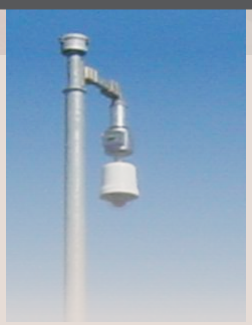
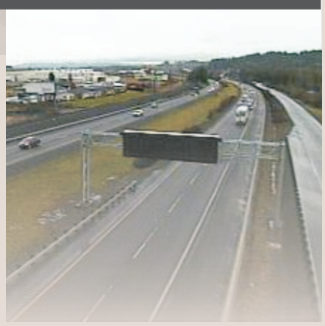
Central Willamette Valley
ITS Plan

Prepared for

OREGON DEPARTMENT OF TRANSPORTATION

ODOT

Prepared by

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TRANSPORTATION SOLUTIONS

In association with

IBI GROUP

December 2010

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

APPENDIX

EXECUTIVE SUMMARY

The *Central Willamette Valley Intelligent Transportation System (ITS) Plan* defines advanced technologies that support regional transportation initiatives such as promoting travel options, optimizing transportation system performance, and reducing the frequency and effects of incidents. The plan was developed collaboratively with a Steering Committee made up of key stakeholders from across the region. Key sections of this *ITS Plan* are summarized below.

Regional ITS Vision

The regional vision for ITS in the Central Willamette Valley is to:

> *Manage and operate a safe, multi-modal transportation system that makes the best use of available capacity and optimizes existing and future operations investments in the Central Willamette Valley.*

Specific goals, objectives, and guiding principles supporting the vision are described in Chapter 2.

Regional ITS Architecture

The regional ITS architecture provides a framework that describes the functions of system components, how the components interconnect, the organizations involved, and the type of information to be shared. The architecture benefits regional ITS planning because it presents a common system framework and identifies standards that promote interoperable systems between the range of stakeholders. Using common system standards should maximize the return on investment and enable real-time information sharing between stakeholders. In addition, the architecture satisfies an important requirement from the Federal Highway Administration (FHWA) and the Federal Transit Administration (FTA) regarding transportation funding. FHWA and FTA require regional ITS architectures for ITS projects using federal funds. The appendix includes a checklist that shows how the Central Willamette Valley regional ITS architecture meets federal requirements.

The ITS architecture should be used for project development and will require updates as projects are deployed and priorities change. A maintenance plan for updating the ITS architecture is detailed in Chapter 8.

Operational Concept

The operational concept, which supplements the ITS architecture, describes the agency roles and responsibilities that support implementation of ITS technologies and services. Agency roles and responsibilities are described for activities such as design, construction, integration, planning, operations, and maintenance. In addition, the operational concept the information shared between agencies at a high level. Each operational concept includes a diagram of stakeholder relationships for key ITS functional categories: traffic management and operations, public transportation management, traveler information, incident and emergency management, and data management.

ITS Action Plan

The ITS Action Plan includes advanced technologies and management strategies that improve the safety and efficiency of the transportation system and improve the traveler experience for all modes in the Central Willamette Valley. The ITS Action Plan includes specific ITS projects and deployment priorities. A total of 43 ITS projects were identified for the Central Willamette Valley to support the region's vision and goals. The ITS projects that best fit the region's vision can be described as follows:

- **Expand Traveler Information Services** - Provide traveler information on arterial roadways and support multimodal route planning and guidance.
- **Implement Transit Service Enhancements** - Improve transit speed and reliability and broadcast real-time vehicle location and stop arrival information.
- **Enhance Safety of Alternative Modes** - Improve bicycle detection and provide bicycle signal timing.
- **Improve Corridor System Management Capabilities** - Enhance traffic signal operations (timing and signal system), provide video monitoring, provide vehicle detection (speeds and volumes), install Ethernet communications, update coordinated signal timings, and support transit signal priority.
- **Construct a Regional Communications Network Between Agencies** – Provide a network that supports transportation data exchange and video sharing.
- **Construct Virtual Traffic Operations Centers** - Provide staff and physical space to support active corridor management.
- **Enable Emergency Service Coordination** - Provide coordinated planning and operations and share real-time traffic and incident information between emergency services and traffic management.

Funding allocations will have significant impacts on the deployment of ITS Action Plan Projects. This plan identifies ITS projects that meet stakeholder needs and provides a general priority level for each project. The region should use the project list in the regional planning process to reassess priorities relative to available funding for transportation projects.

Each project identified in this plan includes an identification of the primary agency responsible for implementation, the priority for implementation, a brief project description, an estimated cost, and the project relationship to the regional ITS architecture. Separate chapters in this plan describe planned communications infrastructure to support the projects and project funding options. The action plan projects are grouped under the following six functional categories:

- Traffic Management and Operations
- Public Transportation Management
- Traveler Information
- Data Management
- Incident and Emergency Management
- Maintenance and Construction Management

Regional Collaboration

The Central Willamette Valley ITS Plan was developed with significant input from a project Steering Committee. A series of six Steering Committee meetings, phone interviews, and several stakeholder meetings were held to solicit input and ensure that the plan reflects the needs of the region. Copies of the draft reports were made available to all stakeholders for review and comment. The Regional ITS Architecture and Action Plan reflects a snapshot of existing ITS deployments and future ITS projects in the region. Needs and priorities of the Region will change over time and, in order to remain effective, this plan should be periodically reviewed and updated. This ITS plan should be incorporated into local agency transportation system plans. At a minimum local plans should reference this ITS plan or include it as an appendix.

CHAPTER 1 TRANSPORTATION SYSTEM CONDITIONS

Study Area

The study area for the Central Willamette Valley ITS Plan is illustrated in Figure 1-1. It includes 12 key regional corridors (described in Table 1-1) located within Benton and Linn Counties. The corridors illustrated in Figure 1-1 serve as major transportation routes within and between the cities of Albany, Corvallis, Lebanon, Philomath, Adair Village, and Millersburg. In addition to the key regional corridors, Table 1-1 lists other identified study corridors. The intent of the study corridors is to highlight key corridors that provide connections throughout the region. The list of corridors does not preclude other corridors from being included for project consideration at later stages in Central Willamette Valley ITS Plan. In general, all corridors within the study area (shown in Figure 1-1) are considered study corridors[1] and will be subject to the Central Willamette Valley ITS Plan.

[1] This includes all federally classified roadways by the Corvallis MPO, ODOT, Linn and Benton Counties, and the Cites of Corvallis, Albany, Lebanon, Philomath, Adair Village, and Millersburg.

Table 1-1: Study Corridors

Corridor #	Corridor	Extent
Key Regional Corridors		
1	53rd Street/ Walnut Boulevard	Plymouth Drive to OR 99W (Pacific Highway West)
2	Harrison Boulevard	53rd Street/ Walnut Boulevard to Willamette River
3	Van Buren Avenue	NW Kings Avenue to Willamette River
4	US 20 (Newport Highway/ Albany-Corvallis Highway/ Santiam Highway)	OR 34 (Alsea Highway) to US 20 (Santiam Highway) near Crowfoot Road
5	9th Street	NW Elks Drive to SW Washington Street
6	OR 99W (Pacific Highway West)	Camp Adair Road to Llewellyn Drive
7	OR 34 (Corvallis-Lebanon Highway)	US 20 (Albany-Corvallis Hwy) to US 20 (Santiam Highway)
8	OR 99E (Albany-Junction City Highway)	Interstate 5 to OR 34 (Corvallis-Lebanon Highway)
9	Waverly Drive/ Columbus Street	Salem Avenue to OR 34 (Corvallis-Lebanon Highway)
10	Queen Avenue	Elm Street to Waverly Drive
11	Interstate 5	Exit 238 (Millersburg/ Jefferson Highway) to Exit 228 (OR 34: Corvallis-Lebanon Highway)
12	Denny School Road/ Airport Road	OR 34 (Corvallis-Lebanon Highway) to US 20 (Santiam Highway)
Other Study Corridors- City of Albany		
-	34th Avenue	OR 99E (Albany-Junction City Highway) to Waverly Drive
-	53rd Avenue/ Ellingson Road	OR 99E (Albany-Junction City Hwy) to Columbus Street
-	Geary Street	Salem Avenue to 34th Avenue
-	Knox Butte Road/ Goldfish Farm Road	Interstate 5 to US 20 (Santiam Highway)
-	North Albany Road	US 20 (Albany-Corvallis Hwy) to Hickory Avenue
Other Study Corridors- City of Corvallis		
-	5th Street/Buchanan Avenue	Kings Boulevard to Van Buren Avenue
-	35th Street	US 20 (Corvallis-Newport Highway) to Harrison Boulevard
-	Circle Boulevard	Kings Boulevard to US 20 (Albany-Corvallis Hwy)
-	Conifer Boulevard	9th Street to US 20 (Albany-Corvallis Hwy)
-	Highland Drive	Lewisburg Avenue to Circle Boulevard
-	Kings Boulevard	Walnut Boulevard to Monroe Avenue
-	Reservoir Road/19th St/West Hills Road	US 20 (Corvallis-Newport Highway) to 53rd Street
-	Western Boulevard	US 20 (Corvallis-Newport Highway) to 3rd Street
Other Study Corridors- City of Lebanon		
-	Wheeler St/Williams St/Milton Street	US 20 (Santiam Highway) to US 20 (Santiam Highway)

Central Willamette Valley ITS Plan

FIG. 1-1 **Study Areas and Regional Corridors**

Legend

Study Corridors

1. 53rd Street/Walnut Boulevard
2. Harrison Boulevard
3. Van Buren Avenue
4. US 20
5. 9th Street
6. OR 99W
7. SR 34
8. OR 99E
9. Waverly Drive/Columbus Street
10. Queen Avenue
11. Interstate 5
12. Denny School Road/Airport Road

- City Limit
- Urban Growth Boundary
- County Line
- Roadway
- Railroad
- Water

N

0 0.5 1 2 Miles

Adair Village
Millersburg
Corvallis
Albany
Philomath
Tangent
Lebanon
LINN CO.
BENTON CO.
NW WALNUT BLVD
HARRISON BLVD
NW 9TH ST
2ND ST
SW 53RD ST
Pacific Highway West
Albany-Corvallis Highway
Corvallis-Newport Highway
ELLSWORTH
LYON
QUEEN AVE
WAVERLY DR
Albany-Junction City Highway
SE COLUMBUS ST
PACIFIC HIGHWAY
Corvallis-Lebanon Highway
Santiam Highway
TANGENT ST
SCHOOL RD
DENNY
AIRPORT DR
MAIN ST
I-5
99W
99E
20
34

Relevant References

This section provides a bibliography of relevant statewide and regional studies and transportation plans relating to the ITS plan. These documents identify statewide ITS initiatives, existing system capacity and safety analyses, and potential connections to other agencies and/or planned projects in the Central Willamette Valley area.

- *Oregon Statewide ITS Architecture and Operational Concept Plan*, ODOT, 2006
- *Oregon Transportation Plan (OTP)*, ODOT, 2006
- *1999 Oregon Highway Plan (OHP)*, ODOT, as amended January 2006
- *Statewide Transportation Improvement Program (STIP)*, ODOT, 2008-2011
- *Corvallis Area Metropolitan Transportation Plan: Destination 2030*, 2006
- *Corvallis Area MPO Transportation Improvement Program (TIP)*, 2008-2011
- *City of Albany Transportation System Plan (TSP)*, 2010
- *City of Albany Capital Improvement Program (CIP)*, 2010-2014
- *City of Corvallis Transportation Plan*, 1996
- *City of Corvallis Capital Improvement Program (CIP)*, 2010-2014
- *City of Lebanon Transportation System Plan (TSP)*, 2006
- *City of Lebanon Capital Improvement Program (CIP)*, 2007-2011
- *City of Philomath Transportation System Plan (TSP)*, 1999
- *Benton County Transportation System Plan (TSP)*, 2001
- *Benton County Capital Improvement Plan (CIP)*, 2009-2011
- *Benton County Coordinated Human Services and Transportation Plan,* 2007
- *Linn County Transportation System Code,* 2005
- *Linn County Coordinated Public Transit Human Services Transportation Plan*, 2009

Existing and Planned ITS Equipment and Traffic Signals

The Central Willamette Valley area currently has existing systems, ITS devices, and many traffic signals. The following sections summarize the existing and planned systems that currently or could potentially support operations of traffic signals and ITS equipment (systems and devices) in the study area. The identification of existing transportation systems and devices will be used, along with other background material, for needs assessment and evaluation of ITS project alternatives in the Central Willamette Valley area.

ODOT Region 2 Northwest Transportation Operations Center

The Northwest Transportation Operations Center (NWTOC) in Salem is used by ODOT to manage the state highway system for all of Region 2, which includes the study area. The NWTOC operates all hours on all days. Operators at the NWTOC perform the following functions:

- Traffic Management: Operation of traffic control devices
- Incident Management: Detection/identification, response (e.g. dispatch), and management of incidents

- Maintenance Support: Dispatch and communications for ODOT maintenance crews
- Information Service Provider: Dissemination of traveler information to the public regarding events that impact the highway

The NWTOC is co-located with the Oregon State Police and Oregon Emergency Management.

Transportation Systems

This section provides a summary of existing transportation systems in use or that could potentially be implemented in the Central Willamette Valley area. Table 1-2 provides a summary of existing systems and their primary function. Systems that are available for use by local agencies are described in more detail in separate subsections.

Table 1-2: Existing Transportation Systems

System	Operating Agency	Purpose
TransSuite Signal System	ODOT/ City of Corvallis	Traffic Signal Control
Transportation Operations Center System (TOCS)	ODOT	System Management and Operations
Skyline Software	ODOT	Message Sign Control
Highway Information Systems Highway Advisory Radio (HAR)	ODOT	Radio Message Control
SCAN Web Software	ODOT	Weather Information
Public Safety Systems Computer Aided Dispatch (CAD)	Oregon State Police	Manage Incidents
Emergency CAD	911 Communication Center	Dispatch Emergency Responders
Luminator CAD	Corvallis Transit System	Transit Dispatch
Mobilitat CAD	Benton County Rural and Special Transportation	Transit Dispatch
PORTAL Data Warehouse	Portland State University	Data Archive
TripCheck Local Entry (TLE)	ODOT	Traveler Information
TripCheck Traveler Information Portal (TTIP)	ODOT	Traveler Information
Corvallis Cable Television	ODOT	Traveler Information

TransSuite Signal System

ODOT uses the TransSuite traffic control system to operate many traffic signals in other parts of the state. The system allows remote access to traffic signals and enables ODOT to make timing adjustments, collect and archive traffic signal phase and detector data, and receive alerts about system failures. ODOT and the City of Corvallis plan to connect eight traffic signals to TransSuite as part of the OR 99W Advanced Traffic Management System project. Ultimately ODOT would like to connect all of their traffic signals in the study area to TransSuite but does not currently have funding programmed to do so.

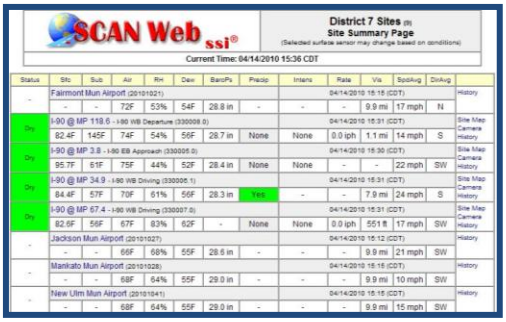
Partnerships between ODOT and other Oregon agencies exist to share the use of ODOT's TransSuite system.

Transportation Operations Center System (TOCS)

ODOT has developed the Transportation Operations Center System (TOCS) to provide a common, integrated system for use at all ODOT Transportation Operations Centers (TOCs) statewide. Parts of the system are already in use while others are still in development. Ultimately the system will support all of the following functional areas: traffic management, incident management, emergency management, resource management, maintenance operations, winter operations, device management, traveler information, data archival and reporting, and connection with external agencies.

SCAN Web

SCAN Web is a software user interface that uses standard internet technologies for viewing of road weather information system (RWIS) data parameters from current pavement status to still images. In addition, the software is capable of device control, such as activating fixed anti-icing spray systems, flashing beacons, or other roadside devices. The ability to view RWIS data quickly and easily enables maintenance and operations personnel to monitor changing weather conditions in real time, which allows for quick analysis and decision-making during weather events.



Scan Web

Luminator Computer Aided Dispatch (CAD)

The Corvallis Transit System (CTS) uses a vehicle information system by Luminator that tracks vehicles and provides computer aided dispatch, passenger counting, and passenger announcements. However, Luminator no longer manufactures this particular system and only provides limited support. CTS is actively pursuing funding opportunities to replace this system.

PORTAL Data Warehouse

PORTAL provides a centralized, electronic database that facilitates the collection, archiving, and sharing of information/data for public agencies within the Portland region and the Vancouver, Washington metropolitan area.

TripCheck

ODOT's TripCheck website (www.tripcheck.com) is a traveler information web site for real-time traffic information. The TripCheck site includes camera images, road conditions, weather information, incident maps, and construction activity for the state. ODOT continues to add information to TripCheck as new equipment is deployed

ODOT's TripCheck website

TripCheck Local Entry (TLE)

TripCheck Local Entry (TLE) is a website that allows local jurisdictions to enter information about events such as incidents or construction activities in their area that might affect traffic flow. This information

can be posted on the TripCheck website.

TripCheck Traveler Information Portal (TTIP)

TripCheck Traveler Information Portal (TTIP) is a data exchange system that collects traveler information from multiple sources, and provides a data portal to subscribers, formatting the consolidated data as standardized traveler information messages. It enables the sharing of real-time information from multiple sources to any subscriber who is interested in the current status of the roadway system. Multiple providers (public and private) can access to the information free of charge and can tailor it for their uses.

ITS Devices

The existing and planned ITS devices in the Central Willamette Valley area are displayed in Figure 1-2 and described in the following subsections.

Traffic Count Stations

ODOT currently operates four automatic traffic recorders (ATRs) in the study area to collect volume, speed, and occupancy data. One ATR is located on OR 34 between Corvallis and I-5 (MP 3.92), one on US 20/OR 99E in Albany (MP 2.14), one on I-5 north of the OR 99E exit (MP 234.80), and one on OR 226 (MP 0.43) to the east of US 20.

In addition, ODOT and the City of Corvallis plan to collect vehicle volume information from system detectors at four locations as part of the OR 99W Advanced Transportation Management System (ATMS). The system detectors are expected to be located at the intersections of Van Buren Avenue/3rd Street, Van Buren Avenue/5th Street, Harrison Boulevard/2nd Street, and Harrison Boulevard/4th Street.

Closed-Circuit Television (CCTV) Cameras

In the study area, ODOT utilizes one closed-circuit television (CCTV) camera to monitor traffic along I-5 in Millersburg. ODOT posts images from the existing cameras on the TripCheck website.

CCTV Camera

In addition, ODOT and the City of Corvallis plan to install two CCTV cameras as part of the OR 99W Advanced Transportation Management System (ATMS). The CCTV cameras are planned be located at the intersections of Harrison Boulevard/3rd Street and Van Buren Avenue/4th Street in the City of Corvallis.

Automated Red Light Enforcement

The City of Albany collects video images at one signalized intersection (Queen Avenue/Geary Street). At this intersection, a fixed mount camera collects video images for the southbound and westbound approaches that are generally used to capture traffic infractions at the signal (i.e. red light running).

Dynamic Message Sign (DMS)

ODOT currently operates and maintains one fixed dynamic message sign on northbound I-5 in Millersburg (at Berry Drive). Dynamic message signs are used to display key messages regarding traffic conditions.

Dynamic message sign

Highway Advisory Radio (HAR)

ODOT currently operates and maintains a highway advisory radio (HAR) system for the Corvallis area. The system is used to provide traveler information and is suitably located to provide information to westbound OR 34 and southbound OR 99W traffic coming into Corvallis. In addition, a HAR is located along northbound I-5 in North Albany.

Highway advisory radio

Central Willamette Valley ITS Plan

FIG. 1-2 **Existing & Planned ITS Equipment**

Legend

- Traffic Count Station
- Planned Traffic Count Station
- Camera
- Planned Camera
- Highway Advisory Radio (HAR) Transmitter
- Highway Advisory Radio (HAR) Sign with Beacon
- Variable Message Sign (VMS)
- Planned Variable Message Sign (VMS)
- Red Light Enforcement
- Planned Weather Station
- City Limit
- Urban Growth Boundary
- County Line
- Roadway
- Railroad
- Water

0 0.5 1 2 Miles

N

Adair Village
Millersburg
Albany
Corvallis
Philomath
Tangent
Lebanon

(southbound)
(northbound)
(westbound)

I-5
99W
99E
20
34

Pacific Highway West
Albany-Corvallis Highway
US-20
OR-34
Corvallis-Lebanon Highway
Corvallis-Newport Highway
Albany-Junction City Highway
PACIFIC HIGHWAY
SE COLUMBUS ST
ELLINGSON RD
ELKSWORTH
LYON
14TH
QUEEN AVE
34TH AVE
GEARY ST
WAVERLY DR
GOLDFISH FARM
NW WALNUT BLVD
CIRCLE BLVD
WITHAM HILL CIRCLE
29TH ST
NW 9TH ST
GARFIELD
GRANT
HARRISON BLVD
see inset
2ND ST
35TH ST
SW 53RD ST
RESERVOIR
WEST HILLS RD
19TH ST
C OUNTRY CLUB
CRYSTAL LAKE
LINN CO.
BENTON CO.
DENNY
SCHOOL RD
OAK ST
AIRPORT DR
MAIN ST
WILLIAMS
WHEELER
MILTON

Coast Range Inset Area

Lake Creek Drive Inset Area

Inset - Downtown Corvallis

BUCHANAN AVE
TAYLOR AVE
FILLMORE AVE
POLK AVE
VAN BUREN AVE
JACKSON AVE
MONROE AVE
MADISON AVE
JEFFERSON AVE
ADAMS AVE
WASHINGTON AVE
17TH ST
15TH ST
14TH ST
13TH ST
12TH ST
10TH ST
9TH ST
8TH ST
7TH ST
6TH ST
5TH ST
2ND ST
1ST ST
13TH ST
11TH ST
4TH ST / HWY 99W
B AVE
C AVE
Willamette River

Inset - Coast Range

NORTON CRE
US HWY 20
B L O DGETT RD
TUM TUM RD
HARRIS RD
Philomath

Inset - Lake Creek Drive

Albany - Junction City Highway
I-5
228
Halsey - Sweet Home Highway
Brownsville
Halsey
99E
LAKE CREEK DRIVE
(northbound)

Traffic Signals

The existing and planned traffic signals within the study area are shown in Figure 1-3. Traffic signals in the Central Willamette Valley area are currently operated and maintained by the following agencies: City of Albany, City of Corvallis, City of Lebanon, Benton County, and ODOT. In the study area there are over 140 traffic signals, with a majority of them belonging to the City of Corvallis and ODOT. The City of Corvallis has agreements with ODOT and Benton County to maintain and operate all traffic signals within City limits.

Coordinated signal timing plans are used during the a.m., midday, and p.m. peaks at various closely spaced intersections throughout the region where twisted pair copper interconnect cable is present (see Figure 1-4). All other traffic signals run free with green lights activated based on vehicle detection at the intersection.

The majority of existing traffic signals in the study area utilize Type 170 or 170E controllers with Wapiti W4IKS software. As part of the OR 99W Advanced Transportation Management System (ATMS), eight traffic signals in the City of Corvallis are planned to be upgraded to Type 2070 controllers with Voyage software. These signals will be connected to ODOT's TransSuite central traffic signal system and will be operated using a traffic responsive plan, which means the system will select pre-determined coordinated signal timing plans based on real-time volumes.

Emergency Vehicle Preemption

The majority of the traffic signals in the Central Willamette Valley area have full emergency vehicle preemption capability using opticom equipment. Only area fire and life safety vehicles have the capability to preempt traffic signals. All of the new detectors and discriminators being installed have the ability to recognize vehicle identification codes and different levels of priority requests (e.g. bus priority). Many of the existing detectors and discriminators were installed prior to this functionality being offered.

Transit Priority

Transit priority operates at 21 traffic signals along several key corridors in the City of Corvallis, including Walnut Boulevard-53rd Street, Harrison Boulevard, Western Boulevard, 9th Street, and Kings Boulevard. Transit priority is implemented using the opticom equipment on traffic signals as well as opticom transmitters on Corvallis buses. The goal of transit priority is to reduce transit travel times by providing an early green or extending the green for a bus behind schedule.

Communications Equipment

The communications system is one of the most critical components in the deployment of ITS infrastructure. Local agencies must be able to monitor, control, and operate traffic management devices from remote locations to effectively manage the movement of passengers and goods and respond to incidents. The existing communication system in the Central Willamette Valley area consists of twisted pair copper cable, fiber optic cable, and cellular telephone. The existing agency-owned communications infrastructure is illustrated in Figure 1-4.

Key networks that exist for communicating to field devices, and between agencies in the Central Willamette Valley area include:

- City of Corvallis and Benton County fiber optic cable connection between City, County, and OSU facilities
- City of Albany and Linn County fiber optic cable connection between City and County facilities
- Twisted pair copper interconnect cable links to many traffic signals
- Remote access to many ODOT traffic signals is provided via conventional and cellular telephone
- The City of Corvallis and ODOT plan to install fiber optic cable to eight traffic signals as part of the OR 99W ATMS project. The new fiber will link to the existing fiber network for City and County facilities.

Central Willamette Valley ITS Plan

FIG. 1-3 **Existing & Planned Traffic Signals**

Traffic Signal, Ownership

- Benton County
- City of Corvallis
- Planned City of Corvallis
- City of Albany
- City of Lebanon
- ODOT*
- Planned ODOT
- Transit Priority

- City Limit
- Urban Growth Boundary
- County Line
- Roadway
- Railroad
- Water

** Note: traffic signals within Corvallis city limits are maintained and operated by the City of Corvallis.*

0 0.5 1 2 Miles

Corvallis
Adair Village
Millersburg
Albany
Philomath
Tangent
Lebanon
See Inset
Corvallis

NW WALNUT BLVD
CIRCLE BLVD
GARFIELD
GRANT
HARRISON BLVD
WITHAM HILL
CIRCLE
29TH ST
35TH ST
9TH ST
2ND ST
WEST HILLS RD
RESERVOIR
SW 53RD ST
19TH ST
C OUNTRY CLUB
CRYSTAL LAKE
Corvallis-Newport Highway
Pacific Highway West
Albany-Corvallis Highway
ELLSWORTH
LYON
14TH
QUEEN AVE
GEARY ST
WAVERLY DR
GOLDFISH FARM
34TH AVE
ELLINGSON RD
Albany-Junction City Highway
SE COLUMBUS ST
PACIFIC HIGHWAY
Corvallis-Lebanon Highway
OR-34
SCHOOL RD
DENNY
OAK ST
MAIN ST
WILLIAMS
WHEELER
MILTON
AIRPORT DR
LINN COUNTY
BENTON COUNTY
US-20
99W
99E
I-5
20
34

BUCHANAN AVE
TAYLOR AVE
FILLMORE AVE
POLK AVE
VAN BUREN AVE
JACKSON AVE
MONROE AVE
MADISON AVE
JEFFERSON AVE
ADAMS AVE
WASHINGTON AVE
B AVE
C AVE
17TH ST
15TH ST
14TH ST
13TH ST
12TH ST
11TH ST
10TH ST
9TH ST
8TH ST
7TH ST
6TH ST
5TH ST
2ND ST
1ST ST
4TH ST / HWY 99W
Willamette River

Real Urban Geographics 2010 www.realurban.com

Central Willamette Valley ITS Plan

FIG. 1-4 **Existing & Planned Communications Infrastructure**

Legend

Communication Infrastructure

- Existing Twisted Pair Interconnect Cable
- Programmed Twisted Pair Interconnect Cable
- Existing Fiber Optic Cable for City Facilities
- Planned Fiber Optic Cable for City Facilities

- City Limit
- Urban Growth Boundary
- County Line
- Roadway
- Railroad
- Water

0 0.5 1 2 Miles

Adair Village
Millersburg
Albany
Corvallis
Philomath
Tangent
Lebanon
99W
Pacific Highway West
Albany-Corvallis Highway
US-20
OR-34
Corvallis-Lebanon Highway
Corvallis-Newport Highway
Albany-Junction City Highway
Santiam Highway
I-5
20
34
99E
LINN CO.
BENTON CO.
NW WALNUT BLVD
CIRCLE BLVD
HARRISON BLVD
WITHAM HILL CIRCLE
29TH ST
35TH ST
NW 9TH ST
2ND ST
GARFIELD
GRANT
RESERVOIR
WEST HILLS RD
SW 53RD ST
19TH ST
C OUNTRY CLUB
CRYSTAL LAKE
ELLSWORTH
LYON
14TH
QUEEN AVE
34TH AVE
GEARY ST
WAVERLY DR
GOLDFISH FARM
ELLINGSON RD
SE COLUMBUS ST
PACIFIC HIGHWAY
OAK ST
WHEELER
MAIN ST
WILLAMINA
MILTON
DENNY SCHOOL RD
AIRPORT DR

Real Urban Geographics 2010 www.realurban.com

Transit Infrastructure

The Central Willamette Valley area is served by a combination of fixed route and demand response systems. Table 1-3 provides an overview of the public transportation services in the region. Intercity bus and rail services are also provided by commercial transportation providers: Amtrak, Greyhound, Hut Shuttle, and Valley Retriever. Rideshare programs are provided in the area by Cascades West Rideshare and Valley Van Pool. A statewide ridesharing project is currently underway to combine all rideshare programs in the state into one system. This section provides additional details about ITS systems used by regional transportation systems.

Table 1-3: Regional Public Transportation Services

Transit System	Service Type		Operated By
	Fixed Route	Demand Response	
Albany Call-a-Ride		✓	Albany Transit System
Albany Transit System	✓		Albany Transit System
Benton County Rural and Special Transportation: Dial-a-Bus Corvallis-Albany Connection Coast to Valley Express 99 Express	 ✓ ✓	 ✓ ✓ 	Benton County Dial-a-Bus (run by Senior Citizens Council of Benton County, Inc.) -phone reservations only -includes route deviations -includes demand response deviations in Monroe & Adair Village and fixed deviations in Corvallis
Corvallis Transit System	✓		Corvallis Transit System
Lebanon Dial-a-Bus		✓	City of Lebanon
Linn-Benton Loop*	✓		Albany Transit System
Linn Shuttle	✓		Linn Shuttle
OSU Shuttle	✓		OSU
Philomath Connection	✓		Corvallis Transit System

* Joint venture by City of Albany, City of Corvallis, Benton County, Linn County, ODOT, OSU, and LBCC

The Corvallis Transit System is the only public transit provider in the study area that has automated vehicle location (AVL) on its fleet, computer aided dispatch, passenger counting, and passenger announcements. Wayside signs were previously used to display real-time next bus arrival information; however, these signs do not currently work and are no longer supported by the manufacturer. Benton County Rural and Special Transportation also has a system for computer aided dispatch for its fleet.

The public transportation systems use UHF two-way 25 kHz radio communications to operate their systems and to communicate between systems. These systems need to be replaced with a narrowband 12.5 kHz system by January 1, 2013 per a Federal Communications Commission mandate.

The ODOT TripCheck website includes a Transportation Options tab that helps travelers plan transit trips within Oregon. This feature allows users to view a listing of service providers (including contact and service information) by county, city, or A-to-Z listing and also provides transit options for city-to-city trips, including whether or not accommodations are available for wheelchair or bicycle transport.

Freight Mobility

Freight mobility in the Central Willamette Valley area consists of the State Highway Freight System and railroad tracks through the study area. Existing designated freight routes in the study area include Interstate 5, OR 99W (Pacific Highway West), OR 34 (Corvallis-Lebanon Highway) between Corvallis and Lebanon, US 20/ OR 34 (Corvallis-Newport Highway) between Corvallis and Philomath, and US 20 (Santiam Highway) south of OR 34 in Lebanon. Freight routes are designated to facilitate efficient and reliable interstate and intrastate truck movements. These are primarily state highways that carry a significant tonnage of freight by truck and/or serve as the primary interstate and intrastate highway freight connections to ports, intermodal terminals, urban areas and other states.

In addition, the Central Willamette Valley area is served by the Willamette & Pacific Railroad (WPRR), Burlington Northern & Santa Fe (BNSF), Union Pacific (UP), Portland & Western (P&W), and Albany & Eastern (A&E) railroads.

Event Management

Many events occur in the Central Willamette Valley area each year. Many of the events are planned special events however, often unplanned events occur in the form of traffic incidents or emergencies. The approach to resolving each event is often handled differently. The following sections summarize incident management, special event operations, and emergency management in the Central Willamette Valley area.

Incident Management

ODOT currently staffs two incident responders in the Central Willamette Valley area that serve as the first responders to an incident. The responders typically work from 7:30 a.m. to 6:00 p.m. and are on-call 24 hours a day, seven days a week. Each responder has an incident response vehicle equipped with a changeable message sign (two lines of text with eight characters per line). Interstate 5 is the priority for the incident responders, however, they will respond to incidents on OR 34 (Corvallis-Lebanon Highway) and OR 99E (Albany-Junction City Highway) as needed. The success of the program relies heavily on interagency coordination, training and developing an understanding about each agency's roles and responsibilities regarding response, dispatch and other communication. When an incident occurs, the incident responders coordinate with fire and police.

In the event of a major I-5 incident, lasting eight or more hours, alternate routes have been mapped along I-5. These detours provide accessible parallel routes. Existing flip-down signs play a critical role in the use of the alternate routes. In the Central Willamette Valley area three detour routes are available along I-5. One detour route is available north of the study area on OR 164 (Jefferson Highway), another is available along Old Salem Road for southbound I-5 traffic, and one along Century Drive for northbound I-5 traffic, and the final detour route is available through Albany along OR 99E (Albany-Junction City Highway) and OR 34 (Corvallis-Lebanon Highway). The mapped detour routes can be found in the appendix.

Special Event Operations

The Central Willamette Valley area has several special events throughout the year that attract people from throughout the region and state and impact transportation system operations. Each special event creates different impacts to study area corridors, major interchanges, and the transit system. Oregon State University sporting events cause the most significant traffic congestion in the study area. Since most of the traffic to these sporting events originates from I-5, significant amounts of congestion are often experienced on game days on OR 34, US 20, and OR 99E between Albany and Corvallis. Queues from the I-5 ramps often spill back into the southbound travel lanes of I-5. A summary of the special events and impacts can be seen in Table 1-4.

Table 1-4: Special Events

Location	Event Center	Special Event	Transportation System Impact
Albany	Timber Linn Park	Northwest Art & Air Festival	Congestion
	City Streets	Albany Veterans Day Parade	Street closures cause congestion in Albany
	Monteith Riverpark	Summer Concert Series: River Rhythms and Mondays at Monteith	Congestion
	Oregon State University	University Sporting/Cultural Events	Traffic congestion from I-5 on US 20, OR 99E, and OR 34
	Linn County Fair and Expo	Various Events/Linn County Fair	Congestion
Corvallis	Oregon State University	University Sporting/Cultural Events	Significant congestion in Corvallis
	Central Park	Corvallis Fall Festival	Congestion
	Oregon State University	Corvallis da Vinci Days	Congestion
	Benton County Fairgrounds	Various Events/Benton County Fair	Congestion
Lebanon	Cheadle Lake Regional Park	Lebanon Strawberry Festival	Congestion
Philomath	Rodeo Grounds	Philomath Frolic & Rodeo	Congestion

Emergency Management

This section lists the emergency management agencies in the Central Willamette Valley area and provides the strategies used for routine services typically handled by 911, police, fire, and medical agencies and strategies for major emergencies and disasters.

911 Center and Dispatching

The Corvallis Regional Communication Center is the primary 911 Center that services Benton County, including the Corvallis, Philomath, and Adair Village areas. The City of Corvallis Police Department operates the Corvallis Regional Communications Center, which provides emergency call answering (911) and dispatch services for all Benton County emergency service providers. The 911 Center is equipped

with a central computer-aided dispatch (CAD) system to monitor police, fire, and emergency vehicle dispatch.

The City of Albany Police Department provides its own emergency dispatching services. The police communications center operates a computer-aided dispatch (CAD) system to maintain an accurate accounting of officer locations, calls, and times and to document all calls for service received by the department.

In addition, Linn County has one primary dispatch communications center. It is located in the Linn County Sheriff's Office in Albany. All emergency service providers in Linn County, including fire and ambulance, are dispatched by the communications center, including the Linn County Sheriff's Office, Albany Fire Department, and Lebanon Fire Department.

Police, Fire, and Medical Agencies

The police, fire, and medical agencies that serve the study area are represented by the City of Corvallis, the City of Albany, the City of Lebanon, City of Philomath, City of Adair Village, Benton County, Linn County and the Oregon State Police. While each of these agencies primarily serves their jurisdiction, the Oregon State Police patrols all of the region's federal and state highways.

The City of Albany and Corvallis Police Departments use mobile data terminals (MDTs) in all of their vehicles to dispatch officers.

CHAPTER 2 USER NEEDS ASSESSMENT

This chapter provides a summary of transportation system user needs for the Central Willamette Valley based on input from project stakeholders. The needs were gathered through in-person and phone interviews and Steering Committee meetings. The transportation user needs documented in this section will be used to develop an action plan and a regional ITS architecture. Input was provided from the following stakeholders:

- Oregon Department of Transportation: ITS Unit, Region 2, and District 4
- Corvallis Area Metropolitan Planning Organization
- Oregon Cascades West Council of Governments
- City of Corvallis
- City of Albany
- City of Lebanon
- City of Philomath
- City of Adair Village
- City of Millersburg
- Benton County
- Linn County
- Corvallis Transit System (CTS)
- Albany Transit System (ATS)
- Linn Shuttle
- Benton County Special Transportation Fund (STF) Program
- Linn County STF Program
- Oregon State University (OSU)
- Benton County 911
- Linn County 911

User needs are grouped in the following categories:

- Traffic Operations and Management
- Public Transportation Management
- Traveler Information
- Data Management and Performance Measurement
- Incident and Emergency Management
- Maintenance and Construction Management
- General

Traffic Operations and Management

Stakeholders identified the following needs related to traffic operations and management:

- Upgrade ODOT traffic signal controllers to the current ODOT standard (2070 controller with Northwest Signal Voyage software).
- Connect ODOT traffic signal controllers to ODOT's TransSuite central traffic control system to allow remote access to traffic signals.
- Provide central control of and remote access to City of Corvallis and City of Albany traffic signals.
- Add communications and replace outdated interconnect communications to traffic signals throughout the City of Corvallis.

- Replace protected left turn phases with protected-permissive phases (with flashing yellow arrow) at many traffic signals within the City of Corvallis.
- Add battery back-up to traffic signals in the City of Corvallis that do not have battery back-up (approximately 80 percent).
- Regularly maintain coordinated signal timing plans and consider advanced traffic signal timing in some areas.
- Address the delays to freight and other travelers when large trucks get stopped at traffic signals.
- Provide video surveillance on key regional corridors.
- Collect real-time road condition information on regional corridors to support day-to-day operations, particularly during peak hours.
- Preserve existing system capacity.
- Address congestion at key bottlenecks (e.g. OR 34/OR 34 Bypass, eastbound OR 34 (Van Buren) at the bridge over the Willamette River).
- Address congestion on US 20 and OR 34. (This is partially caused by land use and access control.)
- Reduce queuing at a number of locations within the City of Albany.
- Address congestion on southbound OR 99W adjacent to the City of Adair Village.
- Apply access management strategies.
- Support alternative modes.
- Support high local demand for safe and efficient bicycle facilities.
- Warn overheight vehicles of height restrictions at Marys River Bridge.
- Reduce regional congestion associated with OSU and University of Oregon (UO) football games.
- Increase information about parking availability and routing to parking for OSU football games.

Public Transportation Management

Stakeholders identified the following needs related to public transportation management:

- Develop transportation services consistent with the Benton County and Linn County Coordinated Public Transit-Human Services Plans.
- Replace the existing radio communications used by all the regional public transportation agencies by 2013 to meet federal narrowband communications requirements.
- Fill gap in radio communications coverage in southern Benton County.
- Replace the CTS's vehicle information system (includes automated vehicle location, dispatch, wayside signs, passenger counting, and automated stop announcements) because it is no longer manufactured and limited support is available.
- Track all public transportation vehicles to support dispatch, real-time transit arrival information, and transit route planning. (Only CTS fixed route buses currently have automated vehicle tracking.)
- Add computer-aided dispatch (CAD) capabilities for public transportation services and include mobile data terminals (MDTs) in public transportation vehicles. (Only the CTS fixed route bus system has a CAD system.)
- Collect real-time travel conditions information to support public transportation dispatch.

- Efficiently manage flexible route and demand response service reservations.
- Automate data collection to support National Transit Database (NTD) reporting. (The CTS CAD system collects data that supports NTD reporting.)
- Expand transit signal priority at traffic signals within the City of Corvallis and implement transit signal priority throughout the rest of the study area. (Only CTS fixed route buses are currently outfitted with equipment to support transit signal priority.)
- Explore options to share technology (e.g. automated vehicle location, computer-aided dispatch) to reduce capital, maintenance, and operations costs for public transportation agencies within the region.
- Use a regional fare collection system to support easy transfer between the various regional public transportation providers.
- Improve transit service connections between communities.
- Provide additional transit service between communities during off-peak hours (e.g. after 6 pm it is not possible to travel from Albany to Corvallis by transit if arriving in Albany by Amtrak).
- Provide better service coordination between CTS and OSU Shuttle. (Potentially need a transit center on campus.)
- Address OR 34 transportation demand management (TDM) solutions identified in ODOT OR 34 study such as large park and rides and more buses.
- Provide more bus service connections to Amtrak.
- Consider north-south high speed rail service on west side of Willamette River.

Traveler Information

Stakeholders identified the following needs related to traveler information:

- Provide wayside information dissemination (e.g. dynamic message signs, highway advisory radio) on key regional routes.
- Provide real-time information about the entire transportation system.
- Disseminate real-time information about major events that impact travel and parking (e.g. incidents, OSU football games).
- Provide parking availability information at/near OSU.
- Provide real-time bus and train arrival information online, via personal handheld devices, and wayside at key transit stations, park and rides, and stops. (This information is especially critical for routes with large service headways, for rural areas, and when a major event impacts scheduled transit arrival times.)
- Disseminate static information about Linn Shuttle service availability.
- Tailor transit information (content and delivery method) to OSU and Linn-Benton Community College students, who make up approximately 30 to 40 percent of the regional fixed route bus ridership. (Foreign students in particular have high expectations for transit information and service.)
- Provide flexible route and demand response service users with reservation confirmation information and real-time arrival information.

- Integrate transit information with Google Transit. (CTS has already integrated their system data with Google Transit.)
- Provide travel time information for key regional routes.
- Educate the public on travel choices and greenhouse gas impacts.

Data Management and Performance Measurement

Stakeholders identified the following needs related to information management and performance measurement:

- Improve ease of data sharing between agencies.
- Measure travel times to support traditional planning efforts and system operations.
- Collect and archive regional traffic count data. (Budget cuts have eliminated the City of Corvallis' traffic count program that previously collected volume data every three years.)
- Reduce greenhouse gas emissions and collect data that supports measurement of greenhouse gas emissions. (Federal and state procedures, targets, and measurements for reducing greenhouse gas emissions are currently being developed.)
- Measure vehicle miles traveled (VMT), which will likely be a measure to evaluate greenhouse gas emissions.
- Provide record-keeping capabilities for public transportation services to evaluate system performance and support public transportation service planning.

Incident and Emergency Management

Stakeholders identified the following needs related to incidents and emergencies:

- Establish clearer protocols between transportation and emergency response agencies for event management.
- Use more video surveillance for incident detection and verification.
- Consider roadway restrictions (e.g. weight limits) prior to selecting diversion routes in response to an event.
- Manage diverted traffic on OR 99E when there is a major event on I-5.
- Provide traffic video surveillance and real-time traffic flow conditions to 911 centers.
- Provide accurate construction and maintenance schedule information to 911 centers.
- Provide transit video feed (at transit stations and park and rides) to 911 centers for security surveillance.
- Need to share data between the various CAD systems used in the region and adjacent counties today: ODOT, Oregon State Police, Benton County 911, Linn County 911, Lincoln County 911, Central Lane County 911, Willamette Valley Communications Center (Polk County), Lebanon Police Department, and Sweet Home Police Department.

Maintenance and Construction Management

Stakeholders identified the following needs related to maintenance management:

- Address frequent flooding on OR 34 east of the bypass.
- Use stream gauges to help predict flooding more accurately.
- Collect weather information and pavement temperature in downtown Corvallis.

Stakeholders did not identify any needs related to construction management as there is already a high level of regional coordination for construction projects.

General

Stakeholders identified the following general needs:

- Secure stable funding streams to support system management and operations.
- Ensure the regional ITS architecture is consistent with the statewide ITS architecture and other regional architectures in Oregon.
- Incorporate the applicable content of this ITS plan into the CAMPO RTP and other regional plans.
- Consider the travel shed model approach that takes into consideration the impact of trips into and out of the MPO from outside areas.
- Apply transportation demand management strategies.
- Support carpool and vanpool matching.
- Provide outreach to the Cascades West Area Commission on Transportation (CWACT), who advises the Oregon Transportation Commission on project funding for a large region that includes this study area.
- Seek partnership opportunities with OSU, who is working to establish a transportation research center.

Vision, Goals, and Objectives

This section summarizes the user need vision, goals, and objectives that will be used to guide ITS planning and project development in the Central Willamette Valley over the next 10 years. The vision and goals are based on input received from the Steering Committee.

Vision

Manage and operate a safe, multi-modal transportation system that makes the best use of available capacity and optimizes existing and future operations investments in the Central Willamette Valley.

Goal: Support informed travel choices and promote travel options

Objectives

- Increase mode split for transit, bicycles, and pedestrians.
- Reduce transportation related air pollution.
- Expand breadth and geographic coverage of traveler information.
- Disseminate traveler information for public and private uses.

Goal: Optimize the performance of the transportation infrastructure

Objectives

- Improve travel time reliability for people and goods movement.
- Reduce recurring and non-recurring delay.

Goal: Operate a safe transportation system

Objectives

- Reduce frequency, duration, and effects of incidents.
- Reduce emergency response times.

Guiding Principles and Aims

Guiding Principle: Integrate regional system management and operations

Aims

- Deploy systems that can be coordinated and integrated with other agencies and other local, regional, and statewide projects.
- Deploy systems with minimal maintenance and operational support requirements.
- Share infrastructure and operations resources between agencies.
- Provide financial and staff resources to effectively manage, operate, and maintain transportation systems.

Guiding Principle: Monitor and measure transportation system performance

Aims

- Include an automated data collection component with all ITS projects.
- Collect and archive transportation data.
- Apply appropriate performance measures to support investment in cost-effective strategies.
- Promote anticipated and measured project benefits to decision makers and the public.
- Maintain a GIS database of the transportation infrastructure, including ITS devices.

Guiding Principle: Provide guidance for future development of ITS solutions

Aims

- Build consensus among the Steering Committee members.
- Develop operational policies to support regional transportation system management and operations.
- Develop regional investment strategies to develop, operate, and implement ITS strategies.
- Educate decision makers, operators, planners, and engineers using outreach, project benefit summaries, training, and workshops.

Performance Measures

Sample performance measures that could be used to assess how the region is meeting the goals can be seen in Table 2-1. The performance measures range from travel time and delay to volume to capacity ratios to transit performance.

Table 2-1: Sample Performance Measures for Goal Assessment

Performance Measures	Goals			Sample Measurement
	Support informed **travel choices** and promote **travel options**	Optimize the **performance** of the transportation infrastructure	Operate a **safe** transportation system	
Travel Time and Delay	✓	✓	✓	Average travel time Average speed Vehicle Delay Person Delay Freight Delay
Travel Time Reliability	✓	✓		Travel time index Planning time index
Volume to Capacity (v/c) Ratio		✓		v/c ratio at intersections v/c ratio of roadway segments
Transit Performance	✓	✓		On-time transit performance Passenger load (ridership/capacity)
Greenhouse Gas Emissions	✓	✓		Vehicle miles traveled Vehicle emissions- CO_2, CO, NOx, VOC
Incident Response		✓	✓	Incident duration Incident response time Average incident clearance time
Safety		✓	✓	Rate/number of primary crashes Rate/number of secondary crashes Rate/number of fatalities Rate/number of injuries
Public Perception	✓			Percent of population satisfied with travel conditions Number/type of hits on TripCheck Number/type of hits on 511

CHAPTER 3 COMMUNICATION PLAN

This chapter outlines a communication plan that will support transportation requirements for data and video transmission including phased implementation of a communications network. The basic purpose of this network is to provide the communication links required for ITS deployment between various end points on the network. It will provide a backbone communication system, as well as a distribution network to reach the individual devices or control locations. The communication end points for the ITS network are distributed across the region and can include everything from a closed circuit television (CCTV) camera to a central traffic signal server.

Throughout this document, reference will be made programmed and planned ITS devices. For the reader's clarification, **Programmed** ITS devices are previously identified and/or funded prior to the development of this ITS plan. **Planned** ITS devices are identified during the development of this plan but currently do not have funding identified for their implementation.

Communication Plan Methodology

This communication plan was developed using a "bottom-up" approach. The analysis began by identifying and mapping existing communication infrastructure in the region along with the current communication requirements and known additional requirements for planned and programmed ITS devices. This aspect of the planning was guided by experience with similar systems and an understanding of the current trends in the industry and provides a "gap analysis" between existing infrastructure and future required investment. Based on current and potential communication requirements to connect planned and programmed ITS devices, a communication model was developed for the entire network. This model establishes the general configuration of the communication network and the basic protocols that will be supported. The final stage of the methodology applies this model to the region, outlining the deployment and build-out of the communication network.

The regional communication plan addresses the configuration, general routes and implementation approach, but it does not determine exact routing, costs, equipment selection and capacities. These aspects of the communication network are best finalized during detailed design as a section of the network is to be implemented, allowing the most up to date requirements to be incorporated in sizing and in selecting current transmission equipment.

Therefore, the communication plan should be considered a guide, rather than a final design. As each network segment enters planning and detailed design, all options should be considered for connecting centers and field devices, including:

- Building new fiber optic cable,
- Leasing communications services from private providers and public entities, and
- Building new wireless communications links.

In municipal networks, cost effective facility routing and equipment locations can be selected by considering the plans for road reconstruction, and construction or renovation of buildings that can be used for communication equipment. Where possible, the communications infrastructure should be built as part of large capital improvement and other construction projects where including the additional conduit and fiber cable is only a minor incremental project cost.

Communications Plan Guidelines

The following principles, which must be considered during the detailed design, guided the development of this communication plan:

- **Reliability**: The system must provide a high level of reliability, achieved through the use of components with a high MTBF (mean time between failures) and combined with redundancy in the network design.
- **Growth**: The network must be expected to grow gracefully. This requires the incorporation of a reasonable amount of unused capacity and a design approach that allows extra capacity to be provided by upgrading the transmission equipment.
- **Flexibility**: The network configuration must be designed to maximize flexibility to accommodate future changes, rearrangements, and equipment changes including the strategic location of field communication hubs and network access locations and slack cable for future splices.
- **Standards**: Communication protocols and component selection must use widely accepted standards that minimize ongoing operations and maintenance costs.
- **Decentralized**: As the network supports several agencies, it must be configured around several centers of control and allow the control location to be changed according to current needs. This will support the concept of a virtual operations center.

Application of the Communication Plan

The communication plan should be considered a "living document" that is updated on a regular basis, as the communication needs change, to follow improvements in technology, and to reflect the implementation of various portions of the network. As the opportunity arises to construct a section of the network (through funding or provision of facilities by a third party), the detailed design for that section can then be undertaken.

The following approach is recommended for each detailed design:

Pre-Design Planning Review

The purpose of the pre-design planning review is to ensure that the concepts and principles of the communication plan are considered in the detailed design. For example, if a road is being reconstructed, and it is known to be on a planned backbone communication route, the pre-design planning review ensures the detailed design (even if it is only a small section of the ultimate backbone) provides the infrastructure on the planned route. These provisions could accommodate the future capacity with the initial installation or provide conduit and equipment mounting space for future installation.

Before the start of the detailed design, typically at the same time as the documents are prepared to seek budget funding for the design, a brief "Pre-Design Planning Review" should be prepared. This document is typically two pages or less and addresses the following topics:

- Key elements of the design that are required by the communication plan.
- Aspects of the design that deviate from the communication plan, with justification for these changes.

Final Planning Review

After completing the detailed design of the specific network segment, the pre-design planning review should be finalized to include any changes that have been made during the detailed design. The final review documents any provisions made in the detailed design to support the communication plan (for instance spare capacity, routing or configuration considerations). It also justifies deviations that have been made to the communication plan.

Communication Plan Updates

As sections of the network are implemented, and as technology and communication requirements change, the communication plan should be updated as required. At any given time the "current" communication plan should consist of the plan itself, and any completed Planning Reviews.

Communications Requirements

This section describes the current and future requirements for communication that the network must accommodate. The detailed design of any section of the network should support all current requirements, and provide for all anticipated requirements. In those cases where the exact deployment of the anticipated equipment is not finalized or where there is a significant incremental cost, the provision for these future requirements may be limited to the following:

- Installation of conduit for future population as requirements become known,
- Increasing the size of equipment enclosures, cabinets, and facilities to accommodate the future requirements,
- Increasing the size of power systems to support future load requirements, and
- Choosing transmission systems that allow modular expansion.

