



State of Texas  
ITS Architectures and Deployment Plans  
**Beaumont Region**

---

## Executive Summary

*Prepared by:*



**ConSysTec Corp**

**December 29, 2003**

068510008

Copyright © 2003 by Texas Department of Transportation. All rights reserved.

## TABLE OF CONTENTS

### EXECUTIVE SUMMARY

<b>PROJECT APPROACH.....</b>	<b>1</b>
<b>OVERVIEW OF THE BEAUMONT REGION .....</b>	<b>2</b>
<b>BEAUMONT REGION STAKEHOLDERS.....</b>	<b>4</b>
<b>BEAUMONT REGIONAL ITS ARCHITECTURE .....</b>	<b>5</b>
<b>Inventory and Needs in the Region.....</b>	<b>5</b>
<b>Market Packages .....</b>	<b>7</b>
<b>Interconnects, Interfaces, and Standards.....</b>	<b>7</b>
<b>Operational Concept and Scenarios .....</b>	<b>11</b>
<b>Agreements .....</b>	<b>12</b>
<b>ITS Architecture Documentation.....</b>	<b>12</b>
<b>BEAUMONT REGIONAL ITS DEPLOYMENT PLAN.....</b>	<b>13</b>
<b>Prioritized Market Packages.....</b>	<b>13</b>
<b>ITS Project Recommendations for the Beaumont Region.....</b>	<b>15</b>
<b>MAINTAINING THE REGIONAL ITS ARCHITECTURE AND DEPLOYMENT PLAN.....</b>	<b>20</b>
<b>MEMORANDUM OF UNDERSTANDING .....</b>	<b>21</b>

## TABLE OF CONTENTS

### EXECUTIVE SUMMARY

## LIST OF FIGURES

Figure 1 – Beaumont Regional ITS Architecture and Deployment Plan Development Process ....	1
Figure 2 – Beaumont Region Map.....	3
Figure 3 – Beaumont Regional System Interconnect Diagram.....	8
Figure 4 – Beaumont Surface Street Control Customized Market Package .....	9
Figure 5 – TxDOT Beaumont District Traffic Signals Interfaces.....	10
Figure 6 – TxDOT Beaumont District Office to TranStar and Other Texas Region TMCs Architecture Flows.....	11

## LIST OF TABLES

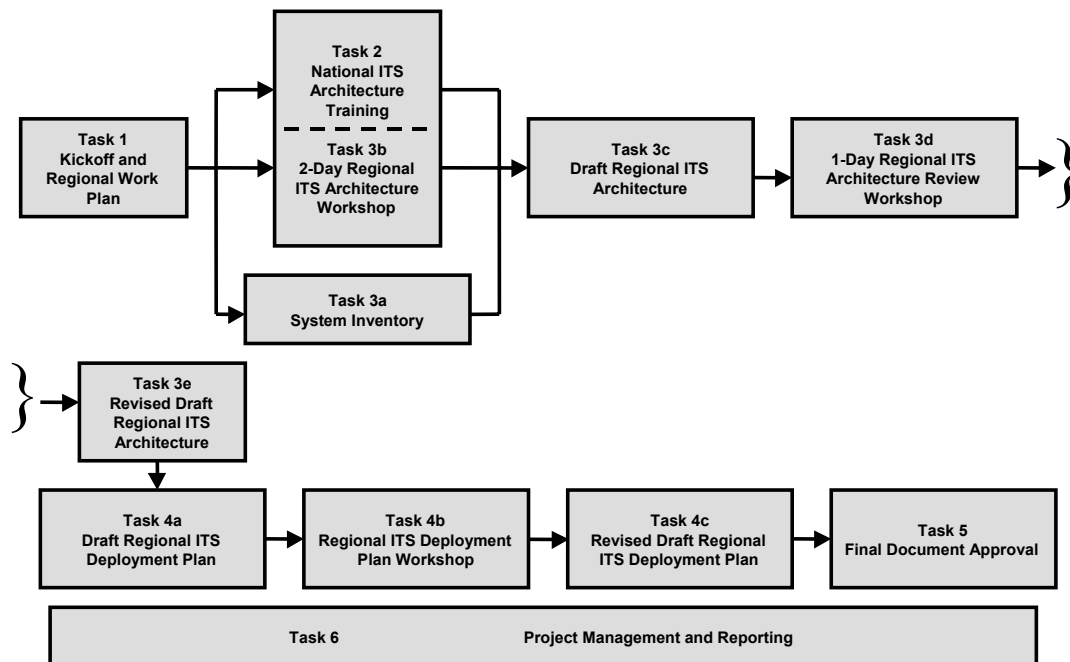
Table 1 – Beaumont Region: Summary of ITS Needs.....	6
Table 2 – Summary of Prioritized Market Packages for the Beaumont Region.....	14
Table 3 – Recommended ITS Projects for the Beaumont Region .....	16

## PROJECT APPROACH

The Federal Highway Administration (FHWA) issued a final rule to implement Section 5206(e) of the Transportation Equity Act for the 21st Century (TEA-21) in January of 2001. This final rule requires that Intelligent Transportation System (ITS) projects funded through the Highway Trust Fund conform to the National ITS Architecture and applicable standards. FHWA has further established a deadline of April 2005 for regions to have an ITS architecture in place.

To meet these requirements and ensure future federal funding eligibility for ITS, the Texas Department of Transportation (TxDOT) initiated the development of regional ITS architectures and deployment plans throughout the State of Texas. There are several metropolitan areas in the state that already have ITS architectures in place or under development. The focus of the State of Texas Regional ITS Architectures and Deployment Plans program is to develop architectures in those areas outside of the Austin, Houston, Dallas, Fort Worth, and San Antonio Regions. TxDOT expanded upon the ITS architecture requirements outlined in the FHWA Final Rule, and included an ITS deployment plan as part of the Regional efforts. The regional ITS architecture provides a framework for ITS systems, services, integration, and interoperability, and the regional ITS deployment plan identifies specific projects and timeframes for ITS implementation to support the vision developed by stakeholders in the architecture.

TxDOT's process for developing the regional ITS architectures and deployment plans followed a consensus-based approach to meeting the requirements in the FHWA Final Rule and supporting guidelines. This process was further tailored to meet the specific multi-agency needs of these Regional plans, and was structured around stakeholder input and involvement. The addition of an ITS deployment plan provides for a tangible road map for regional ITS deployment and integration. **Figure 1** shows the development process for each of the State of Texas Regional ITS Architectures and Deployment Plans.



**Figure 1 – Beaumont Regional ITS Architecture and Deployment Plan Development Process**

## OVERVIEW OF THE BEAUMONT REGION

The Beaumont Region is located in southeastern Texas, and is bordered by the TxDOT Lufkin District to the north, the TxDOT Houston District to the west, Louisiana to the east, and the Gulf of Mexico to the south. For the Beaumont Regional ITS Architecture and Deployment Plan, the study area included all eight counties that comprise the TxDOT Beaumont District. **Figure 2** illustrates the Regional boundaries.

The Beaumont Region has an extensive transportation infrastructure. The primary roadway facilities include I-10, US-90, US-96, US-69, US-190, US-287, SH-87, SH-61, SH-65, and SH-105.

