# Lafayette Regional ITS Architecture

FHWA

Acadiana Planning Commission

DOTD
LOUISIANA DEPARTMENT OF TRANSPORTATION & DEVELOPMENT

Lafayette
CONSOLIDATED GOVERNMENT

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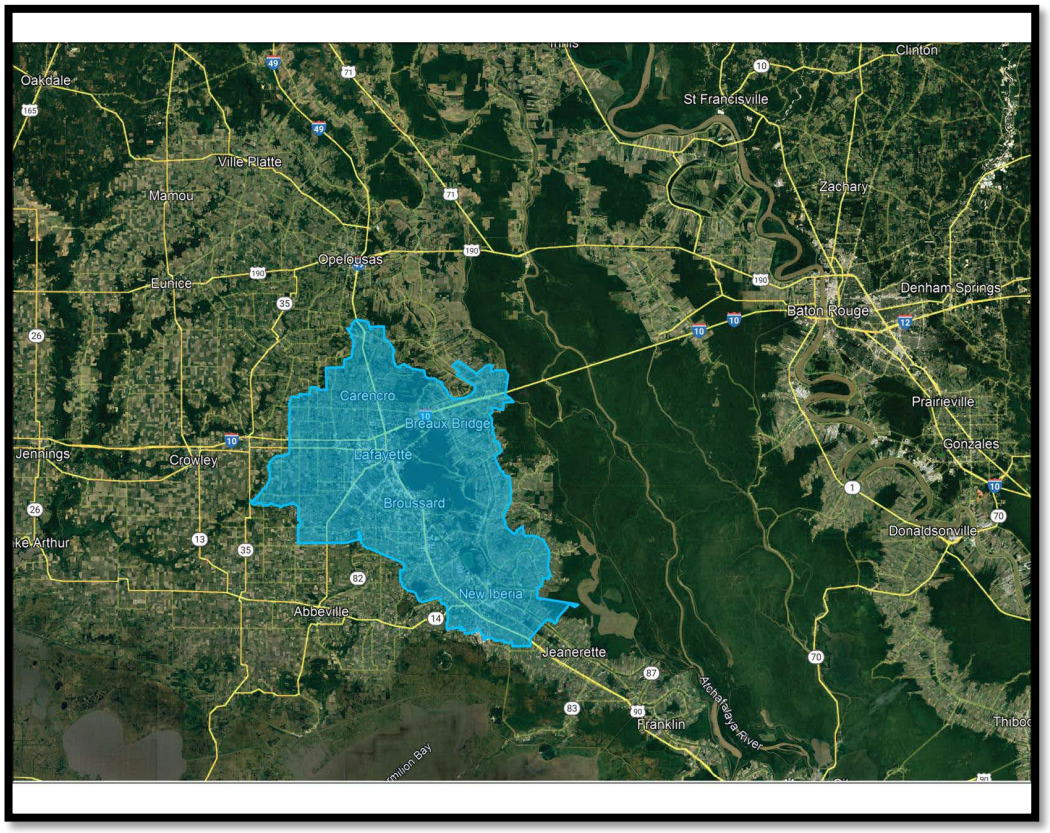


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**ITS ARCHITECTURE (UPDATES)**

# LAFAYETTE REGIONAL ITS ARCHITECTURE

***Presented to:***

LOUISIANA DEPARTMENT OF TRANSPORTATION & DEVELOPMENT

***Prepared by:***

***Neel-Schaffer, Inc***
***In Association with ITS, LLC and***
***Vectura Consulting Services, LLC***

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# 1 Introduction

This document describes the Intelligent Transportation System (ITS) architecture for the Lafayette 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. Regional ITS Architectures have been promoted by the United States Department of Transportation (USDOT) as descriptive tools, using a standard vocabulary and set of concepts for regional deployments in order to aid the integration of User Services and Service packages in addressing 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 states:

> "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, describes 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 13**
5) System functional requirements – **Section 11**
6) Interface requirements and information exchanges with planned and existing systems – **Appendix B** (also see the Lafayette Regional ITS Architecture RAD-IT source file)
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 8**

The products derived from architecture development processes 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 and 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

APC – Acadiana Planning Commission
ASC – Actuated Traffic Signal Controller
ATIS – Advanced Traveler Information System
ATMS – Advanced Traffic Management System
AVL – Automated Vehicle Location
CAD – Computer Aided Dispatch
CCTV – Closed Circuit Television
CFR – Code of Federal Regulations
CMU – Conflict Monitor Units
DCM – Data Collection and Monitoring
DMS – Dynamic Message Signs
DOTD – Department of Transportation and Development
FHWA – Federal Highway Administration
FMS – Field Management Stations
FTA – Federal Transit Administration
HAR – Highway Advisory Radio
HRI – High-rail Intersection
ITS – Intelligent Transportation Systems
LADOTD – Louisiana Department of Transportation and Development
LCG – Lafayette Consolidated Government
LCGTT – Lafayette Consolidated Government Traffic and Transportation
LPCD – Lafayette Parish Communications District
LPSO – Lafayette Parish Sheriff's Office
LSP – Louisiana State Police
MAP – Motorist Assistance Patrol
MPO – Metropolitan Planning Organization
MTP – Metropolitan Transportation Plan
MS/ETMCC – Message Sets for External Traffic Management Center Communications
NTCIP – National Transportation Communications for Intelligent Transportation System Protocol
O & M – Operations and Maintenance
PDA – Personal Digital Assistant
RR – Roles and Responsibilities
RVD – Radar Vehicle Detector
SCP – Signal Control and Prioritization
SDO – Standards Development Organizations
SSM – Signal System Master
SSL – Signal System Local
TDM – Travel Demand Management
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
VHT – Vehicle Hours Traveled
VMT – Vehicle Miles Traveled

# 3 Architecture Scope

The Lafayette 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 chapter 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 this Architecture is five years.

## 3.2 Geographic Scope

The Metropolitan Planning Organization (MPO) is responsible for comprehensive evaluation of region-wide transportation planning for the Lafayette Urbanized Area. The Acadiana MPO has expanded based on the 2010 Census data, and it is now designated as a Transportation Management Area (TMA). The regional ITS architecture typically falls within the boundaries of the MPO, however based on the needs of the stakeholders, the architecture boundary has been extended to include I-10, I-49, US 90, and US 190 to the limits of LADOTD District 03. This expansion in geographic scope will allow devices to be deployed at locations that will facilitate emergency management for District 03 Traffic Engineering. **Figure 1** shows the location of Lafayette Parish in the State of Louisiana. **Figure 2** is a map showing the designated limits of the MPO (shaded blue) and the limits of the roadways affected beyond the MPO boundary (highlighted in red).

## 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 issues. Various services based on the national ITS architecture service packages shall be selected and programmed into projects to address the transportation needs in a logical manner. **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 the MPO will maintain the Lafayette Regional ITS Architecture.

**Figure 1: Louisiana Parish Map Showing Lafayette Parish Shaded**

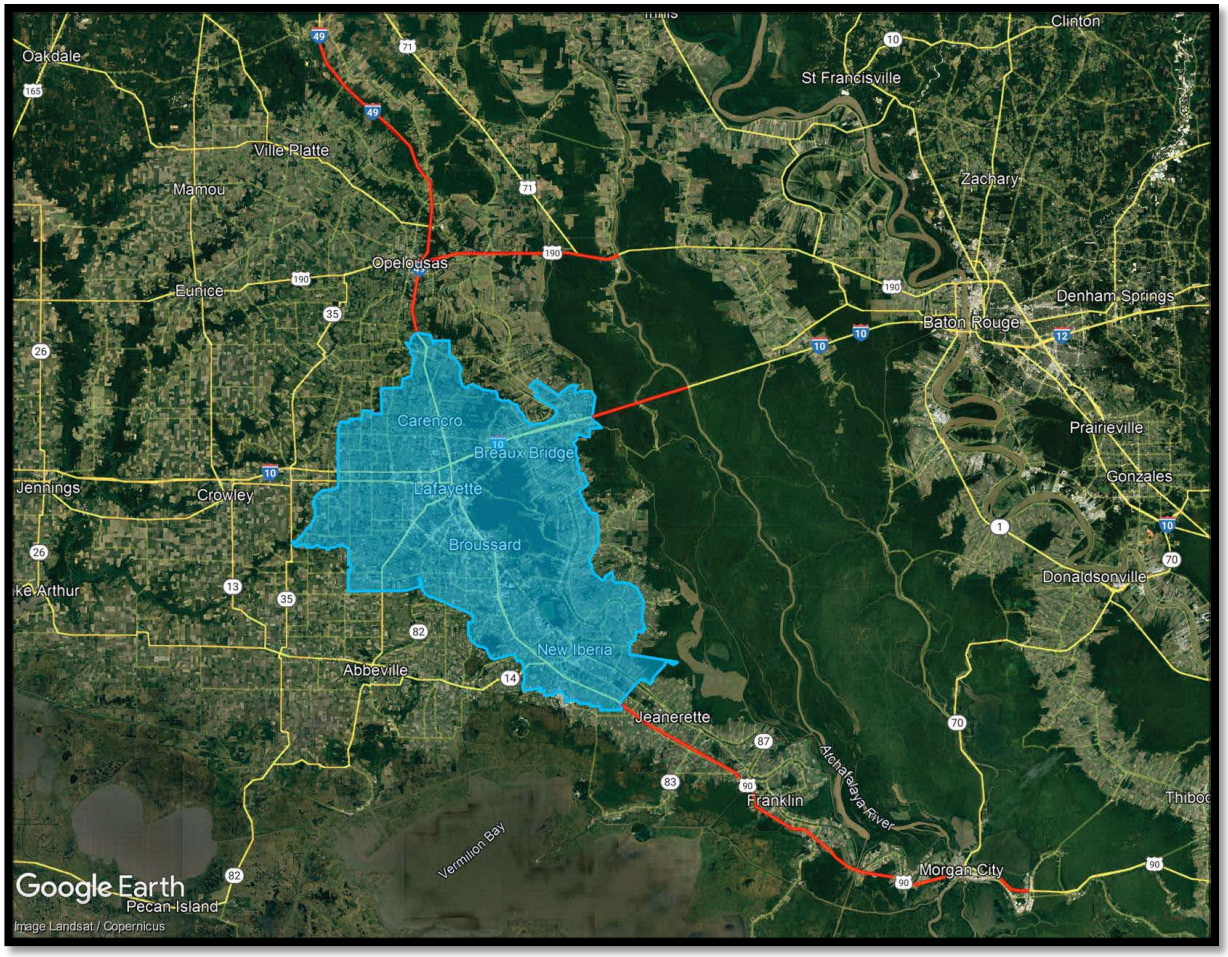



**Figure 2: MPO Area Showing Limits of Devices on Roads Highlighted in Red**

# 4 Relationship to Regional Planning

The Lafayette 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 is also used to define the data needs associated with performance monitoring that supports an informed planning process. This chapter identifies the planning objectives, strategies, and associated performance measures from the regional plan. These planning elements are connected with ITS services in the RAD-IT Architecture database.

**Table 1: Relationship to Planning**

| Name | Description | Source | PM Category | Performance Measure |
|---|---|---|---|---|
| Economic Efficiency | Provide for an orderly improvement and expansion of the roadway system at minimum cost as the need for improvement arises. | 2040 Lafayette Metropolitan Transportation Plan (April 2012) | Delay | Vehicle-Hours |
| | | | Reliability | Travel Time Reliability |
| Enhance Mobility | The goal is to build a transportation system that will accommodate the present and future mobility needs of all people and goods. | 2040 Lafayette Metropolitan Transportation Plan (April 2012) | Delay | Vehicle-Hours |
| | | | Reliability | Travel Time Reliability |
| Environmental Impacts | Reduce air pollution, noise and other environmental impacts associated with transportation improvements and new facility construction. | 2040 Lafayette Metropolitan Transportation Plan (April 2012) | Air Quality | VOC, CO, NOX |
| | | | Noise | Decibel (dB) |
| Improve Safety | Provide a high degree of safety for motorists, bicyclists and pedestrians | 2040 Lafayette Metropolitan Transportation Plan (April 2012) | Crash Rate | Crashes/MVM |
| | | | Fatalities | Number of Fatalities |

# 5 ITS Stakeholders

A stakeholder questionnaire was developed and distributed to all the agencies that needed to be included in the development of the Lafayette Regional ITS Architectures. The description of individual stakeholders is provided in **Table 2**. Some stakeholders have been grouped based on their mutual participation or involvement in transportation services and elements. The ITS system inventory and the association of these stakeholders with the elements in this inventory are described in **Section 6**.

**Table 2: ITS Stakeholders**

| Stakeholder Name | Stakeholder Description |
|---|---|
| Louisiana Department of Transportation and Development (LADOTD) | LADOTD is the state agency responsible for maintaining state-wide transportation and infrastructure system. This stakeholder group includes ITS, Office of Planning Programming, Highway Safety, Weights and Standards, Traffic Services, and Traffic Engineering, which are 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. |
| Lafayette Consolidated Government (LCG) | LCG is responsible for the administration of the City of Lafayette, Louisiana. LCG provides various services including public safety, utilities, transit, and public works among others. |
| Acadiana Planning Commission (APC) | APC, the Lafayette Metropolitan Planning Organization (MPO), is the transportation planning agency for the Lafayette Urbanized Area. The main function of this MPO is the oversight of short and long-range transportation plans, the coordination of federal, state and local transportation programs and projects, and the allocation of federal, state and local funds for transportation projects and programs. |
| Lafayette Parish Sheriff's Office (LPSO) | The mission of LPSO is the maintenance of social order based on ethical, constitutional, and legal restrictions. The goal of LPSO is to promote public safety. The primary patrol area is the unincorporated areas of the parish. |
| Lafayette Parish Communications District (LPCD) – 911 Traffic | LPCD operates the 911 call center for the Lafayette region. LPCD is the initial point of contact for emergency management and communications for the first responders, local emergency service providers and enforcement agencies. LPCD diverts the calls to LPSO, LCG Police Department, Parish and Volunteer Fire Departments, and Acadian Ambulance. |
| Local Emergency Operations Centers | The Local Emergency Operations Centers refer to public entities that coordinate and support the emergency management system which protect lives and prevent the loss of property from all hazards. Local Emergency Operations Centers are responsible for planning and managing the emergency response to major disasters. |
| Local Public Safety Agencies | Local Public Safety Agencies represent the emergency safety responders that are operated and maintained by parish and local municipalities. |
| Parish and Volunteer Fire Departments | This stakeholder group as a part of first responders assists with incident response and incident management. |
| Louisiana State Police (Troop I) | Louisiana State Police(Troop I) is the state police department charged with the responsibility of protecting lives, property and constitutional rights of people living in Louisiana. Troop I is the part of the Louisiana State Police responsible for the Lafayette area. |
| Media | This stakeholder group includes local TV/Radio stations, and print media that is responsible for receiving and distributing transportation information like traffic conditions, incidents and road weather conditions. |
| Public | Members of the general public own and operate various devices/systems to access ITS information including personal digital assistants (PDAs), cell phones, and personal computers. |
| Tourism and Traveler Information Service Providers | This includes various tourism agencies, chambers of commerce, hotel associations, motorist services, etc. |

## 6 ITS System Inventory

An inventory of existing and planned transportation systems is an integral part of the Regional ITS Architecture. The transportation system inventory was developed based on responses and inputs determined from the stakeholder questionnaires. The inventory includes a list of ITS elements and the associated stakeholder responsible for system operation.

**Table 3** describes the surface transportation inventory elements which are part of this architecture. A transportation element can be a center, a vehicle, a traveler, or a piece of field equipment. Each transportation element listed below has one or more stakeholders associated with it from **Section 5**. To reduce the complexity of the architecture, some transportation elements with like functionality have been grouped. 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 | Element Type | Associated Physical Objects |
|---|---|---|---|---|---|
| Electric Vehicle Charging Stations | Electric vehicles (both private and public) are slated to be located throughout the region. | LCG | Planned | Normal | Electric Charging Station |
| LADOTD District 03 | This element is responsible for roadway maintenance and management activities within the district. This includes communicating with the Statewide TMC and theLCGTT TMC for roadway maintenance activities. District 03 is located in Lafayette. | LADOTD | Existing | Normal | Archived Data User System |
| | | | | | Emergency Management Center |
| | | | | | Maintenance and Construction Management Center |
| | | | | | Traffic Management Center |
| LADOTD District 03 Traffic Operations | This element is responsible for traffic management activities within District 03. The typical activities include traffic monitoring, traffic data collection, traffic signal operations, and other traffic management activities. This also includes communicating with Statewide TMC, LCGTT TMC and other departments, such as roadway maintenance activities. | LADOTD | Existing | Normal | Archived Data System |
| | | | | | Emergency Management Center |
| | | | | | Archived Data User System |
| | | | | | Traffic Management Center |
| LADOTD District 03 Traffic Signal System | This system includes field communications, field controllers, field masters, and vehicle detection on state highways(non-freeway) that are operated and maintained by the LADOTD. | LADOTD | Existing | Normal | Archived Data User System |
| | | | | | Connected Vehicle Roadside Equipment |
| | | | | | ITS Roadway Equipment |
| | | | | | Traffic Management Center |
| LADOTD ITS Field Equipment | This element includes the equipment along the roadway that monitors traffic and manages the operations. Equipment includes traffic signals, vehicle detectors, environmental sensors, highway advisory radios, dynamic message signs, closed circuit television (CCTV) cameras and video image processing systems, weigh-in-motion, water level monitoring, and grade crossing warning systems. | LADOTD | Existing | Normal | Connected Vehicle Roadside Equipment |
| | | | | | ITS Roadside Equipment |
| LADOTD ITS Section | This element also known as LADOTD Section 56 is responsible for the Statewide TMC located in LADOTD headquarters and all other regional TMCs. It is responsible for the management of information systems for transportation, statewide ITS elements operations, and maintenance. The ITS section is also responsible for the maintenance of all ITS equipment in the state. | LADOTD | Existing | Normal | Archived Data System |
| | | | | | Archived Data User System |
| | | | | | Emergency Management Center |
| | | | | | Maintenance and Construction Management Center |
| | | | | | Traffic Management Center |

| Element Name | Element Description | Stakeholder | Element Status | Element Type | Associated Physical Objects |
|---|---|---|---|---|---|
| LADOTD MAP | This element represents the Motorist Assistance Patrol (MAP) vehicles contracted by LADOTD's ITS Section, but operated and maintained by the LADOTD's District Office (District 03). | LADOTD (District 03) | Planned | Normal | Emergency Management Center |
| | | | | | Emergency Vehicle OBE |
| | | LADOTD | Existing | | Maintenance and Construction Management Center |
| | | | | | Traffic Management Center |
| LADOTD Statewide TMC | This element is responsible for statewide traffic management activities that typically includes monitoring traffic and data collection, operation of ITS elements (CCTV, DMS, etc.), detection and verification of incidents, and other traffic management related activities. Additional activities include communicating with local agencies, districts, and LADOTD departments for roadway maintenance activities. | LADOTD | Existing | Normal | Archived Data System |
| | | | | | Archived Data User System |
| | | | | | Data Distribution System |
| | | | | | Emergency Management Center |
| | | | | | Transportation Information Center |
| | | | | | Maintenance and Construction Management Center |
| | | | | | Traffic Management Center |
| LADOTD Social Media | Social media such MyDOTD, YouTube, Facebook, Twitter, and 511LA. | LADOTD | Existing | Normal | Data Distribution System |
| | | | | | Transportation Information Center |
| Lafayette MPO Database | The database collects, manages, and distributes data generated from the transportation system for use in transportation administration, policy evaluation, program assessment, performance monitoring, and research applications for safety, planning, and operations. | APC | Existing | Normal | Archived Data System |
| Lafayette Police Department | This element are the first responders responsible for dispatching vehicles, communications systems, computer-aided dispatch, and automatic vehicle location system (AVL). | LCG | Existing | Normal | Emergency Management Center |
| Lafayette Transit System | This element operates a public transit system within metropolitan Lafayette. The transit service runs six days a week from Monday to Saturday. | LCG | Existing | Normal | Archived Data System |
| | | | | | Archived Data User System |
| | | | | | Transit Management Center |
| | | | | | Transit Vehicle OBE |
| | | | | | Vehicle OBE |
| LCG Traffic and Transportation (LCGTT) | LCGTT is responsible for the maintenance and operation of traffic control systems and their associated communications equipment. This department monitors traffic within city limits and modifies traffic signal timings through its traffic control and communications infrastructure. | LCG | Existing | Normal | Archived Data System |
| | | | | | Archived Data User System |
| | | | | | Emergency Management Center |
| | | | | | Maintenance and Construction Management Center |
| | | | | | Maintenance and Construction Vehicle OBE |
| | | | | | Traffic Management Center |
| LCGTT TMC | LCGTT TMC is located within the LCG premises is responsible for traffic management activities throughout the City of Lafayette area. The typicalactivities include traffic monitoring and data collection, operation of ITS elements (Signals, portable DMS etc.), detection and verification ofincidents, traffic signal monitoring, and other traffic management related activities. This also includes communicating with other agencies, districts, TMCs, and LADOTD departments for roadway maintenance activities. | LCG | Existing | Normal | Archived Data System |
| | | | | | Archived Data User System |
| | | | | | Data Distribution System |
| | | | | | Emergency Management Center |
| | | | | | Transportation Information Center |
| | | | | | Maintenance and Construction Management Center |
| | | | | | Traffic Management Center |

| Element Name | Element Description | Stakeholder | Element Status | Element Type | Associated Physical Objects |
|---|---|---|---|---|---|
| LCGTT Traffic Signals | Field communications, field controllers, field masters, and vehicle detection on roadways within the parish that are operated and maintained by the LCGTT. | LCG | Existing | Normal | Archived Data System<br>Archived Data User System<br>Connected Vehicle Roadside Equipment<br>ITS Roadside Equipment<br>Traffic Management Center |
| Local Emergency Safety Providers | This element includes local hospitals and emergency medical service providers (i.e., acadian ambulance, air vac, etc) that are components of emergency management. These elements are operated and maintained by public and private local medical providers. | Local Public Safety Agencies | Existing | Normal | Archived Data System<br>Emergency Management Center<br>Personnel Device<br>Emergency Vehicle OBE<br>Public Health System |
| Local Emergency Operations Centers | This element coordinates and supports the emergency management system. They are responsible for planning and managing emergency response to major disasters. | Local Emergency Operations Centers | Existing | Normal | Data Distribution System<br>Emergency Management Center<br>Personnel Device<br>Transportation Information Center |
| Louisiana 511 | This element provides traveler information serviceprovided by the LADOTD in conjunction with private partners. | LADOTD | Existing | Normal | Data Distribution System<br>Transportation Information Center |
| Lafayette Parish Communications District (LPCD) | LPCD operates the 911 call center for the Lafayette region. LPCD is the initial point of contact for emergency management and communications for the first responders, local emergency service providers and enforcement agencies. LPCD diverts the calls to LPSO, LCG Police Department, Parish and Volunteer Fire Departments, and Acadian Ambulance. | Lafayette Parish CommunicationsDistrict (LPCD) | Existing | Normal | Archived Data System<br>Emergency Management Center |
| Lafayette Parish Sheriff's Office (LPSO) | The mission of LPSO is the maintenance of social order based on ethical, constitutional, and legal restrictions. The goal of LPSO is to promote publicsafety. The primary patrol area is the unincorporated areas of the parish. | Lafayette Parish Sheriff's Office (LPSO) | Existing | Normal | Archived Data System<br>Emergency Management Center<br>Emergency Vehicle OBE<br>Enforcement Center<br>Traffic Management Center |
| LSP Troop I | This element represents the Louisiana State Police Department covering the Lafayette area (Troop I).Also, this element represents the troop's dispatch, vehicles, communications systems, computer aided dispatch and automatic vehicle location system (AVL). | Louisiana StatePolice (Troop I) | Existing | Normal | Emergency Management Center |
| Parish and Volunteer Fire Departments | This stakeholder group as a part of first responders assists with incident response and incident management. | Parish and Volunteer Fire Departments | Existing | Normal | Archived Data System<br>Emergency Management Center<br>Emergency Vehicle OBE |
| Personal Devices | These are primarily smartphones, tablets andsmart devices used for information exchange. | Public | Existing | Normal | Connected Vehicle Roadside Equipment<br>Emergency Vehicle OBE<br>Personal Information Device<br>Vehicle OBE |
| Private Traveler Information Service Provider | This element provides traveler information to the public through private corporations. | Media | Existing | Normal | Data Distribution System<br>Transportation Information Center |

| Element Name | Element Description | Stakeholder | Element Status | Element Type | Associated Physical Objects |
|---|---|---|---|---|---|
| Tourism and Traveler Information Service Provider | This includes various tourism agencies, chambers of commerce, hotel associations, motorist services, etc. | Tourism and Traveler Information Service Providers | Existing | Normal | Data Distribution System |
| | | | | | Transportation Information Center |
| Traveler | Motorist or user of the regional transportationsystem. | Public | Existing | Normal | Connected Vehicle Roadside Equipment |
| | | | | | Personal Information Device |
| | | | | | Vehicle OBE |
| LCG Parking System | These are the system that are part of the LCG public parking complexes (e.g., garages and lots) | LCG | Planned | Normal | Parking Area Equipment |
| | | | | | Parking Management Center |

## 6.1 Existing Regional ITS Systems and Operations

The Lafayette Region has some ITS elements already deployed by LADOTD and Lafayette Consolidated Government. LCG has deployed significant ITS elements including a TMC and many ITS field devices with communications to help manage traffic within the city limits of Lafayette. LADOTD does not have a local TMC to monitor and manage traffic. The existing LADOTD devices are monitored and controlled from the Statewide TMC located in Baton Rouge. The existing ITS elements within the limits of the regional architecture coverage area have been compiled and described in **Table 4**.