When available and cost effective, the communication needs of ITS devices and connectivity between ITS related facilities should utilize Ethernet over fiber optic cable. In those circumstances where fiber is not viable, there are many different options available. Each type of ITS device is particularly well suited to different media types, requiring an evaluation of the device and options available. Table 3-1 presents general guidelines to be used in selecting appropriate communications media.

Table 3-1: Communication Requirements of ITS Devices

Device	Approximate Bandwidth	Media Alternatives
Traffic Signals	64 kbps	Copper, fiber, wireless, cellular
CCTV	4 Mbps	Fiber
Dynamic Message Sign	56 kbps	Cellular, Twisted Pair Ethernet/Copper, Fiber
Highway Advisory Radio	56 kbps	Cellular, Twisted Pair Ethernet/Copper
Traffic Count Station	56 kbps	Twisted Pair Ethernet
TSP Enabled Traffic Signals	64 kbps	Fiber, Twisted Pair Ethernet/Copper

Traffic Signals

Traffic signals in the Central Willamette Valley are operated and maintained by multiple city and state (i.e., ODOT) agencies. The existing and programmed traffic signals of the region are illustrated in Figure 1-3 (see Chapter 1).

Current Requirement

Communication to traffic signals requires a data channel between the traffic signal system computer and the controller for each intersection.

For the City of Corvallis, many signals in Corvallis are stand-alone devices; some have radio interconnect available but not used. A portion of the current communication structure is a 120V system consisting of seven or more controllers connected along a data channel with modems to provide the communication link. This structure supports Recommended Standard 232 (RS-232) channels between the traffic signal system computers and the signal controller. The existing central software enables channels to be shared so that seven or more controllers can utilize the same channel for linkage to local traffic operations center as illustrated in Figure 3-1. This current 120V system of communication between traffic signals, while functional, is in need of replacement.

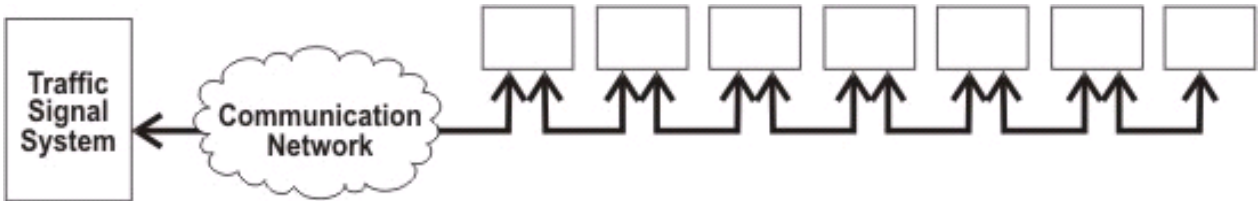


Figure 3-1: Traffic Signal Communications

For the Cities of Albany and Lebanon, traffic signals currently operate as stand-alone devices that are not connected to a central system.

Anticipated Requirements

The City of Corvallis will be upgrading some of their controllers to Type 2070 controllers with Voyage software. These controllers will support both RS-232 and Ethernet communication that can be carried over fiber or twisted pair utilizing very high bit-rate digital subscriber line (VDSL). These signals will be connected to a local communications server located at the Corvallis Public Works building, which will be connected to the TransSuite server located at the Northwest Traffic Operations Center (NWTOC) in Salem via a Virtual Private Network (VPN) over the Internet. The configuration and management of the local communications server is performed by TransSuite user terminal connected to the TransSuite server in Salem via VPN. This configuration is depicted in Figure 3-2.

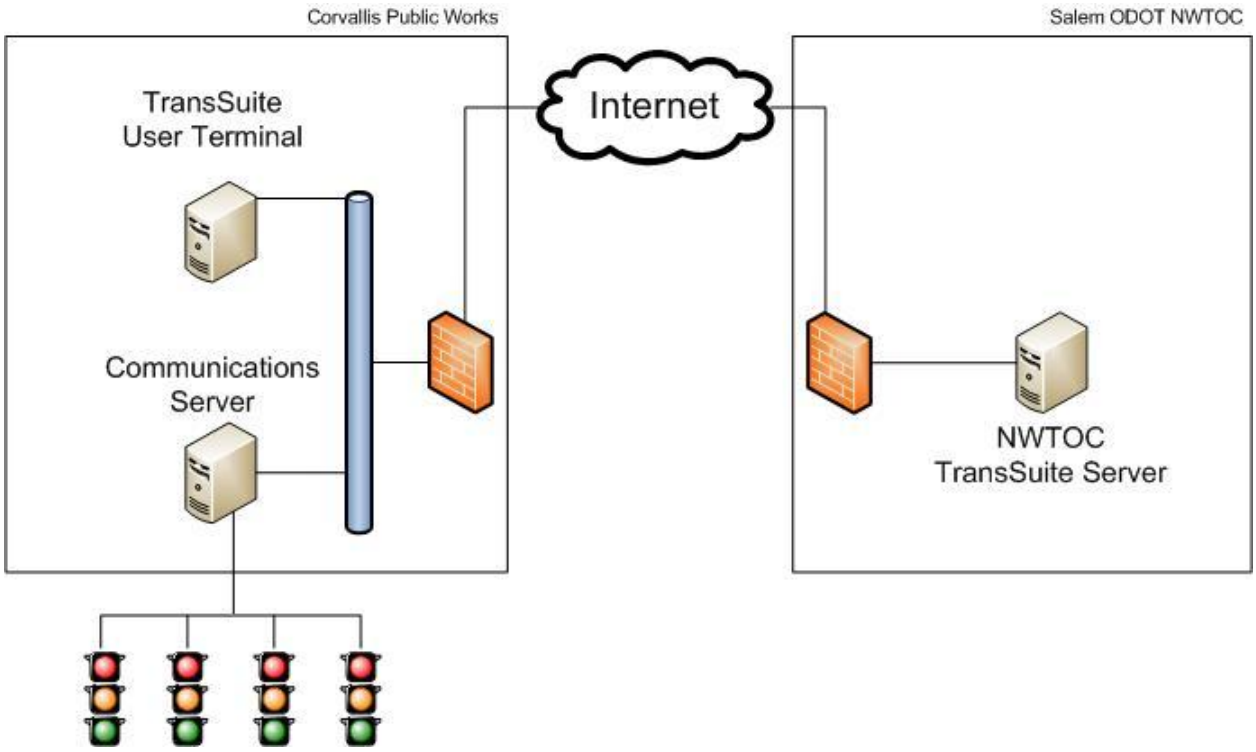


Figure 3-2: Corvallis to ODOT TransSuite Communications

For the Cities of Albany and Lebanon, there are plans to connect their traffic signals, currently operating as stand-alone devices, to central systems.

CCTV Video

Closed-circuit television (CCTV) monitoring requires transmission of a video signal and a data channel for camera control. In most systems the camera control, used to provide pan-tilt-zoom (PTZ) and focus, is carried on an RS-422 or EIA/TIA 485 (commonly called RS-485) data channel, which can be digitized in an internet protocol (IP) video stream or carried as a separate low speed data channel.

Current Requirement

ODOT operates CCTV cameras to monitor traffic along certain portions of I-5, as discussed in Chapter 1. Video signals from these cameras are transmitted to the NWTOC via a combination of wireless technology and leased lines. ODOT uses a video switch at the NWTOC to select the analog camera images to display on the center's monitors.

Anticipated Requirements

It is envisioned that CCTV cameras implemented as part of this ITS plan will eventually be shared between agencies within the region. The video signals interfaced at a typical control center are shown in Figure 3-3 as daisy chained Ethernet on 2 fibers between Ethernet switches. This center could be the NWTOC, Corvallis Public Works office, or another facility.

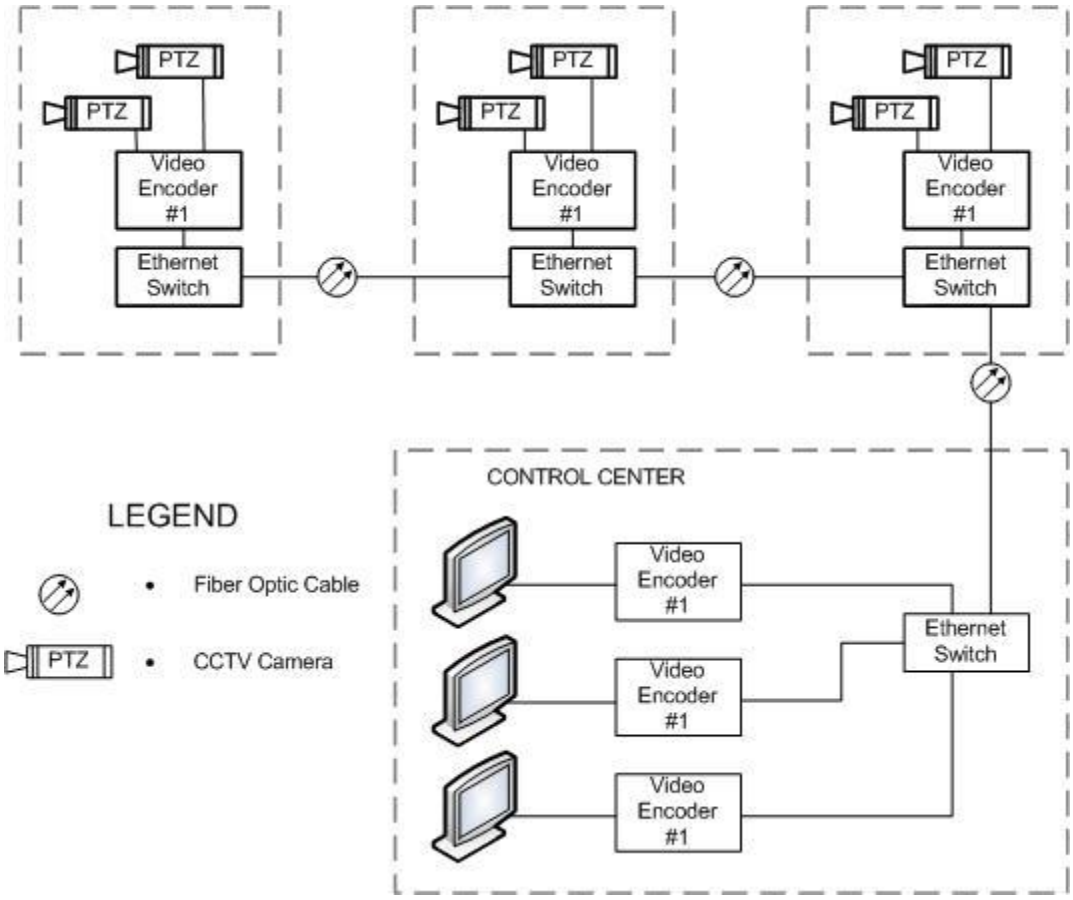


Figure 3-3: CCTV Camera Communications

Automatic Traffic Recorders

Automatic traffic recorders (ATR) collect traffic volume, speed and occupancy data at a given location. Recorders may be located at signalized intersections using the traffic signal controller or at stand alone vehicle detection sites. For planning purposes, the communication requirements are identical with those of a traffic signal controller.

Current Requirement

ODOT currently operates four automatic traffic recorders (ATRs) in the study area to collect volume, speed, and occupancy data, as described in Chapter 1. ODOT's ATR stations consist of inductive loops that are directly connected to a 170 controller housed in a cabinet. Communications with ATR stations in the field utilize leased, dialup and cellular.

Anticipated Requirements

Future requirements will arise from new signalized intersections, and isolated detection sites along major roadways. ODOT and the City of Corvallis are planning additional ATR stations at three intersections to collect vehicle volume information, as described in Chapter 1. There is also a planned traffic count station along US 20 west of the City of Philomath.

Video detection can be used in locations where permanent loop installations are not recommended (e.g. in areas where future road work is anticipated), but it is not necessary to bring video feeds from video

detection sites back to the NWTOC – only the detection data is required. If the selected video detection system provides a suitable image for monitoring traffic, the video signal may be supported in the same manner as a CCTV camera.

Dynamic Message Signs

A dynamic message sign (DMS) is an electronic sign used to post messages that are variable (any message) or changeable (one of several fixed messages). Traffic management personnel typically utilize DMS to inform motorists of current or changing traffic conditions.

Current Requirement

ODOT currently operates and maintains DMS equipment at two locations along I-5, as Chapter 1 describes. ODOT currently communicates with these signs using Point to Multi-Point Protocol (PMPP)/Point to Point Protocol (PPP) through 56K leased dial-up phone lines.

Anticipated Requirements

ODOT plans to install additional DMS signs, as part of the deployment plan for the region, at the following locations:

- I-5 Southbound in Millersburg
- Westbound OR 34 west of the intersection of SE Columbus St/OR 34.
- Southbound OR 99E north of the intersection of OR 99E/ McFarland Rd.

ODOT's new DMS installations are all National Transportation Communication for ITS Protocol (NTCIP) compliant and user configurable for 56K dial-up and UDP/IP over Ethernet. Communication requirements are similar to the traffic signal controllers, and several signs may share a single data communications path depending on device location.

Automated Enforcement

Current Requirement

The City of Albany utilizes third party, outsourced red light enforcement at one signalized intersection (Queen Avenue/Geary Street), as described in Chapter 1. All communications required for this implementation are provided by the vendor.

Anticipated Requirements

There are no anticipated communications requirements to support automated enforcement.

Center-to-Center

A key element of a regional ITS operation is the use of center-to-center links to support the sharing of video and data, and in some cases to enable the control of a traffic operations/maintenance center from a backup location. The following centers in the Central Willamette Valley region should be interconnected:

- Transportation maintenance centers,
- Emergency operations centers (EOCs), and
- 911 centers.

Current Requirement

ODOT maintains the Northwest Transportation Operations Center (NWTOC) in Salem to manage state highway facilities in the region, as Chapter 1 describes. There are no existing Center to Center

connections within the region. The only programmed Center to Center connectivity is via a VPN between the ODOT NWTOC in Salem and The City of Corvallis in support of the OR 99W ATMS project as discussed previously.

Anticipated Requirements

With the addition of the planned ITS devices throughout the region, Center to Center connectivity will become a critical component to establishing a cohesive Intelligent Transportation System for the Region. By connecting all traffic management centers within the region and connecting the region to ODOT's NWTOC, traffic data, CCTV images, and traffic management systems can be shared.

ODOT is currently developing the Transportation Operations Center System (TOCS) to support multiple functional areas including traffic management, incident management, and emergency management, as described in Chapter 1. Planned Center to Center links should interconnect with TOCS once the system is fully developed. Currently, ODOT utilizes primarily VPN tunnels over the Internet for Center-to-Center connections and does not allow local agencies to connect directly to ODOT's wide area network (WAN).

Other Traffic Subsystems

Other low data devices, such as road weather information systems, traffic beacons and highway advisory radio systems (HARs) have communications requirements that are similar to those of the DMS devices.

Current Requirement

ODOT currently operates and maintains a highway advisory radio (HAR) system for the Corvallis area, as described in Chapter 1. In addition, ODOT has many traveler information tools that could be linked to the region today: TripCheck website, TripCheck local entry tool, TripCheck traveler information portal, and 511.

Anticipated Requirements

For the Corvallis region, a weather station is planned for US 20 west of Philomath. It is anticipated this device will be NTCIP compliant and user configurable for 56K dial-up and UDP/IP data transmission over Ethernet.

Communication linkages could also be established with the PORTAL database system described in Chapter 1 to help create a data warehouse for the region. Other alternatives for data warehousing could in include an ODOT lead initiative or a partnership from OSU.

Transit Signal Priority

Current Requirement

The goal of transit signal priority (TSP) is to reduce transit travel times by providing an early green or extending the green for a bus behind schedule. Most TSP systems use local communication between a roadside sensor and the traffic signal controller. The roadside sensor identifies the location of a transit vehicle and may provide signal priority as required.

In some municipalities a more centralized monitoring approach has been used, where the location of the transit vehicles is tracked, and the signal priorities changed system-wide in response to the congestion experienced by these vehicles. Such systems require field detectors that use wireless communication with transit vehicles to collect location information. They also require fast, reliable communication and a near-real time traffic signal control system.

Transit signal priority utilizing Opticom equipment currently operates along several key corridors in the City of Corvallis, as described in Chapter 1.

Anticipated Requirements

Within the region, additional TSP corridors have been identified for the City of Corvallis that include portions of Walnut Blvd, Harrison Blvd, 9th Street, and Philomath Boulevard. Potential TSP locations have also been identified along corridors in the Cities of Philomath, Albany, and Lebanon.

Other Transit Subsystems

Other transit subsystems consist of Automated Vehicle Location (AVL), Computer Aided Dispatch (CAD), and Advanced Traveler Information Systems (ATIS). ATIS can include trip planning websites, electronic wayside information signs, and "next bus arrival", providing time and/or routing information to transit riders for the next bus to arrive.

Many of these transit subsystems are dependent on wireless data communication between vehicles and their central systems.

Current and Anticipated Requirements

The existing mobile wireless data system utilized in the region is based on a 450MHz narrowband system. The existing wireless communications system is based on 450MHz system which is currently under a Federal Communications Commission (FCC) mandate to convert to be narrowbanded by January 1, 2013. The City of Corvallis recently won a grant to accomplish narrowbanding with the intention to continue to own and operate a private wireless communications system. Other options for complying with narrowbanding requirements include partnering with the regional public safety communications effort to implement a new 700 MHz communications system. Further recommendations for wireless mobile voice and data are not included as part of the scope of this document.

Communications Plan Recommendations

This section describes the communication plan recommendations for connecting centers and programmed and planned ITS devices across the region and within the cities of Corvallis, Albany, and Lebanon.

Application of Communications Plan Guidelines

Earlier in Section 1.1 of this document, a series of Communications Plan Principles were identified, with the recommendation that each must be considered during the detailed design, as well as the note that these principals guided the development of this communication plan. These guidelines are revisited below, identifying how they specifically relate to the Central Willamette Valley ITS and Communications Plan:

- **Reliability**: In order to achieve a high level of system reliability, the Network Architecture illustrated in Figures 3-4 and 3-5 shows many redundant paths to be constructed over the long term. In addition to path redundancy, communications links can utilize alternate technologies or communications services (e.g., fiber can be reinforced by leased line circuit) to further enhance system reliability. Finally, as identified in the original guideline, equipment with high MTBF should be implemented throughout the system.
- **Growth**: To support future network growth, additional fiber count should be included in any segment of new design. Additional fiber should be added to support future undefined devices, services and partners. Adding fiber count to a segment adds nominal cost over the cost of

constructing the segment itself, but the cost savings over future construction is significant. In addition to fiber, spare conduit (or at least innerduct), should be considered in any underground construction for similar reasons. Finally, the communications transport layers of the network should be designed in a manner that efficiently utilizes the infrastructure once it is constructed, (e.g., CCTV video should be digitized in the field, aggregated at node locations, and brought back over the network utilizing Ethernet communications.)

- **Flexibility**: To support moves, adds, network rearrangements and/or equipment changes in the future, the communications network should include a number of specific elements in the detailed design of any individual communications segment. These design elements include the strategic utilization of field communications hubs at key network intersection points, as well as periodic fiber access points in the field, especially at other potential intersection points. Fiber patching should be considered at these communications hubs, nodes or other termination facilities, as opposed to splicing through. Finally, slack loops should be built into any new fiber construction, particularly at the hub and access points, to further provide network flexibility.
- **Standards**: Within the standards guideline, three specific principals should be considered by agencies in Central Willamette Valley that will be deploying communications infrastructure.
- **Open Communications Standards:** Whenever possible, common industry open standards for communications should be utilized. Communications and computing industry standards should be considered, as well as, ITS industry standards. This is one of the driving factors for the recommendation of Ethernet over fiber as the preferred communications medium and transport mechanism.
- **Utilize Common Construction Standards**: Communications construction standards should be developed and utilized among regional agencies to support industry best practice and to support all of the design guidelines (such as growth and flexibility) as discussed in this section.
- **Standardize Among Regional Agencies:** Whenever possible, standardization between all regional participating agencies should be enforced or at least strongly encouraged. This includes standardization on both communications protocols and construction methods as identified above, as well as, standardization of network equipment wherever practical. While utilization of open standards is intended to support the ability to utilize multiple vendor products with full interoperability, many other benefits, such as sharing of spare equipment and maintenance responsibilities and training of staff, all support standardization of network equipment.
- **Decentralized**: The Central Willamette Valley ITS Communications network is decentralized by nature, due to the geographic dispersion of the participating agencies and the fact that ODOT manages their devices from the NWTOC in Salem. This architecture allows for both local control of agency owned devices and the sharing of traffic and transportation data between agencies as required. The latter point has not been a significant issue in the past, but is anticipated to grow as more devices and more real-time data becomes available regionally over time.

Network Architecture & Phasing

For the planned communication links, Ethernet over fiber optic cable is the communication medium of choice. It is understood that building fiber optic cable to all ITS devices and between centers is not cost effective, nor is it required. Utilization of leased fiber, leased telecom services, and agency built wireless links/networking are all alternative options that can be considered on a device by device or corridor by corridor basis. Cellular services are also options for connecting remote, non-traffic control devices such as highway advisory radios to traffic operations centers. Ultimately, with the media selected,

communication build outs should be coordinated with other construction efforts to utilize shared resources and reduce marginal costs.

As part of this communications plan, transportation corridors were broken up into three categories:

- **High Priority Planned Fiber Corridors**– Primary transportation corridors with existing, programmed or planned high bandwidth ITS devices, such as CCTV cameras, and other ITS equipment. These corridors are the ones most likely to require or justify the construction of new, agency owned fiber optic cable, due to the types and density of ITS devices and/or their relationship in the overall regional communication network.
- **Medium Priority Planned Fiber Corridors** –Secondary transportation corridors with existing, programmed or planned high bandwidth ITS devices. These corridors are less likely to require or justify fiber in the near term, but should be considered, particularly when opportunities such as road enhancement or other capital construction projects are planned.
- **Low Priority Communications Corridor** – Transportation corridors with or without existing, programmed or planned ITS devices that either do not require high bandwidth, or the physical location makes fiber construction cost prohibitive or unlikely. Devices along this corridor type will utilize wireless, dialup, leased services, or cellular for connectivity, unless unique opportunities present themselves to support cost effective construction.

Regional Communications Plan Maps

Figure 3-4, illustrates the locations of these future ITS devices together with planned communication segments. Figure 3-5 illustrates the planned communication segments without the planned and programmed ITS devices.

For greater detail of each urban area, the communications plan if further broken into areas and discussed later in this section.

NOTE: The fiber corridors depicted in this plan are intended to be an indication of the general route for planned fiber optic builds. These routes indicated are not intended to show the actual fiber routes for a completed design. Many of the depicted routes run parallel to one another, however when actually designed and implemented, the "better" of the two routes (or preferred route) should be selected and devices that are on nearby roadways can be served by stubs off of the selected route. The preferred route may be decided by cost (e.g., aerial instead of underground construction) or by opportunity (e.g., one of the two routes has a capital improvement project that can be leveraged.)

An example of these parallel routes is depicted in Figure 3-6 where NW Van Buren runs parallel to NW Harrison Blvd for several blocks.

Central Willamette Valley ITS Plan

FIG. 3-4 **Planned ITS Devices and Communications Infrastructure**

Legend

- Traffic Count Station
- Planned Traffic Count Station
- Camera
- Planned Camera
- Highway Advisory Radio (HAR) Transmitter
- Highway Advisory Radio (HAR) Sign with Beacon
- Variable Message Sign (VMS)
- Planned Variable Message Sign (VMS)
- Planned Weather Station
- City Limit
- Urban Growth Boundary
- County Line
- Water

Communications Infrastructure

- Existing Fiber
- High Priority Planned Fiber
- Medium Priority Planned Fiber
- Low Priority Communications Corridor

IBI GROUP

0 0.5 1 2 3 4 5 6 Miles

to Salem
Jefferson
Millersburg
Adair Village
BENTON CO.
LINN CO.
ELLSWORTH
Albany
Corvallis
Philomath
Tangent
Lebanon
LINN CO.
BENTON CO.
5
20
99W
34

Lake Creek Drive Inset

Lake Creek Drive
Brownsville
Halsey

Central Willamette Valley ITS Plan

FIG. 3-5

Existing & Planned Communications Infrastructure

Legend

Existing Infrastructure

Fiber

Planned Infrastructure

High Priority Planned Fiber

Medium Priority Planned Fiber

Low Priority Communications Corridor

City Limit

County Line

Roadway

Water

IBI GROUP

0 0.5 1 2 3 4 5 6 Miles

to Salem

Jefferson

Millersburg

Adair Village

BENTON CO.
LINN CO.

ELLSWORTH

Albany

Corvallis

Philomath

Tangent

Lebanon

LINN CO.
BENTON CO.

99W

20

34

5

Lake Creek Drive Inset

Lake Creek Drive

Brownsville

Halsey

As depicted in Figure 3-5 the corridors or sections of limited access roadway connecting urban centers within the Central Willamette Valley are largely classified as Low Priority Communications Corridors. This classification is primarily based on the cost associated with building infrastructure between urban centers and the lack of density of future ITS devices planned along the corridors. In addition to the options listed above for this type of corridor, when establishing center to center connectivity between urban centers, leasing of dark fiber or other communications services from a commercial provider, such as LS Networks, should be considered. LS Networks maintains a considerable amount of fiber assets throughout the region and focuses on services to municipal organizations.

Local Opportunities

City of Corvallis

When considering leveraging existing fiber optic resources within the City of Corvallis it is important to understand the existing infrastructure. The majority of the existing infrastructure was constructed utilizing aerial runs between established fiber nodes that are indicated as green dots on Figure 3-6. The aerial infrastructure between nodes lacks existing fiber access points and in most cases does not have adequate slack loops to establish new access points. While it may be possible to utilize a mid-line splice to access the fiber along the route, in most cases the fiber will only accessible from established fiber nodes.

As illustrated in Figure 3-6, high, medium, and low priority communication corridors are planned for the cities of Corvallis and Philomath. The high priority links will consist of fiber connections that support planned TSP corridors and planned/programmed ITS devices, which include CCTV cameras and traffic count stations. The medium priority corridors support center to field links for planned TSP corridors, and they occur along secondary ITS routes.

The low priority corridors for Corvallis/Philomath include a planned communications line along US 20 north of the city to support a center to center connection to Albany. Planned or programmed devices are not proposed for the other low priority segments; however, these corridors could support ITS devices in the future and thus are included in the plan (as low priority).

City of Albany

For the city of Albany, as illustrated in Figure 3-7, communication lines are planned along high and medium corridors. The high priority corridors will be fiber based and will support planned CCTV cameras and TSP corridors, as illustrated in Figure 3-7. These corridors will also support communication between existing traffic signals and traffic count stations. Medium fiber corridors, colored in blue, will only facilitate communication for planned TSP corridors.

Central Willamette Valley ITS Plan

FIG. 3-6 Corvallis/Philomath Existing & Planned Communications Infrastructure

Legend

Existing & Programmed Infrastructure

- Fiber
- Programmed Fiber
- Fiber nodes

Planned Infrastructure

- High Priority Planned Fiber
- Medium Priority Planned Fiber
- Low Priority Communications Corridors

Public Facilities

- Fire Stations
- 911 Call Ctr.
- Public Works
- ODOT District 4
- OSU Campus

IBI GROUP

0 0.5 1 2 3 Miles

Corvallis

Philomath

99W

20

34

NW HIGHLAND DR

NW GLENRIDGE DR

NW WALNUT BLVD

NW ELKS DR

NE CONSER DR

NE CIRCLE BLVD

NW WITHAM HILL DR

NW 29TH ST

NW KINGS BLVD

NW 9TH ST

NW 10TH ST

NW OAK CREEK DR

NW HARRISON BLVD

NW VAN BUREN AVE

NW 2ND ST

NW 30TH ST

SW RESERVOIR RD

SW WESTERN BLVD

WEST HILLS RD

SW WEST HILLS RD

SW 49TH ST

SW 53RD ST

SW PLYMOUTH DR

SE 3RD ST

SE MIDVALE DR

BENTON CO.

LINN CO.

Downtown Corvallis Inset

NW POLK AVE

NW TYLER AVE

NW HARRISON AVE

NW JACKSON AVE

SW MONROE AVE

SW MADISON AVE

NW 10TH ST

NW 9TH ST

NW 8TH ST

NW 7TH ST

NW 6TH ST

NW 5TH ST

NW 4TH ST

NW 3RD ST

NW 2ND ST

NW 1ST ST

NW VAN BUREN AVE

Central Willamette Valley ITS Plan

FIG. 3-7 **Albany Existing & Planned Communications Infrastructure**

Legend

- Existing Fiber

Planned Infrastructure

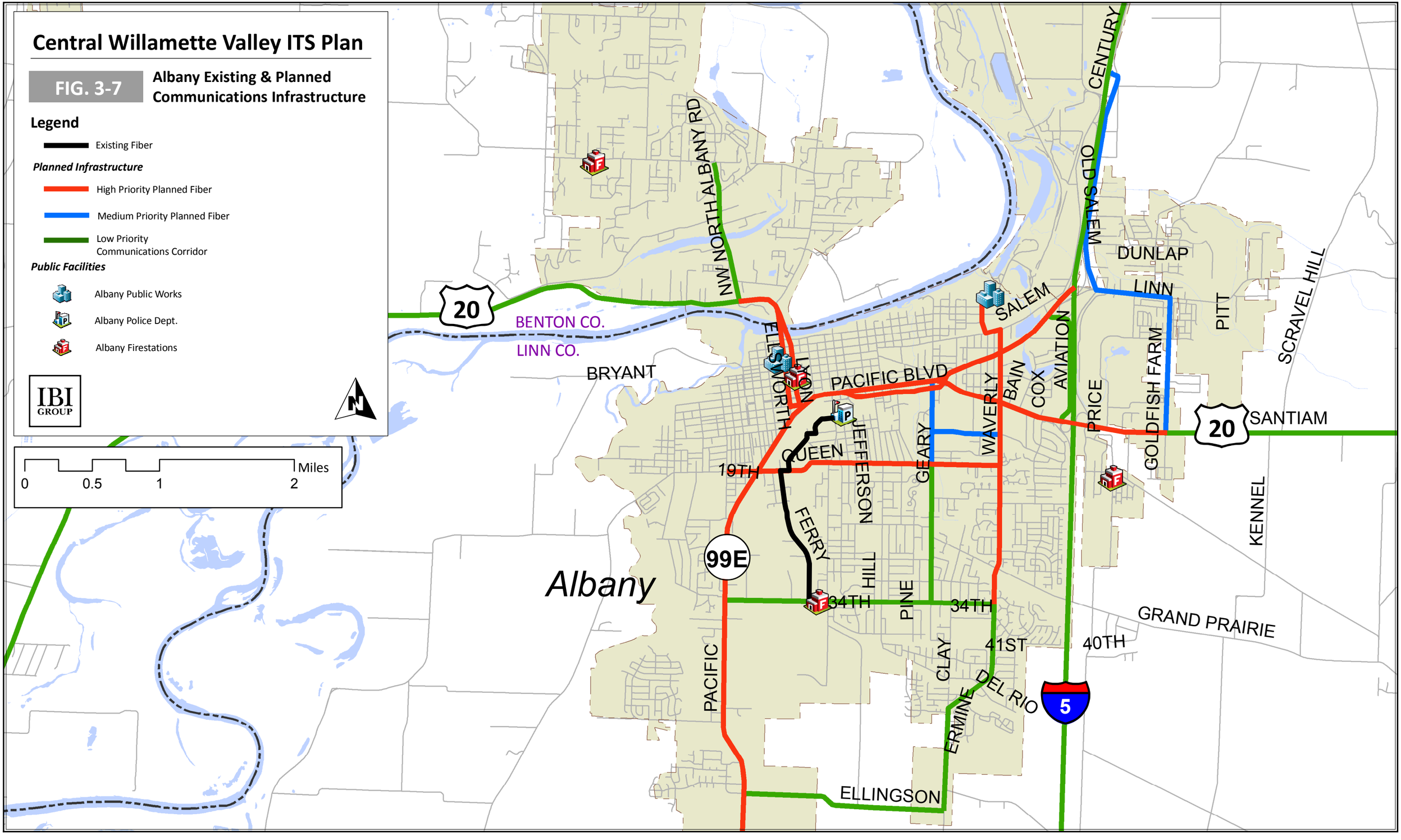
- High Priority Planned Fiber
- Medium Priority Planned Fiber
- Low Priority Communications Corridor

Public Facilities

- Albany Public Works
- Albany Police Dept.
- Albany Firestations

IBI GROUP

0 0.5 1 2 Miles



For the City of Albany, low priority green colored corridors primarily support center to center connections. The first is along US 20 west of Albany for the C2C connection between the cities of Albany and Corvallis. The second is along US 20, east of Albany, for communication between the cities of Lebanon and Albany. The third is the center to center corridor along I-5 to support connectivity between Albany's traffic operations center and ODOT's NWTOC in Salem. For the other low priority corridors, ITS devices are not planned or programmed but may exist along these segments in the future.

When considering connectivity for ITS devices within the City of Albany there is a potential of utilizing services and/or infrastructure from LS Networks. LS Networks currently maintains an extensive fiber optic plant throughout the City of Albany that the city currently utilizes for connectivity between city locations. While it is most likely not possible to utilize currently allocated LS Networks fiber, a discussion with LS Networks may present cost effective alternatives to building fiber for some planned corridors.

City of Lebanon

As illustrated in Figure 3-8, low and high priority communication links are planned for the City of Lebanon. The one high priority corridor along US 20 will support a planned TSP corridor. The low priority corridor along US 20 north of Lebanon will support C2C connectivity. For the remaining low priority corridors, ITS devices are neither planned nor programmed, but may be deployed along these segments in the future.

Central Willamette Valley ITS Plan

FIG. 3-8 **Lebanon Existing & Planned Communications Infrastructure**

Legend

Planned Infrastructure

- High Priority Planned Fiber
- Low Priority Communications Corridor

Public Facilities

- Lebanon Police Station
- Lebanon City Hall

IBI GROUP

0 0.5 1 Miles

20
GORE
REEVES
HANSARD
34
CORVALLIS-LEBANON HWY
WHEELER
12TH
ROSE
ASH
MAIN
8TH
MAPLE
WILLIAMS
PARK
OAK
LEBANON
Lebanon
DENNY SCHOOL RD
MILTON
AIRWAY
9TH
POST
AIRPORT
2ND
MILL
MAY
6TH
HOBBS
11TH
CEDAR
8TH
20
SANTIAM HWY
CROWFOOT

CHAPTER 4 REGIONAL ITS ARCHITECTURE

This chapter provides a summary of the National ITS Architecture[2] and how it applies to the deployment of intelligent transportation systems in the Central Willamette Valley. This includes definitions of National ITS Architecture terminology, the Central Willamette Valley ITS systems inventory, descriptions of the user services and market packages selected by the Steering Committee to meet the needs of the Central Willamette Valley transportation network, and applicable ITS standards.

Why Develop an ITS Architecture?

The U.S. Department of Transportation (U.S. DOT) developed the National ITS Architecture to ensure that intelligent transportation systems deployed around the country can communicate with one other and share information to maximize the return of investment on ITS. The architecture is a framework that describes the functions of system components, how these components interconnect, the organizations involved, and the type of information to be shared.

For example, if a transportation agency wants to clear incidents faster, the architecture defines a function to monitor roadways and identifies the interconnection and information flows between the roadway, the traffic management center, and the emergency management center needed to provide responders with incident information. The architecture provides the framework for the process, but does not define how this is done with technology or management techniques.

The reasons for developing a regional ITS architecture tailored to the Central Willamette Valley include to:

- Develop a framework for institutional agreements and technical integration for organized ITS project deployment that meets local transportation user needs.
- Build consensus among regional stakeholders about resource and information sharing and activity coordination.
- Meet federal funding requirements.

The Federal Highway Administration (FHWA) published a policy[3] that all agencies seeking federal highway trust funding for ITS projects must develop a regional architecture that is compliant with the National ITS Architecture. The Federal Transit Administration (FTA) published a similar policy[4] that applies to federal funding from the mass transit account of the highway trust fund.

Regional ITS Architecture Development Process

The Central Willamette Valley Regional ITS Architecture was developed based upon the regional transportation network infrastructure, the user needs identified by stakeholders through interviews and

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[2] *National ITS Architecture, Version 6.1*. U.S. Department of Transportation. Jan. 7, 2009. itsarch/iteris.com/itsarch. Accessed July 20, 2010.

[3] *Intelligent Transportation System Architecture and Standards: Final Rule*, U.S. Department of Transportation, Federal Highway Administration, FHWA Docket No. FHWA-99-5899, Jan. 8, 2001.

[4] Federal Transit Administration National ITS Architecture Policy on Transit Projects: Notice, Federal Transit Administration, FTA Docket No. FTA-99-6147, Jan. 8, 2001.

steering committee meetings, and the *Regional ITS Architecture Guidance*[5]. *Turbo Architecture*[6], a software tool designed to support development of regional and project architectures based on the National ITS Architecture, was used to document the Central Willamette Valley Regional ITS Architecture. This *Turbo Architecture* database is intended to be a living document that gets updated by the key stakeholders as regional needs change.

The following steps, illustrated in Figure 4-1, were followed in the development of the regional architecture:

- Stakeholder Input: Stakeholders, who are listed in Chapter 2, provided input throughout the architecture development process to obtain regional consensus. The *Turbo Architecture* stakeholder report for the regional architecture can be found in the appendix.
- Systems Inventory: Existing and planned ITS elements, described in Chapter 1, were input into the architecture. The *Turbo Architecture* inventory report for the regional architecture can be found in the appendix.
- Map User Needs to User Services: The transportation user needs, documented in Chapter 2, were mapped to user services to ensure the architecture meets the regional needs.
- Market Package Selection: Market packages were selected based on the systems inventory and user needs. The *Turbo Architecture* market packages report for the regional architecture can be found in the appendix.
- Interconnect and Information Flow Customization: Information flows between subsystems were customized to ensure that the architecture reflects existing and planned regional interconnects.

Additionally, the regional architecture was developed to be consistent with the statewide architecture. The same stakeholder and inventory element naming conventions were used. Many of the systems used throughout the state, particularly those used by ODOT, can be directly mapped between the regional and statewide architectures.

[5] National ITS Architecture Team. *Regional ITS Architecture Guidance: Developing, Using, and Maintaining an ITS Architecture for Your Region, Version 2.0*. Prepared for U.S. Department of Transportation, Federal Highway Administration, and Federal Transit Administration. FHWA-OP-02-024. July 2006.

[6] *Turbo Architecture, Version 5.0*, developed by Iteris for the U.S. Department of Transportation, Federal Highway Administration, 2010.

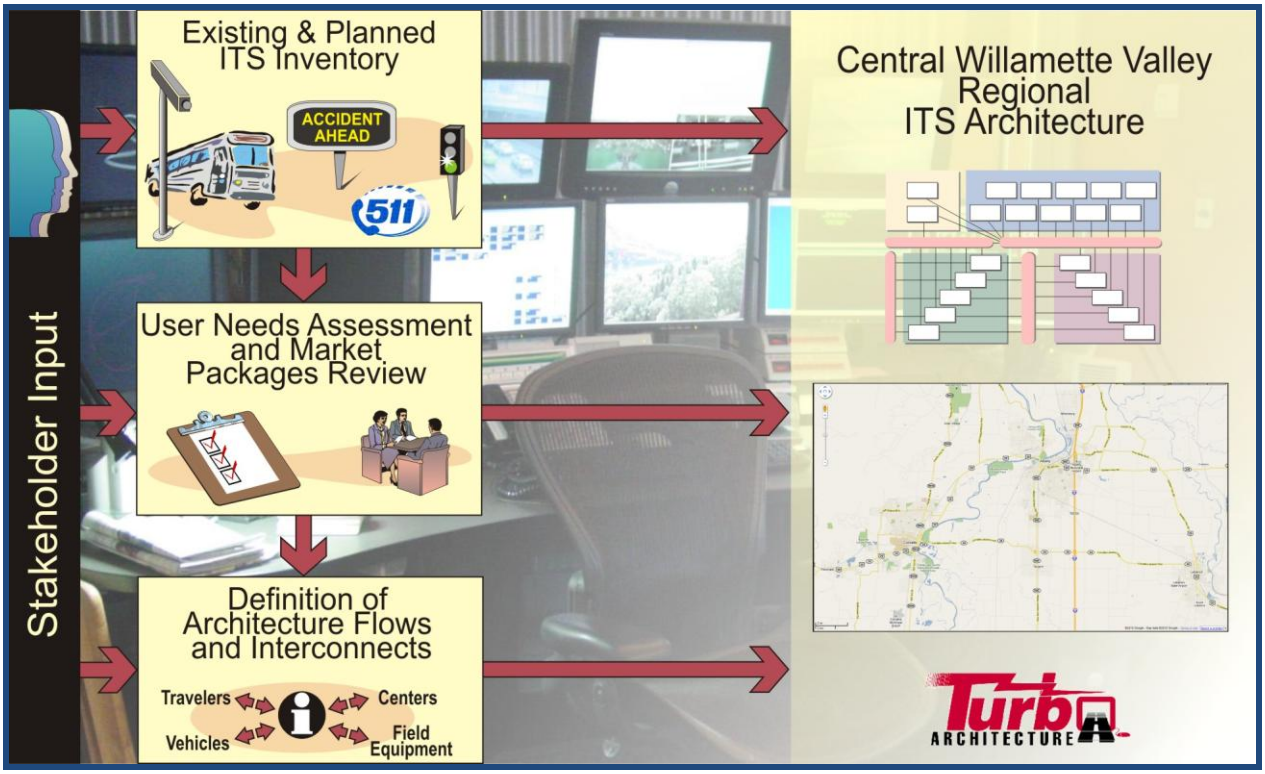


Figure 4-1: Regional ITS Architecture Development Process

User Services

User services describe what functions intelligent transportation systems should perform from the user's perspective. Users encompass a broad range including groups such as the traveling public, transportation agency personnel, emergency management personnel, and commercial vehicle operators. Although a user service is a functional requirement of the system, it does not describe where components fit into the architecture or how the service will be implemented. Selection of user services provides a high-level means of identifying the services to provide that address the regional user needs and problems. To simplify the range of requirements in a broad area of services, the user services are logically grouped into eight user services bundles. Table 4-1 includes the 33 nationally defined user services, grouped by user service bundle, and indicates the ones selected by the Steering Committee. A description of each user service may be found on the National ITS Architecture website[7].

[7] *User Services Bundles and User Services*. U.S. Department of Transportation. Jan. 7, 2009. itsarch/iteris.com/itsarch/html/user/userserv.htm. Accessed July 20, 2010.

Table 4-1: User Services in the Central Willamette Valley Regional ITS Architecture

User Services Bundles and User Services		Status
1	**Travel and Traffic Management**	
1.1	Pre-Trip Travel Information	Existing
1.2	En-Route Driver Information	Existing/Planned
1.3	Route Guidance	Existing/Planned
1.4	Ride Matching and Reservation	Planned
1.5	Traveler Services Information	Not Planned
1.6	Traffic Control	Existing
1.7	Incident Management	Existing
1.8	Travel Demand Management	Planned
1.9	Emissions Testing and Mitigation	Not Planned
1.10	Highway Rail Intersection	Existing
2	**Public Transportation Management**	
2.1	Public Transportation Management	Existing/Planned
2.2	En-Route Transit Information	Planned
2.3	Personalized Public Transit	Existing/Planned
2.4	Public Travel Security	Existing/Planned
3	**Electronic Payment**	
3.1	Electronic Payment Services	Planned
4	**Commercial Vehicle Operations**	
4.1	Commercial Vehicle Electronic Clearance	Not Planned
4.2	Automated Roadside Safety Inspection	Not Planned
4.3	On-Board Safety and Security Monitoring	Not Planned
4.4	Commercial Vehicle Administrative Process	Not Planned
4.5	Hazardous Materials Security and Incident Response	Not Planned
4.6	Freight Mobility	Not Planned
5	**Emergency Management**	
5.1	Emergency Notification and Personal Security	Existing
5.2	Emergency Vehicle Management	Existing/Planned
5.3	Disaster Response and Evacuation	Not Planned
6	**Advanced Vehicle Safety Systems**	
6.1	Longitudinal Collision Avoidance	Not Planned
6.2	Lateral Collision Avoidance	Not Planned
6.3	Intersection Collision Avoidance	Not Planned
6.4	Vision Enhancement for Crash Avoidance	Not Planned
6.5	Safety Readiness	Not Planned
6.6	Pre-Crash Restraint Development	Not Planned
6.7	Automated Vehicle Operation	Not Planned
7	**Information Management**	
7.1	Archived Data	Existing/Planned
8	**Maintenance and Construction Management**	
8.1	Maintenance and Construction Operations	Existing/Planned

Logical Architecture

The logical architecture defines the requirements needed to provide the selected user services and is comprised of the following components:

- Processes: Activities and functions that must work together and share information to provide a user service.
- Terminators: Represent the people, systems, environment, and other subsystems that interact with intelligent transportation systems. These are described in more detail in the Physical Architecture section of this chapter.
- Data Flows: Information exchange between processes or between processes and terminators. For example, passenger count data is exchanged between a transit fare box and a transit system operator.
- Data Stores: Repositories of information maintained by the processes.

The logical architecture is typically described by data flow diagrams (DFDs) and process specifications (PSpecs) for specific project-related systems. Data flow diagrams graphically represent the processes, terminators, data flows, and data stores in a hierarchical format. The process specifications are used to write the specifications for specific project-related systems and consist of an overview, a set of functional requirements, and a complete listing of inputs and outputs. Public sector agencies tailor the logical architecture by identifying the processes, terminators, data flows and data stores that are existing or planned for a region.

Physical Architecture

The physical architecture creates a high-level structure around the processes and data flows included in the logical architecture. It consists of subsystems, equipment packages, terminators, architecture flows, and architecture interconnects, which are all described in this section. Figure 4-2 illustrates the high-level physical architecture of the National ITS Architecture and includes the subsystems and architecture interconnects between subsystems. This diagram was tailored to the Central Willamette Valley metropolitan area to include the existing and planned regional subsystems and is included at the end of this section. Figure 4-3 depicts the interaction between the logical and physical architectures.

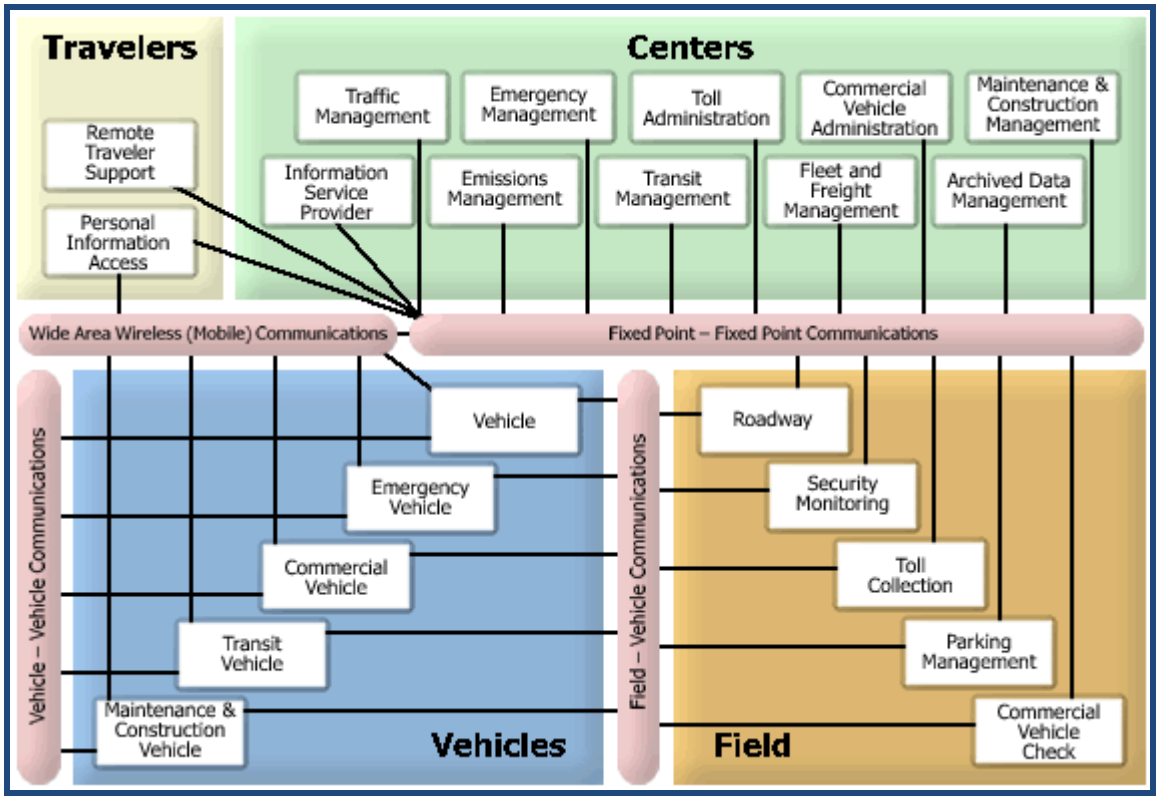


Figure 4-2: High-Level Physical National ITS Architecture

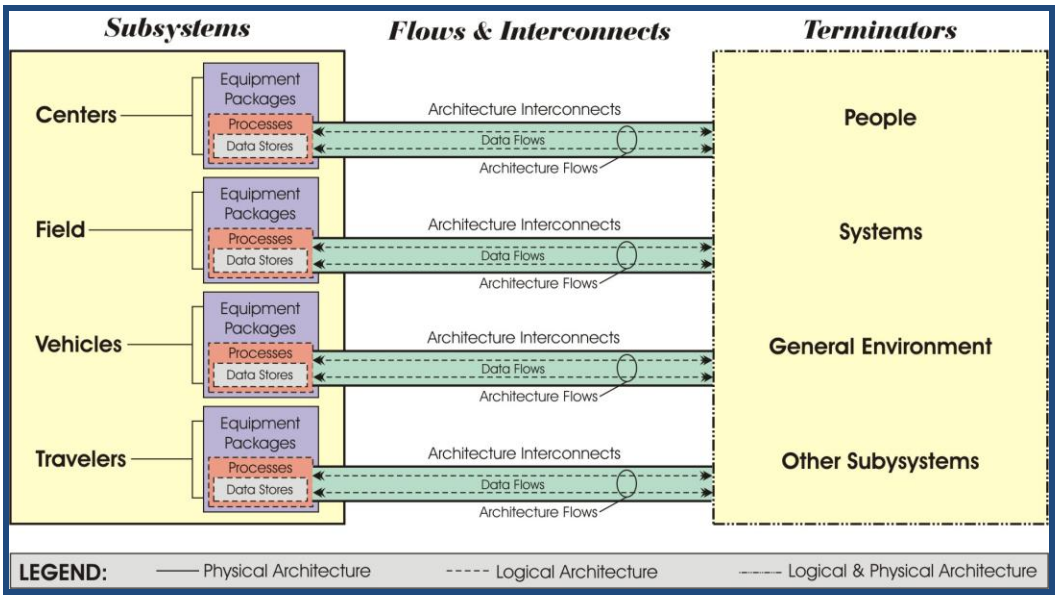


Figure 4-3: Logical & Physical Architecture Components

Subsystems

A subsystem represents a grouping of processes defined in the logical architecture that may be defined by single entities. There are 22 subsystems in the physical architecture that are assigned to four overarching classes that correspond to the physical world as described in Table 4-2 and illustrated in Figure 4-2.

Table 4-2: Subsystem Classes

Subsystem Class	Function	Real World Examples
Centers	Provide management, administration, and support functions for the transportation system.	ODOT Region 2 Transportation Operations Center (TOC) 911 Centers
Field	Provide direct interface to the roadway network, vehicles traveling on the roadway network, and travelers in transit.	Dynamic Message Signs Highway Advisory Radio Traffic Signals
Vehicles	Use the roadway network and provide driver information and safety systems.	Transit Vehicles Police Vehicles
Travelers	Gain access to traveler information through the use of equipment.	TripCheck Website Google Transit

Equipment Packages

Equipment packages group similar processes of a subsystem together into an implementable package that addresses user services. The equipment packages are considered the building blocks of the physical architecture subsystems. Table 4-3 lists several examples of equipment packages in the National ITS Architecture.

Table 4-3: Sample Equipment Packages

Equipment Package	Process Specifications (PSpecs)	User Service Addressed
Roadway Basic Surveillance	Process Traffic Sensor Data Process Traffic Images	Traffic Control
Transit Center Tracking and Dispatch	Manage Transit Vehicle Operations Update Transit Map Data	Public Transportation Management

Terminators

Terminators, also called entities, define the boundary of the architecture by representing the people, systems, other subsystems, and general environment that interface with intelligent transportation systems. The National ITS Architecture includes interfaces between terminators and subsystems and processes, but does not allocate function requirements to terminators. For example, an emergency system operator is a terminator that interfaces with the Oregon State Police; however, the architecture does not define the functions performed by the operator to support the agency. The same set of terminators applies to both the logical and physical architectures, but the logical architecture processes communicate using data flows and the physical architecture subsystems communicate using

architecture flows. The inventory report in the appendix includes applicable terminators, or entities, in the Central Willamette Valley.