I-10 is an east-west, four-lane divided interstate highway. The effective operation of this highway is critical to the movement of goods and people across the United States. I-10 extends from Florida in the east to California in the west. Within the Beaumont Region, the frontage roads are not always continuous. Blockages along I-10 can have serious implications for drive-time for commercial vehicles and motorists alike due to the lack of obvious alternate routes. Knowing the road and travel conditions within this transportation corridor and having the ability to disseminate this information to motorists are important elements for this project. For example, if I-10 has been closed due to a major incident or weather, and motorists are informed of the closure in advance, they can alter their travel plans with an alternate route or wait to begin their travels.

In addition to roadway infrastructure, the Beaumont Region has a commercial airport, the Southeast Texas Regional Airport and three major ports. The Port of Beaumont, the Port of Orange, and the Port of Port Arthur all serve local and national shipping needs.

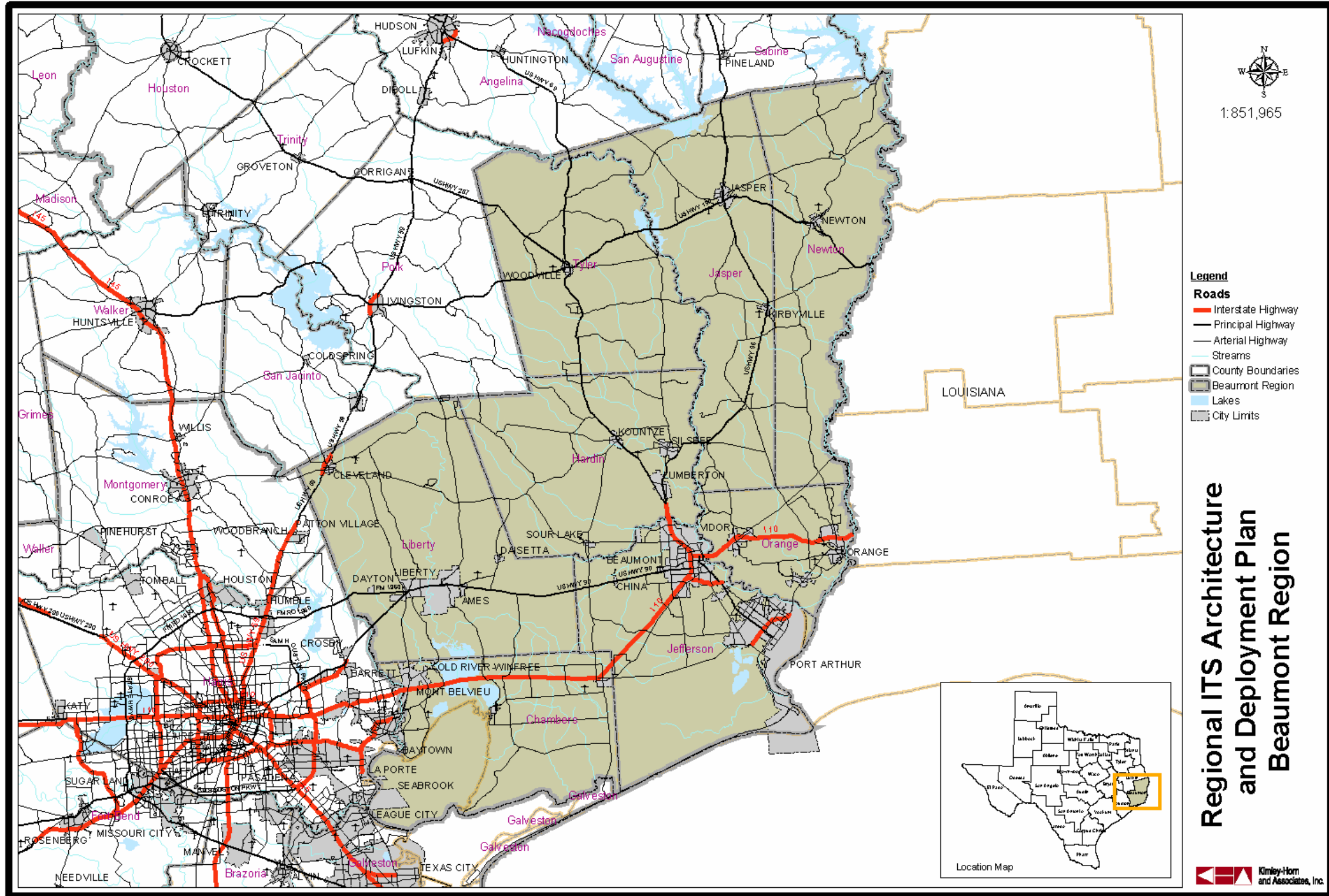


Figure 2 – Beaumont Region Map

## BEAUMONT REGION STAKEHOLDERS

Involving a range of perspectives in the development of a regional ITS architecture and deployment plan, and obtaining consensus on the vision and recommendations are key components to the process. Stakeholders from throughout the Beaumont Region and neighboring Regions participated in the development of the Beaumont Regional ITS Architecture and Deployment Plan. Key participants included representatives from TxDOT, the Texas Department of Public Safety (DPS), Southeast Texas Regional Planning Commission (SETRPC), cities, counties, transit agencies, and rail operators. These stakeholders provided input and review at key steps in the development process, including a project kick-off meeting, architecture development and review workshops, a deployment plan workshop, and review of the final project documentation.

Beaumont Region stakeholders included:

- Beaumont Municipal Transit;
- Chambers County;
- City of Beaumont;
- City of Pinehurst;
- City of Port Arthur;
- City of Port Arthur Transit;
- City of Port Neches;
- City of West Orange;
- City of Vidor;
- Department of Public Safety;
- Jefferson County;
- Kansas City Southern Railway;
- Louisiana Department of Transportation and Development (LADOTD);
- Southeast Texas Regional Planning Commission;
- TxDOT Beaumont District; and
- TxDOT Traffic Operations Division (Austin).

## BEAUMONT REGIONAL ITS ARCHITECTURE

The process for developing the Regional ITS Architecture for Beaumont included several key steps:

- Preparing an inventory of planned and existing systems in the Region;
- Identifying needs in the Region that could be addressed by ITS deployment or integration;
- Customizing and prioritizing market packages to address the specific needs and services identified by stakeholders;
- Developing interconnects and interfaces for system elements to map out data flows and agency links;
- Preparing an operational concept to illustrate how the systems, components, and agencies will be integrated and function as a result of the architecture framework;
- Identifying high-level functional requirements;
- Identifying standards that could be applicable to the Beaumont Region; and
- Outlining potential agreements that would be needed to facilitate information or resource sharing as a result of ITS implementation.

### Inventory and Needs in the Region

The Beaumont Regional ITS Architecture began with a project kick-off meeting in December of 2002. At that meeting, stakeholders provided information about existing and planned ITS elements in the Region. A diverse range of needs were identified by stakeholders who attended. High priority needs focused on evacuation management for hurricanes, as well as HAZMAT and petrochemical emergencies. Coordinating between the Beaumont Region and the TxDOT Houston District, and with LADOTD also were cited as priority needs. There are several highway/rail intersections within the Beaumont Region, and train arrival/warning systems and coordinating with rail operators were identified as key needs by several stakeholders.

