November 7, 2024

H-GAC ITS Architecture and Website Update

TSMO Subcommittee Meeting

Houston-Galveston Area Council

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STEVENS TECHNICAL

s+v+traffic
snyder | voigt traffic engineers

Project Goals

H-GAC ITS ARCHITECTURE AND WEBSITE UPDATE

1. Update the **existing H-GAC Regional ITS Architecture** to the current National ITS Architecture (Version 9.2)
2. Develop an ITS inventory software analysis tool that will **assist in transportation project prioritization**, benefit cost analysis, and economic impact analysis
3. Update and advance the existing Transportation Systems Management and Operations (TSMO) website
4. Create a **Geographic Information System (GIS) database of all ITS and signal fiber in the eight-county MPO**
5. Develop a standard method for collecting inventories and implementation plans from each stakeholder agency
6. Meet with all **eight counties and in the region (and cities)** to verify existing inventory and obtain plans for new ITS, signals, TMCs, and other deployments to be implemented over the next seven years
7. Meet with the **TxDOT Houston and Beaumont Districts** to inventory all existing ITS, signal, and tolling facilities and document their implementation plans for the next seven to 10 years
8. Determine which **cities will potentially surpass 50,000 residents** in the 2030 Census **and meet with them** to document their existing ITS and signal inventories and implementation plans leading up to 2030
9. Meet with all **Toll Authorities** in the MPO to inventory all existing ITS, signal, and tolling facilities and document the implementation plans for each for the next seven to 10 years

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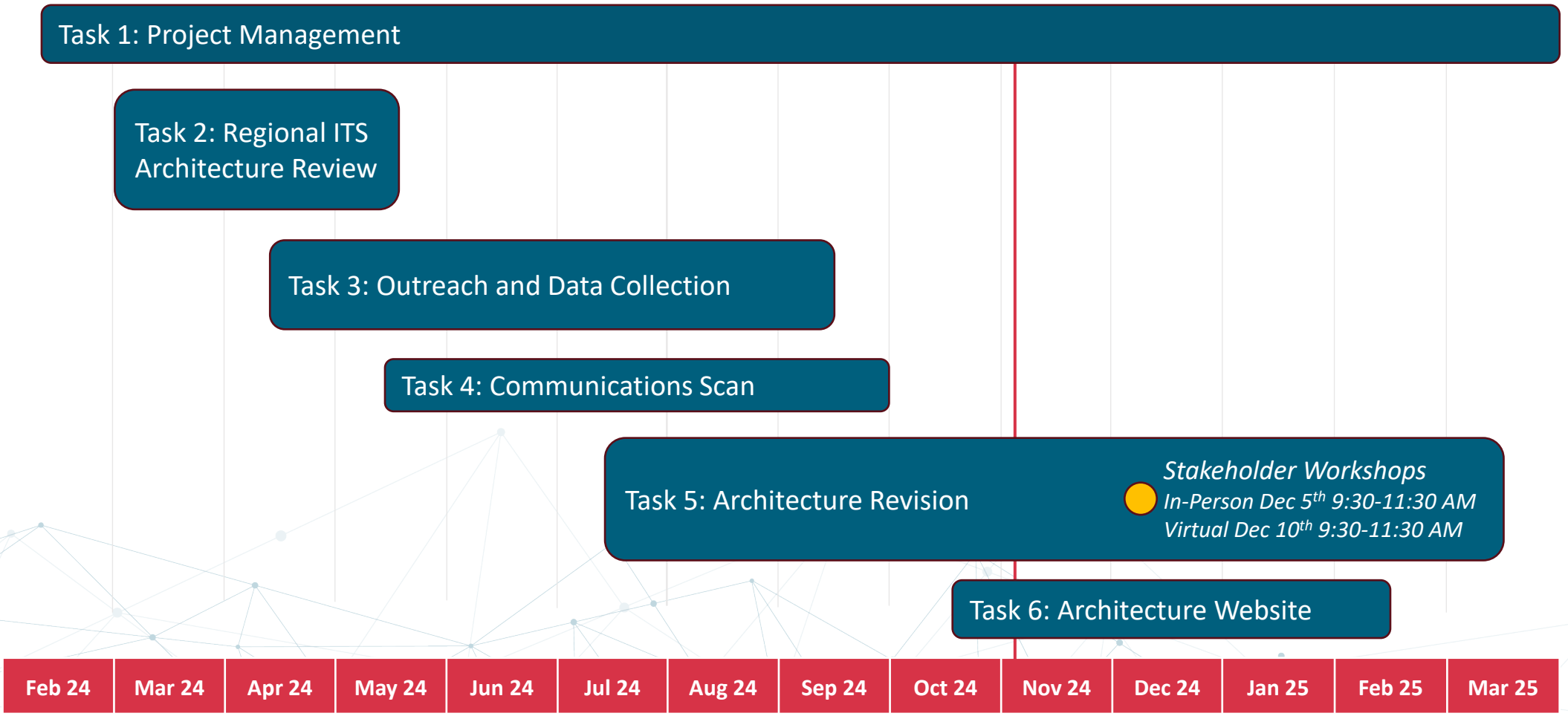
Stakeholder Agencies Interviewed