Architecture Flows

Architecture flows, also called information flows, are groupings of data flows that represent the actual information exchanged between subsystems and terminators and are the primary tool used to define interfaces within a regional ITS architecture. For example, an accident report is an architecture flow that is exchanged between a 911 center (subsystem) and the appropriate emergency system operator (terminator).

Architecture Interconnects

Architecture interconnects, also called information interconnects, are the communications paths that carry architecture flows between the subsystems and terminators. These interconnects, shown in Figure 4-2, are typically grouped into one of the four categories listed in Table 4-4. Chapter 3 provides an overview of the communications requirements for the Central Willamette Valley Regional ITS Architecture.

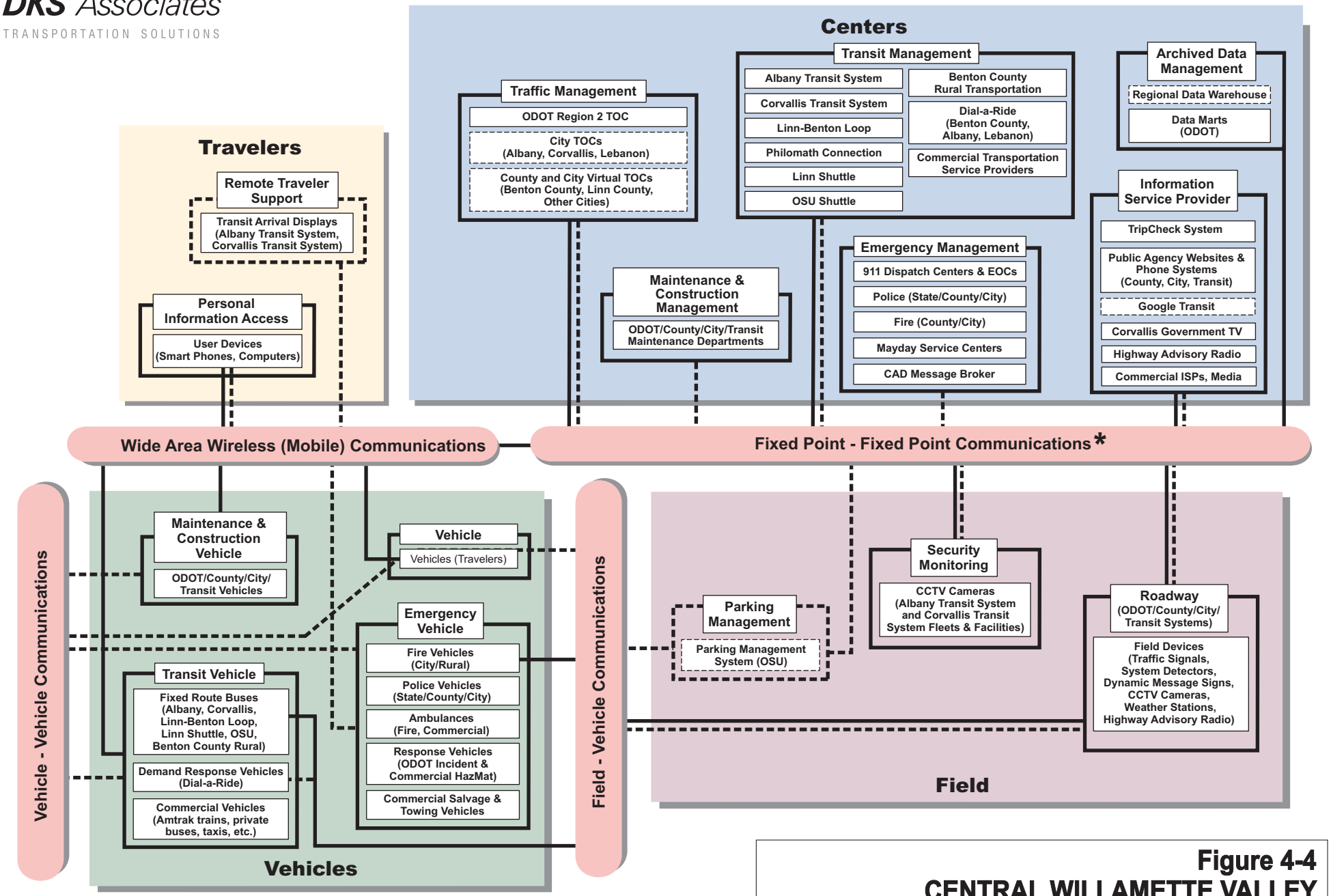
Table 4-4: Architecture Interconnects

Interconnect	Function	Real World Example
Fixed-Point to Fixed-Point Communications	Uses a communications network to link stationary entities.	Fiber optic connection between a traffic management center and a CCTV camera
Wide Area Wireless Communications	Uses wireless devices to links users and infrastructure-based systems.	Mobile telephone used to access traveler information
Dedicated Short Range Communications	Uses wireless communications channels to link vehicles and the immediate infrastructure within close proximity.	Radio waves between a roadside transmitter and a vehicle
Vehicle to Vehicle Communications	Uses a wireless system to link communications between vehicles.	Future vehicle collision avoidance systems

Central Willamette Valley Physical Architecture

Figure 4-4 illustrates the subsystems and architecture interconnects that make up the high-level physical architecture for the Central Willamette Valley. This figure includes both existing and planned physical entities. The planned entities include both upcoming elements that are programmed to receive funding and elements that will be deployed over the next 10 years as a part of this plan.

DKS Associates
TRANSPORTATION SOLUTIONS



Existing
Planned

* Center to vehicle radio communications are represented by the link between Wide Area Wireless and Fixed Point - Fixed Point Communications.

Figure 4-4
CENTRAL WILLAMETTE VALLEY REGIONAL ITS ARCHITECTURE FOR YEARS 2010 - 2020

Market Packages

Market packages are deployment-oriented groupings of physical architecture entities that address specific user services. The user services identified earlier in this chapter are too broad in scope to aid in the planning of actual deployments. Market packages are made up of one or more equipment packages that work together to deliver a transportation service and the architecture flows that connect them with subsystems and terminators. Figure 4-5 illustrates a sample market package that includes subsystems (the large rectangular boxes), and the architecture flows (the arrows).

Market packages for the Central Willamette Valley were selected early in the ITS plan development process to stimulate ideas about regional needs that may not have been previously identified. Table 4-5 lists the market packages selected by the Steering Committee and includes both existing market packages already deployed and planned market packages that will be deployed within the next 10 years as part of this plan. Eight broad categories of interest are used to group the 90 market packages and a description of each market package may be found on the National ITS Architecture website[8].

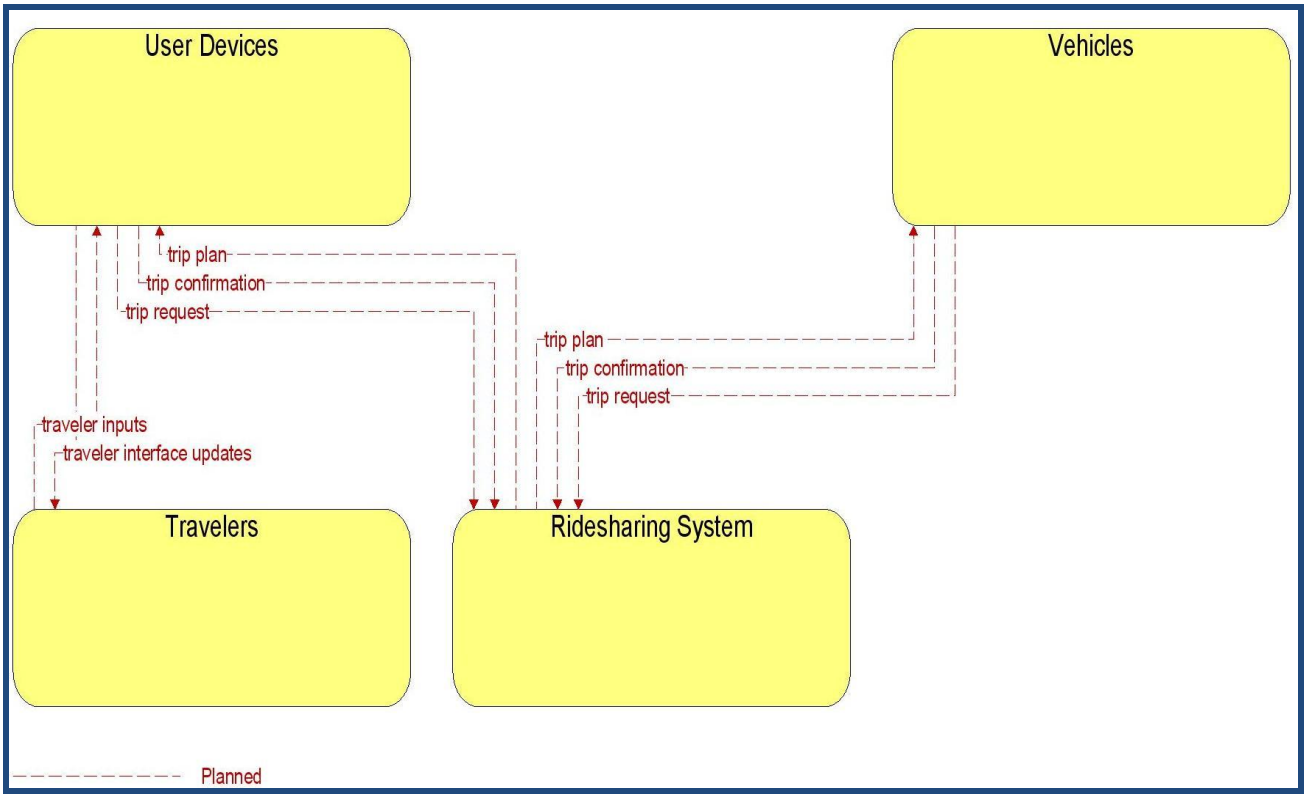


Figure 4-5: Sample Market Package Graphic- Dynamic Ridesharing

[8] *Market Packages*. U.S. Department of Transportation. Jan. 7, 2009. itsarch/iteris.com/itsarch/html/user/userserv.htm. Accessed July 20, 2010.

Table 4-5: Market Packages in the Central Willamette Valley Regional ITS Architecture

Market Packages		Existing	Existing/ Planned	Planned	Not Planned
Archived Data (AD) Management					
AD1:	ITS Data Mart	✓			
AD2:	ITS Data Warehouse			✓	
AD3:	ITS Virtual Data Warehouse				✓
Advanced Public Transportation Systems (APTS)					
APTS01:	Transit Vehicle Tracking		✓		
APTS02:	Transit Fixed-Route Operations		✓		
APTS03:	Demand Response Transit Operations			✓	
APTS04:	Transit Fare Collection Management			✓	
APTS05:	Transit Security		✓		
APTS06:	Transit Fleet Management			✓	
APTS07:	Multi-Modal Coordination		✓		
APTS08:	Transit Traveler Information		✓		
APTS09:	Transit Signal Priority		✓		
APTS10:	Transit Passenger Counting		✓		
Advanced Traveler Information Systems (ATIS)					
ATIS01:	Broadcast Traveler Information		✓		
ATIS02:	Interactive Traveler Information		✓		
ATIS03:	Autonomous Route Guidance				✓
ATIS04:	Dynamic Route Guidance				✓
ATIS05:	ISP Based Trip Planning and Route Guidance		✓		
ATIS06:	Transportation Operations Data Sharing		✓		
ATIS07:	Yellow Pages and Reservation				✓
ATIS08:	Dynamic Ridesharing			✓	
ATIS09:	In Vehicle Signing				✓
ATIS10:	VII Traveler Information				✓
Advanced Traffic Management Systems (ATMS)					
ATMS01:	Network Surveillance		✓		
ATMS02:	Traffic Probe Surveillance			✓	
ATMS03:	Surface Street Control	✓			
ATMS04:	Freeway Control	✓			
ATMS05:	HOV Lane Management				✓
ATMS06:	Traffic Information Dissemination		✓		
ATMS07:	Regional Traffic Management			✓	
ATMS08:	Traffic Incident Management System		✓		
ATMS09:	Traffic Decision Support and Demand Management			✓	
ATMS10:	Electronic Toll Collection				✓
ATMS11:	Emissions Monitoring and Management				✓
ATMS12:	Roadside Lighting System Control				✓

Market Packages		Existing	Existing/ Planned	Planned	Not Planned
ATMS13:	Standard Railroad Grade Crossing	✓			
ATMS14:	Advanced Railroad Grade Crossing				✓
ATMS15:	Railroad Operations Coordination			✓	
ATMS16:	Parking Facility Management			✓	
ATMS17:	Regional Parking Management				✓
ATMS18:	Reversible Lane Management				✓
ATMS19:	Speed Monitoring				✓
ATMS20:	Drawbridge Management				✓
ATMS21:	Roadway Closure Management				✓
Advanced Vehicle Safety Systems (AVSS)					
AVSS01:	Vehicle Safety Monitoring				✓
AVSS02:	Driver Safety Monitoring				✓
AVSS03:	Longitudinal Safety Warning				✓
AVSS04:	Lateral Safety Warning				✓
AVSS05:	Intersection Safety Warning				✓
AVSS06:	Pre-Crash Restraint Deployment				✓
AVSS07:	Driver Visibility Improvement				✓
AVSS08:	Advanced Vehicle Longitudinal Control				✓
AVSS09:	Advanced Vehicle Lateral Control				✓
AVSS10:	Intersection Collision Avoidance				✓
AVSS11:	Automated Vehicle Operations				✓
AVSS12:	Cooperative Vehicle Safety Systems				✓
Commercial Vehicle Operations (CVO)					
CVO01:	Fleet Administration				✓
CVO02:	Freight Administration				✓
CVO03:	Electronic Clearance				✓
CVO04:	CV Administrative Processes				✓
CVO05:	International Border Electronic Clearance				✓
CVO06:	Weigh-in-Motion				✓
CVO07:	Roadside CVO Safety				✓
CVO08:	On-Board CVO and Freight Safety and Security				✓
CVO09:	CVO Fleet Maintenance				✓
CVO10:	HAZMAT Management				✓
CVO11:	Roadside HAZMAT Security Detection and Mitigation				✓
CVO12:	CV Driver Security Authentication				✓
CVO13:	Freight Assignment Tracking				✓
Emergency Management (EM)					
EM01:	Emergency Call-Taking and Dispatch	✓			
EM02:	Emergency Routing		✓		
EM03:	Mayday and Alarms Support	✓			
EM04:	Roadway Service Patrols	✓			

Market Packages		Existing	Existing/ Planned	Planned	Not Planned
EM05:	Transportation Infrastructure Protection				✓
EM06:	Wide-Area Alert	✓			
EM07:	Early Warning System				✓
EM08:	Disaster Response and Recovery				✓
EM09:	Evacuation and Reentry Management				✓
EM10:	Disaster Traveler Information				✓
Maintenance and Construction (MC) Management					
MC01:	Maintenance and Construction Vehicle and Equipment Tracking			✓	
MC02:	Maintenance and Construction Vehicle Maintenance				✓
MC03:	Road Weather Data Collection			✓	
MC04:	Weather Information Processing and Distribution			✓	
MC05:	Roadway Automated Treatment				✓
MC06:	Winter Maintenance				✓
MC07:	Roadway Maintenance and Construction		✓		
MC08:	Work Zone Management		✓		
MC09:	Work Zone Safety Monitoring				✓
MC10:	Maintenance and Construction Activity Coordination		✓		
MC11:	Environmental Probe Surveillance				✓
MC12:	Infrastructure Monitoring				✓

ITS Standards

ITS standards, developed through industry consensus, define how system components should work within the National ITS Architecture to support deployment of interoperable systems at local, regional, state, and national levels. The U.S. Department of Transportation (U.S. DOT) ITS Standards Program has developed cooperative agreements with standards development organizations (SDOs) for development of non-proprietary, industry-based standards (approximately 100 currently in development) and has been encouraging the use of standards for ITS interoperability. They maintain a website[9] that provides the current status of ITS standards, resource documents, fact sheets, development status, testing procedures, deployment contacts, and training resources. Many of the standards are under development and only a small number of standards have been approved by U.S. DOT. Approved ITS standards must be applied to projects funded from federal sources.

This section includes a summary of common ITS standards that are applicable to the Central Willamette Valley Regional ITS Architecture. The selection of ITS standards is based on the architecture flows included in the regional architecture. Due to the ongoing nature of standards development, standards support is not available for all architecture flows at this time. Also, ITS standards do not apply to a few of

[9] *ITS Standards*. U.S. Department of Transportation, Research and Innovative Technology Administration. Aug. 19, 2010. http://www.standards.its.dot.gov/default.asp Accessed Aug. 19, 2010.

the architecture flows for various reasons such as flows supported by non-ITS information (e.g. financial institution).

Existing intelligent transportation systems in the Central Willamette Valley may have been deployed prior to the development of ITS standards or that conform to another set of standards. For all future ITS deployment, agencies in the Central Willamette Valley should perform a systems engineering analysis to determine if compliance with ITS standards is feasible. Steering Committee members should coordinate with one another for projects with system interfaces between one another to consider, select, and apply the appropriate ITS standards across the region.

Key ITS Standards for the Central Willamette Valley

Table 4-6 includes a list of key ITS standards recommended for the Central Willamette Valley Regional ITS Architecture and the associated interfaces that each standard applies to. Several of the standards refer to data dictionaries and message sets, which are defined as follows:

- *Data Dictionary Entry*: Textual description of a data flow that includes any data elements that comprise the data flow. There is a data dictionary entry for every data flow included in the logical architecture.
- *Message Set:* A series or set of individual messages, which are groups of basic data (called data elements), in a strict format established for information exchange between systems.

National Transportation Communications for ITS Protocol (NTCIP)

The National Transportation Communications for ITS Protocol (NTCIP)[10], developed by AASTHO, ITE, and NEMA, is a group of standards that provides rules for communications (called protocols) and vocabulary (called objects) needed for seamless operation of electronic traffic control equipment from different manufacturers operating within the same system. The NTCIP includes standards for the following two types of communications[11]:

- Center-to-Center (C2C): Communications interface between a traffic management center and another center. (Example: Interface between ODOT TOC and City of Corvallis TOC).
- Center-to-Field (C2F): Communications interface between a traffic management center and a field device. (Example: Interface between ODOT TOC and a dynamic message sign).

ODOT currently uses center-to-field standards for dynamic message signs, actuated signal controllers, data collection devices, and plans to use additional center-to-field standards as they are adopted and become mature. For center-to-center standards, ODOT uses the XML standard.

[10] *NTCIP: The National Transportation Communications for ITS Protocol Online Resource*. AASHTO, ITE, and NEMA. Nov. 13, 2009. www.nctip.org. Accessed Aug. 19, 2010.

[11] *The NTCIP Guide: Updated Version 4*. NTCIP 9001 v04. AASHTO, ITE, and NEMA, July 2009.

Table 4-6: Key ITS Standards Recommended for the Central Willamette Valley

Standard Development Organizations	Applicable Architecture Interfaces	Key ITS Standards Recommended for Central Willamette Valley Regional ITS Architecture
AASHTO ITE NEMA	Traffic Management Centers to Other Centers	■ National Transportation Communications for ITS Protocol (NTCIP) – See Section below for additional discussion.
	Traffic Management Center to Field Devices	
	Roadside Signal Controllers	■ Advanced Transportation Controller (ATC)
	Transit Center to Other Centers and Vehicles	■ Transit Communications Interface Profile (TCIP) – See Section below for additional discussion.
ITE	Traffic Management Center to Other Centers	■ Traffic Management Data Dictionary (TMDD) ■ Message Sets for External Traffic Management Center Communications (MS/ETMCC)
IEEE	Emergency Management Center to Other Centers	■ Standard for Incident Management Message Sets (IMSS) for Use by Emergency Management Centers
	General	■ Standard for Data Dictionaries for Intelligent Transportation Systems
ASTM	Archived Data Management Center Interfaces	■ Standard Guide for Archiving and Retrieving ITS-Generated Data
ASTM IEEE	Vehicle to Roadside	■ Dedicated Short Range Communications (DSRC)
SAE	Traveler Information (Information Service Provider (ISP) Interfaces)	■ Advanced Traveler Information Systems (ATIS) Data Dictionary ■ Advanced Traveler Information Systems (ATIS) Core Message List and Data Dictionary
	Location Referencing	■ Location Referencing Standards

Transit Communications Interface Profiles (TCIP)

The Transit Communications Interface Profiles (TCIP)[12], a subset of NTCIP, are communications standards for interfaces between subsystems involving transit elements such as public transportation vehicles, transit management centers, other transit facilities, and other ITS centers and subsystems. TCIP standards provide conformance requirements for automated information exchange, mechanical and electrical interfaces, data integrity, and required message sets. Most of these standards are still in draft form so that have not been put to use by most ITS transit vendors. As transit projects are developed in the Central Willamette Valley a systems engineering approach will need to be used to determine whether compliance with TCIP standards is feasible.

[12] *Transit Communications for ITS Protocols (TCIP)*. American Public Transportation Association. http://www.aptastandards.com/APTAStandards/tabid/36/Default.aspx. Accessed Aug. 19, 2010.

CHAPTER 5 OPERATIONAL CONCEPT

This chapter presents the Operational Concept for the *Central Willamette Valley ITS Plan*.

Purpose of the Operational Concept

The Operational Concept describes the agency roles and responsibilities necessary to support implementation of ITS technologies and services, including:

- A description of the overall regional framework for interagency cooperation to deliver ITS services
- Identification of current and planned stakeholders involved in the implementation of ITS strategies identified in the plan
- Identification of specific roles and responsibilities of each stakeholder in supporting the Operational Concept
- Description of high-level relationships among stakeholder agencies in delivering ITS services in terms of data/information exchange, operational coordination, device control, etc.

ITS technologies themselves are 'enabling tools' that allow regional transportation agencies to implement the Regional Operations Vision. A lesson learned from past ITS implementations is that the success of ITS implementations is as dependent upon the successful establishment of agency and inter-agency working relationships and operational procedures as on the functions of the devices themselves.

Operational Concepts in the Plan

The Operational Concept is organized based on the following functional categories of ITS Strategies:

- Traffic Management and Operations
- Public Transportation Management
- Traveler Information
- Data Management
- Incident and Emergency Management

Due to the limited degree of implementation anticipated within the timeframe of this ITS Plan, an Operational Concept has not been developed at this time for Maintenance and Construction Management.

Operational Concept Content and Organization

Each Operational Concept is organized including an overall description for the regional Operational Concept, a list of ITS strategies covered, agency roles, and a diagram of relationships.

Specific ITS strategies covered by the Operational Concept are listed to provide traceability to the Needs Assessment and ITS Action Plan. Implementation, over time, of all of the ITS strategies results in the Operational Concept vision (participants and connections) illustrated in the accompanying diagram.

Each agency role in the Operational Concept is presented in tabular form, including the status of that operating role (e.g. existing, planned). This table can be used to identify areas where planned evolution of agency roles may be required to support implementation of ITS services. For example, an agency may

assume a more robust future traffic management operational function to implement signal timing plans in response to an incident. During project development, such considerations can inform key technology decisions (e.g., access to signal control from public works workstations) or resource sharing opportunities (e.g., sharing of off-hours signal control with another agency).

Each Operational Concept is supported by a diagram that graphically illustrates the key relationships among agencies included in the Operational Concept. These relationships range from coordination of agency personnel to data exchanges between interfacing ITS systems. The emphasis in the Operational Concept is on agency-to-agency roles and relationships; therefore, system-to-system interconnections are described in more detail within the Regional ITS Architecture.

Relationships among the Operational Concepts

The Operational Concepts presented within this chapter are inter-related similar to the ITS strategies they represent and the transportation network itself. An ITS implementation at the project, corridor, or agency level will likely involve a combination of elements from multiple Operational Concepts.

A prominent example is Traveler Information. Providing Traveler Information is recognized as a cornerstone of many Traffic Management, Incident and Emergency Management, or Public Transportation Management strategy. Similarly, providing Traveler Information presupposes that there is an operational infrastructure to monitor, evaluate, and generate traveler information based upon real-time network conditions.

For clarity, the Traveler Information Operational Concept is shown as a freestanding discussion. However the reader should be mindful that implementation of Traveler Information ITS strategies is likely to occur concurrently with other closely-related ITS strategies. This illustrates the need to further refine the regional Operational Concept at the project level as ITS implementation progresses, to capture the finer-grained roles, responsibilities, and relationships that arise.

Regional Transportation Service	**Traffic Management and Operations**	
Description	Coordinated regional traffic management and operations facilitates efficient and reliable flow of traffic on regional arterials and freeways in a manner that is responsive to real-time conditions. A 'virtual' traffic management center concept is envisioned to permit sharing of information, and in some cases, device control, among agency participants while minimizing the day-to-day operational staffing requirements. Coordination among agencies permits better management of multi-jurisdictional roadways and parallel facilities using Integrated Corridor Management techniques. Expansion of field ITS devices and increased integration of traffic signals into coordinated central system supports improved timing in response to changing conditions, including incidents.	
ITS Strategies Included	• Regional Multi-Agency Virtual Traffic Operations Center • Enhanced Traffic Signal Operations	• Traffic Surveillance
Stakeholder	**Roles and Responsibilities**	**Status**
Oregon Department of Transportation	• Operates Region 2 Traffic Operations Center • Manages Field ITS Devices (CCTV, DMS, etc), particularly in the I-5 Corridor • Operates some State-Owned Traffic Signals • Coordinates State-Wide and Inter-Regional Traffic Operations	• Existing • Existing • Existing • Existing
Cities (Corvallis, Albany, Lebanon)	• Operates Local Traffic Signals and Other Traffic Management Manages Field ITS Devices (CCTV, Data Collection, etc) • Operates Virtual TOC	• Existing/Planned • Existing • Planned
Benton County	• Operates Local Traffic Signals and Other Traffic Management	• Existing/Planned

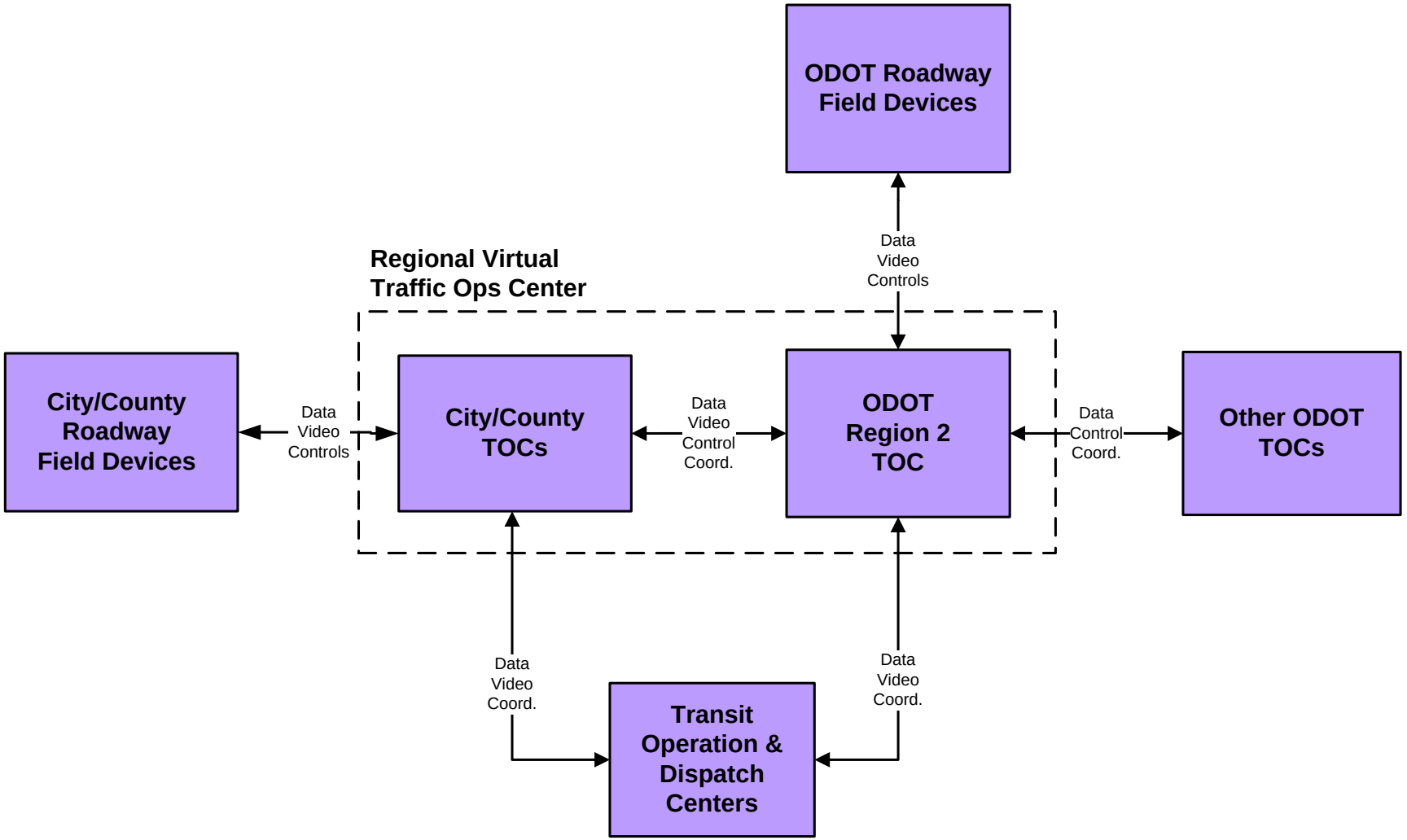


Figure 5-1: Traffic Management & Operations Operational Concept

Regional Transportation Service	**Public Transportation Management**	
Description	Public Transportation providers in the Central Willamette valley will use Advanced Public Transportation System (APTS) ITS technology to improve and maintain service quality for customers. Coordination among service providers through combined or virtual transit operations systems is particularly important given need for interoperability and customer transfers across the systems. ITS technology will facilitate operational coordination in real time so that passengers can smoothly connect across the system and access transit information across multiple systems. Demand-responsive transit providers leverage electronic reservations and dispatching tools to improve efficiency and vehicle scheduling through the day. Transit providers also work with local traffic agencies to implement Transit Signal Priority at key intersection delay points, improving service reliability under congested conditions.	
ITS Strategies Included	• Computer Aided Dispatch/Automatic Vehicle Location (CAD/AVL) • Transit Signal Priority • Reservation System for Special Transportation Services	• Automated Passenger Counting • Automated Transit Stop Announcements • Transit Safety and Security
Stakeholder	**Role**	**Status**
Corvallis Transit System (CTS)	• Operates Fixed-Route Transit Services with CAD/AVL technology • Operates Philomath Connection under contract • Regional Real-Time Service Coordination with other providers • Operates Transit Signal Priority • Operates Automatic Stop Annunciation • Operates Automated Passenger Counting • Operates Transit Security System	• Existing • Existing • Planned • Existing/Planned • Planned • Planned • Planned

Albany Transit System (ATS)	• Operates Fixed-Route Transit Services with CAD/AVL technology • Operates the Linn-Benton Loop • Operates Demand-Responsive Transit Services (Albany Call-a-Ride) • Regional Real-Time Service Coordination with other providers • Operates Transit Signal Priority • Operates Automatic Stop Annunciation • Operates Automated Passenger Counting • Operates Transit Security System	• Planned • Existing • Existing • Planned • Planned • Planned • Planned • Planned
Linn Shuttle	• Operates Fixed-Route Transit Services with CAD/AVL technology • Regional Real-Time Service Coordination with other providers • Operates Transit Signal Priority • Operates Automatic Stop Annunciation • Operates Automated Passenger Counting	• Existing/Planned • Planned • Planned • Planned • Planned
Benton County Rural and Special Transportation	• Operates Demand-Responsive Transit Services • Operates Rural Fixed-Route Transit with CAD/AVL technology • Electronic Reservations for Demand-Responsive Transit • Regional Real-Time Service Coordination with other providers • Operates Transit Signal Priority • Operates Automatic Stop Annunciation • Operates Automated Passenger Counting	• Existing • Existing/Planned • Planned • Planned • Planned • Planned • Planned
Commercial Transportation Service Providers (Greyhound, Valley Retriever, Hut Shuttle, etc.)	• Operates Demand-Responsive Transit Services • Electronic Reservations for Demand-Responsive Transit • Regional Real-Time Service Coordination with other providers	• Existing • Planned • Planned
Oregon State University	• Operates Campus Shuttle Services • Regional Real-Time Service Coordination with other providers	• Existing • Planned

Cities/Counties (Corvallis, Albany, Lebanon, Benton County)	• Supports Transit Signal Priority System Requests from Transit Agencies • Provides Real-Time Traffic and Incident Management Information to Transit Agencies via Virtual Regional TOC	• Existing/Planned • Planned
Oregon Department of Transportation	• Supports Transit Signal Priority System Requests from Transit Agencies • Provides Real-Time Traffic and Incident Management Information to Transit Agencies via Virtual Regional TOC	• Planned • Planned

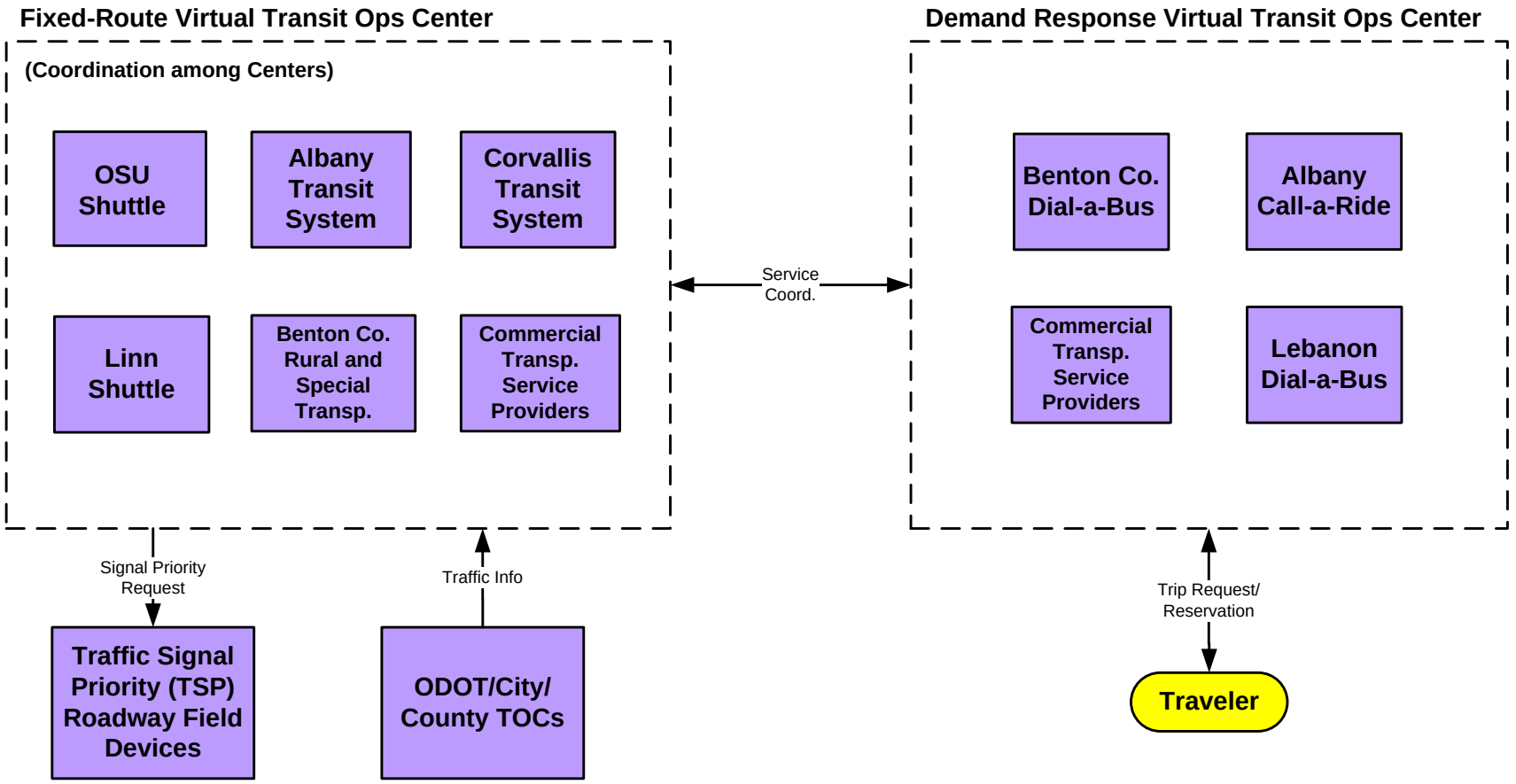


Figure 5-2: Public Transportation Management Operational Concept

Regional Transportation Service	**Traveler Information**	
Description	Agencies in the Central Willamette Valley provide real-time traveler information on traffic conditions, transit services, and incident/emergency information through shared and integrated ITS systems. With the availability of up-to-date and reliable information, travelers are able to make more informed decisions, reduce travel delays, and make more effective use of the multimodal regional transportation system. Local agencies take advantage of the local agency data entry portal of TripCheck to provide incident and event entry into the statewide traveler information system, including web-based and 511 telephone traveler information tools.	
ITS Strategies Included	• Roadside Traveler Information Dissemination • Regional Travel Information	• Transit Trip Planning Website • Parking Availability

Stakeholder	Roles and Responsibilities	Status
Oregon Department of Transportation	• Operates *TripCheck* Statewide Traveler Information System • Operates Field Traveler Information Devices	• Existing • Existing
Cities/Counties (Corvallis, Albany, Lebanon, Benton County)	• Provides Local Event and Traffic Information • Operates Field Traveler Information Devices • Operates Traveler/Traffic Information Websites	• Existing • Planned • Existing
Transit Providers (Corvallis Transit, Albany Transit, Linn Shuttle, OSU Shuttle, Benton County Rural and Special Transportation, Lebanon Dial-a-Bus)	• Operates Transit Traveler Information Websites • Operates Transit Trip Planner • Operates Stop/Station Traveler Information Field Devices	• Existing • Planned • Planned
Oregon State University	• Manages On-Campus Parking and Parking Information • Provides OSU Campus Shuttle Information	• Planned • Planned
Ridesharing System	• Provides carpool and rideshare information through web-based services	• Planned

Media	• Real-time traffic, incident and event information dissemination through broadcast television and radio	• Existing/Planned
Commercial Information Service Providers (ISPs)	• Dissemination of transit and traffic traveler information through third-party services, including, web, mobile, in-vehicle, and social media sources	• Existing/Planned

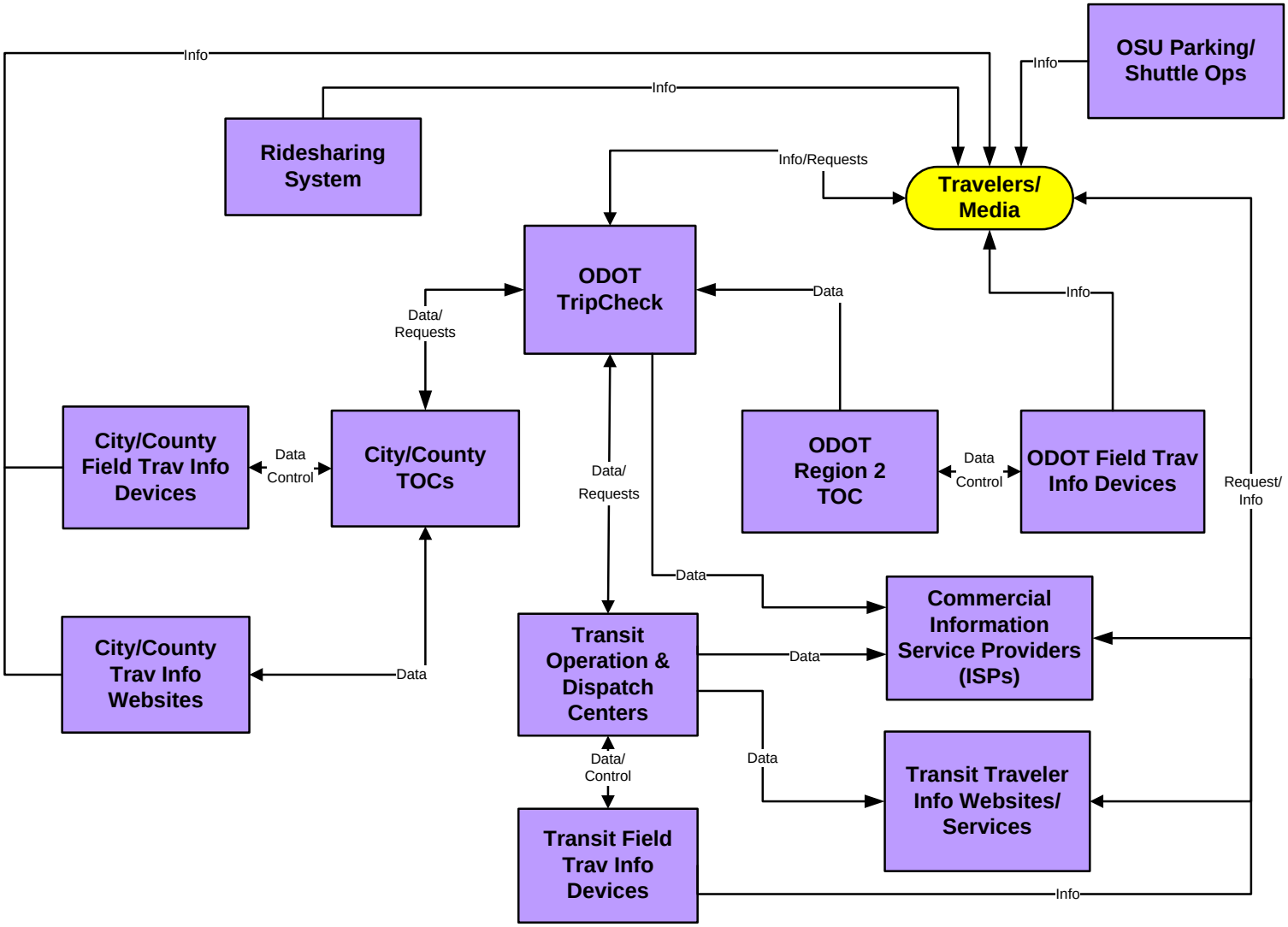


Figure 5-3: Traveler Information Operational Concept

Regional Transportation Service	**Incident and Emergency Management**	
Description	Incident and Emergency Management involves coordinated response to traffic accidents, weather events, disasters, and other localized or widespread disruptions to the regional transportation system. Using ITS technologies, coordinated response and communications, agencies at the state, regional, and local levels detect, respond, and manage incidents and emergencies to promptly restore the transportation system to normal operations. Information sharing between transportation and emergency management agencies includes statewide information and interoperable communication networks to exchange event information, video, and other data to support coordinated management and response.	
ITS Strategies Included	• Regional Incident and Emergency Management • Integrated Corridor Management	• Computer Aided Dispatch (CAD) integration • Special Event Management
Stakeholder	**Roles and Responsibilities**	**Status**
Oregon Department of Transportation	• Operates Region 2 Traffic Operations Center (TOC) • Coordinates with other Regions and Statewide Agencies for Incident and Emergency Management • Participates in Regional Virtual TOC for Incident Management • Facilitates statewide sharing of transportation data among subscribing public agencies and private entities using TripCheck Traveler Information Portal (TTIP)	• Existing • Existing • Planned • Existing
Video Sharing Server	• Secure statewide system for interfacing video between transportation and emergency management centers	• Planned
Oregon and County Office of Emergency Management	• Statewide Emergency Management/Operations Coordination • Manages WebEOC Virtual Emergency Management Information Center	• Existing • Existing

Oregon State Police	• Incident and Emergency First Responders • Participates in Regional Virtual TOC for Incident Management	• Existing • Planned
Public Safety Dispatch Agencies (Regional Communications Center, Linn County Sheriff's Office, Albany Police Department)	• Emergency Management PSAP for Linn County • Participates in Regional Virtual TOC for Incident Management	• Existing • Planned
City Police and Fire Departments	• Incident and Emergency First Responders • Participates in Regional Virtual TOC for Incident Management	• Existing • Planned
CAD Message Broker	• Secure virtual tool for sharing of incident and emergency data and documentation among emergency response agencies	• Existing
Cities/Counties (Corvallis, Albany, Lebanon, Benton County, Linn County)	• Local Traffic Management and Incident Response • Participates in Regional Virtual TOC for Incident Management	• Existing • Planned
Special Event Promoters (OSU, Linn County Fair, Benton County Fairgrounds)	• Other entities involved in Sports and Special Events Coordination • Participates in Regional Virtual TOC for Events Management	• Existing • Planned

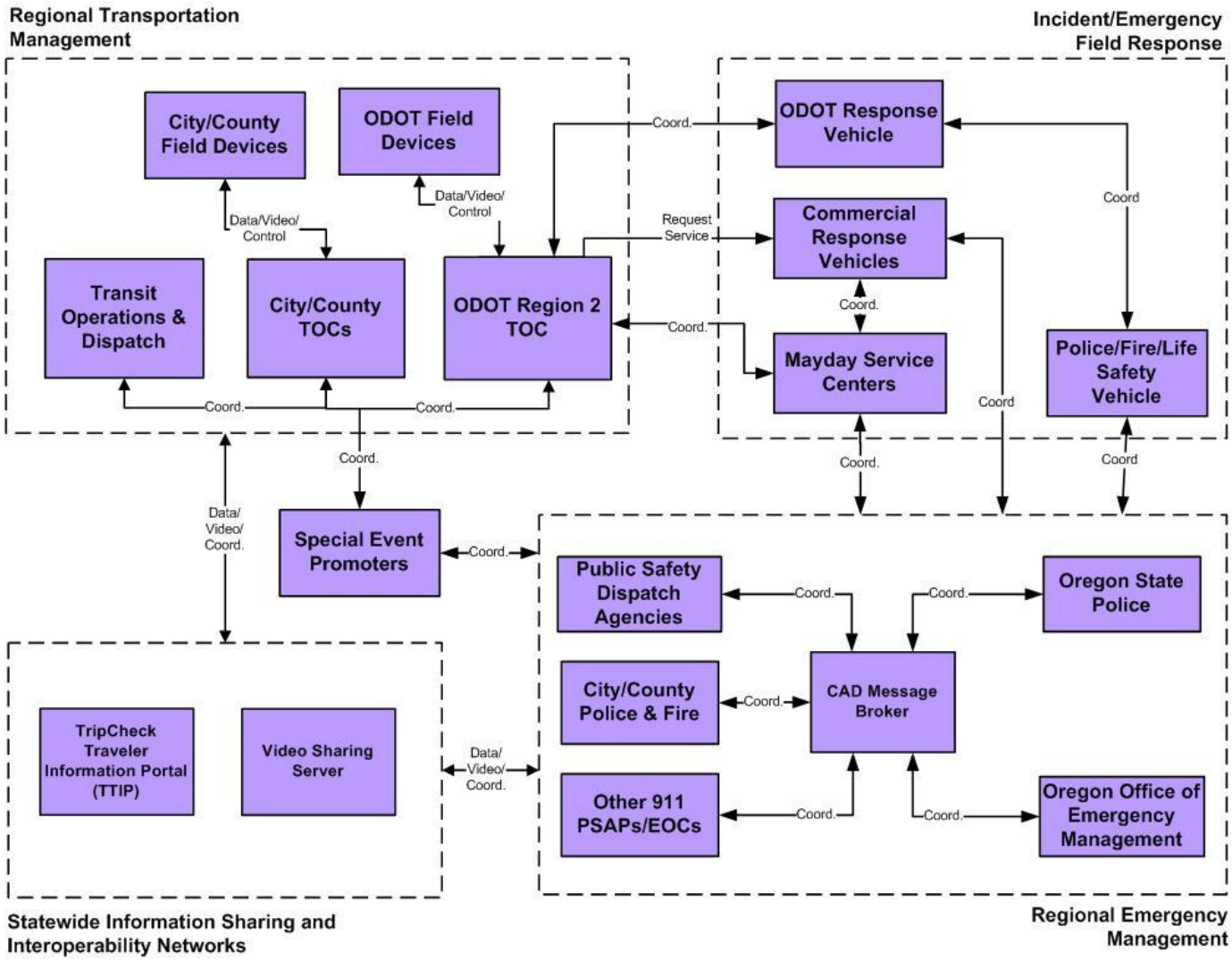


Figure 5-4: Incident & Emergency Management Operational Concept

Regional Transportation Service	**Data Management**	
Description	Regional archive data management makes data generated by agency ITS systems available to support planning, analysis, before-after studies, and performance measurement. The Central Willamette Valley archived data management may be supported locally or use the PSU PORTAL data warehouse. Data stored through the archived data management system can be accessed by contributing agencies as well as other users using a web-based interface to support planning and performance measurement functions.	
ITS Strategies Included	• Regional Data Warehouse	• Regional Performance Measures and Supportive Data Collection

Stakeholder	Roles and Responsibilities	Status
Corvallis Area Metropolitan Planning Organization	• Regional User of Archived ITS Data for Planning and Performance Measurement	• Planned
Oregon Department of Transportation	• ITS System Data Source • Operates and Maintains Region 2 Data Mart and Other Region Data Marts • Regional User of Archived ITS Data for Planning and Performance Measurement	• Existing/Planned • Existing • Planned
Regional Data Archive Host	• Owns and Operates the Regional Archived Data Management System (Data Warehouse) on Behalf of Other Regional Agencies	• Planned
Cities/Counties (Corvallis, Albany, Lebanon, Benton County, Linn County)	• ITS System Data Sources • Owns and Operates Agency Data Marts • Regional User of Archived ITS Data for Planning and Performance Measurement	• Existing/Planned • Planned • Planned

Transit Providers (Corvallis Transit, Albany Transit, Linn Shuttle, OSU Shuttle, Benton County Rural and Special Transportation, Lebanon Dial-a-Bus)	• ITS System Data Sources • Owns and Operates Agency Data Marts • Regional User of Archived ITS Data for Planning and Performance Measurement	• Existing/Planned • Planned • Planned
Data Users	• Regional User of Archived ITS Data for Planning and Performance Measurement	• Planned

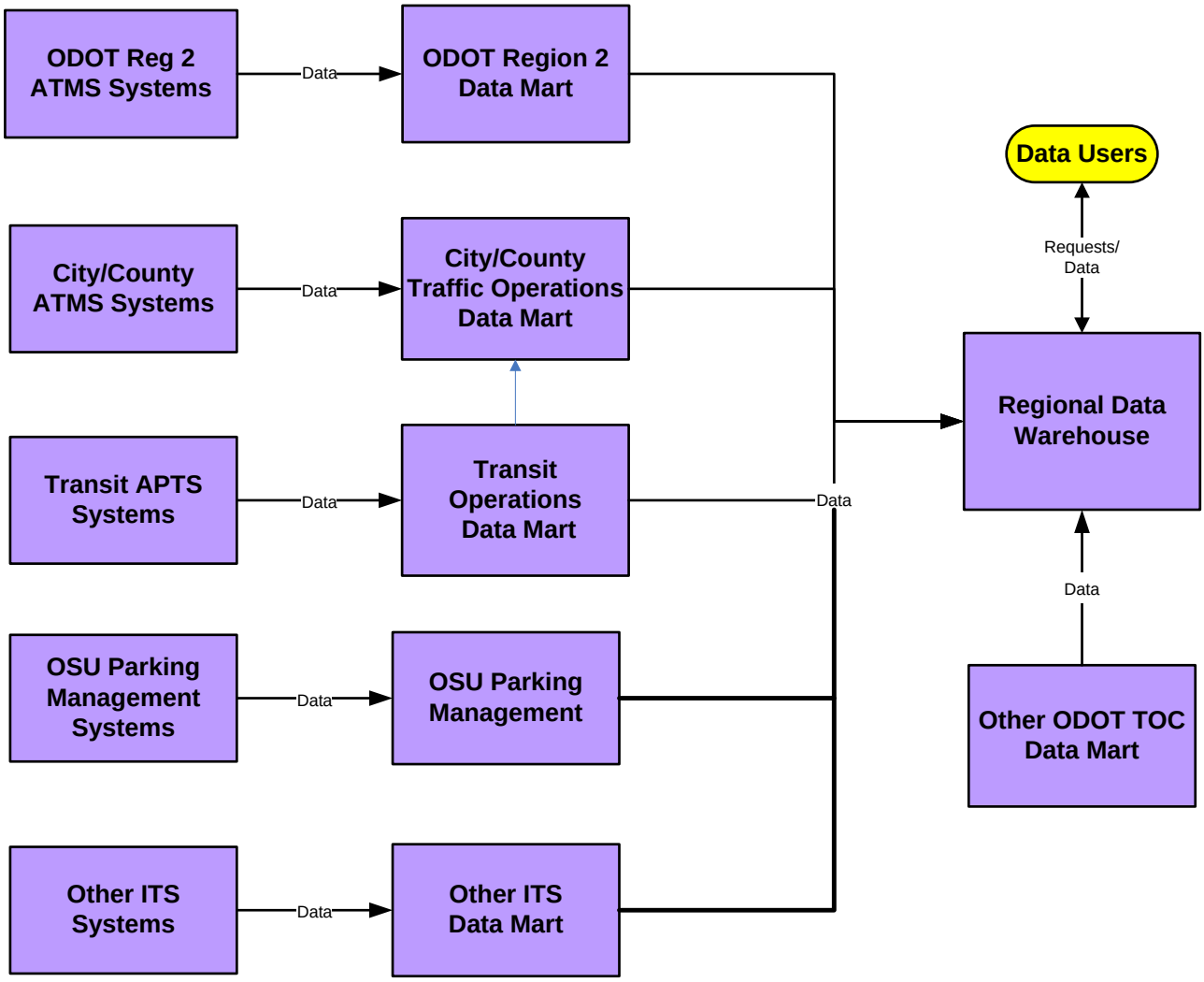


Figure 5-5: Data Management Operational Concept

CHAPTER 6 ITS ACTION PLAN

This chapter provides a summary of the ITS action plan for the Central Willamette Valley. The ITS action plan includes a range of ITS projects that address the needs of the region. The action plan projects are grouped under the following six functional categories:

- Traffic Management and Operations
- Public Transportation Management
- Traveler Information
- Data Management
- Incident and Emergency Management
- Maintenance and Construction Management

The ITS projects included in the action plan were generated with input and collaboration of the project Steering Committee. The following sections present a summary of the regional ITS vision, a toolbox of strategies, priority corridors, and the action plan projects.