The needs identified by the Beaumont Region stakeholders were categorized into functional areas, and are shown in **Table 1**.



**Table 1 – Beaumont Region: Summary of ITS Needs**

<p style="text-align: center;"><b>Beaumont Region</b> <b>Summary of ITS Needs</b> <b>Beaumont Regional ITS Architecture and Deployment Plan Kick-Off Meeting</b> <b>December 10, 2002</b></p> <p><b>Travel and Traffic Management Needs</b></p> <ul style="list-style-type: none"><li>▪ Need hurricane evacuation signal coordination</li><li>▪ Need congestion detection</li><li>▪ Need CCTV or loops for roadway speed detection</li><li>▪ Need school flashers, activated by pager or wireless</li><li>▪ Need motorist Assistance Patrol</li><li>▪ Need signal system upgrades</li><li>▪ Need railroad crossing malfunction notification – possibly using CCTV cameras</li><li>▪ Need railroad traffic signal preemption</li><li>▪ Need multilingual traveler information</li><li>▪ Need hurricane evacuation website with evacuation routes and road closure information</li><li>▪ Need improved highway advisory radio and expanded coverage</li><li>▪ Need website for information dissemination, including construction information, road closures, etc.</li><li>▪ Need improved traffic information for areas south of I-10</li></ul> <p><b>Institutional Issues/Needs</b></p> <ul style="list-style-type: none"><li>▪ Need coordination with Louisiana on Amber Alerts in LA/TX border areas</li></ul> <p><b>Public Transportation Management Needs</b> None Identified</p> <p><b>Electronic Payment Needs</b> None Identified</p> <p><b>Commercial Vehicle Operations Needs</b> None Identified</p> <p><b>Emergency Management Needs</b></p> <ul style="list-style-type: none"><li>▪ Need petrochemical emergency evacuation planning</li><li>▪ Need improved hurricane evacuation planning (Include coordination with Louisiana)</li><li>▪ Need additional automated vehicle location for emergency vehicles</li><li>▪ Need to expand automated call out system</li></ul> <p><b>Advanced Vehicle Safety System Needs</b> None Identified</p> <p><b>Information Management Needs (Data Archiving)</b> None Identified</p> <p><b>Maintenance and Construction Management Needs</b></p> <ul style="list-style-type: none"><li>▪ Need portable VMS for five rural counties</li></ul>
-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

## Market Packages

A 2-Day ITS Architecture Workshop was held in Beaumont in February 2003. At this workshop, stakeholders were provided with architecture training that included background information about the National ITS Architecture, the purpose and benefits of a regional ITS architecture, and the process that would be used to develop the Beaumont Regional ITS Architecture.

The next step in developing the Beaumont Regional ITS Architecture was to identify the services that would be needed to address the stakeholder needs. In the National ITS Architecture, services are referred to as market packages. Market packages may include several stakeholders and elements that work together to provide a service in the Region. Examples of market packages from the National ITS Architecture include Network Surveillance, Traffic Information Dissemination, and Transit Vehicle Tracking. There are currently a total of 75 market packages identified in the National ITS Architecture.

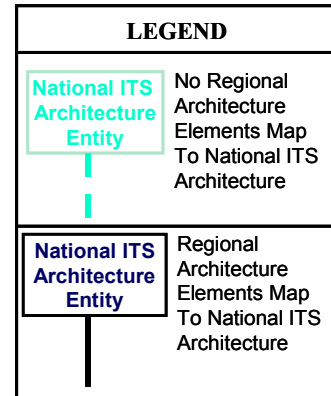
At the 2-Day ITS Architecture Workshop, stakeholders selected the market packages that corresponded to the desired services and functions identified for the Region, and then customized these market packages. They included services and functions such as Network Surveillance, Traffic Information Dissemination, and Emergency Response as well as market packages to address coordination needs, including an Incident Management System and Regional Traffic Control and Coordination. Because market packages are groups of services and functions, they can be deployed incrementally and over time. Of the 75 market packages in the National ITS Architecture, stakeholders identified 33 as being applicable to the Beaumont Region.

## Interconnects, Interfaces, and Standards

Stakeholders also began the process of mapping existing and planned ITS elements in Beaumont to the subsystems in the National ITS Architecture. These elements included agencies, systems, and essentially all of the ITS components in the Region. Subsystems are the highest level building blocks of the physical architecture, and the National ITS Architecture groups them into four major classes: Centers, Roadside, Vehicles, and Travelers. This mapping resulted in an interconnect diagram for the Beaumont Region, which is shown in **Figure 3** on the following page. This architecture diagram, also referred to as the “sausage diagram” shows the relationship of existing, planned, and future systems in the Beaumont Region.

The market packages in the National ITS Architecture were customized to reflect the unique systems, subsystems, and terminators in the Beaumont Region. Each market package was shown graphically, with the market package name, Beaumont Region specific element, and the unique agency and system identifiers within the subsystems and terminators.

**Figure 4** is an example of an ATMS market package for Surface Street Control that has been customized for the Beaumont Region. This market package shows the two subsystems, Traffic Management and Roadway, and the associated entities (TxDOT Beaumont District Traffic Signals, TxDOT Beaumont District Field Sensors, etc.). Data flows between the subsystems indicate what information is being shared. The solid data flow lines in this market package indicate existing information flows and the dashed lines indicate planned or future flows. All of the Beaumont Region market package diagrams are included in the Regional ITS Architecture report.



**Remote Traveler Support Subsystem**

- \*BMT Transit Information Display / Point of Sale
- \*City of Port Arthur Transit Information Display / Point of Sale
- \*TxDOT Rest Areas/Visitor Centers/Service/Truck Stops/ Plaza Kiosks

**Personal Information Access Subsystem**

- \*Private Travelers Personal Computing Devices

**Transit Vehicle Subsystem**

- BMT Transit Vehicles
- City of Port Arthur Transit Vehicles
- Independent School District Buses
- Southeast Texas Transit Participants Vehicles

**Vehicle Subsystem**

- BMT Transit Vehicles
- City of Port Arthur Transit Vehicles
- Commercial Vehicles

**Commercial Vehicle Subsystem**

- Commercial Vehicles
- \*Rail Operators Rail Cars

**Maintenance and Const Vehicle Subsystem**

- County Road and Bridge Vehicles
- Municipal PWD Vehicles
- TxDOT Beaumont District Maintenance Vehicles

**Emergency Vehicle Subsystem**

- City of Beaumont Fire Vehicles
- City of Beaumont Police Vehicles
- City of Port Arthur Emergency Vehicles
- DPS Emergency Vehicles
- Municipal or County Emergency Vehicles
- Private Ambulance Vehicle
- \*SETRPC Motorist Assistance Vehicles

**Transit Management Subsystem**

- BMT Transit Dispatch
- City of Port Arthur Transit System Dispatch
- Independent School District Dispatch
- Private Taxi Provider Dispatch
- Southeast Texas Transit Participants Dispatch