H-GAC Counties	H-GAC Cities	Regional and State Agencies
Brazoria	Baytown	Harris County Toll Road Authority
Chambers	Galveston	Harris County Transit
Fort Bend	Houston	Houston Metro
Galveston	League City	Port Freeport
Harris	Missouri City	Port Houston
Montgomery	Pearland	TxDOT Beaumont District
Waller	Sugar Land	TxDOT Houston District
		The Woodlands Regional Transit Authority

Key Tasks and Timeline



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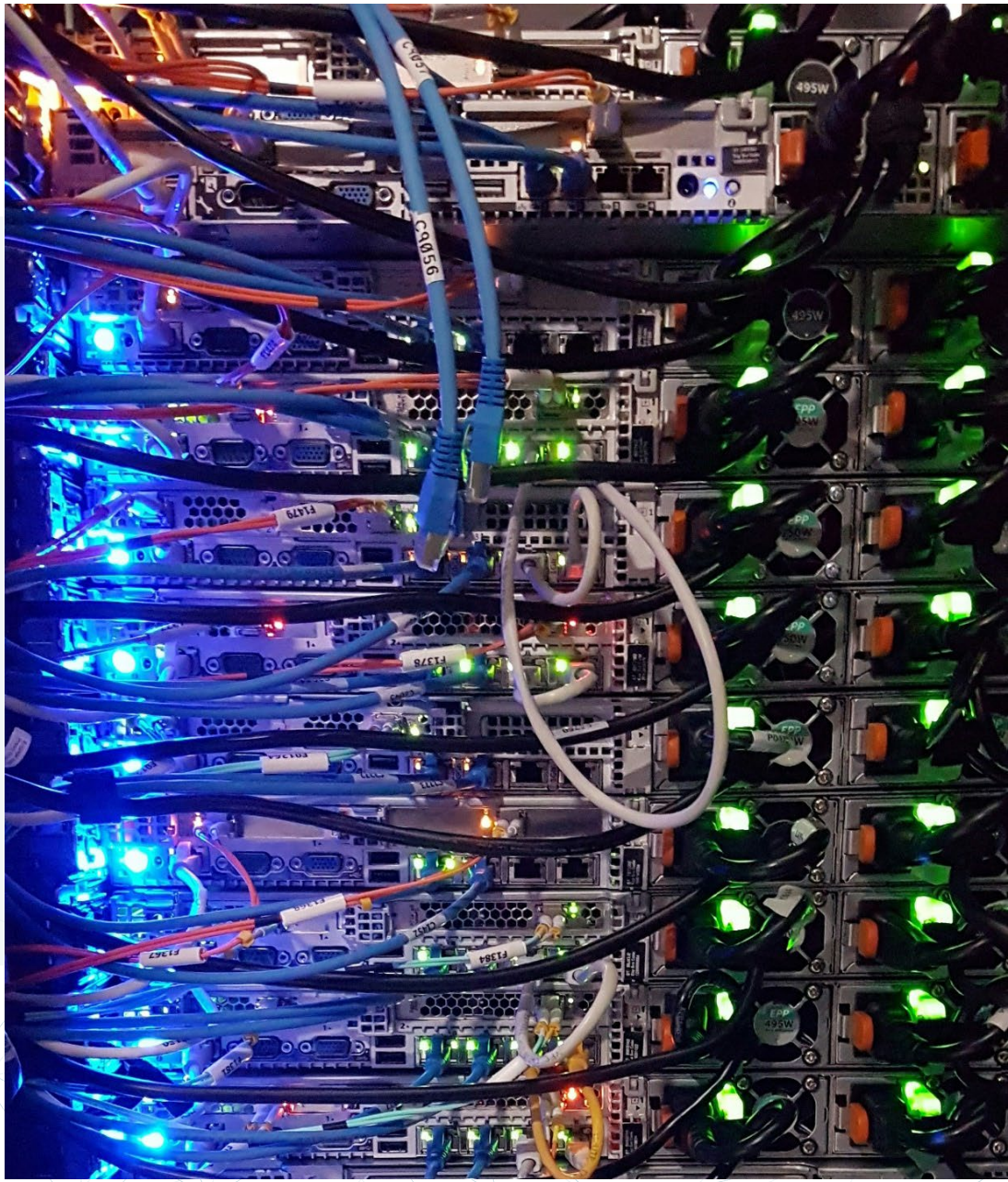
Communications Scan