**Table 4: Inventory of Existing ITS Elements**

| ITS Equipment | Description | Stakeholder | Element Name |
|---|---|---|---|
| LCG Webpage | LCG has a website with traffic information. There is a webpage with live camera feeds. Also, there is a webpage for Lafayette Transit Service with information on bus route maps and schedule. | LCG | LCGTT |
| LCG Traffic Control Signals | There are 191 signals with fiber connection, ATC Controllers, and vehicle detection maintained and operated by the City of Lafayette. 94 of these signals are State owned. | Lafayette Consolidated Government | LCGTT Traffic Signals |
| Closed Circuit Television (CCTV) | The City has 82 CCTV (PTZ) cameras. All are currently being updated to AXIS P3727-PLE Panoramic cameras. The cameras utilize a FususONE server. | Lafayette Consolidated Government | ITS Field Equipment |
| Vehicle Detection | There are also 100 wireless magnetometer vehicle detection systems | Lafayette Consolidated Government | ITS Field Equipment |
| LADOTD CCTV | There are 31 CCTV camera locations with PTZ in the Lafayette area. | LADOTD | ITS Field Equipment |
| LADOTD DMS | There are 7 DMS in the Lafayette area. | LADOTD | ITS Field Equipment |
| LADOTD Traffic ControlSignals | There are 265 signals and 105 beacons maintained and operated by LADOTD District 03. | LADOTD | LADOTD District 03 Traffic Signal System |
| Louisiana 511 | This element provides traveler information service provided by the LADOTD in conjunction with private partner. | LADOTD | Louisiana 511 |

### 6.1.1 Traveler Information System

511 is Louisiana's official, easy-to-remember traveler information service. 511 provides continual updates about weather-related road conditions, road work, commercial vehicle restrictions, road closures and other travel information via the phone, Internet or free downloadable mobile app. This system allows drivers to actively engage in smart travel by choosing less congested routes and avoiding incident areas. 511 can be reached by most cell phones and landlines or accessed on the internet at www.511LA.org.

### 6.1.2 Emergency Vehicle Preemption

In Emergency Vehicle Preemption (EVP) applications, specialized Intelligent Transportation System (ITS) devices are used to allow emergency vehicles to suspend normal signal operations in order to proceed through an intersection in a manner that can improve safety and emergency response times. In short, the system accomplishes this by providing a green light on an emergency vehicle's approach to the intersection.

LCG recently upgraded all 191 traffic signals intersections with new GPS based EPV system with an online central software management system. In addition, local fire departments and emergency medical services (EMS) will be provided with a preemption equipment that will trigger approaching traffic signal preemption when the vehicle enters a preemption zone. When emergency vehicle activates the device, the information on vehicle speed, heading and location were transmitted to central management systems which monitors vehicle location and then transmits the requests to respective approaching traffic signal traffic signal. The fundamental goal of the EVP system is to improve roadway safety for all commuters and improve emergency incident response times.

## 6.2 Transportation Needs

### 6.2.1 Traffic Signal Detection

Recent projects have updated some of the older state-owned traffic signals within the area. However, most of the city-owned intersections, as well as some others, have either no vehicle detection or unreliable vehicle detection. Vehicle detection would greatly improve the efficiency of these traffic signals. LADOTD District 03 is in favor of updating these signals to include radar vehicle detection.

### 6.2.2 CCTV Coverage

Several gaps in CCTV coverage have been identified within the area. These areas are listed below:

- Bayou Vista (along US 90)
- Crowley (at LA 13 along I -10) (under construction in state project No. H.013256)
- Grand Coteau (at LA 93 along I-49)

LADOTD District 03 has identified the Bayou Vista location as a location that would provide great benefit as it would help to facilitate hurricane evacuation.

### 6.2.3 Road Weather Information System

LCG has several roadways that flood when large rain events occur. State-owned roads currently are monitored and provide roadway users with real-time roadway conditions via the Louisiana 511 app. Local roads monitor traffic conditions via private traveler information service providers (Waze, Google Maps, Apple Maps, etc.) as well as on the 911 webpage (http://lafayette911.org/). Some more specific means to alert road users of road conditions, such as a crowdsourcing app that roadways users could download,

would be beneficial in this area. Integrating such an app with the local police to verify the roadway conditions would improve the reliability as well.

### 6.2.4 Dynamic Message Signs (DMS)

In the previous architecture, LSP Troop I had identified the US 190 corridor, both east and west of I-49 in Opelousas as high-priority locations for deployment of DMS. The DMS signs were the preferred option than the existing HAR system.

Another potential DMS location identified in the previous architecture is along US 90 northbound upstream of Ambassador Caffery Road. A DMS at this location was identified as a need to help facilitate re-routing of traffic in the event of an incident on Evangeline Throughway. This would allow travelers to detour sooner than the existing sign on Evangeline which is primarily purposed for I-10 detouring.

Since the time of the previous architecture, this project had not been implemented. However, the need for these signs at both these locations is still present.

### 6.2.5 Motorist Assistance Patrol (MAP)

In the previous architecture, LSP Troop I had recommended MAP services (particularly on the I-10 Atchafalaya Basin Bridge). Since that time, Construction MAP was introduced to the area as part of the ongoing I-10 construction. However, the Construction MAP is currently scheduled to end for the area on August 19, 2022. Therefore, MAP services will be desirable for the future within the area.

### 6.2.7 Transportation Management Center (TMC)

Currently LCG invites other stakeholders to their TMC during emergencies. The LCG TMC is located within the Rosa Parks Transportation Center. LADOTD District 03 staff can join the City of Lafayette at this TMC. However, this arrangement is not favorable for District 03 because of staff constraints. The LCG camera system in operation at traffic signals is not available to the public. Video sharing of the LCG camera images with other public safety agencies will be considered upon request

DOTD currently operates a video distribution system that allows LCG, LSP, and DOTD District 03 to view the DOTD ITS camera video feeds. Provisions can be made for representatives from other agencies to be stationed at Statewide TMC to assist during major emergencies, such as hurricane evacuations.

### 6.2.8 High Congestion

The interchange connecting I-10 and US 167 experiences significant congestion and becomes a choke point especially during emergencies and evacuations from regions to the south and east of Lafayette. This situation has been identified as a capacity issue when evacuees head west towards Houston, TX because the ramp connecting northbound traffic to I-10 West is one lane. This creates heavy congestion with long delays on US 167. These delays also adversely affect the entire evacuation process including those heading north towards Alexandria and Shreveport.

In addition to the above, US 167 and LA 3073 (Ambassador Caffery Parkway) are major roadways providing access from the south to the north. These corridors are critical during emergencies and currently they are very congested on any normal day.

# 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 |
|---|---|---|---|---|
| DM01 | ITS Data Warehouse | This service package provides access to transportation data to support transportation planning, condition and performance monitoring, safety analysis, and research. Configurations range from focused repositories that house data collected and owned by a single agency, district, private sector provider, or research institution to broad repositories that contain multimodal, multidimensional data from varied data sources covering a broader region. Both central repositories and physical distributed ITS data repositories are supported. Requests for data that are satisfied by access to a single repository in the ITS Data Warehouse service package may be parsed by the local repository and dynamically translated to requests to other repositories that relay the data necessary to satisfy the request. The repositories could include a data registry capability that allows registration of data identifiers or data definitions for interoperable use throughout a region. | Planned | LADOTD District03 Traffic Operations<br>Lafayette MPO Database<br>LCGTT TMC |
| MC05 | 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 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 | LADOTD District03<br>LADOTD District03 Traffic Operations<br>LADOTD ITS Section<br>LADOTD Statewide TMC<br>LCGTT TMC<br>LCG Traffic and Transportation (LCGTT) (Instance 1)<br>LADOTD District 03 Traffic Operations (Instance 1)<br>LADOTD ITS Section (Instance 1)<br>LADOTD Statewide TMC (Instance 1) |
| MC06 | 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. Work zone information is coordinated with other groups (e.g., TIC, traffic management, other maintenance and construction centers). Work zone speeds and delays are provided to the motorist prior to the work zones. This service package provides control of field equipment in all maintenance and construction areas, including fixed, portable, and truck-mounted devices supporting both stationary and mobile work zones. | Existing | LADOTD District03 Traffic Operations<br>LADOTD ITS Section<br>LADOTD Statewide TMC<br>LCG Traffic and Transportation (LCGTT)<br>LCGTT TMC |

| Service Package | Service Package Name | Service Package Description | Service Package Status | Included Elements |
|---|---|---|---|---|
| MC07 | Work Zone Safety Monitoring | This service package provides warnings to maintenance personnel within a work zone about potential hazards within the work zone. It enables vehicles or the infrastructure to provide warnings to workers in a work zone when a vehicle is moving in a manner that appears to create an unsafe condition (e.g., moving at high speed or entering the work zone). | Existing | LADOTD Statewide TMC |
| | | | | LCG Traffic and Transportation (LCGTT) |
| | | | | LCGTT TMC |
| MC07 | Work Zone Safety Monitoring (Instance 1) | 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). | Existing | LADOTD ITS Section |
| | | | | LADOTD Statewide TMC |
| MC09 | 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. | Existing | LADOTD District03 |
| | | | | LADOTD ITS Section |
| | | | | LADOTD Statewide TMC |
| | | | | LCG Traffic and Transportation (LCGTT) |
| | | | | LCGTT TMC |
| | | | | LADOTD ITS Section (Instance 1) |
| | | | | LADOTD Statewide TMC (Instance 1) |
| PM01 | Parking Space Management | This service package monitors and manages parking spaces in lots, garages, and other parking areas and facilities. It assists in the management of parking operations by monitoring parking lot ingress and egress, parking space occupancy and availability. Infrastructure-based detectors and/or connected vehicles may be used to monitor parking occupancy. The service package shares collected parking information with local drivers and information providers for broader distribution. | Planned | LCG Parking Systems |
| | | | | LCG Traffic and Transportation (LCGTT) |
| | | | | LCGTT TMC |
| | | | | Personal Devices |
| | | | | Traveler |
| PS01 | 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 Centers supports emergency notification between agencies. Wide area wireless communications between the Emergency Management Center and an Emergency Vehicle supports dispatch and provision of information to responding personnel. This service package also provides information to support dynamic routing of emergency vehicles. Traffic information, road conditions, and weather advisories are provided to enhance emergency vehicle routing. The Emergency Management Center provides routing information based on real-time conditions and has the option to request an ingress/egress route from the Traffic Management Center. | Existing | LADOTD MAP |
| | | | | LADOTD Statewide TMC |
| | | | | Lafayette Parish Communications District (LPCD) |
| | | | | Lafayette Parish Sheriff's Office (LPSO) |
| | | | | Lafayette Police Department |
| | | | | LCGTT TMC |
| | | | | LSP Troop I |
| | | | Planned | LADOTD Statewide TMC |

| Service | Service Package | Service Package Description | Service Package | Included |
|---|---|---|---|---|
| PS02 | Emergency Response | This service package supports emergency/ incident response by personnel in the field. It includes emergency vehicle equipment used to provide response status as well as video or images from either the vehicle or from emergency personnel in the field. Wide area wireless communications between the Emergency Management Center, Emergency Personnel and Emergency Vehicles supports a sharing of emergency response information. The service package also includes tactical decision support, resource coordination, and communications integration for Incident Commands that are established by first responders at or near the incident scene to support local management of an incident, including the functions and interfaces commonly supported by a mobile command center. | Existing | LADOTD MAP |
| | | | | LADOTD Statewide TMC |
| | | | | Lafayette Police Department |
| | | | | LCG Traffic and Transportation (LCGTT) |
| | | | | Local Emergency Safety Providers |
| | | | | LSP Troop I |
| PS02 | Emergency Response (Instance 1) | 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 | LADOTD District 03 Traffic Operations |
| | | | | LADOTD ITS Section |
| | | | | LADOTD Statewide TMC |
| PS03 | Emergency Vehicle Preemption | This service package provides signal preemption for public safety first responder vehicles. Both traditional signal preemption systems and new systems based on connected vehicle technology are covered. In more advanced systems, movement of public safety vehicles through the intersection can be facilitated by clearing queues and holding conflicting phases. In addition, this SP also covers the transition back to normal traffic signal operations after providing emergency vehicle preemption. | Existing | LADOTD Statewide TMC |
| | | | | Lafayette Police Department |
| | | | | LCGTT TMC |
| | | | | Lafayette Parish Sheriff's Office (LPSO) |
| | | | | LSP Troop I |

| Service Package | Service Package Name | Service Package Description | Service Package Status | Included Elements |
|---|---|---|---|---|
| PS03 | Emergency Vehicle Preemption (Instance 1) | 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 | LADOTD Statewide TMC |
| PS08 | Roadway Service Patrols | This service package supports roadway service patrol vehicles that monitor roads and 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. | Planned | LADOTD District 03<br>LADOTD ITS Section<br>LADOTD MAP<br>LADOTD Statewide TMC<br>Lafayette Police Department<br>LCGTT TMC<br>Local Emergency Operation Centers |
| PS10 | 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. The ITS systems, in turn, provide the alert information to transportation system operators and the traveling public using ITS technologies such as dynamic message signs, highway advisory radios, in-vehicle displays, transit displays, 511 traveler information systems, and traveler information websites. | Existing | LADOTD ITS Field Equipment<br>Lafayette Transit System<br>LCGTT TMC<br>LADOTD District 03 Traffic Operations<br>LADOTD Statewide TMC<br>Lafayette Police Department<br>LCGTT TMC<br>Local Emergency Operation Centers<br>Local Emergency Safety Providers<br>LADOTD ITS Section (Instance 1) |

| Service Package | Service Package Name | Service Package Description | Service Package Status | Included Elements |
|---|---|---|---|---|
| PS12 | 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).The service package supports coordination of emergency response plans, including general plans developed before a disaster as well as specific tactical plans with short time horizon that are developed as part of a disaster response. The service package provides enhanced access to the scene for response personnel and resources, provides better information about the transportation system in the vicinity of the disaster, and maintains situation awareness regarding the disaster itself. In addition, this service package tracks and coordinates the transportation resources - the transportation professionals, equipment, and materials - that constitute a portion of the disaster response.The service package identifies the key points of integration between transportation systems and the public safety, emergency management, public health, and other allied organizations that form the overall disaster response. In this service package, the Emergency Management Center represents the federal, regional, state, and local Emergency Operations Centers and the Incident Commands that are established to respond to the disaster. The interface between the Emergency Management Center and the other centers provides situation awareness and resource coordination among transportation and other allied response agencies. In its role, traffic management implements special traffic control strategies and detours and restrictions to effectively manage traffic in and around the disaster. Maintenance and construction provides damage assessment of road network facilities and manages service restoration. Transit management provides a similar assessment of status for transit facilities and modifies transit operations to meet the special demands of the disaster. As immediate public safety concerns are addressed and disaster response transitions into recovery, this service package supports transition back to normal transportation system operation, recovering resources, managing on-going transportation facility repair, supporting data collection and revised plan coordination, and other recovery activities. This service package builds on the basic traffic incident response service that is provided by TM08, the Traffic Incident Management service package. This service package addresses the additional complexities and coordination requirements that are associated with the most severe incidents that warrant an extraordinary response from outside the local jurisdictions and require special measures such as the activation of one or more emergency operations centers. Many users of ARC-IT will want to consider both TM08 and this service package since every region is concerned with both day-to-day management of traffic-related incidents and occasional management of disasters that require extraordinary response.Disaster Response and Recovery is also supported by PS14, the "Disaster Traveler Information" service package that keeps the public informed during a disaster response. See that service package for more information. | | LADOTD Statewide TMC<br>Lafayette Police Department<br>LCGTT TMC<br>Local Emergency Operations Centers<br>Local Emergency Safety Providers<br>LADOTD District 03 Traffic Operations<br>LADOTD ITS Section |

| Service | Service Package | Service Package Description | Service Package | Included |
|---|---|---|---|---|
| PS13 | 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. This service package supports coordination of evacuation plans among the federal, state, and local transportation, emergency, and law enforcement agencies that may be involved in a large-scale evacuation. All affected jurisdictions (e.g., states and counties) at the evacuation origin, evacuation destination, and along the evacuation route are informed of the plan. Information is shared with traffic management agencies to implement special traffic control strategies and to control evacuation traffic, including traffic on local streets and arterials as well as the major evacuation routes. Reversible lanes, shoulder use, closures, special signal control strategies, and other special strategies may be implemented to maximize capacity along the evacuation routes. Transit resources play an important role in an evacuation, removing many people from an evacuated area while making efficient use of limited capacity. Additional shared transit resources may be added and managed in evacuation scenarios. Resource requirements are forecast based on the evacuation plans, and the necessary resources are located, shared between agencies if necessary, and deployed at the right locations at the appropriate times. Evacuations are also supported by PS14, the "Disaster Traveler Information" service package, which keeps the public informed during evacuations. See that service package for more information. | Existing | LADOTD District 03 Traffic Operations<br>LADOTD Statewide TMC<br>Lafayette Police Department<br>LCG Traffic and Transportation (LCGTT)<br>LCGTT TMC<br>Local Emergency Operation Centers<br>Louisiana 511<br>LSP Troop I<br>LADOTD District 03 Traffic Operations (Instance 1)<br>LADOTD ITS Section (Instance 1)<br>LADOTD Statewide TMC (Instance 1) |

| Service Package | Service Package Name | Service Package Description | Service Package Status | Included Elements |
|---|---|---|---|---|
| PS14 | 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 information systems. A disaster will stress the surface transportation system since it may damage transportation facilities at the same time that it places unique demands on these facilities to support public evacuation and provide access for emergency responders. Similarly, a disaster may interrupt or degrade the operation of many traveler information systems at the same time that safety-critical information must be provided to the traveling public. This service package keeps the public informed in these scenarios, using all available means to provide information about the disaster area including damage to the transportation system, detours and closures in effect, special traffic restrictions and allowances, special transit schedules, and real-time information on traffic conditions and transit system performance in and around the disaster. This service package also provides emergency information to assist the public with evacuations when necessary. Information on mandatory and voluntary evacuation zones, evacuation times, and instructions are provided. Available evacuation routes and destinations and current and anticipated travel conditions along those routes are provided so evacuees are prepared and know their destination and preferred evacuation route. Information on available transit services and traveler services (shelters, medical services, hotels, restaurants, gas stations, etc.) is also provided. In addition to general evacuation information, this service package provides specific evacuation trip planning information that is tailored for the evacuee based on origin, selected destination, and evacuee-specified evacuation requirements and route parameters. This service package augments the Traveler Information (TI) service packages that provide traveler information on a day-to-day basis for the surface transportation system. This service package provides focus on the special requirements for traveler information dissemination in disaster situations. | Existing | LADOTD District 03 Traffic Operations<br>LADOTD Social Media<br>LADOTD Statewide TMC<br>Lafayette Police Department<br>LCGTT TMC<br>Local Emergency Operations Centers<br>Louisiana 511<br>LSP Troop I<br>Private Traveler Information Service Provider<br>Traveler<br>LADOTD District 03 Traffic Operations (Instance 1)<br>LADOTD ITS Section (Instance 1)<br>LADOTD Statewide TMC (Instance 1) |

| Service Package | Service Package Name | Service Package Description | Service Package Status | Included Elements |
|---|---|---|---|---|
| PT01 | 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. | Existing | Lafayette Transit System |
| PT02 | 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 monitors the transit vehicle trip performance against the schedule and provides information displays at the Transit Management Center. | Existing | Lafayette Transit System |
| PT05 | Transit Security | This service package provides for the physical security of transit passengers and transit vehicle operators. On-board equipment performs surveillance and sensor monitoring in order to identify 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. In addition this service package provides surveillance and sensor monitoring of non-public areas of transit facilities (e.g., transit yards) and transit infrastructure such as bridges, tunnels, and transit railways or bus rapid transit (BRT) guideways. The surveillance equipment includes video and/or audio systems. The sensor equipment includes threat sensors and object detection sensors as described above as well as, intrusion or motion detection sensors and infrastructure integrity monitoring (e.g., rail track continuity checking or bridge structural integrity monitoring).Most of the surveillance and sensor data that is collected by this service package may be monitored by either the Emergency Management Center or the Transit Management Center, providing two possible approaches to implementing this service package. This service package also supports remote transit vehicle disabling and transit vehicle operator authentication by the Transit Management Center. | Existing | Lafayette Transit System |
| PT06 | 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 Center. The Transit Management Center 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 and the assignment of transit vehicle operators to runs. | Planned | Lafayette Transit System |
| PT08 | 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. | Existing | LADOTD Social Media<br>Lafayette Transit System<br>Private Traveler Information Service Provider<br>Traveler |