**Maintenance & Construction Management**

- City of Beaumont Maintenance
- City of Port Arthur Public Works
- County Road and Bridge
- LADOTD District 7 HQ
- Municipal PWD
- Other TxDOT District Maintenance Sections
- TxDOT Beaumont District Area Engineers Office
- TxDOT Beaumont District Maintenance Sections

**Emissions Management**

- TCEQ Monitor Operations Section

**Emergency Management Subsystem**

- City of Beaumont Fire and EMS Dispatch
- City of Beaumont Police Dispatch and PSAP
- City of Port Arthur Police/Fire Dispatch
- Coast Guard Marine Safety Office
- Correctional Facilities Operations
- County EOC
- County Public Safety Dispatch and PSAP
- DPS Administration
- DPS Communications Service
- \*Forest Service Dispatch
- HAZMAT Alliance Emergency Center
- LA DPS Troop D Dispatch
- Lower Neches Valley Authority
- MAMB Emergency Management Center
- Municipal Public Safety Dispatch
- Orange County LEPC Center
- Private Ambulance Dispatch
- \*Private Tow/Wrecker Dispatch
- Sabine River Authority Gulf Coast Division
- \*SETRPC Motorist Assistance Dispatch
- State EOC
- Trinity River Authority Control Center

**Information Service Provider Subsystem**

- Automated Calling System
- BMT Transit Website
- City of Port Arthur Transit Web Site
- KFDM Web Site
- LADOTD Traveler Information Website
- \*Private Sector Traveler Information Services
- SETRPC Website
- Statewide Crash Records Information System
- \*TxDOT 511 System
- \*TxDOT Beaumont District Public Information Office
- TxDOT Beaumont District Web Page
- TxDOT Highway Conditions Reporting System
- TxDOT Motor Carrier Routing Information

**Fleet and Freight Management Subsystem**

- \*Private Fleet Management Systems
- Rail Operations Center

**Commercial Vehicle Administration**

- Municipal or County Permitting System

**Traffic Management Subsystem**

- City of Beaumont Traffic Signal System
- City of Port Arthur Traffic Signal System
- DPS Communications Service
- LADOTD District 7 HQ
- TranStar and Other Texas Region TMCs
- TxDOT Beaumont District Office
- TxDOT Beaumont District Signal Shop
- TxDOT Fort Worth TMC (TransVision)

**Archived Data Management Subsystem**

- SETRPC Accident Database
- \*SETRPC Data System
- Statewide Crash Records Information System
- TxDOT Beaumont District Pavement Management System
- TxDOT Beaumont District Public Transportation Management System (PTMS)
- TxDOT Statewide Pavement Management System

**Archived Data User Systems**

- SETRPC Accident Database User Systems
- \*SETRPC Data System Users
- Statewide Crash Records Information System Users
- TxDOT Beaumont District Pavement Management System Users