Communications Scan

Documented Existing Fiber Optic Communications in the H-GAC Region

Examined ITS Communications Options

ITS Communication	Advantages	Disadvantages	Best Practice
Fiber Optic Communications	• Advanced data transfer capabilities • Transmits large amounts of data over long distances • Can be installed while constructing roadways as a small percent of a project	• High cost when installed as a stand-alone project in urban areas	• Urban areas • Installed as part of roadway construction projects
Cellular Communications	• Cost effective for simple applications such as device monitoring and control	• Susceptible to regional power outages • Requires re-occurring costs	• Remote and isolated locations • Short-term solution
Radio Communications	• Cost effective • Transmits data, voice, and video over long distances	• Requires line of sight • Unique maintenance skills required	• Rugged terrain • Bodies of water • Remote locations

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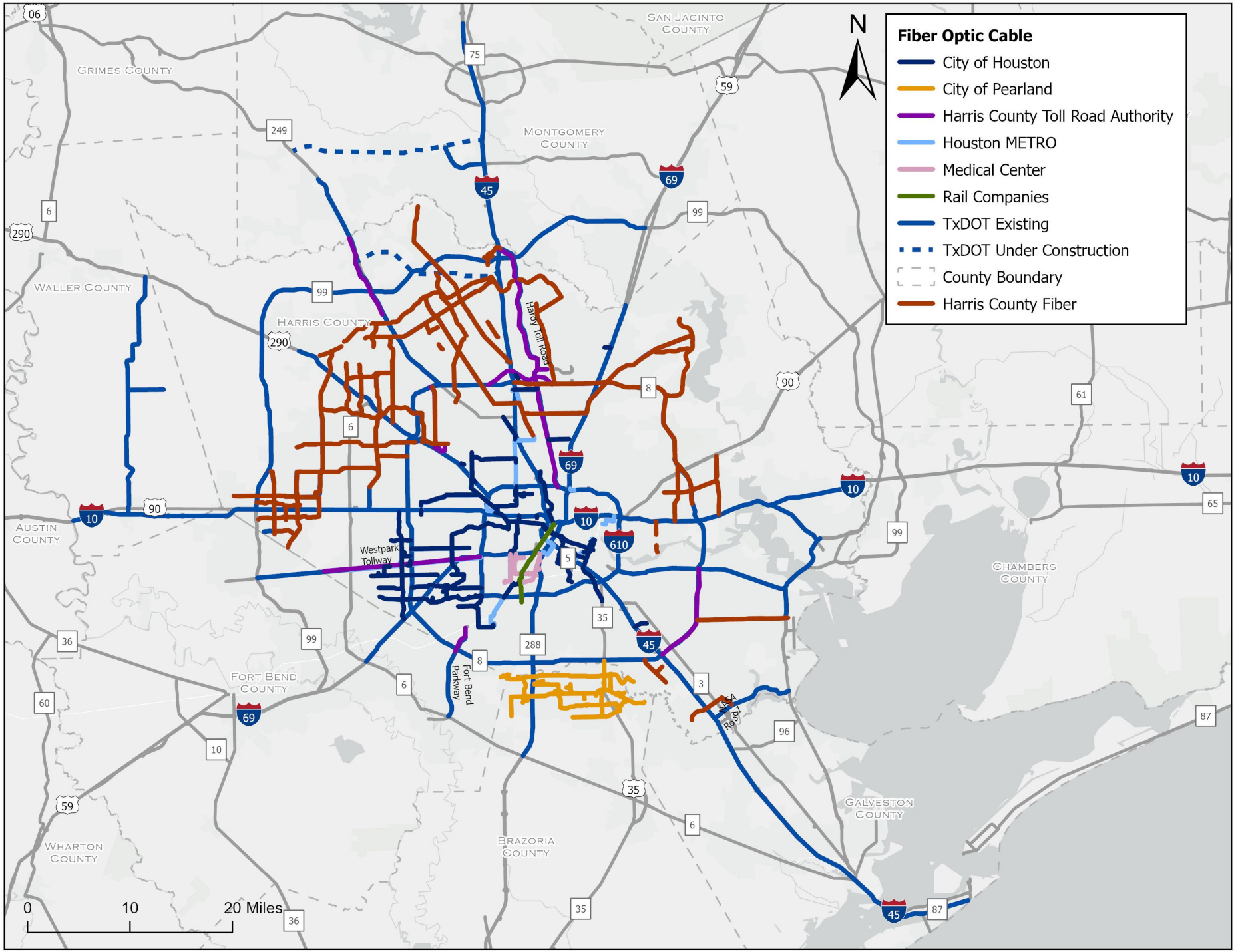
N
Fiber Optic Cable
City of Houston
City of Pearland
Harris County Toll Road Authority
Houston METRO
Medical Center
Rail Companies
TxDOT Existing
TxDOT Under Construction
County Boundary
Harris County Fiber
San Jacinto County
Grimes County
Montgomery County
Waller County
Harris County
Austin County
Fort Bend County
Wharton County
Brazoria County
Galveston County
Chambers County
Hardy Toll Road
Westpark Tollway
Fort Bend Parkway
0
10
20 Miles