| Service Package | Service Package Name | Service Package Description | Service Package Status | Included Elements |
|---|---|---|---|---|
| PT09 | Transit Signal Priority | The Transit Signal Priority service package uses transit vehicle to infrastructure communications to allow a transit vehicle to request priority at one or a series of intersections. The service package provides feedback to the transit driver indicating whether the signal priority has been granted or not. This service package can contribute to improved operating performance of the transit vehicles by reducing the time spent stopped at a red light. | Planned | Lafayette Transit System<br>LCG Traffic and Transportation (LCGTT)<br>LCGTT TMC<br>LCGTT Traffic Signals |
| PT14 | 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. | Planned | Lafayette Transit System<br>LCG Traffic and Transportation (LCGTT) |
| ST05 | Electric Charging Stations Management | The Electric Charging Station Management service package provides an exchange of information between the electric vehicle and charging station to manage the charging operation. The agency or company operating the charging station can use vehicle information such as the capability of the vehicle (e.g. operational status of the electrical system, how many amps can the vehicle handle, and % charge complete) to determine that the charge is being properly applied and determine an estimated time to complete charging. | Planned | Electric Vehicle Charging Stations<br>LCGTT TMC<br>Traveler |
| SU01 | Connected Vehicle System Monitoring and Management | This service package provides monitoring, management and control services necessary to other applications and/or devices operating within the Connected Vehicle Environment. This service package maintains and monitors the performance and configuration of the connected vehicle system. This includes tracking and management of the infrastructure configuration as well as detection, isolation, and correction of infrastructure service problems. It also includes monitoring of performance of the infrastructure and mobile equipment, which includes RSEs (Roadside Equipment), OBEs (On-Board Equipment), the back office applications, as well as the communication links that connect the system. | Planned | LCG Traffic and Transportation (LCGTT)<br>LCGTT TMC<br>LCGTT Traffic Signals |
| SU03 | Data Distribution | This service package manages the distribution of data from data providers to data consumers and protects those data from unauthorized access. It informs data providers of how to provide data, manages data subscriptions, and provides data forwarding capabilities. The service package also maintains a directory of System Users that want data and supports multiple distribution mechanisms including publish-subscribe and directly from data provider to data consumer. It allows data consumers to specify (and change the specification of) data they wish to receive. | Existing | LADOTD District 03<br>LADOTD ITS Section<br>LADOTD Statewide TMC<br>LCGTT TMC |
| SU03 | Data Distribution (Instance 1) | This service package makes real-time transportation operations data available to transportation system operators. The Information Service Provider collects, processes, and stores current information on traffic and travel conditions and other information about the current state of the transportation network and makes this information available to transportation system operators, facilitating the exchange of qualified, real-time information between agencies. Using the provided information, transportation system operators can manage their individual systems based on an overall view of the regional transportation system. The regional transportation operations data resource represented by the Information Service Provider may be implemented as a web application that provides a web-based access to system operators, an enterprise database that provides a network interface to remote center applications, or any implementation that supports regional sharing of real-time transportation operations data. | Existing | LADOTD District 03 Traffic Operations<br>LADOTD ITS Section<br>LADOTD Statewide TMC |

| Service Package | Service Package Name | Service Package Description | Service Package Status | Included Elements |
|---|---|---|---|---|
| TI01 | Broadcast Traveler Information | This service package provides a digital broadcast service that disseminates traveler information to all equipped travelers within range. It 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 streaming technologies. This service package also provides location-specific or situation-relevant information to travelers in vehicles using Dedicated Short Range Communications (DSRC) infrastructure supporting mobility service packages for connected vehicles. DSRC is used to deliver real-time traveler information including travel times, incident information, road conditions, and emergency traveler information to vehicles as they pass connected vehicle roadside equipment along their route. This service package provides public information that is available to all equipped vehicles in the vicinity of the roadside equipment. | Existing | LADOTD Social Media<br>LADOTD Statewide TMC<br>Lafayette Transit System<br>Louisiana 511<br>Private Traveler Information Service Provider<br>Traveler<br>LADOTD District 03 Traffic Operations<br>LADOTD ITS Section |
| TI01 | Broadcast Traveler Information (Instance 1) | 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. Different from the service package ATMS06 - Traffic Information Dissemination, which provides localized HAR and DMS information capabilities, ATIS01 provides a wide area digital broadcast service. Successful deployment of this service package relies on availability of real-time traveler information from roadway instrumentation, probe vehicles or other sources. | Existing | LADOTD District 03 Traffic Operations<br>LADOTD ITS Section<br>LADOTD Statewide TMC |
| TI02 | Personalized 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 with the traveler. A variety of interactive devices may be used by the traveler to access information prior to a trip or en route including phone via a 511-like portal and web pages via smart phone, tablet, personal computer, and a variety of in-vehicle devices. | Existing | Lafayette Transit System<br>Traveler |
| TI03 | Dynamic Route Guidance | This service package offers advanced route planning and guidance that is responsive to current conditions. The package augments a user's navigation system equipment with a digital receiver capable of receiving real-time traffic, transit, and road condition information, which is used by the user equipment to provide real-time route guidance that factors in current conditions. | Planned | Lafayette Transit System |

| Service | Service Package | Service Package Description | Service Package | Included |
|---|---|---|---|---|
| TI07 | In-Vehicle Signage | This service package augments regulatory, warning, and informational signs and signals by providing information directly to drivers through in-vehicle devices. The information provided would include static sign information (e.g., stop, curve warning, guide signs, service signs, and directional signs) and dynamic information (e.g., current signal states including highway intersection and highway-rail intersection status and local conditions warnings identified by local environmental sensors). This service package also includes the capability for maintenance and construction, emergency, and transit vehicles to transmit sign information to vehicles in the vicinity so that in vehicle signing can be used without fixed infrastructure in areas such as work zones, around incidents, and at bus stops. | Planned | Lafayette Transit System<br>LCG Traffic and Transportation (LCGTT)<br>LCGTT TMC<br>LCGTT Traffic Signals<br>Local Emergency Safety Providers<br>Parish and Volunteer Fire Departments<br>Personal Devices<br>Traveler |
| TM01 | Infrastructure-Based Traffic Surveillance | This service package includes traffic detectors, other surveillance equipment, the supporting field equipment, and Center to Field communications to transmit the collected data back to the Traffic Management Center. 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 the Traffic Management Center). 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 Traveler Information Center physical object. | Existing | LADOTD District 03 Traffic Operations<br>LADOTD ITS Field Equipment<br>LADOTD Statewide TMC<br>LCG Traffic and Transportation (LCGTT)<br>LCGTT TMC |
| TM01 | Infrastructure-Based Traffic Surveillance (Instance 1) | 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 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. | Existing | LADOTD District 03 Traffic Operations<br>LADOTD Statewide TMC |
| TM03 | Traffic Signal Control | This service package provides the central control and monitoring equipment, communication links, and the signal control equipment that support traffic control at signalized intersections. A range of traffic signal control systems are represented by this service package ranging from fixed-schedule control systems to fully traffic responsive systems that dynamically adjust control plans and strategies based on current traffic conditions and priority requests. This service package is generally an intra-jurisdictional package. Systems that achieve coordination across jurisdictions by using a common time base or other strategies that do not require real time coordination would also be represented by this package. Coordination of traffic signal systems using real-time communications is covered in the TM07-Regional Traffic Management service package. This service package is consistent with typical traffic signal control systems. | Existing | LADOTD District 03 Traffic Operations<br>LADOTD District 03 Traffic Signal System<br>LADOTD ITS Field Equipment<br>LADOTD Statewide TMC<br>LCGTT TMC<br>LCGTT Traffic Signals |

| Service Package | Service Package Name | Service Package Description | Service Package Status | Included Elements |
|---|---|---|---|---|
| TM04 | Connected Vehicle Traffic Signal System | This service package uses both vehicle location and movement information from connected vehicles as well as infrastructure measurement of non-equipped vehicles to improve the operations of traffic signal control systems. The service package utilizes the vehicle information to adjust signal timing for an intersection or group of intersections in order to improve traffic flow, including allowing platoon flow through the intersection. Other service package provide related mobility services such as Transit Signal Priority, Freight Signal Priority, Emergency Vehicle Preemption, and Pedestrian Mobility to maximize overall arterial network performance. | Planned | LCGTT TMC<br>LCGTT Traffic Signals<br>Personal Devices<br>Traveler |
| TM06 | 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, travel restrictions, 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 Transportation Information Centers. A link to the Maintenance and Construction Management Center allows real time information on road/bridge closures and restrictions due to maintenance and construction activities to be disseminated. | Existing | LADOTD ITS Field Equipment<br>LADOTD Statewide TMC<br>LCGTT TMC<br>Private Traveler Information Service Provider<br>LADOTD District 03 Traffic Operations<br>LADOTD ITS Section |
| TM06 | Traffic Information Dissemination (Instance 1) | 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, travel restrictions, 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 and restrictions due to maintenance and construction activities to be disseminated. The sharing of transportation operations data described in this service package also supports other services like ATMS09- Traffic Decision Support and Demand Management. | Existing | LADOTD District 03 Traffic Operations<br>LADOTD ITS Section<br>LADOTD Statewide TMC |

| Service | Service Package | Service Package Description | Service Package | Included |
|---|---|---|---|---|
| TM07 | Regional Traffic Management | This service package provides for the sharing of information and control among traffic management centers to support regional traffic management strategies. Regional traffic management strategies that are supported include inter-jurisdictional, real-time coordinated traffic signal control systems and coordination between freeway operations and traffic signal control within a corridor. This service package advances the TM03-Traffic Signal Control and TM05-Traffic Metering service packages by adding the communications links and integrated control strategies that enable integrated, interjurisdictional traffic management. The nature of optimization and extent of information and control sharing is determined through working arrangements between jurisdictions. This package relies principally on roadside instrumentation supported by the Traffic Signal Control and Traffic Metering service packages and adds hardware, software, and fixed-point communications capabilities to implement traffic management strategies that are coordinated between allied traffic management centers. Several levels of coordination are supported from sharing of information through sharing of device control between traffic management centers. | Existing | LADOTD District03 Traffic Operations<br>LADOTD Statewide TMC<br>LCG Traffic and Transportation (LCGTT)<br>LCGTT TMC<br>LCGTT Traffic Signals<br>LADOTD District03 Traffic Operations (Instance 1)<br>LADOTD ITS Section (Instance 1)<br>LADOTD Statewide TMC (Instance 1) |
| TM08 | 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 centers. 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 personnel. The coordination can also extend to tow trucks and other allied response agencies and field service personnel. This service package is closely related with the Public Safety service packages, which focus on services that support first responders. In particular, local management of the incident using an incident command system is covered by PS02. | Existing | LADOTD District 03 Traffic Operations<br>LADOTD ITS Field Equipment<br>LADOTD Social Media<br>LADOTD Statewide TMC<br>Lafayette Police Department<br>LCG Traffic and Transportation (LCGTT)<br>LCGTT TMC<br>Local Emergency Safety Providers<br>Louisiana 511<br>LSP Troop I |

| Service Package | Service Package Name | Service Package Description | Service Package Status | Included Elements |
|---|---|---|---|---|
| TM08 | Traffic Incident Management System (Instance 1) | 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 | LADOTD District 03 Traffic Operations<br>LADOTD ITS Section<br>LADOTD Statewide TMC |
| TM09 | Integrated Decision Support and Demand Management | This service package recommends courses of action to transportation operators in a corridor, downtown area, or other heavily traveled area. Recommendations are based on an assessment of current and forecast transportation network performance and environmental conditions. Multi-modal transportation operational strategies are created that consider all modes and all roads in the travel area to correct network imbalances and effectively manage available capacity. As part of the operational strategies, this service package may also recommend lane restrictions, transit, parking, and toll strategies to influence traveler route and mode choices to support active demand management programs and policies managing both traffic and the environment. Operational strategies, including demand management recommendations, are coordinated to support operational decisions by each transportation operator that are consistent with the recommended strategy. All recommended operational strategies are based on historical evaluation, real-time assessment, and forecast of the roadway network performance based on predicted travel demand patterns. This service package also collects air quality, parking availability, transit usage, and vehicle occupancy data to support operational strategies that manage and balance capacity and demand. | Planned | LADOTD Statewide TMC<br>LCGTT TMC<br>LADOTD District 03 Traffic Operations<br>LADOTD ITS Section |

| Service | Service Package | Service Package Description | Service Package | Included |
|---|---|---|---|---|
| TM09 | Integrated Decision Support and Demand Management (Instance 1) | This service package recommends courses of action to traffic operations personnel based on an assessment of current and forecast road network performance. Recommendations may include predefined incident response plans and regional surface street and freeway control strategies that correct network imbalances. Where applicable, this service package also recommends transit, parking, and toll strategies to influence traveler route and mode choices to support travel demand management (TDM) programs and policies managing both traffic and the environment. TDM recommendations are coordinated with transit, parking, and toll administration centers to support regional implementation of TDM strategies. Incident response and congestion management recommendations are implemented by the local traffic management center and coordinated with other regional centers by other service packages (see ATMS07-Regional Traffic Management and ATMS08-Traffic Incident Management). All recommendations are based on historical evaluation, real-time assessment, and forecast of the roadway network performance based on predicted travel demand patterns. Traffic data is collected from sensors and surveillance equipment as well as other transportation management centers (see ATIS06-Transportation Operations Data Sharing). Forecasted traffic loads are derived from historical data and route plans supplied by the Information Service Provider Subsystem. This service package also collects air quality, parking availability, transit usage, and vehicle occupancy data to support TDM, where applicable. | Planned | LADOTD District 03 Traffic Operations |
| | | | | LADOTD ITS Section |
| | | | | LADOTD Statewide TMC |
| VS02 | V2V Basic Safety | This service package exchanges basic safety messages with surrounding Connected Vehicles to support and augment the safety warning and control automation features identified in VS01. These exchanges support Connected Vehicle safety applications defined in SAE J2945/1: Emergency Electronic Brake Lights, Forward Crash Warning, Blind Spot Warning/Lane Change Warning, Intersection Movement Assist, Left Turn Assist, and Control Loss Warning. It also supports other safety applications that benefit from the exchange of basic safety messages that provide additional information about surrounding vehicles beyond what can be determined by vehicle-based sensors. | Planned | Personal Devices |
| | | | | Traveler |
| VS04 | V2V Special Vehicle Alert | This service package alerts the driver about the location of and the movement of public safety vehicles responding to an incident, slow moving vehicles, oversized vehicles, and other special vehicles that may require special attention from the driver. These public safety, commercial, and maintenance vehicles share their current status and location with surrounding vehicles so that other drivers in the vicinity can avoid interfering with their actions and avoid collisions. | Planned | Lafayette Transit System |
| | | | | LCG Traffic and Transportation (LCGTT) |
| | | | | Local Emergency Safety Providers |
| | | | | Parish and Volunteer Fire Departments |
| | | | | Personal Devices |
| | | | | Traveler |

# 8 Interface between Systems

The interfaces of the transportation systems in this 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 Lafayette 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 diagram. These diagrams are 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 flow definitions are included in **Appendix A**. The architecture context flow diagrams are also presented in **Appendix B** to better illustrate the interconnections and information flow between the interfaces of the systems in the region. The RAD-IT database can be used to create tailored subsystem, interconnect, and 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 will require an agreement to be formed between all affected parties that defines new or additional roles. 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 system throughout the region.

**Table 6: Operational Concept**

| RR Area Name | RR Area Description | Stakeholder | RR Description | RR Status |
|---|---|---|---|---|
| Archived Data Systems for Lafayette Regional Architecture | The Archive Data System collects, archives, manages, and distributes data generated from ITS sources for use in transportation administration, policy evaluation, safety, planning, performance monitoring, program assessment, operations and research applications. The data collected is formatted tagged with attributes that define the data source, conditions under which it was collected, data transformations, and other information (i.e. meta data) necessary to interprete the data. The subsystem can fuse ITS generated data with data from non-ITS sources and other archives to generate information products utilizing data from multiple functional areas, modes and jurisdictions. The subsystem can also prepare data products for Federal, State and Local data reporting systems. | LADOTD | Archive traffic operations data | Existing |
| | | Acadiana MPO | Aggregate, analyze, process and store traffic operations data and demographics | Existing |
| | | | archive data products | |
| | | LCG | archive data products | Existing |
| Emergency Management for Lafayette Regional Architecture | The Emergency Management System coordinates emergency response involving multiple agencies such as the police, fire stations, search and rescue and HAZMAT response teams. The system creates, stores and utilizes emergency response plans to facilitated coordinated response. Real time tracking of emergency vehicles and transportation network status for instance will help emergency dispatcher to communicate with vehicle fleet and dispatch vehicles on routes that will provide timely response. Advanced traffic management capability will enable strategic coordination to support en-route traffic control to reduce response time of emergency vehicles. Emergency Management will fall under the purview of LCGDTT and LPCD. | LADOTD | Develop, implement, operate and maintain transportation management system | Existing |
| | | | Resources for emergency | |
| | | | Traffic control | |
| | | | Event monitoring | |
| | | | Motorist information system | |
| | | LCG | Emergency response | Existing |
| | | | Disseminate emergency information | |
| | | | Traffic control | |
| | | | Manage incident management system | |
| | | | Event monitoring | |
| | | Local Emergency Operations Centers | Emergency response and management | Existing |
| | | | Event monitoring | |
| | | Local Public Safety Agencies | Emergency response | Existing |
| | | Louisiana State Police (Troop I) | Emergency response | Existing |
| | | | Traffic control | |
| | | Media | Public information | Existing |
| | | Public | End user of emergency management information | Existing |

| RR Area Name | RR Area Description | Stakeholder | RR Description | RR Status |
|---|---|---|---|---|
| Freeway Management for Lafayette Regional Architecture | The Freeway Management System involves traffic monitoring, incident detection and verification, information display and enforcement, and incident clearance. Freeway Management will help to improve safety in the event of an incident and also reduce delays that result from incidents. LADOTD will be responsible for freeway management system.. | LADOTD | Develop, implement, operate and maintain transportation management system | Existing |
| | | | Event monitoring | |
| | | | Motorist information | |
| | | | Network surveillance | |
| | | | Traffic control | |
| | | LCG | Design, implement, operate and maintain Transportation Management System | Existing |
| | | | Incident detection, verification and response coordination | |
| | | | Event monitoring | |
| | | | Traffic control | |
| | | Local Public Safety Agencies | Incident response | Existing |
| | | | Emergency response | |
| | | | Event monitoring | |
| | | Louisiana State Police (Troop I) | Traffic control | Existing |
| | | | Emergency response | |
| | | | Incident response | |
| | | Media | Public information | Existing |
| Incident Management for Lafayette Regional Architecture | Incident Management System facilitates the rapid recognition and coordination of response efforts of incidents on freeways or surface streets in order to reduce the negative impacts such as secondary incidents (safety) and delays. The system may include detectors or CCTVs for incident detection and verification and message signs to inform drivers of incident and detour routes. LSP Troop (I) will have the primary responsibility for incident management with LCGDTT, LADOTD, LPDC. | LADOTD | Incident detection, verification and response coordination | Existing |
| | | | Update TMS with up to the minute information on response actions and clearance times | |
| | | | Provide public information on incidents | |
| | | | Incident response | |
| | | | Develop diversion routes, detour signage | |
| | | | Provide staffing for efficient responsive operation of transportation management system | |
| | | LCG | Incident detection, verification and response coordination | Existing |
| | | | Manage incident management system | |
| | | | Disseminate incident information | |
| | | Local Public Safety Agencies | Incident response | Existing |
| | | Louisiana State Police (Troop I) | Incident response | Existing |
| | | | Traffic control | |
| | | Media | Public information | Existing |
| Maintenance and Construction for Lafayette Regional Architecture | The Maintenance and Construction System will coordinate infrastructure preservation activities and also provide information to users to minimize the negative impacts of construction. Travelers will be provided information such as lane closures, workzone areas, incidents within workzones, etc. LADOTD will be responsible for maintenance and construction. | LADOTD | Develop performance metrics to enhance efficiency of ITS developments | Existing |
| | | | Maintain ITS hardware, communications, software, and ITS devices owned and operated by LADOTD | |

| RR Area Name | RR Area Description | Stakeholder | RR Description | RR Status |
|---|---|---|---|---|
| | | | Develop design concepts, implementation operation and maintenance of the transportation management system including connection to Statewide Architecture | |
| | | LCG | Maintenance of LCG ITS related hardware, communications, software | Existing |
| | | | Recommend architecture modifications based on emerging transportation needs | |
| | | | Design, implement, operate and maintain Transportation Management System | Existing |
| Surface Street Management for Lafayette Regional Architecture | The Surface Street Management involves traffic monitoring, incident detection and verification, traveler information and incident clearance. Use of advanced traffic controllers will enhance efficiency of the surface streets through signal optimization. Surface Street Management will fall under the purview of LADOTD and LCGDTT. | LADOTD | Respond to incidents/emergencies and develop diversion routes with signing | Existing |
| | | | Develop and integrate interfaces to incident/emergency management system | |
| | | | Provide staffing for efficient mangement of ATMS | Planned |
| | | | Develop design concepts, implementation, operation and maintenance of advanced transportation management system for arterials | |
| | | LCG | Emergency response | Existing |
| | | | Incident detection, verification and response coordination | |
| | | | Disseminate emergency information | |
| | | Local Public Safety Agencies | Emergency response | Existing |
| | | | Incident response | |
| | | Louisiana State Police (Troop I) | Traffic control | Existing |
| | | | Incident response | |
| | | | Emergency response | |
| | | Media | Public information | Existing |
| Transit Services for Lafayette Regional Architecture | Transit Management System will improve schedule adherence and dissemination of schedule route information to passengers and improve passenger wait time and transfer coordination. Advanced Public Transportation System applications enable real-time tracking of transit vehicles and improve arrival time reporting and real-time information to travelers. It also helps to manage and maintain transit fleet cost effectively. Transit is under the purview of LCG. | LADOTD | Integration of transit system into advanced transportation management system | Planned |
| | | | Provide real time communications between Emergency Operations Center and transit centers | |
| | | LCG | Responsible for design, construction and operation of transit ITS facilities | Existing |
| | | | Transit maintenance and fleet management | |
| | | | Transit fare management | |
| | | | Automated transit passenger counting | |

| RR Area Name | RR Area Description | Stakeholder | RR Description | RR Status |
|---|---|---|---|---|
| | | | Demand responsive operation and management including paratransit | |
| | | | Fixed route operation management | |
| | | | Transit vehicle tracking | |
| | | | Transit security | |
| | | Local Public Safety Agencies | Incident response | Existing |
| | | | Transit security | |
| | | Louisiana State Police (Troop I) | Incident response | Existing |
| | | | Transit security | |
| | | Media | Disseminate transit information | Existing |
| | | Public | End user of transit | Existing |
| Traveler Information for Lafayette Regional Architecture | Traveler Information will disseminate information from traffic management, transit management, and emergency management centers to the public. These will include radios, television networks, internet etc. LADOTD, LCG, LCGDTT and LPC will be the lead agencies who would supply traveler information. | LADOTD | Real time communications to interactive traveler information network (kiosks, web, smartphones, etc) | Existing |
| | | | Motorist information system | |
| | | LCG | Real time communications to interactive traveler information network (kiosks, web, smartphones, etc) | Existing |
| | | Local Public Safety Agencies | Disseminate realtime traveler information about incidents and emergencies | Existing |
| | | Louisiana State Police (Troop I) | Disseminate realtime traveler information about incidents and emergencies | Existing |
| | | Media | Disseminate real time traveler information | Existing |
| | | | Public information | |
| | | Public | End user of motorist information | Existing |

## 9.1 ITS Deployment Plan-Sequence of Planned Projects

The Lafayette Regional ITS Architecture is implemented one ITS project at a time. This section lists the projects that have been identified as part of the Regional ITS Architecture.