**Asset Management**

- TxDOT Beaumont District Pavement Management System
- TxDOT BRINSAP

**Care Facility**

- Regional Medical Center

**Equipment Repair Facility**

- County Road and Bridge Equipment Repair
- TxDOT Beaumont District Shop

**Event Promoters**

- Municipal Convention and Visitors Bureau

**Financial Institution**

- \*Financial Institution

**Maintenance & Construction Admin**

- TxDOT Beaumont District Area Engineers Office

**Media**

- Local Print and Broadcast Media
- SETRPC Air Quality Information Office System

**Multimodal Transportation Service Provider**

- Regional Airports

**Other EM**

- \*Beaumont Region Incident and Mutual Aid Network

**Other Emissions**

- TCEQ State HQ

**Rail Operations**

- Rail Operations Centers

**Traveler Card**

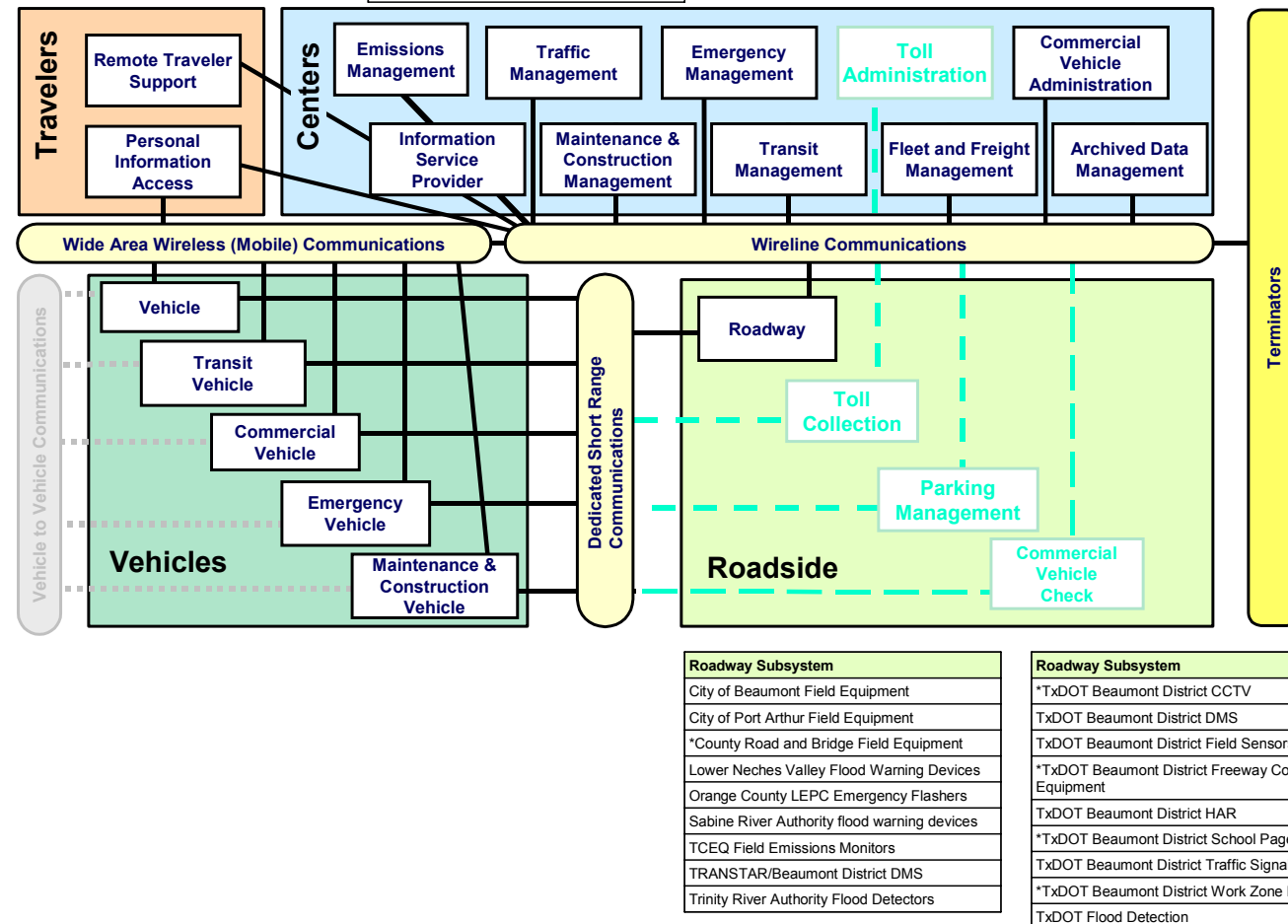
- \*Beaumont Regional Smart Card

**Wayside Equipment**

- Rail Operators Wayside Equipment

**Weather Service**

- National Weather Service



**Roadway Subsystem**

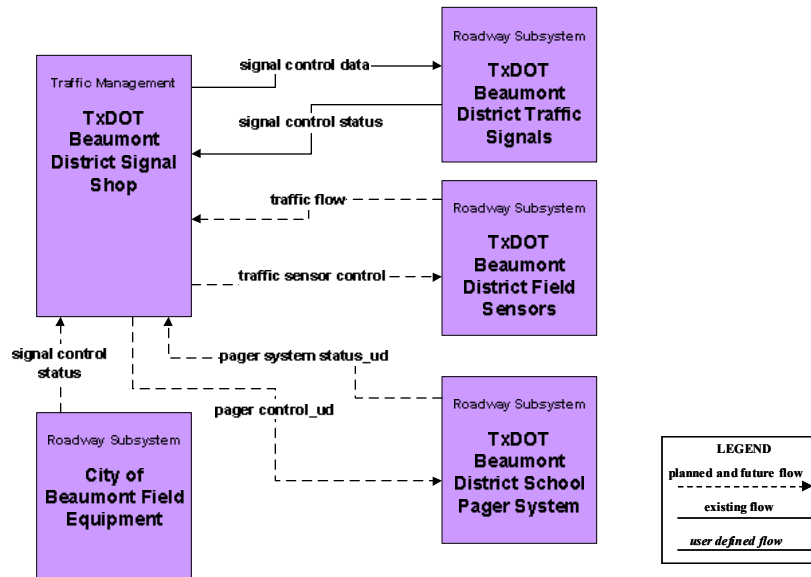
- City of Beaumont Field Equipment
- City of Port Arthur Field Equipment
- \*County Road and Bridge Field Equipment
- Lower Neches Valley Flood Warning Devices
- Orange County LEPC Emergency Flashers
- Sabine River Authority flood warning devices
- TCEQ Field Emissions Monitors
- TRANSTAR/Beaumont District DMS
- Trinity River Authority Flood Detectors

**Roadway Subsystem**

- \*TxDOT Beaumont District CCTV
- TxDOT Beaumont District DMS
- TxDOT Beaumont District Field Sensors
- \*TxDOT Beaumont District Freeway Control Equipment
- TxDOT Beaumont District HAR
- \*TxDOT Beaumont District School Pager System
- TxDOT Beaumont District Traffic Signals
- \*TxDOT Beaumont District Work Zone Equipment
- TxDOT Flood Detection

\* Elements are *planned or future*, not existing.  
 Last Updated: December 10, 2003

**Figure 3 – Beaumont Regional System Interconnect Diagram**



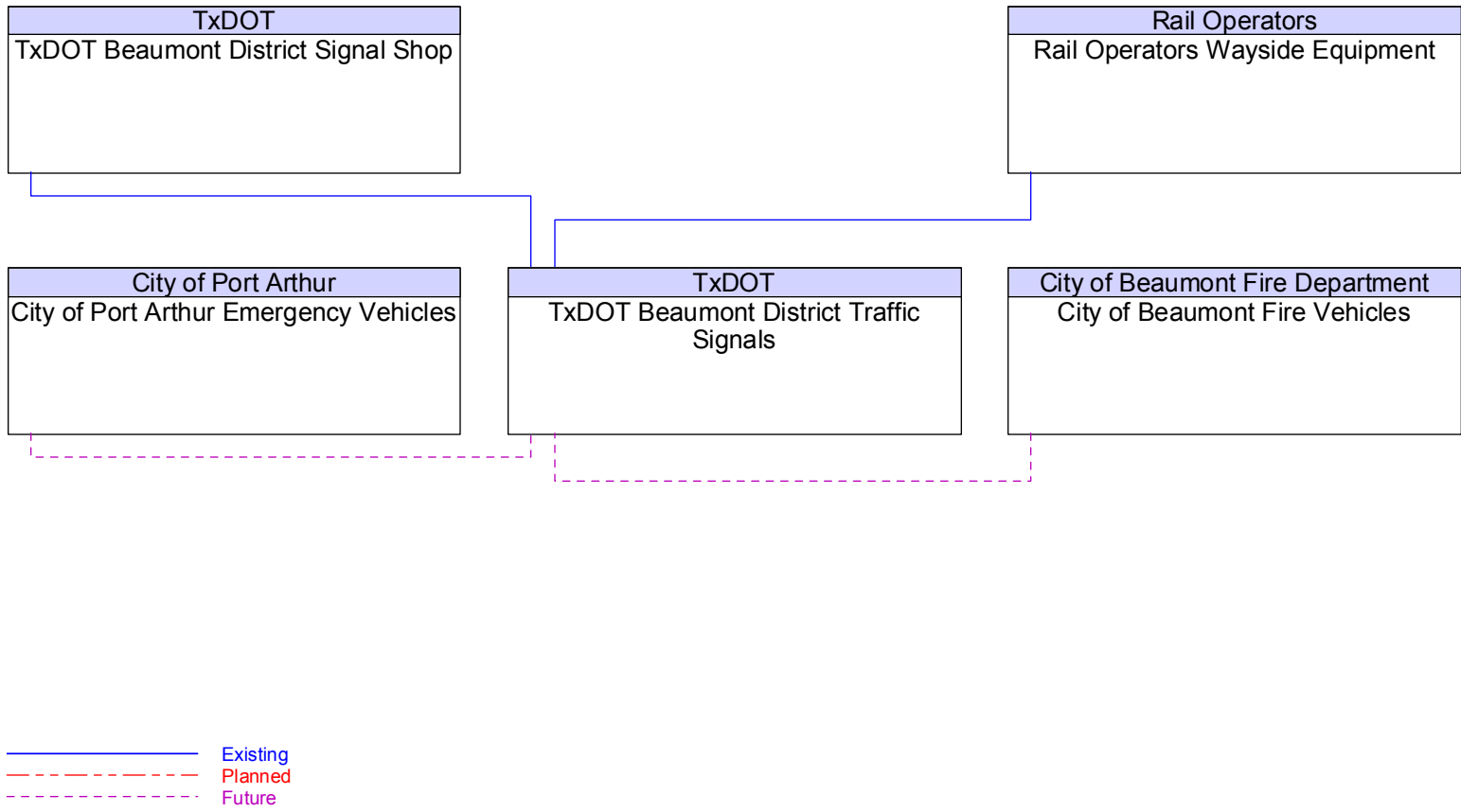
**Figure 4 – Beaumont Surface Street Control Customized Market Package**

More detailed interfaces were developed which identified the connectivity between the systems and elements. Each element identified in the ITS architecture for the Beaumont Region was mapped to the other elements that it must interface with. These interfaces were further defined by architecture data flows between individual elements that specify the information to be exchanged. The data flows include requests for information, alerts and messages, status requests, confirmations, and other information requirements.