Communications Scan

City of Pearland Case Study

- Found fiber to be the most beneficial and reliable form of communications
- Reliability of 14-year period
  - Underground fiber – Three incidents of damage
  - Above ground fiber – Six incidents of damage
- Prioritized installing fiber conduit with all roadway construction projects
  - Cost effective to do concurrently
  - Additional fiber strands installed
- Targeted fiber deployment in other locations
- Established redundancy within fiber network throughout city limits
- Available for all city departments
- Credited much of the success to relationship of Engineering and Public Works Department with IT Department

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Stakeholder Input

Needs

Regional Needs

COMMON REGIONAL NEEDS
Commercial Vehicle Operations
Deploy freight signal priority
Provide truck drivers with parking information and availability
Parking Management
Provide parking availability information for vehicles
Public Transportation
Install transit signal priority
Develop a regional transit fare application
Public safety
Expand emergency vehicle preemption
Data and Information Management
Develop data sharing agreements and expand data sharing capabilities
Improve utilization of data through dashboards, notification, and automation
Develop CCTV camera sharing network to share live video feeds
Expand fiber communications network
Share fiber network where appropriate
Traffic Management
Improve traffic signal timing and coordination between jurisdictions
Expand the CCTV camera network
Expand the DMS network (Including color and arterial DMS)
Deploy railroad monitoring system that provides notification of blockages
Deploy wrong-way driving detection and alert systems
Improve traffic incident management
Weather
Deploy road weather information systems (RWIS) for flood monitoring

Regional ITS Service Packages

- ITS service packages represent slices of the ITS architecture that map out specific services that ITS can provide
- ITS service packages include ITS elements and data flows for each service
- National ITS Architecture includes 150 ITS service packages
- Examples include
  - Infrastructure-Based Traffic Surveillance
  - Transit Signal Priority
  - Traffic Information Dissemination
  - Wrong-Way Vehicle Detection and Warning
- H-GAC ITS Architecture includes
  - ITS service packages for **TxDOT Houston, TxDOT Beaumont**, **Harris County, City of Houston,** and **transit agencies** within the Region
  - ITS service packages also included for agencies with unique ITS deployments or needs
- Local Agencies placeholder used for future ITS service packages