**Table 7: Project Sequence**

| Priority | Name | Description | Geographic Scope | Timeframe | Service Packages |
|---|---|---|---|---|---|
| 1 | I-49 Connector (Lafayette) | The project includes construction of freeway and interchanges in the US 90 corridor in Lafayette. The project limits are from the Lafayette Airport to I-10/I-49/US 167 Interchange). This project will include installation of ITS devices such as CCTV Cameras, DMS, hub site at I-10, and detectors for traffic management. | Evangeline Thruway US 90/US 167 Corridor from south of Lafayette Regional Airport to I-10/I-49 interchange | 1-5 years | DM01<br>MC06<br>PT01<br>PT02<br>PT06<br>PT08<br>PT14<br>TI02<br>TI03 |
| 2 | CCTV Deployment | Provide CCTV to facilitate traffic surveillance especially during hurricane evacuation. | Crowley (LA 13)<br>Grand Coteau (LA 93)<br>Bayou Vista | 1-3 years | ATMS01<br>ATMS03 |

| Priority | Name | Description | Geographic Scope | Timeframe | Service Packages |
|---|---|---|---|---|---|
| 3 | Signal Detection Upgrades – Phase 1 (High Priority Corridors) | Project to add vehicle detection to traffic signals. Vehicle detection upgrades will include adding radar detection to several signals through the area. | US 90 Corridor:<br>Thurguson, Southeast Blvd, Walmart, LA 318, Chemin (JTurn),<br>Chemin, LA 92 (Smede Hwy), LA 92 (Young J-Turn), LA 92 (Young Street), LA 3073 (Ambassador Caffery Pkwy), Albertson's, Celebrity Drive, Morgan (South JTurn), Morgan, Morgan (North J-Turn)<br><br>US 190 Corridor:<br>LA 103 (Port Barre), LA 13 (Eunice)<br><br>LA 182 Corridor:<br>Albertson's Pkwy | 1-2 years | ATMS01<br>ATMS03 |
| 4 | Signal Detection Upgrades – Phase 2 (Low Priority Corridors) | Project to add vehicle detection to traffic signals. Vehicle detection upgrades will include adding radar detection to several signals through the area. | LA 3073 (Ambassador Caffery) Corridor:<br>Morgan, LA 89, Bonin<br><br>LA 167 Corridor:<br>LA 733, LA 92 West, LA 92 East | 2-3 years | ATMS01<br>ATMS03 |
| 5 | Motorist Assistance Patrol Deployment | Project to deploy Motorist Assistance Patrol vehicles for towing services only | MAP service is desired in the Atchafalaya Basin on I-10 for peak hours | +5 years | EM04<br>MC12 |
| 6 | DMS Deployment | Provision of DMS signs to facilitate rerouting of traffic in the event of incidents or congestion | DMS to be positioned on US 90 northbound before Ambassador Caffrey Parkway.<br>DMS to be positioned on US 190 eastbound just west of I-49; and US 190 west just east of I-49 | +5 years | ATMS06 |

## 9.2 Operations and Maintenance of Regional ITS

LADOTD ITS Section (Section 56) is responsible for providing statewide ITS equipment O&M support for equipment on State and Federal routes. LADOTD 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. Every regional ITS does not have dedicated funding source/structure for periodic maintenance of the 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 Lafayette region prepares to expand and enhance existing ITS, it is critical to identify which agency will be responsible for a proposed ITS and how many resources will be required for O&M of the system. The more ITS deployment there is in the region, the less money will there 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.

## 9.3 ITS Funding

As mentioned earlier, currently there is no dedicated funding source for ITS deployments in the Lafayette region. LADOTD ITS Section has a capital budget of $14 million each year as part of the highway funding program, which is allocated statewide on a prioritized basis depending on immediate need. Although a part of this money is typically allocated to each region, the Lafayette Transportation Improvement Program (TIP) indicates that no ITS funds have been allocated to ITS projects in the Acadiana MPO area. As part of the follow-up to this architecture effort, it is recommended that the MPO, being the regional planning entity, work together with LADOTD and the other Lafayette stakeholders and 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 for developing and maintaining regional ITS infrastructure (http://ops.fhwa.dot.gov/its_arch_imp/guidance.htm). The Maintenance Plan for the Lafayette Regional ITS Architecture is based on the guidelines provided by FHWA's White Paper 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/policy_1.htm. This section 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, consistent with its mission, has the authority to initiate, update, and document changes in regional planning documents. For the Lafayette Regional ITS Architecture, 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 RAD-IT tool, if that is used to hold some of the architecture information.

As the agency responsible for maintaining the architecture, 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 RAD-IT and ITS Planning (Considering this is a new functional/skill area, the training will need to be comprehensive and will require resources: three (3) work days for RAD-IT training and (4) four weeks to study regional and national architecture documents)
- Approximately sixteen (16) man-hours per month for ITS architecture maintenance activities. Thismay be performed by the manager or designee.
- Manage the update of the Regional ITS Architecture RAD-IT source file with project level ITS architectures
- A qualified consultant to assist with the ITS architecture maintenance activities. (LADOTD has on a retainer contract a professional engineering 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 03
- LADOTD ITS Section
- Louisiana State Police (Troop I)
- Acadiana Metropolitan Planning Organization (Transportation Technical Committee)
- Lafayette Consolidated Government

*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 to oversee regional ITS architecture maintenance work, which would have representation from the key stakeholders to the agreement as listed above. At minimum, such a committee will include two LADOTD representatives, one MPO representative, and one FHWA representative.

Following this architecture adoption by the MPO, it is recommended that the Regional ITS Architecture items below be frequently reviewed (e.g. annually):

- Review progress in ITS implementation projects
- Verify that the regional ITS architecture RAD-IT 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 Lafayette 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 should be reviewed annually and architecture updates performed 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 RAD-IT 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 LADOTD may 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 LADOTD, 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

Regional ITS architectures are created to support transportation planning in addressing regional needs. Over time these needs can change and new stakeholders will be introduced. 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.

### 10.3.3 Changes in Scope of Service 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 of Element Names

An agency's name or the name used to describe their element(s) undergoes change. Transportation agencies occasionally merge, split, or are just renamed. 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 Definitions 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 is 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 RAD-IT 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 needed 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 ITSs 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 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 Lafayette Regional ITS Architecture. The high-level requirements are grouped into functional areas that identify requirements associated with each selected ITS service.

Due to the detail of the functional requirements in **Table 8**, they have not been fully included within the written Regional ITS Architecture. However, the functional requirements are available in the Regional ITS Architecture RAD-IT source file. A pdf of the full list can be made available upon request to the LADOTD ITS Section. **Table 8** below shows a sample of the report output information that can be obtained from RAD-IT.

**Table 8: Functional Requirements (Sample)**

| Element Name | Physical Object Name | Functional Object | Functional Object Description | FO User Defined | Requirement # | Requirement | Status |
|---|---|---|---|---|---|---|---|
| LADOTD District 03 | Maint and Constr Management Center | MCM Infrastructure Monitoring | 'MCM Infrastructure Monitoring' monitors the condition of pavement, bridges, tunnels, associated hardware, and other transportation-related infrastructure (e.g., culverts). It monitors the infrastructure, collecting data from both fixed and vehicle-based sensors. In addition to specialized infrastructure monitoring sensors, it also monitors the broader population of equipped vehicles for vertical acceleration data and other situation data that may be used to determine current pavement condition. | No | 01 | The center shall remotely control and collect data from fixed infrastructure monitoring sensors that monitor vibration, stress, temperature, surface continuity, and other condition measures. | Existing |
| LADOTD District 03 | Maint and Constr Management Center | MCM Infrastructure Monitoring | 'MCM Infrastructure Monitoring' monitors the condition of pavement, bridges, tunnels, associated hardware, and other transportation-related infrastructure (e.g., culverts). It monitors the infrastructure, collecting data from both fixed and vehicle-based sensors. In addition to specialized infrastructure monitoring sensors, it also monitors the broader population of equipped vehicles for vertical acceleration data and other situation data that may be used to determine current pavement condition. | No | 04 | The center shall process the collected infrastructure information and use it to monitor the condition of pavement, bridges, tunnels, associated hardware, and other transportation-related infrastructure. | Existing |
| LADOTD District 03 Traffic Operations | Center | Center Data Collection | 'Center Data Collection' collects and stores information that is created in the course of center operations. This data can be used directly by operations personnel or it can be made available to other data users and archives in the region. | No | 03 | The center shall receive and respond to requests from ITS Archives for either a catalog of the traffic data or for the data itself. | Planned |
| **For the entire table of functional requirements, see the Local ITS RAD-IT source file.** | | | | | | | |

## 12 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 systems 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 communications standards overlap in applicability. This provides flexibility in the design of ITS systems 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**

| Standard | Standard Number | Standard Title | Standard Version |
|---|---|---|---|
| 3GPP Cellular Network | 3GPP Network | 3GPP Cellular Communications Network | |
| ASTM Archiving Traffic Data | ASTM E2665-08 | Standard Specification for Archiving ITS-Generated Traffic Monitoring Data | 2017 |
| ASTM E2259-03a Guide for Archive Data | ASTM E2259-03a | Standard Guide for Archiving and Retrieving ITS-Generated Data | 2018 |
| ASTM Metadata to support ADMS | ASTM E2468-05 | Standard Practice for Metadata to Support Archived Data Management Systems | 2018 |
| General Transit Feed Specification | GTFS | General Transit Feed Specification | 2019 |
| GTFS Realtime | GTFS Realtime | General Transit Feed Specification Realtime | 2019 |
| IEEE 1609.2 WAVE - Security | IEEE 1609.2 | IEEE Standard for Wireless Access in Vehicular Environments - Security Services for Applications and Management Messages | 2016 |
| IEEE 1609.2 WAVE - Security Amendment 1 | IEEE 1609.2a | IEEE 1609.2a-2017 - IEEE Standard for Wireless Access in Vehicular Environments--Security Services for Applications and Management Messages - Amendment 1 | 2017 |
| IEEE 1609.2 WAVE - Security Amendment 2 | IEEE 1609.2b | IEEE Standard for Wireless Access in Vehicular Environments--Security Services for Applications and Management Messages - Amendment 2--PDU Functional Types and Encryption Key Management | 2017 |
| IEEE 1609.3 WAVE - Networking Services | IEEE 1609.3 | IEEE Standard for Wireless Access in Vehicular Environments (WAVE) - Networking Services | 2016 |
| IEEE 1609.4 WAVE - Multi-Channel | IEEE 1609.4 | IEEE Draft Standard for Wireless Access in Vehicular Environments - Multi-Channel Operation | 2016 |
| IEEE 802.11 Wireless LAN (Wi-Fi) | IEEE 802.11 | IEEE Draft Standard for Information technology--Telecommunications and information exchange between systems Local and metropolitan area networks--Specific requirements Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specificatio | 2016 |
| IEEE 802.2 LLC | ISO/IEC 8802-2 | IEEE Standard for Information technology -- Telecommunications and information exchange between systems--Local and metropolitan area networks -- Specific requirements -- Part 2: Logical Link Control | 1998 |
| IETF RFC 2460 IPv6 | IETF RFC 2460 | Internet Protocol, Version 6 (IPv6) Specification | 6 |

| Standard | Standard Number | Standard Title | Standard Version |
|---|---|---|---|
| IETF RFC 3411 SNMP Architecture MIB | IETF RFC 3411 | An Architecture for Describing Simple Network Management Protocol (SNMP) Management Frameworks | 2002 |
| IETF RFC 3412 SNMP Message Processing MIB | IETF RFC 3412 | Message Processing and Dispatching for the Simple Network Management Protocol (SNMP) | |
| IETF RFC 3413 SNMP Target and Notification MIBs | IETF RFC 3413 | Simple Network Management Protocol (SNMP) Applications | |
| IETF RFC 3414 SNMP USM MIB | IETF RFC 3414 | User-based Security Model (USM) for version 3 of the Simple Network Management Protocol (SNMPv3) | |
| IETF RFC 3415 SNMP VACM MIB | IETF RFC 3415 | View-based Access Control Model (VACM) for the Simple Network Management Protocol (SNMP) | |
| IETF RFC 3416 SNMP Protocol Operations | IETF RFC 3416 | Version 2 of the Protocol Operations for the Simple Network Management Protocol (SNMP) | |
| IETF RFC 3418 SNMP MIB | IETF RFC 3418 | Management Information Base (MIB) for the Simple Network Management Protocol (SNMP) | |
| IETF RFC 4180 CSV Files | IETF RFC 4180 | Common Format and MIME Type for Comma-Separated Values (CSV) Files | |
| IETF RFC 4291 IPv6 Addressing | IETF RFC 4291 | IP Version 6 Addressing Architecture | |
| IETF RFC 4293 SNMP IP MIB | IETF RFC 4293 | Management Information Base for the Internet Protocol (IP) | |
| IETF RFC 4443 IPv6 ICMP | IETF RFC 4443 | Internet Control Message Protocol (ICMPv6) for the Internet Protocol Version 6 (IPv6) Specification | |
| IETF RFC 4861 IPv6 Neighbor Discovery | IETF RFC 4861 | Neighbor Discovery for IP version 6 (IPv6) | |
| IETF RFC 4862 IPv6 Stateless Address | IETF RFC 4862 | IPv6 Stateless Address Autoconfiguration | |
| IETF RFC 5280 X.509 | IETF RFC 5280 | Internet X.509 Public Key Infrastructure Certificate and Certificate Revocation List (CRL) Profile | |
| IETF RFC 6353 TLS for SNMP | IETF RFC 6353 | Transport Layer Security (TLS) Transport Model for the Simple Network Management Protocol (SNMP) | |
| IETF RFC 7159 JSON | IETF RFC 7159 | The JavaScript Object Notation (JSON) Data Interchange Format | 1.2 |
| IETF RFC 7230 HTTP | IETF RFC 7230 | Hypertext Transfer Protocol (HTTP/1.1): Message Syntax and Routing | |
| IETF RFC 793 TCP | IETF RFC 793 | Transmission Control Protocol | |
| IETF RFC 8446 TLS | IETF RFC 8446 | The Transport Layer Security (TLS) Protocol | 1.3 |
| ISO 19091 V2I for signalized intersections | CEN ISO 19091 | Intelligent transport systems -- Cooperative ITS -- Using V2I and I2V communications for applications related to signalized intersections | 2019 |
| ISO 21219-15 TPEG2 - Traffic Event | ISO 21219-15 | Intelligent transport systems -- Traffic and travel information (TTI) via transport protocol experts group, generation 2 (TPEG2) -- Part 15: Traffic event compact (TPEG2-TEC) | |
| ISO 21219-24 TPEG2 - Light Encryption | ISO 21219-24 | Intelligent transport systems - Traffic and travel information (TTI) via transport protocol experts group, generation 2 (TPEG2) -- Part 24: Light encryption (TPEG2-LTE) | 2017 |
| ISO 21219-6 TPEG2 - Message Mgmt | ISO 21219-6 | Intelligent transport systems - Traffic and travel information via transport protocol experts group, generation 2(TPEG2) -- Part 6: Message management container (TPEG2-MMC) | 1 |
| ISO 21320-1 ZIP | ISO 21320-1 | Information technology — Document Container File — Part 1: Core | 2015 |
| ITE TMDD Vol 2 | ITE TMDD Vol 2 | Traffic Management Data Dictionary Standard for the Center-to-Center Communications: Volume 2: Design Content | 3.03d |

| Standard | Standard Number | Standard Title | Standard Version |
|---|---|---|---|
| NTCIP CCTV Objects | NTCIP 1205 | NTCIP Objects for CCTV Camera Control | 01.Amd1.14 |
| NTCIP Data Collection Objects | NTCIP 1206 | NTCIP Object Definitions for Data Collection | 1.23 |
| NTCIP Global Objects | NTCIP 1201 | NTCIP Global Object (GO) Definitions | 03.15r |
| NTCIP Message Sign Objects | NTCIP 1203 | NTCIP Object Definitions for Dynamic Message Signs (DMS) | 03.05 |
| NTCIP RSUs | NTCIP 1218 | National Transportation Communications for ITS Protocol - Object Definitions for Roadside Units (RSUs) | 01.19 |
| NTCIP Signal Controller Objects | NTCIP 1202 | NTCIP Object Definitions for ASC | 3.22 |
| NTCIP Signal System Master Objects | NTCIP 1210 | NTCIP Objects for Signal System Masters | 01.55r |
| NTCIP SP-Ethernet | NTCIP 2104 | NTCIP SP-Ethernet | 1.11 |
| NTCIP Transportation Sensor Objects | NTCIP 1209 | NTCIP Object Definitions for Transportation Sensor Systems (TSS) | 02.18 |
| NTCIP Video Switch Objects | NTCIP 1208 | NTCIP Object Definitions for Video Switches | 01.12 |
| SAE J2353 ATIS DD | SAE J2353 | Data Dictionary for Advanced Traveler Information Systems (ATIS) | 201906 |
| SAE J2354 ATIS Messages | SAE J2354 | Message Sets for Advanced Traveler Information System (ATIS) | 201906 |
| SAE J2735 DSRC Message Set | SAE J2735 | Dedicated Short Range Communications (DSRC) Message Set Dictionary (TM) | 201603 |
| SAE J2945/0 DSRC Common Design Elements | SAE J2945 | Dedicated Short Range Communication (DSRC) Systems Engineering Process Guidance for J2945/x Documents and Common Design Concepts | 201712 |
| SAE J2945/1 V2V Basic Safety | SAE J2945/1 | On-Board System Requirements for V2V Safety Communications | 201603 |
| SAE J2945/2 V2V Safety Awareness | SAE J2945/2 | DSRC Requirements for V2V Safety Awareness | 201810 |
| SAE J2945/4 Road Safety Applications | SAE J2945/4 | Road Safety Applications | |
| SAE J2945/B Signal Intersection Applications | SAE J2945/B | Recommended Practices for Signalized Intersection Applications | |
| TCIP - Data | APTA TCIP-S-001 Vol 2 | Transit Communications Interface Profiles - TCIP Data and Dialog Definitions | 4.1.1 |
| The Update Framework | TUF | The Update Framework | |
| W3C SOAP | W3C SOAP 1.2 | SOAP Version 1.2 | 1.2 |
| W3C WSDL | W3C WSDL 1.1 | Web Services Description Language (WSDL) 1.1 | |
| W3C XML | W3C XML | Extensible Markup Language (XML) 1.0 (Fifth Edition) | 5 |
| Work Zone Data Exchange | WZDx | Work Zone Data Exchange | |

## 13 Agreements

This section identifies the list of existing and future agreements between each of the stakeholder organizations whose ITS systems were or will be exchanging information 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 Number | Agreement Title | Agreement Status | Description | Lead Stakeholder | Associated Stakeholders |
|---|---|---|---|---|---|
| 1 | Traffic Signal Maintenance Agreement - LADOTD/City of Lafayette | Existing | Agreement between LADOTD and City of Lafayette for providing maintenance and operations of traffic signals at state intersections within city limits. Maintenance and operations include payment of electricity, inspection, replacement of inoperative light bulbs and fuses, and straightening of signal heads and signs. | LADOTD | LADOTD<br>LCG |
| 2 | Lafayette Regional Motorist Assistance Patrol (MAP) | Existing | Agreement between LADOTD and the Acadiana Planning Commission (APC) for providing MAP (Motorist Assistance Patrol) services during the I-10 project construction. Once the construction is over, the MAP services will discontinue in the area. | LADOTD | Acadiana Planning Commission (APC) |

## APPENDIX - A. Architecture Flow Definitions

**Table 11: Architecture Flow Definitions**

| Flow Name | Flow Description | Flow Type |
|---|---|---|
| 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. | Information |
| 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. | Information |
| 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. | Information |
| 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. | Request |
| 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. | Information |
| broadcast traveler information | General traveler information that contains traffic and road conditions, link travel times, incidents, advisories, restrictions, work zones, transit service information, weather information, parking information, and other related traveler information. | Information |
| current infrastructure restrictions | Restrictions levied on transportation asset usage based on infrastructure design, surveys, tests, or analyses. This includes standard facility design height, width, and weight restrictions, special restrictions such as spring weight restrictions, and temporary facility restrictions that are imposed during maintenance and construction. | Information |
| data collection and monitoring control | Information used to configure and control data collection and monitoring systems. | Information |
| data query publication | Data query publication includes those dialogs necessary to satisfy the response portion of a query-response action using the data distribution architecture. The information content varies widely based on available content and the query, but it generally includes information on the state of transportation system operations including traffic and road conditions, advisories, incidents, transit service information, weather information, parking information, and other related data. | Information |
| decision support information | Information provided to support effective and safe incident response, including local traffic, road, and weather conditions, hazardous material information, and the current status of resources (including vehicles, other equipment, supplies) that have been allocated to an incident. | Information |
| device control request | Request for device control action | Information |
| device data | Data from detectors, environmental sensor stations, roadside equipment, and traffic control devices, including device inventory information. | Information |
| 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. | Information |

| Flow Name | Flow Description | Flow Type |
|---|---|---|
| emergency dispatch requests | Emergency vehicle dispatch instructions including incident location and available information concerning the incident. | Request |
| 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. | Information |
| emergency traffic coordination | Coordination supporting disaster response including evacuation and reentry. Includes coordination of special traffic control strategies that support efficient evacuation and reentry while protecting and optimizing movement of response vehicles and other resources responding to the emergency. | Information |
| 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. | Information |
| 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. | Request |
| 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. | Information |
| emergency traveler information | Public notification of an emergency such as a natural or man-made disaster, civil emergency, or child abduction. This flow also includes evacuation information including evacuation instructions, evacuation zones, recommended evacuation times, tailored evacuation routes and destinations, traffic and road conditions along the evacuation routes, traveler services and shelter information, and reentry times and instructions. | Information |
| emergency traveler information request | Request for alerts, evacuation information, and other emergency information provided to the traveling public. | Request |
| equipment control commands | System-level control commands issued to the RSE such as reset and remote diagnostics. | Information |
| equipment maintenance request | Identification of field equipment requiring repair and known information about the associated faults. | Information |
| equipment maintenance status | Current status of field equipment maintenance actions. | Information |
| 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. | Information |
| evacuation information | Evacuation instructions and information including evacuation zones, evacuation times, and reentry times. | Information |
| field equipment status | Reports from field equipment (sensors, signals, signs, controllers, etc.) which indicate current operational status. | Information |
| 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. | Information |
| incident report | Report of an identified incident including incident location, type, severity and other information necessary to initiate an appropriate incident response. | Information |

| Flow Name | Flow Description | Flow Type |
|---|---|---|
| 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. | Information |
| interactive traveler information | Traveler information provided in response to a traveler request. The provided information includes traffic and road conditions, advisories, incidents, restrictions, payment information, transit services, parking information, weather information, and other travel-related data updates and confirmations. | Information |
| intersection status | Current signal phase and timing information for all lanes at a signalized intersection. This flow identifies active lanes and lanes that are being stopped and specifies the length of time that the current state will persist for each lane. It also identifies signal priority and preemption status and pedestrian crossing status information where applicable. | Information |
| lane closure information | Lane closure information provided to passing vehicles. This flow provides information about roadway configuration changes such as lane closures and shifts. | Information |
| local signal preemption request | Direct control signal or message to a signalized intersection that results in preemption of the current control plan and grants right-of-way to the requesting vehicle. | Information |
| local signal priority request | Request from a vehicle to a signalized intersection for priority at that intersection. This flow also allows the vehicle to cancel a priority request (for example, when the vehicle clears the intersection). | Information |
| maint and constr 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. | Information |
| maint and constr resource request | Request for road maintenance and construction resources that can be used in the diversion of traffic (cones, portable signs), clearance of a road hazard, repair of ancillary damage, or any other incident response. The request may poll for resource availability or request pre-staging, staging, or immediate dispatch of resources. | Request |
| maint and constr 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. | Information |
| maint and constr work plans | Future construction and maintenance work schedules and activities including anticipated closures with anticipated impact to the roadway, alternate routes, anticipated delays, closure times, and durations. | Information |
| personal transit information | General and personalized transit information for a particular fixed route, flexible route, or paratransit system. | Information |
| reduced speed warning info | Real time notification of vehicle detections, measured vehicle characteristics (e.g., vehicle height), speed measurements, and warnings issued by roadway infrastructure. This flow can also include roadway configuration data, current speed limits, and warning parameters and thresholds enabling local speed management application configuration and management. | Information |
| 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. | Information |
| 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. | Information |
| 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. | Request |