While it is important to identify the various systems and stakeholders as part of a regional ITS, a primary purpose of the architecture is to identify the connectivity between transportation systems in the Beaumont Region. There are 119 different elements identified as part of the Beaumont Regional ITS Architecture. These elements include local and state traffic management/operations centers, transit vehicles, dispatch systems, emergency management agencies, and others – essentially, all of the existing and planned physical components that contribute to a Regional ITS. Interfaces have been identified for each element in the Beaumont Regional ITS Architecture, and each element has been mapped to those other elements with which it must interface.

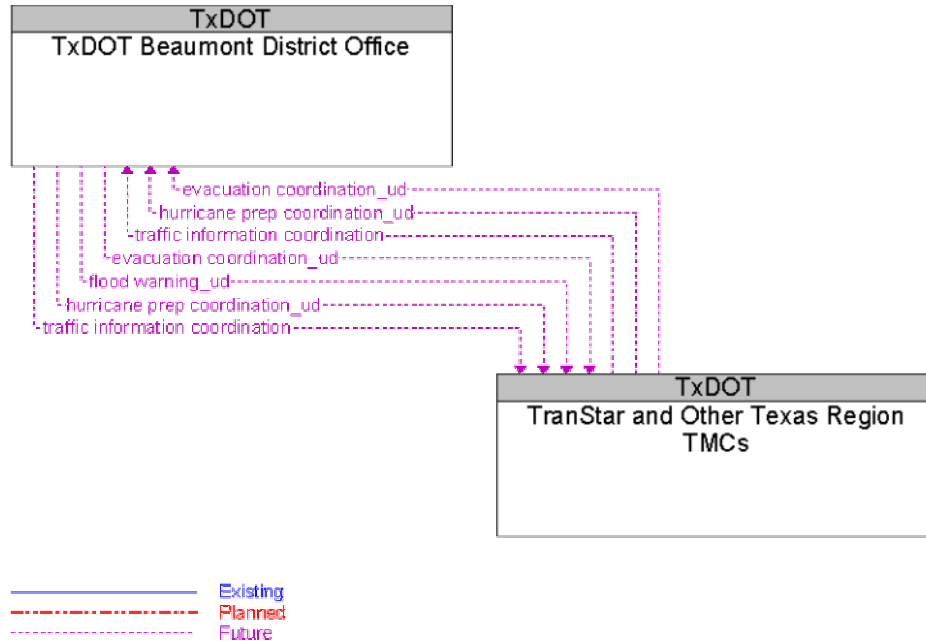
An example of one of the system interfaces is included as **Figure 5**. This graphic shows the TxDOT Beaumont District traffic signals and the existing and planned interfaces with other elements throughout the Region. These interfaces are shown as existing, planned, or future. Interfaces defined as planned have funding identified, while future interfaces are desired by stakeholders but funding has not yet been identified.

Architecture flows between the subsystems and terminators define the specific information (data) that is exchanged between subsystems and terminators. Each architecture flow has one or more data flows that specify what information is exchanged and the direction of the exchange.



**Figure 5 – TxDOT Beaumont District Traffic Signals Interfaces**

An example of the architecture flows between two elements is shown in **Figure 6**. In this interface, the flows between the TxDOT Beaumont District Office and TranStar and Other Texas Region TMCs show information that must go from the Beaumont District Office to other Texas TMCs, as well as information that the District Office needs from devices. Similar to the interfaces, architecture flows also are defined as existing, planned, or future. All of the architecture flows between elements have been included on the project website.



**Figure 6 – TxDOT Beaumont District Office to TranStar and Other Texas Region TMCs Architecture Flows**

With the required interfaces and interconnections identified, standards that could potentially be applied to the Beaumont Region were identified. Standards are an important tool that will allow efficient implementation of the elements in the Beaumont Regional ITS Architecture over time. They facilitate deployment of interoperable systems at local, regional, and national levels without impeding innovation as technology advances, vendors change, and as new approaches evolve.

### Operational Concept and Scenarios

An operational concept for the Beaumont Region was developed as part of the architecture process to illustrate how systems, components, and agencies will be integrated and function as a result of the framework provided by the Regional ITS Architecture. For the Beaumont Region, two concepts were illustrated. The first describes how ITS technologies could be used during a hurricane evacuation in the Region. The operational concept shows how through enhanced coordination and real-time travel information agencies are able to better coordinate wide area evacuations among traffic management and public safety. The second scenario describes a HAZMAT incident at a highway/rail intersection. In this scenario, ITS technologies are used to rapidly detect the impacts of the derailment, and multiple agencies can implement strategies to divert traffic, inform motorists, and coordinate with emergency response crews.

## Agreements

Interfaces and data flows among public and private entities in the Beaumont Region will require agreements among agencies that establish parameters for sharing agency information to support traffic and incident management, provide traveler information, and perform other functions identified in the Regional ITS Architecture. Recommended projects will result in systems and interfaces that will require inter-agency agreements, both public and private, to facilitate the exchange of information.

Currently, there are no formal agreements in place in the Beaumont Region. Stakeholders indicated that while there is a high degree of cooperation among agencies, there hasn't been a need for formal agreements to facilitate multi-jurisdictional resource sharing, cooperation, or mutual aid. With the implementation of ITS technologies, integration of systems from one or more agencies, and the anticipated level of information exchange identified in the architecture, it is likely that more formal agreements will be needed.

The following is a list of potential agreements for the Beaumont Region based on the interfaces identified in the Regional ITS Architecture and recommended ITS projects in the Deployment Plan:

- Data sharing and usage agreements among public agencies;
- Data sharing and usage agreements among public and private media and information service providers;
- Shared operations agreements for Ferry DMS;
- Shared video monitoring agreements between TxDOT and public safety agencies; and
- Mutual aid agreements among public sector agencies, primarily fire, police, emergency services, DPS, and TxDOT.

It is important to note that as ITS services and systems are implemented in the Region, part of the planning and review process for those projects should include a review of potential agreements that would be needed for implementation or operations.

## ITS Architecture Documentation

The Regional ITS Architecture for the Beaumont Region is documented in a final report. Stakeholders were brought together to review the Regional ITS Architecture and provide feedback. The final report was not prepared until after completion of the Beaumont Regional ITS Deployment Plan, to allow for modifications based on information and input received for the ITS Deployment Plan recommendations.

A website with all of the Regional ITS Architectures also was maintained. The website allowed stakeholders to review the architecture and provide comments directly to the project team through the website. At the time this report was published, the Beaumont Regional ITS Architecture website was being hosted at [www.consystec.com](http://www.consystec.com). The site can be accessed by selecting the link to Texas, and then the link to Beaumont. TxDOT plans to permanently host the site in the future at [www.dot.state.tx.us/trf/its](http://www.dot.state.tx.us/trf/its).



## BEAUMONT REGIONAL ITS DEPLOYMENT PLAN

Although development of an ITS deployment plan was not required by the FHWA Final Rule for the architecture, the Final Rule does request a sequence of projects required for implementation. Capitalizing on the momentum and interagency dialogue established during the development of the Beaumont Regional ITS Architecture, TxDOT chose to expand on the project sequence requirement to develop a formal ITS deployment plan for the Region.