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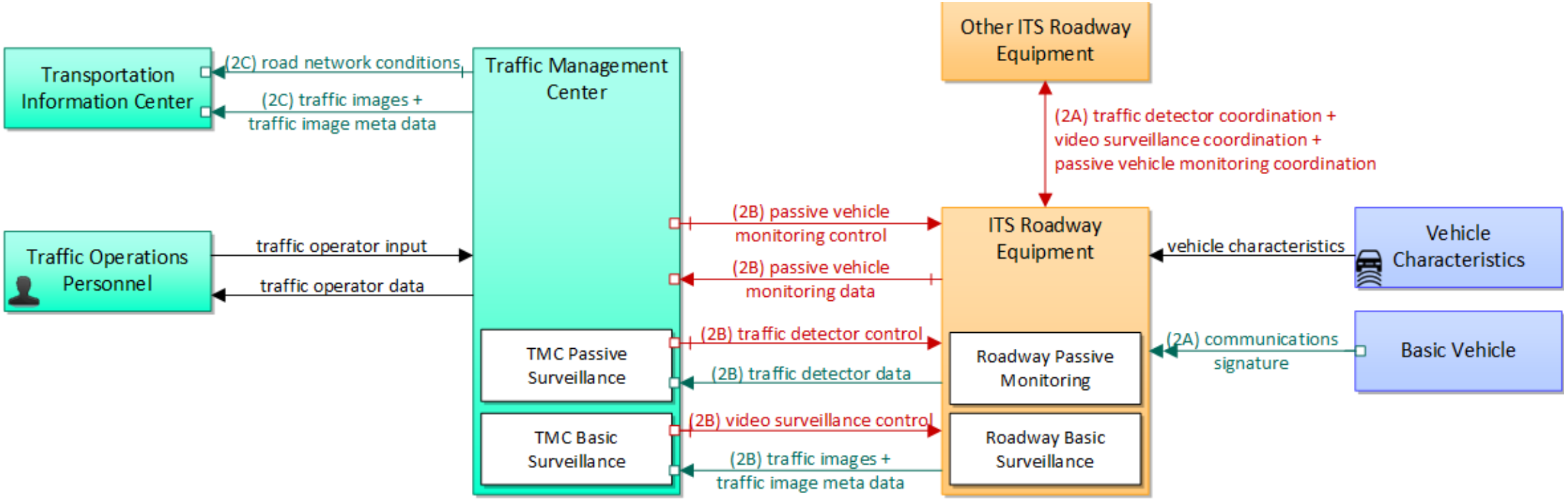
Regional ITS Service Packages



National ITS Architecture Service Package

TM01 Infrastructure-Based Traffic Surveillance

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Regional ITS Service Packages

Summary of ITS Service Packages in the 2017 H-GAC Regional ITS Architecture

52 Total Service Packages

- Commercial Vehicle Operations (2)
- Data Management (1)
- Maintenance and Construction (4)
- Parking Management (2)
- Public Safety (9)
- Public Transportation (11)
- Support (2)
- Sustainable Travel (0)
- Traffic Management (15)
- Traveler Information and Personal Mobility (3)
- Vehicle Safety (0)
- Weather (3)

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Regional ITS Service Packages

Summary of **NEW** ITS Service Packages in the 2024 H-GAC Regional ITS Architecture

17 New Service Packages

- Commercial Vehicle Operations (2)
- Data Management (1)
- Maintenance and Construction (1)
- Parking Management (3)
- Public Safety (0)
- Public Transportation (0)
- Support (0)
- Sustainable Travel (1)
- Traffic Management (4)
- Traveler Information and Personal Mobility (1)
- Vehicle Safety (4)
- Weather (0)

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Regional ITS Service Packages

Summary of **NEW** ITS Service Packages in the 2024 H-GAC Regional ITS Architecture

17 New Service Packages

Commercial Vehicle Operations (2)

- CVO05 Commercial Vehicle Parking
- CVO06 Freight Signal Priority

Data Management (1)

- DM02 Performance Monitoring

Maintenance and Construction (1)

- MC02 Maintenance and Construction Vehicle Maintenance

Parking Management (3)

- PM02 Smart Park and Ride System
- PM04 Regional Parking Management
- PM06 Loading Zone Management

Sustainable Travel (1)

- ST06 HOV/HOT Lane Management

Traffic Management (4)