| Flow Name | Flow Description | Flow Type |
|---|---|---|
| restricted lanes information | This flow defines the location, duration, and operating parameters for lanes that are reserved for the exclusive use of certain types of vehicles (e.g., transit vehicles) or vehicles that meet other qualifications (e.g., number of occupants, low emissions criteria). It identifies the lane(s), the start and stop locations, start and end times, vehicle restrictions, speed limits and platooning parameters. | Information |
| road closure information | Road closure information provided to passing vehicles. This flow provides information about the road closure with diversion information. | Information |
| 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 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. | Information |
| 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. | Information |
| road weather advisories | Segment-specific weather and road conditions including real-time advisories of deteriorating road and weather conditions, medium-term advisories for the next 2-12 hours, and long-term advisories more than 12 hours into the future. The advisories may include advisories that are issued based on locally collected environmental data (e.g., an ice on bridge advisory). | Information |
| road weather advisory info | Road weather advisories and associated configuration and control information that are used to manage the RSE. Advisories include segment-specific weather and road conditions including real-time advisories of deteriorating road and weather conditions, medium-term advisories for the next 2-12 hours, and long-term advisories more than 12 hours into the future. This flow includes a schedule for issuing the included advisories. | Information |
| road weather advisory status | Current RSE application status that is monitored by the back office center including the operational state of the RSE, current configuration parameters, and a log of advisories issued. The advisories may include advisories that are issued by the RSE based on locally collected environmental data (e.g., an ice on bridge advisory). | Information |
| road weather information | Road conditions and weather information that are made available by road maintenance operations to other transportation system operators. | Information |
| roadway dynamic signage data | Information used to initialize, configure, and control dynamic message signs. 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 devices. | Information |
| RSE application information | RSE application configuration data and parameters that are used to control applications and configure the application for a specific local use. This flow also supports remote control of the application so the application can be taken offline, reset, or restarted. | Information |
| RSE application install/upgrade | This flow supports remote installation and update of software applications residing in the RSE. It supports transmission of the secure software installation files, including executable application code and associated support files. | Information |
| RSE application status | Monitoring of RSE application status including current mode, operational status, and configuration settings. It includes the status of installed applications and the application-specific data provided by the RSE. | Information |
| signal control device configuration | Data used to configure traffic signal control equipment including local controllers and system masters. | Information |
| signal control plans | Traffic signal timing parameters including minimum green time and interval durations for basic operation and cycle length, splits, offset, phase sequence, etc. for coordinated systems. | Information |
| signal control status | Operational and status data of traffic signal control equipment including operating condition and current indications. | Information |
| signal fault data | Faults reported by traffic signal control equipment. | Information |
| signal priority status | In response to a request for signal priority, this flow indicates the status of the priority or preemption request. | Information |

| Flow Name | Flow Description | Flow Type |
|---|---|---|
| special vehicle alert | Notification that a vehicle is in the vicinity that requires special attention from drivers. In this context, 'special vehicle' refers to any type of vehicle that uses lights or placards to alert drivers including public safety vehicles, oversize vehicles, slow vehicles, and service vehicles that stop and back up frequently. | Information |
| suggested route | Suggested route for a dispatched emergency or maintenance vehicle that may reflect current network conditions and the additional routing options available to en route emergency or maintenance vehicles that are not available to the general public. | Information |
| 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. | Information |
| traffic detector control | Information used to configure and control traffic detector systems such as inductive loop detectors and machine vision sensors. | Information |
| traffic detector data | 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 | Information |
| 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. Meta data that describes the images is contained in another flow. | Information |
| traffic situation data | Current, aggregate traffic data collected from connected vehicles that can be used to supplement or replace information collected by roadside traffic detectors. It includes raw and/or processed reported vehicle speeds, counts, and other derived measures. Raw and/or filtered vehicle control events may also be included to support incident detection. | Information |
| transit and fare schedules | Transit service information including routes, schedules, and fare information. This also includes on-demand service information. | 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. | Information |
| transit information user request | Request for special transit routing, real-time schedule information, and availability information. | Request |
| 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. | Information |
| travel services request | Request for travel service information including tourist attractions, lodging, restaurants, service stations, and emergency services. The request identifies the type of service, the area of interest, optional reservation request information, parameters that are used to prioritize or filter the returned information, and sorting preferences. | Request |
| 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. | Information |
| 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. | Request |
| user account setup | Billing information, vehicle information (or registration information), and requests for reports. Also includes subsequent account changes. | Information |
| user profile | Information provided to register for a travel service and create a user account. The provided information includes personal identification, traveler preferences (e.g., maximum transfer wait time, maximum walking distance, mode preferences, special needs), device information, a user ID and password, and information to support payment transactions, if applicable. | Information |

| Flow Name | Flow Description | Flow Type |
|---|---|---|
| vehicle location and motion for surveillance | Data describing the vehicle's location in three dimensions, heading, speed, acceleration, braking status, and size. This flow represents monitoring of basic safety data ('vehicle location and motion') broadcast by passing connected vehicles for use in vehicle detection and traffic monitoring applications. | Information |
| vehicle signage data | In-vehicle signing data that augments regulatory, warning, and informational road signs and signals. The information provided would include static sign information (e.g., stop, curve warning, guide signs, service signs, and directional signs) and dynamic information (e.g., local traffic and road conditions, lane restrictions, work zones, detours, closures, advisories, and warnings). | Information |
| vehicle situation data | This flow represents vehicle snapshots that may be provided by the vehicle to support traffic and environmental conditions monitoring. Snapshots are collected by the vehicle for specific events (e.g., when a sensor exceeds a threshold) or periodically and reported based on control parameters when communications is available. Traffic-related data includes snapshots of measured speed and heading and events including starts and stops, speed changes, and other vehicle control events. Environmental data may include measured air temperature, exterior light status, wiper status, sun sensor status, rain sensor status, traction control status, anti-lock brake status, and other collected vehicle system status and sensor information. The collected data is reported along with the location, heading, and time that the data was collected. | Information |
| vehicle situation data parameters | A request for vehicle situation data that includes parameters used to control the data that is reported and the flow of data reported by the vehicle. This flow identifies the type of data/snapshots that are requested and reporting parameters such as snapshot frequency, filtering criteria (data thresholds for reporting), and reporting interval. | Information |
| video surveillance control | Information used to configure and control video surveillance systems. | Information |
| work zone information | Summary of maintenance and construction work zone activities affecting the road network including the nature of the maintenance or construction activity, location, impact to the roadway, expected time(s) and duration of impact, anticipated delays, alternate routes, and suggested speed limits. This information may be augmented with images that provide a visual indication of current work zone status and traffic impacts. | Information |

