Project Sequencing

While project sequencing is partly determined by functional dependencies (e.g. "surveillance" must be a precursor to "traffic management"), the reality is that most project sequences are local policy decisions. Project sequences should be reviewed to make sure that they are in line with current policy decisions. Furthermore, policy makers should be informed of the sequences and their input should be sought to make the project sequences coincide with their expectations. This is crucial to eliminate the possibility of the regional ITS architecture becoming irrelevant. The project sequencing should be included in the architecture documentation and may also be held in a spreadsheet or database. These should be part of the architecture baseline.

10.5   How will the Architecture be Maintained?

LADOTD ITS Section (Section 56) will oversee and ensure that the regional architecture is maintained. LADOTD will utilize its contracted consulting services contract for ITS Traffic Incident Management (TIM) Program TMC Operations Staffing and Systems Engineering Support for this effort. The guidelines contained within FHWA's *Regional ITS Architecture Maintenance White Paper* will be helpful in guiding the maintenance effort. In addition to detailing the recommended maintenance process, the White Paper also contains examples of Maintenance Plans developed by a range of agencies and regions throughout the country.

11 Functional Requirements

Each ITS system operated by the stakeholders must perform certain functions to effectively deliver the ITS services desired by the region. The primary functions that each system needs to perform are broadly defined in the Shreveport/Bossier City TMA Regional ITS Architecture. The high-level requirements are grouped into functional areas that identify requirements associated with each selected ITS service.

Table 8: Functional Requirements (Sample)

Element Name	Entity Name	Functional Area	Functional Area Description	ID	Requirement	Status
Shreveport/Bossier City Regional TMC	Archived Data Management Subsystem	Government Reporting Systems Support	Selects and formats data residing in an ITS archive to facilitate local, state, and federal government data reporting requirements.	1	The center shall provide data from an ITS archive to federal, state, or local government reporting systems.	Planned
				2	The center shall provide the capability to select data from an ITS archive for use in government reports.	Planned
				3	The center shall provide the capability to format data from an ITS archive suitable for input into government reports.	Planned
For the entire table of functional requirements, see the regional ITS architecture Turbo Architecture source file						

12 ITS Standards

Standardizing the flow of information between the systems is essential to cost-effectively integrating ITS throughout the region. ITS standards are fundamental to the establishment of an open ITS environment that achieves the goal of interoperability for ITS. Standards facilitate deployment of interoperable systems at local, regional, and national levels without impeding innovation as technology advances and new approaches evolve.

Establishing standards for exchanging information among ITS is important not only from an interoperability point of view, it also provides interchangeability and expandability thereby reducing risk and cost. Since an agency using standardized interfaces can select among multiple vendors for products and applications, competition is maintained and prices are lower in the long term.

Standards Development Organizations (SDO) are developing ITS standards that support interoperability and interchangeability. Several of the communication standards overlap in applicability. This provides flexibility in the design of ITS allowing agencies to choose the most applicable standard for their needs. Before systems are designed, all stakeholders involved in the applicable ITS service(s) should decide upon the standards and their specifics that will be used. Once a decision is made, all future systems should use the agreed upon standards.

Table 9: ITS Standards Details

Group	SDO	Document ID	Standard Title
No	AASHTO/ITE	ITE TMDD	Traffic Management Data Dictionary (TMDD) and Message Sets for External Traffic Management Center Communications (MS/ETMCC)
No	AASHTO/ITE/NEMA	NTCIP 1201	Global Object Definitions
No	AASHTO/ITE/NEMA	NTCIP 1202	Object Definitions for Actuated Traffic Signal Controller (ASC) Units
No	AASHTO/ITE/NEMA	NTCIP 1203	Object Definitions for Dynamic Message Signs (DMS)
No	AASHTO/ITE/NEMA	NTCIP 1204	Object Definitions for Environmental Sensor Stations (ESS)
No	AASHTO/ITE/NEMA	NTCIP 1205	Object Definitions for Closed Circuit Television (CCTV) Camera Control
No	AASHTO/ITE/NEMA	NTCIP 1206	Object Definitions for Data Collection and Monitoring (DCM) Devices
No	AASHTO/ITE/NEMA	NTCIP 1207	Object Definitions for Ramp Meter Control (RMC) Units
No	AASHTO/ITE/NEMA	NTCIP 1208	Object Definitions for Closed Circuit Television (CCTV) Switching
No	AASHTO/ITE/NEMA	NTCIP 1208	Object Definitions for Closed Circuit Television (CCTV) Switching
No	AASHTO/ITE/NEMA	NTCIP 1209	Data Element Definitions for Transportation Sensor Systems (TSS)
No	AASHTO/ITE/NEMA	NTCIP 1210	Field Management Stations (FMS) - Part 1: Object Definitions for Signal System Masters
No	AASHTO/ITE/NEMA	NTCIP 1211	Object Definitions for Signal Control and Prioritization (SCP)
No	AASHTO/ITE/NEMA	NTCIP 1214	Object Definitions for Conflict Monitor Units (CMU)
No	APTA	APTA TCIP-S-001 3.0.3	Standard for Transit Communications Interface Profiles
No	ASTM	ASTM E2468-05	Standard Practice for Metadata to Support Archived Data Management Systems
No	ASTM	ASTM E2665-08	Standard Specifications for Archiving ITS-Generated Traffic Monitoring Data
Yes	AASHTO/ITE/NEMA	NTCIP C2C	NTCIP Center-to-Center Standards Group
Yes	AASHTO/ITE/NEMA	NTCIP C2C	NTCIP Center-to-Center Standards Group

Group	SDO	Document ID	Standard Title
Yes	AASHTO/ITE/NEMA	NTCIP C2F	NTCIP Center-to-Field Standards Group
Yes	IEEE	IEEE IM	Incident Management Standards Group
Yes	SAE	ATIS General Use	Advanced Traveler Information Systems (ATIS) General Use Standards Group
Yes	SAE	ATIS Low Bandwidth	Advanced Traveler Information Systems (ATIS) Bandwidth Limited Standards Group

13   Agreements

This section identifies the list of existing and future agreements between each of the stakeholder organizations who's ITS will be exchanging information was generated prior to implementing relevant projects. This list identifies the agreements that should be established but does not define the agreements themselves.

Table 10: Agreements

Agreement Title	Agreement Type	Agreement Status	Description	Lead Stakeholder	Associated Stakeholders
Cooperative Endeavor Agreement	Signal Maintenance Agreement	Existing	Bossier City has full signal maintenance and operations agreements.	LADOTD	Bossier City
Cooperative Endeavor Agreement	Signal Maintenance Agreement	Existing	Shreveport has full signal maintenance and operations agreements.	LADOTD	City of Shreveport
Motorist Assistance Patrol	MAP Service	Planned	MAP assists motorists who need tires changed or inflated, and fuel. Also MAP may perform first aid if necessary, clear travel lanes and provide traffic control.	LADOTD	Northwest Louisiana Council of Governments (NLCOG)

Appendix A. Architecture Flow Definitions

Flow Name	Description
alert notification	Notification of a major emergency such as a natural or man-made disaster, civil emergency, or child abduction for distribution to the public. The flow identifies the alert originator, the nature of the emergency, the geographic area affected by the emergency, the effective time period, and information and instructions necessary for the public to respond to the alert. This flow may also identify specific information that should not be released to the public.
alert notification coordination	Coordination of emergency alerts to be distributed to the public. This includes notification of a major emergency such as a natural or man-made disaster, civil emergency, or child abduction for distribution to the public and status of the public notification.
alert status	Information indicating the current status of the emergency alert including identification of the traveler and driver information systems that are being used to provide the alert.
archive requests	A request to a data source for information on available data (i.e. "catalog") or a request that defines the data to be archived. The request can be a general subscription intended to initiate a continuous or regular data stream or a specific request intended to initiate a one-time response from the recipient.
archive status	Notification that data provided to an archive contains erroneous, missing, or suspicious data or verification that the data provided appears valid. If an error has been detected, the offending data and the nature of the potential problem are identified.
archived data product requests	A user-specified request for archived data products (i.e. data, meta data, or data catalogs). The request also includes information that is used to identify and authenticate the user and support electronic payment requirements, if any.
archived data products	Raw or processed data, meta data, data catalogs and other data products provided to a user system upon request. The response may also include any associated transaction information.
broadcast traveler information	General traveler information that contains traffic and road conditions, link travel times, incidents, advisories, restrictions, transit service information, weather information, parking information, and other related traveler information.
data collection and monitoring control	Information used to configure and control data collection and monitoring systems.
emergency archive data	Logged emergency information including information that characterizes identified incidents (routine highway incidents through disasters), corresponding incident response information, evacuation information, surveillance data, threat data, and resource information. Content may include a catalog of available information, the actual information to be archived, and associated meta data that describes the archived information.
emergency plan coordination	Information that supports coordination of emergency management plans, continuity of operations plans, emergency response and recovery plans, evacuation plans, and other emergency plans between agencies. This includes general plans that are coordinated prior to an incident and shorter duration tactical plans that are prepared during an incident.
emergency route request	Request for access routes for emergency response vehicles and equipment. This may be a request for ingress or egress routes or other emergency routes.
emergency routes	Suggested ingress and egress routes for access to and between the scene and staging areas or other specialized emergency access routes.
emergency traffic control information	Status of a special traffic control strategy or system activation implemented in response to an emergency traffic control request, a request for emergency access routes, a request for evacuation, a request to activate closure systems, a request to employ driver information systems to support public safety objectives, or other special requests. Identifies the selected traffic control strategy and system control status.
emergency transit schedule information	Information on transit schedule and service changes that adapt the service to better meet needs of responders and the general public in an emergency situation, including special service schedules supporting evacuation.

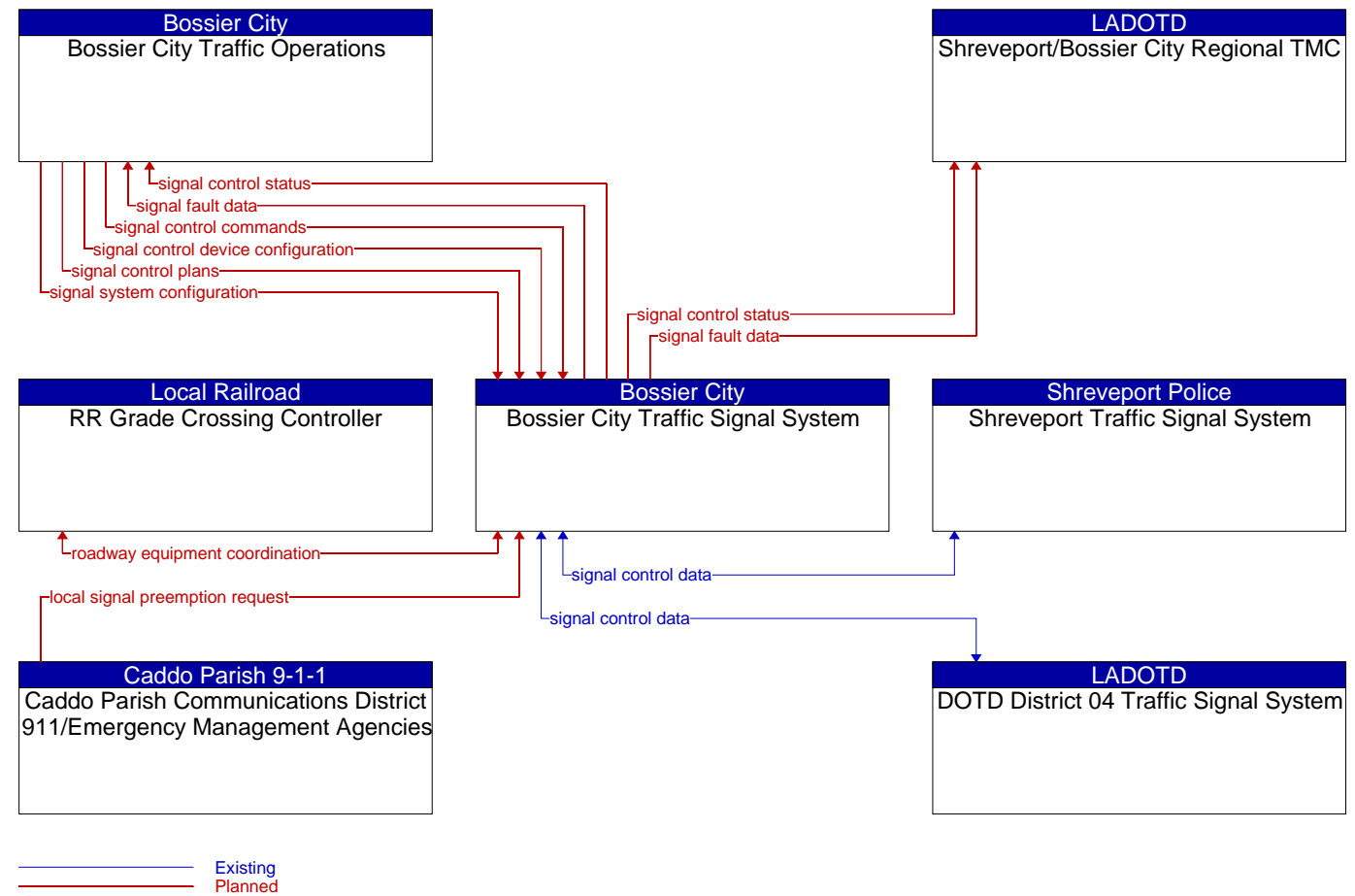| Flow Name	Description
emergency transit service request	Request to modify transit service and fare schedules to address emergencies, including requests for transit services to evacuate people from and/or deploy response agency personnel to an emergency scene. The request may poll for resource availability or request pre-staging, staging, or immediate dispatch of transit resources.
emergency transit service response	Response indicating changes to transit service, fares, and/or restrictions that will be made and status of transit resources to be deployed to support emergency response and/or evacuation.
evacuation coordination	Coordination of information regarding a pending or in-process evacuation. Includes evacuation zones, evacuation times, evacuation routes, forecast network conditions, and reentry times.
evacuation information	Evacuation instructions and information including evacuation zones, evacuation times, and reentry times.
field device status	Reports from field equipment (sensors, signals, signs, controllers, etc.) which indicate current operational status.
field equipment status	Identification of field equipment requiring repair and known information about the associated faults.
freeway control data	Control commands and operating parameters for ramp meters, mainline metering/lane controls and other systems associated with freeway operations.
freeway control status	Current operational status and operating parameters for ramp meters, mainline metering/lane controls and other control equipment associated with freeway operations.
HRI control data	Data required for HRI information transmitted at railroad grade crossings and within railroad operations.
HRI request	A request for highway-rail intersection status or a specific control request intended to modify HRI operation.
HRI status	Status of the highway-rail intersection equipment including both the current state or mode of operation and the current equipment condition.
incident command information coordination	Information that supports local management of an incident. It includes resource deployment status, hazardous material information, traffic, road, and weather conditions, evacuation advice, and other information that enables emergency or maintenance personnel in the field to implement an effective, safe incident response.
incident information	Notification of existence of incident and expected severity, location, time and nature of incident. As additional information is gathered and the incident evolves, updated incident information is provided. Incidents include any event that impacts transportation system operation ranging from routine incidents (e.g., disabled vehicle at the side of the road) through large-scale natural or human-caused disasters that involve loss of life, injuries, extensive property damage, and multi-jurisdictional response. This also includes special events, closures, and other planned events that may impact the transportation system.
incident response coordination	Incident response procedures and current incident response status that are shared between allied response agencies to support a coordinated response to incidents. This flow provides current situation information, including a summary of incident status and its impact on the transportation system and other infrastructure, and current and planned response activities. This flow also coordinates a positive hand off of responsibility for all or part of an incident response between agencies.
incident response status	Status of the current incident response including a summary of incident status and its impact on the transportation system, traffic management strategies implemented at the site (e.g., closures, diversions, traffic signal control overrides), and current and planned response activities.
interactive traveler information	Traveler information provided in response to a traveler request. The provided information includes traffic and road conditions, advisories, incidents, payment information, transit services, parking information, weather information, and other travel-related data updates and confirmations.
ISP coordination	Coordination and exchange of transportation information between centers. This flow allows a broad range of transportation information collected by one ISP to be redistributed to many other ISPs and their clients.