Regional ITS Vision

ITS projects will be implemented in the region to address transportation problems or deficiencies. To assure that the Central Willamette Valley ITS Plan was properly directed, transportation system user needs were gathered through in-person and phone interviews and Steering Committee meetings (see Chapter 2). The transportation user needs guided the development of the Central Willamette Valley Action Plan. Stakeholders identified the following as some of the key regional goals:

- Provide real-time travel information
- Provide real-time transit arrival information
- Provide traffic condition monitoring
- Address congestion at key bottlenecks
- Support alternative modes
- Expand transit signal priority
- Collect data to monitor transportation system performance
- Manage diverted traffic

While the goals focus on what should be accomplished to address specific user needs, transportation problems and issues, the action plan identifies specific ITS projects that will support the region's goals. For the Central Willamette Valley, the intelligent transportation system projects that best fit the region's vision can be described as follows.

- **Expand Traveler Information Services** - Provide traveler information on arterial roadways and support multimodal route planning and guidance.
- **Implement Transit Service Enhancements** - Improve transit speed and reliability and broadcast real time vehicle location and stop arrival information.
- **Enhance Safety of Alternative Modes** - Improve bicycle detection and provide bike signal timing.
- **Improve Corridor System Management Capabilities** - Enhance signal operations (timing and signal system), provide video monitoring, provide vehicle detection (speeds and volumes), install Ethernet communications, update coordinated signal timings, support transit signal priority.
- **Construct a Regional Communications Network Between Agencies** - This network will support transportation data exchange and video sharing.

- **Construct Virtual Traffic Operations Centers** - Provide physical space to support active corridor management.
- **Enable Emergency Service Coordination** - Provide coordinated planning and operations of incident management between emergency services and traffic management.

Table 6-1 illustrates the transportation projects areas that address specific user goals and needs. As shown, the project areas support all of the key regional goals identified and represent the action plan priorities for ITS in the region.

Table 6-1: Regional Vision Addressed by Transportation Project Area

Regional Vision	Transportation Project Area						
	Traveler Information	Transit Enhancements	Alternative Modes	Corridor System Management	Regional Communications Network	Virtual Traffic Operations Center	Emergency Service Coordination
Provide real-time travel information	✓			✓	✓	✓	✓
Provide real-time transit arrival information		✓	✓				
Provide traffic condition monitoring	✓	✓		✓	✓	✓	✓
Address congestion at key bottlenecks	✓	✓	✓	✓	✓	✓	
Support alternative modes		✓	✓				
Expand transit signal priority		✓	✓				
Collect data to monitor transportation system performance	✓			✓	✓	✓	
Manage diverted traffic				✓	✓	✓	✓

Toolbox of ITS Strategies

To help advance the regional ITS vision and address the identified needs of the Central Willamette Valley, a toolbox of potential ITS strategies was developed and presented in Table 6-2. The potential ITS strategies are provided for each of the six action plan functional categories, with each strategy supporting one or more of the identified transportation project areas. In addition, Table 6-3 lists

complimentary strategies that support ITS solutions, and Table 6-4 presents other ITS strategies that require political and policy changes to implement.

The toolbox of potential ITS strategies do not represent specific recommendations of the Steering Committee. The strategies represent a range of alternatives for the region to consider when they may elect to address a specific transportation system management need. This is an extensive list of potential ITS strategies, only select strategies, or portions of some strategies, will be applied to the region.

Table 6-2: Regional ITS Strategies

ITS Strategy	Strategy Description	Why Apply Strategy to Region?	Expected Benefits
Traffic Management & Operations			
Regional multi-agency transportation operations center (TOC)	Develop a regional TOC to support traffic operations on City and County roadways and to coordinate with police/emergency services	The ODOT Region 2 TOC is co-located in Salem with the Oregon State Police (OSP) and operates 24 hours a day. A local TOC could be developed physically or virtually to manage the region's City and County roadways and to interface with the ODOT Region 2 TOC and local 911 centers.	Supports coordination and operation of the region's transportation systems Collaboration between traffic and emergency agencies Resource sharing
Enhanced traffic signal operations for vehicles	Improve existing signals through re-timing/optimization, traffic signal controller upgrades, use of protected/permissive phasing, traffic responsive systems, adaptive systems, or better detection	The National Traffic Signal Report Card recommends updating traffic signal timing at least every three years to keep up with changing traffic patterns and to achieve optimal system performance. The City of Corvallis and ODOT have a current project to upgrade controllers at eight traffic signals and to test the effectiveness of traffic responsive signal timing.	Reduces travel time by 10 to 25 percent Potential to improve travel time reliability Reduces fuel consumption and vehicle emissions Benefit-to-cost ratio can range from 15:1 to 40:1
Enhanced traffic signal operations for bicycles	Improve bicycle travel at traffic signals by providing bicycle detection, timing signals to progress bicycles on major bicycle routes, or providing bicycle boxes at stop bars for increased bicycle visibility to motorists.	Approximately 15 percent of trips in the region are made by bicycle. The City of Corvallis uses bicycle detectors in bicycle lanes and left turn lanes today.	Reduces bicycle stops and delay Potential to improve bicycle travel time reliability
Traffic surveillance	Add video and detection equipment (e.g. loop detectors, microwave detectors, vehicle/cell phone probes) to monitor key locations of the regional transportation network and assess real-time traffic flow conditions	Traffic surveillance has been used successfully in other regions to support the management of traffic, transit, incidents, and emergencies as well as provide traveler information and data for planning. ODOT is currently doing a pilot project in the City of Tigard to test Bluetooth devices as probes.	Improves incident detection and verification Reduces incident response times Provides real-time and historic system operations information Supports the dissemination of real-time traveler information Improved visual information for decision makers and travelers
Special event management	Automate traffic control using changeable lane assignment, reversible lanes, or enhanced signal operations at venues such as Reser Stadium	OSU football games cause congestion and travel delays to local traffic throughout the region and for interstate traffic on I-5.	Reduces delay during high traffic demand Potential to improve travel time reliability Increases attractiveness of event attendance
Truck traffic signal priority	Apply truck signal priority on regional freight corridors to allow green phase extension to reduce the frequency of truck stops at traffic signals	There are a number of designated freight routes in the region: I-5, OR 99W, US 20, and OR 34.	Reduces number of truck stops at signals (truck stops cost approximately $3/stop) Reduces start-up lost time for trucks and general traffic
Public Transportation Management			
Automated vehicle location (AVL) and computer aided dispatch (CAD)	Use AVL and CAD to track fixed route and demand response vehicles, assist transit dispatchers, support management of transit operations, and inform travelers of transit arrival status.	The Corvallis Transit System (CTS) has a system that provides AVL and CAD for their fixed route service but the system is no longer manufactured and limited support is available. CTS would like to replace their system and expand it to their demand response fleet. The Albany Transit System (ATS) has identified a need for AVL and CAD.	Improves on-time performance Reduces operations and maintenance costs Enhances passenger convenience because it supports real-time transit arrival information
Automated passenger counting (APC)	Count the number of passengers entering and exiting a transit vehicle to calculate ridership and assess passenger loading on a stop-by-stop basis.	CTS uses APC today but their current system has limited support from the manufacturer. ATS has identified a need for APC.	Allows assessment of existing traveler demand Supports transit route and stop planning

ITS Strategy	Strategy Description	Why Apply Strategy to Region?	Expected Benefits
Automated transit stop announcements	Provide automated announcements of the bus line name when it arrives and announce next stops along a route.	Automated stop announcements reduce the workload of drivers and make it easier for all passengers (particularly those that are visually impaired) to ride transit. CTS has automated stop announcements today, but their current system is no longer supported by the manufacturer.	Increases attractiveness of transit Enhances passenger convenience
Transit signal priority (TSP)	Extend the green phase at traffic signals for buses that are behind schedule to reduce the frequency of bus stops at traffic signals	TSP is used by CTS fixed route buses to a limited degree in the City of Corvallis. Both CTS and ATS would like to expand this region wide.	Reduces delay at traffic signals by up to 45 percent Reduces transit travel time by 5 to 25 percent Improves travel time reliability Increases passenger throughput Reduces system operational costs if fleet can be reduced
Transit only lanes and transit queue jump	Add transit lanes or queue jumps at bottleneck locations on high ridership routes	This strategy will provide preferential treatment to fixed route buses and demand response vehicles over other modes at congested locations to support transit travel time reliability.	Reduces transit delay Improves transit travel time reliability Increases transit ridership
Reservation system for special transportation services	Use a system to manage customers, manage driver and vehicle information, manage reservations, create schedules and routes, dispatch vehicles, verify trip data, manage billing, and archive records.	Most special transportation reservations in the region are done manually today. Benton County wants to add mobile data terminals (MDTs) to their fleet.	Reduces operations and maintenance costs Supports transit route and stop planning Increases traveler satisfaction
Transit safety and security	Provide video surveillance on transit vehicles or at transit facilities (e.g. park and rides, transit centers).	The presence of video surveillance may help deter unsafe behavior and also allows transit security personnel to monitor the transit system.	Improves traveler safety Increases traveler satisfaction
Traveler Information			
Roadside traveler information dissemination	Add dynamic message signs (DMSs) on roadways and at major transit stops and potentially expand highway advisory radio (HAR) for more complete network coverage	ODOT has successfully used DMSs and HAR in the region to provide en-route traveler information. CTS previously used DMSs successfully at key transit stops until their current system stopped working.	Provides information for travelers to make informed choices Reduces delay Potential to improve travel time reliability
Regional traveler information	Provide static and real-time traveler information (e.g. incidents, construction, transit arrivals) from all regional agencies from one central system	Today's society has become accustomed to having up-to-date information at their fingertips. Providing traveler information using a variety of technologies (whether publicly or privately managed) allows travelers to make informed decisions about trip departure times, routes, and travel mode. ODOT has already developed many tools that can be applied to the region: TripCheck website, TripCheck local entry tool, TripCheck traveler information portal, and 511.	Reduces delay by up to 20 percent Reduces the number of stops and vehicle emissions by up to 5 percent Potential to improve travel time reliability Reduces crashes Provides information for travelers to make informed choices Increases attractiveness of alternate modes Increases traveler satisfaction with the transportation network
Predictive traveler information	Develop models/tools that can predict travel conditions	As more data is archived, it may be possible to develop a tool that predicts travel conditions based on historic information. Public/private partnerships may also be explored because there are private companies (e.g. INRIX) that use available data to provide cutting edge traffic information.	Provides information for travelers to make informed choices Increases traveler satisfaction with the transportation network
Transit trip planning website	Develop a website for regional trip planning that provides step-by-step planning directions and may include options related to quickest trip, shortest walk, and accessibility.	Transit trip planning tools enable travelers to make informed travel decisions both pre-trip and en-route. There are numerous transit providers in the region with many opportunities for riders to transfer between systems.	Increases attractiveness of transit Enhances passenger convenience

ITS Strategy	Strategy Description	Why Apply Strategy to Region?	Expected Benefits
Parking availability information	Provide real-time information about parking availability for high demand parking areas (e.g. OSU, transit park and rides)	Parking information supports traveler decisions related to route and mode choice, which in turn helps the overall transportation system operate more efficiently.	More efficient use of roadway capacity adjacent to high demand parking areas Improves traffic flow Increases attractiveness of transit
Data Management			
Regional data warehouse	Collect and store data from multiple agencies and systems in a single repository with consistent formats; Allow users to query basic data and run reports	Resources are needed by many agencies to collect and analyze the vast amount of data already available or that will be available in the future. Portland State University has successfully developed the PORTAL data warehouse for the Portland region. This model could be expanded or adapted to the region through a partnership with OSU.	Shares resources Supports regional operations and planning efforts
Regional performance measures and supportive data collection	Archive data and develop performance measures for roadways, transit, and freight	Limited data is currently available to support benefit-to-cost ratio analysis for ITS improvements. Other systems produce data that needs to be archived and need tools to analyze the data in a cost-effective manner. The next federal transportation reauthorization will likely require performance measurement.	Ability to identify effectiveness of ITS investments and to better target future policies and system improvements Supports regional planning efforts
Incident and Emergency Management			
Regional incident and emergency management	Expand on ODOT's incident response program to support quick clearance (e.g. multi-agency program, more responders, outreach, training); Many other traffic management and traveler information strategies in this table support incident management	ODOT's incident response program could be expanded to regional arterial roadways to support the National Unified Goal for Traffic Incident Management, particularly to support quick, safe clearance, responder safety, and prompt, reliable incident communications.	Reduces average incident duration by 25 to 70 percent Reduces secondary crashes by 25 to 70 percent Reduces delay due to quicker incident response Potential to improve travel time reliability Improves travel time and less congestion during an evacuation
Integrated corridor management (ICM)	ICM typically includes route/mode diversion, real-time information (e.g. dynamic message signs), and system adjustments (e.g. signals, ramp meters)	Several times a year an incident on southbound I-5 necessitates the use of OR 99E as a detour route through the City of Albany. Crews manually adjust static flip-down signs to provide en-route detour guidance.	Reduces travel time and delay Potential to improve travel time reliability Supports alternate travel routing for incident management
Computer Aided Dispatch (CAD) integration	Enable traffic management and emergency management agency CAD systems to communicate with one another to support incident management.	ODOT and OSP have successfully integrated their CAD systems to share incident information between one another and with other emergency management agencies (e.g. 911 centers)	Reduces average incident duration by 25 to 70 percent Reduces secondary crashes by 25 to 70 percent Reduces delay due to quicker incident response Potential to improve travel time reliability
Maintenance & Construction Management			
Road weather information systems (RWISs)	Monitor and predict roadway conditions to mitigate impacts of adverse conditions	Adverse winter weather requires additional maintenance resources to provide a safe and accessible transportation network. RWISs can help plan for and support resource allocation.	Reduces vehicle speed by up to 5 mph during adverse weather Potential to improve travel time reliability Improves safety by reducing crashes up to 15 percent Provides information for decision-makers and travelers Improves maintenance resource allocation
Flood warning system	Monitor and predict river and stream water heights to mitigate impacts of adverse roadway conditions when water levels are high	Flooding of waterways near OR 34 requires highway closures several times a year.	Potential to improve travel time reliability Improves safety by reducing crashes Provides information for decision-makers and travelers Improves maintenance resource allocation

ITS Strategy	Strategy Description	Why Apply Strategy to Region?	Expected Benefits
Work zone management	Use variable speed limits or automated enforcement for work zones that impact regional mobility	2007 legislative changes allow Oregon State Police to use photo radar on non-interstate highways. Over 500 crashes occurred in Oregon work zones in 2009. More than half of these crashes resulted in injuries. (source: ODOT Work Zone Safety Program)	Reduces travel speed across work zone by 10 miles-per-hour Improves safety Reduces delay by 45 to 55 percent Potential to improve travel time reliability

Table 6-3: Complementary Strategies that Support ITS Solutions

Complementary Strategy	Strategy Description	Why Apply Strategy to Region?	Expected Benefits
Park and ride facilities	Provide parking facilities where travelers can leave personal vehicles or bicycles and transfer to bus, rail, or carpool for the rest of their trip.	Transit agencies currently provide park and ride facilities in the region today. An ODOT study of the OR 34 corridor recommended providing additional park and ride capacity.	Increases transit and carpool ridership Reduces congestion Reduces parking demand in city centers
Carpool and vanpool matching systems	Provide a system that helps travelers form carpools or vanpools based on similar trip origins and destinations.	Private initiatives such as iCarpool can be used to help travelers form carpools. There are a number of commute trips between the various cities in the region where carpooling could be applied.	Reduces congestion Reduces fuel consumption and vehicle emissions

Table 6-4: Regional ITS Strategies that Require Political and Policy Changes to Implement

Complementary Strategy	Strategy Description	Why Apply Strategy to Region?	Expected Benefits
Automated enforcement	Automatically issue tickets for red light running or speeding at locations with compliance issues	The City of Albany uses red light automated enforcement at one location today. Public opinion surveys in the U.S. in 2001 found that approximately 60 to 80 percent of drivers approve the use of automated enforcement.	Reduces red light violations by 10 to 75 percent Reduces severity and number of turning and angle crashes Reduces travel speeds
Congestion pricing	To manage demand on congested facilities a number of pricing strategies may be used at all times or by time of day: variable priced lanes, variable tolls on entire roadways or roadway segments, cordon charging, or area-wide charging.	This strategy may be an option for facilities that are over capacity for extended periods of time and capacity improvements are not practical or feasible to fund.	Diverts traffic to other modes or off-peak time periods Improves level of service during peak periods Potential to improve travel time reliability
Electronic toll collection	Apply where tolling or congestion pricing may be considered	If tolling or congestion pricing are applied to any regional facilities, electronic toll collection reduces impacts to traffic flow while also keeping system administration costs lower.	Reduces travel delay and vehicle emissions Potential to improve travel time reliability Cost savings for electronic toll lane over staffed toll lane
Regional transit fare integration	Use smart cards or magnetic stripe technologies to collect transit fare payments for all public transportation providers in the Central Willamette Valley	There are many transit service providers in the region with different fare structures and pass programs: Corvallis Transit System, Philomath Connection, OSU Shuttle, Albany Transit System, Linn-Benton Loop, and Linn Shuttle	Enhances passenger convenience Improves money handling efficiencies

Regional ITS Strategies Evaluation

The ITS strategies were evaluated for potential regional implementation and inclusion as a Central Willamette Valley Action Plan project. The strategies that rank the highest represent the alternatives that the region has selected to address the specific goals and needs identified. The Steering Committee evaluated the existing and future implementation of each of the ITS strategies using the following ranking key (on a scale from one to five). The result of the evaluation can be seen in Table 6-5.

1 – Non-existent in the region today

2 – Implemented to a limited degree or on a trial basis

3 – Implemented with limitations in geographic scope, agency, and/or extent

4 – A mainstay of the regional operations program, with high levels of regional coordination

5 – Implemented to its fullest, using state-of-the-practice methods and fully integrated into agency activities, policies, and investments

Table 6-5: Regional ITS Strategies Evaluation

ITS Strategy	State of Practice	ITS Plan Goal	Notes
Traffic Management & Operations			
Regional multi-agency transportation operations center (TOC)	☐ ☐ ☒ ☐ ☐ 1 2 3 4 5	☐ ☐ ☐ ☒ ☐ 1 2 3 4 5	State of practice limited to ODOT and OSP; Discuss at later date: virtual vs. physical regional TOC
Enhanced traffic signal operations for vehicles	☐ ☒ ☐ ☐ ☐ 1 2 3 4 5	☐ ☐ ☐ ☒ ☐ 1 2 3 4 5	State of practice: ODOT is a 3 (ODOT's policy is to re-time signals every 3 years)
Enhanced traffic signal operations for bicycles	☐ ☐ ☒ ☐ ☐ 1 2 3 4 5	☐ ☐ ☐ ☒ ☐ 1 2 3 4 5	ITS Plan Goal: 4 for City of Corvallis, stay at 3 for City of Albany
Traffic surveillance	☐ ☒ ☐ ☐ ☐ 1 2 3 4 5	☐ ☐ ☐ ☒ ☐ 1 2 3 4 5	
Special event management	☐ ☒ ☐ ☐ ☐ 1 2 3 4 5	☐ ☐ ☒ ☐ ☐ 1 2 3 4 5	Post-game traffic management, particularly related to traffic signal operations
Truck traffic signal priority	☒ ☐ ☐ ☐ ☐ 1 2 3 4 5	☐ ☐ ☒ ☐ ☐ 1 2 3 4 5	

ITS Strategy	State of Practice	ITS Plan Goal	Notes
Public Transportation Management			
Automated vehicle location (AVL) and computer aided dispatch (CAD)	☐ ☐ ☒ ☐ ☐ 1 2 3 4 5	☐ ☐ ☐ ☒ ☐ 1 2 3 4 5	Opportunity to integrate and share information between systems
Automated passenger counting (APC)	☐ ☐ ☒ ☐ ☐ 1 2 3 4 5	☐ ☐ ☐ ☒ ☐ 1 2 3 4 5	Important for planning and operations purposes
Automated transit stop announcements	☐ ☐ ☒ ☐ ☐ 1 2 3 4 5	☐ ☐ ☐ ☐ ☒ 1 2 3 4 5	Key ADA requirement
Transit signal priority (TSP)	☐ ☐ ☒ ☐ ☐ 1 2 3 4 5	☐ ☐ ☐ ☒ ☐ 1 2 3 4 5	
Transit only lanes and transit queue jump	☒ ☐ ☐ ☐ ☐ 1 2 3 4 5	☒ ☐ ☐ ☐ ☐ 1 2 3 4 5	
Reservation system for special transportation services	☐ ☒ ☐ ☐ ☐ 1 2 3 4 5	☐ ☐ ☒ ☐ ☐ 1 2 3 4 5	
Transit safety and security	☒ ☐ ☐ ☐ ☐ 1 2 3 4 5	☐ ☐ ☐ ☒ ☐ 1 2 3 4 5	Video on buses or at facilities is of region-wide importance
Traveler Information			
Roadside traveler information dissemination	☐ ☐ ☒ ☐ ☐ 1 2 3 4 5	☐ ☐ ☐ ☒ ☐ 1 2 3 4 5	
Regional traveler information	☐ ☐ ☒ ☐ ☐ 1 2 3 4 5	☐ ☐ ☐ ☐ ☒ 1 2 3 4 5	High public expectations for traveler information
Predictive traveler information	☒ ☐ ☐ ☐ ☐ 1 2 3 4 5	☐ ☒ ☐ ☐ ☐ 1 2 3 4 5	Private sector initiative
Transit trip planning website	☐ ☒ ☐ ☐ ☐ 1 2 3 4 5	☐ ☐ ☐ ☒ ☐ 1 2 3 4 5	Private sector initiative (e.g. Google Transit); Provide information through TripCheck/511
Parking availability information	☒ ☐ ☐ ☐ ☐ 1 2 3 4 5	☐ ☒ ☐ ☐ ☐ 1 2 3 4 5	Primarily OSU issue
Data Management			
Regional data warehouse	☒ ☐ ☐ ☐ ☐ 1 2 3 4 5	☐ ☐ ☐ ☒ ☐ 1 2 3 4 5	

ITS Strategy	State of Practice	ITS Plan Goal	Notes
Regional performance measures and supportive data collection	☐ ☐ ☒ ☐ ☐ 1 2 3 4 5	☐ ☐ ☐ ☐ ☒ 1 2 3 4 5	
Incident & Emergency Management			
Regional incident and emergency management	☐ ☐ ☒ ☐ ☐ 1 2 3 4 5	☐ ☐ ☐ ☒ ☐ 1 2 3 4 5	Key component of the plan for ODOT because most non-recurrent congestion is caused by incidents
Integrated corridor management (ICM)	☐ ☒ ☐ ☐ ☐ 1 2 3 4 5	☐ ☐ ☐ ☒ ☐ 1 2 3 4 5	Prescriptive plans for specific corridors
Computer Aided Dispatch (CAD) integration	☐ ☐ ☒ ☐ ☐ 1 2 3 4 5	☐ ☐ ☐ ☒ ☐ 1 2 3 4 5	Exists between ODOT/OSP, but not 911 centers
Maintenance & Construction Management			
Road weather information systems (RWISs)	☒ ☐ ☐ ☐ ☐ 1 2 3 4 5	☐ ☐ ☒ ☐ ☐ 1 2 3 4 5	City of Corvallis street supervisor would like a weather station adjacent to a camera in downtown; Other potential sites: Harrison Street Bridge and Lyon Street Bridge
Flood warning system	☒ ☐ ☐ ☐ ☐ 1 2 3 4 5	☒ ☐ ☐ ☐ ☐ 1 2 3 4 5	
Work zone management	☒ ☐ ☐ ☐ ☐ 1 2 3 4 5	☐ ☒ ☐ ☐ ☐ 1 2 3 4 5	ODOT is experimenting with smart work zone technology to monitor traffic flow and delay

Priority Corridors

One of the important outcomes of the ITS Planning process is a set of ITS projects to be implemented over various time frames. For this purpose, primary and secondary corridors were identified to provide emphasis on specific corridors when funding is available for action plan projects. The primary corridors identify starting points for possible project locations. To ensure that the action plan projects address critical transportation needs and result in maximum return on investments, a set a criteria was used to rank corridors in the region. The criteria used for developing the primary and secondary corridors include:

- Signal spacing
- Transit route
- Freight route

- Parallel to major regional route
- High crash facility
- Special event roadway

A primary corridor defines a segment of roadway that represents a greater need for action plan projects. That need is primarily driven by whether there are a significant number of traffic signals, serves as an alternate route, transit route, freight route, is a high crash facility, and/or is affected by special events. A primary corridor designation does not automatically mean that all action plan projects would be implemented on the corridor.

A secondary corridor represents a segment of roadway that is a lesser priority for action plan projects. It typically represents a corridor with very few traffic signals, may be a transit or freight route but one and not both, low crash rate, and does not serve as an alternate route or special event roadway. Action plan projects would be provided on these routes only if it directly served another primary corridor or if primary corridors have been implemented to the fullest extent. The primary and secondary corridors in the region are identified in Figure 6-1.

Central Willamette Valley ITS Plan

FIG. 6-1 **Primary & Secondary Action Plan Corridors**

Legend

Action Plan Corridors

- Primary Corridor
- Secondary Corridor

- City Limit
- Urban Growth Boundary
- County Line
- Roadway
- Railroad
- Water

0 0.5 1 2 Miles

Corvallis
Adair Village
Millersburg
Albany
Tangent
Philomath
Lebanon

99W
Pacific Highway West
Albany-Corvallis Highway
US-20
20
I-5
99E
34
OR-34
Corvallis-Lebanon Highway
Corvallis-Newport Highway
Albany-Junction City Highway
PACIFIC HIGHWAY
SE COLUMBUS ST
ELLSWORTH
LYON
GOLDFISH FARM
14TH
QUEEN AVE
GEARY ST
WAVERLY DR
34TH AVE
ELLINGSON RD
NW WALNUT BLVD
CIRCLE BLVD
WITHAM HILL CIRCLE
GARFIELD
GRANT
HARRISON BLVD
29TH ST
NW 9TH ST
2ND ST
35TH ST
SW 53RD ST
RESERVOIR
WEST HILLS RD
19TH ST
C OUNTRY CLUB
CRYSTAL LAKE
LINN CO.
BENTON CO.
SCHOOL RD
DENNY
OAK ST
MAIN ST
WILLAMETTE
WHEELER
MILTON
AIRPORT DR

Corvallis
NW GRANT AVE
BUCHANAN AVE
SUNNYBROOK AVE
TAYLOR AVE
FILLMORE AVE
POLK AVE
VAN BUREN AVE
JACKSON AVE
MONROE AVE
MADISON AVE
JEFFERSON AVE
ADAMS AVE
WASHINGTON AVE
B AVE
C AVE
NW KINGS BLVD
NW 18TH ST
NW 16TH ST
NW 14TH ST
NW 13TH ST
17TH ST
15TH ST
14TH ST
13TH ST
12TH ST
10TH ST
9TH ST
8TH ST
7TH ST
6TH ST
5TH ST
2ND ST
1ST ST
NORTHWEST 15TH ST
15TH ST
11TH ST
W OLLI W

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Action Plan Projects

Based on the regional ITS strategies, several ITS projects were identified for the Central Willamette Valley. The action plan projects are presented in Tables 6-6 to 6-11. The project list is categorized under the six functional categories and grouped by implementing agency. The project numbers are used for reference purposes only and do not solely indicate project priority. In identifying the action plan projects, it was recognized that funding allocations will have significant impacts of their eventual deployment.

Further descriptions of the action plan projects can be found in the sections following Tables 6-6 to 6-11, where the projects are listed under the corresponding functional area, and sorted by project number. Projects that have multiple implementing agencies were split into subprojects (i.e. TMO-1 was divided into TMO-1a, TMO-1b, TMO-1c, TMO-1d and TMO-1e). Each action plan project is identified with the following information:

- **Primary Agency –** The agency that would take the lead for the implementation, operations, and maintenance of the project has been identified.
- **Priority –** Each project was assigned a priority of higher or lower. Higher priority projects will generally have shorter deployment timeframes than those with lower priorities. The project priority was determined by the implementing agency. Actual deployment timeframes for the projects will depend on availability of funding and priority of the project when compared to other regional needs.
- **Project Name –** Provides a brief description of the project.
- **Cost –** The estimated cost is typically provided as a unit cost per device as most projects will require substantially more conceptual planning and design before more exact quantities can be determined. The cost estimates included with each project are based on past ITS project experience in the State of Oregon and costs found through various ITS resources available through the Federal Highway Administration (FHWA) and ITS America.
- **Market Packages –** The ITS market packages identified in the Central Willamette Valley ITS Architecture represent the ITS project elements that will be implemented as defined by the National ITS Architecture. Additional detail on market packages may be found at http://www.iteris.com/itsarch/.

Table 6-6: Traffic Management and Operations Projects

Primary Agency	Priority	Project #	Project Name	Cost	Market Package
ODOT	Higher	TMO-1a	ODOT Traffic Signal Operations Enhancements (Phase 1)	$20K - $50K/int	ATMS03; ATMS07
	Higher	TMO-2	ODOT Variable Message Signs (Phase 1)	$400K/ sign	ATMS06
	Higher	TMO-3a	ODOT Traffic Performance Monitoring	$30K/site	ATMS01; ATMS02

Primary Agency	Priority	Project #	Project Name	Cost	Market Package
City of Albany	Higher	TMO-4a	Albany Virtual TOC Deployment	$50 - $75K	ATMS07; ATIS06
	Higher	TMO-1b	Albany Traffic Signal Operations Enhancements (Phase 1)	$20K - $50K/int	ATMS03; ATMS07
City of Corvallis	Higher	TMO-4b	Corvallis Virtual TOC Deployment	$50 - $75K	ATMS07; ATIS06
	Higher	TMO-1c	Corvallis Traffic Signal Operations Enhancements (Phase 1)	$20K - $50K/int	ATMS03
	Higher	TMO-5	Corvallis Protected/Permitted Signal Phasing	$10 - $20K/int.	ATMS03
	Higher	TMO-3b	Corvallis Traffic Performance Monitoring	$30K/site	ATMS01; ATMS02
City of Lebanon	Higher	TMO-4c	Lebanon Virtual TOC Deployment	$30K	ATMS07; ATIS06
	Higher	TMO-1d	Lebanon Traffic Signal Operations Enhancements (Phase 1)	$20K - $50K/int	ATMS03; ATMS07
Multiple Agencies	Lower	TMO-6	Special Event Management	TBD	ATMS03; ATMS04; ATMS07
ODOT	Lower	TMO-7a	ODOT Traffic Signal Operations Enhancements (Phase 2)	$20K - $50K/int	ATMS03; ATMS07
	Lower	TMO-8a	ODOT Traffic Monitoring Cameras (Phase 1)	$20K - $50K/site	ATMS01
	Lower	TMO-10	ODOT Variable Message Signs (Phase 2)	$400K/ sign	ATMS06
	Lower	TMO-11	Truck Signal Priority	$15 - $40K/int	ATMS03
	Lower	TMO-12	ODOT Traffic Signal Operations Enhancements (Phase 3)	$20K - $50K/int	ATMS03; ATMS07
	Lower	TMO-9a	ODOT Traffic Monitoring Cameras (Phase 2)	$20K - $50K/site	ATMS01
City of Albany	Lower	TMO-3c	Albany Traffic Performance Monitoring	$30K/site	ATMS01; ATMS02
	Lower	TMO-7b	Albany Traffic Signal Operations Enhancements (Phase 2)	$20K - $50K/int	ATMS03; ATMS07
	Lower	TMO-8b	Albany Traffic Monitoring Cameras (Phase 1)	$20K - $50K/site	ATMS01

Primary Agency	Priority	Project #	Project Name	Cost	Market Package
City of Albany	Lower	TMO-9b	Albany Traffic Monitoring Cameras (Phase 2)	$20K - $50K/site	ATMS01
City of Corvallis	Lower	TMO-7c	Corvallis Traffic Signal Operations Enhancements (Phase 2)	$20K - $50K/int	ATMS03; ATMS07
	Lower	TMO-8c	Corvallis Traffic Monitoring Cameras (Phase 1)	$20K - $50K/site	ATMS01
	Lower	TMO-9c	Corvallis Traffic Monitoring Cameras (Phase 2)	$20K - $50K/site	ATMS01
City of Lebanon	Lower	TMO-3d	Lebanon Traffic Performance Monitoring	$30K/site	ATMS01; ATMS02
	Lower	TMO-7d	Lebanon Traffic Signal Operations Enhancements (Phase 2)	$20K - $50K/int	ATMS03; ATMS07
Benton County	Lower	TMO-3e	Benton County Traffic Performance Monitoring	$30K/site	ATMS01; ATMS02
	Lower	TMO-13a	Benton County Fair Special Event Traffic Management Plans	TBD	ATMS03; ATMS04; ATMS07
	Lower	TMO-1e	Benton County Traffic Signal Operations Enhancements (Phase 1)	$20K - $50K/site	ATMS03; ATMS07
Linn County	Lower	TMO-3f	Linn County Traffic Performance Monitoring	$30K/site	ATMS01; ATMS02
	Lower	TMO-13b	Linn County Fair Special Event Traffic Management Plans	TBD	ATMS03; ATMS04; ATMS07
OSU	Lower	TMO-13c	OSU Special Event Traffic Management Plans	TBD	ATMS03; ATMS04; ATMS07

Table 6-7: Public Transportation Management Projects

Primary Agency	Priority	Project #	Project Name	Cost	Market Package
Regionwide	Higher	PTM-1	Transit Trip Planning Information	$250K	APTS08
Albany Transit System (ATS)	Higher	PTM-2a	ATS On-Board Video Surveillance System	$20K/ bus	APTS05
	Higher	PTM-2b	Linn-Benton Loop On-Board Video Surveillance System	$20K/ bus	APTS05

Primary Agency	Priority	Project #	Project Name	Cost	Market Package
Albany Transit System (ATS)	Higher	PTM-3a	ATS Transit Signal Priority (Phase 1)	$15K/int	APTS09
	Higher	PTM-3b	Linn-Benton Loop Transit Signal Priority (Phase 1)	$15K/int	APTS09
Corvallis Transit System (CTS)	Higher	PTM-4a	Replace Bus Dispatch and Vehicle Location System	$400,000	APTS02
	Higher	PTM-5a	Automated Transit Stop Announcement System	$20K/ bus	APTS08
	Higher	PTM-6a	Automated Passenger Counting System	$10K/ bus	APTS10
	Higher	PTM-7a	Real-Time Transit Arrival Signs	$10 - $25K/ site	APTS08
	Higher	PTM-8a	Telephone Transit Arrival System	$100K	APTS08
Benton County Rural and Special Transportation	Higher	PTM-4b	Reservation, Bus Dispatch and Vehicle Location System	$400K	APTS02; APTS03
Regionwide	Lower	PTM-9	Integrate regional transit bus dispatch systems	$500K	APTS02; APTS03
Albany Transit System (ATS)	Lower	PTM-4c	ATS/Linn-Benton Loop Bus Dispatch and Vehicle Location System	$750K	APTS02; APTS03
	Lower	PTM-5b	ATS/Linn-Benton Loop Automated Transit Stop Announcement System	$20K/ bus	APTS08
	Lower	PTM-6b	ATS/Linn-Benton Loop Automated Passenger Counting System	$10K/ bus	APTS10
	Lower	PTM-10a	ATS Transit Signal Priority (Phase 2)	$15K/int	APTS09
	Lower	PTM-10b	Linn-Benton Loop Transit Signal Priority (Phase 2)	$15K/int	APTS09
	Lower	PTM-7b	Real-Time Transit Arrival Signs	$10 - $25K/ site	APTS08
	Lower	PTM-8b	Telephone Transit Arrival System	$100K	APTS08
Corvallis Transit System (CTS)	Lower	PTM-3c	Upgrade and Automate Existing Transit Signal Priority	$15K/int	APTS09
	Lower	PTM-10c	Transit Signal Priority (Phase 2)	$15K/int	APTS09

Primary Agency	Priority	Project #	Project Name	Cost	Market Package
Corvallis Transit System (CTS)	Lower	PTM-2c	CTS On-Board Video Surveillance System	$20K/ bus	APTS05
	Lower	PTM-11	CTS Public Area Video Surveillance System	$20K/ bus	APTS05
Linn Shuttle	Lower	PTM-4d	Bus Dispatch System and Vehicle Location System	$400K	APTS02; APTS03
	Lower	PTM-5c	Automated Transit Stop Announcement System	$20K/ bus	APTS08
	Lower	PTM-6c	Automated Passenger Counting System	$10K/ bus	APTS10
	Lower	PTM-3d	Transit Signal Priority	$15K/int	APTS09
	Lower	PTM-2d	On-Board Video Surveillance	$20K/ bus	APTS05
Benton County Rural and Special Transportation	Lower	PTM-5d	Automated Transit Stop Announcement System	$20K/ bus	APTS08
	Lower	PTM-6d	Automated Passenger Counting System	$10K/ bus	APTS10
	Lower	PTM-3e	Transit Signal Priority	$15K/int	APTS09
	Lower	PTM-2e	On-Board Video Surveillance	$20K/ bus	APTS05
City of Lebanon Dial-a-Bus	Lower	PTM-4e	Reservation, Bus Dispatch and Vehicle Location System	$400K	APTS03

Table 6-8: Traveler Information Projects

Primary Agency	Priority	Project #	Project Name	Cost	Market Package
Regionwide	Higher	TI-1	Implement Dynamic Ridesharing/Ride Matching Services	TBD	ATIS08
	Higher	TI-2	Integrate Regional Traveler Information Into a Common Source	$50K	ATIS01
ODOT	Higher	TI-3	Expand Central Willamette Valley Traveler Information on TripCheck	$50K	ATIS01
Transit Agencies	Higher	TI-4	Collect and disseminate transit information (See Public Transportation Management Projects)	$100K	APTS08; ATIS01

Primary Agency	Priority	Project #	Project Name	Cost	Market Package
Regionwide	Lower	TI-5	Regional Interactive Traveler Information	$150K	ATIS02
City of Albany	Lower	TI-6a	Integrate collected traveler information with TripCheck	$50K	ATIS01
City of Corvallis	Lower	TI-6b	Integrate collected traveler information with TripCheck	$50K	ATIS01
OSU	Lower	TI-7	OSU Real-Time Parking Information	$450K	ATIS01; ATMS16

Table 6-9: Data Management Projects

Primary Agency	Priority	Project #	Project Name	Cost	Market Package
Regionwide	Higher	DM-1	Develop Regional Policies for Data Collection, Archiving and Performance Measurement	$30K	AD1; AD2
	Higher	DM-2	Document Regional Performance Measures	$15K - $25K	AD1; AD2
Regionwide	Lower	DM-3	Implement a Regional Data Warehouse	$300K	AD2
	Lower	DM-4	Install Center-to-Center Communication Links to Regional Data Warehouse	$10K annually	AD2
	Lower	DM-5	Integrate Regional Data Sources into a Common Format	$100 - $300K	AD2

Table 6-10: Incident and Emergency Management Projects

Primary Agency	Priority	Project #	Project Name	Cost	Market Package
Regionwide	Lower	IEM-1	Emergency Signal Timing Plans for Alternate Routes	$40K	ATMS08
	Lower	IEM-2	Real-time traveler information and traffic signal status at Emergency Operations Centers (EOCs)	$200K	ATMS08
ODOT	Lower	IEM-3	Electronic Detour Signs on Alternate Routes	$20K/ sign	ATMS08
Emergency Management Agencies	Lower	IEM-4	Emergency Computer Aided Dispatch (CAD) System Integration	$250K	ATMS08; EM01

Table 6-11: Maintenance and Construction Management Projects

Primary Agency	Priority	Project #	Project Name	Cost	Market Package
ODOT	Higher	MCM-1	Weather Station (Coast Range)	$50K/ site	MC03; MC04
City of Corvallis	Lower	MCM-2	Weather Station (Downtown Corvallis)	$50K/ site	MC03; MC04
Regionwide	Lower	MCM-3	Smart Work Zone Management and Safety System	$20K/ device	MC07

The project list for the Central Willamette Valley ITS Plan is further detailed in the following sections, categorized under the six functional areas.

Traffic Management and Operations Projects

There were 13 projects identified under the traffic management and operations category. The projects include signal operational enhancements, traffic performance monitoring, and special event management.

TMO-1 Traffic Signal Operations Enhancements (Phase 1)

- Implement signal timing improvements, and/or implement advanced signal timing at applicable traffic signals
- Implement traffic signal timing to support bicycle movements on major bicycle routes
- Install a central traffic signal control system
- Connect traffic signals to central traffic signal control system
- Upgrade signal controllers

TMO-2 DMS (Phase 1)

- Install variable message signs (DMSs) at key decision points

TMO-3 Traffic Performance Monitoring

- Install traffic data collection devices to measure traffic flow conditions including volumes, speeds, occupancy and travel times.

TMO-4 Virtual TOC Deployment

- TOC will be developed to support streaming camera feeds, access to regional systems (e.g. TransSuite, TOCS, CAD) and interaction with emergency management agency's
- Construct a regional transportation communications network that provides video and traffic flow information from the virtual TOC to City of Corvallis, City of Albany, City of Lebanon, City of Philomath, City of Adair Village, City of Millersburg, Benton County, Linn County, CTS, ATS, Linn Shuttle, and Benton County Rural and Special Transportation

TMO-5 Protected/Permitted Signal Phasing

- Install flashing yellow arrow traffic signals for protected/permissive phasing

TMO-6 Special Event Management

- Provide capability to monitor and manage roadways during special events; This is dependent on outcome of TMO-13

TMO-7 Traffic Signal Operations Enhancements (Phase 2)

- Implement signal timing improvements, and/or implement advanced signal timing at applicable traffic signals
- Implement traffic signal timing to support bicycle movements on major bicycle routes
- Install a central traffic signal control system
- Connect traffic signals to central traffic signal control system
- Upgrade signal controllers

TMO-8 Traffic Monitoring Cameras (Phase 1)

- Install traffic monitoring cameras at key locations

TMO-9 Traffic Monitoring Cameras (Phase 2)

- Install traffic monitoring cameras at key locations

TMO-10 DMS (Phase 2)

- Install variable message signs (DMSs) at key decision points

TMO-11 Operations for Trucks

- Improve signal timing for progression of trucks along key freight routes

TMO-12 Traffic Signal Operations Enhancements (Phase 3)

- Implement signal timing improvements, and/or implement advanced signal timing at applicable traffic signals
- Implement traffic signal timing to support bicycle movements on major bicycle routes
- Install a central traffic signal control system
- Connect traffic signals to central traffic signal control system
- Upgrade signal controllers

TMO-13 Special Event Traffic Management Plans

- Develop traffic management plans (including traffic signal timing plans where applicable) for special events

Public Transportation Management Projects

There are 11 projects under the public transportation management category. The projects include transit signal priority, video surveillance, and real-time transit arrival information.

PTM-1 Transit Trip Planning Information

- Provide integrated and personalized transit trip planning information

PTM-2 On-Board Video Surveillance

- Install video surveillance on transit vehicles

PTM-3 Transit Signal Priority (Phase 1)

- Install/upgrade transit signal priority
- Install/upgrade priority equipment on transit vehicles

PTM-4 Bus Dispatch and Vehicle Location System

- Install/upgrade CAD systems and AVL systems on transit vehicles
- Install mobile data terminals on flexible route and demand response vehicles

PTM-5 Transit Stop Support System

- Install/upgrade system to support automated transit stop announcements

PTM-6 Automated Passenger Counting System

- Install/upgrade automated passenger counting system

PTM-7 Real-Time Arrival Signs

- Install real-time arrival signs at key transit stops

PTM-8 Telephone Transit Arrival

- Provide telephone transit arrival alerts with real-time vehicle arrival information to travelers

PTM-9 CAD System Integration

- Integrate CAD systems and install a common AVL system on transit vehicles

PTM-10Transit Signal Priority (Phase 2)

- Install/upgrade transit signal priority
- Install/upgrade priority equipment on transit vehicles

PTM-11 Public Area Video Surveillance

- Install video surveillance at transit centers, park and rides, and/or other key transit stops

Traveler Information Projects

There are seven projects under the traveler information category. The projects range from regional travel integration to real-time parking management information.

TI-1 Dynamic Ridesharing/Ride Matching

- Implement Dynamic Ridesharing/Ride Matching Services

TI-2 Regional Traveler Information Integration

- Integrate Regional Traveler Information Into a Common Source

TI-3 Traveler Information on TripCheck

- Expand Central Willamette Valley Traveler Information on TripCheck

TI-4 Collect and disseminate transit information

- Expand the TripCheck Traveler Information Portal (TTIP) or develop a regional portal to provide transit data in XML format to the public for use in privately developed traveler information tools

- Work with private industry (e.g. Google Transit) to get scheduled fixed route service information online
- Work with private industry (e.g. Google Transit) to get arrival information online

TI-5 Regional Interactive Traveler Information

- Work with private industry (e.g. INRIX, IBM, TraffiCAST) to provide regional predictive traveler information

TI-6 Integrate collected traveler information with TripCheck

- Set up accounts for local agencies to use TripCheck Local Entry and assign dedicated staff at local agencies to input data to TripCheck Local Entry
- Add traffic monitoring camera images to TripCheck

TI-7 Provide Real-Time Parking Information

- Provide real-time parking availability information for the parking garage and other high demand OSU parking areas used during normal business hours

Data Management Projects

There are five data management projects. The projects include developing regional performance measures, and installing communications links.

DM-1 Develop Regional Data Policies

- Develop regional policies about data collection, data archiving, and performance measurement for all ITS projects

DM-2 Document Regional Performance Measures

- Develop/document regional performance measure metrics and methodologies

DM-3 Implement a Regional Data Warehouse

- Develop formal agreement for a regional data warehouse
- Develop tools for the regional data warehouse to support local management, operations, and planning activities

DM-4 Install Communication Links

- Install Center-to-Center Communication Links to Regional Data Warehouse

DM-5 Integrate Regional Data

- Integrate regional data sources into a common format

Incident and Emergency Management Projects

There are a total of four incident and emergency management projects. The projects range from emergency signal timing plans to electronic detour signs.

IEM-1 Emergency Signal Timing Plans

- Develop signal timing plans for emergencies and incidents for alternate routes

IEM-2 Provide Access to Regional Traffic Ops Systems

- Provide access to regional traffic operations systems from regional emergency operations center (EOC)

IEM-3 Electronic Detour Signs on Alternate Routes

- Install electronic detour signs along detour routes

IEM-4 Emergency Computer Aided Dispatch (CAD) System Integration

- Use ODOT's existing CAD integration model to share data regarding traffic incidents and emergencies by developing an interface between CAD systems used in and adjacent to the region: ODOT, Oregon State Police, Benton County 911, Linn County 911, Lincoln County 911, Central Lane County 911, Willamette Valley Communications Center (Polk County 911), Lebanon Police Department, and Sweet Home Police Department

Maintenance and Construction Management Projects

The maintenance and construction category includes three projects. The projects include weather stations and smart work zone management.

MCM-1 Weather Station (Coast Range)

- Install road weather information system (RWIS) on US 20 in the Coast Range to provide a snapshot of regional weather and pavement conditions.
- Link RWIS data to TripCheck and Clarus

MCM-2 Weather Station (Downtown Corvallis)

- Install road weather information system (RWIS) in Downtown Corvallis
- Link RWIS data to TripCheck and Clarus

MCM-3 Smart Work Zone Management and Safety System

- Install smart work zone technology to monitor traffic flow conditions and delay in construction work zones on corridors that impact regional mobility

Recommended ITS Projects by Corridor

A list of recommended ITS projects by corridor throughout the Central Willamette Valley can be seen in Table 6-12. The table identifies whether the ITS projects would be implemented as regional or corridor specific strategies. For the corridor specific strategies, the applicable corridors are identified for potential project implementation should funding become available. The equipment deployment locations for several of the ITS projects including transit signal priority corridors and planned traffic count station, camera, and variable message sign locations can be seen in Figures 6-2 and 6-3.