## APPENDIX - B. Lafayette Regional ITS Architecture Flow and Context Diagrams

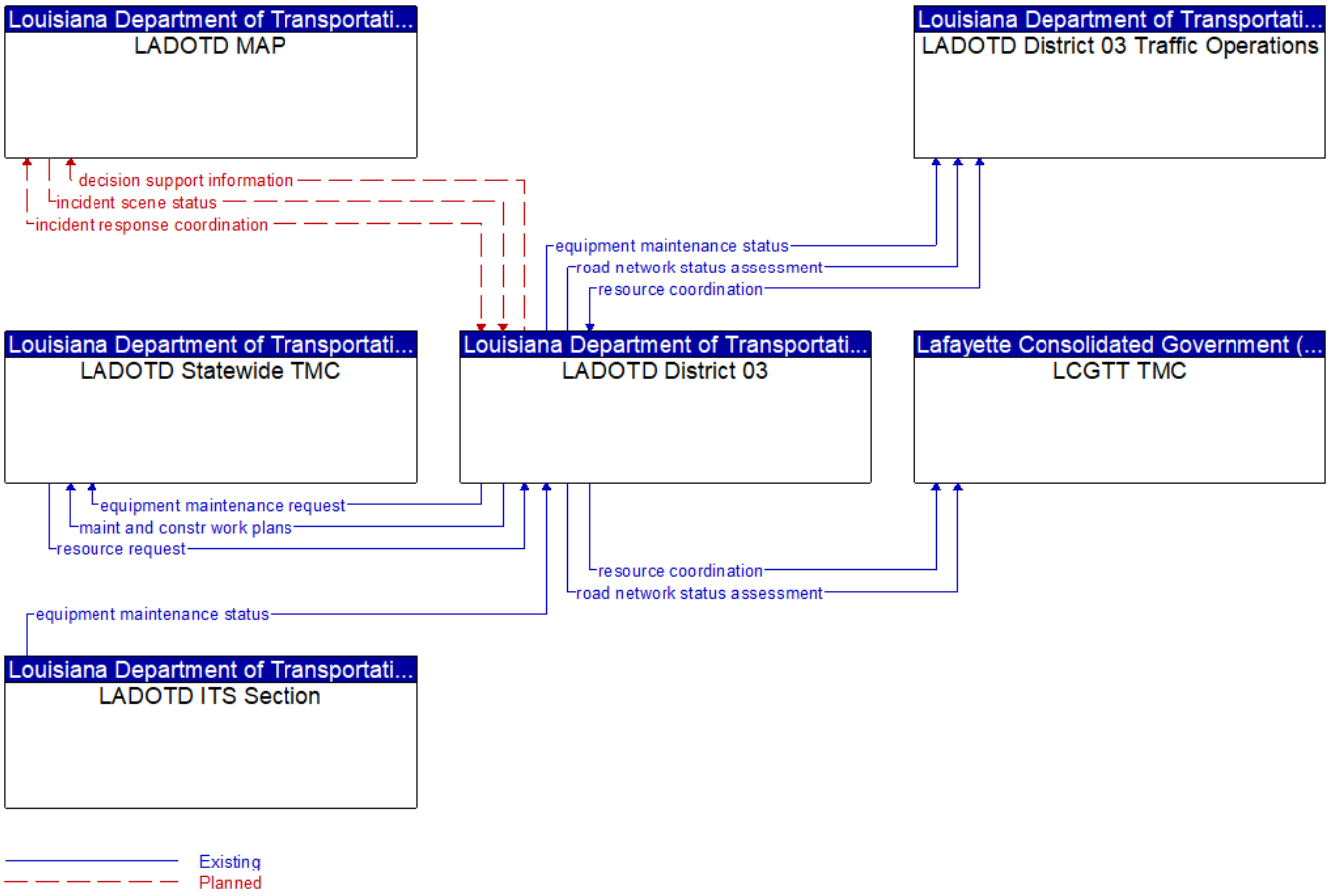



**Figure 3: LADOTD District 03 Flow Context Diagram**

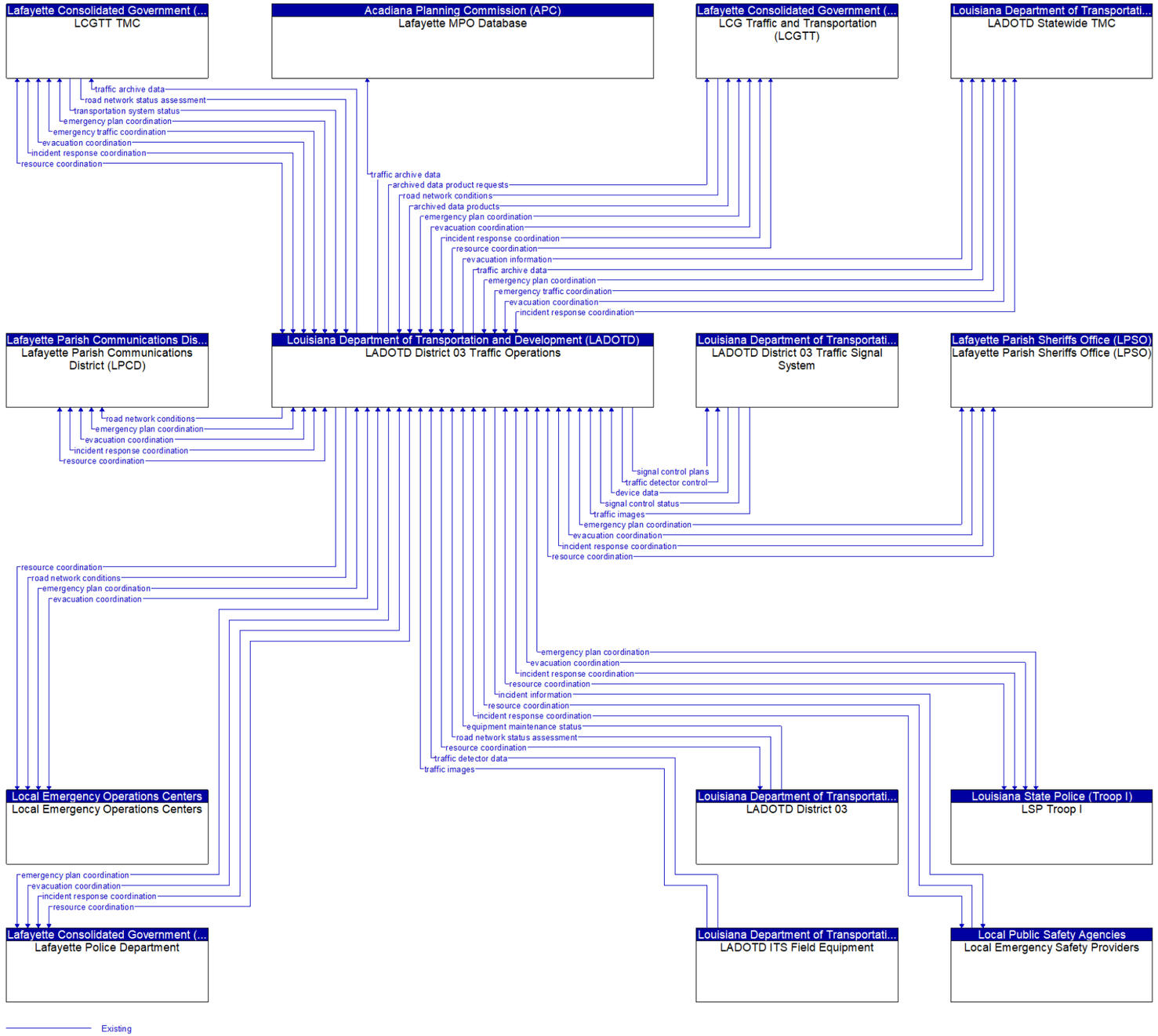



**Figure 4: LADOTD District 03 Traffic Operations Flow Context Diagrams**

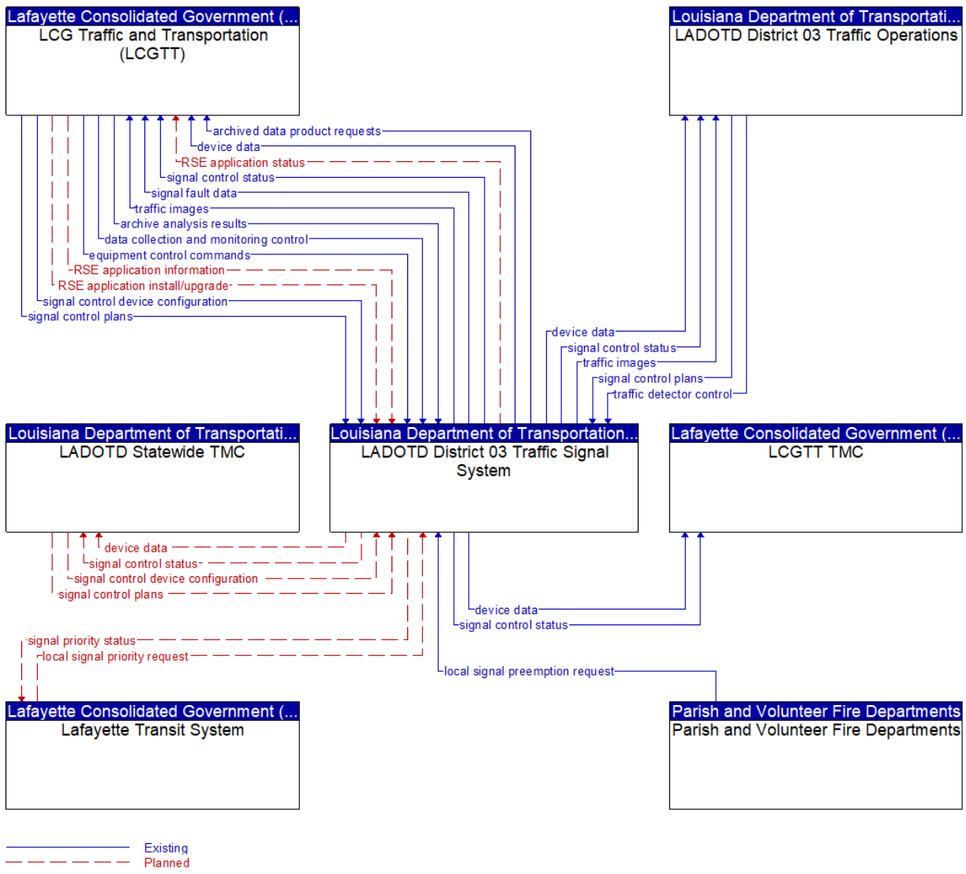



**Figure 6: LADOTD District 03 Traffic Signal System Flow Context Diagram**



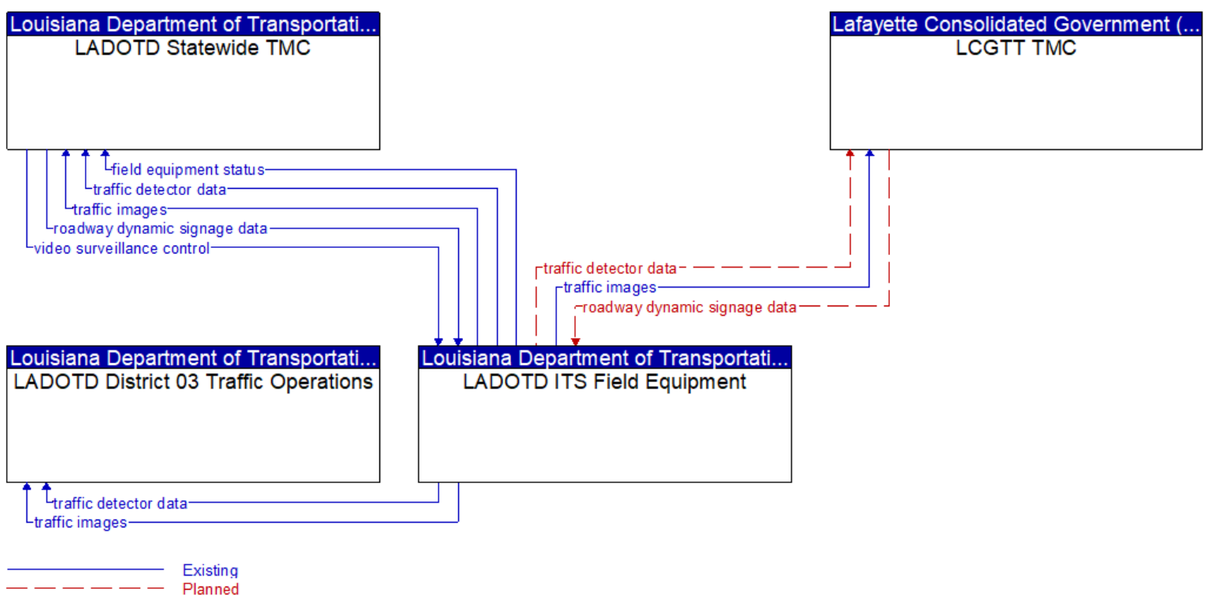



**Figure 5: LADOTD ITS Field Equipment Flow Context Diagram**

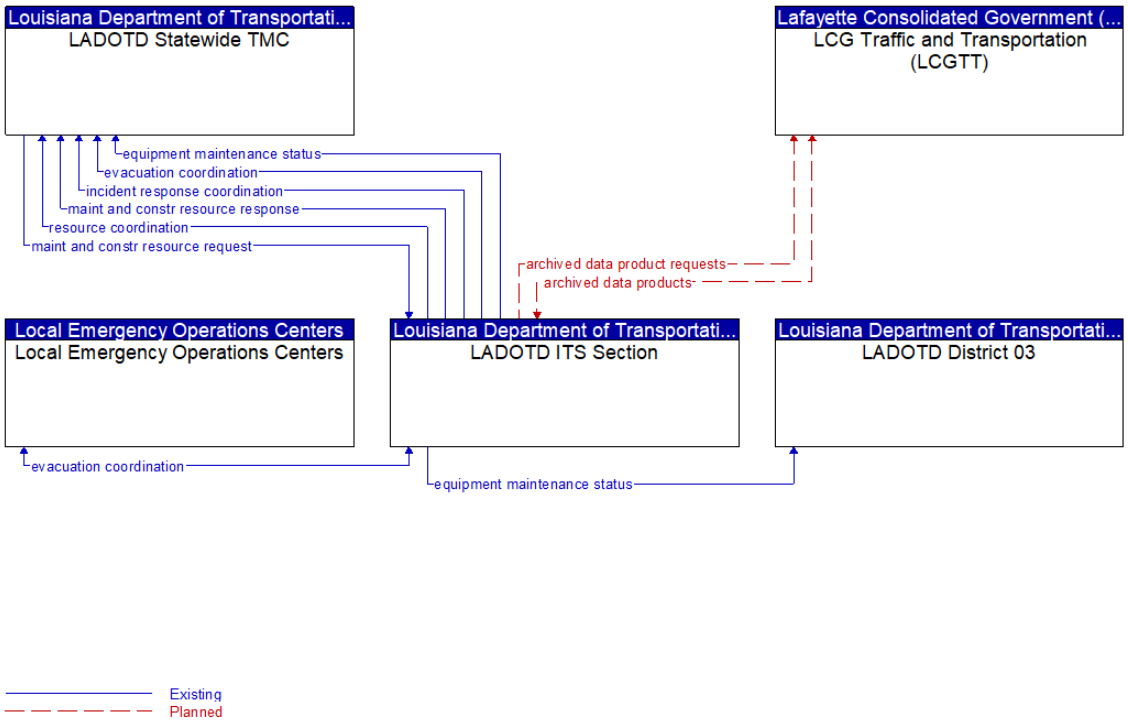



**Figure 7: LADOTD ITS Section Flow Context Diagram**

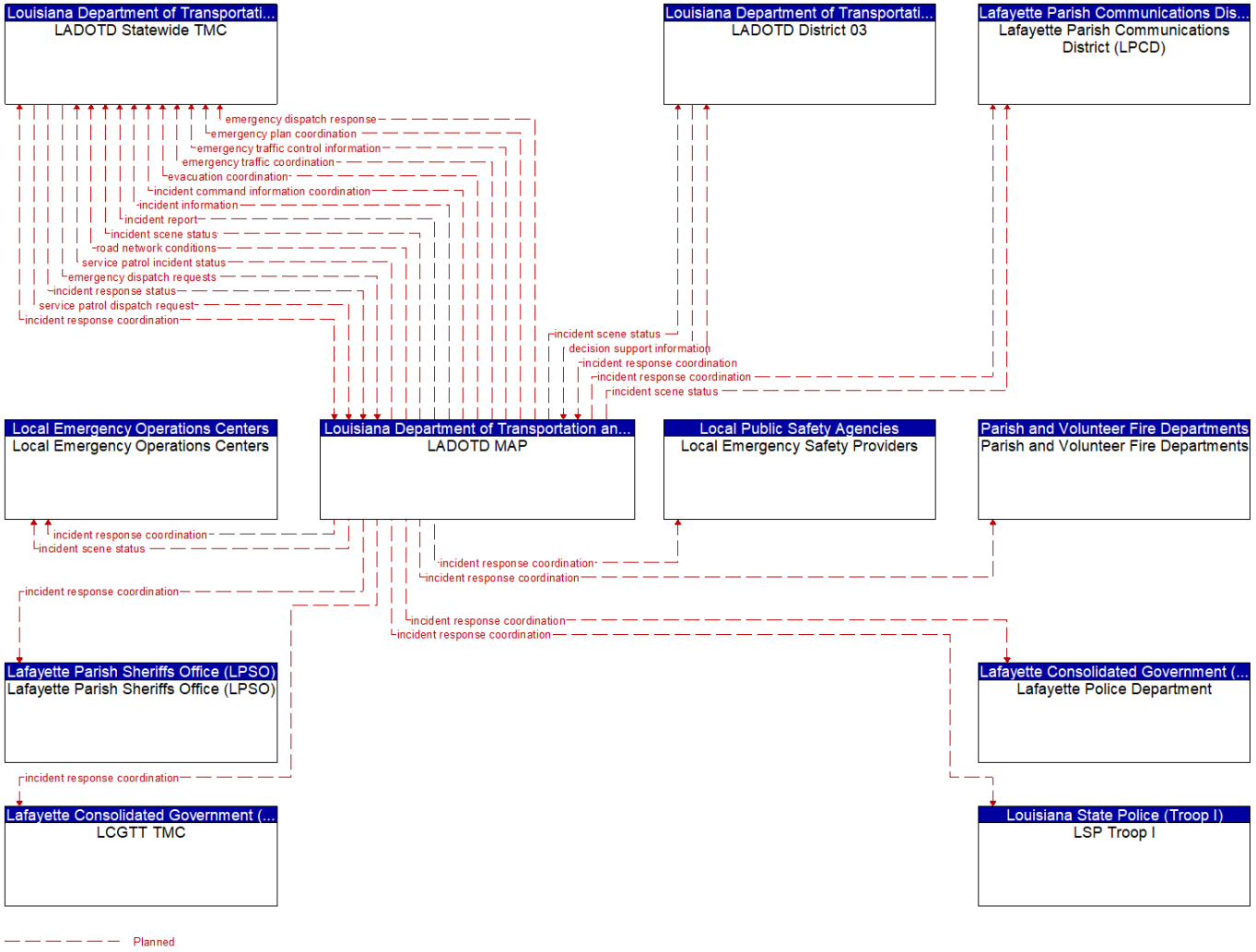



**Figure 8: LADOTD MAP Context Diagram**

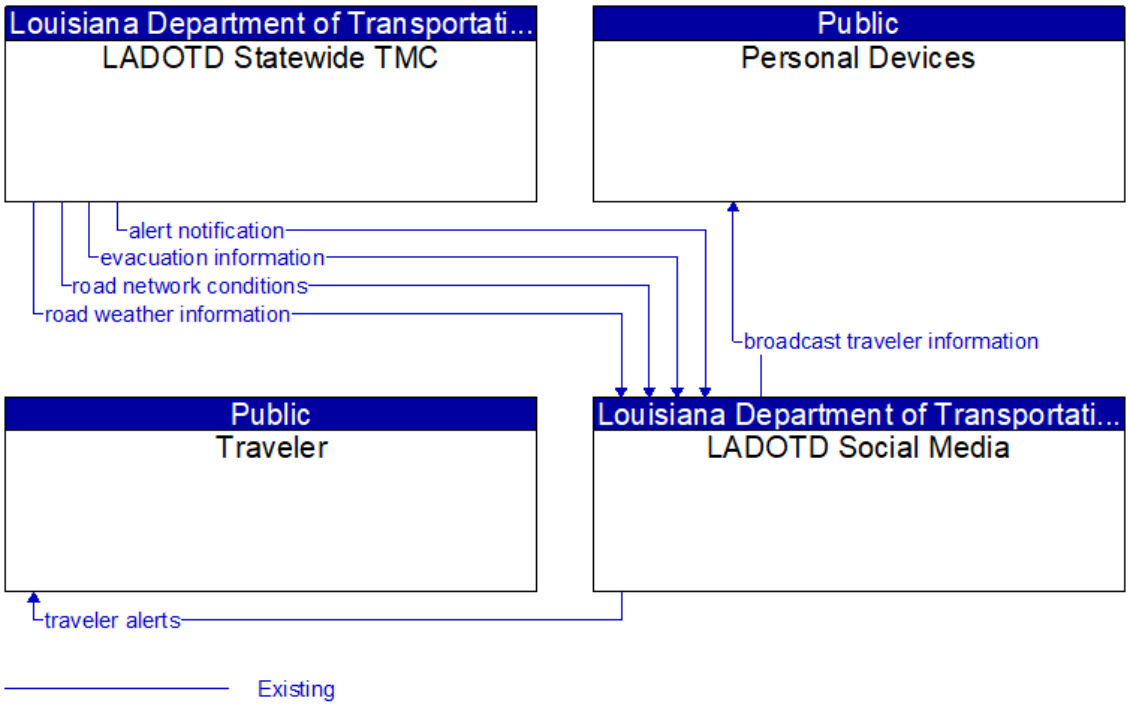



**Figure 9: LADOTD Social Media Flow Context Diagram**

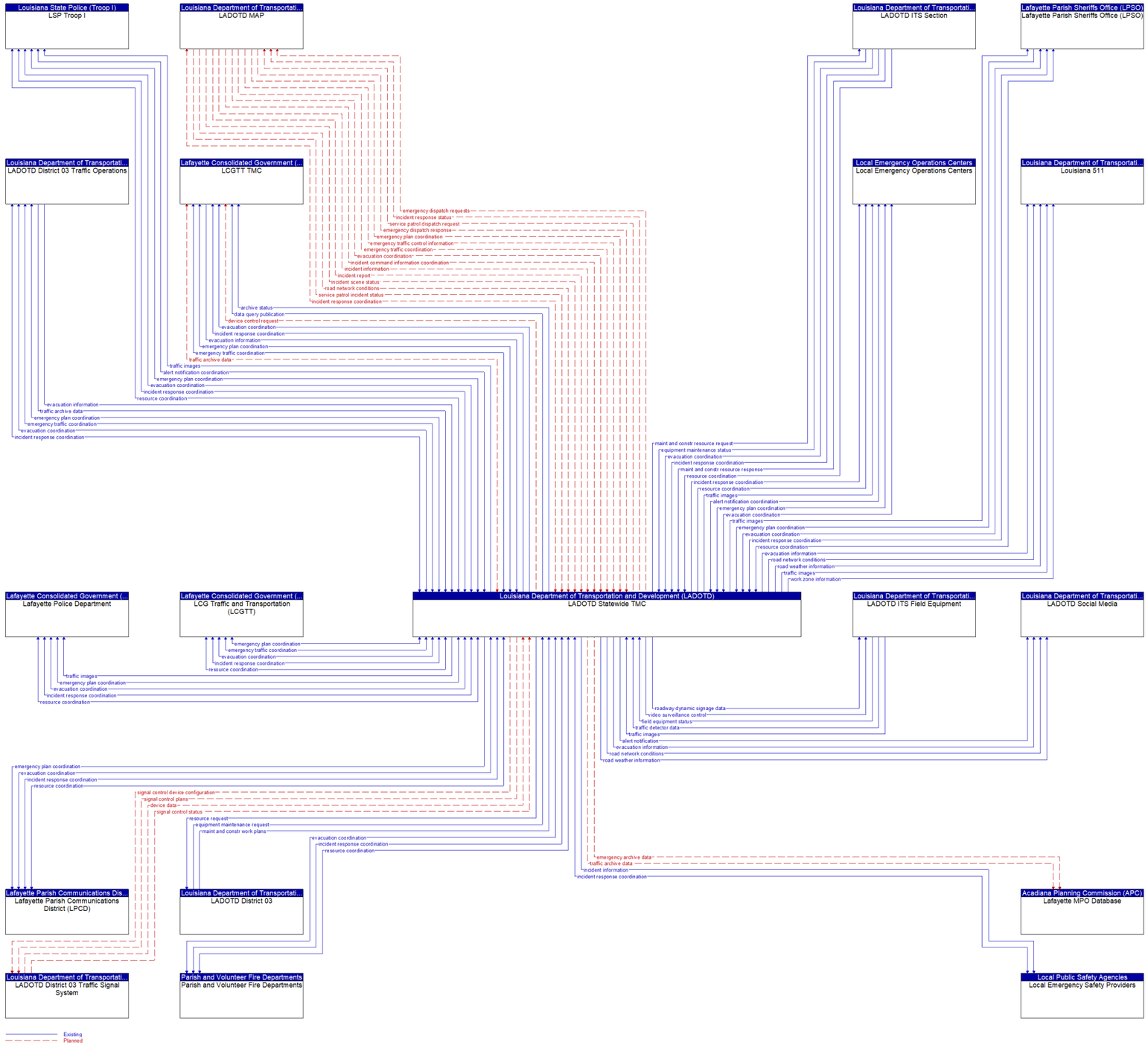