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

### Prioritized Market Packages

Market packages for the Beaumont Region previously identified as part of the architecture were categorized into high, medium, and low priorities by stakeholders. The market package prioritization was a key factor in developing recommendations for ITS deployment and integration in the Beaumont Region. These priorities identified the key needs and services that are desired in the Region, as well as the interfaces that need to be established to provide integrated functionality and establish communication between elements.

It is important to note that the high, medium, and low priorities were not directly related to anticipated deployment timeframes (such as 5, 10, or 20 year deployment horizon). For example, a market package can be a high priority, but because of funding or prerequisite project requirements, it might not be feasible for deployment for several years. Maturity and availability of technology was another factor for prioritizing the market packages. Because market packages often represent groups of technologies or services to deliver a particular functionality, certain components of the market package could be identified as a high priority or existing capability, while other components would have a lower priority. Other considerations included whether or not the market package was better suited for deployment and operations by the private sector rather than public agencies in the Region.

**Table 2** shows the prioritization of the selected market packages for the Beaumont Region. The majority of these market packages fall into the high priority category. This category also includes market packages (or portions of market packages) that are already deployed in the Beaumont Region, such as surface street control and traffic information dissemination.



**Table 2 – Summary of Prioritized Market Packages for the Beaumont Region**

High Priority	Medium Priority	Low Priority
<ul style="list-style-type: none"> <li>▪ Network Surveillance</li> <li>▪ Surface Street Control</li> <li>▪ Traffic Information Dissemination</li> <li>▪ Regional Traffic Control</li> <li>▪ Incident Management System</li> <li>▪ Standard Railroad Grade Crossing</li> <li>▪ Railroad Operations Coordination</li> <li>▪ Roadway Maintenance and Construction</li> <li>▪ Work Zone Management</li> <li>▪ Work Zone Safety Monitoring</li> <li>▪ Maintenance and Construction Activity Coordination</li> <li>▪ Transit Vehicle Tracking</li> <li>▪ Transit Fixed-Route Operations</li> <li>▪ Demand Response Transit Operations</li> <li>▪ Transit Security</li> <li>▪ Multimodal Coordination</li> <li>▪ Transit Traveler Information</li> <li>▪ Broadcast Traveler Information Systems</li> <li>▪ HAZMAT Management</li> <li>▪ Emergency Response</li> <li>▪ Roadway Service Patrol</li> <li>▪ ITS Data Mart</li> </ul>	<ul style="list-style-type: none"> <li>▪ Freeway Control</li> <li>▪ Emissions Monitoring and Management</li> <li>▪ Transit Passenger and Fare Management</li> <li>▪ Emergency Routing</li> <li>▪ Commercial Vehicle Administrative Processes</li> <li>▪ ITS Data Warehouse</li> </ul>	<ul style="list-style-type: none"> <li>▪ Probe Surveillance</li> <li>▪ Maintenance and Construction Vehicle Tracking</li> <li>▪ Maintenance and Construction Vehicle Maintenance</li> <li>▪ Weather Information Processing and Distribution</li> <li>▪ ISP Based Route Guidance</li> </ul>

Each of the prioritized market packages was assessed from the perspective of deployment status (which components, if any, were already existing in the Region), as well as any planned or additional new needs to bring the market package to the desired level of functionality in the Beaumont Region. Each market package analysis included:

- A brief definition of the market package (modified from the National ITS Architecture definitions);
- Any infrastructure or components from that market package that is already existing in the Beaumont Region;
- Agencies currently operating or maintaining systems that apply to that market package;

- Planned projects that will address some or all of the services that are contained in the market package; and
- Any additional needs to bring the market package to the desired level of deployment or functionality.

### **ITS Project Recommendations for the Beaumont Region**

Using the needs, market package priorities, and any planned projects identified by the stakeholders during the architecture process, a list of recommended ITS projects for the Beaumont Region was developed. These projects were refined and additions and deletions were made by the Regional stakeholders at the ITS Deployment Plan Workshop in June 2003.

Recommended ITS projects for the Beaumont Region were categorized into short-, medium-, and long-term timeframes for programming in the 5, 10, and 20 year horizons. This was done based on current status if the project had previously been identified and planned by the Region, market package priority, and dependency on other project completions. The majority of the short term or 5-year recommendations serve as “foundation” projects to implement basic functionality, infrastructure, and interfaces, with the intent of continuing to build out those foundation projects over the 10 and 20 year timeframes. Most projects for the Beaumont Region are infrastructure based; however, there are some recommendations that focus more on institutional practices and interconnectivity to enhance coordination and communications.

Each recommended project for the Beaumont Region was included in a short-, medium-, or long-term table. These tables provided the name of the project, primary operating/implementing agency, a planning level estimate of probable cost, an indication of whether or not funding had been identified for that specific project, and an estimated project duration. Following each table, detailed descriptions of each project were developed, which also included associated market packages and any pre-requisite project requirements.

**Table 3** summarizes the ITS projects recommended for the Beaumont Region. This summary is divided into the major program areas and subdivided by timeframe. As can be seen from this summary, the majority of the project recommendations focus on the Travel and Traffic Management category, which would implement surface street traffic management, traveler information, and inter-agency coordination elements.

**Table 3 – Recommended ITS Projects for the Beaumont Region**

<b>Project Time Frame</b>	<b>Project Name</b>	<b>Funding Identified (Funding Agency if Applicable)</b>
<b><i>Travel and Traffic Management</i></b>		
Short Term Projects 5-year Horizon	TxDOT Beaumont Freeway Management System Phase 1	No
	TxDOT Advanced Traffic Management System (ATMS)	Yes (TxDOT Statewide)
	TxDOT Ramp Control System	No
	TxDOT Highway Advisory Radio	No
	TxDOT Beaumont Remote Workstations	Yes (TxDOT)
	TxDOT Closed Loop Signal System Upgrades	Yes (TxDOT)
	TxDOT Closed Loop Signal System Expansion Phase 1	Yes (TxDOT)
	TxDOT Beaumont District Web Page	No
	TxDOT Center-to-Center Communications	Yes (TxDOT Statewide)
	City of Beaumont Traffic Signal System Upgrade/Expansion Phase 1	No
	City of Port Arthur Traffic Signal System Upgrade/Expansion Phase 1	No
	Interstate Coordination	No
	City of Beaumont Rail Crossing Warning System	No
Mid Term Projects 10-year Horizon	TxDOT Beaumont Freeway Management System Phase 2	No
	TxDOT Closed Loop Signal System Expansion Phase 2	No
	Regional 511 Advanced Traveler Information System Server	No
	TxDOT Rest Stop/Welcome Center Kiosks	No
	City of Beaumont Traffic Signal System Expansion Phase 2	No
	City of Beaumont CCTV	No
	City of Port Arthur Traffic Signal System Expansion Phase 2	No
	City of Port Arthur CCTV	No
	City of Beaumont/TxDOT District Office Connection	No
	City of Port Arthur/TxDOT District Office Connection	No
	City of Beaumont Rail Crossing Warning System Expansion	No
	City Port Arthur Rail Crossing Warning System Phase 1	No