Flow Name	Description
maintenance and construction archive data	Information describing road construction and maintenance activities identifying the type of activity, the work performed, and work zone information including work zone configuration and safety (e.g., a record of intrusions and vehicle speeds) information. For construction activities, this information also includes a description of the completed infrastructure, including as-built plans as applicable. Content may include a catalog of available information, the actual information to be archived, and associated meta data that describes the archived information.
maintenance and construction resource response	Current status of maintenance and construction resources including availability and deployment status. General resource inventory information covering vehicles, equipment, materials, and people and specific resource deployment status may be included.
personal transit information	General and personalized transit information for a particular fixed route, flexible route, or paratransit system.
request transit information	Request for transit service information and current transit status.
resource coordination	Coordination of resource inventory information, specific resource status information, resource prioritization and reallocation between jurisdictions, and specific requests for resources and responses that service those requests.
resource deployment status	Status of resource deployment identifying the resources (vehicles, equipment, materials, and personnel) available and their current status. General resource inventory information and specific status of deployed resources may be included.
resource request	A request for resources to implement special traffic control measures, assist in clean up, verify an incident, etc. The request may poll for resource availability or request pre-staging, staging, or immediate deployment of resources. Resources may be explicitly requested or a service may be requested and the specific resource deployment may be determined by the responding agency.
road network conditions	Current and forecasted traffic information, road and weather conditions, and other road network status. Either raw data, processed data, or some combination of both may be provided by this architecture flow. Information on diversions and alternate routes, closures, and special traffic restrictions (lane/shoulder use, weight restrictions, width restrictions, HOV requirements) in effect is included along with a definition of the links, nodes, and routes that make up the road network.
road network status assessment	Assessment of damage sustained by the road network including location and extent of the damage, estimate of remaining capacity, required closures, alternate routes, necessary restrictions, and time frame for repair and recovery.
roadside archive data	A broad set of data derived from roadside sensors that includes current traffic conditions, environmental conditions, and any other data that can be directly collected by roadside sensors. This data also indicates the status of the sensors and reports of any identified sensor faults.
roadway equipment coordination	The direct flow of information between field equipment. This includes transfer of information between sensors and driver information systems (e.g., DMS, HAR) or control devices (e.g., traffic signals, ramp meters), direct coordination between adjacent control devices, interfaces between detection and warning or alarm systems, and any other direct communications between field equipment. This includes information exchanged between a Signal System Master (SSM) and the Signal System Local (SSL) equipment.
roadway information system data	Information used to initialize, configure, and control roadside systems that provide driver information (e.g., dynamic message signs, highway advisory radio, beacon systems). This flow can provide message content and delivery attributes, local message store maintenance requests, control mode commands, status queries, and all other commands and associated parameters that support remote management of these systems.
roadway information system status	Current operating status of dynamic message signs, highway advisory radios, beacon systems, or other configurable field equipment that provides dynamic information to the driver.
selected routes	Routes selected based on route request criteria.
signal control data	Information used to configure and control traffic signal systems.

Flow Name	Description
signal control status	Status of surface street signal controls including operating condition and current operational state.
traffic archive data	Information describing the use and vehicle composition on transportation facilities and the traffic control strategies employed. Content may include a catalog of available information, the actual information to be archived, and associated meta data that describes the archived information.
traffic control coordination	Information transfers that enable remote monitoring and control of traffic management devices. This flow is intended to allow cooperative access to, and control of, field equipment during incidents and special events and during day-to-day operations. This flow also allows 24-hour centers to monitor and control assets of other centers during off-hours, allows system redundancies and fail-over capabilities to be established, and otherwise enables integrated traffic control strategies in a region.
traffic control priority status	Status of signal priority request functions at the roadside (e.g. enabled or disabled).
traffic flow	Raw and/or processed traffic detector data which allows derivation of traffic flow variables (e.g., speed, volume, and density measures) and associated information (e.g., congestion, potential incidents). This flow includes the traffic data and the operational status of the traffic detectors.
traffic images	High fidelity, real-time traffic images suitable for surveillance monitoring by the operator or for use in machine vision applications. This flow includes the images and the operational status of the surveillance system.
traffic information coordination	Traffic information exchanged between TMC's. Normally would include incidents, congestion data, traffic data, signal timing plans, and real-time signal control information.
traffic sensor control	Information used to configure and control traffic sensor systems.
transit and fare schedules	Transit service information including routes, schedules, and fare information.
transit archive data	Data used to describe and monitor transit demand, fares, operations, and system performance. Content may include a catalog of available information, the actual information to be archived and associated meta data that describes the archived information.
transit emergency data	Initial notification of transit emergency at a transit stop or on transit vehicles and further coordination as additional details become available and the response is coordinated.
transit incident information	Information on transit incidents that impact transit services for public dissemination.
transit information request	Request for transit operations information including schedule and fare information. The request can be a subscription that initiates as-needed information updates as well as a one-time request for information.
transit information user request	Request for special transit routing, real-time schedule information, and availability information.
transportation system status	Current status and condition of transportation infrastructure (e.g., tunnels, bridges, interchanges, TMC offices, maintenance facilities). In case of disaster or major incident, this flow provides an assessment of damage sustained by the surface transportation system including location and extent of the damage, estimate of remaining capacity and necessary restrictions, and time frame for repair and recovery.
traveler alerts	Traveler information alerts reporting congestion, incidents, adverse road or weather conditions, parking availability, transit service delays or interruptions, and other information that may impact the traveler. Relevant alerts are provided based on traveler-supplied profile information including trip characteristics and preferences.
traveler request	A request for traveler information including traffic, transit, toll, parking, road weather conditions, event, and passenger rail information. The request identifies the type of information, the area of interest, parameters that are used to prioritize or filter the returned information, and sorting preferences.
video surveillance control	Information used to configure and control video surveillance systems.
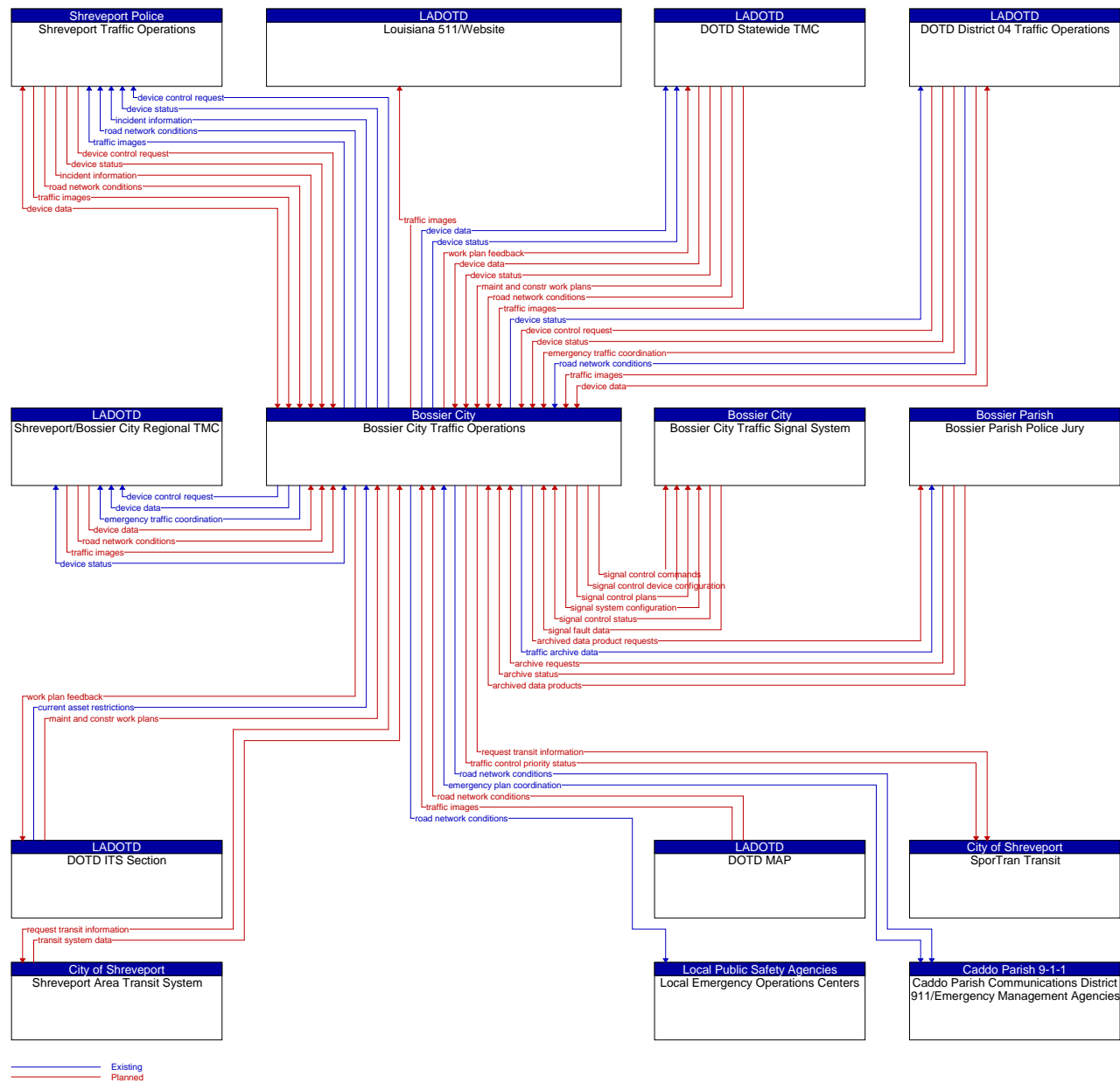
Figure 5: Bossier City Traffic Operations Flow Context Diagram

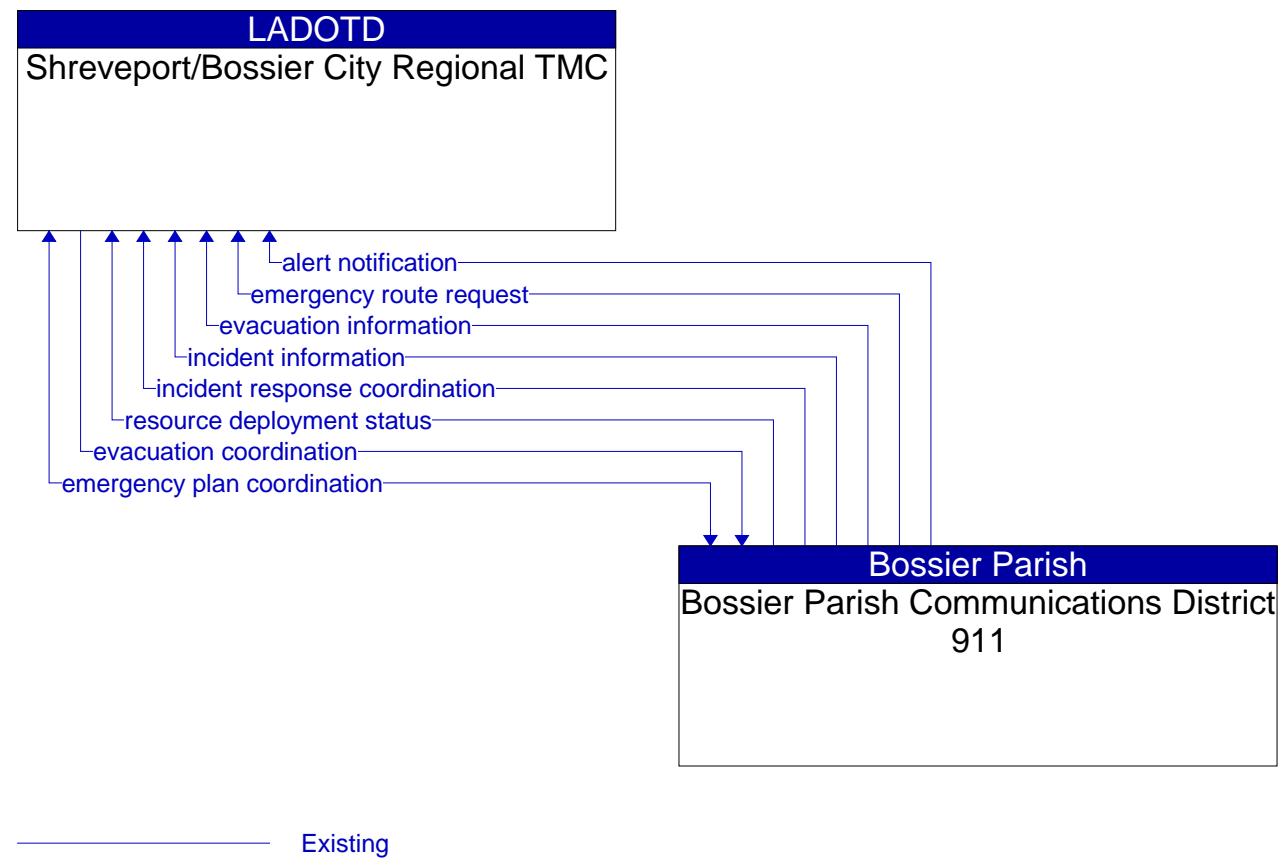**Figure 6: Bossier City Traffic Signal System Flow Context Diagram**

Figure 7

LADOTD
Shreveport/Bossier City Regional TMC

- alert notification
- emergency route request
- evacuation information
- incident information
- incident response coordination
- resource deployment status
- evacuation coordination
- emergency plan coordination

Bossier Parish
Bossier Parish Communications District 911

Existing

Figure 7: Bossier Parish Communications District 911 Flow Context Diagram

Figure 8

LADOTD
Shreveport/Bossier City Regional TMC

City of Shreveport
SporTran Transit

Bossier City
Bossier City Traffic Operations

- alert notification
- alert notification coordination
- emergency route request
- evacuation information
- incident information
- alert status
- emergency routes
- emergency traffic control information
- traffic images
- emergency plan coordination

- emergency transit service request
- incident response status
- emergency transit schedule information
- transit emergency data
- emergency plan coordination
- road network conditions
- emergency plan coordination

Local Public Safety Agencies
Local Emergency Operations Centers

Caddo Parish 9-1-1
Caddo Parish Communications District 911/Emergency Management Agencies

City of Shreveport
Shreveport Police

Caddo Parish
Caddo Parish Commission

- emergency plan coordination
- emergency plan coordination
- incident response coordination