**Figure 10: LADOTD Statewide TMC Interconnect Context Diagram**

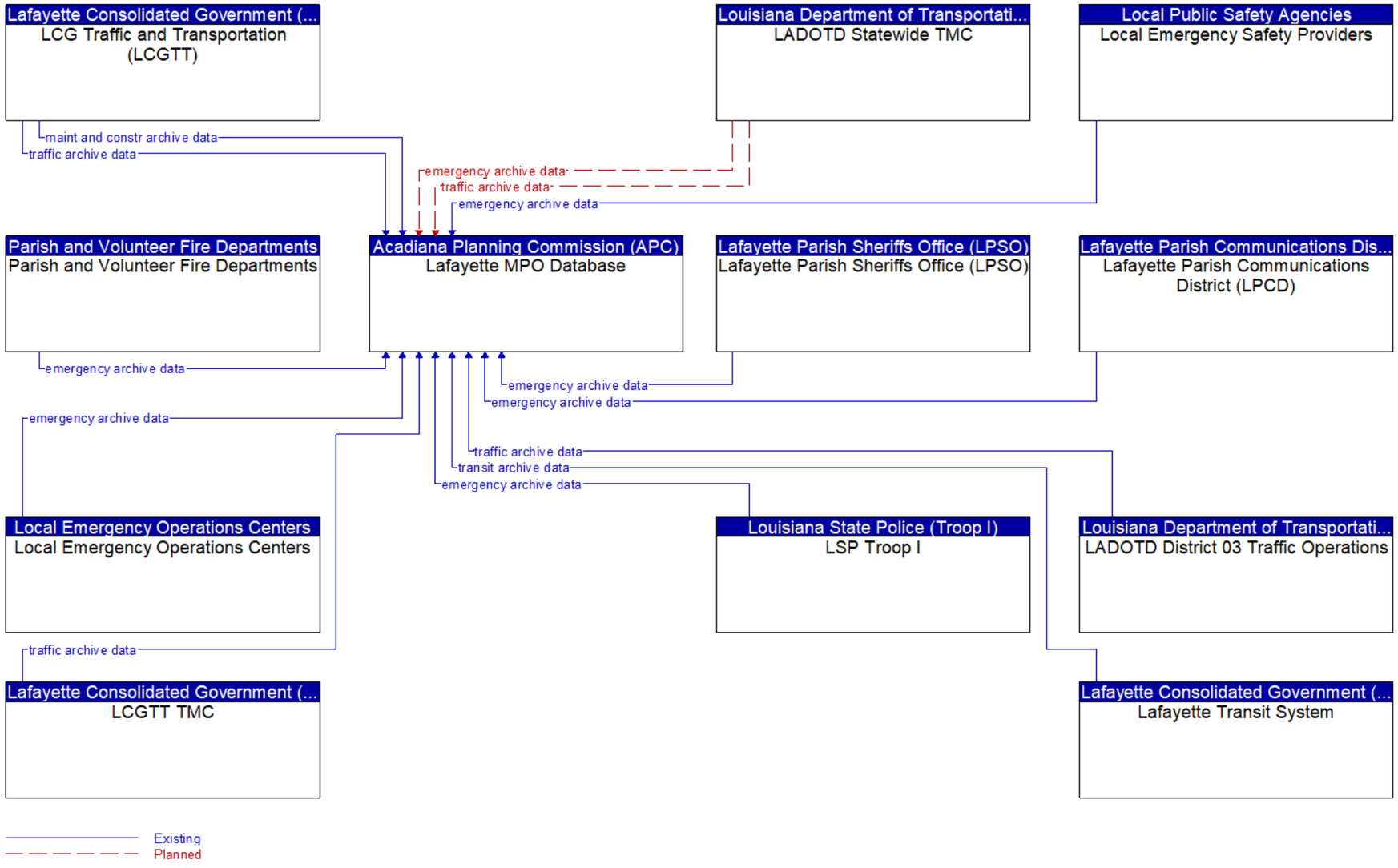



**Figure 11: Lafayette MPO Database Flow Context Diagram**

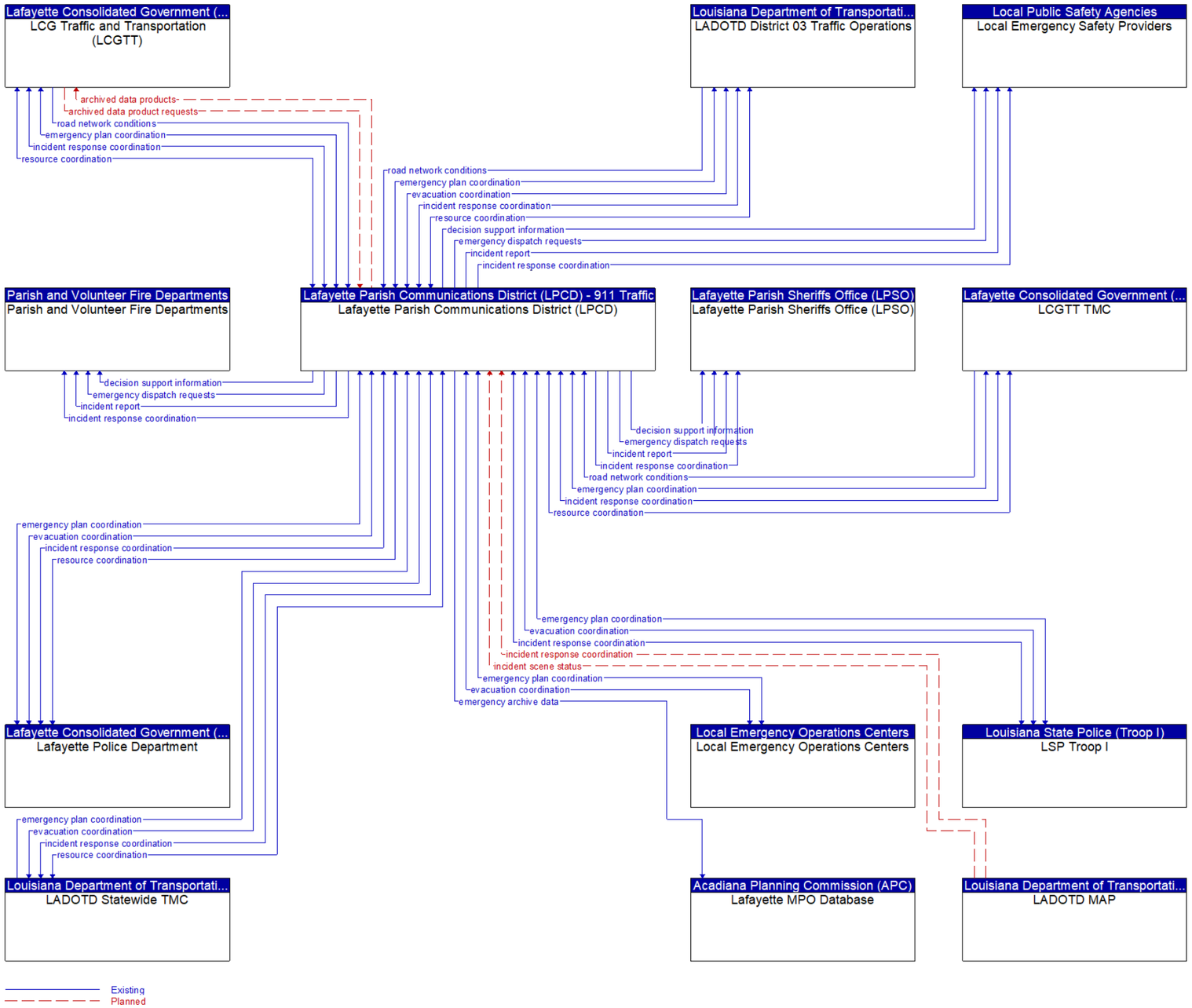



**Figure 12: Lafayette Parish Communications District (LPCD) Context Diagram**

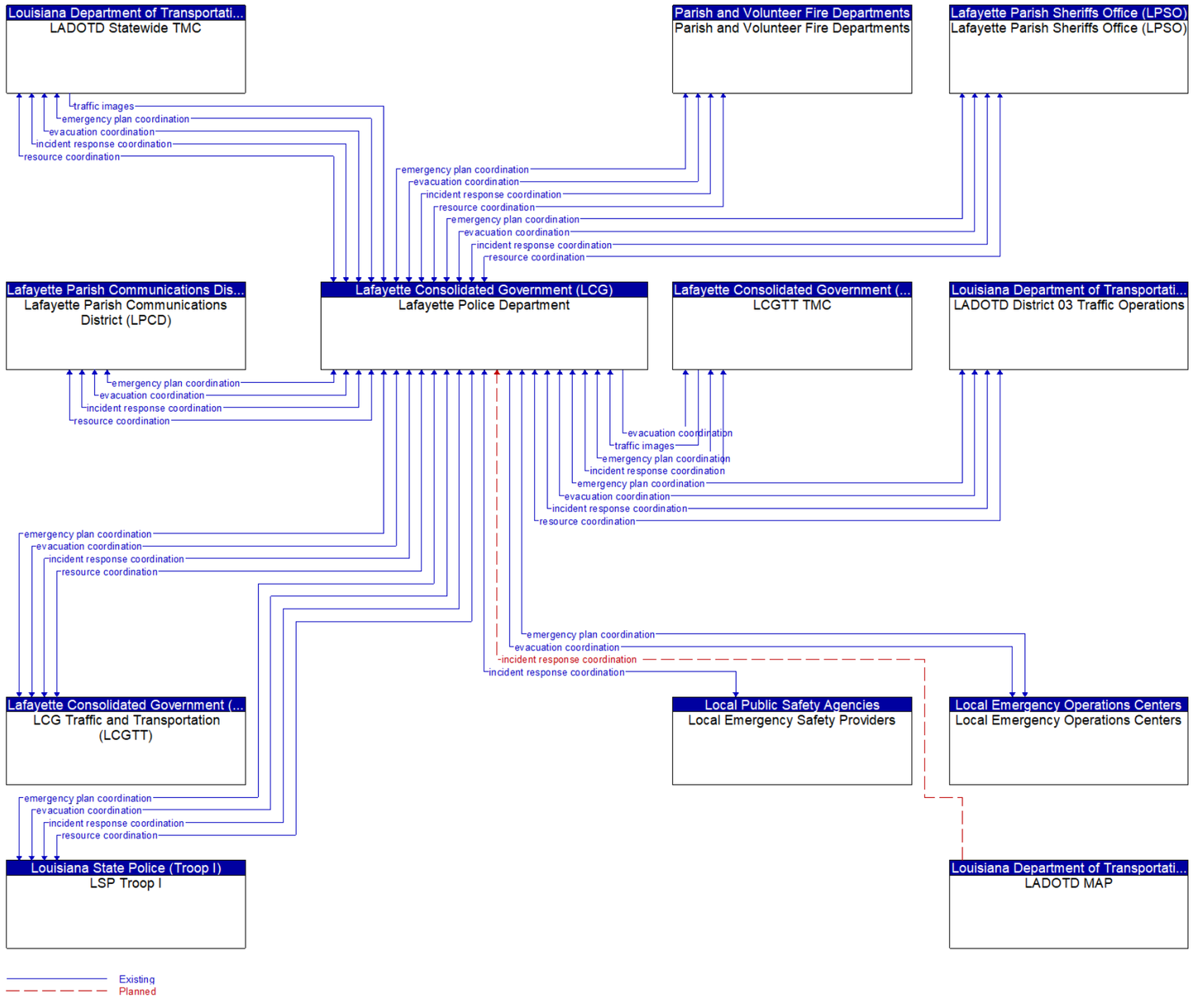



**Figure 13: Lafayette Police Department Context Diagram**

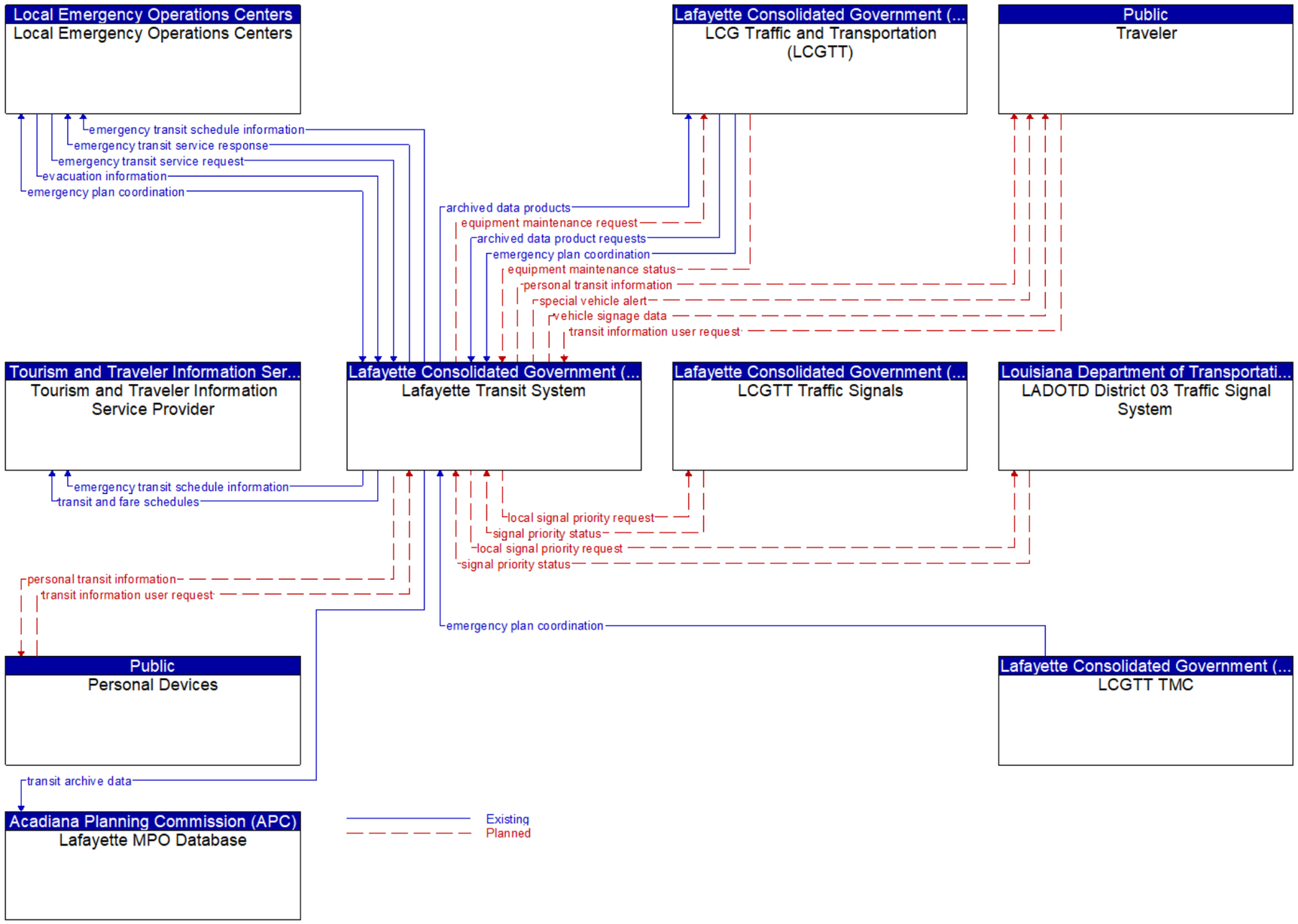



**Figure 14: Lafayette Transit System Flow Context Diagram**

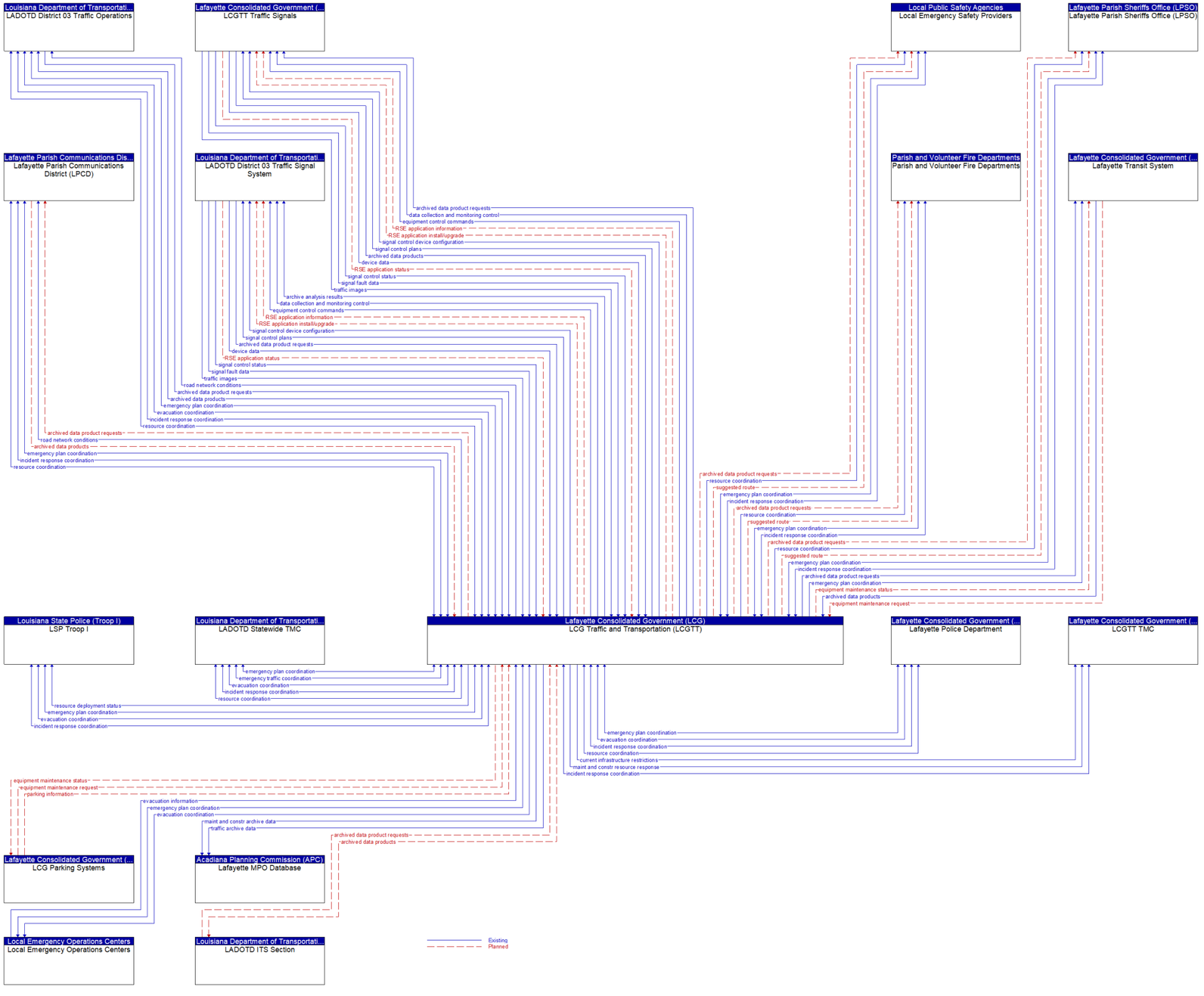



**Figure 15: LCG Traffic and Transportation Flow Context Diagram**

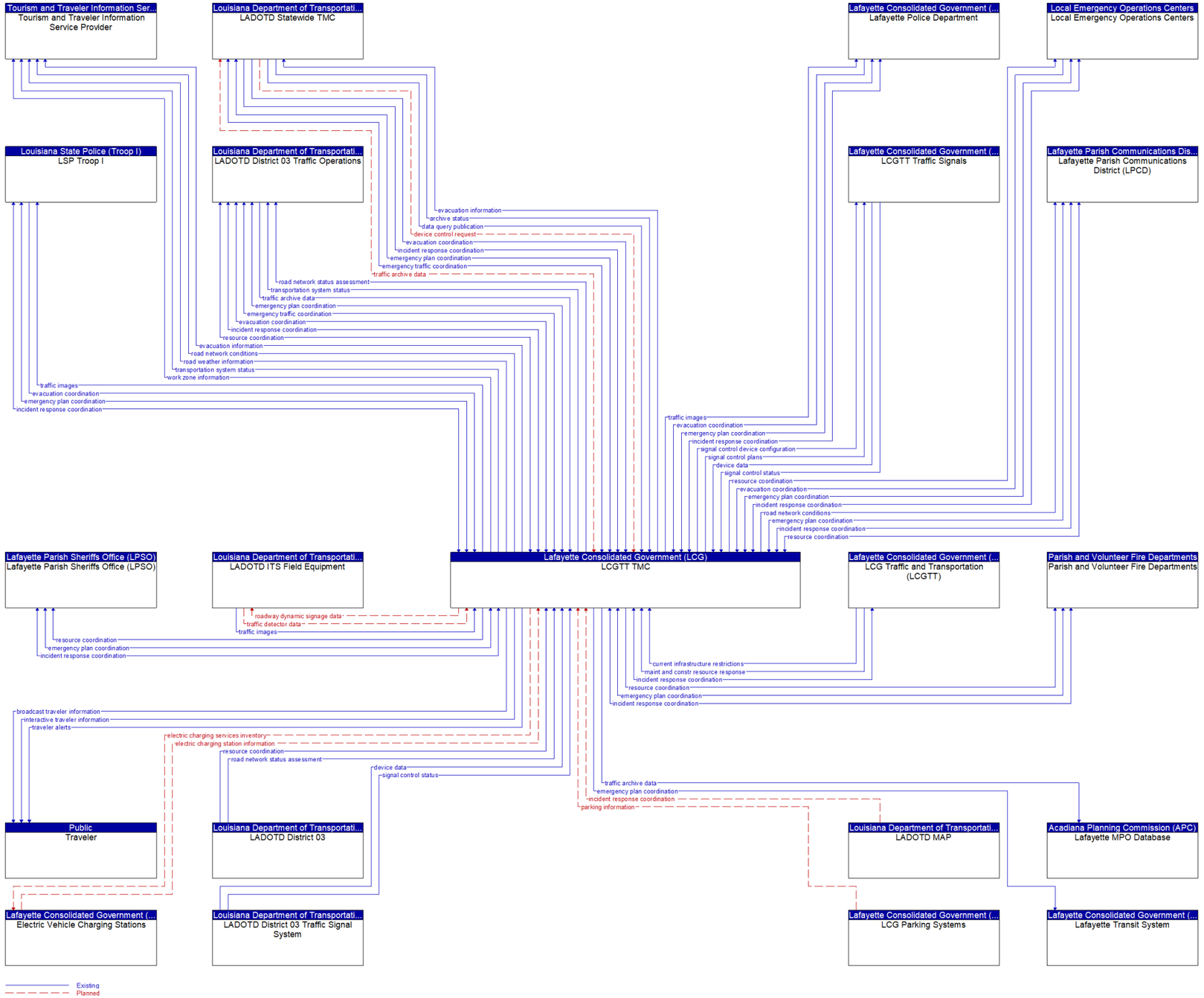



**Figure 16: LCGTT TMC Interconnect Context Diagram**

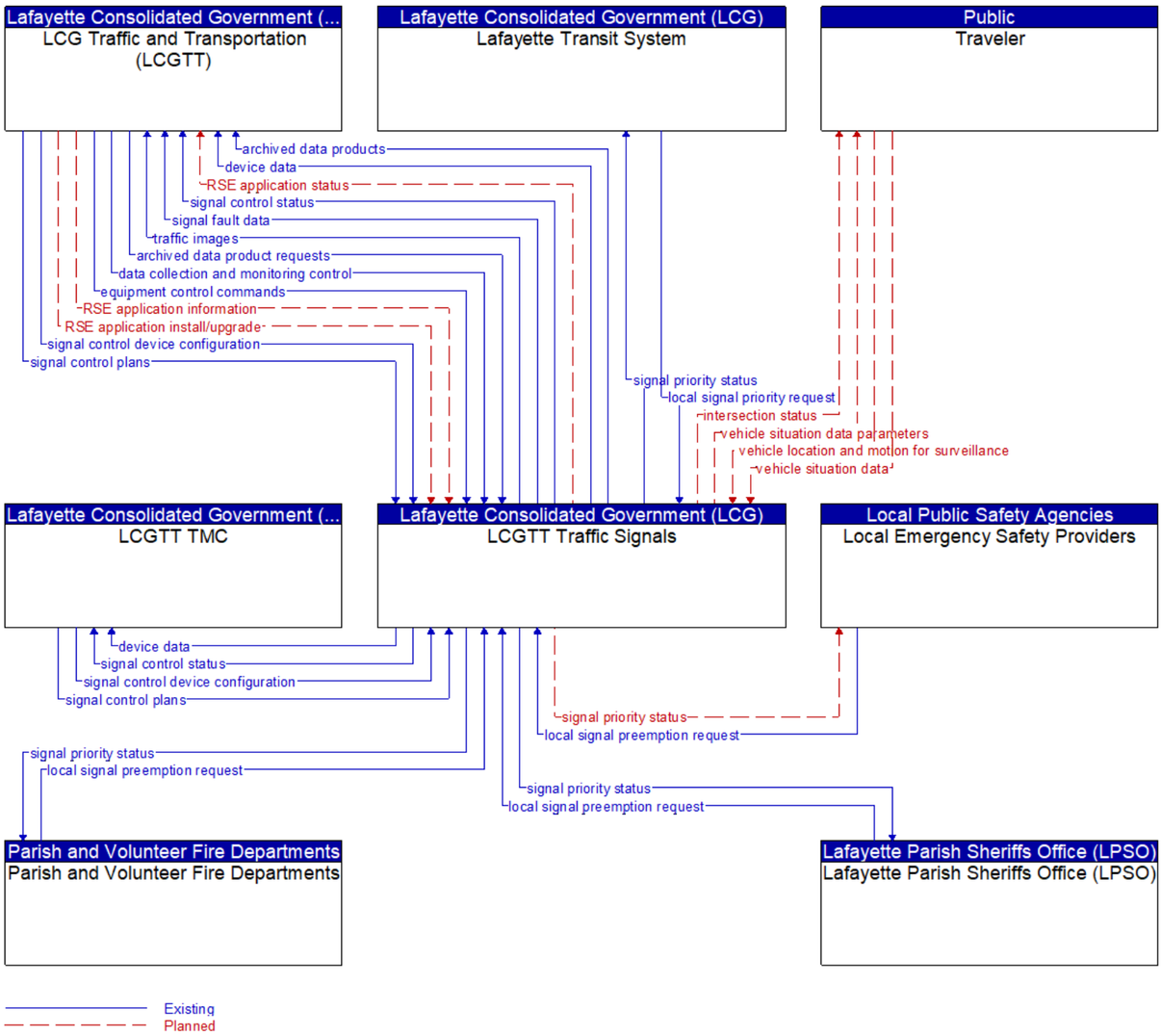



**Figure 17: LCGTT Traffic Signals Flow Context Diagram**



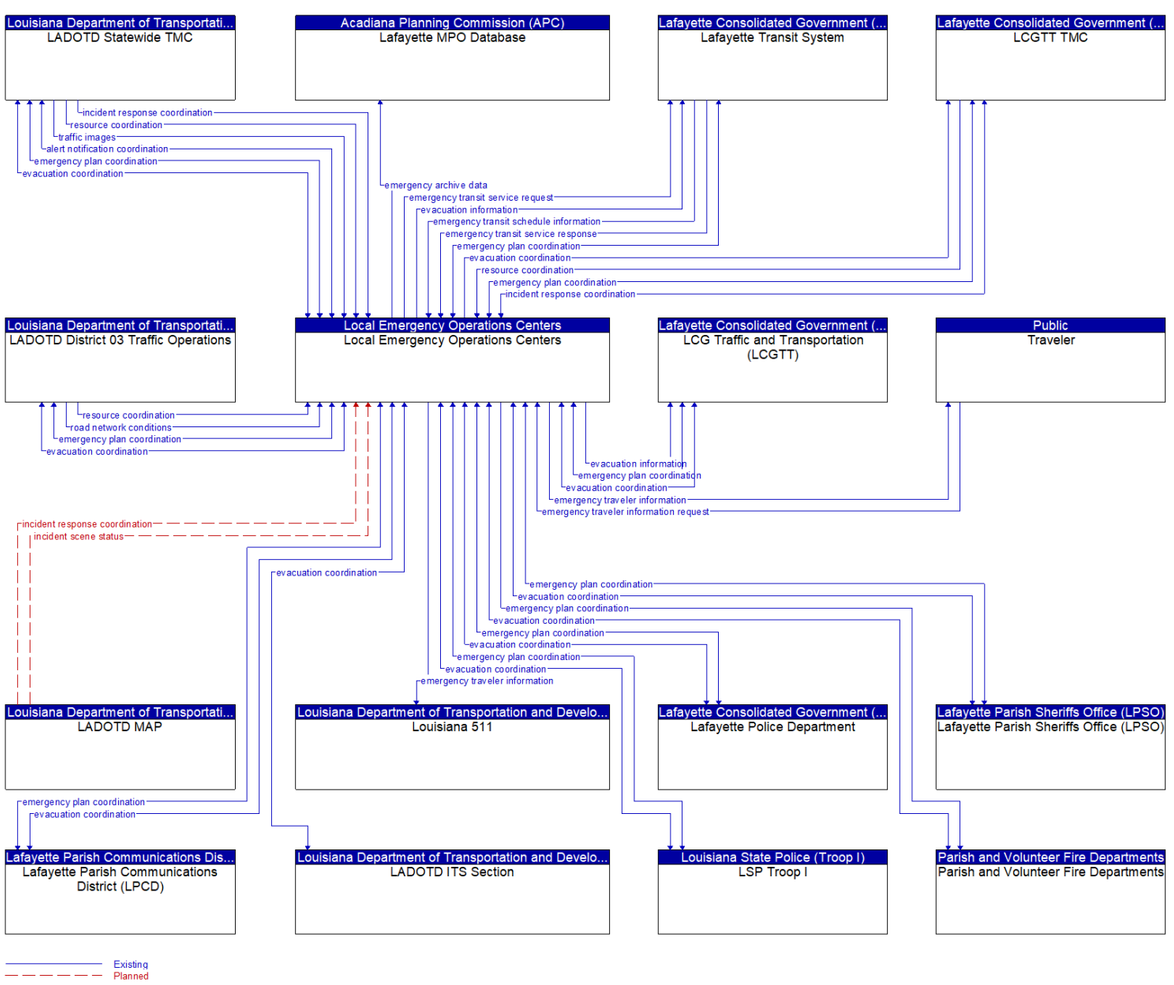
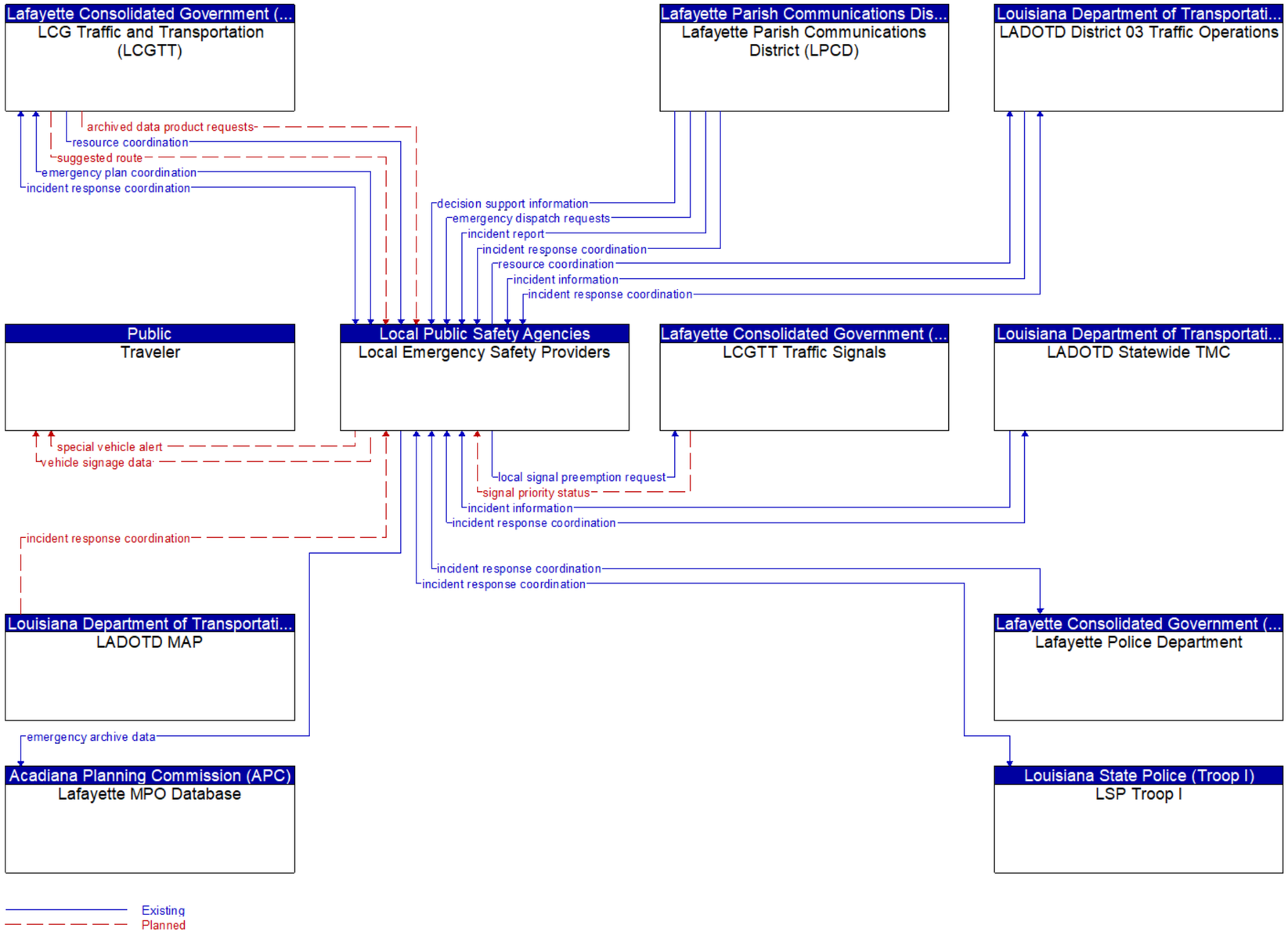