Table 6-12: Recommended ITS Strategies by Corridor

Corridor	Extent	Traffic Management and Operations						Public Transportation Management									Traveler Information				Data Management		Incident and Emergency Management			Maintenance & Construction Management	
		Traffic Operations Center	Enhanced Traffic Signal Operations	Traffic Monitoring	Traffic Performance Monitoring	Event Management	Truck Signal Priority	Automated Transit Stop Announcement (ASA)	CAD System Integration	Automated Passenger Counting	TransitSignal Priority	Transit Arrival Signs	Transit Telephone Information System	Real-time Transit Schedule Information	Security and Surveillance	Mobile Data Terminals	Regional Traveler Information (TripCheck and TTIP)	Roadside Traveler Information (DMS, HAR)	Carpool Match	Real-time Parking Information	Regional Performance Measures	Regional Data Warehouse	Electronic Detour Signs	Integrated Corridor Management	911 CAD Integration	Road Weather Information Systems	Smart Work Zone Technology
Regional Strategies		◆			◆	◆			◆	◆			◆	◆	◆	◆	◆		◆	◆	◆	◆			◆		◆
Corridor Strategies			◆	◆			◆	◆			◆	◆			◆	◆		◆					◆	◆		◆	
US 20 (Newport Highway/ Albany-Corvallis Highway/ Santiam Highway)	Downtown Corvallis		◆	◆			◆	◆				◆												◆		◆	
OR 99W (Pacific Highway West)	Downtown Corvallis		◆	◆			◆	◆				◆												◆		◆	
OR 34 (Corvallis-Lebanon Highway)	US 20 (Albany-Corvallis Hwy) to Tangent		◆	◆			◆	◆			◆	◆												◆			
OR 99E (Albany-Junction City Highway)	Interstate 5 to OR 34 (Corvallis-Lebanon Highway)		◆	◆				◆			◆	◆						◆					◆	◆			
OR 34 (Corvallis-Lebanon Highway)	Tangent to I-5			◆														◆					◆	◆			
US 20 (Newport Highway/ Albany-Corvallis Highway/ Santiam Highway)	Downtown Albany		◆	◆				◆			◆	◆						◆					◆	◆			
US 20 (Newport Highway/ Albany-Corvallis Highway/ Santiam Highway)	OR 34 (Alsea Highway) to US 20 (Santiam Highway) near Crowfoot Road		◆	◆			◆	◆			◆	◆											◆	◆			
US 20 (Newport Highway/ Albany-Corvallis Highway/ Santiam Highway)	OR 34 (Alsea Highway) to downtown Corvallis		◆	◆			◆	◆			◆	◆												◆		◆	
US 20 (Newport Highway/ Albany-Corvallis Highway/ Santiam Highway)	Downtown Corvallis to Albany			◆				◆				◆												◆			
Harrison Boulevard	53rd Street/ Walnut Boulevard to Willamette River		◆	◆				◆			◆	◆												◆			
Van Buren Avenue	NW Kings Avenue to Willamette River		◆	◆				◆				◆												◆			
9th Street	NW Elks Drive to SW Washington Street		◆	◆				◆			◆	◆															
OR 99W (Pacific Highway West)	North of downtown			◆			◆	◆			◆	◆												◆			
Western Boulevard	US 20 (Corvallis-Newport Highway) to 3rd Street		◆	◆				◆			◆	◆															
US 20 (Newport Highway/ Albany-Corvallis Highway/ Santiam Highway)	I-5 to OR34 (Alsea Highway)			◆				◆			◆	◆												◆			
Waverly Drive	Salem Avenue to Columbus Street		◆	◆				◆			◆	◆															
OR 34 (Corvallis-Lebanon Highway)	I-5 to US 20 (Santiam Highway)			◆																				◆			
Interstate 5	Exit 238 (Millersburg/ Jefferson Highway) to Exit 228 (OR 34: Corvallis-Lebanon Highway)			◆														◆					◆	◆			
Queen Avenue	Elm Street to Waverly Drive		◆	◆				◆			◆	◆															
Kings Boulevard	Walnut Boulevard to Monroe Avenue		◆	◆				◆			◆	◆															
53rd Street/ Walnut Boulevard	Country Club Drive to Circle Blvd		◆	◆				◆			◆	◆															
Circle Boulevard	Harrison Boulevard to US 20 (Albany-Corvallis Hwy)		◆	◆				◆			◆	◆															
OR 99W (Pacific Highway West)	South of downtown			◆			◆	◆			◆	◆												◆			
5th Street/Buchanan Avenue	Kings Boulevard to Van Buren Avenue		◆	◆				◆				◆															
Geary Street	Salem Avenue to 34th Avenue		◆	◆				◆				◆															
Oak Street	Denny School Road to US 20						◆																				
Century Drive	Knox Butte Road to Murder Creek Drive																						◆				
Airport Road	OR 99E to US 20																						◆				
Country Club Drive	53rd Street to 35th Street							◆				◆															
Wheeler St/Williams St/Milton Street	US 20 (Santiam Highway) to US 20 (Santiam Highway)																										
29th Street	Walnut Blvd to Harrison Blvd							◆				◆															
34th Avenue	OR 99E (Albany-Junction City Highway) to Waverly Drive							◆				◆															
Crystal Lake Drive	OR 99W to Park Avenue							◆				◆															
North Albany Road	US 20 (Albany-Corvallis Hwy) to Hickory Avenue							◆			◆	◆															
Witham Hill Drive	Walnut Blvd to Harrison Blvd							◆			◆	◆															
Denny School Road/ Airport Road	OR 34 (Corvallis-Lebanon Highway) to US 20 (Santiam Highway)																										
Knox Butte Road/ Goldfish Farm Road	Interstate 5 to US 20 (Santiam Highway)							◆			◆	◆															
Columbus Street	Waverly Drive to OR 34																										
Highland Drive	Lewisburg Avenue to Circle Boulevard							◆				◆															
Garfield Avenue	Kings Boulevard to 9th Street																										
Reservoir Road/19th St/West Hills Road	US 20 (Corvallis-Newport Highway) to 53rd Street							◆				◆															
Conifer Boulevard	9th Street to US 20 (Albany-Corvallis Hwy)							◆				◆															
35th Street	Country Club Drive to Harrison Boulevard							◆				◆															
53rd Avenue/ Ellingson Road	OR 99E (Albany-Junction City Hwy) to Columbus Street																										
Grant Avenue	Kings Boulevard to 9th Street																										

Central Willamette Valley ITS Plan

FIG. 6-2 Transit Signal Priority Corridors

Transit Signal Priority Corridor

Traffic Signal, Ownership

- Benton County
- City of Corvallis
- City of Albany
- City of Lebanon
- ODOT
- Planned ODOT
- Planned City

Maintained and Operated by City of Corvallis

Transit Priority

City Limit

Urban Growth Boundary

County Line

Roadway

Railroad

Water

0 0.5 1 2 3 Miles

Corvallis
Adair Village
Millersburg
Albany
Tangent
Philomath
Lebanon
LINN COUNTY
BENTON COUNTY
NW WALNUT BLVD
CIRCLE BLVD
HARRISON BLVD
GARFIELD
GRANT
WITHAM HILL CIRCLE
29TH ST
35TH ST
9TH ST
2ND ST
RESERVOIR
WEST HILLS RD
SW 53RD ST
19TH ST
C OUNTRY CLUB
CRYSTAL LAKE
Pacific Highway West
Albany-Corvallis Highway
Corvallis-Newport Highway
Albany-Junction City Highway
ELLSWORTH
LYON ST
14TH
QUEEN AVE
34TH AVE
GEARY ST
WAVERLY DR
GOLDFISH FARM
ELLINGSON RD
SE COLUMBUS ST
PACIFIC HIGHWAY
Corvallis-Lebanon Highway
Santiam Highway
OR-34
US-20
99W
99E
I-5
20
34
SCHOOL RD
DENNY
OAK ST
MAIN ST
WILLIAMS
WHEELER
MILTON
AIRPORT DR

Real Urban Geographics 2010 www.realurban.com

Central Willamette Valley ITS Plan

FIG. 6-3 **Planned ITS Devices**

Legend

- Traffic Count Station
- Planned Traffic Count Station
- Camera
- Planned Camera
- Highway Advisory Radio (HAR) Transmitter
- Highway Advisory Radio (HAR) Sign with Beacon
- Variable Message Sign (VMS)
- Planned Variable Message Sign (VMS)
- Red Light Enforcement
- Planned Weather Station
- City Limit
- Urban Growth Boundary
- County Line
- Roadway
- Railroad
- Water

0 0.5 1 2 Miles

Adair Village
Millersburg
Albany
Corvallis
Philomath
Tangent
Lebanon
Brownsville
Halsey

(southbound)
(northbound)
(westbound)

99W
Pacific Highway West
Albany-Corvallis Highway
US-20
OR-34
Corvallis-Lebanon Highway
Corvallis-Newport Highway
Albany-Junction City Highway
PACIFIC HIGHWAY
SE COLUMBUS ST
ELLINGSON RD
LINN CO.
BENTON CO.
LAKE CREEK DRIVE
Lake Creek Drive Inset Area
Coast Range Inset Area
see inset

NW WALNUT BLVD
CIRCLE BLVD
WITHAM HILL
CIRCLE
29TH ST
GARFIELD
GRANT
NW 9TH ST
HARRISON BLVD
2ND ST
35TH ST
SW 53RD ST
RESERVOIR
WEST HILLS RD
19TH ST
C OUNTRY CLUB
CRYSTAL LAKE
ELLSWORTH
LYON
14TH
QUEEN AVE
GEARY ST
WAVERLY DR
GOLDFISH FARM
34TH AVE
SCHOOL RD
DENNY
OAK ST
MAIN ST
WILLIAMS
WHEELER
MILTON
AIRPORT DR

Inset - Downtown Corvallis

BUCHANAN AVE
TAYLOR AVE
FILLMORE AVE
POLK AVE
VAN BUREN AVE
JACKSON AVE
MONROE AVE
MADISON AVE
JEFFERSON AVE
ADAMS AVE
WASHINGTON AVE
17TH ST
15TH ST
14TH ST
13TH ST
12TH ST
10TH ST
9TH ST
8TH ST
7TH ST
6TH ST
5TH ST
2ND ST
1ST ST
4TH ST / HWY 99W
B AVE
C AVE
Willamette River

Inset - Lake Creek Drive

Albany - Junction City Highway
Halsey - Sweet Home Highway
LAKE CREEK DRIVE

Inset - Coast Range

NORTON CRE
US HWY 20
BLODGETT RD
TUM TUM RD
HARRIS RD
Philomath

CHAPTER 7 FINANCE PLAN

This chapter provides an overview of potential funding sources for the Central Willamette Valley ITS projects. Successfully funding an ITS program depends on a combination of capital, operations, and maintenance investments to support active management of the transportation system. The funding sources identified in this finance plan primarily identify funds that could be used for capital investments; however, the Central Willamette Valley should monitor the pending surface transportation spending bill, which could include federal funds for ongoing operations.

Funding Sources

A variety of funding sources should be considered for the implementation of ITS projects in the Central Willamette Valley. Table 7-1 presents a summary of possible funding sources and the following subsections provide more details.

Table 7-1: Potential Funding Sources and Application Cycles

Potential Funding Program	Applicable Project Types	Application Cycle
Oregon Statewide Transportation Improvement Program (STIP)	Any ITS project	Jan. 2012 (2014 – 2017 STIP); Even-numbered years
ODOT Transportation Operations Innovation and Demonstration Program	Projects that reduce congestion or improve freight mobility on the state highway system	To be determined
ODOT Flexible Funds	Transit, bicycle, or TDM projects	Nov. 12, 2010 next deadline; Yearly
ConnectOregon	Transit projects	To be determined (possibly 2011)
State of Good Repair (SGR) Bus and Bus Facilities Initiative	Transit projects	To be determined
Formula Grants for Other than Urbanized Areas (5311)	Rural transit projects	Included in STIP
Energy Efficiency and Conservation Block Grant (EECBG) Program	Projects that improve energy efficiency (e.g. signal timing)	To be determined
Homeland Security Funding	CAD integration with 911 centers	To be determined
Local Funding Sources	Local match when required	Varies

Oregon Statewide Transportation Improvement Program

The Oregon STIP[13] allocates federal and state funding for state and regional transportation systems over a four-year period. The STIP is updated every two years and is adopted by the Oregon Transportation Commission (OTC) and then submitted to the Federal Highway Administration and Federal Transit

[13] Statewide Transportation Improvement Program, retrieved October 2010, http://www.oregon.gov/ODOT/HWY/STIP/index.shtml

Administration per federal law. Within the STIP, the Operations Program typically provides ITS funds since ITS projects support transportation system efficiency and mobility. Transit ITS projects are typically funded through the Public Transit Program within the STIP.

The Cascades West Area Commission on Transportation (CWACT) provides recommendations to ODOT and the OTC on project priorities for the STIP for public jurisdictions within Benton, Linn, and Lincoln Counties. The stakeholders of this plan should continue to work with CWACT to include ITS projects in the STIP review process. The selection of projects for the STIP typically begins in January of even-numbered years. The CWACT uses selection criteria and a review process to finalize and prioritize the list of STIP projects before providing their recommendations to ODOT and the OTC in the fall of even-numbered years.

Federal Funding Reauthorization

Federal funds will be available for ITS projects as part of the next federal funding reauthorization, which is expected to be a priority for Congress in 2011. The Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) federal transportation funding program allocated funds throughout the U.S. for 2005 through 2009 and was extended through 2010. A new funding transportation reauthorization bill is being developed. Historically each federal transportation funding reauthorization continues many of the core federal funding programs (e.g. Highway Trust Fund) but also develops new programs to address the current issues of the transportation system. Most federal transportation funds are allocated through the STIP in Oregon. The current blueprint for transportation investment states national objectives that ITS solutions can address including to: reduce fatalities and injuries, unlock congestion, provide transportation choices, and limit the adverse affects of transportation on the environment.[14]

ODOT Transportation Operations Innovation and Demonstration Program

In 2008 ODOT awarded $8 million through the Transportation Operations Innovation and Demonstration Program[15] for eight projects that demonstrate the ability to reduce congestion or improve freight mobility. The Corvallis ATMS project (currently under design) was one of the projects selected. This program was funded using 2008 – 2011 STIP Operations Program funds set aside for ITS. ODOT has not yet determined if more funding will be allocated through this program but they are performing before and after studies of the eight projects selected to evaluate their effectiveness.

Projects for this program must meet the same eligibility requirements as the STIP Operations Program, must use implementation ready technology and procedures, must provide an expected congestion reduction and/or freight mobility benefit to the Oregon state highway system, and meet one of the following demonstration priorities:

- Demonstration of a concept or technology that improves the national state of the practice for transportation operations.
- Demonstration of a concept or technology that has been demonstrated in another state but is new to Oregon.

[14] The Surface Transportation Authorization Act of 2009, A Blueprint for Investment and Reform, Presented by Chairman James L. Oberstar, Ranking Member John L. Mica, Chairman Peter A. Defazio, and Ranking Member John J. Duncan, Jr., June 18, 2009.

[15] Innovative Operations Funding, retrieved October 2010, http://egov.oregon.gov/ODOT/HWY/ITS/its_news_events.shtml

- Demonstration of a concept or technology that has already been demonstrated in Oregon, but through the proposed project, experience will be expanded to other agencies or areas of the state.
- Demonstration of an expanded use of a concept or technology that has already been demonstrated by the applicant.

ODOT Flexible Funds Program

The Flexible Funds Program[16] was approved by OTC in August 2010 to provide funding for transit, bicycle, pedestrian, and transportation demand management projects. There is $21 million in funding available for eligible projects for this application cycle (applications due November 12, 2010). Projects identified for these funds should help create livable and sustainable communities where multimodal transportation facilities, services, and programs provide safe, comfortable, and convenient options that support active living.

Money for the Flexible Funds Program is being provided through the Federal Highway Administration's Surface Transportation Program (STP). Oregon receives approximately $100 million in STP funds annually. Approximately one quarter of Oregon's STP funds are currently allocated to metropolitan areas, one quarter to congestion mitigation and air quality (CMAQ), one quarter to counties and cities, and one quarter to the Flexible Funds Program. FHWA requires a minimum 10.27% funding match for all projects funded through the STP.

ConnectOregon

ConnectOregon[17] is a lottery bond-based initiative aimed at improving Oregon's transportation system connections through multimodal non-highway investments for aviation, rail, marine, and transit infrastructure. Three phases of ConnectOregon funding ($100 million/phase) were approved by the legislature in 2005, 2007, and 2009; however, it is unknown whether there will be future funding cycles of this program. Typically at least 10 percent of the funds are distributed to each of the five regions of the state as long as each region has qualified projects[18]. Connect- Oregon has funded approximately 40 multimodal projects per phase. CWACT has helped prioritize regional projects for consideration in ConnectOregon funding.

State of Good Repair Bus and Bus Facilities Initiative

The SGR Bus and Bus Facilities initiative[19] makes funds available to public transit providers to finance capital projects to replace, rehabilitate, and purchase buses and related equipment and to construct/rehabilitate bus-related facilities.

The initial SGR Grant became available in 2010 with up to $775 million in program funds available. However, the SGR Initiative states that the Federal Transit Administration may use additional Bus and Bus Facilities program funding that becomes available in the future to further support this initiative. The

[16] ODOT Flexible Funds Program, retrieved September 2010, http://www.oregon.gov/ODOT/TD/TP/FlexFunds.shtml

[17] ConnectOregon, retrieved September 2010, http://www.oregon.gov/ODOT/COMM/CO/index.shtml

[18] The five regions are defined by the five ODOT region boundaries but funding is not limited to ODOT.

[19] State of Good Repair (SGR) Bus and Bus Facilities initiative, retrieved September 2010, http://www.grants.gov/search/search.do?mode=VIEW&oppId=54425

Corvallis Transit System submitted an application to replace their communications and many of their systems in June 2010 and is waiting to hear if they will be awarded funding.

Formula Grants for Other than Urbanized Areas (5311)

FTA manages Formula Grants for Other than Urbanized Areas[20] to support public transportation in rural areas with a population less than 50,000. Goals of this program include to assist in the maintenance, development, improvement, and use of public transportation systems in nonurbanized areas and to assist in the development and support of intercity bus transportation. The Albany Transit System has used 5311 funds in the past.

Energy Efficiency and Conservation Block Grant Program

The U.S. Department of Energy's EECBG Program[21] intends to deploy the cheapest, cleanest, and most reliable energy technologies available across the country. The program is intended to assist agencies to promote, implement, and manage energy efficiency and conservation projects and programs designed to reduce fossil fuel emissions, reduce the total energy use of the eligible entities, improve energy efficiency in the transportation, building, and other appropriate sectors, and create and retain jobs. Projects from agencies around the state who received funding from the EECBG Program include traffic signal controller upgrades and signal timing improvements.

Funding for the EECBG Program under the Recovery Act totaled $3.2 billion in 2009. Of this amount, approximately $2.7 billion was awarded through formula grants and $454 million was allocated through competitive grants. The Department of Energy has not yet determined if this program will be continued through future funding cycles.

Local Funding Sources

Local funding sources provide opportunities to fund ITS projects. Although these sources are typically committed to existing programs and are often not large enough to fund large scale ITS projects, they are often needed to provide a local funding match when required by federal or state funding programs. Local funding sources to consider in the Central Willamette Valley include:

- Transportation/Capital Improvement Programs: Cities, Counties, Corvallis Area MPO
- Special Transportation Funds: Benton County, Linn County

Other jurisdictions in Oregon, such as Clackamas County and the City of Gresham, have successfully used system development charges (SDCs) and tax increment funding (TIF) to fund ITS projects that improve system operations related to development changes. SDCs are collected from developers when a building permit is issued and is based on a formula set by each local government. A TIF is used in an urban renewal district and requires property owners to pay taxes on new or increased property values compared to the assessed property value when the district was formed. SDCs and TIFs are already included as a revenue source in the local transportation/capital improvement programs; however, they should be considered for use when a particular ITS project can help mitigate system impacts directly related to transportation impacts from system development.

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[20] Formula Grants for Other than Urbanized Areas (5311), retrieved December 2010, http://www.fta.dot.gov/funding/grants/grants_financing_3555.html

[21] Energy Efficiency and Conservation Block Grant Program, retrieved September 2010, http://www1.eere.energy.gov/wip/eecbg_allocation.html

Homeland Security Funding

ODOT has received some homeland security funding in the past for integration between the CAD systems used by ODOT, Oregon State Police, and 911 centers. This may be a potential funding source for the Central Willamette Valley.

Partnerships

Partnerships should be considered for ITS projects where investment from private entities or other branches of the public government could benefit both transportation agencies and the partner. These partnerships could help advance projects that would otherwise be held up due to funding constraints or other factors or could result in projects that exceed what could be achieved if both parties were acting strictly within their traditional roles. Partnerships that have already been developed or to consider when funding this ITS plan include:

- Google Transit: The City of Corvallis recently formatted data from the Corvallis Transit System so it can be posted online on Google Transit's website. Google Transit provides this service for free; however, there were some small costs for the City of Corvallis to format their data. Other transit agencies in the Central Willamette Valley also plan to format their data for Google Transit.
- RideshareOnline.com: The state of Oregon recently signed an agreement with King County, Washington to develop a statewide rideshare program for Oregon based on an existing system used in Washington. Details for this program are still being developed and funding obligations, if any, for the Central Willamette Valley are not yet known.
- Portland State University (PSU): The PORTAL Data Archive developed by PSU has proven a useful tool for archived data management and performance measure assessment. PSU is always looking for new partners and is open to expanding the archive to other areas of Oregon.
- Oregon State University (OSU): The City of Corvallis often partners with OSU, who is in the process of establishing a transportation center. Operationally the City of Corvallis coordinates with OSU for special event management associated with OSU football games. Regional stakeholders of this plan may consider partnering with OSU to create a regional data warehouse (similar to PSU's PORTAL Data Archive) or for performance measure assessment.

Leveraging Capital Improvement Projects for ITS

Capital improvement projects, whether public or private, provide an opportunity to install conduit underground to support ITS projects at a reduced cost. Installing conduit during roadway construction and/or preservation projects can result in construction cost savings up to 50 percent. Agencies in the Central Willamette Valley should consider installing or requiring developers to install conduit during roadway construction on any of the corridors in the Communications Plan chapter. This will help reduce the costs when ITS projects and associated communications are installed.

CHAPTER 8 ONGOING MAINTENANCE OF REGIONAL ITS ARCHITECTURE

This chapter presents the maintenance plan for the Central Willamette Valley Regional ITS Architecture. The ITS Architecture Maintenance Plan will define how the regional architecture will be kept up-to-date through periodic updates, and it will identify when the updates will occur and who will take the lead in making the changes.

Maintenance Plan

One of the keys to successful ITS plan implementation is the maintenance of the plan and architecture as ITS projects are implemented, as regional ITS needs and services evolve, and as new technologies emerge. The architecture must be maintained per federal requirements and the FHWA recommends updating the regional architecture for the following primary reasons:

- Changes in regional needs
- Addition of new stakeholders
- Changes in scope of services considered
- Changes in statewide architecture or other architectures in adjoining regions
- Addition or deletion of projects
- Changes in project priority

The goal of the maintenance plan is to guide controlled updates to the regional ITS architecture so that it continues to accurately reflect the region's existing ITS capabilities and future plans.

Lead Agency to Guide ITS Plan Implementation and Maintenance

The Corvallis Area Metropolitan Planning Organization (CAMPO) has volunteered to take the lead agency role for ITS plan implementation and maintenance and the ODOT ITS Unit has volunteered to assist with Turbo Architecture updates. CAMPO will lead and facilitate ongoing action plan project deployment, coordination, education, and pursuit of funding; however, full coordination and participation from of all the key stakeholders is necessary. Successful implementation relies heavily on agency cooperation and committed leadership. Key roles that CAMPO will assume include:

- Facilitate ongoing Steering Committee meetings
- Incorporate the ITS projects into regional project prioritization lists
- Coordinate funding applications for ITS projects
- Coordinate and track project implementation
- Maintain the regional architecture, including the Turbo Architecture file
- Coordinate with and notify Steering Committee members of changes
- Arrange public outreach sessions as needed.

Additionally, the CAMPO will coordinate with the ODOT ITS Unit so that ODOT can update the statewide architecture accordingly. Significant changes to the architecture may be made at any time deemed necessary by CAMPO and the Steering Committee and changes will be tracked using a change log.

Project Implementation

The implementation of ITS projects in the Central Willamette Valley shall conform to the regional architecture per FHWA requirements. If the final design of an ITS project differs from the regional architecture, then the regional architecture shall be updated as described in this section. The FHWA requires a systems engineering analysis for all ITS projects on a scale commensurate to each project. The systems engineering analysis[22] shall include:

- Identification of portions of the region's ITS architecture being implemented
- Roles and responsibilities of participating agencies
- Definition of functional requirements
- Analysis of alternative system configurations and technology options to meet functional requirements
- Procurement options
- List of applicable ITS standards and testing procedures
- Operation and management procedures and resources

Steering Committee Roles

The Steering Committee, which consists of key stakeholders, helps foster interagency coordination and build consensus throughout the region. The continuing roles of the Steering Committee during the implementation of the ITS plan includes the following:

- Make decisions regarding project phasing. As opportunities arise (funding source, priority shift, or concurrent construction), adjust the project phasing as appropriate
- Help with or coordinate funding applications
- Help with or coordinate project implementation
- Develop memoranda of understanding (MOUs) or intergovernmental agreements (IGAs) as required
- Prepare plans and standards (special event traffic management plans and standards for communication design, and data management)
- Review changes to the regional architecture

Members of the Steering Committee will be responsible for requesting changes to the Regional ITS Architecture based on things such as changes to existing ITS elements or operations, addition of new projects, or for securing ITS funding. Table 8-1 lists the general process for maintaining the architecture and a change request form and change log to be used for the process is included in the appendix.

[22] Title 23, Code of Federal Regulations (CFR), Highways, Chapter 1: FHWA, Department of Transportation, Part 940: Intelligent Transportation Systems Architecture and Standards

Table 8-1: Central Willamette Valley Regional ITS Architecture Update Process

Maintenance Step	Responsibility
Submit a change request to the Steering Committee	Steering Committee Member
Review and approve the request.	Steering Committee
Annually update approved changes in the Turbo Architecture database and supporting documentation.	CAMPO/ODOT ITS Unit
Log the changes and notify the stakeholders.	CAMPO

CENTRAL WILLAMETTE VALLEY ITS PLAN APPENDIX

Appendix Items

Appendix A: Glossary of Acronyms

Appendix B: Regional ITS Architecture Assessment Checklist

Appendix C: Incident Detour Routes

Appendix D: Turbo Architecture Summary Report

Appendix E: Turbo Architecture Stakeholders Report

Appendix F: Turbo Architecture Inventory Report

Appendix G: Turbo Architecture Market Packages Report

Appendix H: Change Request Form and Change Log

APPENDIX A

Glossary of Acronyms

Glossary of Acronyms:

A&E	Albany & Eastern
AASHTO	American Association of State Highway and Transportation Officials
AD	Archived Data
APC	Automated Passenger Counting
APTS	Advanced Public Transportation System
ASTM	American Society for Testing and Materials
ATC	Advanced Transportation Controller
ATIS	Advanced Traveler Information Systems
ATMS	Advanced Traffic Management System
ATR	Automatic Traffic Recorder
ATS	Albany Transit System
AVL	Automated Vehicle Location
AVSS	Advanced Vehicle Safety System
BNSF	Burlington Northern & Santa Fe
C2C	Center to Center
C2F	Center to Field
CAD	Computer-Aided Dispatch
CAMPO	Corvallis Area Metropolitan Planning Organization
CCTV	Closed-Circuit Television
CFR	Code of Federal Regulation
CIP	Capital Improvement Plan
CMAQ	Congestion Mitigation and Air Quality
CO	Carbon Monoxide
CO_2	Carbon Dioxide
CTS	Corvallis Transit System
CV	Commercial Vehicle
CVO	Commercial Vehicle Operations
CWACT	Cascades West Area Commission on Transportation
CWV	Central Willamette Valley
DFD	Data Flow Diagram
DM	Data Management
DMS	Dynamic Message Sign
DSRC	Dedicated Short Range Communication
EECBG	Energy Efficiency and Conservation Block Grant Program
EIA	Electronic Industries Alliance
EM	Emergency Management
EOC	Emergency Operations Center
FCC	Federal Communications Commission
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
HAR	Highway Advisory Radio
HAZMAT	Hazardous Materials
HOV	High Occupancy Vehicle
ICM	Integrated Corridor Management
IEEE	Institute of Electrical and Electronics Engineers

IEM	Incident and Emergency Management
IGA	Intergovernmental Agreement
IMSS	Incident Management Message Sets
IP	Internet Protocol
ISP	Information Service Provider
ITE	Institute of Transportation Engineers
ITS	Intelligent Transportation System
kbps	Kilobits Per Second
kHz	Kilohertz
LBCC	Linn-Benton Community College
Mbps	Megabits Per Second
MHz	Megahertz
MC	Maintenance and Construction
MCM	Maintenance and Construction Management
MDT	Mobile Data Terminal
MOU	Memorandum of Understanding
MP	Milepost
MS/ETMCC	Message Sets for External Traffic Management Center Communications
MTBF	Mean Time Between Failures
NEMA	National Electronic Manufacturers Association
NTCIP	National Transportation Communication for ITS Protocol
NOx	Nitrogen Oxide
NTD	National Transit Database
NWTOC	Northwest Transportation Operation Center
OCWCOG	Oregon Cascades West Council of Governments
ODOT	Oregon Department of Transportation
OHP	Oregon Highway Plan
OSP	Oregon State Police
OSU	Oregon State University
OTC	Oregon Transportation Commission
OTP	Oregon Transportation Plan
P&W	Portland & Western
PMPP	Point to Multi-Point Protocol
PPP	Point to Point Protocol
PSAP	Public Safety Answering Point
PSpecs	Process Specifications
PSU	Portland State University
PTM	Public Transportation Management
PTZ	Pan-Tilt-Zoom
RS	Recommended Standard
RTP	Regional Transportation Plan
RWIS	Road Weather Information System
SAE	Society of Automotive Engineers
SAFETEA-LU	Safe, Accountable, Flexible, Efficient, Transportation Equity Act: A Legacy for Users
SDC	System Development Charge
SDO	Standards Development Organization
SGR	State of Good Repair

STF	Special Transportation Fund
STIP	Statewide Transportation Improvement Program
STP	Surface Transportation Program
TCIP	Transit Communications Interface Profile
TDM	Transportation Demand Management
TI	Traveler Information
TIA	Telecommunication Industry Association
TIP	Transportation Improvement Program
TIF	Tax Increment Funding
TLE	TripCheck Local Entry
TOC	Transportation Operations Center
TOCS	Transportation Operations Center System
TMDD	Traffic Management Data Dictionary
TMO	Transportation Management and Operations
TSP	Transportation System Plan or Transit Signal Priority
TTIP	TripCheck Traveler Information Portal
UDP	User Datagram Protocol
UHF	Ultra High Frequency
UO	University of Oregon
UP	Union Pacific
U.S. DOT	U.S. Department of Transporation
v/c	Volume-to-Capacity
VDSL	Very high bit-rate Digital Subscriber Line
VII	Vehicle Infrastructure Integration
VMT	Vehicle Miles Traveled
VOC	Volatile Organic Compound
VPN	Virtual Private Network
WAN	Wide Area Network
WPRR	Willamette & Pacific Railroad
XML	eXtensible Markup Language

APPENDIX B

Regional ITS Architecture Assessment Checklist

Regional ITS Architecture Assessment Checklist

Version 3.0 - 9/27/2008

Architecture Name: Central Willamette Valley Regional ITS Architecture

Architecture Location: Central Willamette Valley (Corvallis MPO, Albany, Lebanon)
Architecture State: Oregon
Type of Architecture: Regional
Date Architecture Originally Developed: 2010
Date Architecture Last Updated: -
Reviewer: Central Willamette Valley ITS Steering Committee and DKS Associates
Review Date: October 21, 2010 (checklist updated October 28, 2010)
National Architecture Version: 6.1
Turbo Architecture Version: 5.0
Artifacts Reviewed:

Type	Title	File	URL
ITS Plan	Draft Central Willamette Valley ITS Plan	Draft CWV Implementation Plan.pdf	Final plan will be posted at http://egov.oregon.gov/ODOT/HWY/ITS/its_documents.shtml
Turbo Architecture	Central Willamette Valley Regional ITS Architecture	CWVITS.tbo	Web version of Turbo database will be posted at http://egov.oregon.gov/ODOT/HWY/ITS/its_documents.shtml

Overall Comments:

Answering Questions:
Each lettered question is essentially a yes/no question but there are places where we'll need to make a determination of how adequate or complete a certain item is covered in an architecture. With that in mind, questions can be answered Mostly if the reviewers determine that an architecture is close to being complete in a particular area or Partly if they appear to have attempted to address the criteria but still need to put additional effort before really getting credit. Unknown may be used if the reviewers cannot tell from the documentation supplied whether an architecture satisfies the criteria – this may reflect poorly on the scoring. Not Applicable would be an appropriate answer if an item truly doesn't apply to that architecture – there are no adjacent regions, for instance. Not Applicable would not be reflected in the scoring either positively or negatively.

Check Scores

Assigning Scores:
Each numbered criteria area is assigned an overall score of Purple (good), Orange (fair-to-middling), or Black (bad). A numerical method can be used to assign values to each Yes/Mostly/Partly/No answer and then average them out to come up with the criteria score. A more subjective method is to assign the score directly based on the reviewers' judgment – the numerical method may be used to suggest the score and then changed by the reviewers if there are extenuating circumstances. In general, to get a Purple score an architecture needs to have YES with perhaps some MOSTLYs in the individual questions.

1. Architecture Scope and Region Description		☑ Turbo Used Purple
General Architecture Scope and Region Description Comments Here		
Question	**Answer**	**Comments**
a. Is the region defined geographically? Have boundaries been established such as counties, municipal boundaries, metropolitan areas, statewide, etc.?	Yes	Corvallis MPO, City of Albany, City of Lebanon, and portions of Benton and Linn Counties (Figure 1-1 in ITS Plan)
b. Has a timeframe for the architecture been defined? (For example, 5 or 10 years into the future, or the TIP/STIP or other Capital Plan planning period)?	Yes	10 Years
c. Has the scope of the regional architecture been defined (i.e. the range of services, institutions, or jurisdictions)? Does the scope seem appropriate given the circumstances?	Yes	ITS Service Areas: • Traffic management and operations • Public transportation management • Traveler information • Incident and emergency management • Maintenance and construction management • Data management
d. Are adjacent/overlapping ITS architectures identified?	Yes	

2. Stakeholders		☑ Turbo Used Purple
General Stakeholders Comments Here		
Question	**Answer**	**Comments**
a. Are the stakeholders identified in sufficient detail to understand who the players are including agency/department name and jurisdiction?	Yes	Primary stakeholders: • Transportation agencies • Transit agencies Expanded stakeholders: • Public safety agencies • Other public agencies • Private sector organizations
b. Is the range of stakeholders commensurate with the defined scope of the regional architecture?	Yes	
c. Were the key stakeholders involved in the architecture development process?	Yes	
d. Was a champion established either individual or group, to lead the development of the architecture?	Yes	Corvallis Area MPO (Ali Bonakdar)

3. System Inventory

Turbo Used | Purple

General Comments:

Question	Answer	Comments
a. Has a system inventory been defined that includes a list of applicable regional system elements along with descriptions and assigned stakeholders?	Yes	
b. Have the National ITS Architecture subsystems and terminators been correctly linked to regional elements?	Yes	
c. Does the inventory take into account adjacent regional ITS architectures such as neighboring districts or states.	Yes	Elements from the Oregon statewide architecture that interface with the region have been included in the regional architecture.
d. (Optional) Does the inventory appropriately map regionally unique elements to user-defined entities that are described in sufficient detail to understand their function?	Not Applicable	

4. Needs and Services

Turbo Used | Purple

General Needs and Services Comments Here

Question	Answer	Comments
a. Are transportation needs for the region defined and described? (This could be by reference to another document, e.g. Strategic Plan.)	Yes	Needs were identified through stakeholder interviews and input from steering committee meetings.
b. Are transportation services, derived from the needs, defined and described?	Yes	
c. Are the services adequately represented in the regional architecture? (i.e. Are services(market packages) identified and linked to inventory elements?)	Yes	

5. Operational Concept

Turbo Used | Purple

General Operational Concept Comments Here

Question	Answer	Comments
a. Has an architecture operational concept been described in sufficient detail to understand the roles and responsibilities of the primary stakeholders in the region in the delivery of ITS services?	Yes	
b. Are the roles and responsibilities of the operational concept appropriately reflected in the architecture?	Yes	

6. Functional Requirements

Turbo Used: ☐ | Black

No functional requirement is assigned to any of the element in the architecture.

Question	Answer	Comments
a. Have high-level functions been defined for each regionally significant element in the architecture?	No	The Central Willamette Valley Steering Committee has decided to identify functional requirements at the project level for regionally significant systems. This is consistent with the other five regional architectures in Oregon and the Oregon statewide architecture.
b. Are the requirements unambiguously stated in terms of shall statements or similar language such that the required functions of each system can be easily understood?	No	

7. Interfaces/ Information Flows

Turbo Used: ☑ | Purple

General Interfaces/ Information Flows Comments Here

Question	Answer	Comments
a. Are information flows defined between elements with descriptions of the information exchanged and their deployment status (existing, planned, etc)?	Yes	
b. Does the architecture include appropriate linkages to elements outside the region or to elements from overlapping or adjacent regional architectures?	Yes	Linkages to statewide systems have been included in the architecture.
c. Does the architecture address the significant integration opportunities implied by the inventory, needs/services, and the operational concept?	Yes	
d. (Optional) Does the architecture consider regionally unique interfaces (defined via user-defined flows) and are they described in sufficient detail to understand their purpose?	Not Applicable	

8. Project Sequencing

Turbo Used: ☐ | Purple

General Project Sequencing Comments Here

Question	Answer	Comments
a. Have projects been defined to include the agencies involved, timeframe, and how each is tied to the regional architecture?	Mostly	A specific timeframe, other than higher or lower priority, has not been identified since implementation is dependent on available funding.
b. Have the relationships to the regional architecture and the interdependencies between projects been defined?	Yes	
c. Has an initial sequencing of currently defined projects been established?	Yes	Higher priority projects have been identified. Projects will be implemented as funding becomes available.

d. (Optional) Have opportunities to coordinate implementation schedules with other transportation improvements been investigated?	Yes	The ITS Plan will be incorporated into planning and funding cycles on an agency-by-agency basis.

9. Agreements

Turbo Used | Orange

General Agreements Comments Here

Question	Answer	Comments
a. Have existing interagency agreements in the region been identified/considered by the regional architecture?	Partly	Many agreements exist but are not documented in the architecture.
b. Have future agreements been identified to implement the regional architecture and support project interoperability?	Partly	Agreements will need to be formalized as projects are implemented.

10. Standards Identification

Turbo Used | Purple

General Standards Identification Comments Here

Question	Answer	Comments
a. Has a plan been documented for how ITS standards will be considered, selected, and/or applied across the region?	Yes	
b. Has a listing of ITS standards been generated and tailored that are applicable to the region and projects coming out of the regional ITS architecture?	Yes	
c. Are these standards associated with specific interfaces (information flows or interconnects)?	Yes	
d. Do the important/relevant ITS standards appear to be identified?	Yes	

11. Using the Regional ITS Architecture

Turbo Used | Orange

General Using the Regional ITS Architecture Comments Here

Question	Answer	Comments
a. Is the architecture output presented in a way that is understandable to a variety of audiences, including the public and decision-makers?	Mostly	
b. Is there a detailed description for incorporating and using the regional ITS architecture in the regional and/or statewide planning process?	Partly	
c. Has a regional stakeholder organization or committee been identified to monitor and manage the use of the architecture in the planning process?	Yes	Corvallis Area MPO, the cities, and the counties will lead this charge on an agency-by-agency basis.

d. Is the relationship between the regional ITS architecture and the project implementation process well defined?	Partly	

12. Maintenance Plan

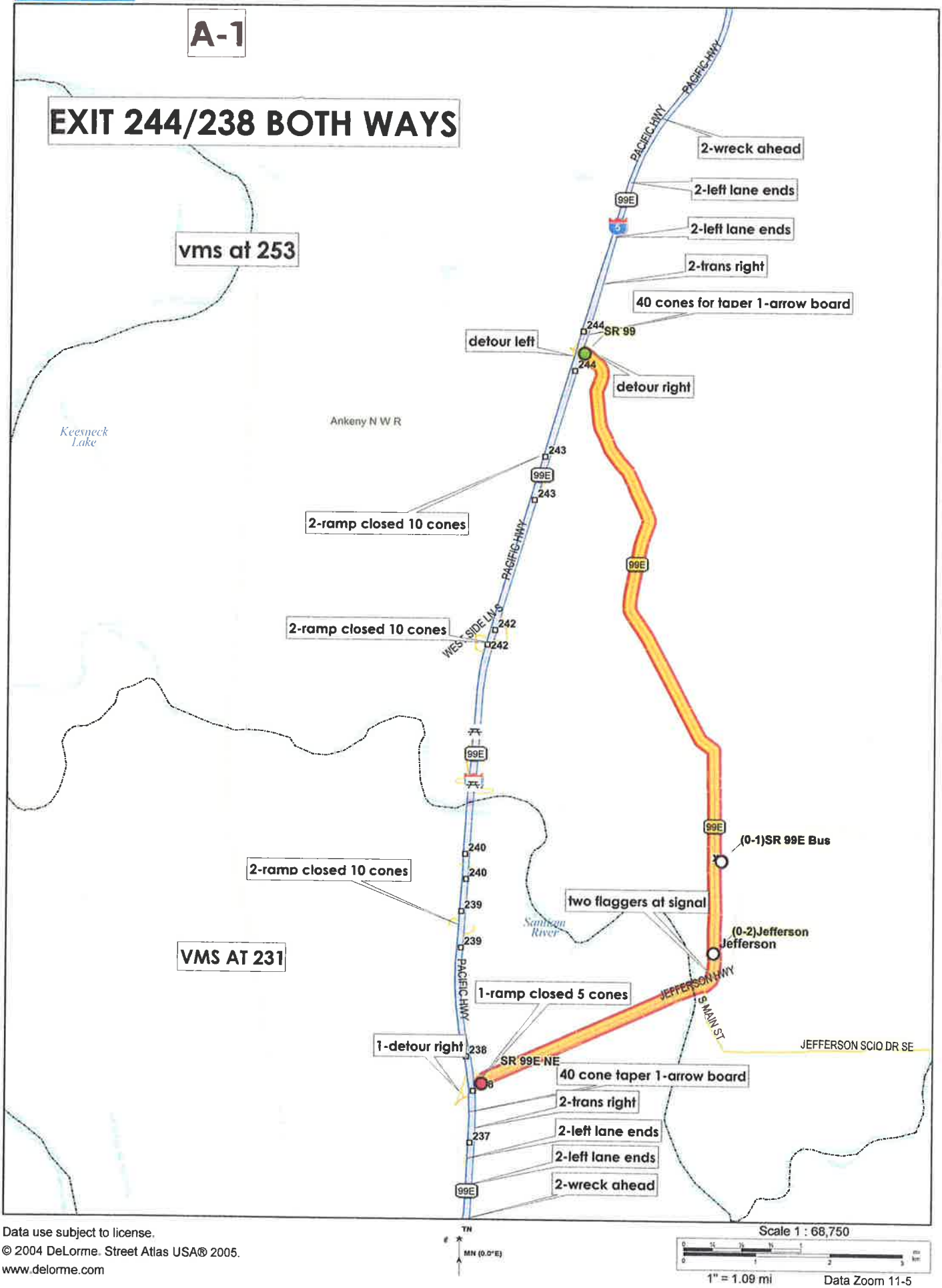
Turbo Used | Purple

General Maintenance Plan Comments Here

Question	Answer	Comments
a. Is there a specific documented plan for maintaining the architecture, including how changes are evaluated, who is involved, what configuration control processes are in place, and when/how often updates are made?	Yes	
b. Have the various reasons for updating the architecture been addressed (project updates, new requirements or initiatives, etc.)?	Yes	
c. Is there a plan for communicating changes in the architecture to stakeholders?		
d. Have the responsibilities of the various stakeholders or groups been well defined with respect to architecture maintenance?	Yes	
e. Is configuration control being used for the architecture outputs (e.g. version numbering schemes, naming conventions, date/time stamps, etc.)?	Yes	

APPENDIX C

Incident Detour Routes



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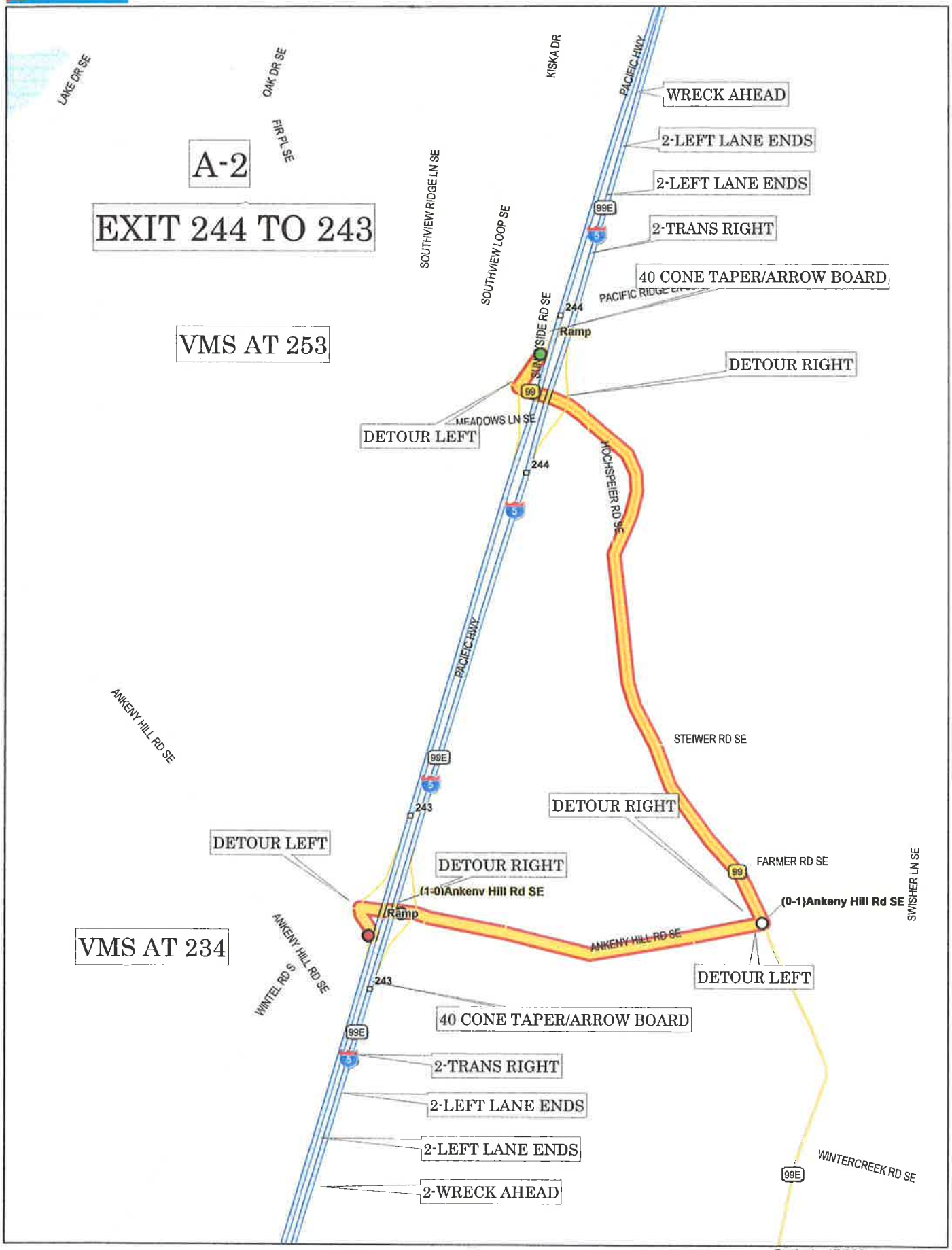

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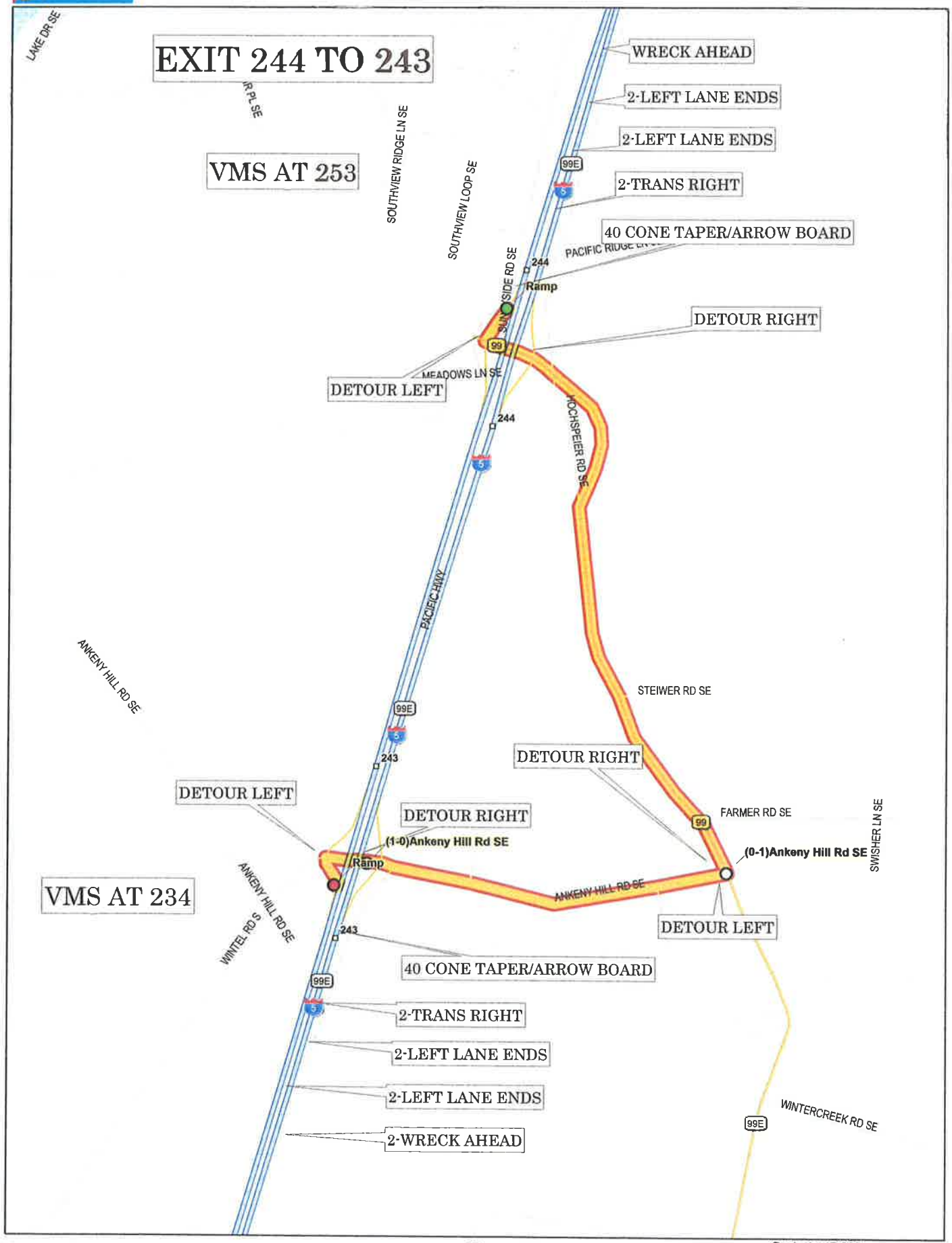

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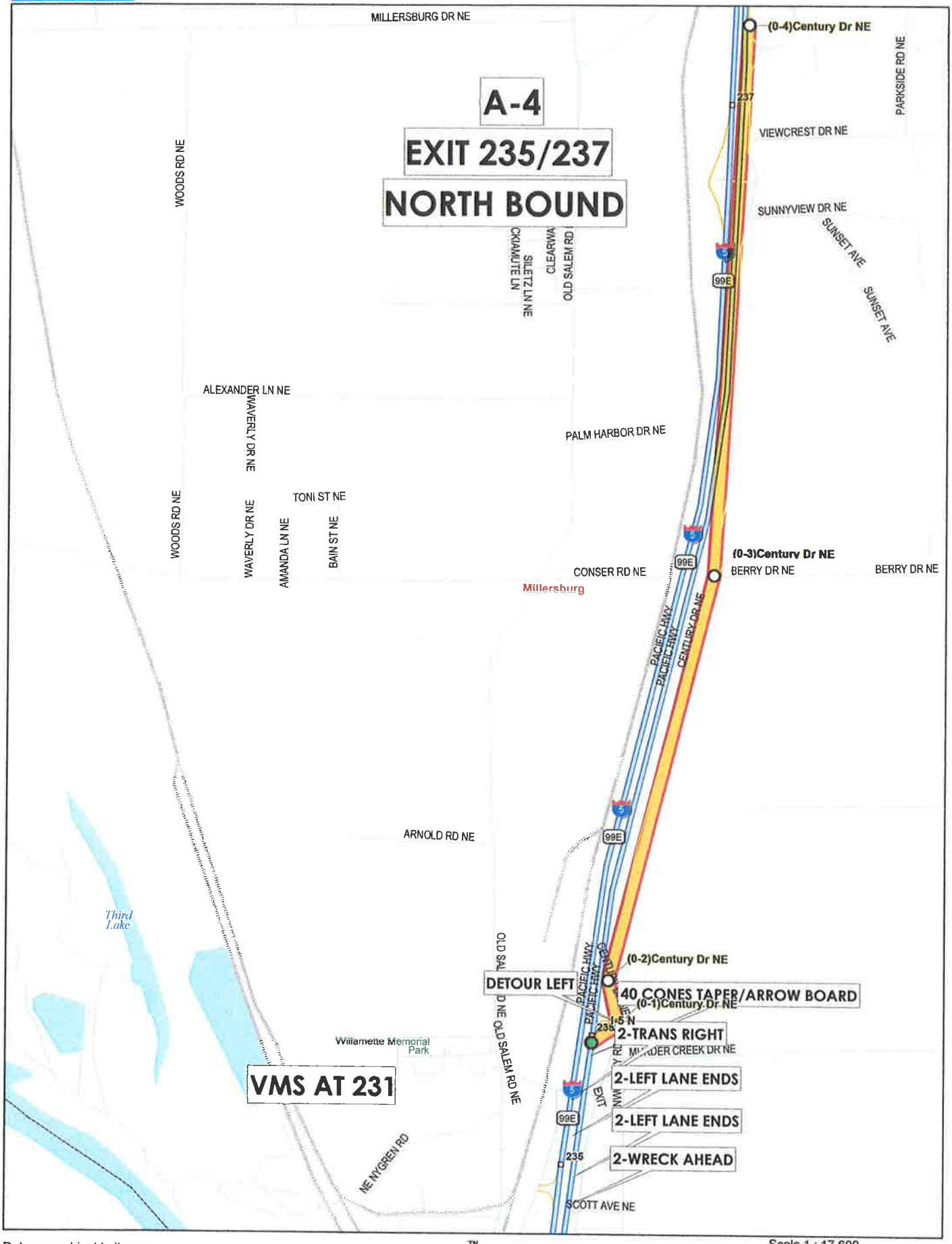