- alert notification coordination
- alert notification coordination

- local signal preemption request

LADOTD
DOTD District 04 Traffic Signal System

- local signal preemption request

Bossier City
Bossier City Traffic Signal System

Existing
Planned

Figure 8: Caddo Parish Communications District 911/Emergency Management Agencies Flow Context Diagram
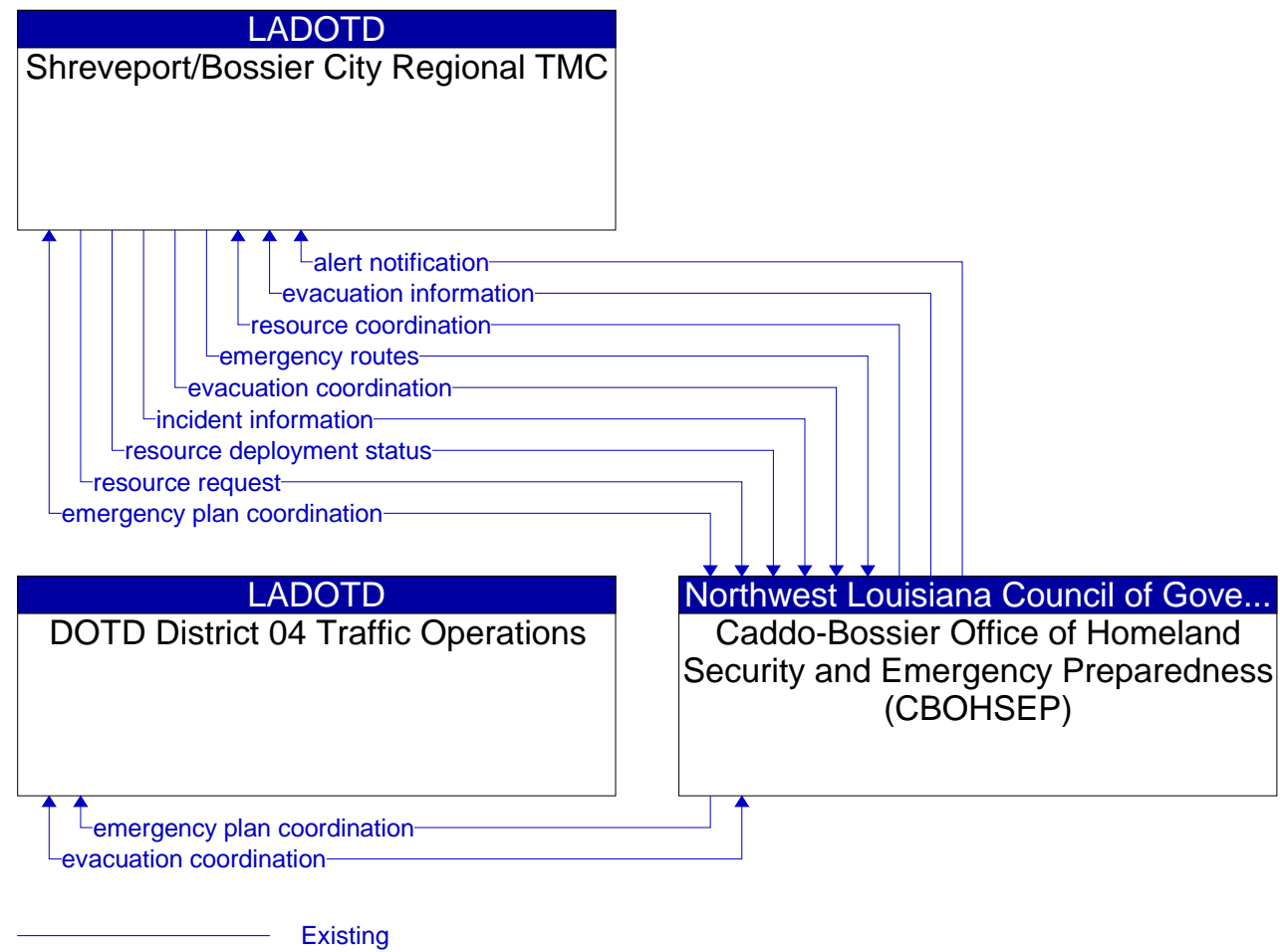
Figure 9: Caddo-Bossier of Homeland Security and Emergency Preparedness (CBOHSEP) Flow Context Diagram
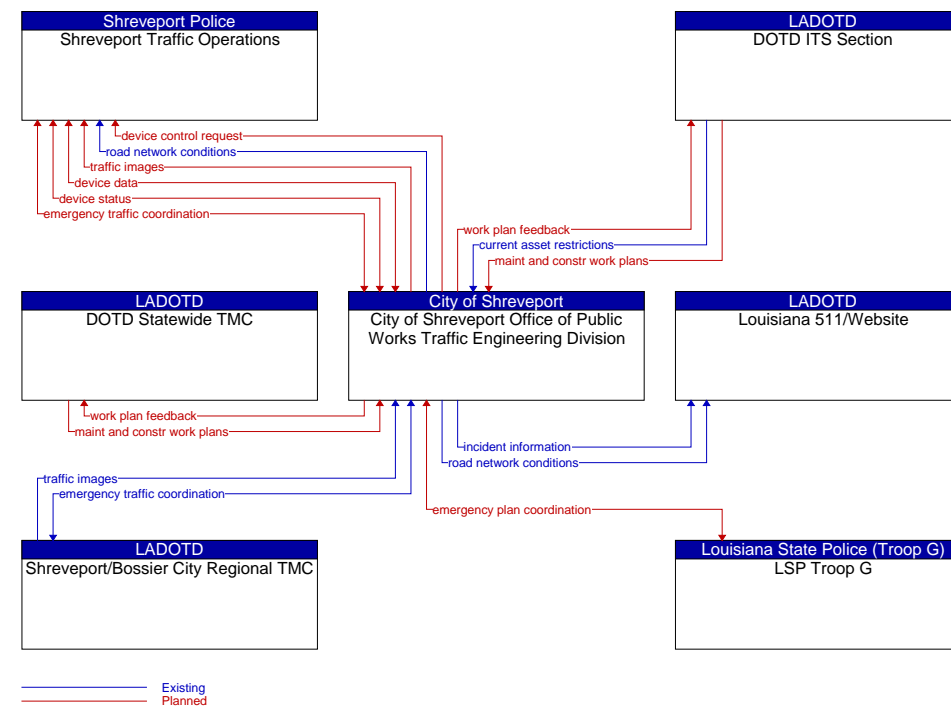
Figure 10: City of Shreveport Office of Public Works Traffic Engineering Division Flow Context Diagram