**Figure 18: Local Emergency Operation Centers Flow Context Diagram**

**Figure 19: Local Emergency Safety Providers Flow Context Diagram**



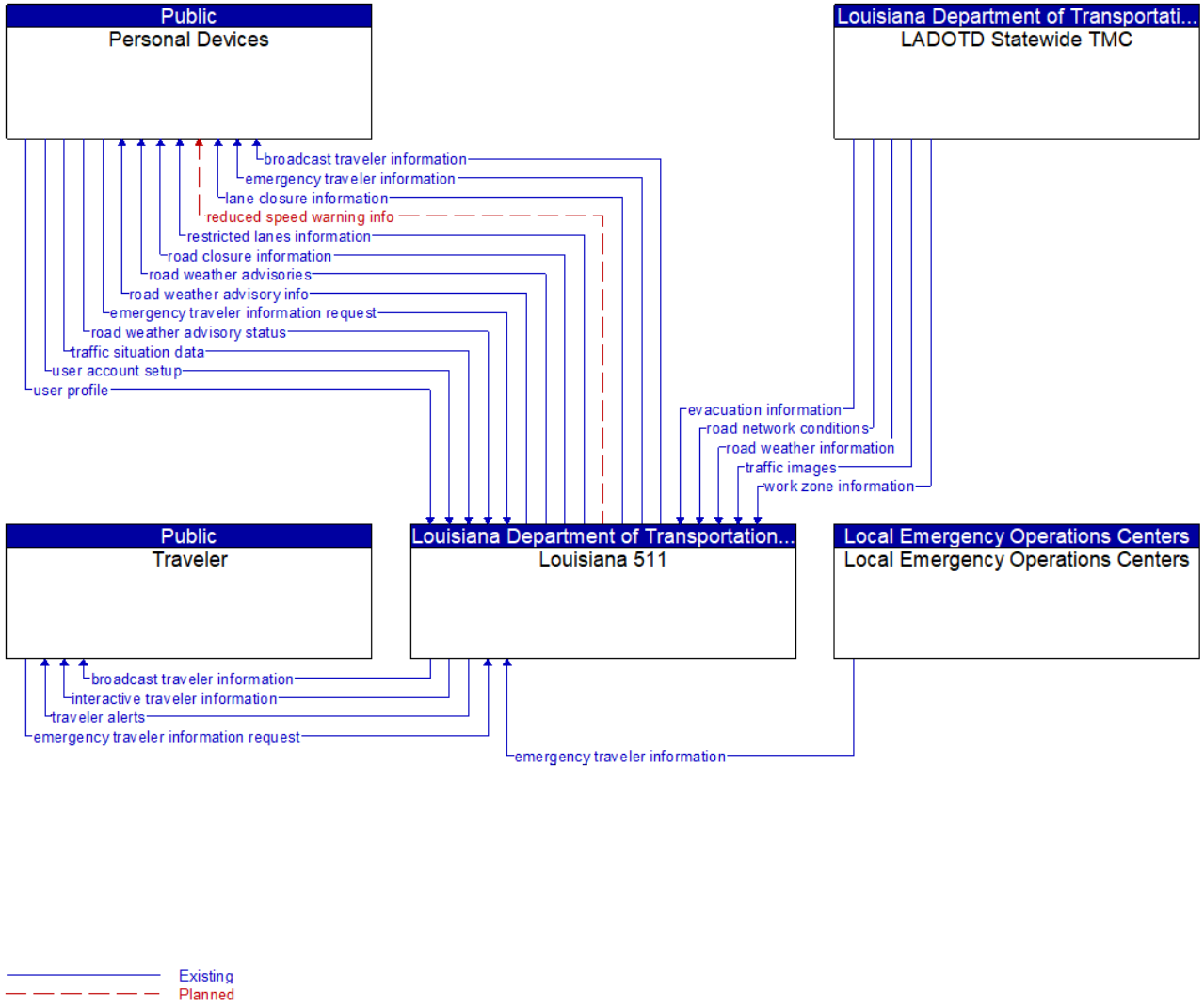



**Figure 20: Louisiana 511 Flow Context Diagram**

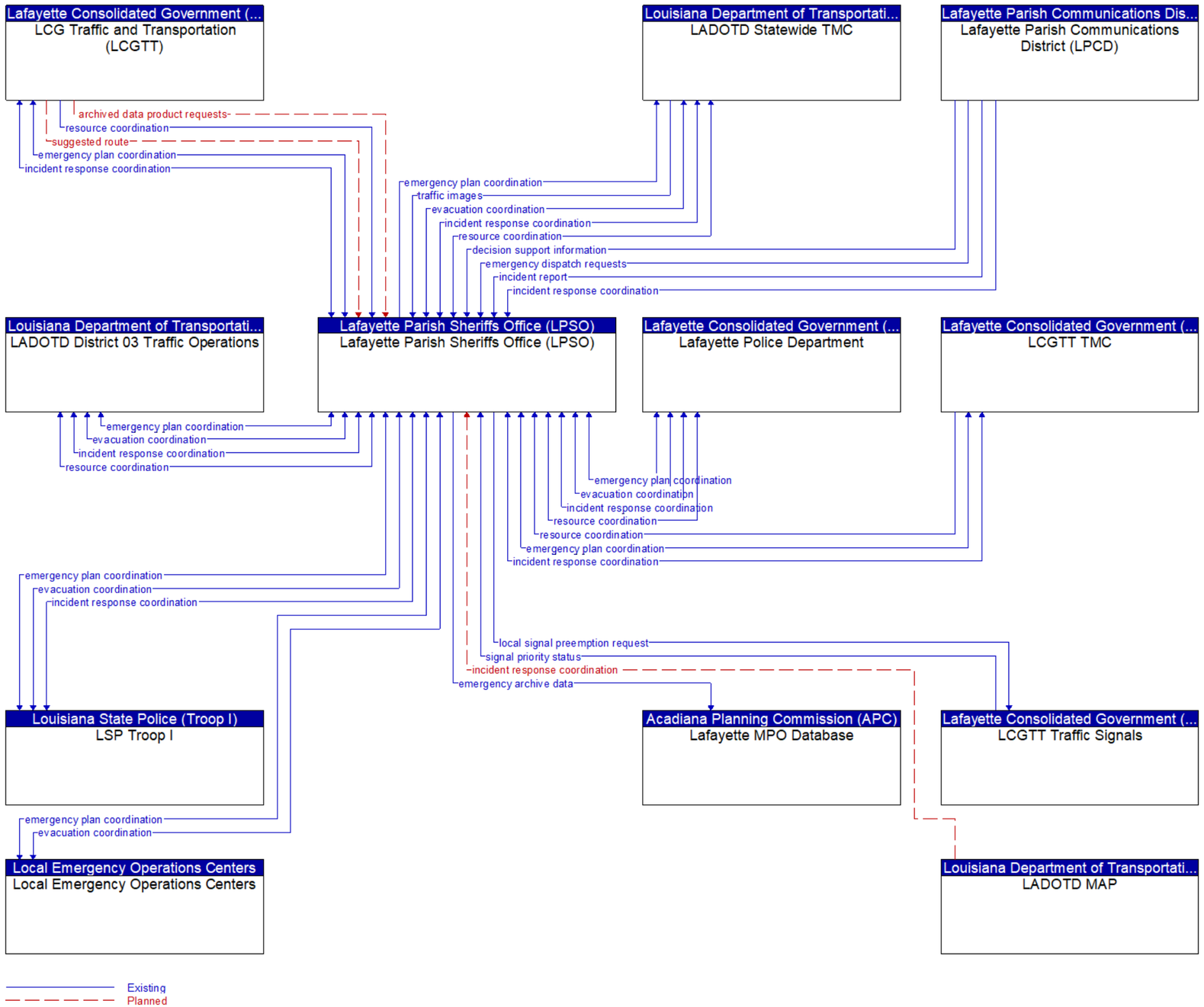



**Figure 21: LPSO Flow Context Diagram**

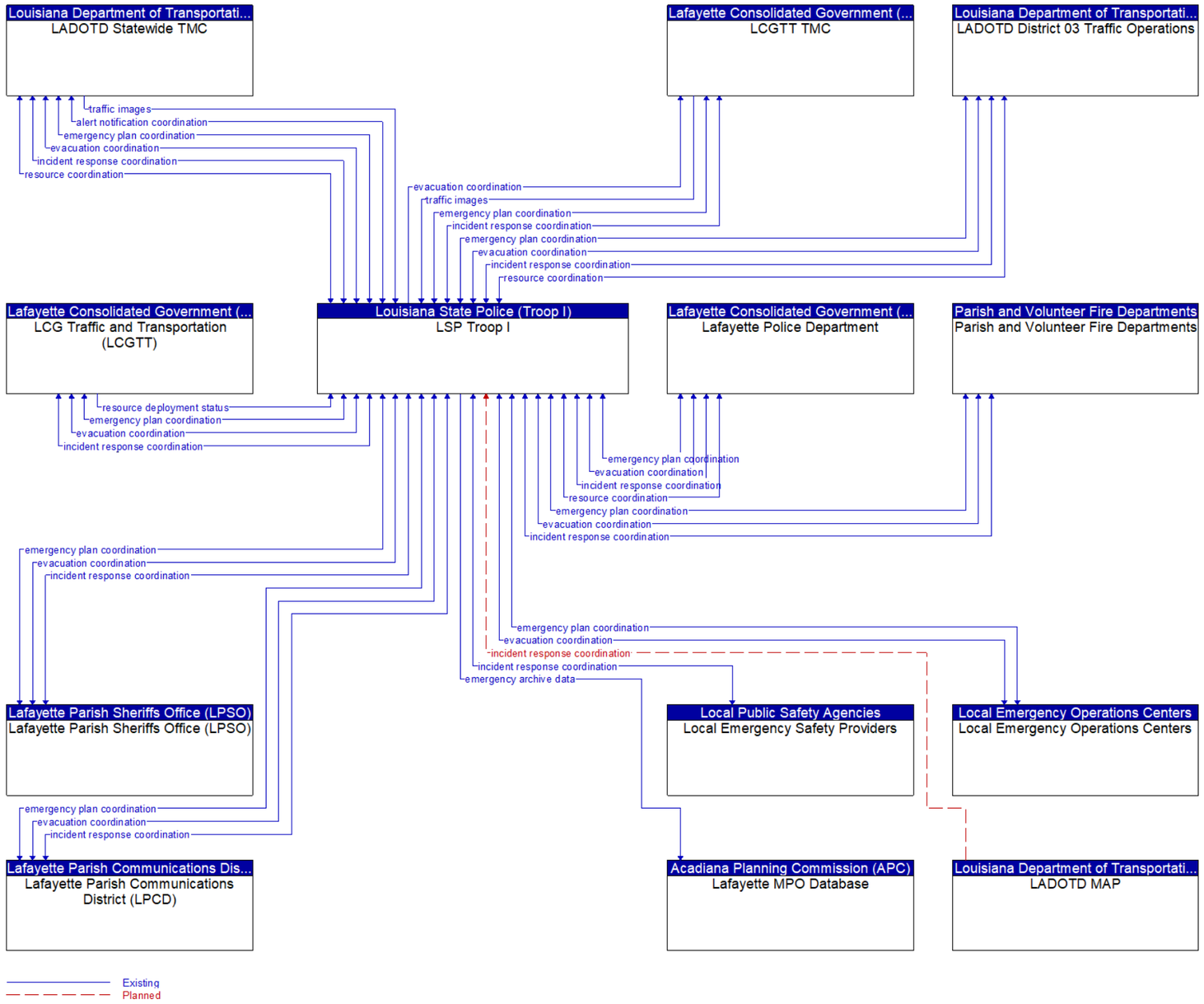



**Figure 22: LSP Troop I Flow Context Diagram**

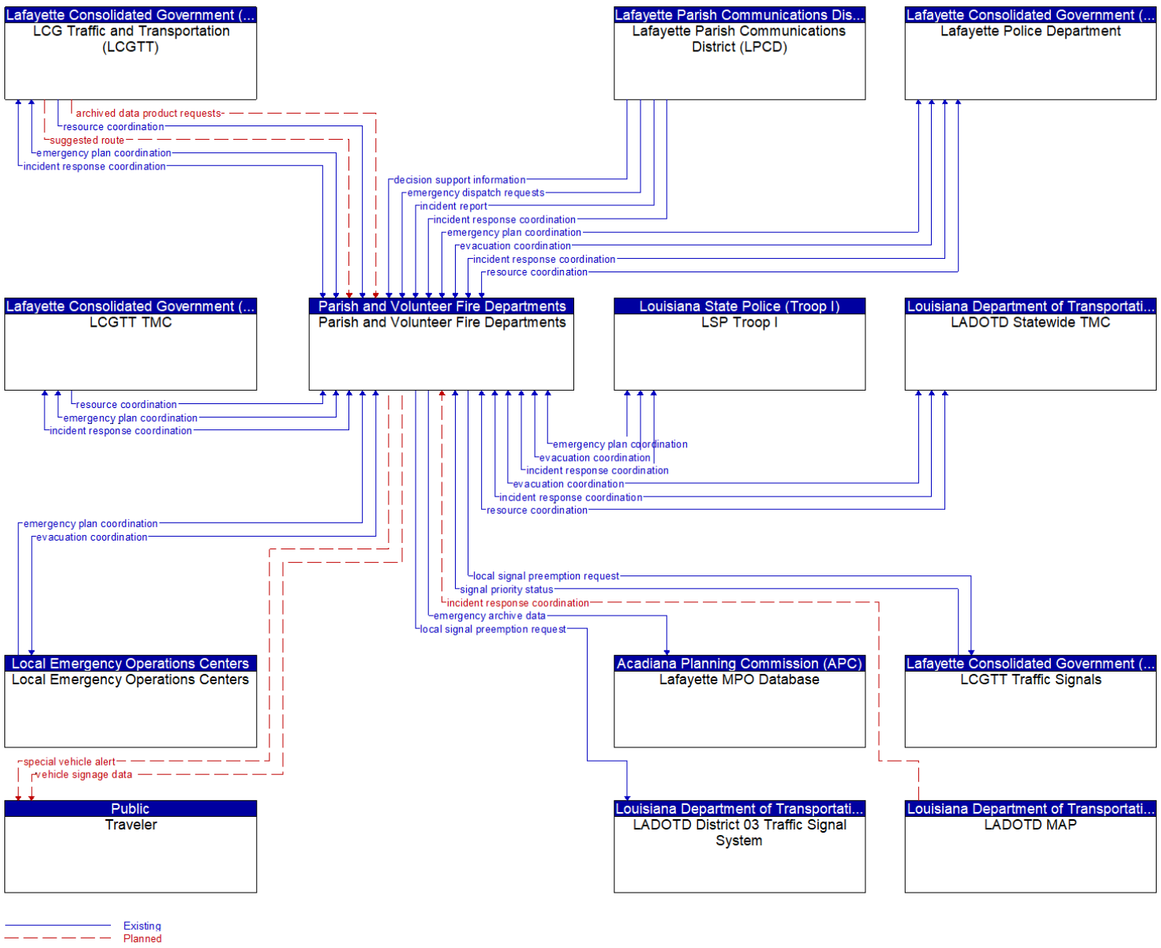



**Figure 23: Parish and Volunteer Fire Departments Flow Context Diagram**



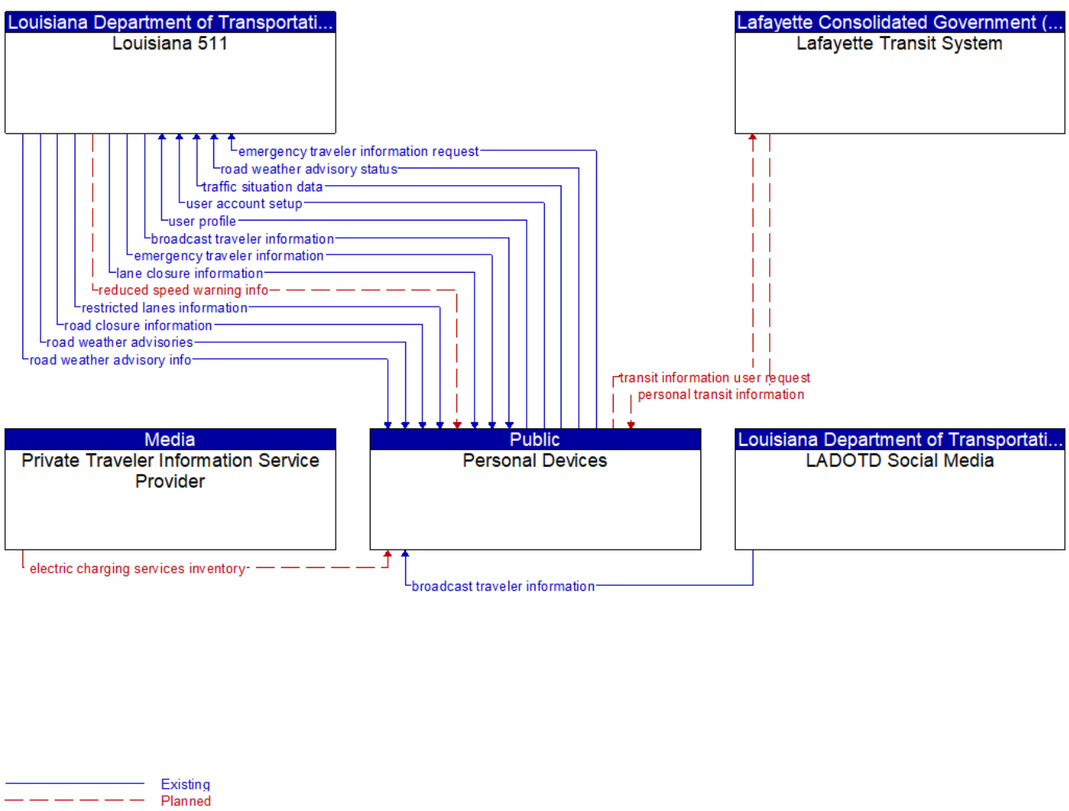



**Figure 24: Personal Devices Flow Context Diagram**

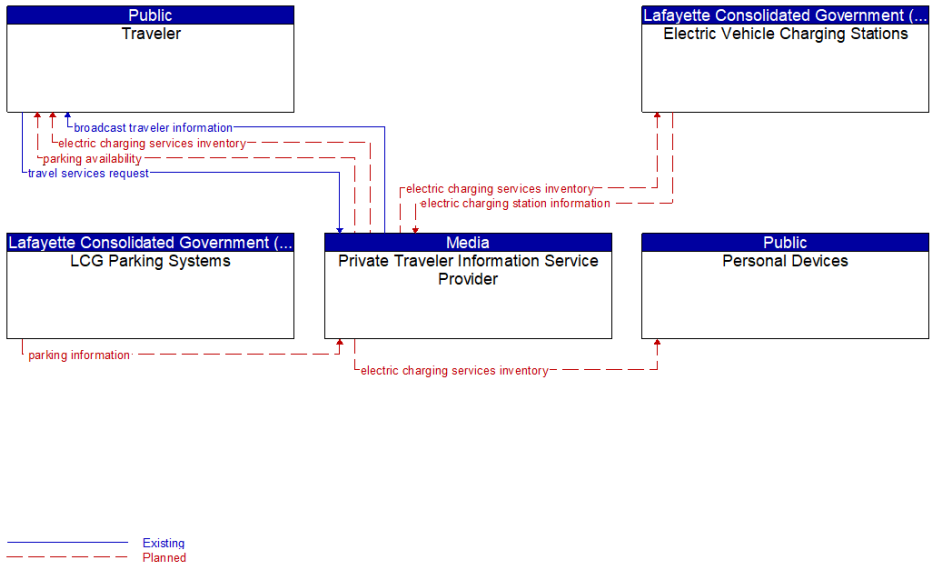



**Figure 25: Private Traveler Information Service Provider Flow Context Diagram**

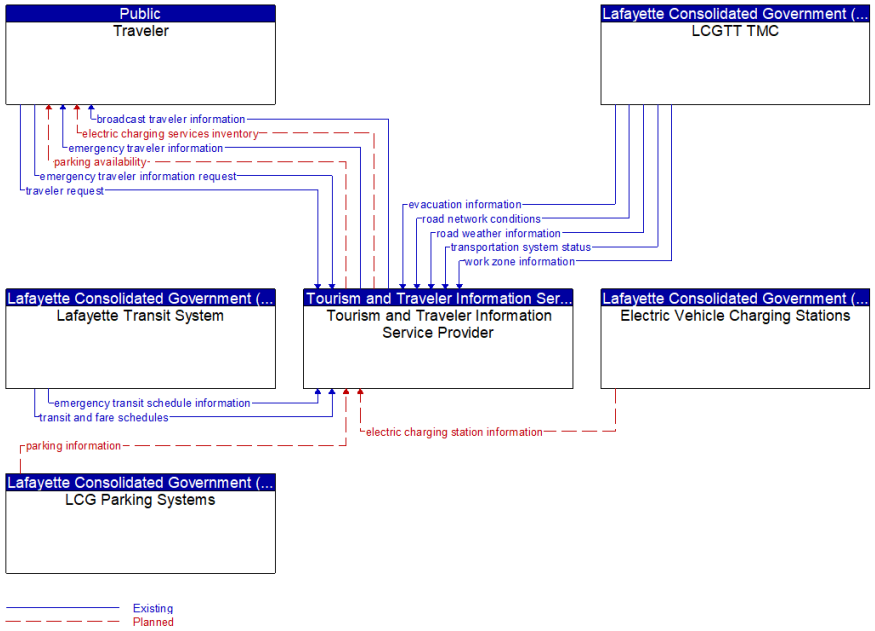



**Figure 26: Tourism and Traveler Information Service Provider Flow Context Diagram**

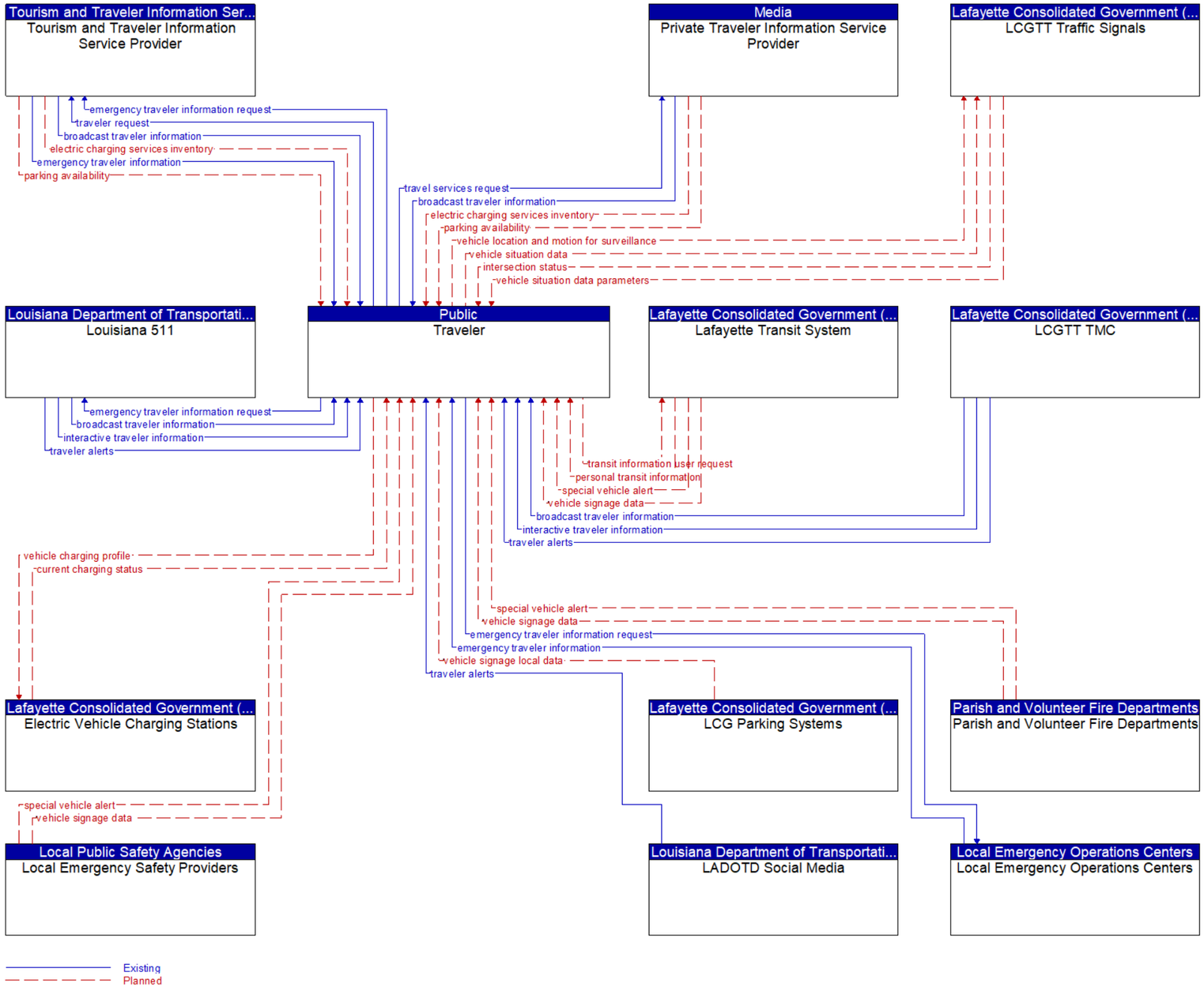



**Figure 27: Traveler Flow Context Diagram**

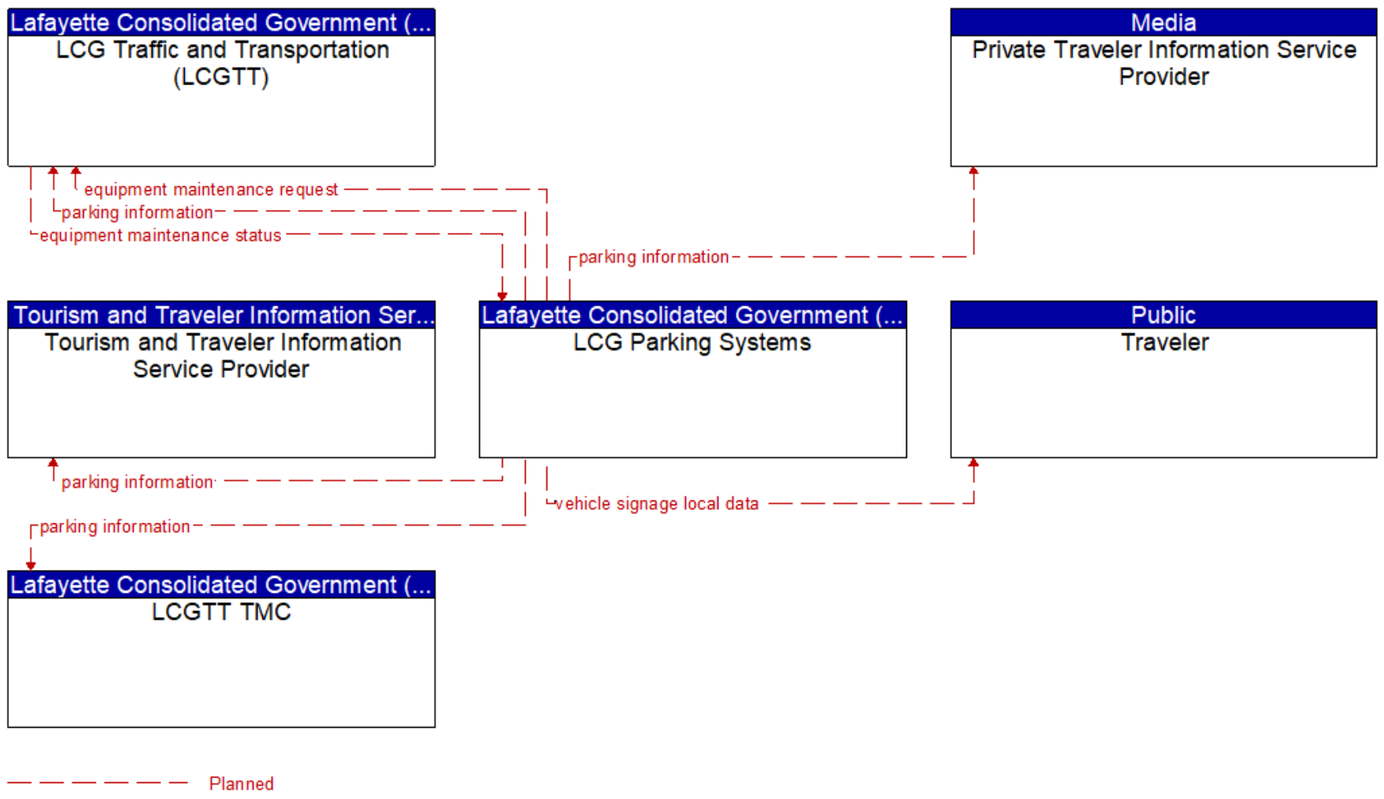



**Figure 28: LCG Parking Systems Flow Context Diagram**