- TM04 Connected Vehicle Traffic Signal System
- TM20 Variable Speed Limits
- TM24 Tunnel Management
- TM25 Wrong Way Vehicle Detection

Traveler Information and Personal Mobility (1)

- TI07 In-Vehicle Signage

Vehicle Safety (4)

- VS07 Road Weather Motorist Alert and Warning
- VS08 Queue Warning
- VS09 Reduced Speed Zone Warning / Lane Closure
- VS16 Automated Vehicle Operations

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Potential ITS Focus Areas within the Region

Potential ITS Focus Areas

Project Deployments

Expand CCTV Camera and DMS Coverage on Freeways and Arterials

Develop Regional CCTV Camera Video Sharing System

Deploy Railroad Crossing Detection and Notification Systems

Develop Regional Transit Rider Application

Expand Fiber Optic Communication Network

Operations and Staffing

Improve Signal Timing on Arterials and Across Jurisdictional Boundaries

Improve Interagency Incident Coordination

Automate Operational Capabilities (Includes Data Sharing)

Increase Staffing for ITS

ITS Project Selection and Ranking System

Review Current H-GAC ITS Project Selection and Ranking

Review National Best Practices Used by Other MPOs

Revised Scoring System for ITS Projects

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ITS Architecture Use & Maintenance

ITS Architecture Training

- On-line ITS Architecture training session to be located on the H-GAC TSMO website
- Will cover use of the architecture for:
  - Systems Engineering Analysis
  - Establishing ITS Architecture Conformity
  - Project Integration
  - Standards
- Process for requesting and documenting future changes to the ITS Architecture

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ITS Architecture Future Updates

- H-GAC will maintain and update the Regional ITS Architecture
- Minor updates of the Regional ITS Architecture will occur as projects are developed or deployed
- Requests for changes should be submitted to H-GAC
- H-GAC will review the Regional ITS Architecture on a regular basis to determine if a major update is needed
- Major updates of the plan will occur on an as-needed basis

Stakeholder Review Workshop

Stakeholder Review Workshop

Agenda

In-Person: Thursday December 5th
9:30 AM – 11:30 AM

Virtual: Tuesday December 10th
9:30 AM – 11:30 AM

9:30 AM **Welcome and Introductions**

9:40 AM **Presentation on the H-GAC Intelligent Transportation System (ITS) Architecture Plan Update Project**
Overview of the ITS Architecture Project
Overview of the ITS Architecture Update Process

9:50 AM **Discussion on the ITS Needs Identified for the Region**

10:10 AM **Discussion on ITS Service Packages from the National ITS Architecture Identified for the Region**

10:20 AM **Discussion on Key Regional Projects and Programs Recommended in the Plan**
Define Projects and Programs
Identify Lead and Supporting Agencies
Identify Timeframe and Priority

11:10 AM **Use and Maintenance of the ITS Architecture Plan**
ITS Architecture Website
ITS Architecture Training
Future Updates

11:30 AM **Adjourn**

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Intelligent Transportation Systems (ITS) Workshop

In-Person Workshop: December 5
9:30 AM - 11:30 AM

H-GAC, 2nd Floor Conference Rooms A, B, C
3555 Timmons Ln., Houston, TX 77027

Virtual Workshop: December 10
9:30 AM - 11:30 AM

Register Now!

hhttps://www.h-gac.com/events/its-architecture-workshop

MUST REGISTER TO ATTEND

**If attending virtually, you will receive a confirmation email along with a link to the workshop.*

Intelligent Transportation Systems (ITS) architecture combines information and communications technologies with transportation infrastructure and vehicle systems in an attempt to maximize mobility, safety, and efficiency, while minimizing cost and environmental impacts. ITS Architecture enables agencies to use technology to optimally operate and manage their facilities in the most efficient and safe manner possible.

For more information, contact: Francis Rodriguez | Francis.Rodriguez@h-gac.com | 713-993-2437

Next Steps

- Continue Update to the Regional ITS Architecture
- Update ITS Scoring System for H-GAC Funded Projects
- Conduct Stakeholder Workshops
  - In Person – December 5th 9:30AM to 11:30AM
  - Virtual – December 10th 9:30AM to 11:30AM
- Develop Training Classes for the Regional ITS Architecture

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Thank You

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