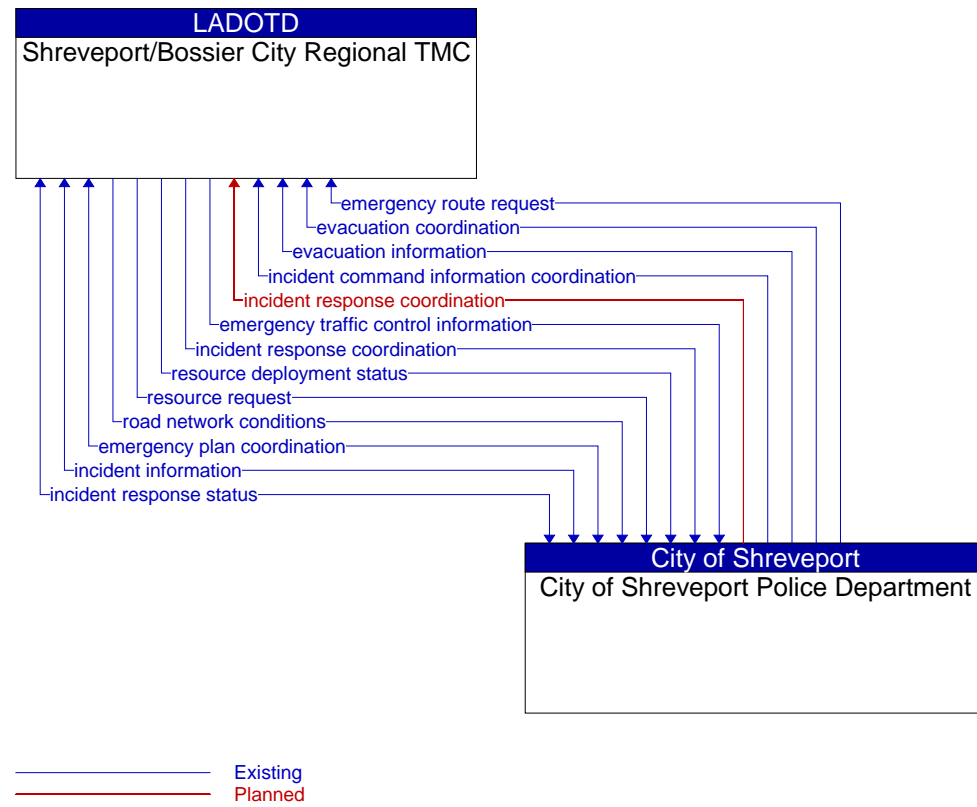
Figure 11: City of Shreveport Police Department Flow Context Diagram
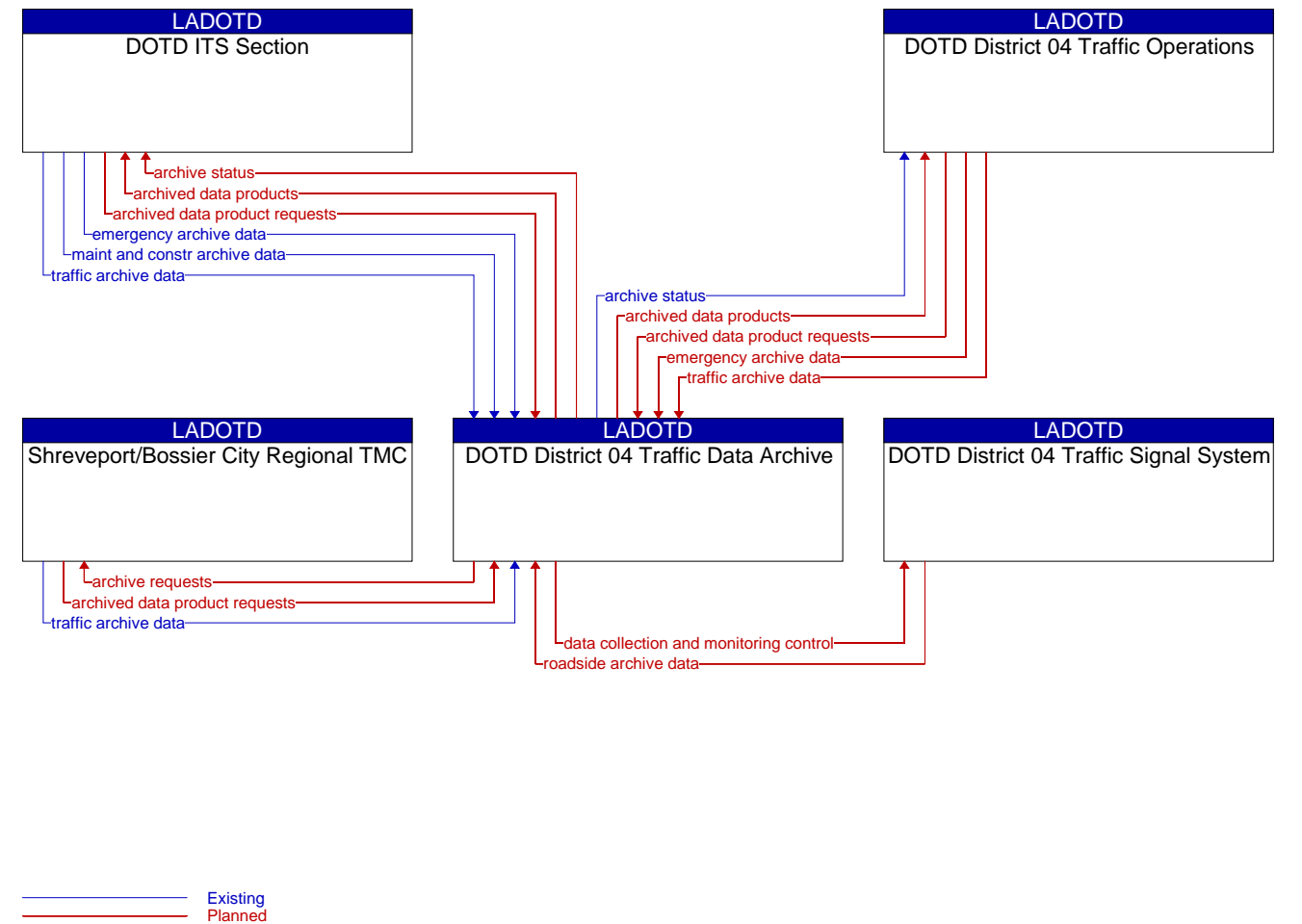
Figure 12: DOTD District 04 Traffic Operations Archive Flow Context Diagram
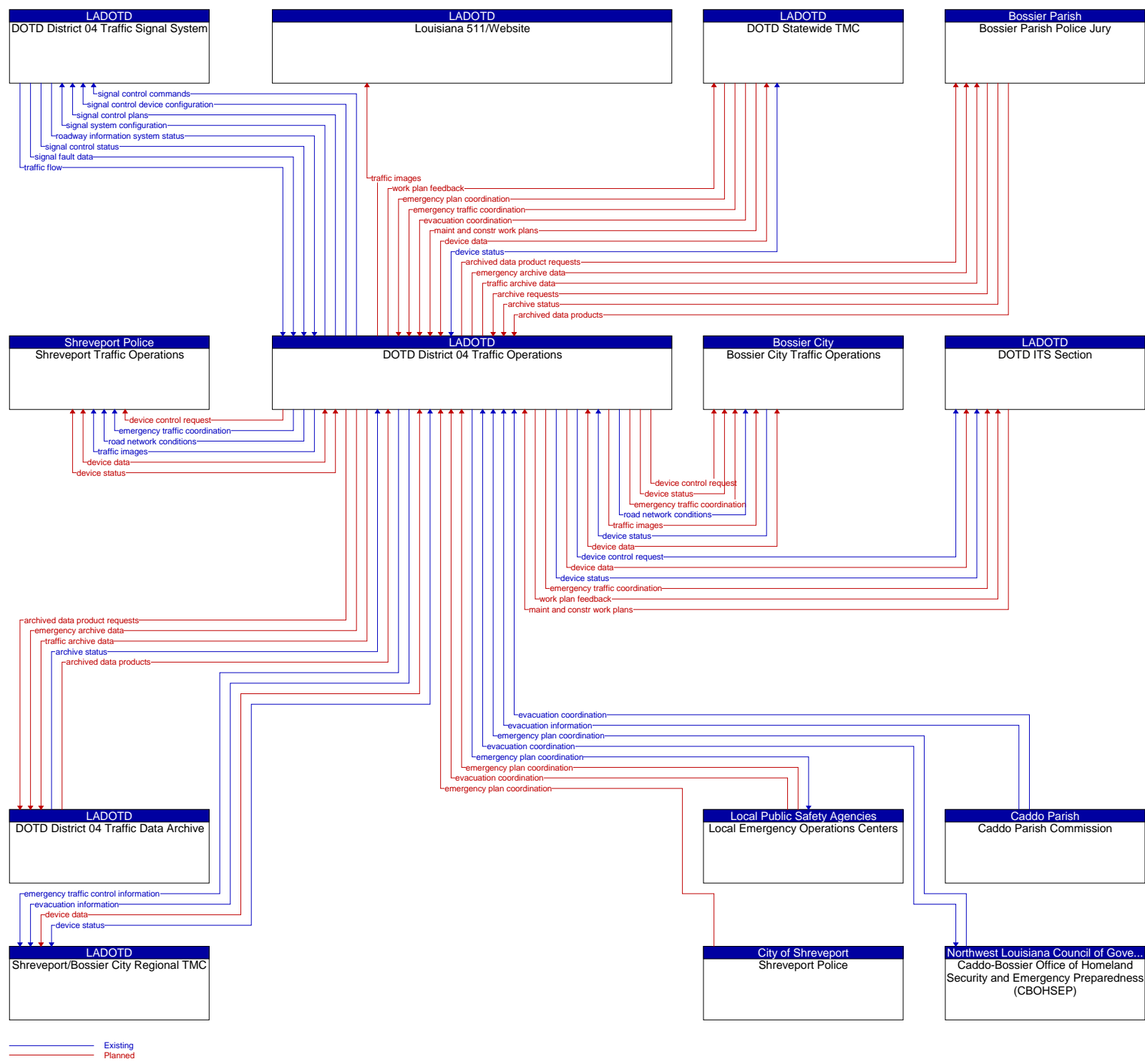
Figure 13: DOTD District 04 Traffic Operations Flow Context Diagram
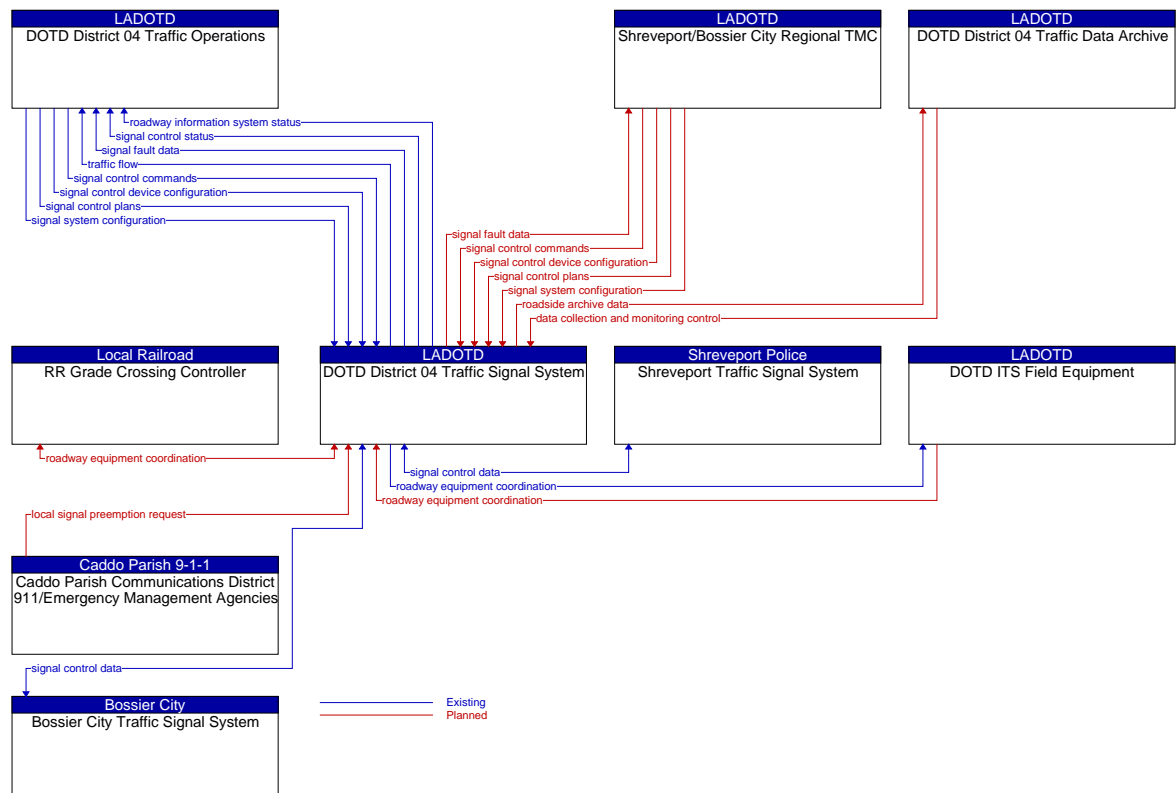
Figure 14: DOTD District 04 Traffic Signal System Flow Context Diagram
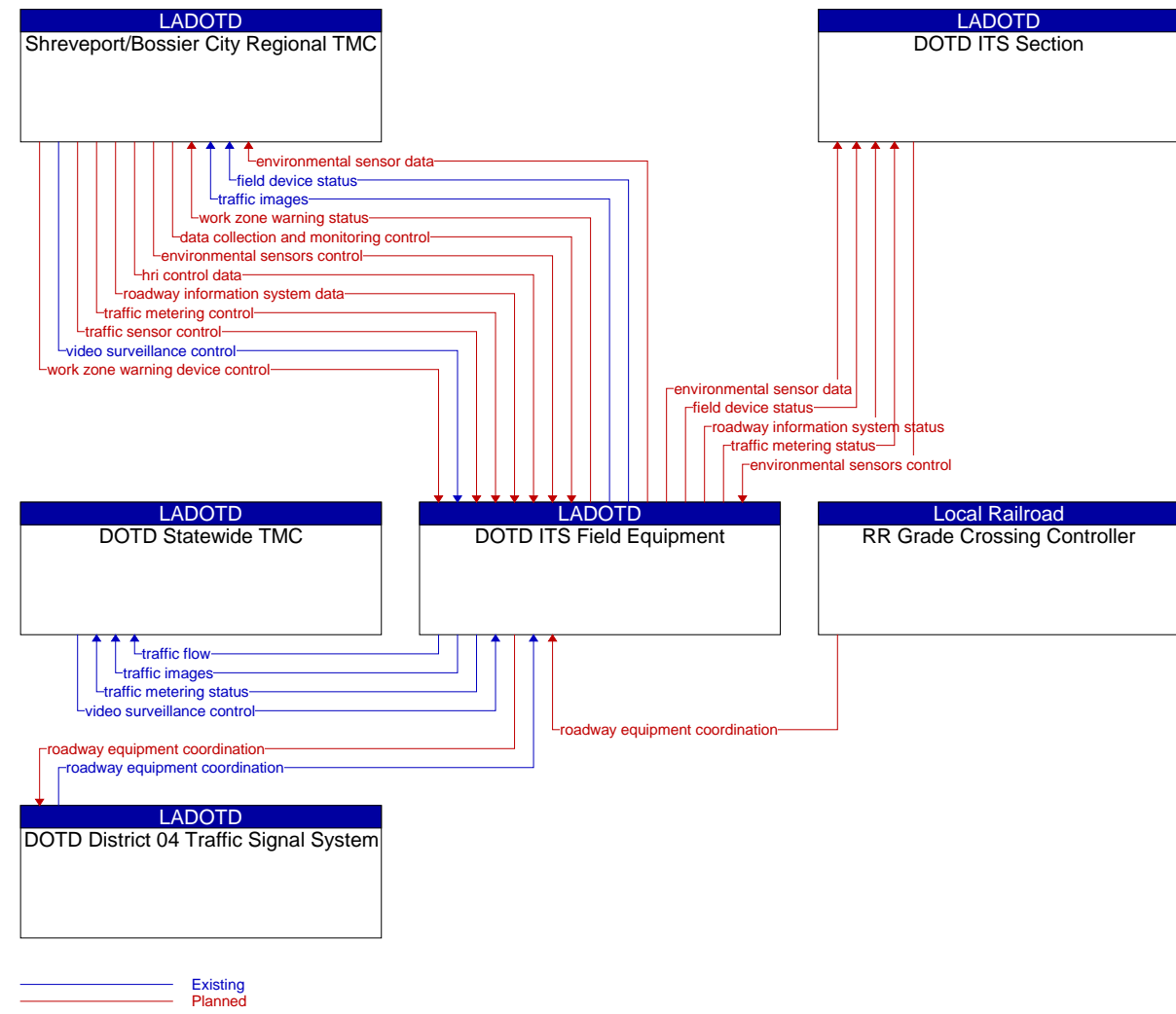
Figure 15: DOTD ITS Field Equipment Flow Context Diagram
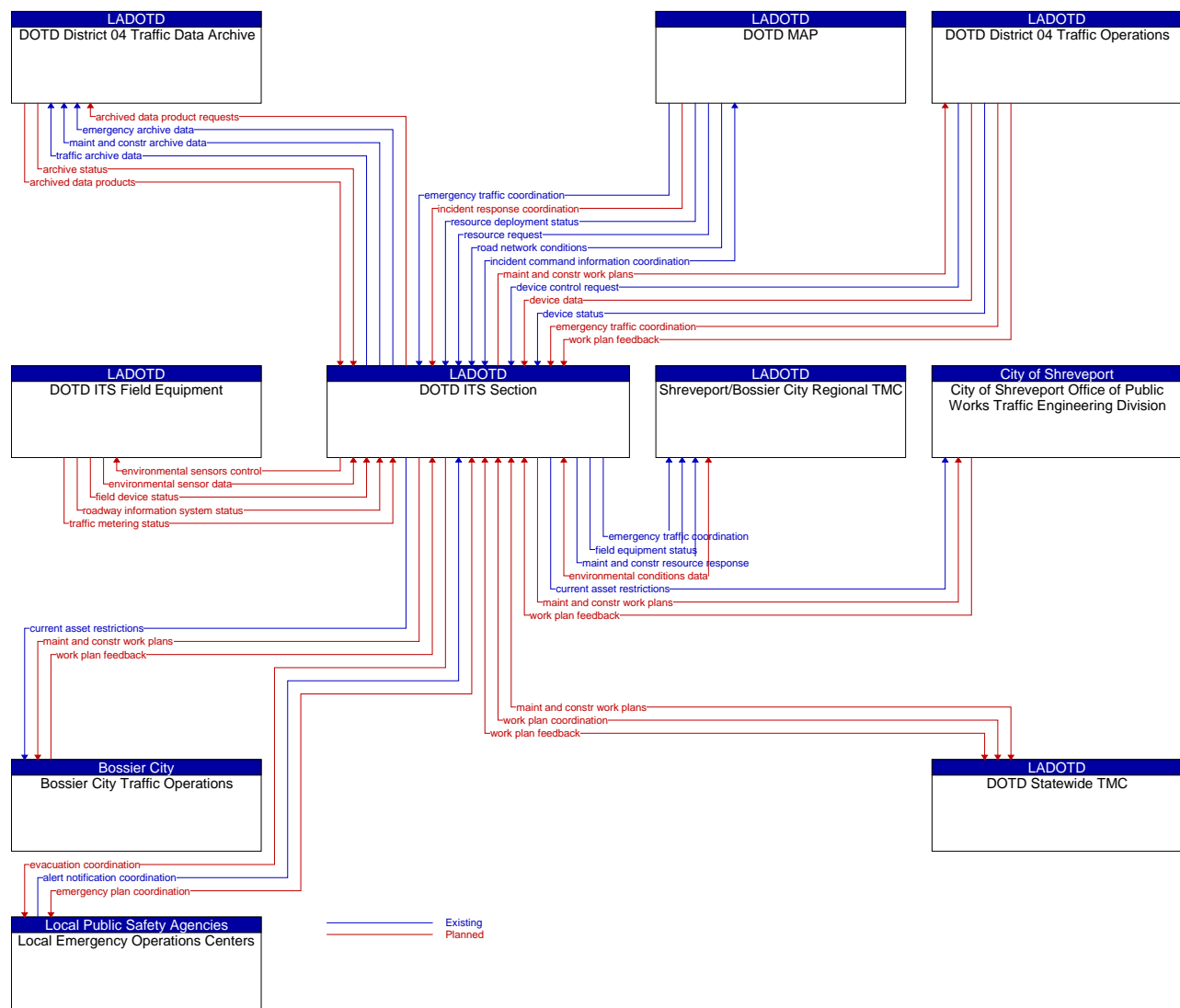