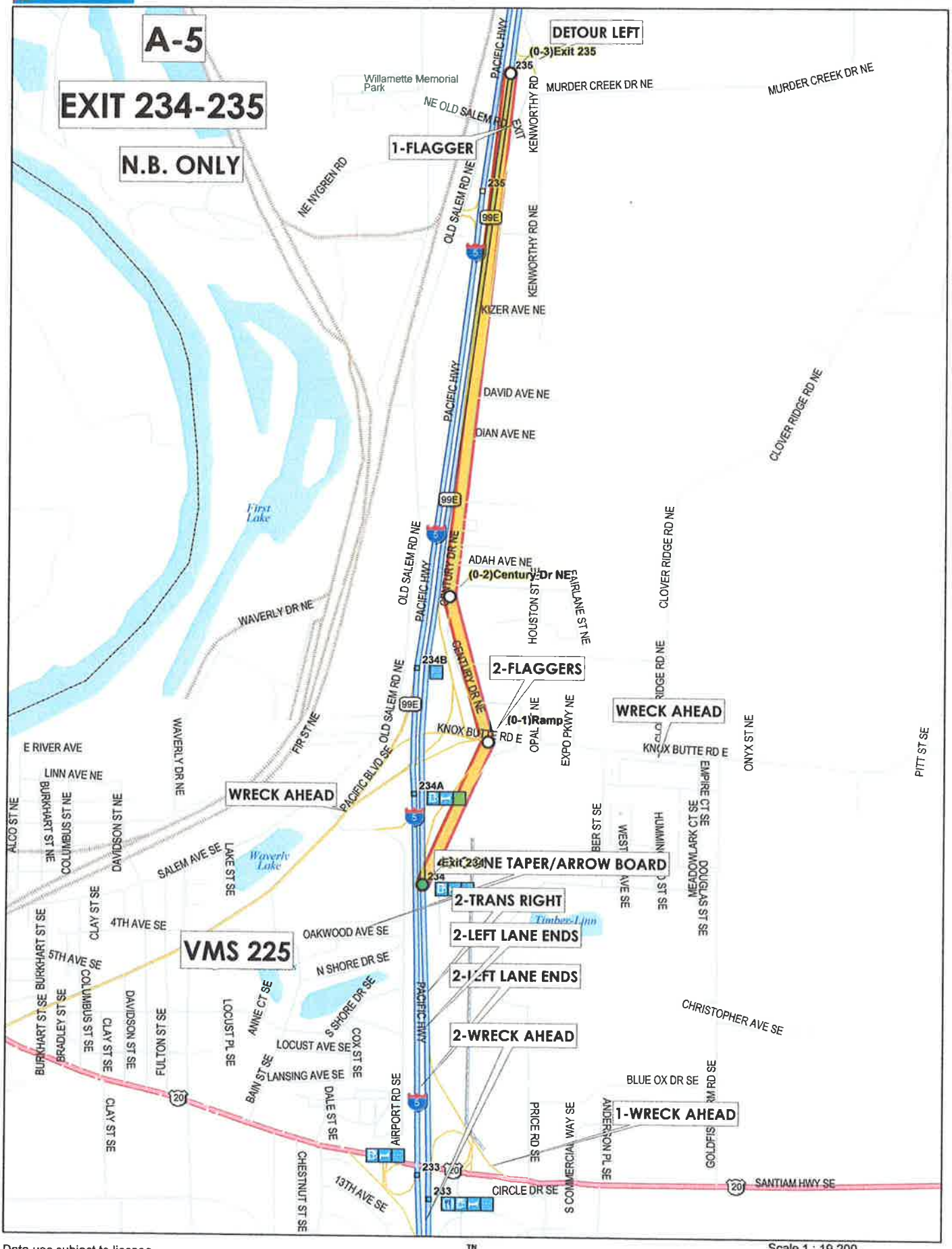

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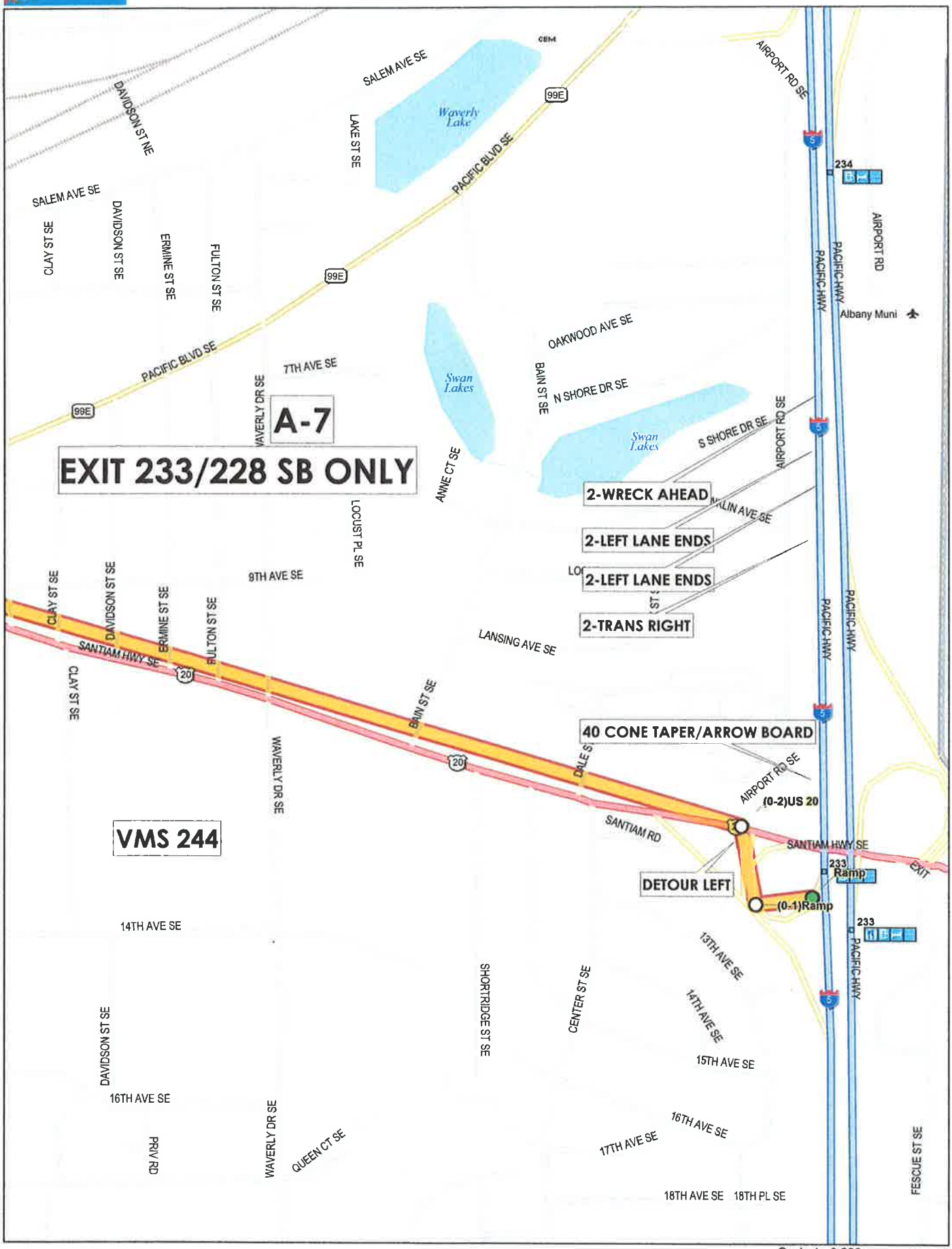

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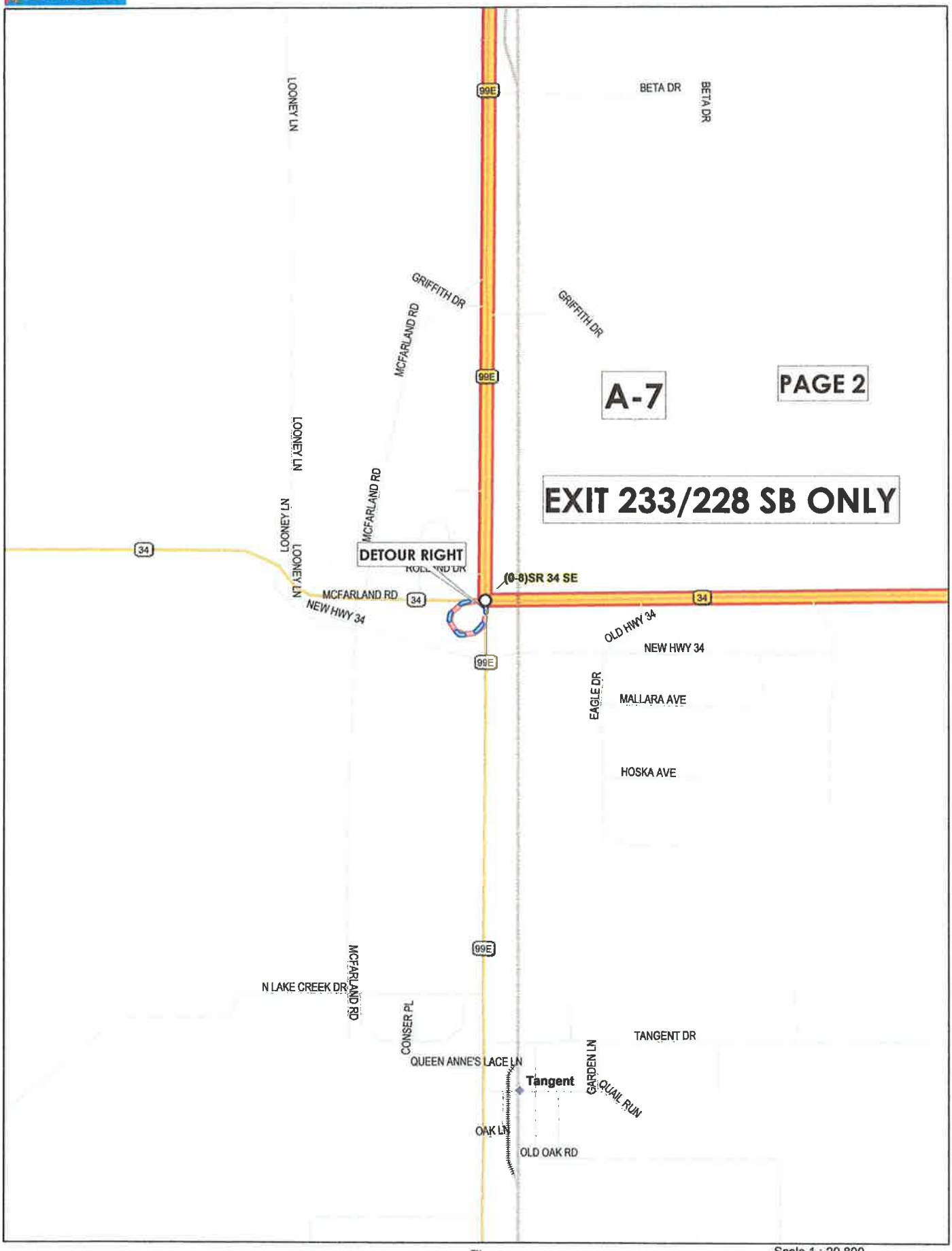

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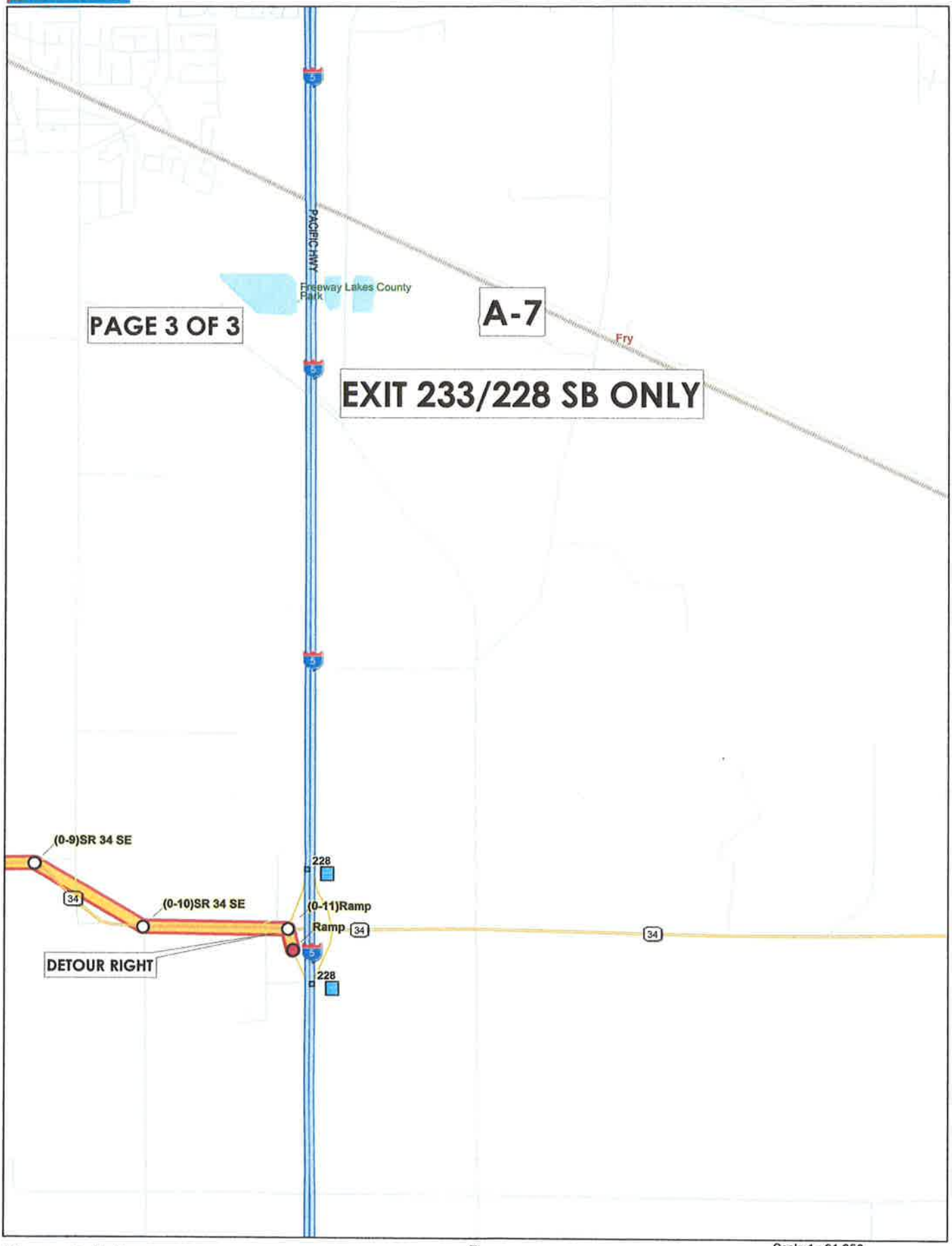

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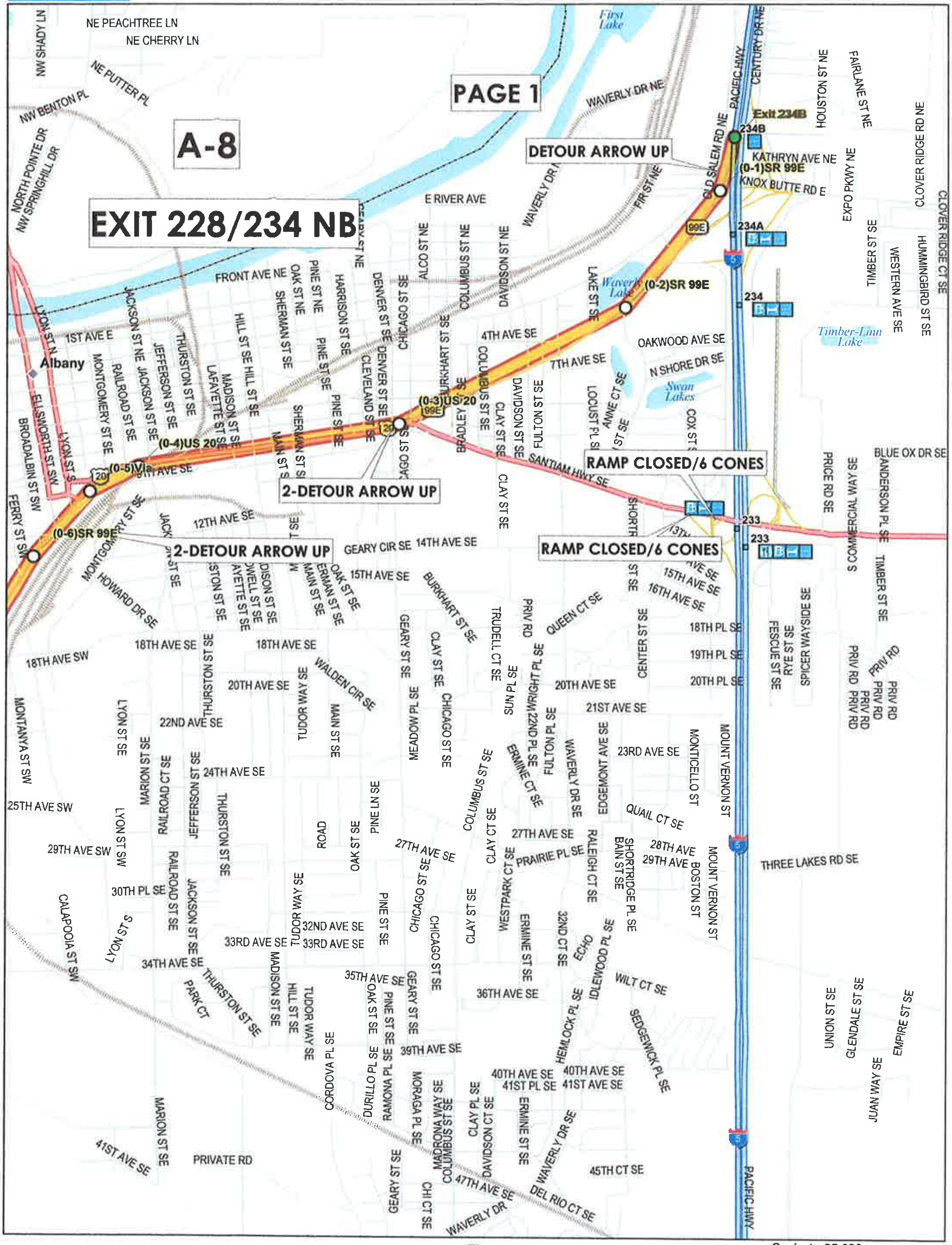

Data use subject to license.

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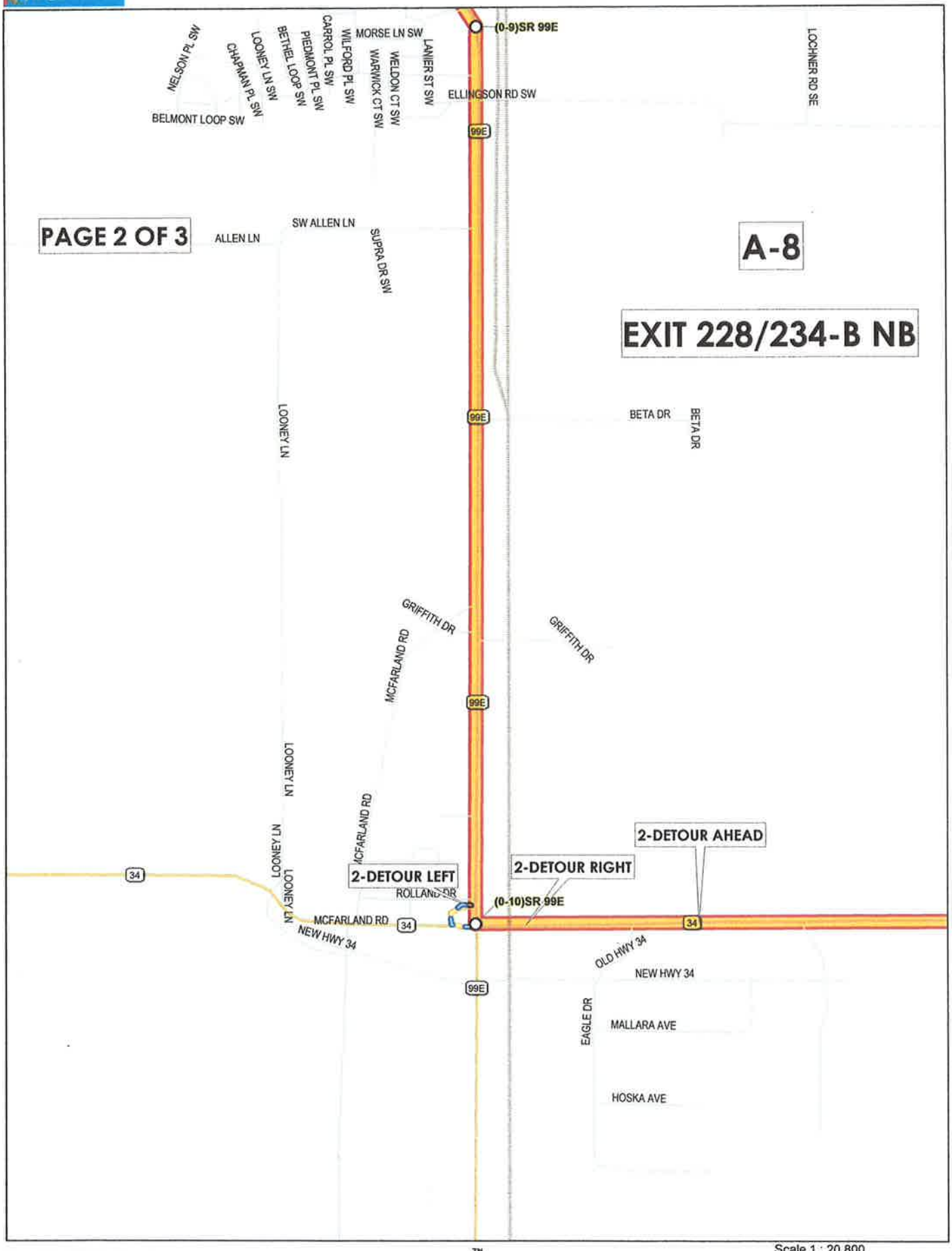

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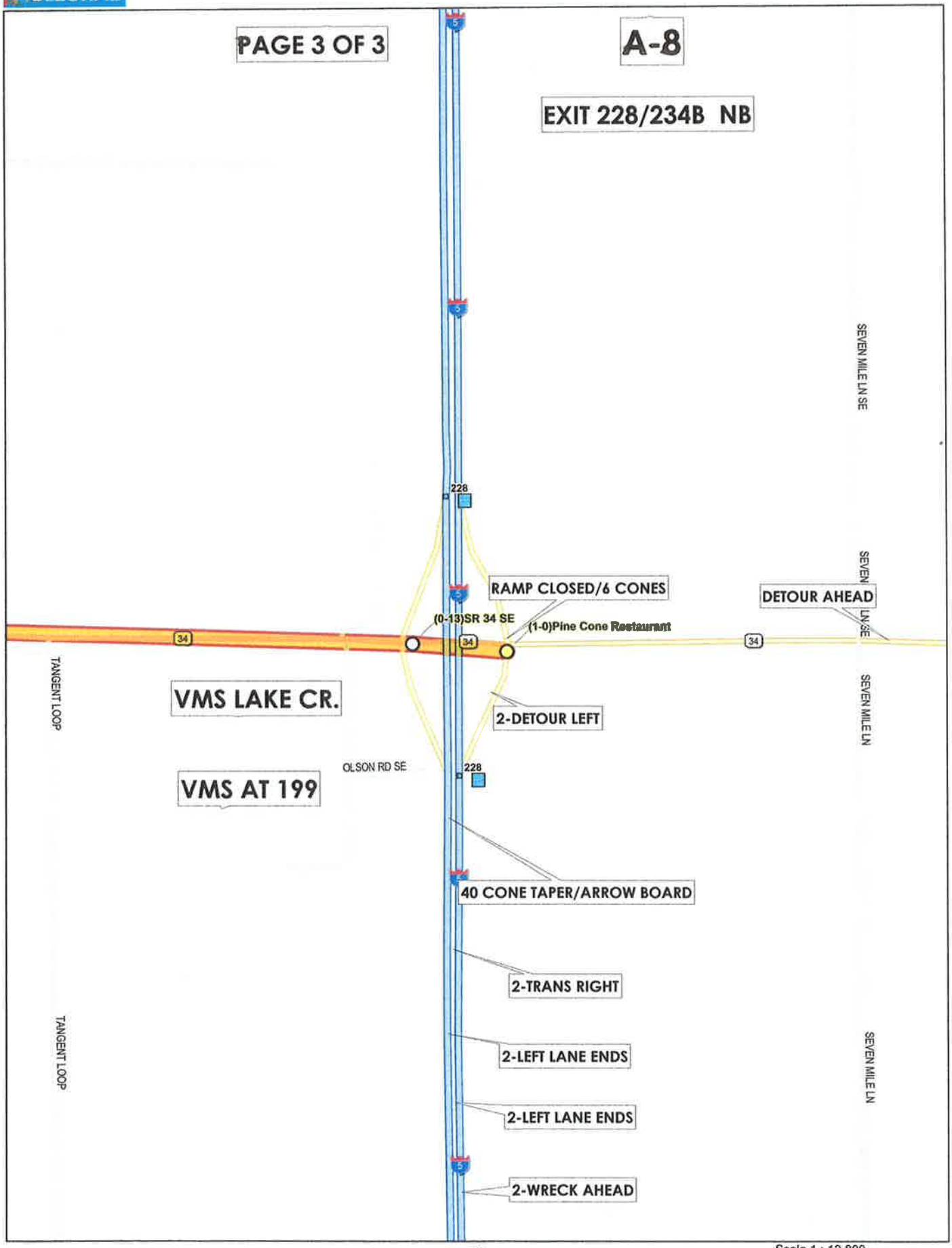

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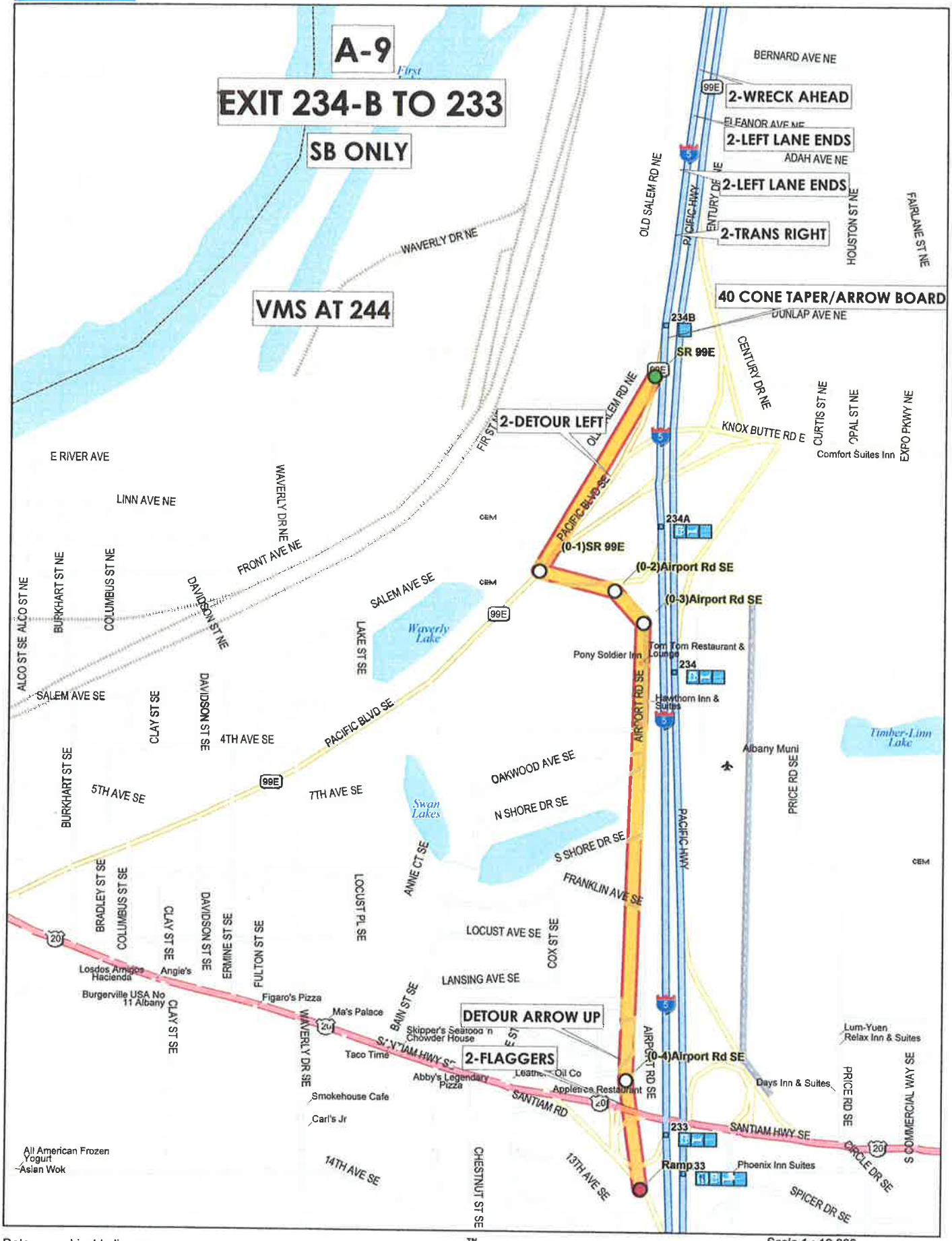

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PAGE 1 OF 4

A-10

EXIT 228 TO 216

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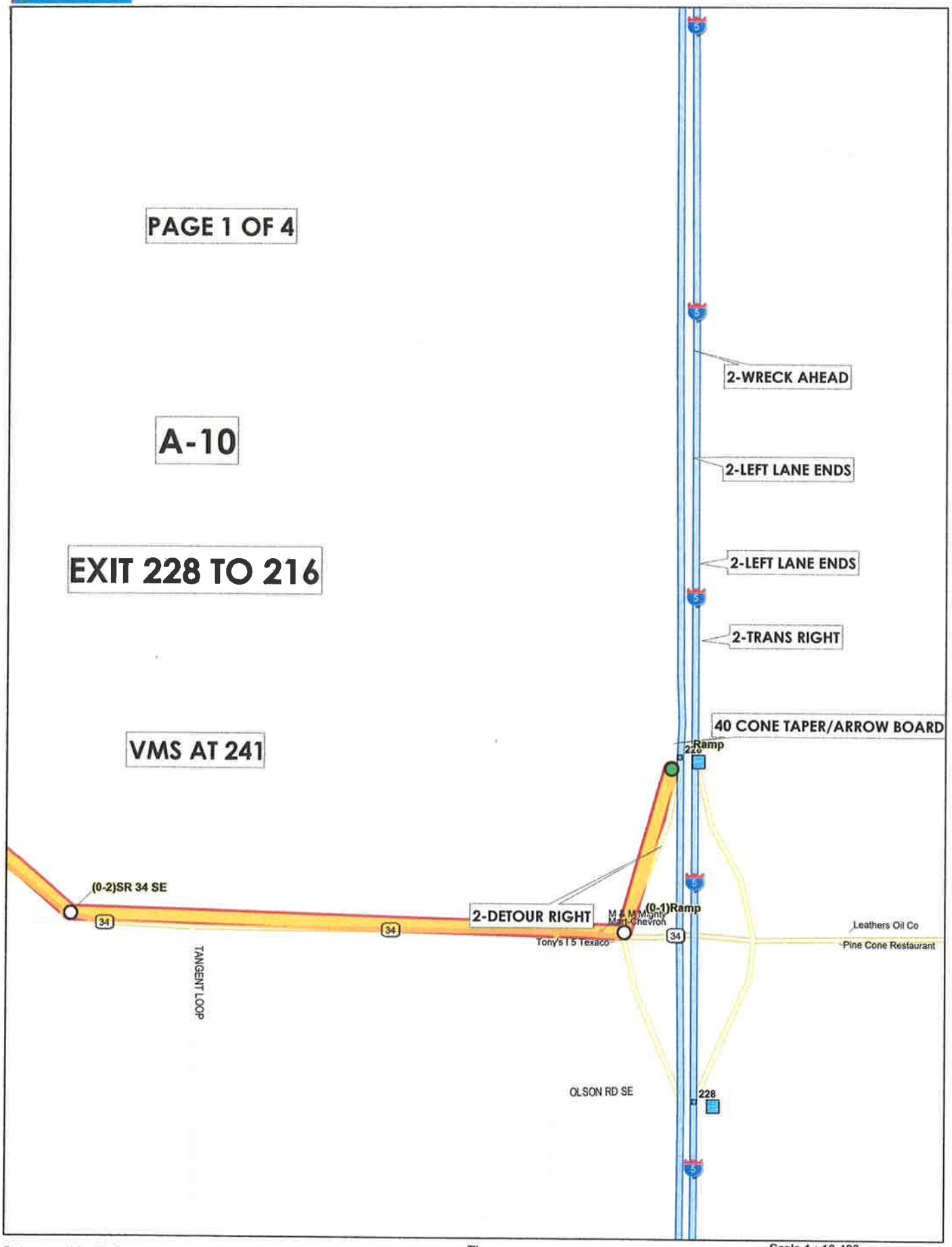

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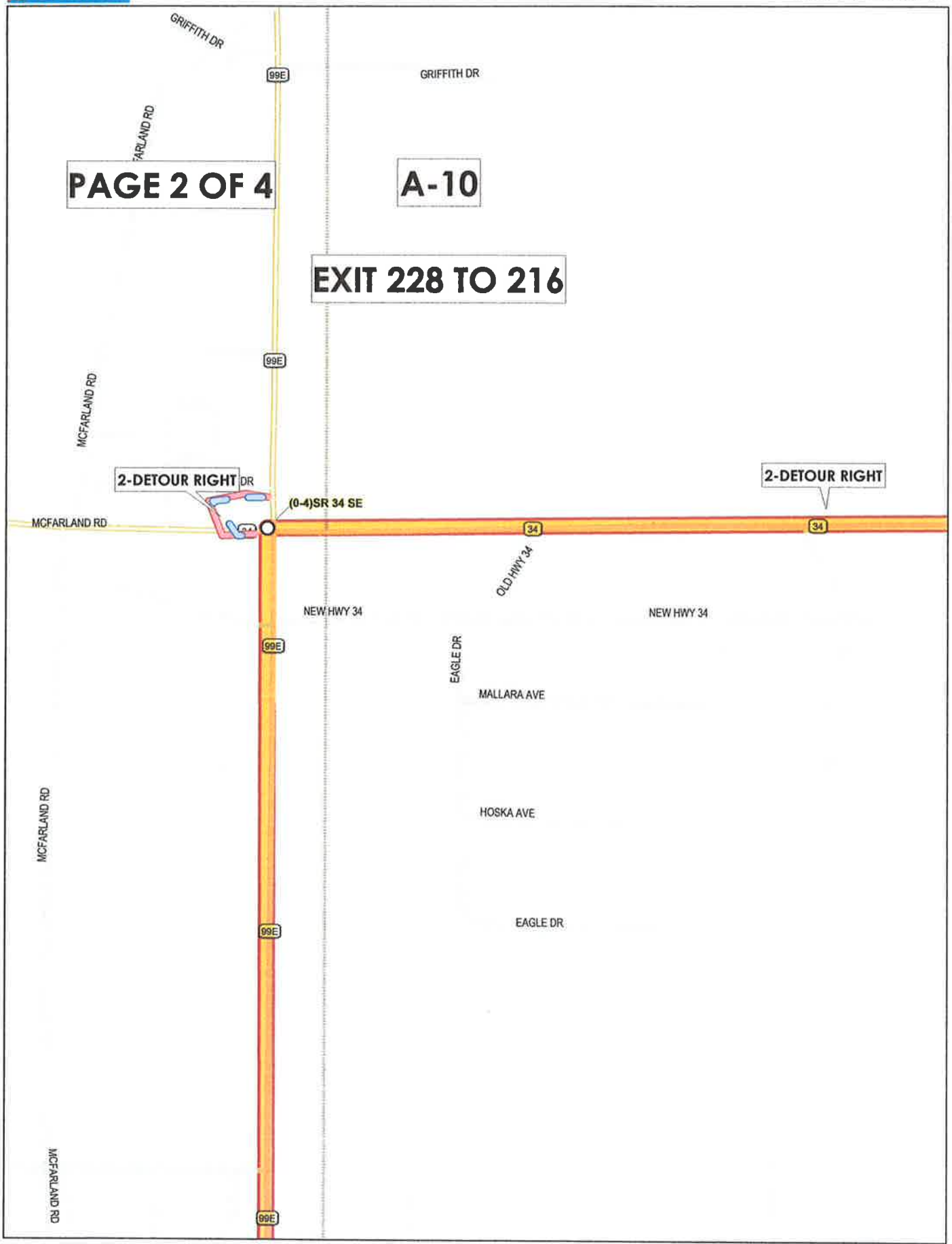

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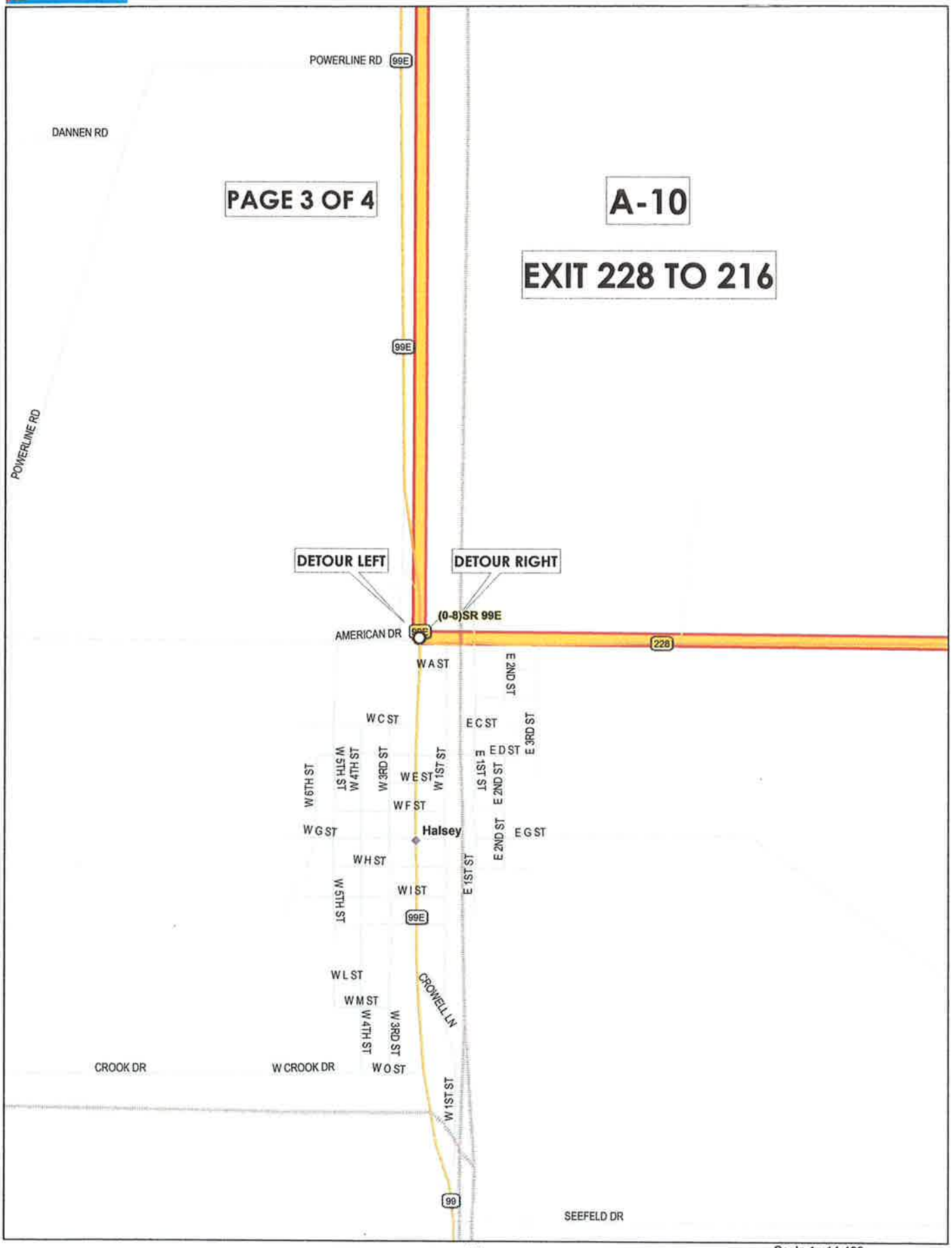

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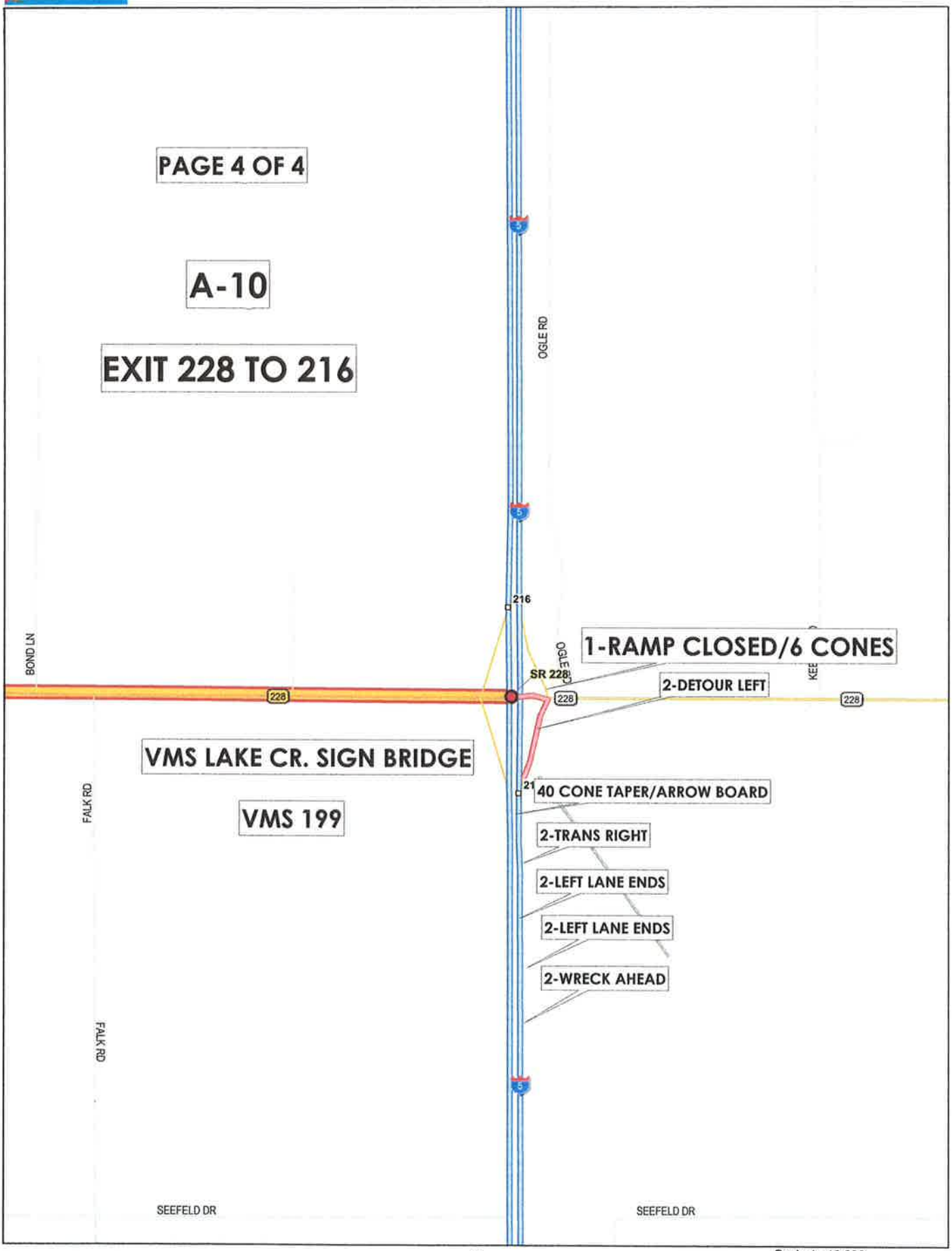

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APPENDIX D

Turbo Architecture Summary Report

Architecture Summary

12/15/2010 5:29:02PM

Architecture Name	Architecture Description	Status

Central Willamette Valley Regional ITS Architecture (Region)

Description: Developed via phone interviews and meetings with stakeholders and the Central Willamette Valley ITS Steering Committee.
Timeframe: 2010
Geographic Scope: Central Willamette Valley within Benton and Linn Counties, including the Cities of Albany, Corvallis, Lebanon, Philomath, Adair Village, and Millersburg.
Service Scope: Traffic Management and Operations
Public Transportation Management
Traveler Information
Data Management
Incident and Emergency Management
Developer: DKS Associates
Maintainer: CAMPO
Version: 2010-1
Revision Date: 15-Jul-2010

Status Value Legend

Name	Description
Existing	
Existing/Planned	
Planned	
Not Planned	

APPENDIX E

Turbo Architecture Stakeholders Report

Stakeholders Report

12/1/2010 2:24:52PM

Stakeholders for Region Central Willamette Valley Regional ITS Architecture

Stakeholder

Albany Transit System

Description: The Albany Transit System (ATS) provides fixed route and demand response (Albany Call-a-Ride) transit service in Albany. ATS also operates the Linn-Benton Loop, which is a regional transit route that provides transfer points with the Albany Transit System, Corvallis Transit System, OSU Shuttle, and Linn Shuttle.

Associated Element: ATS Fixed Route Buses
Associated Element: ATS Transit Operations and Dispatch Center
Associated Element: ATS Call-a-Ride Vehicles
Associated Element: ATS Field Devices
Associated Element: ATS Security Surveillance
Associated Element: Linn-Benton Loop Fixed Route Buses

Benton County

Description:
Associated Element: Benton County Traffic Signals and Field Devices
Associated Element: Benton County Traffic Operations Center

Benton County Rural and Special Transportation

Description: Provides demand response transit service in Benton County as well as rural fixed route transit service for the general public with route deviations for seniors and people with disabilities. Service includes:
*Benton County Dial-a-Bus (demand response)
*Corvallis-Albany Connection (demand response)
*Coast to Valley Express (fixed route with deviations): service between Corvallis and Newport
*99 Express (fixed route with deviations): rural transit service for Monroe and Adair Village with routes for Adair Village to Corvallis, Monroe to Corvallis, Monroe to Junction City, and Corvallis Municipal Airport to Corvallis

Benton County also supports other specialty demand response transportation services (e.g. Senior Companion Program, Cascades West Ride Line).

Associated Element: Benton County Public Transportation Vehicles
Associated Element: Benton County Transit Operations and Dispatch Center

Cascades West Area Commission on Transportation

Description: The Cascades West Area Commission on Transportation (CWACT) provides a forum for local governments to communicate and collaborate on local, regional and state transportation issues. The CWACT is chartered by the Oregon Transportation Commission (OTC) as an advisory body and provides input, advice and recommendations to the OTC and ODOT.

All local governments within Benton, Lincoln and Linn Counties are eligible to appoint an elected representative to serve on the CWACT. In addition, each County may appoint two private sector representatives to the CWACT. The ODOT Area Manager also serves as a member of the CWACT. In addition to these voting members, the CWACT has a number of non-voting ex officio members (see bylaws).

A major role of the CWACT is to solicit public input on transportation needs and to provide recommendations to ODOT and the OTC on project priorities for the Statewide Transportation Improvement Program (STIP). The CWACT provides input on state transportation plans, policies and programs and maintains an inventory of transportation system improvement needs.

City and Rural Fire and Life Safety Departments

Description: This stakeholder includes the following fire services: Adair Rural Fire & Rescue, Albany Fire Department, Corvallis Fire Department, Corvallis Rural Fire Protection District, Lebanon Fire Department, Philomath Fire & Rescue, and Tangent Rural Fire Protection District. The Corvallis Fire Department provides ambulance services for Benton County and portions of Linn and Lincoln Counties. The Albany Fire Department also provides ambulance services.

Associated Element: City and Rural Fire and Life Safety Vehicles

City of Albany

Description:
Associated Element: City of Albany Traffic Signals and Field Devices
Associated Element: City of Albany Traffic Operations Center

City of Corvallis

Description:
Associated Element: City of Corvallis Traffic Signals and Field Devices
Associated Element: City of Corvallis Traffic Operations Center
Associated Element: Corvallis Government Television

City of Lebanon

Description: The City of Lebanon operates Lebanon Dial-a-Bus and traffic signals in the City of Lebanon.
Associated Element: City of Lebanon Traffic Signals and Field Devices
Associated Element: City of Lebanon Traffic Operations Center
Associated Element: City of Lebanon Dial-a-Bus Vehicles
Associated Element: City of Lebanon Transit Operations and Dispatch Center

City Police Departments

Description: This stakeholder includes the following City Police Departments: Adair Village, Albany, Corvallis, Lebanon, and Philomath.

Associated Element: City Police Vehicles

Commercial Emergency Medical Service Providers

Description: This stakeholder includes commercial companies that provide ambulance and medical response services in the Central Willamette Valley area.

Associated Element: Commercial Ambulances

Commercial HazMat Clean-Up Operators

Description: This stakeholder includes any commercial operators that provide hazardous material (hazmat) clean-up services related to roadway incidents.

Associated Element: Commercial HazMat Vehicles

Commercial Information Service Providers

Description:
Associated Element: Commercial Information Service Providers

Commercial Salvage and Towing Operators

Stakeholder

Description: This stakeholder includes any commercial operators that provide salvage or towing operations for roadway incidents. This stakeholder is also included in the Oregon Statewide Architecture.
Associated Element: Commercial Salvage and Towing Vehicles

Commercial Transportation Service Providers
Description: This stakeholder includes all commercial companies (e.g. Greyhound, Valley Retriever, Hut Shuttle) that provide transportation services within and in and out of the Central Willamette Valley. This includes buses, shuttles, taxis, limousines, etc.
Associated Element: Commercial Transit Vehicles

Corvallis Area Metropolitan Planning Organization
Description: The Corvallis Area Metropolitan Planning Organization (CAMPO) includes the cities of Corvallis, Philomath, Adair Village and the densely populated portions of Benton County adjacent to those cities.

Corvallis Transit System
Description: The Corvallis Transit System (CTS) provides transit service in and between Corvallis and Philomath. CTS operates the Philomath Connection through a contract with the City of Philomath. Connections are also available to the OSU Shuttle, Albany via the Linn-Benton Loop, Newport via the Coast-to-Valley Express, and Monroe and Adair Village via the 99 Express.
Associated Element: CTS Fixed Route Buses
Associated Element: CTS Transit Operations and Dispatch Center
Associated Element: CTS Field Devices
Associated Element: CTS Security Surveillance
Associated Element: Philomath Connection Fixed Route Buses

County Offices of Emergency Management
Description: This stakeholder includes Benton County Emergency Management and Linn County Emergency Management.
Associated Element: County Emergency Operations Centers

County Sheriff Offices
Description: This includes the sheriff's offices for Benton County and Linn County.
Associated Element: County Sheriff Vehicles

Google
Description:
Associated Element: Google Transit

Heavy Rail Service Providers
Description: Includes Amtrak, Willamette & Pacific Railroad (WPRR), Burlington Northern & Santa Fe (BNSF) Railroad, Union Pacific (UP) Railroad, Portland & Western (P&W) Railroad, and Albany & Eastern (A&E) Railroad
Associated Element: Amtrak Trains
Associated Element: Heavy Rail Operations Centers
Associated Element: Heavy Rail Wayside Equipment

Linn Shuttle
Description: The Linn Shuttle provides transit service between Sweet Home, Lebanon, and Albany. In Albany riders can connect to the Albany Transit System or to the Corvallis Transit System and the OSU Shuttle via the Linn-Benton Loop.

The Linn Shuttle also operates the Sweet Home Dial-a-Bus, which is outside the geographic scope of this architecture.
Associated Element: Linn Shuttle Fixed Route Buses
Associated Element: Linn Shuttle Transit Operations and Dispatch Center
Associated Element: Linn Shuttle Security Surveillance
Associated Element: Linn Shuttle Field Devices

Mayday Service Providers
Description: Mayday service providers (e.g. GM's OnStar, AAA) provide traveler assistance through an interface in personal vehicles.
Associated Element: Mayday Service Centers

Media
Description: This stakeholder includes commercial media companies who disseminate traveler information to the public.
Associated Element: Media

Oregon Cascades West Council of Governments
Description: Oregon Cascades West Council of Governments (OCWCOG) is an entity created in the mid-1960s by local governments within Linn, Benton, and Lincoln counties under Oregon Law (ORS 190.010). On behalf of the member governments the agency carries out a variety of local, state and federal programs.

The agency is governed by a Board of Directors with one representative from each member government. Participation is voluntary. The vast majority of funding is provided by way of contracts to operate specific services. The COG is not a taxing authority.

Current services include:
Senior citizen services
Services for persons with long-term disabilities
Community planning and development
Economic development
Business development lending
Transportation programs and planning
Technology services

Oregon Department of Transportation
Description: In the Central Willamette Valley stakeholders from the Oregon Department of Transportation (ODOT) primarily include the ITS Unit, Region 2, and District 4.
Associated Element: ODOT Incident Response Vehicles
Associated Element: ODOT Traffic Signals and Field Devices
Associated Element: ODOT Region 2 Transportation Operations Center
Associated Element: TripCheck System
Associated Element: ODOT Emergency Operations Centers

Oregon Office of Emergency Management

Stakeholder

Description: The purpose of the Office of Emergency Management (OEM) is to execute the Governor's responsibilities to maintain an emergency services system as prescribed in ORS 401 by planning, preparing and providing for the prevention, mitigation and management of emergencies or disasters that present a threat to the lives and property of citizens of and visitors to the State of Oregon.

Oregon State Police

Description: Oregon State Police (OSP) is the state police agency.
Associated Element: Oregon State Police Dispatch Center
Associated Element: Oregon State Police Vehicles

Oregon State University

Description: Oregon State University (OSU) operates parking garages/areas and the OSU Shuttle.
Associated Element: OSU Parking Management
Associated Element: OSU Shuttle Fixed Route Buses
Associated Element: OSU Shuttle Transit Operations and Dispatch Center
Associated Element: OSU Shuttle Field Devices

Other Counties and Cities in Central Willamette Valley

Description: This includes the following counties or cities in the Central Willamette Valley: Linn County and the Cities of Philomath, Adair Village, and Millersburg

These agencies do not operate or maintain any traffic signals or electronic roadside devices. ODOT, Benton County, and the Cities of Albany, Corvallis, and Lebanon operate and maintain the traffic signals and electronic roadside devices in the region.
Associated Element: Other Counties and Cities Traffic Operations Center

Other Emergency Management Services

Description: This stakeholder includes other agencies or companies that contribute to emergency management in the Central Willamette Valley area. Examples include hospitals, the Red Cross, and emergency shelter sites (e.g. schools and churches). Regional hospitals include Good Samaratin Regional Hospital, Samaritan Albany General Hospital, and Samaritan Lebanon Community Hospital.
Associated Element: Other Emergency Management Operations

Public Safety Dispatch Agencies

Description: This stakeholder includes the following agencies that do 911 call-taking and/or dispatch: Corvallis Regional Communications Center, Linn County Sheriff's Office, Albany Police Department, and Lebanon Police Department.