**Table 3 – Recommended ITS Projects for the Beaumont Region (continued)**

<b>Project Time Frame</b>	<b>Project Name</b>	<b>Funding Identified (Funding Agency if Applicable)</b>
<b><i>Travel and Traffic Management (continued)</i></b>		
Long Term Projects 20-year Horizon	TxDOT Beaumont Freeway Management System Additional Phases	No
	TxDOT Closed Loop Signal System Expansion Phase 3	No
	City of Beaumont Traffic Signal System Expansion Phase 3	No
	City of Port Arthur Traffic Signal System Expansion Phase 3	No
	Emissions/Air Quality Management System	No
	ISP-based Route Guidance	No
<b><i>Emergency Management</i></b>		
Short Term Projects 5-year Horizon	DPS/TxDOT District Office Connection	No
	DPS Computer Aided Dispatch System	No
	Emergency Management Agencies/TxDOT District Office Connection	No
	River Authority/TxDOT District Office Connection	No
	Emergency Vehicle Traffic Signal Preemption	Yes (SETRPC/TxDOT/Fire)
	Motorist Assistance Patrol	Yes (SETRPC)
	Emergency Call-Out System	No
Mid Term Projects 10-year Horizon	TxDOT Flood Detection Stations Phase 1	No
	EOC/TxDOT District Office Connection	No
	Emergency Vehicle Traffic Signal Preemption Expansion	No
	DPS AVL System	No
	City of Port Arthur Emergency Vehicle AVL	No
	City of Orange Emergency Vehicle AVL	No
Long Term Projects 20-year Horizon	TxDOT Flood Detection Phase 2	No
	Motorist Assistance Patrol Expansion	No
<b><i>Maintenance and Construction Management</i></b>		
Short Term Projects 5-year Horizon	TxDOT HCRS Enhancements	Yes (TxDOT Statewide)
	TxDOT Portable DMS	No
	County Portable DMS	No

**Table 3 – Recommended ITS Projects for the Beaumont Region (continued)**

<b>Project Time Frame</b>	<b>Project Name</b>	<b>Funding Identified (Funding Agency if Applicable)</b>
<b><i>Maintenance and Construction Management (continued)</i></b>		
Mid Term Projects 10-year Horizon	TxDOT Regional Maintenance Decision Support System	No
	TxDOT Maintenance Vehicle AVL and CAD System	No
	TxDOT Portable Smart Workzones	No
	Port Arthur Municipal Vehicle AVL Phase 1	No
	County Maintenance Vehicle AVL	No
Long Term Projects 20-year Horizon	TxDOT Automated Maintenance Vehicles	No
	Port Arthur Municipal Vehicle AVL Phase 2	No
	Beaumont Municipal Maintenance Vehicle AVL	No
<b><i>Public Transportation Management</i></b>		
Short Term Projects 5-year Horizon	Beaumont Municipal Transit AVL	No
	Port Arthur Transit AVL	No
	Web-based Transit Traveler Information	No
	SETRPC Computer Aided Dispatch	No
Mid Term Projects 10-year Horizon	Beaumont Municipal Transit Security System	No
	Port Arthur Transit Security System	No
	BMT/PAT Passenger Fare Card	No
	PAT Transit Security Cameras	No
	Beaumont Municipal Transit Information Kiosks	No
	Port Arthur Transit Information Kiosks	No
	SETRPC Automated Fare and Passenger Information System	No
Long Term Projects 20-year Horizon	SETRPC Paratransit Web-Based Scheduling System and Trip Planner	No
	BMT Paratransit Web-Based Scheduling System and Trip Planner	No
	PAT Paratransit Web-Based Scheduling System and Trip Planner	No
<b><i>Information Management</i></b>		
Short Term Projects 5-year Horizon	Regional Accident/Crash Database	Yes (SETRPC)
Mid Term Projects 10-year Horizon	N/A	N/A
Long Term Projects 20-year Horizon	N/A	N/A

**Table 3 – Recommended ITS Projects for the Beaumont Region (continued)**

Project Time Frame	Project Name	Funding Identified (Funding Agency if Applicable)
<b><i>Commercial Vehicle Operations</i></b>		
Short Term Projects 5-year Horizon	N/A	N/A
Mid Term Projects 10-year Horizon	HAZMAT Tracking	No
	Regional HAZMAT Permitting Coordination	No
Long Term Projects 20-year Horizon	Truck Stop Electrification	No

## **MAINTAINING THE REGIONAL ITS ARCHITECTURE AND DEPLOYMENT PLAN**

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

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

At the Comment Resolution Meeting in October 2003, stakeholders recommended that a meeting be held on an annual basis to review the existing Regional ITS Architecture and ITS Deployment Plan. At these annual meetings, stakeholders should identify which projects in the ITS Deployment Plan have been deployed. New projects that are recommended by a stakeholder for inclusion in the ITS Deployment Plan should also be discussed to ensure that the Region as a whole feels that the project agrees with regional needs and priorities. This same type of consensus building should also be used should the geographic scope of the Region need to change or should additional stakeholders need to be added to the Regional ITS Architecture and ITS Deployment Plan.

Stakeholders also recommended that the Beaumont Regional ITS Architecture and ITS Deployment Plan be updated every two years to correspond with the TIP update. At this time, input and changes agreed upon at the annual review meeting will be incorporated into the document. Any new market packages that have been added to the National Architecture should be reviewed to see if they are applicable to the Beaumont Region. Data flows in existing market packages should also be reviewed to determine if any planned/future flows are now existing. The Deployment Plan will be updated to reflect projects that have been deployed, new projects that are necessary, and to reprioritize projects currently shown in the plan. Projects that are added to the ITS Deployment Plan should also be reviewed closely to determine if they fit into the current ITS Architecture for the Beaumont Region. If a new project does not fit into the ITS Architecture, then the ITS Architecture will need to be revised to include the necessary links and data flows for the project.

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

## MEMORANDUM OF UNDERSTANDING

As a final step in the development of the Beaumont Regional ITS Architecture and Deployment Plan, a Memorandum of Understanding (MOU) was prepared for the participating stakeholder agencies. The MOU was developed for stakeholders to acknowledge their participation and approval of the plan, and pledge their support in the implementation and operation of intelligent transportation systems in the Beaumont Region. Also included in the MOU was a pledge to provide TxDOT with the information necessary to maintain the Regional ITS Architecture and ITS Deployment Plan.

Those stakeholders that were asked to sign the MOU represented agencies that will have the greatest impact in the Region in terms of ITS deployments and system operations. Stakeholder agencies that were asked to sign the MOU for the Beaumont Regional ITS Architecture and Deployment Plan included the following:

- Chambers County;
- City of Beaumont;
- City of Bridge City;
- City of Groves;
- City of Nederland;
- City of Orange;
- City of Pinehurst;
- City of Port Arthur;
- City of Port Neches;
- City of Vidor;
- City of West Orange;
- Hardin County;
- Jefferson County;
- Kansas City Southern Railway;
- Louisiana Department of Transportation and Development;
- Orange County;
- Southeast Texas Regional Planning Commission;
- Texas Department of Public Safety; and
- Texas Department of Transportation.