Figure 16: DOTD ITS Section Flow Context Diagram
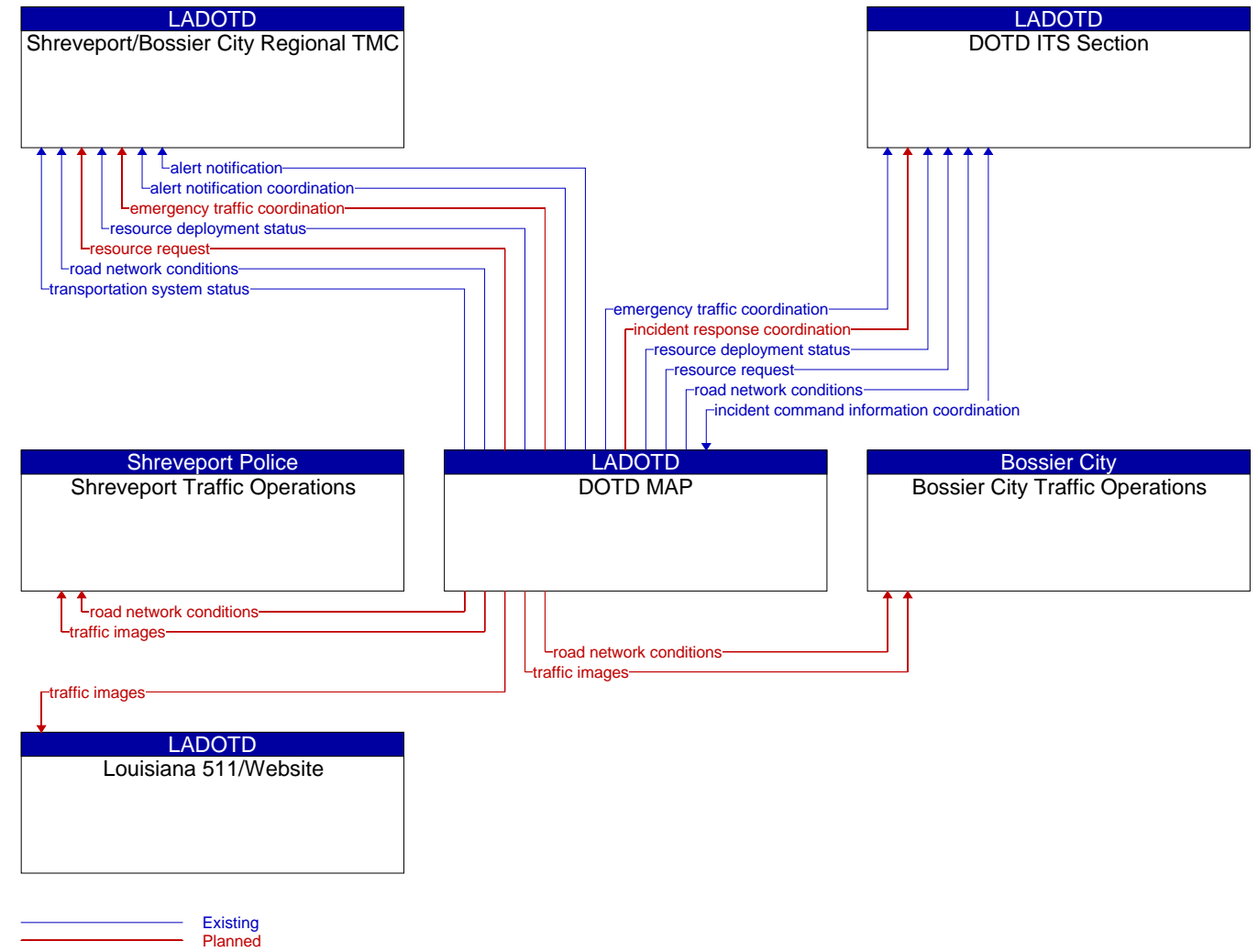
Figure 17: DOTD MAP Flow Context Diagram
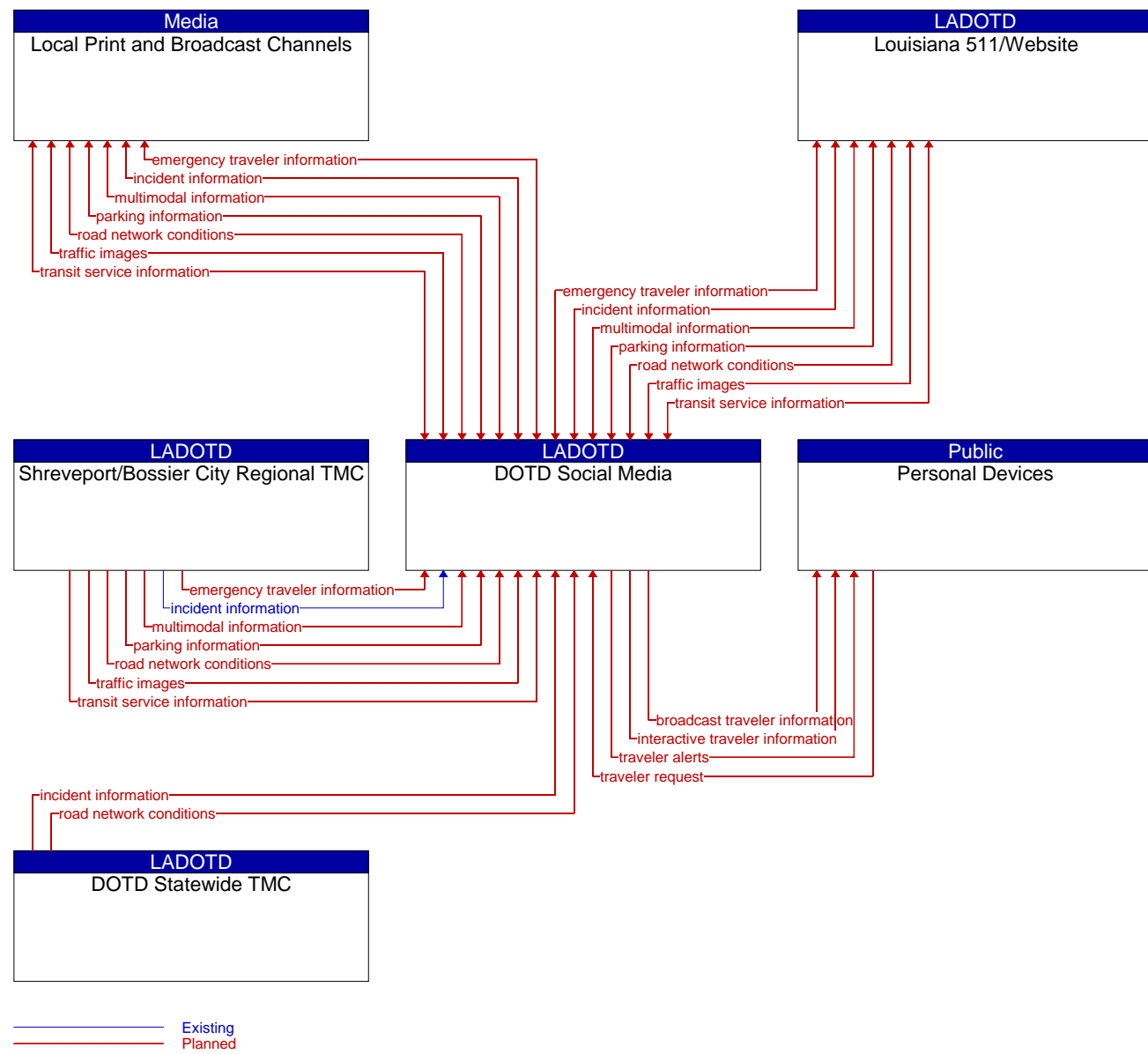
Figure 18: DOTD Social Media Flow Context Diagram
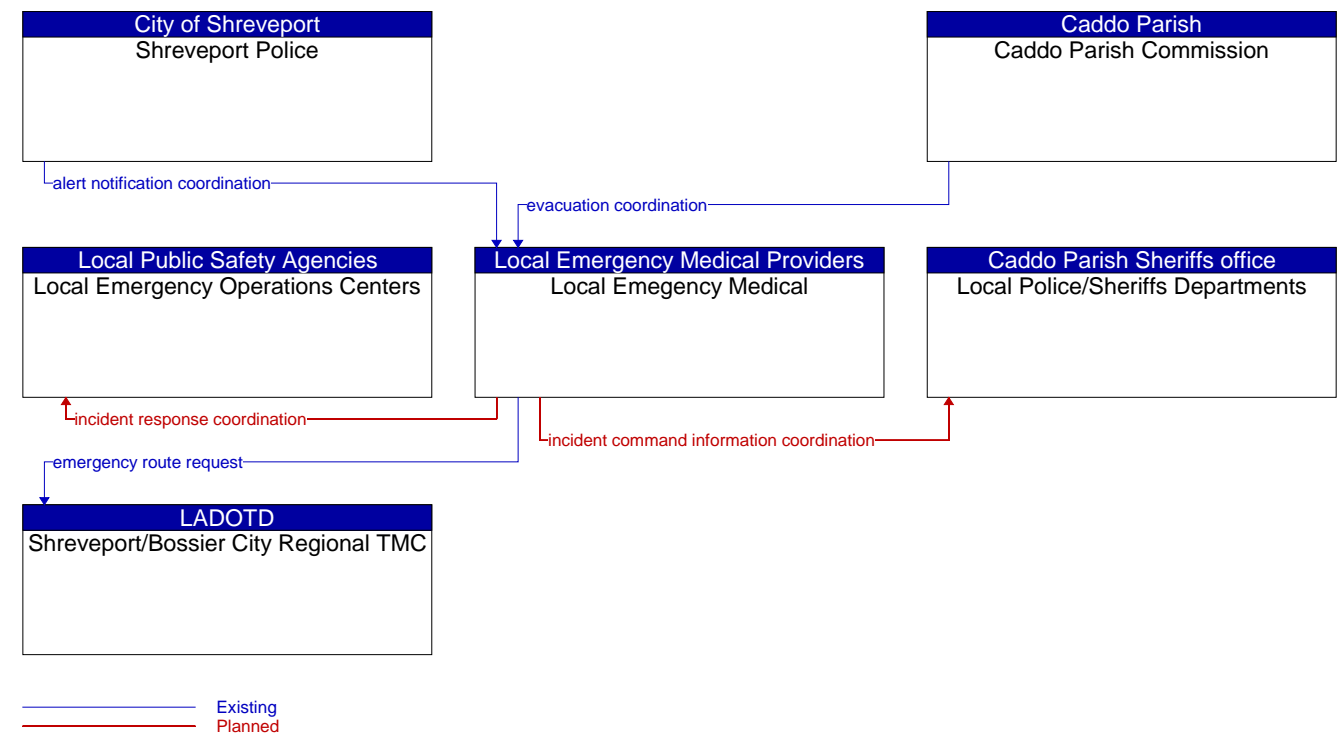
Figure 19: Local Emergency Medical Flow Context Diagram
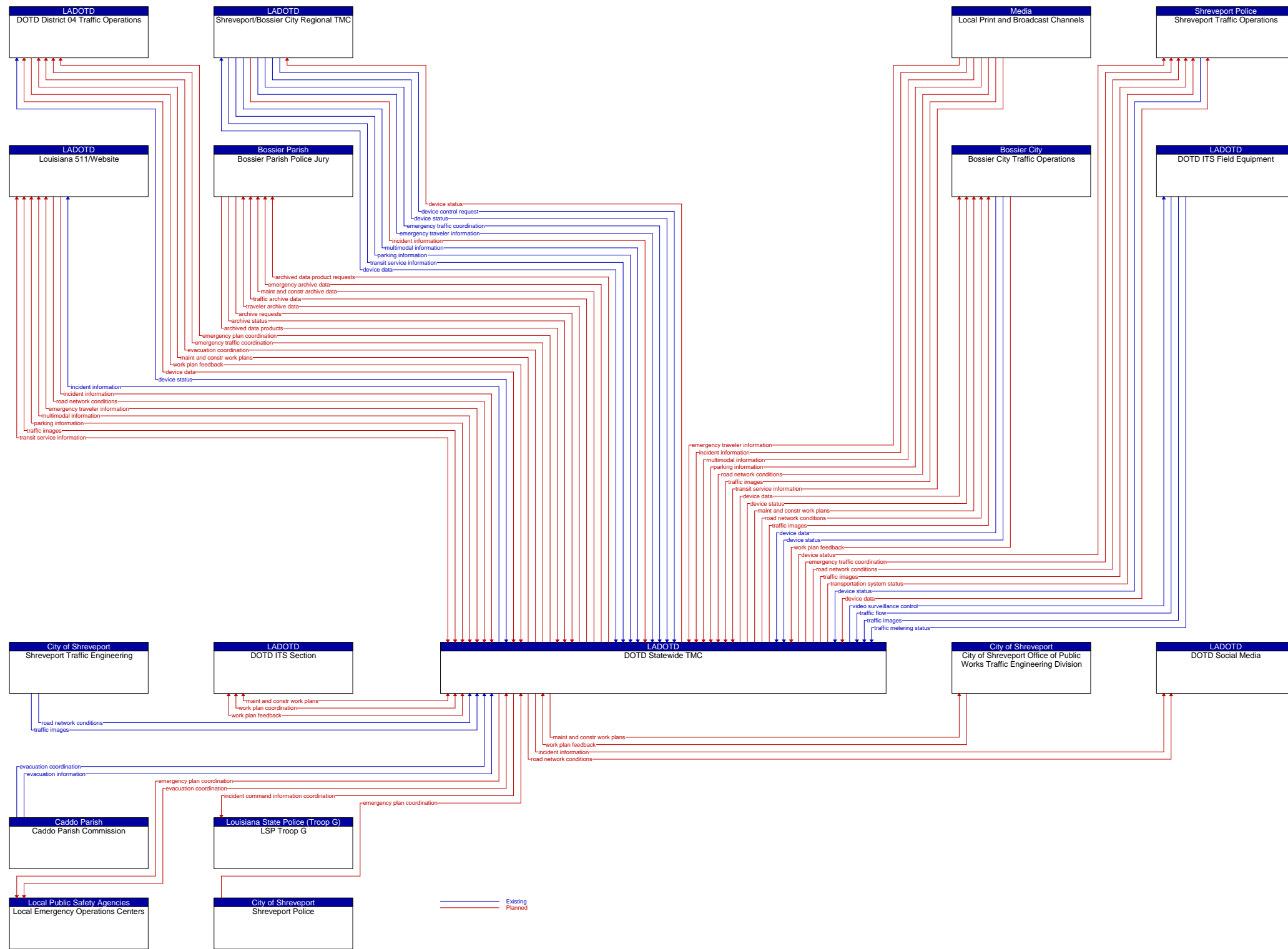
Figure 20: DOTD Statewide TMC Flow Context Diagram
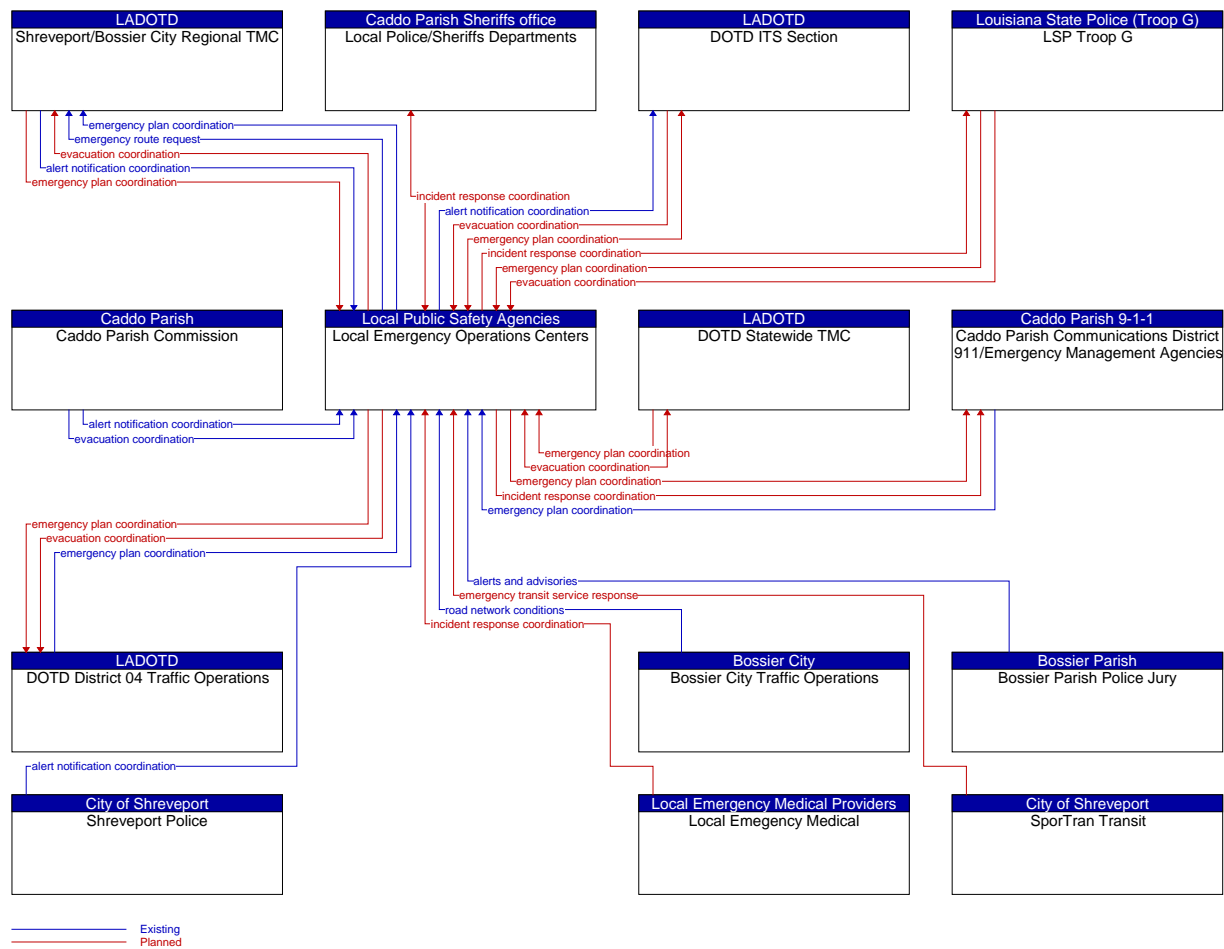
Figure 21: Local Emergency Operations Centers Flow Context Diagram
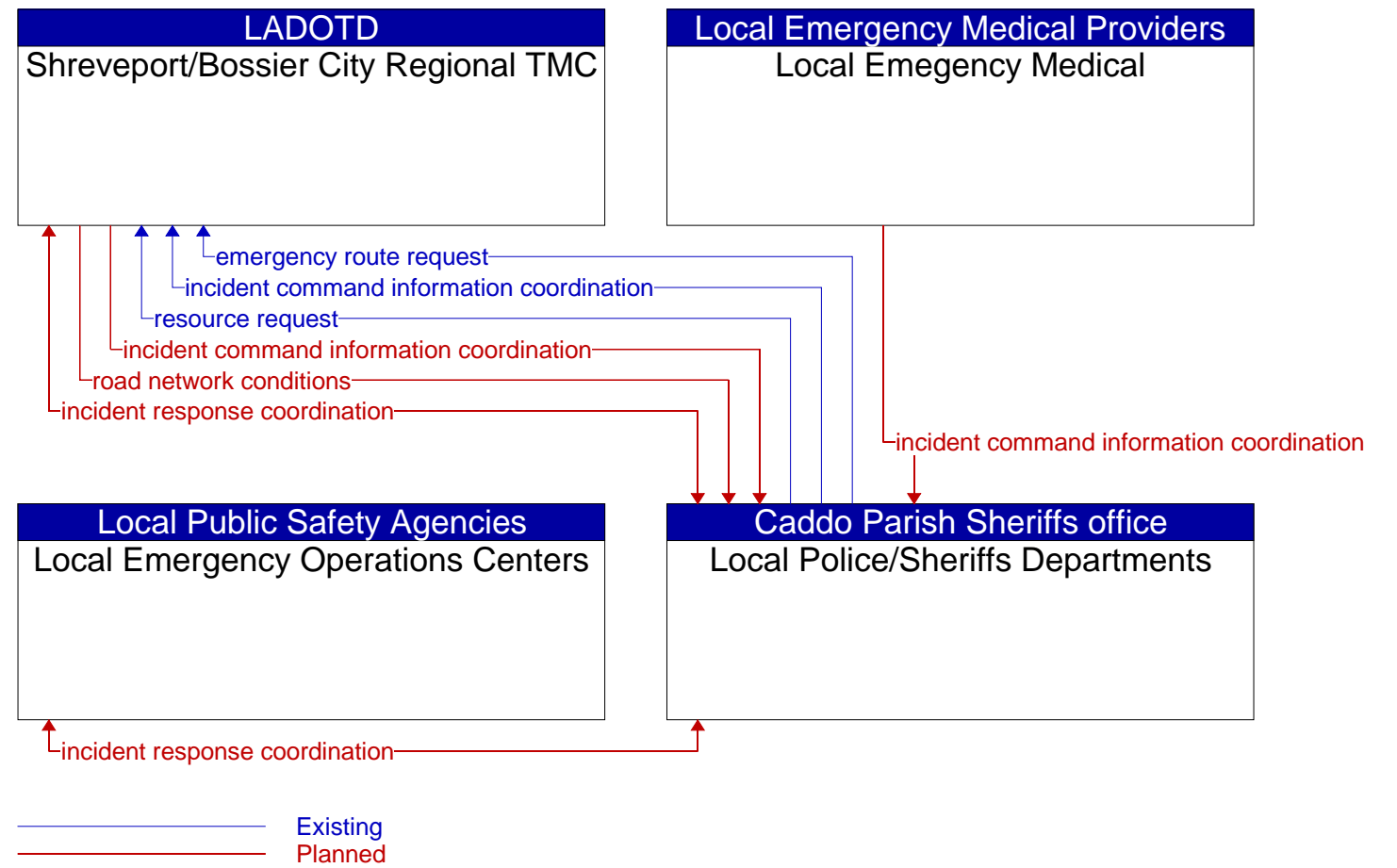
Figure 22: Local Police/Sheriff's Departments Flow Context Diagram