A Public Safety Answering Point (PSAP) is responsible for 911 call-taking.

The Corvallis Regional Communications Center (CRCC) is the PSAP for Benton County, including the Corvallis, Philomath, and Adair Village areas. They provide dispatch services for all Benton County emergency service providers.

The Linn County Sheriff's Office is the PSAP for Linn County. They provide dispatch services for Linn County emergency service providers except for the following agencies who provide their own dispatch services:
-Albany Police Department
-Lebanon Police Department
-Sweet Home Police Department (outside geographic scope of this architecture)
Associated Element: Public Safety Dispatch Centers
Associated Element: CAD Message Broker

Regional Transportation Agencies

Description: This stakeholder group includes the regional agencies that manage and/or operate the transportation system or provide public transportation services.

Stakeholders in this group:
City of Corvallis
City of Albany
City of Lebanon
Other Counties and Cities in Central Willamette Valley
Corvallis Transit System
Albany Transit System
Oregon Department of Transportation
Oregon State University
Oregon Cascades West Council of Governments
Corvallis Area Metropolitan Planning Organization
Linn Shuttle
Benton County Rural and Special Transportation
Benton County
Cascades West Area Commission on Transportation
Associated Element: Public Agency Websites and Phone Systems
Associated Element: Data Warehouse
Associated Element: Data Mart
Associated Element: Ridesharing System

Special Event Promoters

Description: Includes Linn County Fair and Expo, Benton County Fairgrounds, and Oregon State University. These promotors regularly hold large events that impact traffic and are locations that could potentially use ITS and share infrastructure.
Associated Element: Special Event Promoters
Associated Element: Special Event Promoters Field Devices

Transportation Maintenance and Construction Agencies

Description: This stakeholder group includes all public transportation management agencies who provide maintenance and construction services on or along roadways.

Stakeholder

Stakeholders in this group:

City of Corvallis
City of Albany
City of Lebanon
Other Counties and Cities in Central Willamette Valley
Corvallis Transit System
Albany Transit System
Oregon Department of Transportation
Oregon State University
Linn Shuttle
Benton County Rural and Special Transportation
Benton County

Associated Element: Maintenance and Construction Management
Associated Element: Maintenance and Construction Vehicles

Travelers

Description: Travelers, also called customers, are the general end-user of ITS. This includes vehicular drivers, vehicular passengers, transit users, bicyclists, pedestrians, and any other forms of transportation users.
Associated Element: Vehicles
Associated Element: User Devices
Associated Element: Travelers

APPENDIX F

Turbo Architecture Inventory Report

Inventory Report

12/1/2010 2:26:13PM

Stakeholder Inventory for Region Central Willamette Valley Regional ITS Architecture

Albany Transit System

Element: ATS Call-a-Ride Vehicles *Status:* Existing
Description:
Mapped to Entity: Transit Vehicle Subsystem
Mapped to Entity: Vehicle

Element: ATS Field Devices *Status:* Planned
Description: In the future this may include real-time bus arrival information displays (online, via smart phones, or wayside at key transit stations, park and rides, and bus stops) or electronic payment systems.
Mapped to Entity: Remote Traveler Support

Element: ATS Fixed Route Buses *Status:* Existing
Description:
Mapped to Entity: Transit Vehicle Subsystem
Mapped to Entity: Vehicle

Element: ATS Security Surveillance *Status:* Planned
Description: Includes cameras to monitor security on buses and at transit centers and park and rides.
Mapped to Entity: Security Monitoring Subsystem

Element: ATS Transit Operations and Dispatch Center *Status:* Existing
Description: ATS manages the operations and provides the dispatch for its fixed route bus and call-a-ride services
Mapped to Entity: Transit Management

Element: Linn-Benton Loop Fixed Route Buses *Status:* Existing
Description: The Linn-Benton Loop is a regional fixed transit route (defined as a commuter route by the Federal Transit Administration) that provides transfer points with the Albany Transit System, Corvallis Transit System, OSU Shuttle, and Linn Shuttle. Although the Linn-Benton Loop is not governed by a legal structure, there is an advisory committee and funding is provided by the City of Albany, the City of Corvallis, Linn County, Benton County, ODOT, OSU, and LBCC.
Mapped to Entity: Transit Vehicle Subsystem
Mapped to Entity: Vehicle

Benton County

Element: Benton County Traffic Operations Center *Status:* Planned
Description: A virtual TOC will be implemented at Benton County that provides desktop access to the County's traffic signal and devices (e.g. CCTV camera images) operated by other agencies in the Central Willamette Valley.
Mapped to Entity: Traffic Management

Element: Benton County Traffic Signals and Field Devices *Status:* Existing
Description: Benton County currently operates one traffic signal within the geographic area of this ITS plan.
Mapped to Entity: Roadway Subsystem

Benton County Rural and Special Transportation

Element: Benton County Public Transportation Vehicles *Status:* Existing
Description: Includes fixed route and demand response vehicles
Mapped to Entity: Transit Vehicle Subsystem
Mapped to Entity: Vehicle

Element: Benton County Transit Operations and Dispatch Center *Status:* Existing
Description: Benton County contracts with Benton County Dial-a-Bus to manage the operations and provide the dispatch for its public transportation services.
Mapped to Entity: Transit Management

City and Rural Fire and Life Safety Departments

Element: City and Rural Fire and Life Safety Vehicles *Status:* Existing
Description: This includes fire vehicles and ambulances operated by public agencies. Most city fire vehicles are equipped with mobile data terminals and emitters for traffic signal preemption.
Mapped to Entity: Emergency Vehicle Subsystem
Mapped to Entity: Vehicle

City of Albany

Element: City of Albany Traffic Operations Center *Status:* Planned
Description: A virtual TOC will be implemented at the City of Albany that provides desktop access to the City's traffic signals and field devices and devices (e.g. CCTV camera images) operated by other agencies in the Central Willamette Valley.
Mapped to Entity: Traffic Management

Element: City of Albany Traffic Signals and Field Devices *Status:* Existing/Planned
Description: The City of Albany currenty operates traffic signals, coordinated traffic signal systems, and red light photo enforcement cameras. The future may include the installation of CCTV cameras, dynamic message signs, and weather stations.
Mapped to Entity: Roadway Subsystem

City of Corvallis

Element: City of Corvallis Traffic Operations Center *Status:* Planned
Description: A virtual TOC will be implemented at the City of Corvallis that provides desktop access to the City's traffic signals and field devices and devices (e.g. CCTV camera images) operated by other agencies in the Central Willamette Valley.
Mapped to Entity: Traffic Management

Element: City of Corvallis Traffic Signals and Field Devices *Status:* Existing/Planned
Description: The City of Corvallis currenty operates traffic signals and coordinated traffic signal systems. CCTV cameras and system detectors are currently being designed. The future may include the installation of system detectors, CCTV cameras, dynamic message signs, and weather stations.
Mapped to Entity: Roadway Subsystem

Element: Corvallis Government Television *Status:* Existing
Description: Corvallis Government Television on Cable Channel 21 broadcasts a variety of information including traveler information from ODOT's TripCheck system.

Element: Corvallis Government Television *Status:* Existing
Description: Corvallis Government Television on Cable Channel 21 broadcasts a variety of information including traveler information from ODOT's TripCheck system.
Mapped to Entity: Information Service Provider

City of Lebanon

Element: City of Lebanon Dial-a-Bus Vehicles *Status:* Existing
Description:
Mapped to Entity: Transit Vehicle Subsystem
Mapped to Entity: Vehicle

Element: City of Lebanon Traffic Operations Center *Status:* Planned
Description: A virtual TOC will be implemented at the City of Lebanon that provides desktop access to the City's traffic signals and field devices and devices (e.g. CCTV camera images) operated by other agencies in the Central Willamette Valley.
Mapped to Entity: Traffic Management

Element: City of Lebanon Traffic Signals and Field Devices *Status:* Existing
Description: The City of Lebanon currenty operates traffic signals.
Mapped to Entity: Roadway Subsystem

Element: City of Lebanon Transit Operations and Dispatch Center *Status:* Existing
Description: The City of Lebanon manages the operations and provides the dispatch for its dial-a-bus services.
Mapped to Entity: Transit Management

City Police Departments

Element: City Police Vehicles *Status:* Existing
Description: Many police vehicles are equipped with mobile data terminals.
Mapped to Entity: Emergency Vehicle Subsystem
Mapped to Entity: Vehicle

Commercial Emergency Medical Service Providers

Element: Commercial Ambulances *Status:* Existing
Description:
Mapped to Entity: Emergency Vehicle Subsystem
Mapped to Entity: Vehicle

Commercial HazMat Clean-Up Operators

Element: Commercial HazMat Vehicles *Status:* Existing
Description: These vehicles are used for HazMat clean-up when needed for a roadway incident.
Mapped to Entity: Emergency Vehicle Subsystem

Commercial Information Service Providers

Element: Commercial Information Service Providers *Status:* Existing
Description: This element represents commercial businesses who provide transportation information such as basic advisories, traffic and road conditions, transit schedule information, yellow pages information, ridematching information, and parking information.
Mapped to Entity: Information Service Provider

Commercial Salvage and Towing Operators

Element: Commercial Salvage and Towing Vehicles *Status:* Existing
Description: This includes any vehicle used for salvage or towing operations for roadway incident management.
Mapped to Entity: Emergency Vehicle Subsystem

Commercial Transportation Service Providers

Element: Commercial Transit Vehicles *Status:* Existing
Description: This includes all transit vehicles (e.g. buses, shuttles, taxis, limousines, etc.) used by commercial providers throughout the Central Willamette Valley.
Mapped to Entity: Transit Vehicle Subsystem
Mapped to Entity: Vehicle

Corvallis Transit System

Element: CTS Field Devices *Status:* Planned
Description: In the future this may include real-time bus arrival information displays (online, via smart phones, or wayside at key transit stations, park and rides, and bus stops) or electronic payment systems.
Mapped to Entity: Remote Traveler Support

Element: CTS Fixed Route Buses *Status:* Existing
Description:
Mapped to Entity: Transit Vehicle Subsystem
Mapped to Entity: Vehicle

Element: CTS Security Surveillance *Status:* Existing/Planned
Description: Includes cameras to monitor security on buses and at transit centers and park and rides.
Mapped to Entity: Security Monitoring Subsystem

Element: CTS Transit Operations and Dispatch Center *Status:* Existing
Description: CTS manages the operations and provides the dispatch for its fixed route bus services and the Philomath Connection.
Mapped to Entity: Transit Management

Element: Philomath Connection Fixed Route Buses *Status:* Existing
Description: The Philomath Connection is jointly funded by the City of Philomath and the City of Corvallis. It is operated by the Corvallis Transit System and provides service in Philomath and connections to the OSU Shuttle, CTS routes, and the Linn-Benton Loop.
Mapped to Entity: Transit Vehicle Subsystem
Mapped to Entity: Vehicle

County Offices of Emergency Management

Element: County Emergency Operations Centers *Status:* Existing
Description: This element includes emergency operations centers (EOCs) in Benton County and Linn County. This also includes alternate or back-up EOCs.

Element: County Emergency Operations Centers *Status:* Existing
Description: This element includes emergency operations centers (EOCs) in Benton County and Linn County. This also includes alternate or back-up EOCs.
Mapped to Entity: Emergency Management

County Sheriff Offices

Element: County Sheriff Vehicles *Status:* Existing
Description:
Mapped to Entity: Emergency Vehicle Subsystem
Mapped to Entity: Vehicle

Google

Element: Google Transit *Status:* Planned
Description: Transit agencies in the Central Willamette Valley have decided to use the Google Transit Partner Program as the regional provider of fixed and real-time transit information.

Transit on Google Maps is a public transportation planning tool that combines the latest agency data with the power of Google Maps. It integrates transit stop, route, schedule, and fare information to make trip planning quick and easy for everyone. Google Maps is available in 12 different languages and is compatible with screen readers for the visually impaired. The Transit on Google Maps feature is available on selected mobile devices through Google Maps for mobile. Public transportation information is also included in Google Earth.

Google Transit is free. Agencies just have to provide their data in a format compatible with Google's requirements. Several regional transit providers are currently working with Google Transit to get their data integrated: CTS, Valley Retriever, Hut Shuttle, and Greyhound.
Mapped to Entity: Information Service Provider

Heavy Rail Service Providers

Element: Amtrak Trains *Status:* Existing
Description: Amtrak trains carry passengers between metropolitan areas around the country. Amtrak lines connect the Central Willamette Valley to Portland, Vancouver, B.C., Los Angeles, and Chicago.
Mapped to Entity: Transit Vehicle Subsystem

Element: Heavy Rail Operations Centers *Status:* Existing
Description: This element supports transit rail operations of Amtrak and other heavy rail trains that travel through the Central Willamette Valley. This element is roughly equivalent to a traffic operations center and is the source and destination of information that can be used to coordinate rail and highway traffic management and maintenance operations.
Mapped to Entity: Rail Operations

Element: Heavy Rail Wayside Equipment *Status:* Existing
Description: This equipment detects approaching trains and can be used to transmit train location information to traffic management centers or individual crossings.
Mapped to Entity: Wayside Equipment

Linn Shuttle

Element: Linn Shuttle Field Devices *Status:* Planned
Description: In the future this may include real-time bus arrival information displays (online, via smart phones, or wayside at key transit stations, park and rides, and bus stops) or electronic payment systems.
Mapped to Entity: Remote Traveler Support

Element: Linn Shuttle Fixed Route Buses *Status:* Existing
Description:
Mapped to Entity: Transit Vehicle Subsystem
Mapped to Entity: Vehicle

Element: Linn Shuttle Security Surveillance *Status:* Planned
Description: Includes cameras to monitor security on buses and at transit centers and park and rides.
Mapped to Entity: Security Monitoring Subsystem

Element: Linn Shuttle Transit Operations and Dispatch Center *Status:* Existing
Description: Linn Shuttle manages the operations and provides the dispatch for its fixed route buses and Sweet Home Dial-a-Ride services.
Mapped to Entity: Transit Management

Mayday Service Providers

Element: Mayday Service Centers *Status:* Existing
Description: Mayday services (e.g. GM's OnStar, AAA) provide traveler assistance via communications between a service center and a vehicle.
Mapped to Entity: Emergency Management

Media

Element: Media *Status:* Existing
Description: This element includes the systems used to disseminate traveler information (e.g. traffic reports/news, travel conditions) to the public via broadcast, cable, radio, Internet, print, or other outlets.
Mapped to Entity: Media

Oregon Department of Transportation

Element: ODOT Emergency Operations Centers *Status:* Existing
Description: ODOT has a number of emergency operations centers (EOCs) that are activated per the ODOT Emergency Operations Plan during a major emergency or disaster. In the Central Willamette Valley this includes the EOCs at the District and Region level.
Mapped to Entity: Emergency Management

Element: ODOT Incident Response Vehicles *Status:* Existing
Description: Incident response vehicles are equipped with flat tire repair gear, gasoline, jumper cables, water, traffic control devices, portable dynamic message signs, and other essentials for assisting motorists and responding to incidents. Vehicles are equipped with automated vehicle locators. Interstate 5 is the priority for ODOT incident responders in the region; however, they respond to incidents on OR 34 (Corvallis-Lebanon Highway), OR 99E (Albany-Junction City Highway), and other locations as needed.
Mapped to Entity: Emergency Vehicle Subsystem
Mapped to Entity: Maintenance and Construction Vehicle

Element: ODOT Incident Response Vehicles *Status:* Existing
Description: Incident response vehicles are equipped with flat tire repair gear, gasoline, jumper cables, water, traffic control devices, portable dynamic message signs, and other essentials for assisting motorists and responding to incidents. Vehicles are equipped with automated vehicle locators. Interstate 5 is the priority for ODOT incident responders in the region; however, they respond to incidents on OR 34 (Corvallis-Lebanon Highway), OR 99E (Albany-Junction City Highway), and other locations as needed.
Mapped to Entity: Vehicle

Element: ODOT Region 2 Transportation Operations Center *Status:* Existing/Planned
Description: The Region 2 Transportation Operations Center (TOC) is located in Salem and is the operations base for all of ODOT Region 2, which includes the Central Willamette Valley. Other ODOT TOCs serve as a back-up for the Region 2 TOC in the event of a power or communications outage.

ODOT has developed the Transportation Operations Center System (TOCS) to provide a common, integrated system for use at all ODOT TOCs statewide. Parts of the system is already in use while other parts are still in development. Ultimately the system will support all of the following functional areas: traffic management, incident management, emergency management, resource management, maintenance operations, winter operations, device management, traveler information, data archival and reporting, and connection with external agencies.
Mapped to Entity: Emergency Management
Mapped to Entity: Traffic Management

Element: ODOT Traffic Signals and Field Devices *Status:* Existing/Planned
Description: ODOT currently operates traffic signals, coordinated traffic signal systems, automatic traffic recorders, CCTV cameras, dynamic message signs, and highway advisory radio.
Mapped to Entity: Roadway Subsystem

Element: TripCheck System *Status:* Existing
Description: TripCheck is the statewide public traveler information service provider for Oregon. The system provides various types of traveler information pertaining to road conditions, weather conditions, transit, traveler services, etc. Information from the TripCheck system is disseminated by ODOT through various means: the Internet (www.tripcheck.com), 511 highway advisory telephone, formatted cable television presentations, etc. The TripCheck system includes a TripCheck Traveler Information Portal (TTIP) that allows commercial information service providers to retrieve various types of data from the TripCheck system.There is a TripCheck Local Entry (TLE) tool that allows agencies to enter events (e.g. traffic incidents, construction activities) into the TripCheck system.
Mapped to Entity: Information Service Provider
Mapped to Entity: Traffic Management

Oregon State Police

Element: Oregon State Police Dispatch Center *Status:* Existing
Description: The main OSP dispatch center is co-located with the ODOT Region 2 TOC in Salem. 911 and other phone calls are routed to OSP, who dispatches their own vehicles and resources with a computer-aided dispatch (CAD) system. OSP is one of the key stakeholders for incident management activities on state roadways.
Mapped to Entity: Emergency Management

Element: Oregon State Police Vehicles *Status:* Existing
Description: OSP vehicles are equipped with mobile data terminals that interface with the computer-aided dispatch (CAD) system used by operators at the OSP dispatch centers.
Mapped to Entity: Emergency Vehicle Subsystem
Mapped to Entity: Vehicle

Oregon State University

Element: OSU Parking Management *Status:* Planned
Description: Provide real-time parking availability information for the parking garage and other high demand OSU parking areas used during normal business hours.
Mapped to Entity: Parking Management

Element: OSU Shuttle Field Devices *Status:* Planned
Description: In the future this may include real-time bus arrival information displays (online, via smart phones, or wayside at key transit stations, park and rides, and bus stops) or electronic payment systems.
Mapped to Entity: Remote Traveler Support

Element: OSU Shuttle Fixed Route Buses *Status:* Existing
Description:
Mapped to Entity: Transit Vehicle Subsystem
Mapped to Entity: Vehicle

Element: OSU Shuttle Transit Operations and Dispatch Center *Status:* Existing
Description: OSU manages the operations and provides the dispatch for its fixed route bus services.
Mapped to Entity: Transit Management

Other Counties and Cities in Central Willamette Valley

Element: Other Counties and Cities Traffic Operations Center *Status:* Planned
Description: Virtual TOCs will be implemented at Linn County and other cities within the Central WIllamette Valley that provide desktop access to regional field devices (e.g. CCTV camera images).
Mapped to Entity: Traffic Management

Other Emergency Management Services

Element: Other Emergency Management Operations *Status:* Existing
Description: This element supports emergency operations not typically covered by 911 centers, EOCs, police, fire, and ambulances. It supports projects that integrate information sharing between ambulances en-route to hospitals. It supports coordination with the Red Cross and emergency shelters during regional emergencies or evacuations.
Mapped to Entity: Other Emergency Management

Public Safety Dispatch Agencies

Element: CAD Message Broker *Status:* Planned
Description: The main purpose of the message broker is to provide computer-aided dispatch (CAD) system interoperability and an interface between the dispatch centers in the Central WIllamette Valley, adjacent counties, ODOT, and OSP. This message broker will be a push only system that allows information to flow from one agency to other pre-designated agencies depending on the information type. Subscribers will not be able to extract information from the broker.
Mapped to Entity: Emergency Management

Element: Public Safety Dispatch Centers *Status:* Existing

Element: Public Safety Dispatch Centers *Status:* Existing
Description:
Mapped to Entity: Emergency Management

Regional Transportation Agencies

Element: Data Mart *Status:* Existing
Description: This element represents any sort of data archive maintained by a single agency used for transportation management and operations. ODOT has internal data marts for many of their intelligent transportation systems and their traffic signals. Other agencies have internal data marts for traffic counts, crashes, transit usage, etc.
Mapped to Entity: Archived Data Management Subsystem

Element: Data Warehouse *Status:* Planned
Description: This will be the data warehouse for transportation operations and management data in the Central Willamette Valley.

A potential data warehouse could be the Portland Oregon Regional Transportation Archive Listing (PORTAL), which currently archives traffic, incident, and weather data for the Portland-Vancouver metropolitan area.
Mapped to Entity: Archived Data Management Subsystem

Element: Public Agency Websites and Phone Systems *Status:* Existing
Description: This includes any public agency website that includes traveler information that mostly pertains to a single geographic area within the Central Willamette Valley region. Ideally these websites include links to other regional traveler information websites (TripCheck, Google Transit) and other local agencies. This element includes any public agency phone system that provides recorded information or interaction with a real person.
Mapped to Entity: Information Service Provider

Element: Ridesharing System *Status:* Planned
Description: Oregon, including the Central Willamette Valley, plans to use a statewide ridesharing system. ODOT is developing a program to oversee the implementation.
Mapped to Entity: Information Service Provider

Special Event Promoters

Element: Special Event Promoters *Status:* Existing
Description: This element represents events that may impact travel on roadways or other modal means. Examples include sporting events, festivals, fairs, and parades. These promoters interface with traffic management agencies to provide event information such as date, time, estimated duration, location, and any other information pertinent to traffic movement in the surrounding area.
Mapped to Entity: Event Promoters

Element: Special Event Promoters Field Devices *Status:* Existing/Planned
Description: This element includes any field devices (e.g. dynamic message signs, CCTV cameras) that can be used to manage travelers or provide traveler information.
Mapped to Entity: Remote Traveler Support

Transportation Maintenance and Construction Agencies

Element: Maintenance and Construction Management *Status:* Existing
Description: This element includes all management of roadway maintenance and construction activities in the Central Willamette Valley by ODOT, the counties, the cities, or transit agencies.
Mapped to Entity: Maintenance and Construction Management

Element: Maintenance and Construction Vehicles *Status:* Existing/Planned
Description: This element includes all maintenance and construction vehicles owned and operated by ODOT, the counties, the cities, or the transit agencies. These vehicles are not currently outfitted with any intelligent transportation systems but it is very likely in the next 10 years that these vehicles will be equipped with GPS or automated vehicle location tracking devices.
Mapped to Entity: Emergency Vehicle Subsystem
Mapped to Entity: Maintenance and Construction Vehicle

Travelers

Element: Travelers *Status:* Existing
Description:
Mapped to Entity: Traveler

Element: User Devices *Status:* Existing
Description: This element includes equipment an individual owns and can personalize with their choices for information about transportation networks. Examples include Internet-connected personal computers, landline telephones, and smart phones. Technology for these types of devices continues to rapidly change and improve.
Mapped to Entity: Location Data Source
Mapped to Entity: Personal Information Access

Element: Vehicles *Status:* Existing
Description: A general element that represents personal automobiles and fleet vehicles that include ITS safety, navigation and traveler information systems that may be applicable to any vehicle on the roadway.
Mapped to Entity: Vehicle

APPENDIX G

Turbo Architecture Market Packages Report

Market Packages (Transportation Services)

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Market Packages for Region Central Willamette Valley Regional ITS Architecture

Market Package	Element(s)	
ITS Data Mart (AD1) -- Existing		
This market package provides a focused archive that houses data collected and owned by a single agency, district, private sector provider, research institution, or other organization. This focused archive typically includes data covering a single transportation mode and one jurisdiction that is collected from an operational data store and archived for future use. It provides the basic data quality, data privacy, and meta data management common to all ITS archives and provides general query and report access to archive data users.		
	ATS Call-a-Ride Vehicles	-- Not Selected
	ATS Fixed Route Buses	-- Not Selected
	ATS Transit Operations and Dispatch Center	-- Not Selected
	Benton County Public Transportation Vehicles	-- Not Selected
	Benton County Traffic Operations Center	-- Not Selected
	Benton County Traffic Signals and Field Devices	
	Benton County Transit Operations and Dispatch Center	-- Not Selected
	CAD Message Broker	-- Not Selected
	City and Rural Fire and Life Safety Vehicles	-- Not Selected
	City of Albany Traffic Operations Center	-- Not Selected
	City of Albany Traffic Signals and Field Devices	
	City of Corvallis Traffic Operations Center	-- Not Selected
	City of Corvallis Traffic Signals and Field Devices	
	City of Lebanon Dial-a-Bus Vehicles	-- Not Selected
	City of Lebanon Traffic Operations Center	-- Not Selected
	City of Lebanon Traffic Signals and Field Devices	
	City of Lebanon Transit Operations and Dispatch Center	-- Not Selected
	City Police Vehicles	-- Not Selected
	Commercial Ambulances	-- Not Selected
	Commercial Information Service Providers	-- Not Selected
	Commercial Transit Vehicles	-- Not Selected
	Corvallis Government Television	-- Not Selected
	County Emergency Operations Centers	-- Not Selected
	County Sheriff Vehicles	-- Not Selected
	CTS Fixed Route Buses	-- Not Selected
	CTS Transit Operations and Dispatch Center	-- Not Selected
	Data Mart	
	Data Warehouse	-- Not Selected
	Google Transit	-- Not Selected
	Linn Shuttle Fixed Route Buses	-- Not Selected
	Linn Shuttle Transit Operations and Dispatch Center	-- Not Selected
	Linn-Benton Loop Fixed Route Buses	-- Not Selected
	Maintenance and Construction Management	-- Not Selected
	Mayday Service Centers	-- Not Selected
	ODOT Emergency Operations Centers	-- Not Selected
	ODOT Incident Response Vehicles	-- Not Selected
	ODOT Region 2 Transportation Operations Center	-- Not Selected
	ODOT Traffic Signals and Field Devices	
	Oregon State Police Dispatch Center	-- Not Selected
	Oregon State Police Vehicles	-- Not Selected
	OSU Parking Management	-- Not Selected
	OSU Shuttle Fixed Route Buses	-- Not Selected
	OSU Shuttle Transit Operations and Dispatch Center	-- Not Selected
	Other Counties and Cities Traffic Operations Center	-- Not Selected
	Philomath Connection Fixed Route Buses	-- Not Selected
	Public Agency Websites and Phone Systems	-- Not Selected
	Public Safety Dispatch Centers	-- Not Selected
	Ridesharing System	-- Not Selected
	TripCheck System	-- Not Selected
	Vehicles	-- Not Selected
ITS Data Warehouse (AD2) -- Planned		
This market package includes all the data collection and management capabilities provided by the ITS Data Mart, and adds the functionality and interface definitions that allow collection of data from multiple agencies and data sources spanning across modal and jurisdictional boundaries. It performs the additional transformations and provides the additional meta data management features that are necessary so that all this data can be managed in a single repository with consistent formats. The potential for large volumes of varied data suggests additional on-line analysis and data mining features that are also included in this market package in addition to the basic query and reporting user access features offered by the ITS Data Mart.		
	ATS Call-a-Ride Vehicles	-- Not Selected
	ATS Fixed Route Buses	-- Not Selected
	ATS Transit Operations and Dispatch Center	-- Not Selected
	Benton County Public Transportation Vehicles	-- Not Selected
	Benton County Traffic Operations Center	-- Not Selected
	Benton County Traffic Signals and Field Devices	
	Benton County Transit Operations and Dispatch Center	-- Not Selected
	CAD Message Broker	-- Not Selected
	City and Rural Fire and Life Safety Vehicles	-- Not Selected
	City of Albany Traffic Operations Center	-- Not Selected
	City of Albany Traffic Signals and Field Devices	
	City of Corvallis Traffic Operations Center	-- Not Selected
	City of Corvallis Traffic Signals and Field Devices	
	City of Lebanon Dial-a-Bus Vehicles	-- Not Selected

Market Packages for Region Central Willamette Valley Regional ITS Architecture

Market Package	Element(s)	
	City of Lebanon Traffic Operations Center	-- Not Selected
	City of Lebanon Traffic Signals and Field Devices	
	City of Lebanon Transit Operations and Dispatch Center	-- Not Selected
	City Police Vehicles	-- Not Selected
	Commercial Ambulances	-- Not Selected
	Commercial Information Service Providers	-- Not Selected
	Commercial Transit Vehicles	-- Not Selected
	Corvallis Government Television	-- Not Selected
	County Emergency Operations Centers	-- Not Selected
	County Sheriff Vehicles	-- Not Selected
	CTS Fixed Route Buses	-- Not Selected
	CTS Transit Operations and Dispatch Center	-- Not Selected
	Data Mart	-- Not Selected
	Data Warehouse	
	Google Transit	-- Not Selected
	Linn Shuttle Fixed Route Buses	-- Not Selected
	Linn Shuttle Transit Operations and Dispatch Center	-- Not Selected
	Linn-Benton Loop Fixed Route Buses	-- Not Selected
	Maintenance and Construction Management	-- Not Selected
	Mayday Service Centers	-- Not Selected
	ODOT Emergency Operations Centers	-- Not Selected
	ODOT Incident Response Vehicles	-- Not Selected
	ODOT Region 2 Transportation Operations Center	-- Not Selected
	ODOT Traffic Signals and Field Devices	
	Oregon State Police Dispatch Center	-- Not Selected
	Oregon State Police Vehicles	-- Not Selected
	OSU Parking Management	-- Not Selected
	OSU Shuttle Fixed Route Buses	-- Not Selected
	OSU Shuttle Transit Operations and Dispatch Center	-- Not Selected
	Other Counties and Cities Traffic Operations Center	-- Not Selected
	Philomath Connection Fixed Route Buses	-- Not Selected
	Public Agency Websites and Phone Systems	-- Not Selected
	Public Safety Dispatch Centers	-- Not Selected
	Ridesharing System	-- Not Selected
	TripCheck System	-- Not Selected
	Vehicles	-- Not Selected

Transit Vehicle Tracking (APTS01) -- Existing/Planned

This market package monitors current transit vehicle location using an Automated Vehicle Location System. The location data may be used to determine real time schedule adherence and update the transit system's schedule in real-time. Vehicle position may be determined either by the vehicle (e.g., through GPS) and relayed to the infrastructure or may be determined directly by the communications infrastructure. A two-way wireless communication link with the Transit Management Subsystem is used for relaying vehicle position and control measures. Fixed route transit systems may also employ beacons along the route to enable position determination and facilitate communications with each vehicle at fixed intervals. The Transit Management Subsystem processes this information, updates the transit schedule and makes real-time schedule information available to the Information Service Provider.

Only CTS fixed route buses currently have vehicle tracking; however, this system needs to be replaced because it is no longer supported by the manufacturer.

	Amtrak Trains	-- Not Selected
	ATS Call-a-Ride Vehicles	
	ATS Fixed Route Buses	
	ATS Transit Operations and Dispatch Center	
	Benton County Public Transportation Vehicles	
	Benton County Traffic Operations Center	-- Not Selected
	Benton County Transit Operations and Dispatch Center	
	City of Albany Traffic Operations Center	-- Not Selected
	City of Corvallis Traffic Operations Center	-- Not Selected
	City of Lebanon Dial-a-Bus Vehicles	-- Not Selected
	City of Lebanon Traffic Operations Center	-- Not Selected
	City of Lebanon Transit Operations and Dispatch Center	-- Not Selected
	Commercial Information Service Providers	-- Not Selected
	Commercial Transit Vehicles	-- Not Selected
	Corvallis Government Television	-- Not Selected
	CTS Fixed Route Buses	
	CTS Transit Operations and Dispatch Center	
	Google Transit	-- Not Selected
	Linn Shuttle Fixed Route Buses	
	Linn Shuttle Transit Operations and Dispatch Center	
	Linn-Benton Loop Fixed Route Buses	
	ODOT Region 2 Transportation Operations Center	-- Not Selected
	OSU Shuttle Fixed Route Buses	
	OSU Shuttle Transit Operations and Dispatch Center	
	Other Counties and Cities Traffic Operations Center	-- Not Selected
	Philomath Connection Fixed Route Buses	
	Public Agency Websites and Phone Systems	-- Not Selected
	Ridesharing System	-- Not Selected
	TripCheck System	-- Not Selected
	User Devices	-- Not Selected

Transit Fixed-Route Operations (APTS02) -- Existing/Planned

Market Packages for Region Central Willamette Valley Regional ITS Architecture

Market Package	Element(s)	

This market package performs automated dispatch and system monitoring for fixed-route and flexible-route transit services. This service performs scheduling activities including the creation of schedules, blocks and runs, as well as operator assignment. This service determines the transit vehicle trip performance against the schedule using AVL data and provides information displays at the Transit Management Subsystem. Static and real time transit data is exchanged with Information Service Providers where it is integrated with that from other transportation modes (e.g. rail, ferry, air) to provide the public with integrated and personalized dynamic schedules.
Only CTS currently has a computer-aided dispatch (CAD) system; however, this system needs to be replaced because it is no longer supported by the manufacturer.

Amtrak Trains	
ATS Call-a-Ride Vehicles	-- Not Selected
ATS Fixed Route Buses	
ATS Transit Operations and Dispatch Center	
Benton County Public Transportation Vehicles	
Benton County Traffic Operations Center	-- Not Selected
Benton County Transit Operations and Dispatch Center	
City of Albany Traffic Operations Center	-- Not Selected
City of Corvallis Traffic Operations Center	-- Not Selected
City of Lebanon Dial-a-Bus Vehicles	-- Not Selected
City of Lebanon Traffic Operations Center	-- Not Selected
City of Lebanon Transit Operations and Dispatch Center	-- Not Selected
Commercial Information Service Providers	-- Not Selected
Commercial Transit Vehicles	-- Not Selected
Corvallis Government Television	-- Not Selected
CTS Fixed Route Buses	
CTS Transit Operations and Dispatch Center	
Data Mart	-- Not Selected
Data Warehouse	-- Not Selected
Google Transit	-- Not Selected
Linn Shuttle Fixed Route Buses	
Linn Shuttle Transit Operations and Dispatch Center	
Linn-Benton Loop Fixed Route Buses	
Maintenance and Construction Management	-- Not Selected
ODOT Region 2 Transportation Operations Center	-- Not Selected
OSU Shuttle Fixed Route Buses	
OSU Shuttle Transit Operations and Dispatch Center	
Other Counties and Cities Traffic Operations Center	-- Not Selected
Philomath Connection Fixed Route Buses	
Public Agency Websites and Phone Systems	-- Not Selected
Ridesharing System	-- Not Selected
TripCheck System	-- Not Selected

Demand Response Transit Operations (APTS03) -- Planned

This market package performs automated dispatch and system monitoring for demand responsive transit services. This service performs scheduling activities as well as operator assignment. In addition, this market package performs similar functions to support dynamic features of flexible-route transit services. This package monitors the current status of the transit fleet and supports allocation of these fleet resources to service incoming requests for transit service while also considering traffic conditions. The Transit Management Subsystem provides the necessary data processing and information display to assist the transit operator in making optimal use of the transit fleet. This service includes the capability for a traveler request for personalized transit services to be made through the Information Service Provider (ISP) Subsystem. The ISP may either be operated by a transit management center or be independently owned and operated by a separate service provider. In the first scenario, the traveler makes a direct request to a specific paratransit service. In the second scenario, a third party service provider determines that the paratransit service is a viable means of satisfying a traveler request and makes a reservation for the traveler.

Amtrak Trains	-- Not Selected
ATS Call-a-Ride Vehicles	
ATS Fixed Route Buses	-- Not Selected
ATS Transit Operations and Dispatch Center	
Benton County Public Transportation Vehicles	
Benton County Traffic Operations Center	-- Not Selected
Benton County Transit Operations and Dispatch Center	
City of Albany Traffic Operations Center	-- Not Selected
City of Corvallis Traffic Operations Center	-- Not Selected
City of Lebanon Dial-a-Bus Vehicles	
City of Lebanon Traffic Operations Center	-- Not Selected
City of Lebanon Transit Operations and Dispatch Center	
Commercial Information Service Providers	-- Not Selected
Commercial Transit Vehicles	-- Not Selected
Corvallis Government Television	-- Not Selected
CTS Fixed Route Buses	-- Not Selected
CTS Transit Operations and Dispatch Center	-- Not Selected
Google Transit	-- Not Selected
Linn Shuttle Fixed Route Buses	-- Not Selected
Linn Shuttle Transit Operations and Dispatch Center	-- Not Selected
Linn-Benton Loop Fixed Route Buses	-- Not Selected
Maintenance and Construction Management	-- Not Selected
ODOT Region 2 Transportation Operations Center	-- Not Selected
OSU Shuttle Fixed Route Buses	-- Not Selected
OSU Shuttle Transit Operations and Dispatch Center	-- Not Selected
Other Counties and Cities Traffic Operations Center	-- Not Selected
Philomath Connection Fixed Route Buses	-- Not Selected
Public Agency Websites and Phone Systems	-- Not Selected
Ridesharing System	-- Not Selected
TripCheck System	-- Not Selected

Transit Fare Collection Management (APTS04) -- Planned

Market Package	Element(s)	
This market package manages transit fare collection on-board transit vehicles and at transit stops using electronic means. It allows transit users to use a traveler card or other electronic payment device. Readers located either in the infrastructure or on-board the transit vehicle allow electronic fare payment. Data is processed, stored, and displayed on the transit vehicle and communicated as needed to the Transit Management Subsystem. Two other market packages, ATMS10: Electronic Toll Collection and ATMS16: Parking Facility Management also provide electronic payment services. These three market packages in combination provide an integrated electronic payment system for transportation services.		
	Amtrak Trains	-- Not Selected
	ATS Call-a-Ride Vehicles	
	ATS Field Devices	
	ATS Fixed Route Buses	
	ATS Transit Operations and Dispatch Center	
	Benton County Public Transportation Vehicles	
	Benton County Transit Operations and Dispatch Center	
	City of Lebanon Dial-a-Bus Vehicles	
	City of Lebanon Transit Operations and Dispatch Center	
	Commercial Information Service Providers	-- Not Selected
	Commercial Transit Vehicles	-- Not Selected
	Corvallis Government Television	-- Not Selected
	CTS Field Devices	
	CTS Fixed Route Buses	
	CTS Transit Operations and Dispatch Center	
	Google Transit	-- Not Selected
	Linn Shuttle Field Devices	
	Linn Shuttle Fixed Route Buses	
	Linn Shuttle Transit Operations and Dispatch Center	
	Linn-Benton Loop Fixed Route Buses	
	OSU Shuttle Field Devices	
	OSU Shuttle Fixed Route Buses	
	OSU Shuttle Transit Operations and Dispatch Center	
	Philomath Connection Fixed Route Buses	
	Public Agency Websites and Phone Systems	-- Not Selected
	Ridesharing System	-- Not Selected
	Special Event Promoters Field Devices	-- Not Selected
	Travelers	-- Not Selected
	TripCheck System	-- Not Selected

Transit Security (APTS05) -- Existing/Planned

This market package provides for the physical security of transit passengers and transit vehicle operators. On-board equipment is deployed to perform surveillance and sensor monitoring in order to warn of potentially hazardous situations. The surveillance equipment includes video (e.g., CCTV cameras), audio systems and/or event recorder systems. The sensor equipment includes threat sensors (e.g., chemical agent, toxic industrial chemical, biological, explosives, and radiological sensors) and object detection sensors (e.g., metal detectors). Transit user or transit vehicle operator activated alarms are provided on-board. Public areas (e.g., transit stops, park and ride lots, stations) are also monitored with similar surveillance and sensor equipment and provided with transit user activated alarms. In addition this market 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).

The surveillance and sensor information is transmitted to the Emergency Management Subsystem, as are transit user activated alarms in public secure areas. On-board alarms, activated by transit users or transit vehicle operators are transmitted to both the Emergency Management Subsystem and the Transit Management Subsystem, indicating two possible approaches to implementing this market package.

In addition the market package supports remote transit vehicle disabling by the Transit Management Subsystem and transit vehicle operator authentication.

CTS has some existing cameras and ATS plans to add cameras in the near future.

	Amtrak Trains	-- Not Selected
	ATS Call-a-Ride Vehicles	-- Not Selected
	ATS Field Devices	-- Not Selected
	ATS Fixed Route Buses	
	ATS Security Surveillance	
	ATS Transit Operations and Dispatch Center	
	Benton County Public Transportation Vehicles	-- Not Selected
	Benton County Transit Operations and Dispatch Center	-- Not Selected
	CAD Message Broker	-- Not Selected
	City of Lebanon Dial-a-Bus Vehicles	-- Not Selected
	City of Lebanon Transit Operations and Dispatch Center	-- Not Selected
	Commercial Information Service Providers	-- Not Selected
	Commercial Transit Vehicles	-- Not Selected
	Corvallis Government Television	-- Not Selected
	County Emergency Operations Centers	-- Not Selected
	CTS Field Devices	-- Not Selected
	CTS Fixed Route Buses	
	CTS Security Surveillance	
	CTS Transit Operations and Dispatch Center	
	Google Transit	-- Not Selected
	Heavy Rail Operations Centers	-- Not Selected
	Linn Shuttle Field Devices	-- Not Selected
	Linn Shuttle Fixed Route Buses	
	Linn Shuttle Security Surveillance	
	Linn Shuttle Transit Operations and Dispatch Center	
	Linn-Benton Loop Fixed Route Buses	
	Mayday Service Centers	-- Not Selected

Market Packages for Region Central Willamette Valley Regional ITS Architecture

Market Package	Element(s)	
	Media	-- Not Selected
	ODOT Emergency Operations Centers	-- Not Selected
	ODOT Region 2 Transportation Operations Center	-- Not Selected
	Oregon State Police Dispatch Center	-- Not Selected
	OSU Shuttle Field Devices	-- Not Selected
	OSU Shuttle Fixed Route Buses	-- Not Selected
	OSU Shuttle Transit Operations and Dispatch Center	-- Not Selected
	Other Emergency Management Operations	-- Not Selected
	Philomath Connection Fixed Route Buses	
	Public Agency Websites and Phone Systems	-- Not Selected
	Public Safety Dispatch Centers	
	Ridesharing System	-- Not Selected
	Special Event Promoters Field Devices	-- Not Selected
	Travelers	-- Not Selected
	TripCheck System	-- Not Selected

Transit Fleet Management (APTS06) -- Planned

This market package supports automatic transit maintenance scheduling and monitoring. On-board condition sensors monitor system status and transmit critical status information to the Transit Management Subsystem. Hardware and software in the Transit Management Subsystem processes this data and schedules preventative and corrective maintenance. The market package also supports the day to day management of the transit fleet inventory, including the assignment of specific transit vehicles to blocks.

	Amtrak Trains	-- Not Selected
	ATS Call-a-Ride Vehicles	
	ATS Fixed Route Buses	
	ATS Transit Operations and Dispatch Center	
	Benton County Public Transportation Vehicles	
	Benton County Transit Operations and Dispatch Center	
	City of Lebanon Dial-a-Bus Vehicles	
	City of Lebanon Transit Operations and Dispatch Center	
	Commercial Transit Vehicles	-- Not Selected
	CTS Fixed Route Buses	
	CTS Transit Operations and Dispatch Center	
	Linn Shuttle Fixed Route Buses	
	Linn Shuttle Transit Operations and Dispatch Center	
	Linn-Benton Loop Fixed Route Buses	
	OSU Shuttle Fixed Route Buses	
	OSU Shuttle Transit Operations and Dispatch Center	
	Philomath Connection Fixed Route Buses	

Multi-modal Coordination (APTS07) -- Existing/Planned

This market package establishes two way communications between multiple transit and traffic agencies to improve service coordination. Multimodal coordination between transit agencies can increase traveler convenience at transit transfer points and clusters (a collection of stops, stations, or terminals where transfers can be made conveniently) and also improve operating efficiency. Transit transfer information is shared between Multimodal Transportation Service Providers and Transit Agencies.
There are many transfer points in the region that connect the various public fixed route transportation service providers. Two-way radios are used for coordination today. APTS01 (transit vehicle tracking) will help improve coordination in the future.

	Amtrak Trains	-- Not Selected
	ATS Call-a-Ride Vehicles	-- Not Selected
	ATS Fixed Route Buses	
	ATS Transit Operations and Dispatch Center	
	Benton County Public Transportation Vehicles	
	Benton County Traffic Operations Center	-- Not Selected
	Benton County Transit Operations and Dispatch Center	
	City of Albany Traffic Operations Center	-- Not Selected
	City of Corvallis Traffic Operations Center	-- Not Selected
	City of Lebanon Dial-a-Bus Vehicles	-- Not Selected
	City of Lebanon Traffic Operations Center	-- Not Selected
	City of Lebanon Transit Operations and Dispatch Center	-- Not Selected
	Commercial Transit Vehicles	-- Not Selected
	CTS Fixed Route Buses	
	CTS Transit Operations and Dispatch Center	
	Linn Shuttle Fixed Route Buses	
	Linn Shuttle Transit Operations and Dispatch Center	
	Linn-Benton Loop Fixed Route Buses	
	ODOT Region 2 Transportation Operations Center	-- Not Selected
	OSU Parking Management	-- Not Selected
	OSU Shuttle Fixed Route Buses	
	OSU Shuttle Transit Operations and Dispatch Center	
	Other Counties and Cities Traffic Operations Center	-- Not Selected
	Philomath Connection Fixed Route Buses	
	Special Event Promoters	-- Not Selected
	TripCheck System	-- Not Selected

Transit Traveler Information (APTS08) -- Existing/Planned

This market package provides transit users at transit stops and on-board transit vehicles with ready access to transit information. The information services include transit stop annunciation, imminent arrival signs, and real-time transit schedule displays that are of general interest to transit users. Systems that provide custom transit trip itineraries and other tailored transit information services are also represented by this market package.

	Amtrak Trains	
	ATS Call-a-Ride Vehicles	-- Not Selected
	ATS Field Devices	
	ATS Fixed Route Buses	
	ATS Transit Operations and Dispatch Center	

Market Package	Element(s)	
	Benton County Public Transportation Vehicles	
	Benton County Transit Operations and Dispatch Center	
	City of Lebanon Dial-a-Bus Vehicles	-- Not Selected
	City of Lebanon Transit Operations and Dispatch Center	-- Not Selected
	Commercial Information Service Providers	
	Commercial Transit Vehicles	
	Corvallis Government Television	-- Not Selected
	CTS Field Devices	
	CTS Fixed Route Buses	
	CTS Transit Operations and Dispatch Center	
	Google Transit	
	Linn Shuttle Field Devices	
	Linn Shuttle Fixed Route Buses	
	Linn Shuttle Transit Operations and Dispatch Center	
	Linn-Benton Loop Fixed Route Buses	
	Media	-- Not Selected
	OSU Shuttle Field Devices	
	OSU Shuttle Fixed Route Buses	
	OSU Shuttle Transit Operations and Dispatch Center	
	Philomath Connection Fixed Route Buses	
	Public Agency Websites and Phone Systems	
	Ridesharing System	-- Not Selected
	Special Event Promoters Field Devices	
	Travelers	-- Not Selected
	TripCheck System	
	User Devices	

Transit Signal Priority (APTS09) -- Existing/Planned

This market package determines the need for transit priority on routes and at certain intersections and requests transit vehicle priority at these locations. The signal priority may result from limited local coordination between the transit vehicle and the individual intersection for signal priority or may result from coordination between transit management and traffic management centers. Coordination between traffic and transit management is intended to improve on-time performance of the transit system to the extent that this can be accommodated without degrading overall performance of the traffic network.

Transit signal priority (TSP) has been implemented on CTS fixed route buses and is used on some of the signalized corridors in the City of Corvallis. The City of Corvallis would like to implement TSP on other signalized corridors. ATS would like to implement ATS on key signalized corridors in the City of Albany.

	Amtrak Trains	-- Not Selected
	ATS Call-a-Ride Vehicles	-- Not Selected
	ATS Fixed Route Buses	
	ATS Transit Operations and Dispatch Center	
	Benton County Public Transportation Vehicles	
	Benton County Traffic Operations Center	
	Benton County Traffic Signals and Field Devices	
	Benton County Transit Operations and Dispatch Center	
	City of Albany Traffic Operations Center	
	City of Albany Traffic Signals and Field Devices	
	City of Corvallis Traffic Operations Center	
	City of Corvallis Traffic Signals and Field Devices	
	City of Lebanon Dial-a-Bus Vehicles	-- Not Selected
	City of Lebanon Traffic Operations Center	
	City of Lebanon Traffic Signals and Field Devices	
	City of Lebanon Transit Operations and Dispatch Center	-- Not Selected
	Commercial Transit Vehicles	-- Not Selected
	CTS Fixed Route Buses	
	CTS Transit Operations and Dispatch Center	
	Linn Shuttle Fixed Route Buses	
	Linn Shuttle Transit Operations and Dispatch Center	
	Linn-Benton Loop Fixed Route Buses	
	ODOT Region 2 Transportation Operations Center	
	ODOT Traffic Signals and Field Devices	
	OSU Shuttle Fixed Route Buses	
	OSU Shuttle Transit Operations and Dispatch Center	
	Other Counties and Cities Traffic Operations Center	-- Not Selected
	Philomath Connection Fixed Route Buses	
	TripCheck System	-- Not Selected

Transit Passenger Counting (APTS10) -- Existing/Planned

This market package counts the number of passengers entering and exiting a transit vehicle using sensors mounted on the vehicle and communicates the collected passenger data back to the management center. The collected data can be used to calculate reliable ridership figures and measure passenger load information at particular stops.

Only CTS fixed route buses currently have automated passenger counting; however, this system needs to be replaced because it is no longer supported by the manufacturer.

	Amtrak Trains	-- Not Selected
	ATS Call-a-Ride Vehicles	-- Not Selected
	ATS Fixed Route Buses	
	ATS Transit Operations and Dispatch Center	
	Benton County Public Transportation Vehicles	-- Not Selected
	Benton County Transit Operations and Dispatch Center	-- Not Selected
	City of Lebanon Dial-a-Bus Vehicles	-- Not Selected
	City of Lebanon Transit Operations and Dispatch Center	-- Not Selected
	Commercial Transit Vehicles	-- Not Selected
	CTS Fixed Route Buses	
	CTS Transit Operations and Dispatch Center	
	Linn Shuttle Fixed Route Buses	

Market Package	Element(s)	
	Linn Shuttle Transit Operations and Dispatch Center	
	Linn-Benton Loop Fixed Route Buses	
	OSU Shuttle Fixed Route Buses	
	OSU Shuttle Transit Operations and Dispatch Center	
	Philomath Connection Fixed Route Buses	
	Travelers	-- Not Selected

Broadcast Traveler Information (ATIS01) -- Existing/Planned

This market 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 market package ATMS6 - Traffic Information Dissemination, which provides localized HAR and DMS information capabilities, ATIS1 provides a wide area digital broadcast service. Successful deployment of this market package relies on availability of real-time traveler information from roadway instrumentation, probe vehicles or other sources.

	ATS Call-a-Ride Vehicles	-- Not Selected
	ATS Field Devices	-- Not Selected
	ATS Fixed Route Buses	-- Not Selected
	ATS Transit Operations and Dispatch Center	-- Not Selected
	Benton County Public Transportation Vehicles	-- Not Selected
	Benton County Traffic Operations Center	-- Not Selected
	Benton County Transit Operations and Dispatch Center	-- Not Selected
	CAD Message Broker	-- Not Selected
	City and Rural Fire and Life Safety Vehicles	-- Not Selected
	City of Albany Traffic Operations Center	-- Not Selected
	City of Corvallis Traffic Operations Center	-- Not Selected
	City of Lebanon Dial-a-Bus Vehicles	-- Not Selected
	City of Lebanon Traffic Operations Center	-- Not Selected
	City of Lebanon Transit Operations and Dispatch Center	-- Not Selected
	City Police Vehicles	-- Not Selected
	Commercial Ambulances	-- Not Selected
	Commercial Information Service Providers	-- Not Selected
	Commercial Transit Vehicles	-- Not Selected
	Corvallis Government Television	
	County Emergency Operations Centers	-- Not Selected
	County Sheriff Vehicles	-- Not Selected
	CTS Field Devices	-- Not Selected
	CTS Fixed Route Buses	-- Not Selected
	CTS Transit Operations and Dispatch Center	-- Not Selected
	Google Transit	-- Not Selected
	Linn Shuttle Field Devices	-- Not Selected
	Linn Shuttle Fixed Route Buses	-- Not Selected
	Linn Shuttle Transit Operations and Dispatch Center	-- Not Selected
	Linn-Benton Loop Fixed Route Buses	-- Not Selected
	Maintenance and Construction Management	-- Not Selected
	Mayday Service Centers	-- Not Selected
	Media	
	ODOT Emergency Operations Centers	-- Not Selected
	ODOT Incident Response Vehicles	-- Not Selected
	ODOT Region 2 Transportation Operations Center	-- Not Selected
	Oregon State Police Dispatch Center	-- Not Selected
	Oregon State Police Vehicles	-- Not Selected
	OSU Parking Management	-- Not Selected
	OSU Shuttle Field Devices	-- Not Selected
	OSU Shuttle Fixed Route Buses	-- Not Selected
	OSU Shuttle Transit Operations and Dispatch Center	-- Not Selected
	Other Counties and Cities Traffic Operations Center	-- Not Selected
	Philomath Connection Fixed Route Buses	-- Not Selected
	Public Agency Websites and Phone Systems	-- Not Selected
	Public Safety Dispatch Centers	-- Not Selected
	Ridesharing System	-- Not Selected
	Special Event Promoters	-- Not Selected
	Special Event Promoters Field Devices	-- Not Selected
	Travelers	-- Not Selected
	TripCheck System	
	User Devices	
	Vehicles	

Interactive Traveler Information (ATIS02) -- Existing/Planned

This market package provides tailored information in response to a traveler request. Both real-time interactive request/response systems and information systems that "push" a tailored stream of information to the traveler based on a submitted profile are supported. The traveler can obtain current information regarding traffic conditions, roadway maintenance and construction, transit services, ride share/ride match, parking management, detours and pricing information. Although the Internet is the predominate network used for traveler information dissemination, a range of two-way wide-area wireless and fixed-point to fixed-point communications systems may be used to support the required data communications between the traveler and Information Service Provider. 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 kiosk, personal digital assistant, personal computer, and a variety of in-vehicle devices. This market package also allows value-added resellers to collect transportation information that can be aggregated and be available to their personal devices or remote traveler systems to better inform their customers of transportation conditions. Successful deployment of this market package relies on availability of real-time transportation data from roadway instrumentation, transit, probe vehicles or other means. A traveler may also input personal preferences and identification information via a “traveler card” that can convey information to the system about the traveler as well as receive updates from the system so the card can be updated over time.