Figure 23: Local Print and Broadcast Channels Flow Context Diagram

LADOTD
DOTD Statewide TMC

LADOTD
DOTD Social Media

LADOTD
Shreveport/Bossier City Regional TMC

- emergency traveler information
- incident information
- multimodal information
- parking information
- road network conditions
- traffic images
- transit service information

- emergency traveler information
- incident information
- multimodal information
- parking information
- road network conditions
- traffic images
- transit service information

City of Shreveport
SporTran Transit

Media
Local Print and Broadcast Channels

Caddo Parish
Caddo Parish Commission

- selected routes
- transit information request
- emergency transit schedule information
- transit and fare schedules
- transit incident information

- broadcast traveler information

- evacuation information
- road network conditions

Public
Personal Devices

Shreveport Police
Shreveport Traffic Operations

- evacuation information
- incident response status
- emergency traffic control information
- resource deployment status
- emergency plan coordination
- incident information

Local Public Safety Agencies
Local Public Safety Agencies

Existing
Planned

Existing

Figure 23: Local Print and Broadcast Channels Flow Context Diagram

Figure 24: Local Public Safety Agencies Flow Context Diagram
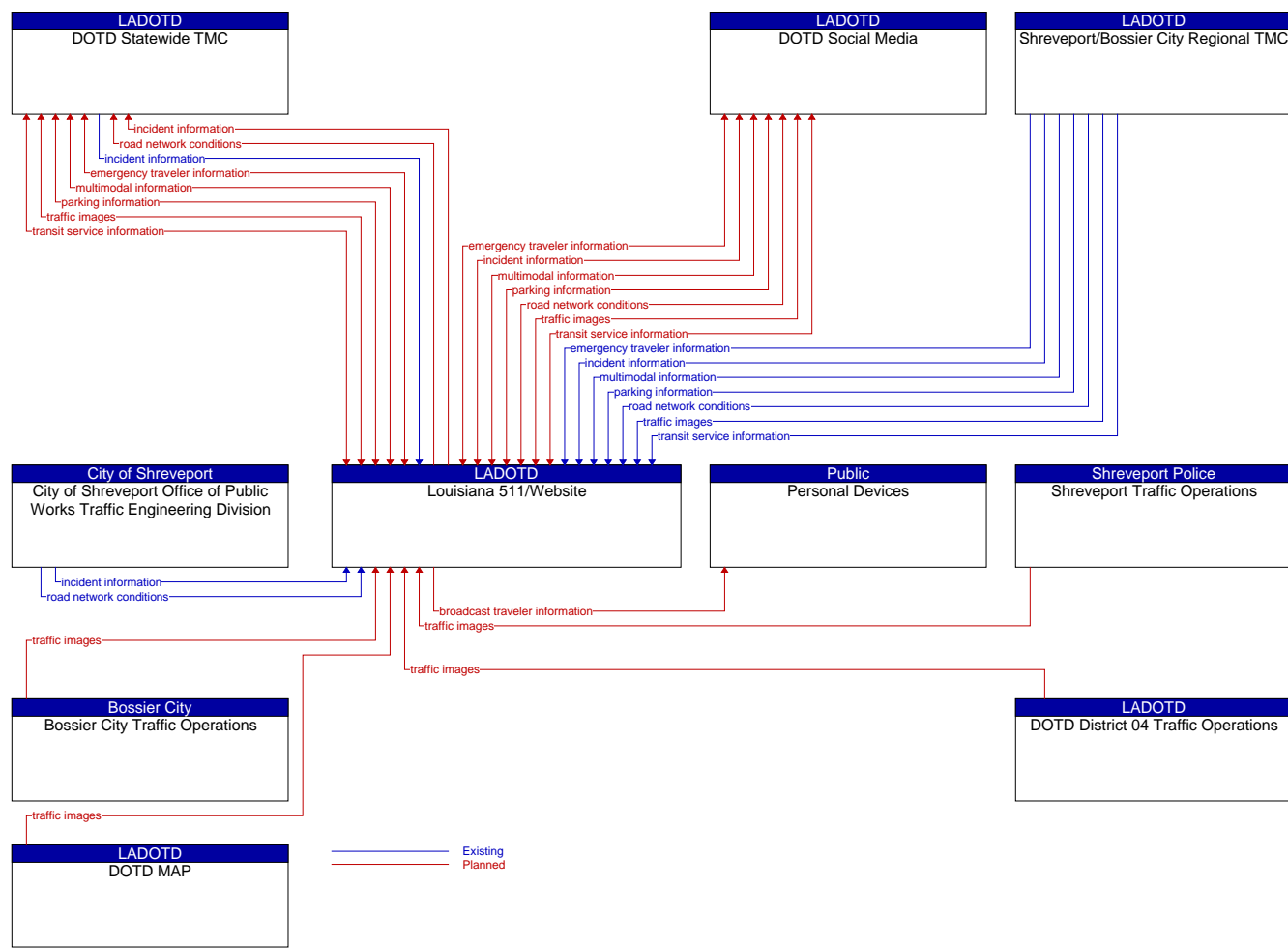
Figure 25: Louisiana 511/Website Flow Context Diagram
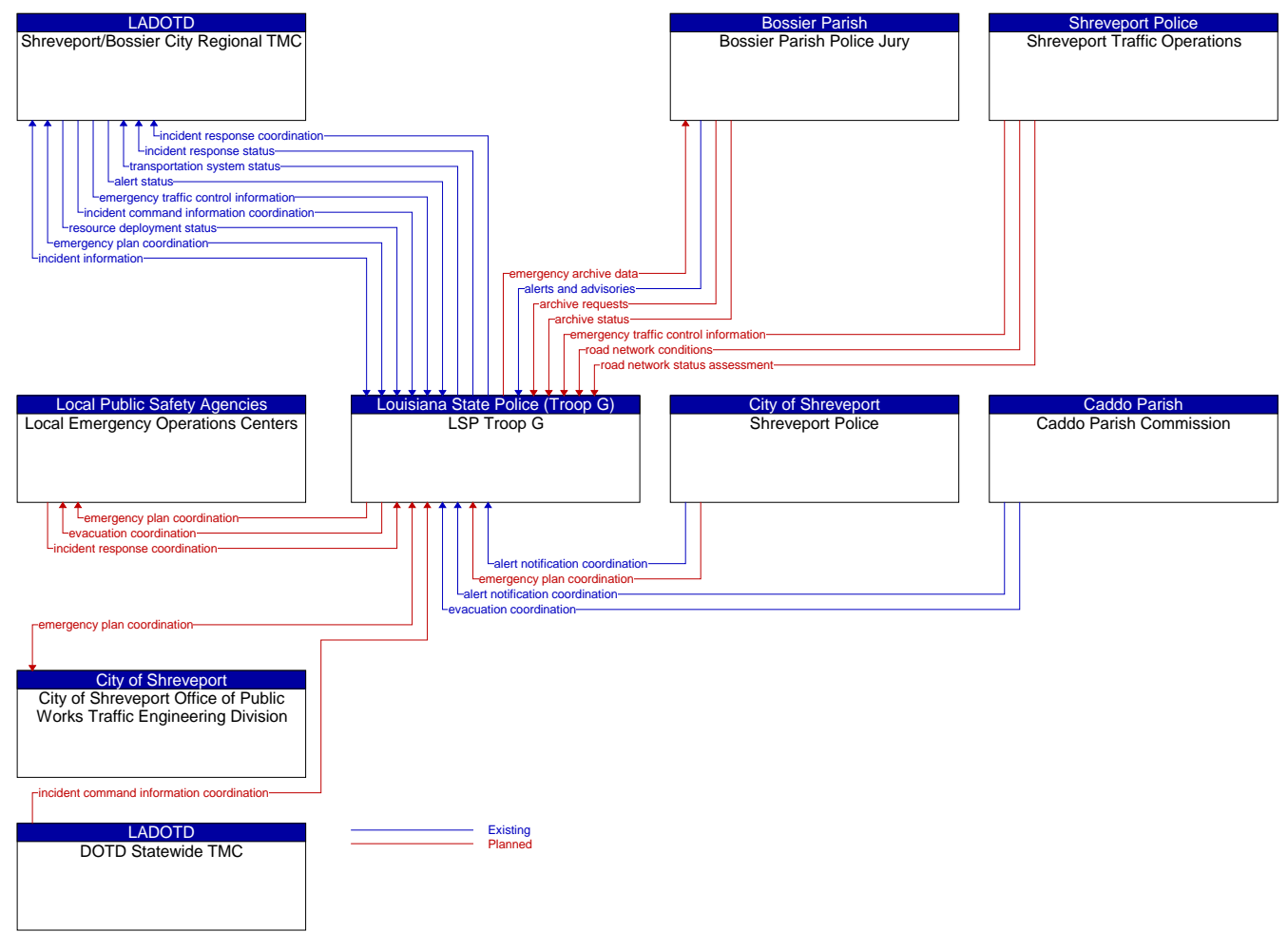
Figure 26: LSP Troop G Flow Context Diagram
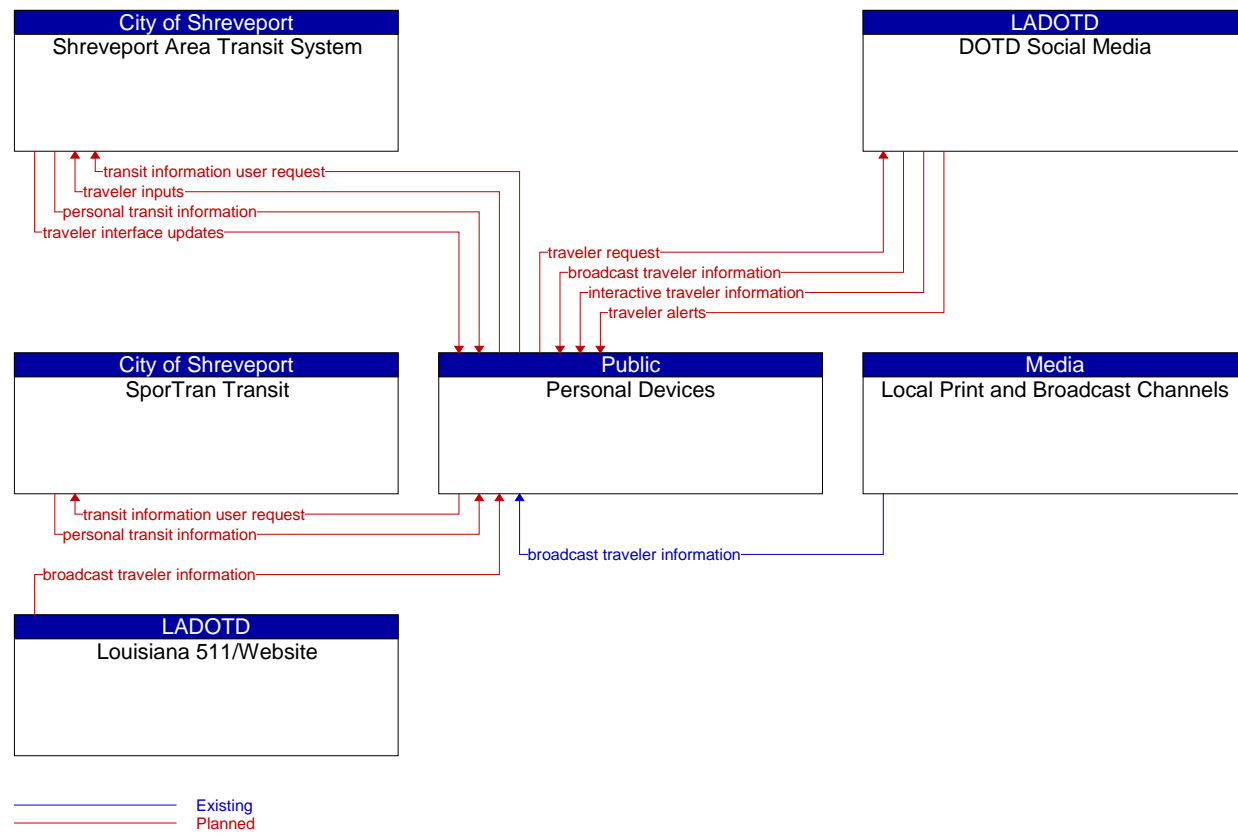
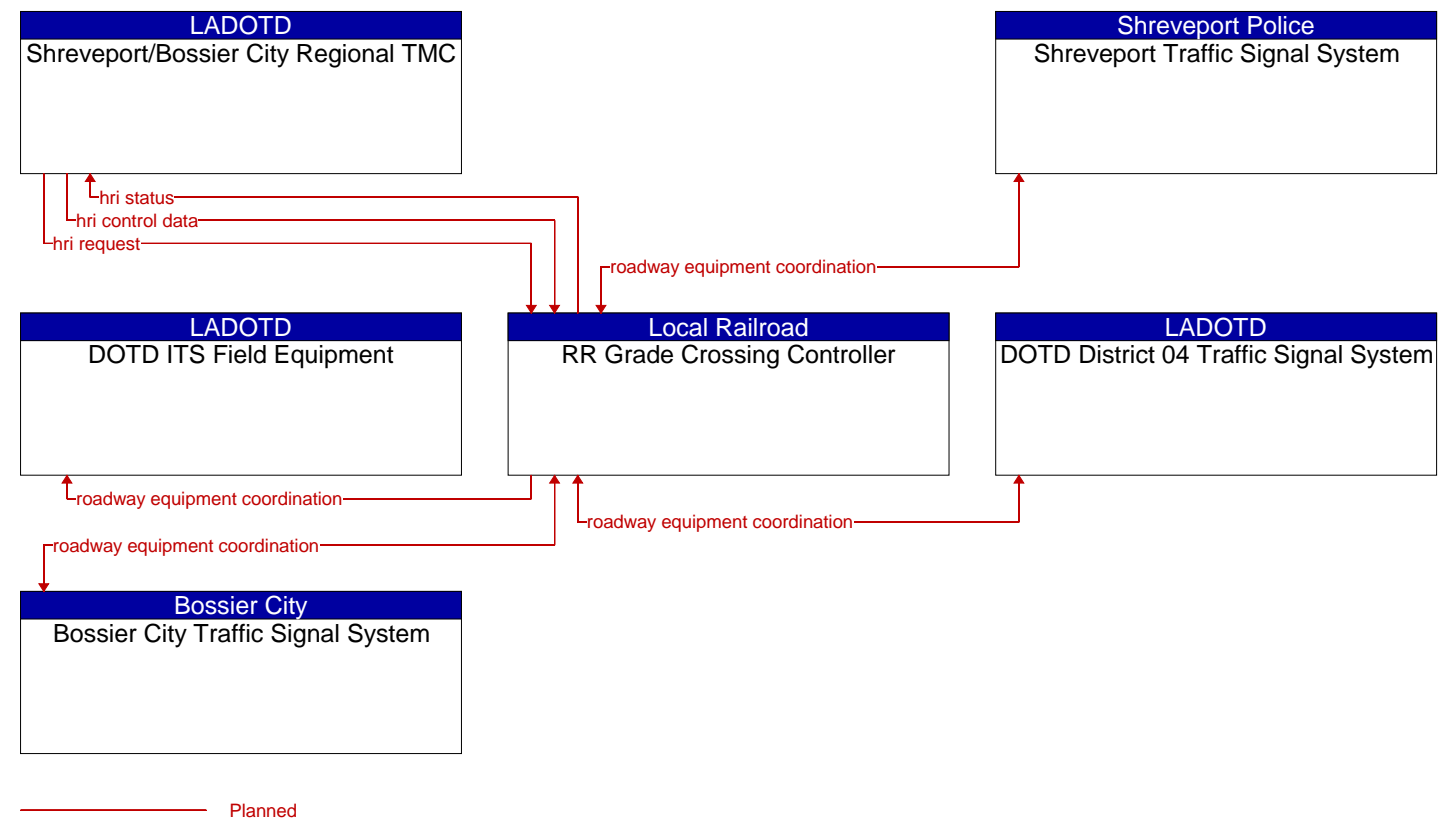**Figure 27: Personal Devices Flow Context Diagram**

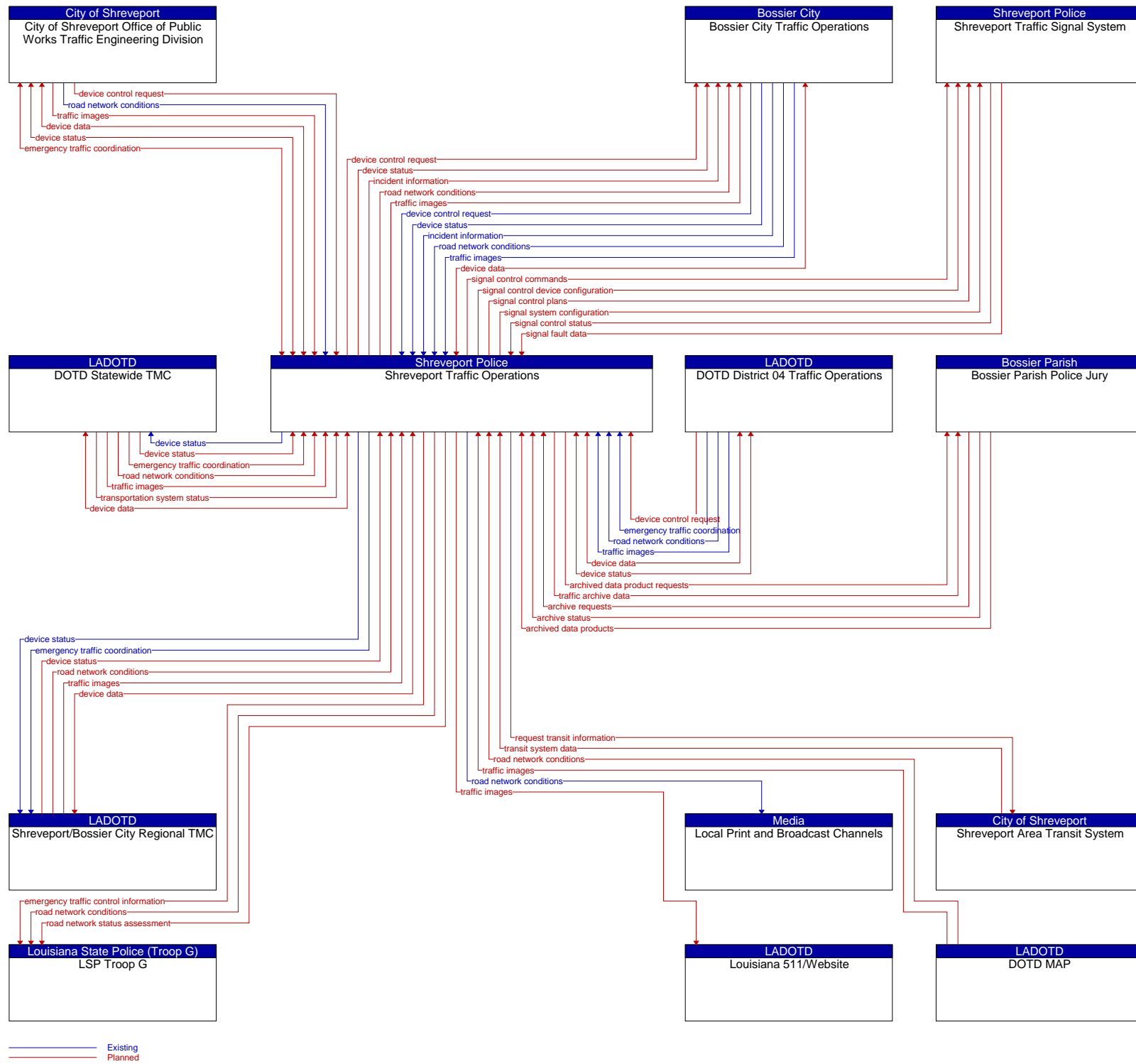**Figure 28: RR Grade Crossing Controller Flow Context Diagram**

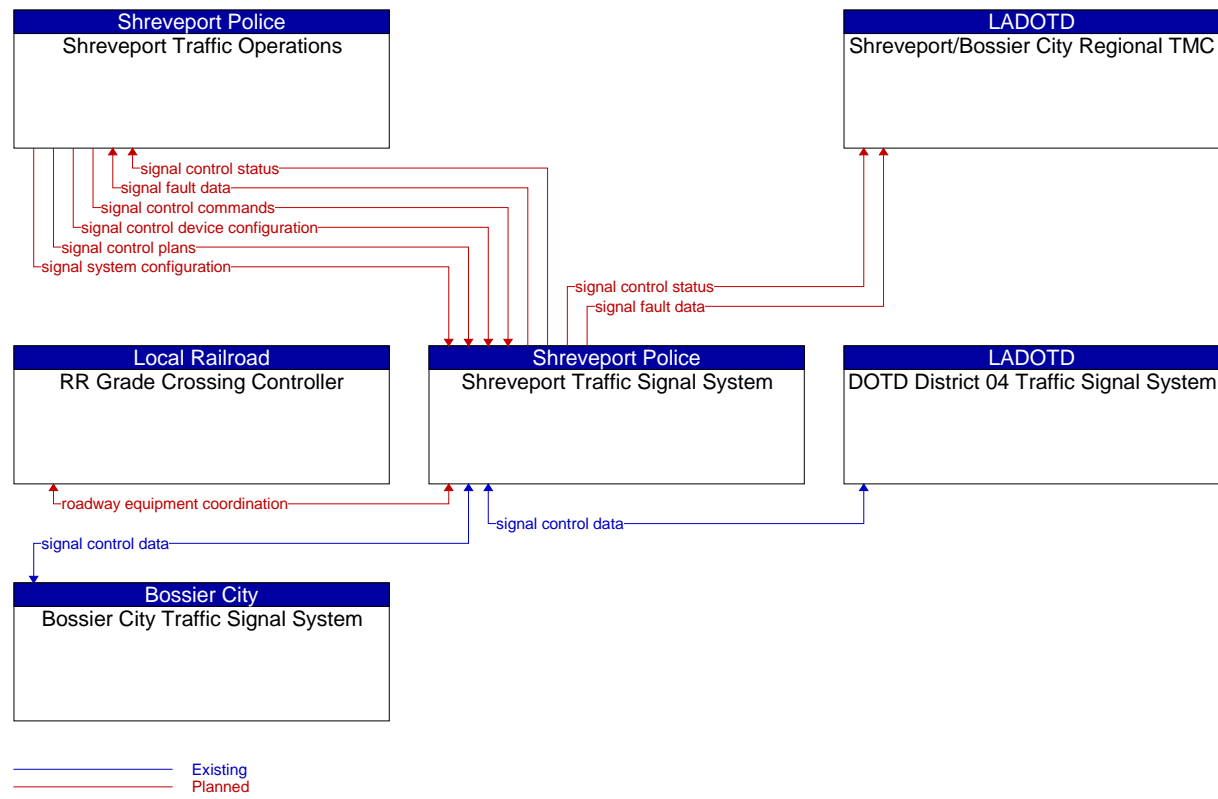**Figure 29: Shreveport Traffic Operations Flow Context Diagram**

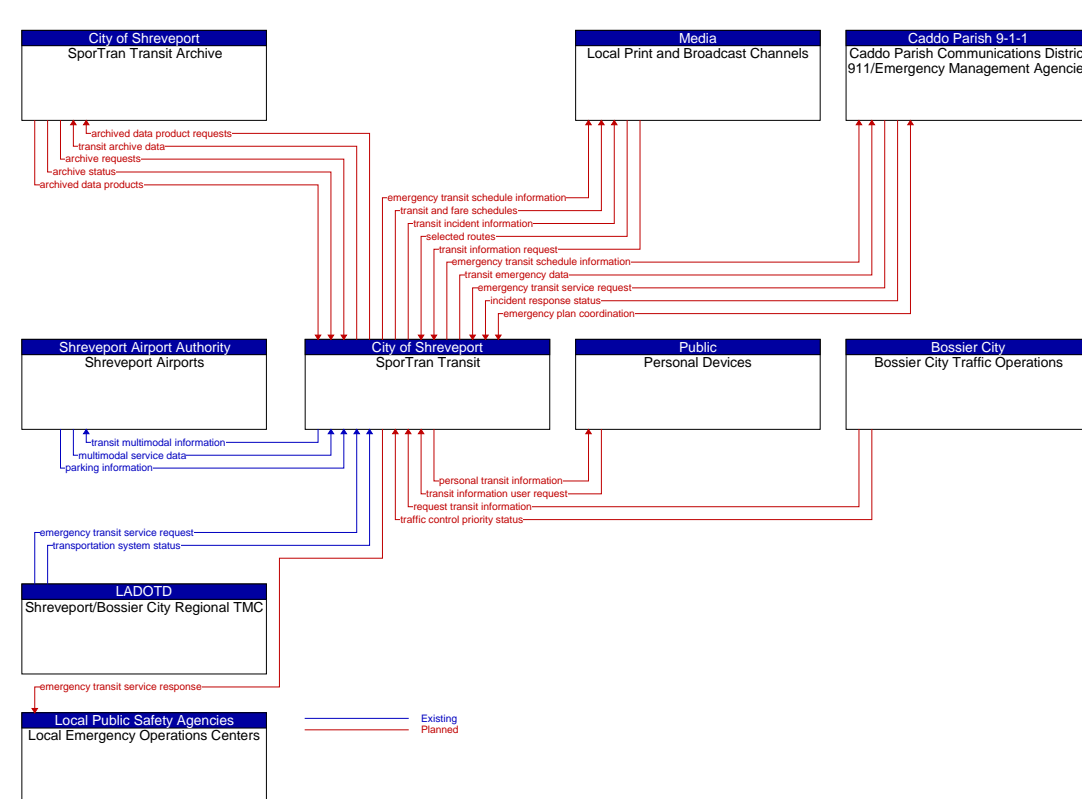**Figure 30: Shreveport Traffic Signal System Flow Context Diagram**