Market Packages for Region Central Willamette Valley Regional ITS Architecture

Market Package	Element(s)	
	ATS Call-a-Ride Vehicles	-- Not Selected
	ATS Field Devices	-- Not Selected
	ATS Fixed Route Buses	-- Not Selected
	ATS Transit Operations and Dispatch Center	-- Not Selected
	Benton County Public Transportation Vehicles	-- Not Selected
	Benton County Traffic Operations Center	-- Not Selected
	Benton County Transit Operations and Dispatch Center	-- Not Selected
	CAD Message Broker	-- Not Selected
	City and Rural Fire and Life Safety Vehicles	-- Not Selected
	City of Albany Traffic Operations Center	-- Not Selected
	City of Corvallis Traffic Operations Center	-- Not Selected
	City of Lebanon Dial-a-Bus Vehicles	-- Not Selected
	City of Lebanon Traffic Operations Center	-- Not Selected
	City of Lebanon Transit Operations and Dispatch Center	-- Not Selected
	City Police Vehicles	-- Not Selected
	Commercial Ambulances	-- Not Selected
	Commercial Information Service Providers	-- Not Selected
	Commercial Transit Vehicles	-- Not Selected
	Corvallis Government Television	-- Not Selected
	County Emergency Operations Centers	-- Not Selected
	County Sheriff Vehicles	-- Not Selected
	CTS Field Devices	-- Not Selected
	CTS Fixed Route Buses	-- Not Selected
	CTS Transit Operations and Dispatch Center	-- Not Selected
	Google Transit	
	Linn Shuttle Field Devices	-- Not Selected
	Linn Shuttle Fixed Route Buses	-- Not Selected
	Linn Shuttle Transit Operations and Dispatch Center	-- Not Selected
	Linn-Benton Loop Fixed Route Buses	-- Not Selected
	Maintenance and Construction Management	-- Not Selected
	Mayday Service Centers	-- Not Selected
	Media	
	ODOT Emergency Operations Centers	-- Not Selected
	ODOT Incident Response Vehicles	-- Not Selected
	ODOT Region 2 Transportation Operations Center	-- Not Selected
	Oregon State Police Dispatch Center	-- Not Selected
	Oregon State Police Vehicles	-- Not Selected
	OSU Parking Management	-- Not Selected
	OSU Shuttle Field Devices	-- Not Selected
	OSU Shuttle Fixed Route Buses	-- Not Selected
	OSU Shuttle Transit Operations and Dispatch Center	-- Not Selected
	Other Counties and Cities Traffic Operations Center	-- Not Selected
	Philomath Connection Fixed Route Buses	-- Not Selected
	Public Agency Websites and Phone Systems	
	Public Safety Dispatch Centers	-- Not Selected
	Ridesharing System	
	Special Event Promoters	-- Not Selected
	Special Event Promoters Field Devices	-- Not Selected
	Travelers	-- Not Selected
	TripCheck System	
	User Devices	
	Vehicles	

ISP Based Trip Planning and Route Guidance (ATIS05) -- Existing/Planned

This market package offers the user trip planning and en-route guidance services. It generates a trip plan, including a multimodal route and associated service information (e.g., parking information), based on traveler preferences and constraints. Routes may be based on static information or reflect real time network conditions. Unlike ATIS3 and ATIS4, where the user equipment determines the route, the route determination functions are performed in the Information Service Provider Subsystem in this market package. The trip plan may be confirmed by the traveler and advanced payment and reservations for transit and alternate mode (e.g., airline, rail, and ferry) trip segments, and ancillary services (e.g., parking reservations) are accepted and processed. The confirmed trip plan may include specific routing information that can be supplied to the traveler as general directions or as turn-by-turn route guidance depending on the level of user equipment.

	ATS Call-a-Ride Vehicles	-- Not Selected
	ATS Field Devices	-- Not Selected
	ATS Fixed Route Buses	-- Not Selected
	ATS Transit Operations and Dispatch Center	-- Not Selected
	Benton County Public Transportation Vehicles	-- Not Selected
	Benton County Traffic Operations Center	-- Not Selected
	Benton County Transit Operations and Dispatch Center	-- Not Selected
	City and Rural Fire and Life Safety Vehicles	-- Not Selected
	City of Albany Traffic Operations Center	-- Not Selected
	City of Corvallis Traffic Operations Center	-- Not Selected
	City of Lebanon Dial-a-Bus Vehicles	-- Not Selected
	City of Lebanon Traffic Operations Center	-- Not Selected
	City of Lebanon Transit Operations and Dispatch Center	-- Not Selected
	City Police Vehicles	-- Not Selected
	Commercial Ambulances	-- Not Selected
	Commercial Information Service Providers	
	Commercial Transit Vehicles	-- Not Selected
	Corvallis Government Television	-- Not Selected
	County Sheriff Vehicles	-- Not Selected
	CTS Field Devices	-- Not Selected

Market Packages for Region Central Willamette Valley Regional ITS Architecture

Market Package	Element(s)	
	CTS Fixed Route Buses	-- Not Selected
	CTS Transit Operations and Dispatch Center	-- Not Selected
	Google Transit	
	Linn Shuttle Field Devices	-- Not Selected
	Linn Shuttle Fixed Route Buses	-- Not Selected
	Linn Shuttle Transit Operations and Dispatch Center	-- Not Selected
	Linn-Benton Loop Fixed Route Buses	-- Not Selected
	Maintenance and Construction Management	-- Not Selected
	ODOT Incident Response Vehicles	-- Not Selected
	ODOT Region 2 Transportation Operations Center	-- Not Selected
	Oregon State Police Vehicles	-- Not Selected
	OSU Parking Management	-- Not Selected
	OSU Shuttle Field Devices	-- Not Selected
	OSU Shuttle Fixed Route Buses	-- Not Selected
	OSU Shuttle Transit Operations and Dispatch Center	-- Not Selected
	Other Counties and Cities Traffic Operations Center	-- Not Selected
	Philomath Connection Fixed Route Buses	-- Not Selected
	Public Agency Websites and Phone Systems	
	Ridesharing System	-- Not Selected
	Special Event Promoters Field Devices	-- Not Selected
	Travelers	-- Not Selected
	TripCheck System	
	User Devices	
	Vehicles	-- Not Selected

Transportation Operations Data Sharing (ATIS06) -- Existing/Planned

This market 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.

	ATS Transit Operations and Dispatch Center	
	Benton County Traffic Operations Center	
	Benton County Transit Operations and Dispatch Center	
	CAD Message Broker	
	City of Albany Traffic Operations Center	
	City of Corvallis Traffic Operations Center	
	City of Lebanon Traffic Operations Center	
	City of Lebanon Transit Operations and Dispatch Center	
	Commercial Information Service Providers	-- Not Selected
	Corvallis Government Television	-- Not Selected
	County Emergency Operations Centers	-- Not Selected
	CTS Transit Operations and Dispatch Center	
	Google Transit	
	Linn Shuttle Transit Operations and Dispatch Center	
	Maintenance and Construction Management	
	Mayday Service Centers	-- Not Selected
	Media	-- Not Selected
	ODOT Emergency Operations Centers	-- Not Selected
	ODOT Region 2 Transportation Operations Center	
	Oregon State Police Dispatch Center	
	OSU Parking Management	-- Not Selected
	OSU Shuttle Transit Operations and Dispatch Center	
	Other Counties and Cities Traffic Operations Center	
	Public Agency Websites and Phone Systems	
	Public Safety Dispatch Centers	
	Ridesharing System	-- Not Selected
	Special Event Promoters	-- Not Selected
	TripCheck System	

Dynamic Ridesharing (ATIS08) -- Planned

This market package provides dynamic ridesharing/ride matching services to travelers. This service could allow near real time ridesharing reservations to be made through the same basic user equipment used for Interactive Traveler Information. This ridesharing/ride matching capability also includes arranging connections to transit or other multimodal services.

	ATS Call-a-Ride Vehicles	-- Not Selected
	ATS Field Devices	-- Not Selected
	ATS Fixed Route Buses	-- Not Selected
	ATS Transit Operations and Dispatch Center	-- Not Selected
	Benton County Public Transportation Vehicles	-- Not Selected
	Benton County Transit Operations and Dispatch Center	-- Not Selected
	City and Rural Fire and Life Safety Vehicles	-- Not Selected
	City of Lebanon Dial-a-Bus Vehicles	-- Not Selected
	City of Lebanon Transit Operations and Dispatch Center	-- Not Selected
	City Police Vehicles	-- Not Selected
	Commercial Ambulances	-- Not Selected
	Commercial Information Service Providers	-- Not Selected
	Commercial Transit Vehicles	-- Not Selected
	Corvallis Government Television	-- Not Selected
	County Sheriff Vehicles	-- Not Selected

Market Packages for Region Central Willamette Valley Regional ITS Architecture

Market Package	Element(s)	
	CTS Field Devices	-- Not Selected
	CTS Fixed Route Buses	-- Not Selected
	CTS Transit Operations and Dispatch Center	-- Not Selected
	Google Transit	-- Not Selected
	Linn Shuttle Field Devices	-- Not Selected
	Linn Shuttle Fixed Route Buses	-- Not Selected
	Linn Shuttle Transit Operations and Dispatch Center	-- Not Selected
	Linn-Benton Loop Fixed Route Buses	-- Not Selected
	ODOT Incident Response Vehicles	-- Not Selected
	Oregon State Police Vehicles	-- Not Selected
	OSU Shuttle Field Devices	-- Not Selected
	OSU Shuttle Fixed Route Buses	-- Not Selected
	OSU Shuttle Transit Operations and Dispatch Center	-- Not Selected
	Philomath Connection Fixed Route Buses	-- Not Selected
	Public Agency Websites and Phone Systems	-- Not Selected
	Ridesharing System	
	Special Event Promoters Field Devices	-- Not Selected
	Travelers	
	TripCheck System	-- Not Selected
	User Devices	
	Vehicles	

Network Surveillance (ATMS01) -- Existing/Planned

This market 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 market 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.

	Benton County Traffic Operations Center	
	Benton County Traffic Signals and Field Devices	
	City of Albany Traffic Operations Center	
	City of Albany Traffic Signals and Field Devices	
	City of Corvallis Traffic Operations Center	
	City of Corvallis Traffic Signals and Field Devices	
	City of Lebanon Traffic Operations Center	
	City of Lebanon Traffic Signals and Field Devices	
	Commercial Information Service Providers	-- Not Selected
	Corvallis Government Television	-- Not Selected
	Google Transit	-- Not Selected
	ODOT Region 2 Transportation Operations Center	
	ODOT Traffic Signals and Field Devices	
	Other Counties and Cities Traffic Operations Center	
	Public Agency Websites and Phone Systems	-- Not Selected
	Ridesharing System	-- Not Selected
	TripCheck System	

Traffic Probe Surveillance (ATMS02) -- Planned

This market package provides an alternative approach for surveillance of the roadway network. Two general implementation paths are supported by this market package: 1) wide-area wireless communications between the vehicle and center is used to communicate vehicle operational information and status directly to the center, and 2) dedicated short range communications between passing vehicles and the roadside is used to provide equivalent information to the center. The first approach leverages wide area communications equipment that may already be in the vehicle to support personal safety and advanced traveler information services. The second approach utilizes vehicle equipment that supports toll collection, in-vehicle signing, and other short range communications applications identified within the architecture. The market package enables transportation operators and traveler information providers to monitor road conditions, identify incidents, analyze and reduce the collected data, and make it available to users and private information providers. It requires one of the communications options identified above, on-board equipment, data reduction software, and fixed-point to fixed-point links between centers to share the collected information. Both “Opt out” and “Opt in” strategies are available to ensure the user has the ability to turn off the probe functions to ensure individual privacy. Due to the large volume of data collected by probes, data reduction techniques are required, such as the ability to identify and filter out-of-bounds or extreme data reports.
Based on the outcome of ODOT's test project in the City of Tigard, personal bluetooth devices (e.g. smart phones, navigation systems) may be used as probes to measure traffic flow.

	ATS Call-a-Ride Vehicles	-- Not Selected
	ATS Fixed Route Buses	-- Not Selected
	ATS Transit Operations and Dispatch Center	-- Not Selected
	Benton County Public Transportation Vehicles	-- Not Selected
	Benton County Traffic Operations Center	
	Benton County Traffic Signals and Field Devices	
	Benton County Transit Operations and Dispatch Center	-- Not Selected
	City and Rural Fire and Life Safety Vehicles	-- Not Selected
	City of Albany Traffic Operations Center	
	City of Albany Traffic Signals and Field Devices	
	City of Corvallis Traffic Operations Center	
	City of Corvallis Traffic Signals and Field Devices	
	City of Lebanon Dial-a-Bus Vehicles	-- Not Selected
	City of Lebanon Traffic Operations Center	
	City of Lebanon Traffic Signals and Field Devices	
	City of Lebanon Transit Operations and Dispatch Center	-- Not Selected
	City Police Vehicles	-- Not Selected
	Commercial Ambulances	-- Not Selected
	Commercial Information Service Providers	-- Not Selected
	Commercial Transit Vehicles	-- Not Selected
	Corvallis Government Television	-- Not Selected

Market Packages for Region Central Willamette Valley Regional ITS Architecture

Market Package	Element(s)	
	County Sheriff Vehicles	-- Not Selected
	CTS Fixed Route Buses	-- Not Selected
	CTS Transit Operations and Dispatch Center	-- Not Selected
	Google Transit	-- Not Selected
	Linn Shuttle Fixed Route Buses	-- Not Selected
	Linn Shuttle Transit Operations and Dispatch Center	-- Not Selected
	Linn-Benton Loop Fixed Route Buses	-- Not Selected
	ODOT Incident Response Vehicles	-- Not Selected
	ODOT Region 2 Transportation Operations Center	
	ODOT Traffic Signals and Field Devices	
	Oregon State Police Vehicles	-- Not Selected
	OSU Shuttle Fixed Route Buses	-- Not Selected
	OSU Shuttle Transit Operations and Dispatch Center	-- Not Selected
	Other Counties and Cities Traffic Operations Center	
	Philomath Connection Fixed Route Buses	-- Not Selected
	Public Agency Websites and Phone Systems	-- Not Selected
	Ridesharing System	-- Not Selected
	TripCheck System	-- Not Selected
	User Devices	
	Vehicles	

Surface Street Control (ATMS03) -- Existing

This market package provides the central control and monitoring equipment, communication links, and the signal control equipment that support local surface street control and/or arterial traffic management. A range of traffic signal control systems are represented by this market package ranging from 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 market package is generally an intra-jurisdictional package that does not rely on real-time communications between separate control systems to achieve area-wide traffic signal coordination. Systems that achieve coordination across jurisdictions by using a common time base or other strategies that do not require real time coordination would be represented by this package. This market package is consistent with typical urban traffic signal control systems.

	Benton County Traffic Operations Center	
	Benton County Traffic Signals and Field Devices	
	City of Albany Traffic Operations Center	
	City of Albany Traffic Signals and Field Devices	
	City of Corvallis Traffic Operations Center	
	City of Corvallis Traffic Signals and Field Devices	
	City of Lebanon Traffic Operations Center	
	City of Lebanon Traffic Signals and Field Devices	
	ODOT Region 2 Transportation Operations Center	
	ODOT Traffic Signals and Field Devices	
	Other Counties and Cities Traffic Operations Center	-- Not Selected
	TripCheck System	-- Not Selected

Freeway Control (ATMS04) -- Existing

This market package provides central monitoring and control, communications, and field equipment that support freeway management. It supports a range of freeway management control strategies including ramp metering, interchange metering, mainline lane controls, mainline metering, and other strategies including variable speed controls. This package incorporates the instrumentation included in the Network Surveillance Market Package to support freeway monitoring and adaptive strategies as an option.

This market package also includes the capability to utilize surveillance information for detection of incidents. Typically, the processing would be performed at a traffic management center; however, developments might allow for point detection with roadway equipment. For example, a CCTV might include the capability to detect an incident based upon image changes. Additionally, this market package allows general advisory and traffic control information to be provided to the driver while en route.

	Benton County Traffic Operations Center	-- Not Selected
	Benton County Traffic Signals and Field Devices	-- Not Selected
	City of Albany Traffic Operations Center	-- Not Selected
	City of Albany Traffic Signals and Field Devices	-- Not Selected
	City of Corvallis Traffic Operations Center	-- Not Selected
	City of Corvallis Traffic Signals and Field Devices	-- Not Selected
	City of Lebanon Traffic Operations Center	-- Not Selected
	City of Lebanon Traffic Signals and Field Devices	-- Not Selected
	ODOT Region 2 Transportation Operations Center	
	ODOT Traffic Signals and Field Devices	
	Other Counties and Cities Traffic Operations Center	-- Not Selected
	TripCheck System	-- Not Selected

Traffic Information Dissemination (ATMS06) -- Existing/Planned

This market package provides driver information using roadway equipment such as dynamic message signs or highway advisory radio. A wide range of information can be disseminated including traffic and road conditions, closure and detour information, incident information, and emergency alerts and driver advisories. This package provides information to drivers at specific equipped locations on the road network. Careful placement of the roadway equipment provides the information at points in the network where the drivers have recourse and can tailor their routes to account for the new information. This package also covers the equipment and interfaces that provide traffic information from a traffic management center to the media (for instance via a direct tie-in between a traffic management center and radio or television station computer systems), Transit Management, Emergency Management, and Information Service Providers. A link to the Maintenance and Construction Management subsystem allows real time information on road/bridge closures due to maintenance and construction activities to be disseminated.
ODOT owns and operates roadway dynamic message signs and a highway advisory radio system today. Other agencies may deploy dynamic message signs in the future.

	ATS Transit Operations and Dispatch Center	-- Not Selected
	Benton County Traffic Operations Center	
	Benton County Traffic Signals and Field Devices	
	Benton County Transit Operations and Dispatch Center	-- Not Selected
	CAD Message Broker	-- Not Selected
	City of Albany Traffic Operations Center	

Market Packages for Region Central Willamette Valley Regional ITS Architecture

Market Package	Element(s)	
	City of Albany Traffic Signals and Field Devices	
	City of Corvallis Traffic Operations Center	
	City of Corvallis Traffic Signals and Field Devices	
	City of Lebanon Traffic Operations Center	
	City of Lebanon Traffic Signals and Field Devices	
	City of Lebanon Transit Operations and Dispatch Center	-- Not Selected
	Commercial Information Service Providers	-- Not Selected
	Corvallis Government Television	-- Not Selected
	County Emergency Operations Centers	-- Not Selected
	CTS Transit Operations and Dispatch Center	-- Not Selected
	Google Transit	-- Not Selected
	Linn Shuttle Transit Operations and Dispatch Center	-- Not Selected
	Maintenance and Construction Management	-- Not Selected
	Mayday Service Centers	-- Not Selected
	Media	
	ODOT Emergency Operations Centers	-- Not Selected
	ODOT Region 2 Transportation Operations Center	
	ODOT Traffic Signals and Field Devices	
	Oregon State Police Dispatch Center	-- Not Selected
	OSU Shuttle Transit Operations and Dispatch Center	-- Not Selected
	Other Counties and Cities Traffic Operations Center	-- Not Selected
	Public Agency Websites and Phone Systems	-- Not Selected
	Public Safety Dispatch Centers	-- Not Selected
	Ridesharing System	-- Not Selected
	TripCheck System	
Regional Traffic Management (ATMS07) -- Planned		
This market package provides for the sharing of traffic information and control among traffic management centers to support regiona traffic management strategies. Regional traffic management strategies that are supported include coordinated signal control in a metropolitan area and coordination between freeway operations and arterial signal control within a corridor. This market package advances the Surface Street Control and Freeway Control Market 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 Surface Street Control and Freeway Control Market Packages and adds hardware, software, and fixed-point to 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 control between traffic management centers.		
	Benton County Traffic Operations Center	
	Benton County Traffic Signals and Field Devices	
	City of Albany Traffic Operations Center	
	City of Albany Traffic Signals and Field Devices	
	City of Corvallis Traffic Operations Center	
	City of Corvallis Traffic Signals and Field Devices	
	City of Lebanon Traffic Operations Center	
	City of Lebanon Traffic Signals and Field Devices	
	ODOT Region 2 Transportation Operations Center	
	ODOT Traffic Signals and Field Devices	
	Other Counties and Cities Traffic Operations Center	
	TripCheck System	-- Not Selected
Traffic Incident Management System (ATMS08) -- Existing/Planned		
This market package manages both unexpected incidents and planned events so that the impact to the transportation network and traveler safety is minimized. The market package includes incident detection capabilities through roadside surveillance devices (e.g. CCTV) and through regional coordination with other traffic management, maintenance and construction management and emergency management centers as well as rail operations and event promoters. Information from these diverse sources is collected and correlated by this market package to detect and verify incidents and implement an appropriate response. This market 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 market package and dissemination of incident information to travelers through the Broadcast Traveler Information or Interactive Traveler Information market 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.		
	ATS Transit Operations and Dispatch Center	
	Benton County Traffic Operations Center	
	Benton County Traffic Signals and Field Devices	
	Benton County Transit Operations and Dispatch Center	
	CAD Message Broker	
	City and Rural Fire and Life Safety Vehicles	
	City of Albany Traffic Operations Center	
	City of Albany Traffic Signals and Field Devices	
	City of Corvallis Traffic Operations Center	
	City of Corvallis Traffic Signals and Field Devices	
	City of Lebanon Traffic Operations Center	
	City of Lebanon Traffic Signals and Field Devices	
	City of Lebanon Transit Operations and Dispatch Center	
	City Police Vehicles	
	Commercial Ambulances	
	Commercial HazMat Vehicles	
	Commercial Information Service Providers	-- Not Selected
	Commercial Salvage and Towing Vehicles	
	Corvallis Government Television	-- Not Selected

Market Package	Element(s)	
	County Emergency Operations Centers	-- Not Selected
	County Sheriff Vehicles	
	CTS Transit Operations and Dispatch Center	
	Google Transit	-- Not Selected
	Heavy Rail Operations Centers	-- Not Selected
	Linn Shuttle Transit Operations and Dispatch Center	
	Maintenance and Construction Management	
	Maintenance and Construction Vehicles	
	Mayday Service Centers	
	Media	-- Not Selected
	ODOT Emergency Operations Centers	-- Not Selected
	ODOT Incident Response Vehicles	
	ODOT Region 2 Transportation Operations Center	
	ODOT Traffic Signals and Field Devices	
	Oregon State Police Dispatch Center	
	Oregon State Police Vehicles	
	OSU Shuttle Transit Operations and Dispatch Center	
	Other Counties and Cities Traffic Operations Center	
	Other Emergency Management Operations	-- Not Selected
	Public Agency Websites and Phone Systems	-- Not Selected
	Public Safety Dispatch Centers	
	Ridesharing System	-- Not Selected
	Special Event Promoters	
	TripCheck System	-- Not Selected

Traffic Decision Support and Demand Management (ATMS09) -- Planned

This market 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 market 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 market 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, other traffic management centers. Forecasted traffic loads are derived from historical data and route plans supplied by the Information Service Provider Subsystem. This market package also collects air quality, parking availability, transit usage, and vehicle occupancy data to support TDM, where applicable.

	ATS Transit Operations and Dispatch Center	
	Benton County Traffic Operations Center	
	Benton County Traffic Signals and Field Devices	
	Benton County Transit Operations and Dispatch Center	
	City of Albany Traffic Operations Center	
	City of Albany Traffic Signals and Field Devices	
	City of Corvallis Traffic Operations Center	
	City of Corvallis Traffic Signals and Field Devices	
	City of Lebanon Traffic Operations Center	
	City of Lebanon Traffic Signals and Field Devices	
	City of Lebanon Transit Operations and Dispatch Center	
	Commercial Information Service Providers	-- Not Selected
	Corvallis Government Television	-- Not Selected
	CTS Transit Operations and Dispatch Center	
	Data Mart	-- Not Selected
	Data Warehouse	-- Not Selected
	Google Transit	-- Not Selected
	Linn Shuttle Transit Operations and Dispatch Center	
	ODOT Region 2 Transportation Operations Center	
	ODOT Traffic Signals and Field Devices	
	OSU Parking Management	
	OSU Shuttle Transit Operations and Dispatch Center	
	Other Counties and Cities Traffic Operations Center	
	Public Agency Websites and Phone Systems	-- Not Selected
	Ridesharing System	-- Not Selected
	Special Event Promoters	
	TripCheck System	-- Not Selected

Standard Railroad Grade Crossing (ATMS13) -- Existing

This market package manages highway traffic at highway-rail intersections (HRIs) where operational requirements do not dictate more advanced features (e.g., where rail operational speeds are less than 80 miles per hour). Both passive (e.g., the crossbuck sign) and active warning systems (e.g., flashing lights and gates) are supported. (Note that passive systems exercise only the single interface between the roadway subsystem and the driver in the architecture definition.) These traditional HRI warning systems may also be augmented with other standard traffic management devices. The warning systems are activated on notification by interfaced wayside equipment of an approaching train. The equipment at the HRI may also be interconnected with adjacent signalized intersections so that local control can be adapted to highway-rail intersection activities. Health monitoring of the HRI equipment and interfaces is performed; detected abnormalities are reported to both highway and railroad officials through wayside interfaces and interfaces to the traffic management subsystem.

	Benton County Traffic Operations Center	-- Not Selected
	Benton County Traffic Signals and Field Devices	-- Not Selected
	City of Albany Traffic Operations Center	
	City of Albany Traffic Signals and Field Devices	
	City of Corvallis Traffic Operations Center	
	City of Corvallis Traffic Signals and Field Devices	
	City of Lebanon Traffic Operations Center	
	City of Lebanon Traffic Signals and Field Devices	

Market Packages for Region Central Willamette Valley Regional ITS Architecture

Market Package	Element(s)	
	Heavy Rail Operations Centers	-- Not Selected
	Heavy Rail Wayside Equipment	
	ODOT Region 2 Transportation Operations Center	
	ODOT Traffic Signals and Field Devices	
	Other Counties and Cities Traffic Operations Center	-- Not Selected
	TripCheck System	-- Not Selected

Railroad Operations Coordination (ATMS15) -- Planned

This market package provides an additional level of strategic coordination between freight rail operations and traffic management centers. Rail operations provides train schedules, maintenance schedules, and any other forecast events that will result in highway-rail intersection (HRI) closures. This information is used to develop forecast HRI closure times and durations that may be used in advanced traffic control strategies or to enhance the quality of traveler information.
Information that affects at-grade rail intersections can be fed into the TripCheck system by heavy rail operators (e.g. train schedules, crossing maintenance) and transportation agencies (e.g. crossing maintenance).

	Benton County Traffic Operations Center	
	Benton County Traffic Signals and Field Devices	
	City of Albany Traffic Operations Center	
	City of Albany Traffic Signals and Field Devices	
	City of Corvallis Traffic Operations Center	
	City of Corvallis Traffic Signals and Field Devices	
	City of Lebanon Traffic Operations Center	
	City of Lebanon Traffic Signals and Field Devices	
	Commercial Information Service Providers	-- Not Selected
	Corvallis Government Television	-- Not Selected
	Google Transit	-- Not Selected
	Heavy Rail Operations Centers	
	ODOT Region 2 Transportation Operations Center	
	ODOT Traffic Signals and Field Devices	
	Other Counties and Cities Traffic Operations Center	
	Public Agency Websites and Phone Systems	-- Not Selected
	Ridesharing System	-- Not Selected
	TripCheck System	-- Not Selected

Parking Facility Management (ATMS16) -- Planned

This market package provides enhanced monitoring and management of parking facilities. It assists in the management of parking operations, coordinates with transportation authorities, and supports electronic collection of parking fees. This market package collects current parking status, shares this data with Information Service Providers and Traffic Management, and collects parking fees using the same in-vehicle equipment utilized for electronic toll collection or contact or proximity traveler cards used for electronic payment. Two other market packages, APTS04: Transit Fare Collection Management and ATMS10: Electronic Toll Collection also provide electronic payment services. These three market packages in combination provide an integrated electronic payment system for transportation services.

	ATS Call-a-Ride Vehicles	-- Not Selected
	ATS Fixed Route Buses	-- Not Selected
	Benton County Public Transportation Vehicles	-- Not Selected
	Benton County Traffic Operations Center	-- Not Selected
	City and Rural Fire and Life Safety Vehicles	-- Not Selected
	City of Albany Traffic Operations Center	-- Not Selected
	City of Corvallis Traffic Operations Center	-- Not Selected
	City of Lebanon Dial-a-Bus Vehicles	-- Not Selected
	City of Lebanon Traffic Operations Center	-- Not Selected
	City Police Vehicles	-- Not Selected
	Commercial Ambulances	-- Not Selected
	Commercial Transit Vehicles	-- Not Selected
	County Sheriff Vehicles	-- Not Selected
	CTS Fixed Route Buses	-- Not Selected
	Linn Shuttle Fixed Route Buses	-- Not Selected
	Linn-Benton Loop Fixed Route Buses	-- Not Selected
	ODOT Incident Response Vehicles	-- Not Selected
	ODOT Region 2 Transportation Operations Center	-- Not Selected
	Oregon State Police Vehicles	-- Not Selected
	OSU Parking Management	
	OSU Shuttle Fixed Route Buses	-- Not Selected
	Other Counties and Cities Traffic Operations Center	-- Not Selected
	Philomath Connection Fixed Route Buses	-- Not Selected
	TripCheck System	-- Not Selected
	Vehicles	

Emergency Call-Taking and Dispatch (EM01) -- Existing

This market package provides basic public safety call-taking and dispatch services. It includes emergency vehicle equipment, equipment used to receive and route emergency calls, and wireless communications that enable safe and rapid deployment of appropriate resources to an emergency. Coordination between Emergency Management Subsystems supports emergency notification between agencies. Wide area wireless communications between the Emergency Management Subsystem and an Emergency Vehicle supports dispatch and provision of information to responding personnel.

	ATS Transit Operations and Dispatch Center	-- Not Selected
	Benton County Traffic Operations Center	-- Not Selected
	Benton County Transit Operations and Dispatch Center	-- Not Selected
	CAD Message Broker	
	City and Rural Fire and Life Safety Vehicles	
	City of Albany Traffic Operations Center	-- Not Selected
	City of Corvallis Traffic Operations Center	-- Not Selected
	City of Lebanon Traffic Operations Center	-- Not Selected
	City of Lebanon Transit Operations and Dispatch Center	-- Not Selected
	City Police Vehicles	
	Commercial Ambulances	

Market Package	Element(s)	
	Commercial HazMat Vehicles	
	Commercial Salvage and Towing Vehicles	
	County Emergency Operations Centers	-- Not Selected
	County Sheriff Vehicles	
	CTS Transit Operations and Dispatch Center	-- Not Selected
	Linn Shuttle Transit Operations and Dispatch Center	-- Not Selected
	Maintenance and Construction Vehicles	
	Mayday Service Centers	
	ODOT Emergency Operations Centers	-- Not Selected
	ODOT Incident Response Vehicles	
	ODOT Region 2 Transportation Operations Center	
	Oregon State Police Dispatch Center	
	Oregon State Police Vehicles	
	OSU Shuttle Transit Operations and Dispatch Center	-- Not Selected
	Other Counties and Cities Traffic Operations Center	-- Not Selected
	Other Emergency Management Operations	-- Not Selected
	Public Safety Dispatch Centers	
	TripCheck System	-- Not Selected

Emergency Routing (EM02) -- Existing/Planned

This market 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.

Most traffic signals currently include signal preemption for fire vehicles, which is included in this market package. Dynamic routing will be possible as transportation infrastructure provides the information to support it.

	ATS Call-a-Ride Vehicles	-- Not Selected
	ATS Fixed Route Buses	-- Not Selected
	Benton County Public Transportation Vehicles	-- Not Selected
	Benton County Traffic Operations Center	-- Not Selected
	Benton County Traffic Signals and Field Devices	
	CAD Message Broker	
	City and Rural Fire and Life Safety Vehicles	
	City of Albany Traffic Operations Center	-- Not Selected
	City of Albany Traffic Signals and Field Devices	
	City of Corvallis Traffic Operations Center	-- Not Selected
	City of Corvallis Traffic Signals and Field Devices	
	City of Lebanon Dial-a-Bus Vehicles	-- Not Selected
	City of Lebanon Traffic Operations Center	-- Not Selected
	City of Lebanon Traffic Signals and Field Devices	
	City Police Vehicles	
	Commercial Ambulances	
	Commercial HazMat Vehicles	
	Commercial Salvage and Towing Vehicles	
	Commercial Transit Vehicles	-- Not Selected
	County Emergency Operations Centers	-- Not Selected
	County Sheriff Vehicles	
	CTS Fixed Route Buses	-- Not Selected
	Linn Shuttle Fixed Route Buses	-- Not Selected
	Linn-Benton Loop Fixed Route Buses	-- Not Selected
	Maintenance and Construction Management	-- Not Selected
	Maintenance and Construction Vehicles	-- Not Selected
	Mayday Service Centers	-- Not Selected
	ODOT Emergency Operations Centers	-- Not Selected
	ODOT Incident Response Vehicles	
	ODOT Region 2 Transportation Operations Center	-- Not Selected
	ODOT Traffic Signals and Field Devices	
	Oregon State Police Dispatch Center	-- Not Selected
	Oregon State Police Vehicles	
	OSU Shuttle Fixed Route Buses	-- Not Selected
	Other Counties and Cities Traffic Operations Center	-- Not Selected
	Philomath Connection Fixed Route Buses	-- Not Selected
	Public Safety Dispatch Centers	
	TripCheck System	-- Not Selected
	User Devices	-- Not Selected
	Vehicles	-- Not Selected

Mayday and Alarms Support (EM03) -- Existing

This market package allows the user (driver or non-driver) to initiate a request for emergency assistance and enables the Emergency Management Subsystem to locate the user, gather information about the incident, and determine the appropriate response. The request for assistance may be manually initiated or automated and linked to vehicle sensors. This market package also includes general surveillance capabilities that enable the Emergency Management Subsystem to remotely monitor public areas (e.g., rest stops parking lots) to improve security in these areas. The Emergency Management Subsystem may be operated by the public sector or by a private sector telematics service provider.

Private companies already provide mayday services to people who purchase vehicles with mayday systems and subscribe to the system. Call-takers at mayday service centers facilitate emergency response by calling 911 and passing along information (communications with driver, location of vehicle determined by GPS, etc.). The ODOT Region 2 TOC also coordinates with mayday service centers.

	ATS Call-a-Ride Vehicles	-- Not Selected
	ATS Field Devices	-- Not Selected
	ATS Fixed Route Buses	-- Not Selected

Market Package	Element(s)	
	Benton County Public Transportation Vehicles	-- Not Selected
	CAD Message Broker	
	City and Rural Fire and Life Safety Vehicles	-- Not Selected
	City of Lebanon Dial-a-Bus Vehicles	-- Not Selected
	City Police Vehicles	-- Not Selected
	Commercial Ambulances	-- Not Selected
	Commercial Transit Vehicles	-- Not Selected
	County Emergency Operations Centers	-- Not Selected
	County Sheriff Vehicles	-- Not Selected
	CTS Field Devices	-- Not Selected
	CTS Fixed Route Buses	-- Not Selected
	Linn Shuttle Field Devices	-- Not Selected
	Linn Shuttle Fixed Route Buses	-- Not Selected
	Linn-Benton Loop Fixed Route Buses	-- Not Selected
	Mayday Service Centers	
	ODOT Emergency Operations Centers	-- Not Selected
	ODOT Incident Response Vehicles	-- Not Selected
	ODOT Region 2 Transportation Operations Center	
	Oregon State Police Dispatch Center	
	Oregon State Police Vehicles	-- Not Selected
	OSU Shuttle Field Devices	-- Not Selected
	OSU Shuttle Fixed Route Buses	-- Not Selected
	Other Emergency Management Operations	-- Not Selected
	Philomath Connection Fixed Route Buses	-- Not Selected
	Public Safety Dispatch Centers	
	Special Event Promoters Field Devices	-- Not Selected
	Travelers	-- Not Selected
	User Devices	-- Not Selected
	Vehicles	

Roadway Service Patrols (EM04) -- Existing

This market package supports roadway service patrol vehicles that monitor roads that aid motorists, offering rapid response to minor incidents (flat tire, accidents, out of gas) to minimize disruption to the traffic stream. If problems are detected, the roadway service patrol vehicles will provide assistance to the motorist (e.g., push a vehicle to the shoulder or median). The market 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.

	Benton County Traffic Operations Center	-- Not Selected
	CAD Message Broker	-- Not Selected
	City and Rural Fire and Life Safety Vehicles	-- Not Selected
	City of Albany Traffic Operations Center	-- Not Selected
	City of Corvallis Traffic Operations Center	-- Not Selected
	City of Lebanon Traffic Operations Center	-- Not Selected
	City Police Vehicles	-- Not Selected
	Commercial Ambulances	-- Not Selected
	Commercial HazMat Vehicles	-- Not Selected
	Commercial Information Service Providers	-- Not Selected
	Commercial Salvage and Towing Vehicles	-- Not Selected
	Corvallis Government Television	-- Not Selected
	County Emergency Operations Centers	-- Not Selected
	County Sheriff Vehicles	-- Not Selected
	Google Transit	-- Not Selected
	Maintenance and Construction Management	-- Not Selected
	Maintenance and Construction Vehicles	-- Not Selected
	Mayday Service Centers	-- Not Selected
	ODOT Emergency Operations Centers	-- Not Selected
	ODOT Incident Response Vehicles	
	ODOT Region 2 Transportation Operations Center	
	Oregon State Police Dispatch Center	-- Not Selected
	Oregon State Police Vehicles	-- Not Selected
	Other Counties and Cities Traffic Operations Center	-- Not Selected
	Public Agency Websites and Phone Systems	-- Not Selected
	Public Safety Dispatch Centers	-- Not Selected
	Ridesharing System	-- Not Selected
	TripCheck System	-- Not Selected
	User Devices	-- Not Selected

Wide-Area Alert (EM06) -- Existing

This market 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 web sites.

	Amtrak Trains	-- Not Selected
	ATS Call-a-Ride Vehicles	-- Not Selected
	ATS Field Devices	-- Not Selected
	ATS Fixed Route Buses	-- Not Selected
	ATS Transit Operations and Dispatch Center	
	Benton County Public Transportation Vehicles	-- Not Selected
	Benton County Traffic Operations Center	

Market Package	Element(s)	
	Benton County Traffic Signals and Field Devices	
	Benton County Transit Operations and Dispatch Center	
	CAD Message Broker	
	City and Rural Fire and Life Safety Vehicles	-- Not Selected
	City of Albany Traffic Operations Center	
	City of Albany Traffic Signals and Field Devices	
	City of Corvallis Traffic Operations Center	
	City of Corvallis Traffic Signals and Field Devices	
	City of Lebanon Dial-a-Bus Vehicles	-- Not Selected
	City of Lebanon Traffic Operations Center	
	City of Lebanon Traffic Signals and Field Devices	
	City of Lebanon Transit Operations and Dispatch Center	
	City Police Vehicles	-- Not Selected
	Commercial Ambulances	-- Not Selected
	Commercial Information Service Providers	
	Commercial Transit Vehicles	-- Not Selected
	Corvallis Government Television	
	County Emergency Operations Centers	
	County Sheriff Vehicles	-- Not Selected
	CTS Field Devices	
	CTS Fixed Route Buses	-- Not Selected
	CTS Transit Operations and Dispatch Center	
	Google Transit	
	Linn Shuttle Field Devices	-- Not Selected
	Linn Shuttle Fixed Route Buses	-- Not Selected
	Linn Shuttle Transit Operations and Dispatch Center	
	Linn-Benton Loop Fixed Route Buses	-- Not Selected
	Maintenance and Construction Management	-- Not Selected
	Mayday Service Centers	-- Not Selected
	ODOT Emergency Operations Centers	
	ODOT Incident Response Vehicles	-- Not Selected
	ODOT Region 2 Transportation Operations Center	
	ODOT Traffic Signals and Field Devices	
	Oregon State Police Dispatch Center	
	Oregon State Police Vehicles	-- Not Selected
	OSU Shuttle Field Devices	-- Not Selected
	OSU Shuttle Fixed Route Buses	-- Not Selected
	OSU Shuttle Transit Operations and Dispatch Center	
	Other Counties and Cities Traffic Operations Center	
	Other Emergency Management Operations	
	Philomath Connection Fixed Route Buses	-- Not Selected
	Public Agency Websites and Phone Systems	
	Public Safety Dispatch Centers	
	Ridesharing System	-- Not Selected
	Special Event Promoters Field Devices	-- Not Selected
	Travelers	-- Not Selected
	TripCheck System	
	User Devices	
	Vehicles	

Maintenance and Construction Vehicle and Equipment Tracking (MC01) -- Planned

This market package will track the location of maintenance and construction vehicles and other equipment to ascertain the progress of their activities. These activities can include ensuring the correct roads are being plowed and work activity is being performed at the correct locations.

	Maintenance and Construction Management	
	Maintenance and Construction Vehicles	
	ODOT Incident Response Vehicles	-- Not Selected
	User Devices	-- Not Selected

Road Weather Data Collection (MC03) -- Planned

This market package collects current road and weather conditions using data collected from environmental sensors deployed on and about the roadway (or guideway in the case of transit related rail systems). In addition to fixed sensor stations at the roadside, sensing of the roadway environment can also occur from sensor systems located on Maintenance and Construction Vehicles. The collected environmental data is used by the Weather Information Processing and Distribution Market Package to process the information and make decisions on operations. The collected environmental data may be aggregated, combined with data attributes and sent to meteorological systems for data qualification and further data consolidation. The market package may also request and receive qualified data sets from meteorological systems.

Agencies plan to add weather stations at a few key locations in the Central Willamette Valley.

	Benton County Traffic Operations Center	-- Not Selected
	Benton County Traffic Signals and Field Devices	-- Not Selected
	City of Albany Traffic Operations Center	
	City of Albany Traffic Signals and Field Devices	
	City of Corvallis Traffic Operations Center	
	City of Corvallis Traffic Signals and Field Devices	
	City of Lebanon Traffic Operations Center	-- Not Selected
	City of Lebanon Traffic Signals and Field Devices	-- Not Selected
	Commercial Information Service Providers	-- Not Selected
	Corvallis Government Television	-- Not Selected
	Google Transit	-- Not Selected
	Maintenance and Construction Management	
	Maintenance and Construction Vehicles	
	ODOT Incident Response Vehicles	-- Not Selected
	ODOT Region 2 Transportation Operations Center	

Market Packages for Region Central Willamette Valley Regional ITS Architecture

Market Package	Element(s)	
	ODOT Traffic Signals and Field Devices	
	Other Counties and Cities Traffic Operations Center	-- Not Selected
	Public Agency Websites and Phone Systems	-- Not Selected
	Ridesharing System	-- Not Selected
	TripCheck System	-- Not Selected

Weather Information Processing and Distribution (MC04) -- Planned

This market package processes and distributes the environmental information collected from the Road Weather Data Collection market package. This market package uses the environmental data to detect environmental hazards such as icy road conditions, high winds, dense fog, etc. so system operators and decision support systems can make decision on corrective actions to take. The continuing updates of road condition information and current temperatures can be used by system operators to more effectively deploy road maintenance resources, issue general traveler advisories, issue location specific warnings to drivers using the Traffic Information Dissemination market package, and aid operators in scheduling work activity.

ATS Transit Operations and Dispatch Center	
Benton County Traffic Operations Center	
Benton County Transit Operations and Dispatch Center	-- Not Selected
CAD Message Broker	-- Not Selected
City of Albany Traffic Operations Center	
City of Corvallis Traffic Operations Center	
City of Lebanon Traffic Operations Center	
City of Lebanon Transit Operations and Dispatch Center	
Commercial Information Service Providers	
Corvallis Government Television	
County Emergency Operations Centers	-- Not Selected
CTS Transit Operations and Dispatch Center	
Google Transit	-- Not Selected
Heavy Rail Operations Centers	-- Not Selected
Linn Shuttle Transit Operations and Dispatch Center	
Maintenance and Construction Management	
Mayday Service Centers	-- Not Selected
Media	
ODOT Emergency Operations Centers	-- Not Selected
ODOT Region 2 Transportation Operations Center	
Oregon State Police Dispatch Center	-- Not Selected
OSU Shuttle Transit Operations and Dispatch Center	
Other Counties and Cities Traffic Operations Center	
Public Agency Websites and Phone Systems	
Public Safety Dispatch Centers	-- Not Selected
Ridesharing System	-- Not Selected
TripCheck System	

Roadway Maintenance and Construction (MC07) -- Existing/Planned

This market package supports numerous services for scheduled and unscheduled maintenance and construction on a roadway system or right-of-way. Maintenance services would include landscape maintenance, hazard removal (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. *Some existing systems currently provide limited automated notification of non-routine maintenance needs. For example, a traffic signal controller may communicate through a central signal system that a detector loop is not working. Most agencies will wait to deploy maintenance scheduling systems until the technology is readily available.*

ATS Call-a-Ride Vehicles	-- Not Selected
ATS Fixed Route Buses	-- Not Selected
Benton County Public Transportation Vehicles	-- Not Selected
Benton County Traffic Operations Center	
Benton County Traffic Signals and Field Devices	
CAD Message Broker	-- Not Selected
City and Rural Fire and Life Safety Vehicles	-- Not Selected
City of Albany Traffic Operations Center	
City of Albany Traffic Signals and Field Devices	
City of Corvallis Traffic Operations Center	
City of Corvallis Traffic Signals and Field Devices	
City of Lebanon Dial-a-Bus Vehicles	-- Not Selected
City of Lebanon Traffic Operations Center	
City of Lebanon Traffic Signals and Field Devices	
City Police Vehicles	-- Not Selected
Commercial Ambulances	-- Not Selected
Commercial Information Service Providers	-- Not Selected
Commercial Transit Vehicles	-- Not Selected
Corvallis Government Television	-- Not Selected
County Emergency Operations Centers	-- Not Selected
County Sheriff Vehicles	-- Not Selected
CTS Fixed Route Buses	-- Not Selected
Google Transit	-- Not Selected
Linn Shuttle Fixed Route Buses	-- Not Selected
Linn-Benton Loop Fixed Route Buses	-- Not Selected
Maintenance and Construction Management	
Maintenance and Construction Vehicles	
Mayday Service Centers	-- Not Selected
ODOT Emergency Operations Centers	-- Not Selected
ODOT Incident Response Vehicles	-- Not Selected
ODOT Region 2 Transportation Operations Center	
ODOT Traffic Signals and Field Devices	
Oregon State Police Dispatch Center	-- Not Selected
Oregon State Police Vehicles	-- Not Selected

Market Packages for Region Central Willamette Valley Regional ITS Architecture

Market Package	Element(s)	
	OSU Shuttle Fixed Route Buses	-- Not Selected
	Other Counties and Cities Traffic Operations Center	-- Not Selected
	Philomath Connection Fixed Route Buses	-- Not Selected
	Public Agency Websites and Phone Systems	-- Not Selected
	Public Safety Dispatch Centers	-- Not Selected
	Ridesharing System	-- Not Selected
	TripCheck System	-- Not Selected
	User Devices	-- Not Selected
	Vehicles	-- Not Selected

Work Zone Management (MC08) -- Existing/Planned

This market 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., ISP, traffic management, other maintenance and construction centers). Work zone speeds and delays are provided to the motorist prior to the work zones. This market 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.
ITS is used in a number of ways today in work zones: posting of delay messages on permanent or portable dynamic message signs, variable speed signs, CCTV camera monitoring, posting of information online at TripCheck or local agency websites, etc. As new construction projects are budgeted, planned and designed, ITS should be built into the project to support the management of the work zone.

	ATS Transit Operations and Dispatch Center	-- Not Selected
	Benton County Traffic Operations Center	
	Benton County Traffic Signals and Field Devices	
	Benton County Transit Operations and Dispatch Center	-- Not Selected
	CAD Message Broker	-- Not Selected
	City of Albany Traffic Operations Center	
	City of Albany Traffic Signals and Field Devices	
	City of Corvallis Traffic Operations Center	
	City of Corvallis Traffic Signals and Field Devices	
	City of Lebanon Traffic Operations Center	
	City of Lebanon Traffic Signals and Field Devices	
	City of Lebanon Transit Operations and Dispatch Center	-- Not Selected
	Commercial Information Service Providers	-- Not Selected
	Corvallis Government Television	-- Not Selected
	County Emergency Operations Centers	-- Not Selected
	CTS Transit Operations and Dispatch Center	-- Not Selected
	Google Transit	-- Not Selected
	Linn Shuttle Transit Operations and Dispatch Center	-- Not Selected
	Maintenance and Construction Management	
	Maintenance and Construction Vehicles	
	Mayday Service Centers	-- Not Selected
	Media	-- Not Selected
	ODOT Emergency Operations Centers	-- Not Selected
	ODOT Incident Response Vehicles	-- Not Selected
	ODOT Region 2 Transportation Operations Center	
	ODOT Traffic Signals and Field Devices	
	Oregon State Police Dispatch Center	-- Not Selected
	OSU Shuttle Transit Operations and Dispatch Center	-- Not Selected
	Other Counties and Cities Traffic Operations Center	-- Not Selected
	Public Agency Websites and Phone Systems	
	Public Safety Dispatch Centers	-- Not Selected
	Ridesharing System	-- Not Selected
	TripCheck System	

Maintenance and Construction Activity Coordination (MC10) -- Existing/Planned

This market package supports the dissemination of maintenance and construction activity to centers that can utilize it as part of their operations, or to the Information Service Providers who can provide the information to travelers.

	ATS Transit Operations and Dispatch Center	
	Benton County Traffic Operations Center	
	Benton County Transit Operations and Dispatch Center	
	CAD Message Broker	-- Not Selected
	City of Albany Traffic Operations Center	
	City of Corvallis Traffic Operations Center	
	City of Lebanon Traffic Operations Center	
	City of Lebanon Transit Operations and Dispatch Center	-- Not Selected
	Commercial Information Service Providers	
	Corvallis Government Television	
	County Emergency Operations Centers	-- Not Selected
	CTS Transit Operations and Dispatch Center	
	Google Transit	
	Heavy Rail Operations Centers	-- Not Selected
	Linn Shuttle Transit Operations and Dispatch Center	
	Maintenance and Construction Management	
	Mayday Service Centers	-- Not Selected
	Media	
	ODOT Emergency Operations Centers	-- Not Selected
	ODOT Region 2 Transportation Operations Center	
	Oregon State Police Dispatch Center	-- Not Selected
	OSU Shuttle Transit Operations and Dispatch Center	
	Other Counties and Cities Traffic Operations Center	
	Public Agency Websites and Phone Systems	
	Public Safety Dispatch Centers	

Market Packages for Region Central Willamette Valley Regional ITS Architecture

Market Package	Element(s)	
	Ridesharing System	-- Not Selected
	TripCheck System	

APPENDIX H

Change Request Form and Change Log

Central Willamette Valley Regional ITS Architecture Change Request Form

To be Filled Out by Change Originator	
Date of Request:	
Title of Change:	
Type of Change:	☐ Stakeholder ☐ Inventory (Subsystems and Terminators) ☐ Services (Market Packages) ☐ Operational Concept ☐ Interfaces (Interconnects/Flows Between Elements) ☐ Standards ☐ Agreements ☐ Project Architecture
Description of Change:	
Reason for Change:	
Originator Information	
Name:	
Agency:	
Telephone:	
E-Mail:	
To be Filled Out by CAMPO	
Change #:	
Change Status:	☐ Approved ☐ Denied
Date of Status Decision:	
Comments:	
Documents Affected:	
Date Architecture Updated:	

Central Willamette Valley Regional ITS Architecture Change Log

Change #	Type of Change	Description of Change	Change Originator	Approval Date	Date Architecture Updated	Comments