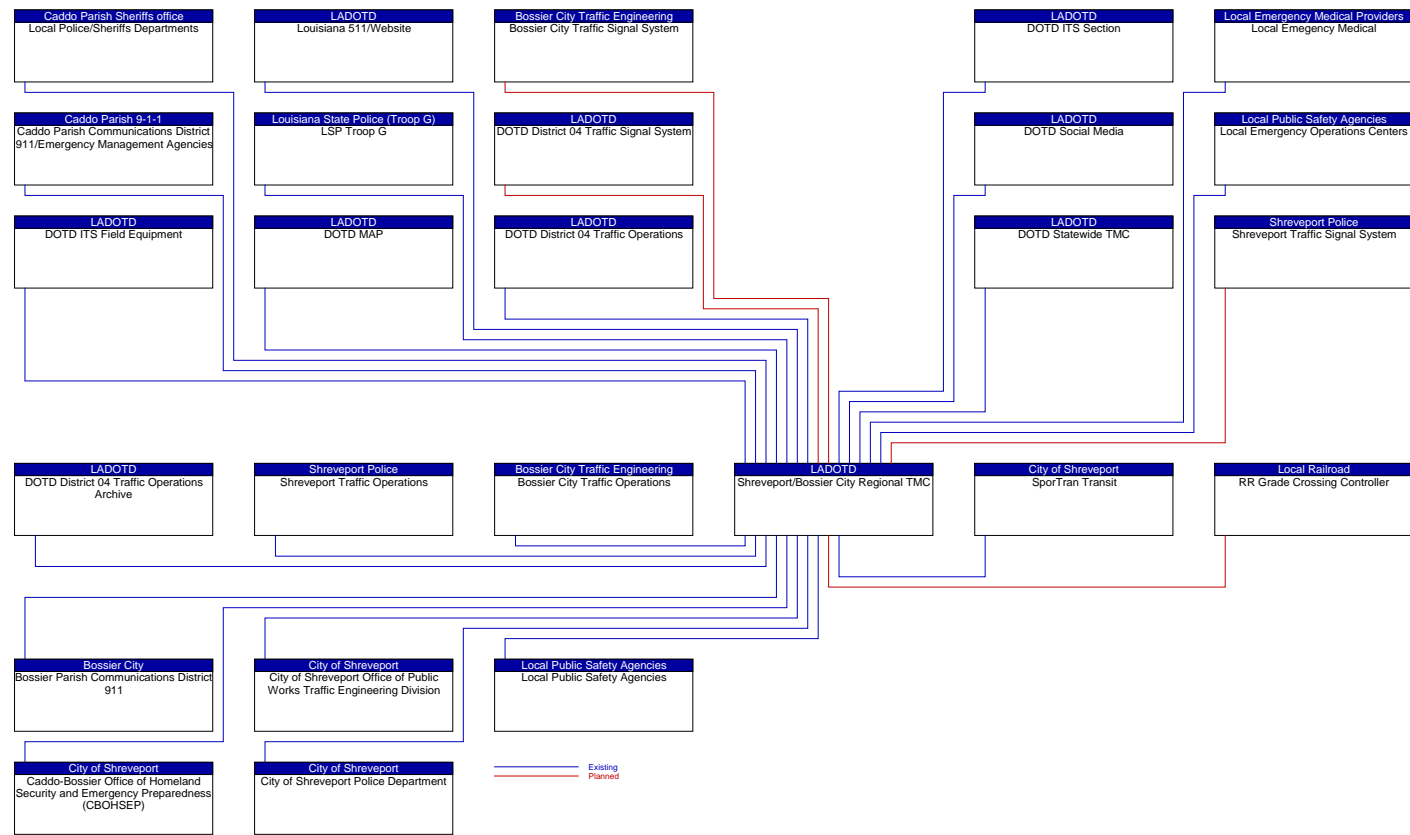**Figure 31: SporTran Transit Archive Flow Context Diagram**

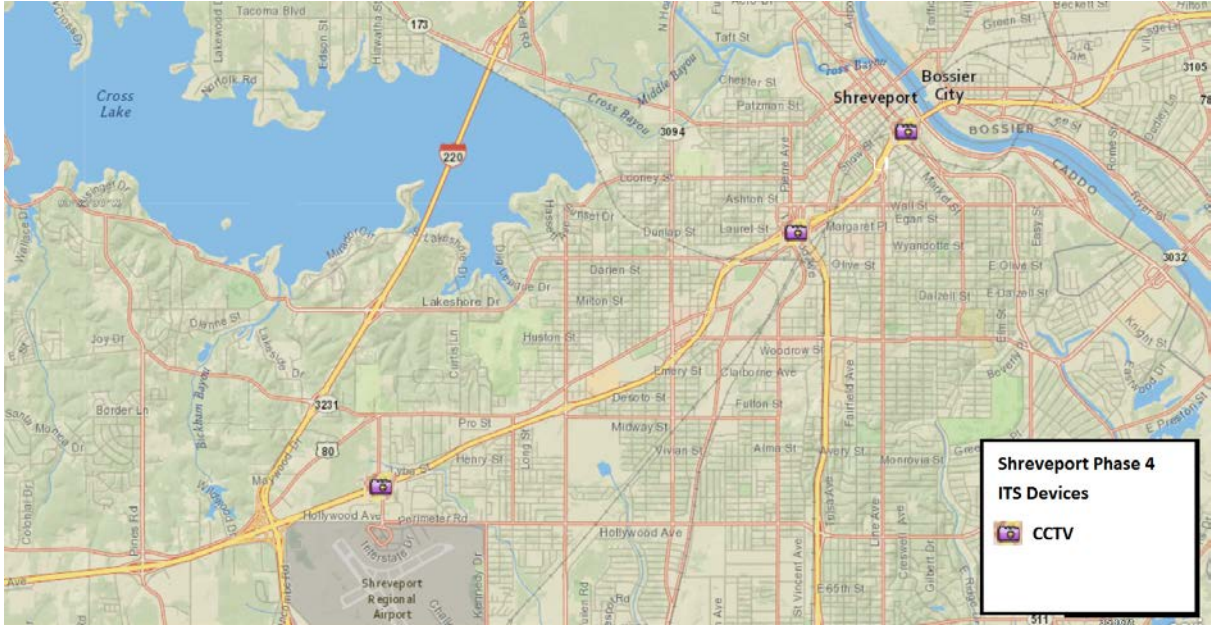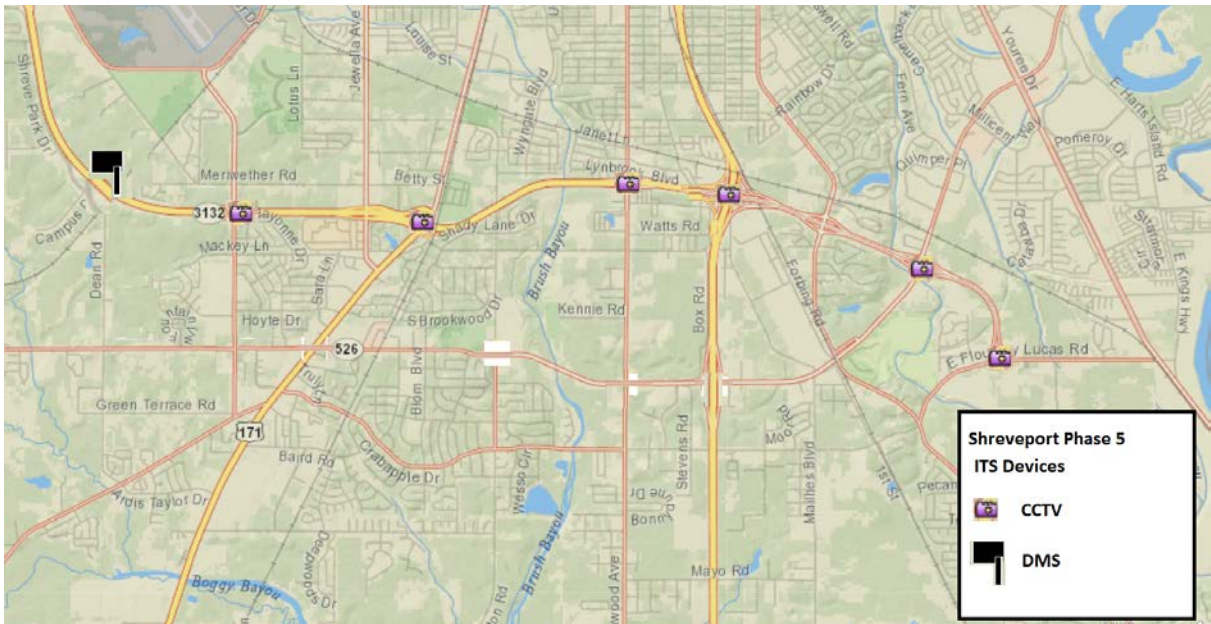**Figure 32: Shreveport/Bossier City Regional TMC Interconnect Context Diagram**
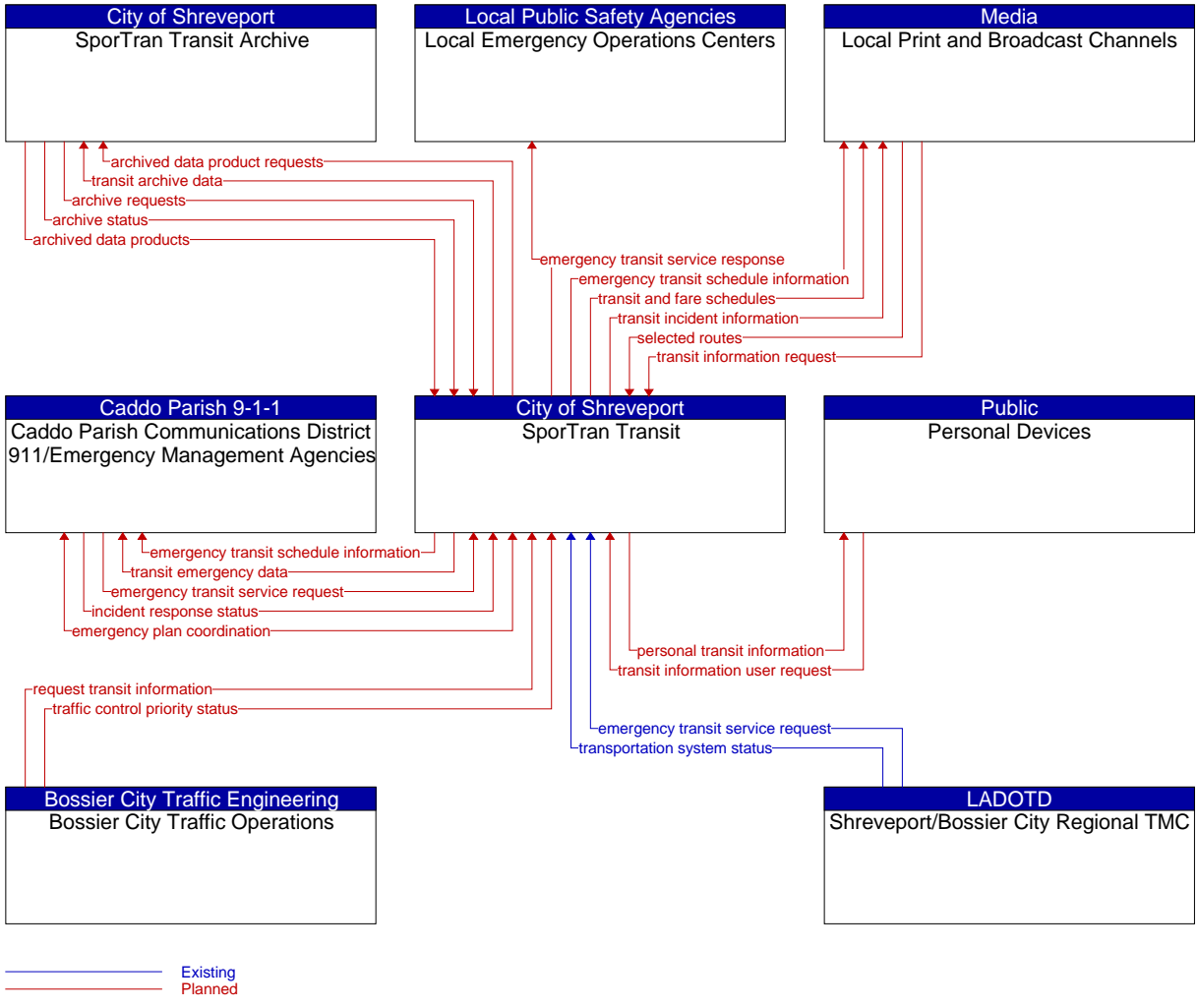
Figure 33: SporTran Transit Flow Context Diagram

Appendix C.   ITS Deployment Plan Detailed Schematics

Figure 34: Shreveport ITS Deployment Detailed Schematics - Phase 4

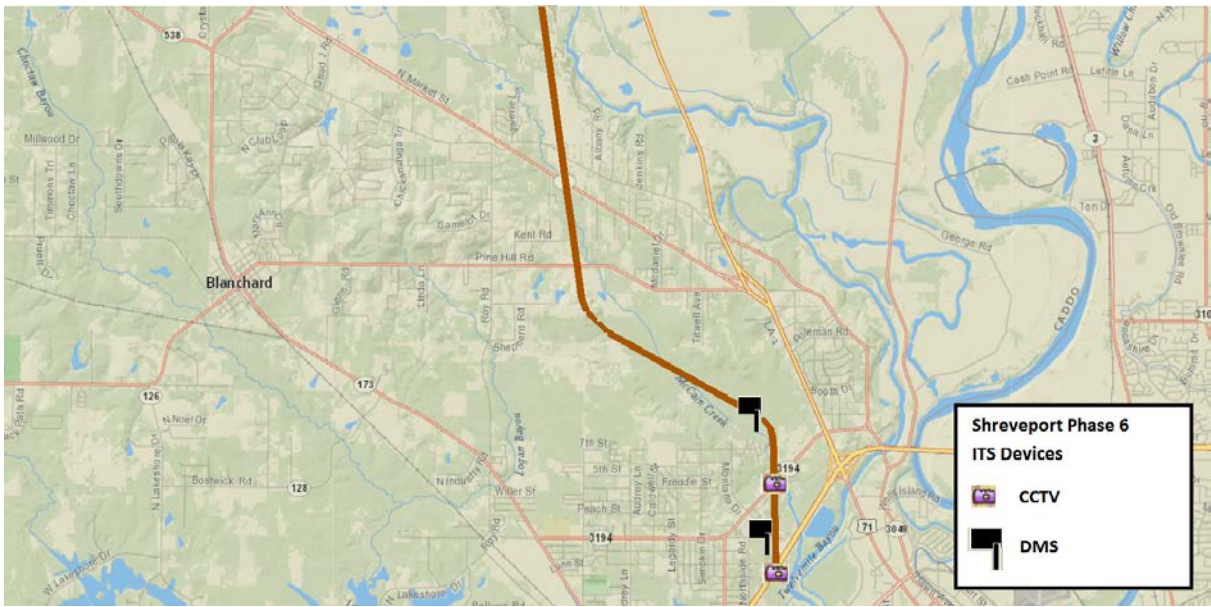**Figure 35: Shreveport ITS Deployment Detailed Schematics - Phase 5**

Figure 36: Shreveport ITS Deployment Detailed Schematics - Phase 6